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Online Recommender Systems based on Data Stream Management Systems	Cornelius A. Ludmann,		10.1145/2792838.2796544		Crossref
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Robust Recommender Systems with Rating Flip Noise	Shanshan Ye, Jie Lu,	<p><jats:p>Recommender systems have become important tools in the daily life of human beings since they are powerful to address information overload, and discover relevant and useful items for users. The success of recommender systems largely relies on the interaction history between users and items, which is expected to accurately reflect the preferences of users on items. However, the expectation is easily broken in practice, due to the corruptions made in the interaction history, resulting in unreliable and untrusted recommender systems. Previous works either ignore this issue (assume that the interaction history is precise) or are limited to handling additive noise. Motivated by this, in this paper, we study rating flip noise which widely exists in the interaction history of recommender systems and combat it by modelling the noise generation process. Specifically, the rating flip noise allows a rating to be flipped to any other ratings within the given rating set, which reflects various real-world situations of rating corruption, e.g., a user may randomly click a rating from the rating set and then submit it. The noise generation</p>	10.1145/3641285		Crossref
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		<p>process is modelled by the noise transition matrix that denotes the probabilities of a clean rating flip into a noisy rating. A statistically consistent algorithm is afterwards applied with the estimated transition matrix to learn a robust recommender system against rating flip noise. Comprehensive experiments on multiple benchmarks confirm the superiority of our method.</p>			
Investigating Information Security in Systems-of-Systems	Roberto Monteiro Dias, Rodrigo Oliveira Zacarias, Jorge Luis de Lima Varella, Rodrigo Pereira dos Santos,		10.1145/3535511.3535523		Crossref

System-Level Design Optimization for Security-Critical Cyber-Physical-Social Systems	Jing Zeng, Laurence T. Yang, Man Lin, Zili Shao, Dakai Zhu,	<p><jats:p>Cyber-physical-social systems (CPSS), an emerging computing paradigm, have attracted intensive attentions from the research community and industry. We are facing various challenges in designing secure, reliable, and user-satisfied CPSS. In this article, we consider these design issues as a whole and propose a system-level design optimization framework for CPSS design where energy consumption, security-level, and user satisfaction requirements can be fulfilled while satisfying constraints for system reliability. Specifically, we model the constraints (energy efficiency, security, and reliability) as the penalty functions to be incorporated into the corresponding objective functions for the optimization problem. A smart office application is presented to demonstrate the feasibility and effectiveness of our proposed design optimization approach.</jats:p></p>	10.1145/2925991		Crossref
RecPS: Privacy Risk Scoring for Recommender Systems	Jiajie He, Yuechun Gu, Keke Chen,		10.1145/3705328.3748052		Crossref

Security Architectural Approaches and Risk Assessment Methods for Blockchain Systems: A Review and Future Directions	Sabreen Ahmadjee, Carlos Mera-Gómez, Rami Bahsoon, Rajkumar Buyya,	<p><jats:p>Amid the widespread use of blockchain technology, the escalating frequency of cyber attacks exploiting its inherent security challenges underscores the critical necessity for a robust and adaptable security risk assessment approach. The distinctive attributes and intricate internal structure of blockchain not only attract malicious actors but also elevate the risk of ill-informed architectural design decisions, potentially introducing security vulnerabilities. This study addresses this imperative by conducting a systematic literature review, classifying publications that elucidate secure architectural design approaches, and categorising those that delineate methods for assessing security risks associated with blockchain and smart contracts. The findings reveal four prevalent approaches supporting secure architectural design—decision models, taxonomies, design patterns, and guidelines—alongside contributions in blockchain risk assessment encompassing risk identification, analysis, and evaluation methods. Furthermore, the study identifies</p>	10.1145/3721140		Crossref
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		unresolved architectural design challenges and proposes future research directions in this evolving landscape.</jats:p>			
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Security Risk Assessments: Modeling and Risk Level Propagation	Daniel Angermeier, Hannah Wester, Kristian Beilke, Gerhard Hansch, Jörn Eichler,	<p><jats:p>Security risk assessment is an important task in systems engineering. It is used to derive security requirements for a secure system design and to evaluate design alternatives as well as vulnerabilities. Security risk assessment is also a complex and interdisciplinary task, where experts from the application domain and the security domain have to collaborate and understand each other. Automated and tool-supported approaches are desired to help manage the complexity. However, the models used for system engineering usually focus on functional behavior and lack security-related aspects. Therefore, we present our modeling approach that alleviates communication between the involved experts and features steps of computer-aided modeling to achieve consistency and avoid omission errors. We demonstrate our approach with an example. We also describe how to model impact rating and attack feasibility estimation in a modular fashion, along with the propagation and aggregation of these estimations through the model. As a result, experts can make local</p>	10.1145/3569458		Crossref
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		decisions or changes in the model, which in turn provides the impact of these decisions or changes on the overall risk profile. Finally, we discuss the advantages of our model-based method.</jats:p>			
Energy Harvesting Systems Need an Operating System Too	Samyukta Venkat, Marshall Clyburn, Bradford Campbell,		10.1145/3417308.3430274		Crossref
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<p><i>How Hard Is Cyber-risk Management in IT/OT Systems?</i>A Theory to Classify and Conquer Hardness of Insuring ICSs</p>	<p>Ranjan Pal, Peihan Liu, Taoan Lu, Ed Hua,</p>	<p><jats:p>Third-party residual cyber-risk management (RCRM) services (e.g., insurance, re-insurance) are getting increasingly popular (currently, a multi-billion-dollar annual market) with C-suites managing industrial control systems (ICSs) based upon IoT-driven cyber-physical IT and OT technology. Apart from mitigating and diversifying losses from (major) cyber-threats RCRM services positively contribute to improved cyber-security as an added societal benefit. However, it is also well known that RCRM markets (RCRM for ICSs being a mere subset) are relatively nascent and sparse. There is a huge (approximately 10-fold) supply-demand gap in an environment where (a) annual cyber-losses range in trillions of USD, and (b) CRM markets (residual or otherwise) are annually worth only up to 0.25 trillion USD. The main reason for this wide gap is the age-old information asymmetry (IA) bottleneck between the demand and supply sides of the third-party RCRM market, which is significantly amplified in modern cyber-space settings. This setting primarily comprises</p>	<p>10.1145/3568399</p>		<p>Crossref</p>
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		<p>interdependent and intra-networked ICSs (and/or traditional IT systems) from diverse application sectors inter-networked with each other in a service supply-chain environment.</p> <p><i>In this article, we are the first to prove that optimal cyber-risk diversification (integral to RCRM) under IA is computationally intractable, i.e., NP-hard, for such (systemic) inter-networked societies.</i></p> <p>Here, the term “optimal diversification” implies the best way a residual and profit-minded cyber-risk manager can form a portfolio of client coverage contracts. We follow this up with the design and analysis of a computational policy that alleviates this intractability challenge for the social good. Here, the social good can be ensured through denser RCRM markets that in principle improve cyber-security. Our work formally establishes (a) the reason why it has been very difficult in practice (without suitable policy intervention) to densify IA-affected RCRM markets despite their high demand in modern CPS/ICS/IoT societies; and (b) the efficacy of our computational policy to mitigate IA issues between the supply and demand sides of</p>			
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		an RCRM market in such societies.</jats:p>			
Security assessment and impact analysis of cyberattacks in integrated T&D power systems	Ioannis Zografopoulos, Charalambos Konstantinou, Nektarios Georgios Tsoutsos, Dan Zhu, Robert Broadwater,		10.1145/3470481.3472706		Crossref
Research on Brittleness Risk Analysis for System of Systems Based on Brittleness Entropy	Yan Xu, Cao Jun-hai, Song Tai-liang, Gao Long, Deng Wei, Wu Zhi-hong,		10.1145/3180374.3181362		Crossref
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A Framework for Parallel Assessment of Reputation Management Systems	Vincenzo Agate, Alessandra De Paola, Salvatore Gaglio, Giuseppe Lo Re, Marco Morana,		10.1145/2983468.2983474		Crossref

Peer-to-Peer (P2P) Lending Risk Management: Assessing Credit Risk on Social Lending Platforms Using Textual Factors	Michael Siering,	<p>Peer-to-peer (P2P) lending platforms offer Internet users the possibility to borrow money from peers without the intervention of traditional financial institutions. Due to the anonymity on such social lending platforms, determining the creditworthiness of borrowers is of high importance. Beyond the disclosure of traditional financial variables that enable risk assessment, peer-to-peer lending platforms offer the opportunity to reveal additional information on the loan purpose. We investigate whether this self-disclosed information is used to show reliability and to outline creditworthiness of platform participants. We analyze more than 70,000 loans funded at a leading social lending platform. We show that linguistic and content-based factors help to explain a loan's probability of default and that content-based factors are more important than linguistic variables. Surprisingly, not every information provided by borrowers underlines creditworthiness. Instead, certain aspects rather indicate a higher probability of default. Our study provides important insights on information disclosure in the context of peer-</p>	10.1145/3589003		Crossref
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		to-peer lending, shows how to increase performance in credit scoring and is highly relevant for the stakeholders on social lending platforms.</jats:p>			
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Systematic Risk Characterisation of Hardware Threats to Automotive Systems	James Pickford, Rasadhi Attale, Siraj Shaikh, Hoang Nga Nguyen, Lee Harrison,	<p>The increasing dependence of modern automotive systems on electronics and software poses cybersecurity risks previously not factored into design and engineering of such systems. Attacks on hardware components, communication modules and embedded software – many of which are purposefully designed for automotive control and communications – are the key focus of this paper. We adopt a novel approach to characterise such attacks using Gajski-Kuhn Y-charts to represent attack manipulation across behavioural, structural and physical domains. Our selection of attacks is evidence-driven demonstrating threats that have been demonstrated to be feasible in the real-world. We then risk assess impact of such threats using the recently adopted ISO/SAE 21434 standard for automotive cybersecurity risk assessment, including mitigations for potential adoption. Our work serves to provide unique insights into the complex dynamic of hardware vulnerabilities and how the industry may address system-level security and protection of modern automotive</p>	10.1145/3661315		Crossref
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		platforms.</jats:p>			
Early Warning Information System of Pregnancy Risk as an Effort to Reduce Maternal Mortality Rate	Nita Yalina, Dwi Rukma Santi, Moh. Abdul Aziz,		10.1145/3127942.3127963		Crossref
Risk Analysis of Ship Methanol Fuel System based on Fuzzy Bayesian Network Model Based on Bow-Tie Diagram	Shuangshuang Wang,		10.1145/3669721.3674534		Crossref
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Risk assessment in open source systems	Xavier Franch, Angelo Susi,		10.1145/2889160.2891052		Crossref
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A Survey on QoS-based communication protocols for IoT systems	Nogaye Lo, Ibrahima Niang,		10.1145/3386723.3387834		Crossref
7th International Conference on Networking, Systems and Security			10.1145/3428363		Crossref
Development and Application of Intelligent Management System for Personnel Safety in Port Area based on Positioning Technology	Taiwei Wang, Yuyang Cheng,		10.1145/3661638.3661700		Crossref

An open system for monitoring environmental phenomena	Michal Kepka, Lukáš erný, Premek Brada,		10.1145/3384419.3430443		Crossref
Recommender Systems for Social Networks: A Short Review	Houda Oubalahcen, Moulay Driss El Quadghiri,		10.1145/3607720.3607725		Crossref
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Risk-Based Methodology for Optimal Cryptoperiod Calculation in ICSs Under Data Siphoning Attack	Natalija Vlajic, Gabriele Cianfarani,		10.1145/3689930.3695203		Crossref
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Attacks on the Siemens S7 Protocol Using an Industrial Control System Testbed	Nicolai Kellerer, Gustavo Sánchez, Hermenegildo Alberto, Veit Hagenmeyer, Ghada Elbez,		10.1145/3679240.3734645		Crossref
Redesigning Mobile Systems for Foundation Models with model- and system-level orchestration	Rongxiang Wang,		10.1145/3711875.3736668	https://dl.acm.org/doi/pdf/10.1145/3711875.3736668	Crossref

A System-Level Modeling and Design for Cyber-Physical-Social Systems	Jing Zeng, Laurence T. Yang, Jianhua Ma,	<p>The design of cyber-physical-social systems (CPSS) is a novel and challenging research field due that it emphasizes the deep fusion of cyberspace, physical space, and social space. In this article, we extend our previously proposed system-level design framework [Zeng et al. 2015] to tailor it to the needs of social scenario of multiple users. A hierarchical Petri net-based model and social flow are presented to extend the control flow and formally describe the social interactions of multiple users, respectively. By using the extended model, the system-level optimization for CPSS can be achieved by the improved design flow. Specifically, object emplacement and user satisfaction are further extended into the social environment. Also maximal power estimation algorithm is improved, leveraging the extended intermediate representation model. Finally, we use a smart office case to demonstrate the feasibility and effectiveness of our improved design approach for multiple users.</p>	10.1145/2834119		Crossref
Assessment of Model-based Methodologies to Architect Cyber-Physical Systems	Andreas Aigner, Abdelmajid Khelil,		10.1145/3312614.3313779		Crossref
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Analysis of Bank Loan Risk Management Based on BP Neural Network	Xianping Yuan, Yue Zhang,		10.1145/3482632.3487450		Crossref
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Detecting Fake Co-visitation Injection Attack in Graph-based Recommendation Systems	Tropa Mahmood, Muhammad Abdullah Adnan,		10.1145/3569551.3569556		Crossref
Smart Contract and Blockchain Based Contract Management System	Svetislav Simi, Marko Markovi, Stevan Gostoji,		10.1145/3459960.3459975		Crossref
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Personalized Recommendation System for Advanced Learning Management Systems	Thoufeeq Ahmed Syed, Smitha Sunil Kumaran Nair,		10.1145/3268891.3268899		Crossref
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Employing multi-agent systems to enhance virtual reality platforms	Ghalia Mdaghri-Alaoui, Abdelhamid Zouhair, Nihad Elghouch,		10.1145/3607720.3607762		Crossref
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Design and Implementation of Nursing Clinical Practice Teaching Management System	Xinzhi Zhuang,		10.1145/3482632.3484030		Crossref
An Integrated Approach to Information Systems Security Policy Violation	Tilahun Muluneh Arage, Tibebe Beshah Tesema,		10.1145/2908446.2908456		Crossref
An Advanced IoT-Based Architecture for Healthcare Systems: A Focus on Blockchain-based Edge Computing for Diabetes Management	Khadija Tlemçani, Said Jai Andaloussi, Kebira Azbeg, Ouail Ouchetto, Laila Fetjah,		10.1145/3607720.3607756		Crossref
Optimization of anomaly detection in a microservice system through continuous feedback from development	Adha Hrusto, Emelie Engström, Per Runeson,		10.1145/3528229.3529382		Crossref
Achieving System Reliability Using Reliability Adjustment	Edita Djambazova,		10.1145/3546118.3546129		Crossref
Bringing Modern Hierarchical Memory Systems Into Focus	Paul Tschirhart, Jim Stevens, Zeshan Chishti, Shih-Lien Lu, Bruce Jacob,		10.1145/2818950.2818975		Crossref
Challenges to the Development of Smart City Systems	Everton Cavalcante, Nélío Cacho, Frederico Lopes, Thais Batista,		10.1145/3131151.3131189		Crossref
Simplification of the Calcine Transfer Control System Architecture for Ferronickel Projects in System Reliability Assessment	Gilang Almaghribi Sarkara Putra, Bagus Ardiansyah,		10.1145/3468013.3468654		Crossref

Task-Relevant Evaluation Metrics of Object Detection for Quantitative System-Level Analysis of Safety-Critical Autonomous Systems	Apurva Badithela, Ranai Srivastav, Tichakorn Wongpiromsarn, Richard Murray,	<p>In safety-critical robotic systems, perception is tasked with representing the environment to effectively guide decision-making and plays a crucial role in ensuring that the overall system meets its requirements. To quantitatively assess the impact of object detection and classification errors on system-level performance, we present a rigorous formalism for a model of detection error, and probabilistically reason about the satisfaction of regular-safety temporal logic requirements at the system level. We also show how standard evaluation metrics for object detection, such as confusion matrices, can be represented as models of detection error, which enables the computation of probabilistic satisfaction of system-level specifications. However, traditional confusion matrices treat all detections equally, without considering their relevance to the system-level task. To address this limitation, we propose novel evaluation metrics for object detection that are informed by both the system-level task and the downstream control logic, enabling a more context-appropriate evaluation of</p>	10.1145/3771284		Crossref
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		<p>detection models. We identify logic-based formulas relevant to the downstream control and system-level specifications and use these formulas to define a logic-based evaluation metric for object detection and classification. These logic-based metrics result in less conservative assessments of system-level performance. Finally, we demonstrate our approach on a car-pedestrian example with a leaderboard PointPillars model evaluated on the nuScenes dataset, and validate probabilistic system-level guarantees in simulation.</p>			
Analysis of Effective Ways of Human Resource Management in Enterprise Management Based on Risk Early Warning Model	Shufang Sun,		10.1145/3482632.3487426		Crossref

Design of a Novel Information System for Semi-automated Management of Cybersecurity in Industrial Control Systems	Kimia Ameri, Michael Hempel, Hamid Sharif, Juan Lopez, Kalyan Perumalla,	<p>There is an urgent need in many critical infrastructure sectors, including the energy sector, for attaining detailed insights into cybersecurity features and compliance with cybersecurity requirements related to their Operational Technology (OT) deployments. Frequent feature changes of OT devices interfere with this need, posing a great risk to customers. One effective way to address this challenge is via a semi-automated cyber-physical security assurance approach, which enables verification and validation of the OT device cybersecurity claims against actual capabilities, both pre- and post-deployment. To realize this approach, this article presents new methodology and algorithms to automatically identify cybersecurity-related claims expressed in natural language form in ICS device documents. We developed an identification process that employs natural language processing (NLP) techniques with the goal of semi-automated vetting of detected claims against their device implementation. We also present our novel NLP components for verifying feature claims against relevant cybersecurity</p>	10.1145/3546580		Crossref
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		requirements. The verification pipeline includes components such as automated vendor identification, device document curation, feature claim identification utilizing sentiment analysis for conflict resolution, and reporting of features that are claimed to be supported or indicated as unsupported. Our novel matching engine represents the first automated information system available in the cybersecurity domain that directly aids the generation of ICS compliance reports.</jats:p>			
A Score approach to identify the risk of students dropout: an experiment with Information Systems Course	Robinson Crusóé Da Cruz, Renato Correa Juliano, Francisco Carlos Monteiro Souza, Alinne Cristinne Correa Souza,		10.1145/3592813.3592896		Crossref
The Leaky Actuator	Amir Herzberg, Yehonatan Kfir,		10.1145/3338499.3357358		Crossref
Management System of Hybrid Classroom Teaching Process Oriented to Smart Classroom	Yi Jiang,		10.1145/3482632.3483121		Crossref
Session details: Theme: System software and security: RS - Recommender systems: Theory and applications track	Markus Zanker, Panagiotis Symeonidis, Yong Zheng,		10.1145/3389669		Crossref
Session details: Volume II: Software design and development, and system software and security: Operating systems track	Bongjae Kim, George Hamer,		10.1145/3252771		Crossref
Tiered trust for useful embedded systems security	Hudson Ayers, Prabal Dutta, Philip Levis, Amit Levy, Pat Pannuto, Johnathan Van Why, Jean-Luc Watson,		10.1145/3517208.3523752	https://dl.acm.org/doi/pdf/10.1145/3517208.3523752	Crossref
Session details: System software and security: CPS - cyber-physical systems track			10.1145/3167132.3258635		Crossref

Real-time Prediction of Accident using Big Data System	Mouad Tantaoui, My Driss Laanaoui, Mustapha Kabil,		10.1145/3386723.3387886		Crossref
Design of RFID Data Acquisition System for Manufacturing Execution Systems	Feng Li, Guangyue Jia, Chengbo Liu,		10.1145/3617184.3630126		Crossref
Building dynamic, long-running systems	Steven P. Reiss, Qi Xin,		10.1145/2897829.2897831		Crossref
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Enhancing E-commerce Recommender Systems through Multi-Objective Immune Algorithm	Fatima Ezzahra Zaizi, Sara Qassimi, Said Rakrak,		10.1145/3659677.3659702		Crossref
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Secure and Resilient Control Design for Cloud Enabled Networked Control Systems	Zhiheng Xu, Quanyan Zhu,		10.1145/2808705.2808708		Crossref
Construction Strategy of Student Management Information System under Digital Information Technology	Yiling Xu,		10.1145/3482632.3483003		Crossref
Low-cost multi-person continuous skin temperature sensing system for fever detection	Peter Wei, Chenye Yang, Xiaofan Jiang,		10.1145/3384419.3430398	https://dl.acm.org/doi/pdf/10.1145/3384419.3430398	Crossref
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AI Enhanced Ticket Management System for optimized Support	Shubham Jain, Amit Gupta, Kumari Neha,		10.1145/3703412.3703433		Crossref
Adaptability of Microservices Architecture in IoT Systems : A Comprehensive Review	Abir El Akhdar, Chafik Baidada, Ali Kartit,		10.1145/3659677.3659734		Crossref
Challenges and Opportunities of Integrating AI with IFRS in Accounting Systems Insights from Morocco	Omar Hniche, Rachid Saadane,		10.1145/3607720.3607785		Crossref
Remote Attestation and Secure AI in Systems-on-Chip/Systems-in-Package	Giridhar Mandyam,		10.1145/3703412.3703435		Crossref
Predictive Collision Management for Time and Risk Dependent Path Planning	Carsten Hahn, Sebastian Feld, Hannes Schroter,		10.1145/3397536.3422252		Crossref

Interactive Genetic Algorithm for Human-Computer Interface Layout Design System	Mengyao Yu, Changhua He, Lijun Shi,		10.1145/3661638.3661647		Crossref
Towards methodological support for secure architectures of software-intensive systems-of-systems	Jamal El Hachem, Vanea Chiprianov, Ali Babar, Philippe Aniorte,		10.1145/3175731.3176178		Crossref
Ontology-Based Security Tool for Critical Cyber-Physical Systems	Abdelkader Magdy Shaaban, Thomas Gruber, Christoph Schmittner,		10.1145/3307630.3342397		Crossref
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Disparity-Aware Federated Learning for Intrusion Detection Systems in Imbalanced Non-IID Settings	Md Mohaiminul Islam, A. B. M. Alim Al Islam,		10.1145/3629188.3629197		Crossref
Risk Management for Spam over IP Telephony using Combined Countermeasures	R. Jabeur Ben Chikha, Tarek Abbes, Adel Bouhoula,		10.1145/2908446.2908486		Crossref
Development and Application of Smart Marketing Systems Based on Big Data Technology	Liyun Jia,		10.1145/3661638.3661679		Crossref
Medical Device Insurance Fund Management and Risk Prevention and Control Based on Feature Matching Algorithm	Lesheng Jiang,		10.1145/3482632.3483998		Crossref
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Unveiling Neural Network Data Free Backdoor Threats in Industrial Control Systems	Zijian Zhang, Isra Elsharef, Zhen Zeng,		10.1145/3689930.3695208		Crossref

Security Assessment of Phase-Based Ranging Systems in a Multipath Environment	Arslan Riaz, Dylan Nash, Jonathan Ngo, Chiraag Juvekar, Phillip Nadeau, Tao Yu, Rabia Tugce Yazicigil,	<p>Phase-based ranging has been widely deployed in proximity detection scenarios including security-critical applications due to their low implementation complexity on existing transceivers. In this work, the security of multi-carrier phase-based ranging systems in a multipath propagation environment is investigated. We present a threat model that can successfully target any decreasing distance in different multipath environmental conditions rendering the phase-based ranging method insecure. We assess the feasibility of attacks in various attack scenarios through simulations using a multipath channel and demonstrate a simplified version of the attacker model implemented in hardware. We show that the attacker can spoof the measured distance to less than one meter when the devices are separated by 30 meters. The evaluation of possible countermeasures and their limitations for different threat models is performed.</p>	10.1145/3517809		Crossref
Summit	Louai Alarabi,		10.1145/3274895.3282795		Crossref

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GraphCNNpred: A stock market indices prediction using a Graph based deep learning system	Yuhui Jin,		10.1145/3714334.3714364		Crossref
Exploration of Cloud Computing Based Data Mining Mobile Intelligent Tourism Guide System	Xiang Nan, Rajamohan Parthasarathy,		10.1145/3661638.3661674		Crossref

BlueIO	Zhe Jiang, Neil Audsley, Pan Dong,	<p><jats:p> In safety-critical systems, time predictability is vital. This extends to I/O operations that require predictability, timing-accuracy, parallel access, scalability, and isolation. Currently, existing approaches cannot achieve all these requirements at the same time. In this article, we propose a framework of hardware framework for real-time I/O virtualization—termed</p> <p><jats:italic>BlueIO</jats:italic>—to meet all these requirements simultaneously.</p> <p></jats:p></p> <p><jats:p>BlueIO integrates the functionalities of I/O virtualization, low-layer I/O drivers, and a clock cycle level timing-accurate I/O controller (using the GPIOCP [36]). BlueIO provides this functionality in the hardware layer, supporting abstract virtualized access to I/O from the software domain. The hardware implementation includes I/O virtualization and I/O drivers, provides isolation and parallel (concurrent) access to I/O operations, and improves I/O performance. Furthermore, the approach includes the previously proposed GPIOCP to guarantee that I/O operations will</p>	10.1145/3309765		Crossref
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		<p>occur at a specific clock cycle (i.e., be timing-accurate and predictable).</p> <p>In this article, we present a hardware consumption analysis of BlueIO to show that it linearly scales with the number of CPUs and I/O devices, which is evidenced by our implementation in VLSI and FPGA. We also describe the design and implementation of BlueIO and demonstrate how a BlueIO-based system can be exploited to meet real-time requirements with significant improvements in I/O performance and a low running cost on different OSs.</p>			
Tracking and Reporting Software Maintenance Requests Challenges in CMMS Systems	Gumma B. Alshokry, Mohamed A. Hagal, Bilal A. Aljabour,		10.1145/3492547.3492621		Crossref
BATMAN	Chiachen Chou, Aamer Jaleel, Moinuddin Qureshi,		10.1145/3132402.3132404	https://dl.acm.org/doi/pdf/10.1145/3132402.3132404	Crossref
A Risk Based Creative Design Framework: Integrating Risk Assessment and Design Thinking Approach on Small to Medium Sized Batik Enterprises	Yanuar Sindhu Riyanto, Amalia Suzianti, Maya Arlini Puspasari,		10.1145/3468013.3468636		Crossref
Survey of the Formal Verification of Operating Systems in Power Monitoring System	Kangle Yang, Jianye Yu, Xinshen Wei, Feng You, Haidong Huang, Xuesong Huo,		10.1145/3609703.3609714		Crossref
DIPS	Jasper de Winkel, Tom Hoefnagel, Boris Blokland, Przemyslaw Paweczak,		10.1145/3560905.3568543		Crossref
Smart Home Energy Management System Architecture Using IoT	Boulkamh Chouaib, Derdouri Lakhdar, Zendaoui Lokmane,		10.1145/3361570.3361593		Crossref

Food Safety Risk Assessment Method Based on SVM Optimization Model	Miao Hao, Yajie Wang, Wei Huang, Minghui Wang, Hong Yang,		10.1145/3545822.3545827		Crossref
Multi-scale modeling for software-intensive systems-of-systems architectures	Ilhem Khlif, Mohamed Hadj Kacem, Cédric Eichler, Khalil Drira, Ahmed Hadj Kacem,		10.1145/3175731.3176179		Crossref
Design of Xinjiang Uygur Sports Virtual Museum Management System Based on ASP.NET	Ping Wang,		10.1145/3482632.3484029		Crossref
Construction of Educational Economy and Management Content System Based on Big Data	Lingyan Meng,		10.1145/3482632.3483127		Crossref
Employing Discrete Controller Synthesis for Developing Systems-of-Systems Controllers	Jialong Li, Wallace Manzano, Takuto Yamauchi, Nobuhiro Matsuyama, Elisa Yumi Nakagawa, Kenji Tei,		10.1145/3643655.3643875		Crossref
Session details: System software and security: RS - recommender systems: theory, user interactions and applications track			10.1145/3167132.3258667		Crossref
Research on Osteoporosis Risk Assessment Based on Semi-supervised Machine Learning	Lei Lu, Luo Tao, Wang Yining, Han Jiahui, Li Jianfeng,		10.1145/3407703.3407725		Crossref
Assessment System for Residual Risks of Information Leakage in Incident Countermeasures	Tomohiro Noda, Hirokazu Hasegawa, Hiroki Takakura,		10.1145/3459955.3460598		Crossref

Security Modelling for Cyber-Physical Systems: A Systematic Literature Review	Shaofei Huang, Christopher M. Poskitt, Lwin Khin Shar,	<p><jats:p>Cyber-physical systems are at the intersection of digital technology and engineering domains, rendering them high-value targets of sophisticated and well-funded cybersecurity threat actors. Prominent cybersecurity attacks on CPS have brought attention to the vulnerability of these systems and the inherent weaknesses of critical infrastructure reliant on them. Security modelling for CPS is an important mechanism to systematically identify and assess vulnerabilities, threats, and risks throughout system life cycles, and to ultimately ensure system resilience, safety, and reliability. This survey delves into state-of-the-art research on CPS security modelling, encompassing both threat and attack modelling. While these terms are sometimes used interchangeably, they are different concepts. This paper elaborates on the differences between threat and attack modelling, examining their implications for CPS security. We conducted a systematic search that yielded 449 papers, from which 32 were selected and categorised into three clusters: those focused on threat modelling methods, attack</p>	10.1145/3776549		Crossref
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		modelling methods, and literature reviews. Specifically, we sought to examine what security modelling methods exist today, and how they address real-world cybersecurity threats and CPS-specific attacker capabilities throughout the life cycle of CPS, which typically span longer durations compared to traditional IT systems. This paper also highlights several limitations in existing research, wherein security models adopt simplistic approaches that do not adequately consider the dynamic, multi-layer, multi-path, and multi-agent characteristics of real-world cyber-physical attacks.			
Research on Industry and Commerce Management System Based on Computer Big Data algorithm	Yubing Zhang,		10.1145/3469213.3470315		Crossref
Strategic Placement of Intrusion Detection Systems in IoT Mesh Networks through Machine Learning	Samhitha Perala, Manaswitha Reddy, Sharvari Ravindran, Sasirekha Gvk, Jyotsna Bapat,		10.1145/3629188.3629195		Crossref
Cyber-Physical Systems Security	Dieter Gollmann, Pavel Gurikov, Alexander Isakov, Marina Krotofil, Jason Larsen, Alexander Winnicki,		10.1145/2732198.2732208		Crossref
Review on Embedded Systems and the Internet of Things: Comparative Study	Abdessamad Cherkaoui, Soukaina Merzouk, Abdelaziz Marzak, Mostapha Hain,		10.1145/3454127.3457636		Crossref
Mediators in Systems-of-Systems and Ecosystems: A Systematic Literature Review and Conceptualization	Jakob Axelsson,		10.1145/3643655.3643880		Crossref

Going Beyond Usability and UX: Adding Dependability, Safety and Security to Interactive Systems and Interactive Technologies	Philippe Palanque,		10.1145/3544549.3574186		Crossref
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Search-space Decomposition for System- level Design Space Exploration of Embedded Systems	Valentina Richthammer, Fabian Fassnacht, Michael Glaß,	<p><jats:p> The development of large-scale multi- and many-core platforms and the rising complexity of embedded applications have led to a significant increase in the number of implementation possibilities for a single application. Furthermore, rising demands on safe, energy-efficient, or real-time capable application execution make the problem of determining feasible implementations that are optimal with respect to such design objectives even more of a challenge. State-of-the-art Design Space Exploration (DSE) techniques for this problem demonstrably suffer from the vast and sparse search spaces posed by modern embedded systems, emphasizing the need for novel design methodologies in this field. Based on the idea of reducing problem complexity by a suitable decomposition of the system specification—in particular, by a reduction of target architecture or task mapping options—the work at hand proposes a portfolio of</p> <p><jats:italic>dyna mic</jats:italic></p> <p>decomposition mechanisms that automatically decompose any system specification</p>	10.1145/3369388		Crossref
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		<p>based on a short pre-exploration of the complete system. We present a two-phase approach consisting of (a) a set of novel</p> <p><i>data extraction and representation</i></p> <p>techniques combined with (b) a selection of</p> <p><i>filtering operations</i></p> <p>that automatically extract a decomposed system specification based on information gathered during pre-exploration. In particular, we employ</p> <p><i>heat map</i> data structures and threshold as well as graph-partitioning filters to reduce problem complexity. The proposed decomposition procedure can seamlessly be integrated in any DSE flow, constituting a flexible extension for existing DSE approaches. Furthermore, it improves existing</p> <p><i>static</i></p> <p>decomposition techniques and other heuristics relying on information about the problem instance, since systems with irregular architectural topology or distribution of resource types can now be decomposed</p>			
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		<p>based on an automatic, problem-independent pre-exploration phase. We illustrate the efficiency of the proposed decomposition portfolio applied to state-of-the-art DSEs for many-core systems as well as networked embedded systems from the automotive domain. Experimental results show significant increases in optimization quality of up to 87% within constant DSE time compared to existing approaches.</p> <p></jats:p></p>			
Session details: System software and security: RS - recommender systems: theory, user interactions and applications track			10.1145/3258667		Crossref

A Dynamic Threat Prevention Framework for Autonomous Vehicle Networks based on Ruin-theoretic Security Risk Assessment	Anika Anwar, Talal Halabi, Mohammad Zulkernine,	<p>In recent years, Autonomous Vehicle Networks (AVNs) have gained significant attention for their potential to make transportation safer and more efficient. These networks rely on Vehicle-to-Vehicle (V2V) communication to exchange critical information, such as location, speed, and driving intentions. However, V2V communication also introduces security vulnerabilities that can be exploited to compromise the safety and privacy of drivers and passengers. Malicious or selfish drivers can potentially intercept, modify, and manipulate V2V communication, causing confusion among vehicles or stealing sensitive data. Therefore, to identify and mitigate security threats that could jeopardize V2V communication in AVNs, the implementation of a threat prevention framework is imperative. This article presents a threat prevention framework that assesses security risks dynamically to facilitate secure message forwarding in V2V communication. First, we propose a dynamic risk assessment technique that utilizes the Probability-Impact-Exposure-Recovery metrics approach to evaluate the level of security threats posed to V2V communication</p>	10.1145/3660527		Crossref
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		and ultimately generate a risk score. Second, we develop a security decay assessment method that utilizes ruin theory to continuously monitor security risk within the AVNs. Third, we design a risk-aware message forwarding protocol based on coalitional game theory to facilitate secure V2V communication. Our experiments using the simulator Veins demonstrate the efficiency and scalability of the proposed framework in preventing potential damage caused by common security threats and enhancing the security of the Automated Highway System.</jats:p>			
Proceedings of the 6th International Conference on Networking, Systems and Security			10.1145/3362966		Crossref
AssociPass	Rei Yamagishi, Tetsuji Takada,		10.1145/3170427.3188519		Crossref
Smart School Guidance and Vocational Guidance System Through the Internet of Things	Hicham El Mrabet, Abdelaziz Ait Moussa,		10.1145/3320326.3320404		Crossref
Analysis of the Security Level of Information Systems and Methods for Detecting Network Anomalies	Besik O Beridze, Mikheil V Donadze,		10.1145/3674912.3674924		Crossref
Proceedings of the 9th International Conference on Networking, Systems and Security			10.1145/3569551		Crossref
Qualitative risk assessment of cyberattacks on power systems	H. E. Brown,		10.1145/3212687.3212867	https://dl.acm.org/doi/pdf/10.1145/3212687.3212867	Crossref
On an Exemplar Supporting Model-based Quality Assurance Research for Healthcare Systems-of-Systems	Lucas Sakizloglou, Taisiya Khakharova, Florian Ruehs, Leen Lambers,		10.1145/3643655.3643879		Crossref

Session details: Theme: System software and security: RS - Recommender systems: Theory and applications track	Yong Zheng, Li Chen, Markus Zanker, Panagiotis Symeonidis,		10.1145/3462430		Crossref
Session details: Theme: System software and security: RS - Recommender systems: Theory and applications track			10.1145/3329387		Crossref
Towards systematic live experimentation in software-intensive systems of systems	Ilias Gerostathopoulos, Tomas Bures, Sanny Schmid, Vojtech Horky, Christian Prehofer, Petr Tuma,		10.1145/3175731.3176175		Crossref
Bootstrapping a Destination Recommender System	Neal Lathia,		10.1145/3109859.3109924		Crossref
Online Recommender system for Accessible Tourism Destinations	Luchiana C. Brodeala,		10.1145/3383313.3411450		Crossref
Scheduling Intrusion Detection Systems in Resource-Bounded Cyber-Physical Systems	Waseem Abbas, Aron Laszka, Yevgeniy Vorobeychik, Xenofon Koutsoukos,		10.1145/2808705.2808711	https://dl.acm.org/doi/pdf/10.1145/2808705.2808711	Crossref
Proceedings of the 11th International Conference on Networking, Systems, and Security			10.1145/3704522		Crossref
Session details: Volume I: Artificial intelligence and agents, distributed systems, and information systems: Cooperative systems track	Rachid Anane,		10.1145/3251668		Crossref
A systems-of-systems security framework for requirements definition in cloud environment	Sara B. O. Gennari Carturan, Denise Hideko Goya,		10.1145/3344948.3344977		Crossref
Latest Trends in Recommender Systems applied in the medical domain	Stitini Oumaima, Kaloun Soulaimane, Bencharef Omar,		10.1145/3386723.3387860		Crossref
Avoid false alarms in monitoring systems based on chainsaw and saw sound detection	Abel Diatta, Shigeru Kashiara, Youssou Faye,		10.1145/3659677.3659706		Crossref
Boundary objects in Agile practices	Rebekka Wohlrab, Patrizio Pelliccione, Eric Knauss, Mats Larsson,		10.1145/3202710.3203155		Crossref
System framework of intelligent consulting systems with intellectual technology	Phanintorn Suaprae, Prachyanun Nilsook, Panita Wannapiroon,		10.1145/3479162.3479167		Crossref
NAT Constraints Management in Tree-Based P2P Live Streaming Systems	Amgad Naiem, Mohammed El-Beltagy,		10.1145/2908446.2908500		Crossref

The sosADL studio	Flavio Oquendo, Jérémy Buisson, Elena Leroux, Gersan Moguéro, Jean Quilbeuf,		10.1145/3175731 .3176180		Crossref
Revolutionizing Fashion Recommendations: A Deep Dive into Deep Learning-based Recommender Systems	Ilham Kachbal, Said El Abdellaoui, Khadija Arhid,		10.1145/3659677 .3659678		Crossref

Enhancing Security of Distributed Multi-Agent Systems in Smart Grids: An AI-Driven Approach to Regular Audits	Madhukrishna Priyadarsini,	<p><jats:p> Smart grids are increasingly susceptible to cyber-physical anomalies due to their complex interconnections and reliance on real-time data. Ensuring grid reliability and minimizing operational risks require robust anomaly detection systems and cost-effective audit strategies. This paper proposes a novel multi-objective framework that integrates anomaly detection with dynamic audit optimization to address these challenges. The framework leverages real-time operational data (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(X\)</jats:tex-math></p> <p></jats:inline-formula></p> <p>), baseline metrics (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(B\)</jats:tex-math></p> <p></jats:inline-formula></p> <p>), thresholds (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(Th\)</jats:tex-math></p>	10.1145/3748730		Crossref
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		<p></jats:inline-formula>) , and criticality weights (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(w)</jats:tex-math></p> <p></jats:inline-formula>) to identify anomalies and dynamically assess system risks. Using a deviation-based scoring mechanism, anomalies are detected across critical grid components such as power generators, breakers, and controllers, while audit frequencies are optimized to balance attack rates and operational costs. In addition, this research contributes to Embodied AI by integrating intelligent audit agents within a physical smart grid environment; representing perception-action cycles that monitor, learn, and act in response to environmental conditions which is an essential characteristic of Embodied AI systems. These agents learn from real-time interactions and adapt behavior dynamically, aligning with the embodied AI paradigm.</p> <p></jats:p> <jats:p> The framework's multi-objective optimization</p>			
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		<p>model minimizes the attack rate (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(R_{\text{attack}}\)</jats:tex-math></p> <p></jats:inline-formula></p> <p>) and the total cost (</p> <p><jats:inline-formula content-type="math/tex"></p> <p><jats:tex-math notation="LaTeX" version="MathJax">\(C\)</jats:tex-math></p> <p></jats:inline-formula></p> <p>) by dynamically adjusting audit schedules based on real-time risk trends. The proposed solution is validated using simulated scenarios of cyberattacks (e.g., false data injection) and physical faults (e.g., overcurrent, voltage sag). Comparative analysis with traditional fixed-audit schedules demonstrates significant improvements, including 42.5% cost efficiency, 93.8% audit coverage, and 98.4% anomaly detection accuracy. The results establish the framework as a scalable and adaptive solution for anomaly management in smart grids, advancing the field of secure and efficient grid operations. This work contributes to the development of intelligent, risk-aware</p>			
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		<p>methodologies for grid resilience and operational optimization. The findings lay the groundwork for further exploration of AI-enhanced security solutions in autonomous and distributed systems.</p> <p></jats:p></p>			
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Genomics-Enhanced Cancer Risk Prediction for Personalized LLM-Driven Healthcare Recommender Systems	Kezhi Lu, Jie Lu, Hanshi Xu, Kairui Guo, Qian Zhang, Hua Lin, Mark Grosser, Yi Zhang, Guangquan Zhang,	<p><jats:p>Cancer risk prediction is a cornerstone of personalized medicine that offers opportunities for early detection and preventive interventions. However, the current models are designed to predict cancer risk face several challenges. First, most rely on traditional statistical methods, which struggle to capture the complexity of genetic, family medical history, and lifestyle factors. Hence, the accuracy of these models is limited. Additionally, the models neglect to integrate multidimensional data sources, particularly genetic information like single nucleotide polymorphisms (SNPs), which could enhance prediction accuracy. Third, while the system might effectively predict risk, it cannot translate those predictions into actionable healthcare recommendations to reduce cancer risk.</jats:p></p> <p><jats:p>In this study, we address all three of these limitations. With a focus on six prevalent cancers—we extracted SNP data from the UK Biobank and designed a novel risk prediction model for cancer and personalized healthcare recommendations based upon the mixture of experts (MoE) paradigm and large</p>	10.1145/3745022		Crossref
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		<p>language models (LLMs), respectively. Named MoE-HRS, experts based two router networks for separate processing by the Transformer and the convolutional neural network (CNN). Experiments on UK Biobank data show that our model outperforms state-of-the-art cancer risk prediction models. To bridge the gap between risk prediction and practical healthcare applications, we devised a healthcare recommender system powered by LLMs. This approach holds promise for enhancing early detection rates and promoting preventive healthcare management (relevant coding and data are available at https://github.com/bjtu-lucas-nlp/MoE-HRS).</p>			
Session details: Volume II: Software design and development, and system software and security: Object oriented programming languages and systems track	Davide Ancona,		10.1145/3252770		Crossref
Session details: System-2 (Smart Multimedia Systems)	Yijuan Lu,		10.1145/3286942		Crossref

A Review of Intrusion Detection Systems: Datasets and machine learning methods	Aouatif Arqane, Omar Boutkhoul, Hicham Boukharriss, Abdelmajid El Moutaouakkil,		10.1145/3454127.3456576		Crossref
The Impact of Positive Transfer Affordance Analysis on Learning Management System Version Upgrade	Nabila Khaerunisa Thazila, Herman Tolle,		10.1145/3641032.3641051		Crossref
On the construction of employee performance management system of smart tourism hotel under P-O model	Liu Jingjiang,		10.1145/3516529.3516553		Crossref
Towards a framework for comprehensive and systematic reliability evaluation of building management systems	Sanja Lazarova-Molnar,		10.1145/3055004.3064844		Crossref
From Schedules to Programs — Reimagining Networking Infrastructure for Future Cyber-Physical Systems	Md Kowsar Hossain, Ryan Brummet, Octav Chipara, Ted Herman, Steve Goddard,		10.1145/3491371.3491387		Crossref
Exploration in Recommender Systems	Minmin Chen,		10.1145/3460231.3474601		Crossref
Database Management Systems			10.1145/3477339.3477347		Crossref

Generative Vulnerability Assessment for Cyber-Physical Systems	Yu Zheng, Satish Vedula, Ayobami Aremu Olajube, Olugbenga Moses Anubi,	<p>Cyber-physical systems (CPS) are highly susceptible to malicious attacks due to their complex dynamics and interconnectivity. A comprehensive understanding of their vulnerabilities is essential for designing effective resilience measures. This paper presents a data-driven attack generative system for evaluating the vulnerability of CPS. The proposed approach formulates the vulnerability assessment problem as determining the feasibility of a specific attack set based on two boundary functions that represent the effectiveness and stealthiness of attacks. The attack generative model is trained using a custom loss function, with two universal approximators designed to learn the effectiveness and stealthiness functions simultaneously. Theoretical results for successful generation and asymptotic convergence of the resulting training algorithm are given. The proposed approach is evaluated via numerical simulation of an IEEE 14-bus system and gas pipeline systems, demonstrating its viability in learning how to attack nonlinear CPS and identify potential vulnerabilities.</p>	10.1145/3776543		Crossref
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Fail through the Cracks: Cross-System Interaction Failures in Modern Cloud Systems	Lilia Tang, Chaitanya Bhandari, Yongle Zhang, Anna Karanika, Shuyang Ji, Indranil Gupta, Tianyin Xu,		10.1145/3552326.3587448	https://dl.acm.org/doi/pdf/10.1145/3552326.3587448	Crossref
A Fault-Tolerant Real-Time System with Adjustable Reliability	Edita Djambazova,		10.1145/3472410.3472415		Crossref
Personalized Neural Modeling for Daily Injury Risk Assessment via Wearable Health Data	Melik Ozolcer, Sang Won Bae,		10.1145/3721201.3724417		Crossref
Research on the Construction and Optimization of Financial Management Information Systems Based on Big Data Background	Fei An,		10.1145/3718751.3718774		Crossref
Proceedings of the 4th International Workshop on Software Engineering for Systems-of-Systems			10.1145/2897829		Crossref
Transparent Management of BFT Systems with TEE	Bijun Li, Pierre-Louis Aublin,		10.1145/3578359.3593041		Crossref
Living Well with Diabetes: Rethinking Digital Diabetes Management Systems	Rebecca Gerstenberg, Robin Neuhaus, Martin Vitt, Marc Hassenzahl,		10.1145/3715336.3735726		Crossref

Assessing Cyber Risk in Cyber-Physical Systems Using the ATT&CK Framework	Ahmed Amro, Vasileios Gkioulos, Sokratis Katsikas,	<p><jats:p>Autonomous transport is receiving increasing attention, with research and development activities already providing prototype implementations. In this article we focus on</p> <p><jats:bold>Autonomous Passenger Ships (APS)</jats:bold>, which are being considered as a solution for passenger transport across urban waterways. The ambition of the authors has been to examine the safety and security implications of such a</p> <p><jats:bold>Cyber Physical System (CPS)</jats:bold>, particularly focusing on threats that endanger the passengers and the operational environment of the APS. Accordingly, the article presents a new risk assessment approach based on a</p> <p><jats:bold>Failure Modes Effects and Criticality Analysis (FMECA)</jats:bold> that is enriched with selected semantics and components of the MITRE ATT&CK framework, in order to utilize the encoded common knowledge and facilitate the expression of attacks. Then, the proposed approach is</p>	10.1145/3571733		Crossref
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		<p>demonstrated through conducting a risk assessment for a communication architecture tailored to the requirements of APSs that were proposed in earlier work. Moreover, we propose a group of graph theory-based metrics for estimating the impact of the identified risks. The use of this method has resulted in the identification of risks and their corresponding countermeasures , in addition to identifying risks with limited existing mitigation mechanisms. The benefits of the proposed approach are the comprehensive, atomic, and descriptive nature of the identified threats, which reduce the need for expert judgment, and the granular impact estimation metrics that reduce the impact of bias. All these features are provided in a semi-automated approach to reduce the required effort and collectively are argued to enrich the design-level risk assessment processes with an updatable industry threat model standard, namely ATT&CK.</p>			
Assurance Techniques for Industrial Control Systems (ICS)	William Knowles, Jose M. Such, Antonios Gouglidis, Gaurav Misra, Awais Rashid,		10.1145/2808705.2808710		Crossref

Integration of Information Systems and Cybersecurity Countermeasures	Richard Baskerville, Frantz Rowe, François-Charles Wolff,	<p>This paper investigates the relationship between Information Systems (IS) integration and the use of cybersecurity countermeasures using an adapted exposure to risk perspective which considers both the probability of a risk through vulnerability points theory and the impact of the risk if it occurs. Based on an econometric analysis of a survey sample of 9,721 French firms, the study finds that higher degrees of system integration entail higher degrees of cybersecurity usage. Whereas previously it was thought that systems integration reduces the number of vulnerabilities and thus the need for cybersecurity countermeasures, we find that the more the system is integrated, the greater the use of self-protective cybersecurity countermeasures. We theorize that this finding comes from the elimination of many uncontrollable vulnerabilities and the presence of fewer, but controllable, vulnerability points. This finding holds both for internal and external integration but is stronger in the latter case. Moreover, results show that internal dynamism is positively correlated with cybersecurity</p>	10.1145/3184444.3184448		Crossref
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		countermeasures . Our reasoning applies to cybersecurity in terms of self-protective security measures but not necessarily to risk-transfer security measures.</jats:p>			
Proceedings of the 6th International Workshop on Software Engineering for Systems-of-Systems			10.1145/3194754		Crossref
Proceedings of the Fourth Workshop on Cryptography and Security in Computing Systems			10.1145/3031836		Crossref
Proceedings of the 4th International Conference on Networking, Information Systems & Security			10.1145/3454127		Crossref
Risk Management in the Remote Provision of Banking Services in the Conditions of Digital Transformation of Banks	Zokir Toshtemirovich Mamadiyarov,		10.1145/3508072.3508119		Crossref
Proceedings of the 4th Workshop on Security in Highly Connected IT Systems			10.1145/3099012		Crossref
Proceedings of the Second Workshop on Cryptography and Security in Computing Systems			10.1145/2694805		Crossref
Proceedings of the Third Workshop on Cryptography and Security in Computing Systems			10.1145/2858930		Crossref
Design of inpatient medical insurance management system based on three-tier architecture mode	Lianying Ge,		10.1145/3482632.3487551		Crossref
Design and Realization of College Student Employment Management System Based on Intelligent Optimization Algorithm	Jie Li, ZhaoYi Xu,		10.1145/3516529.3516531		Crossref
Design and Realization of Integrity Management System for Operators of Expressway Service Area	Wenlong Wang,		10.1145/3482632.3484106		Crossref
Dynamic Multi-Clock Management for Embedded Systems	Holly Chiang, Daniel Giffin, Amit Levy, Philip Levis,		10.1145/3274783.3275176		Crossref
"We Have No Security Concerns": Understanding the Privacy-Security Nexus in Telehealth for Audiologists and Speech-Language Pathologists	Faiza Tazi, Josiah Dykstra, Prashanth Rajivan, Sanchari Das,		10.1145/3613904.3642208		Crossref
DESIGN OF PRODUCT COUNTING SYSTEM BASED ON STC89C52	Zhijia Chen, Zhihong Xiao, Mingjun Li, Bingbing Zhang,		10.1145/3714334.3714363		Crossref

Ph.D. Forum: Intelligent Home Energy Management: Developing AI-Driven Systems for Sustainable Living	Yu Sheng,		10.1145/3666025.3699665		Crossref
Session details: Volume II: Software design and development, and system software and security: Embedded systems track	Marco Di Natale, Li-Pin Chang,		10.1145/3252769		Crossref
Quantifying Trustworthiness in Decentralized Trusted Applications	Paul Georg Wagner, Jürgen Beyerer,		10.1145/3510547.3517930		Crossref
A Novel Traffic Prediction System based on Floating Car Data and Machine Learning	M. Mzibri, A. Maach, A. Elhadri,		10.1145/3320326.3320355		Crossref
Compliance check software system	Ventsislav Nikolov,		10.1145/2812428.2812445		Crossref

Techniques for Enhancing Security in Industrial Control Systems	Vijay Varadharajan, Uday Tupakula, Kallol Krishna Karmakar,	<p>Increasingly Industrial Control Systems (ICS) systems are being connected to the Internet to minimise the operational costs and provide additional flexibility. These control systems such as the ones used in power grids, manufacturing and utilities operate continually and have long lifespans measured in decades rather than years as in the case of Information Technology (IT) systems. Such industrial control systems require uninterrupted and safe operation. However, they can be vulnerable to a variety of attacks, as successful attacks on critical control infrastructures could have devastating consequences to the safety of human lives as well as a nation's security and prosperity. Furthermore, there can be a range of attacks that can target ICS and it is not easy to secure these systems against all known attacks let alone unknown ones. In this paper, we propose a software enabled security architecture using Software Defined Networking (SDN) and Network Function Virtualisation (NFV) that can enhance the capability to secure industrial control systems. We have designed such an</p>	10.1145/3630103		Crossref
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		<p>SDN/NFV enabled security architecture and developed a Control System Security Application (CSSA) in SDN Controller for enhancing security in ICS by achieving real time situational awareness and dynamic policy-driven decision making across the network infrastructure. In particular, CSSA can be used for establishing secure path for end-to-end communication between devices and also deal against certain specific attacks namely denial of service attacks, from unpatched vulnerable control system components and securing the communication flows from the legacy devices that do not support any security functionality. We also discuss how CSSA provides reliable paths for safety critical messages in control systems. We discuss the prototype implementation of the proposed architecture and the results obtained from our analysis.</p>			
A Cross-Layer Key Establishment Model for Wireless Devices in Cyber-Physical Systems	Yuxin Zhang, Yang Xiang, Xinyi Huang,		10.1145/3055186.3055187		Crossref
Application Research of Geological Information Metadata System in Big Data Environment	Xiaohong Wu, Hanrui Sun, Mingming Zhao,		10.1145/3661638.3661673		Crossref

Risk of Stochastic Systems for Temporal Logic Specifications	Lars Lindemann, Lejun Jiang, Nikolai Matni, George J. Pappas,	<p><jats:p> The wide availability of data coupled with the computational advances in artificial intelligence and machine learning promise to enable many future technologies such as autonomous driving. While there has been a variety of successful demonstrations of these technologies, critical system failures have repeatedly been reported. Even if rare, such system failures pose a serious barrier to adoption without a rigorous risk assessment. This article presents a framework for the</p> <p><jats:italic>syste matic and rigorous risk verification</jats:i talic> of systems. We consider a wide range of system specifications formulated in signal temporal logic (STL) and model the system as a stochastic process, permitting discrete-time and continuous-time stochastic processes. We then define the STL robustness risk as</p> <p><jats:italic>the risk of lacking robustness against failure</jats:italic> . This definition is motivated as system failures are often caused by missing robustness to modeling errors, system disturbances, and distribution shifts</p>	10.1145/3580490	https://dl.acm.org/doi/pdf/10.1145/3580490	Crossref
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		<p>in the underlying data generating process. Within the definition, we permit general classes of risk measures and focus on tail risk measures such as the value-at-risk and the conditional value-at-risk. While the STL robustness risk is in general hard to compute, we propose the approximate STL robustness risk as a more tractable notion that upper bounds the STL robustness risk. We show how the approximate STL robustness risk can accurately be estimated from system trajectory data. For discrete-time stochastic processes, we show under which conditions the approximate STL robustness risk can even be computed exactly. We illustrate our verification algorithm in the autonomous driving simulator CARLA and show how a least risky controller can be selected among four neural network lane-keeping controllers for five meaningful system specifications.</p>			
Self-assembling heterogeneous interactive systems	G. Stefanescu, C. I. Paduraru,		10.1145/3175731.3176174		Crossref
Towards collaborative technical debt management in systems of systems	Johann Schütz, Jorge Marx Gómez,		10.1145/3387906.3388620		Crossref
Development of a web-based conference management system using SOFL	Fumiko Nagoya, Shaoying Liu,		10.1145/2811411.2811502		Crossref
Towards Educational Systems-of-Information Systems	Vânia de Oliveira Neves, Lina Garcés, Valdemar Graciano Graciano Neto,		10.1145/3411564.3411650		Crossref

Context-Based IDE Command Recommender System	Marko Gasparic,		10.1145/2959100.2959106		Crossref
A Hierarchical Method for Dynamic Job Execution in NREN-based Cloud Systems	Cheikh Saliou Mbacke Babou, Bernard Ousmane Sane, Ibrahima Niang,		10.1145/3320326.3320370		Crossref
FA ³	Yan Lin, Joshua Wong, Debin Gao,		10.1145/3572864.3580338		Crossref
Proceedings of the 6th International Conference on Networking, Intelligent Systems & Security			10.1145/3607720		Crossref
Concept of a holistic HiL test system for autonomous vehicles in cyber-physical Traffic Systems	Xiaobo Liu-Henke, Sven Jacobitz, Marian Göllner, Jie Zhang,		10.1145/3655532.3655588		Crossref
Conceptual Model of Analysing Risk in a Fuel Gas Supply System (FGSS) on LNG Fuelled-gas Vessel	Pandhu A. Lakshana, Akhmad Hidayatno, Andri D. Setiawan,		10.1145/3400934.3400961		Crossref
How can interoperability approaches impact on Systems-of-Information Systems characteristics?	Juliana Fernandes, Francisco Ferreira, Felipe Cordeiro, Valdemar Graciano Neto, Rodrigo Santos,		10.1145/3411564.3411621		Crossref
Proceedings of the 2017 Workshop on Cyber-Physical Systems Security and PrivaCy			10.1145/3140241		Crossref
Bayesian Networks in Intelligent Tutoring Systems as an Assessment of Student Performance using Student Modeling	Roselie B. Alday,		10.1145/3242840.3242867		Crossref
Modeling traceability in system of systems	Bedir Tekinerdogan, Ferhat Erata,		10.1145/3019612.3019908		Crossref
Proceedings of the 3rd International Conference on Networking, Information Systems & Security			10.1145/3386723		Crossref
Proceedings of the Sixth Workshop on Cryptography and Security in Computing Systems			10.1145/3304080		Crossref
Proceedings of the 7th International Conference on Networking, Intelligent Systems and Security			10.1145/3659677		Crossref
A low-cost driving risk prediction system for hilly roads via surveillance cameras and onsite webcams	Deepali Verma, Tanima Dutta, Monika Varshney,		10.1145/3563357.3567749		Crossref
An end-to-end framework for privacy risk assessment of AI models	Abigail Goldsteen, Shlomit Shachor, Natalia Raznikov,		10.1145/3534056.3534998		Crossref

Session details: Theme: System software and security: RS - Recommender systems: Theory and applications track			10.1145/3297280.3329387		Crossref
Context-Aware Intrusion Detection in Industrial Control Systems	Md Raihan Ahmed, Mu Zhang,		10.1145/3689930.3695212		Crossref
The Architecture of a Comprehensive System for Civil Unmanned Aerial Vehicle Traffic Management in Urban Low-Altitude Airspace	Lei Cao, Qingbin Xu, Chen Chen, Qinggang Wu, Jianping Zhang,		10.1145/3661638.3661683		Crossref
The Case for Operating System Management of User Attention	Kyungmin Lee, Jason Flinn, Brian Noble,		10.1145/2699343.2699362		Crossref
Ergonomical assessment using wearable motion capture system in dockworkers during lashing	Sofia Scataglini, Lenie Denteneer, Nele Struyf, Steven Truijen,		10.1145/3597061.3597258		Crossref
Proceedings of the 2nd International Conference on Networking, Information Systems & Security			10.1145/3320326		Crossref
Acoustic Event Detection and Sound Separation for security systems and IoT devices	Alexander Iliev, Mayank Dewli, Muhsin Kalkan, Preeti Prakash Kudva, Rekha Turkar,		10.1145/3472410.3472441		Crossref
A Deep Learning Based Semi-Supervised Network Intrusion Detection System Robust to Adversarial Attacks	Syed Md. Mukit Rashid, Md. Toufikuzzaman, Md. Shohrab Hossain,		10.1145/3629188.3629189		Crossref
Towards Automatic Generation of Systems-of-Systems Architectural Configurations	Marcos Borges, Wallace Manzano, Lincoln Rocha, Paulo Maia, Elisa Nakagawa,		10.1145/3643655.3643884		Crossref
Playing a Multi-objective Spot-checking Game in Public Transportation Systems	Ali Alshawish, Mohamed Amine Abid, Stefan Rass, Hermann de Meer,		10.1145/3099012.3099019		Crossref
Character Alive	Min Fan, Jianyu Fan, Alissa N. Antle, Sheng Jin, Dongxu Yin, Philippe Pasquier,		10.1145/3290607.3312756		Crossref
Research on the Efficacy Assessment of Civil Aviation Risk Control Measures Based on GloVe-textCNN	Weizhen Tang, Ting Huang, Zhousheng Huang,		10.1145/3700706.3700712		Crossref
Fair and Transparent Recommender Systems for Advertisements	Dina Zilbershtein,		10.1145/3705328.3748755		Crossref
Proceedings of the Fifth Workshop on Cryptography and Security in Computing Systems			10.1145/3178291		Crossref
Proceedings of the 2018 Workshop on Cyber-Physical Systems Security and Privacy			10.1145/3264888		Crossref

Session details: Distributed systems	Marcos Aguilera,		10.1145/3257812		Crossref
Globally Coordinated Distributed Storm Water Management System	Luis Montestruque, M. D. Lemmon,		10.1145/2738935.2738948		Crossref
Design and Implementation of Meteorological Equipment Management System Based on SSM Framework	Jing Chen, Xiao Han,		10.1145/3482632.3484035		Crossref
Information Transformation of Teaching Management System Based on Big Data Investigation Technology	Meijuan Yuan, Fei Yan,		10.1145/3482632.3483009		Crossref
Risk-Hedged Venture Capital Investment Recommendation	Xiaoxue Zhao, Weinan Zhang, Jun Wang,		10.1145/2792838.2800181		Crossref
Toward Distributed Smart Parking Management System	Nihal El Khalidi, Faouzia Benabbou, Nawal Sael, Khadija Sabiri,		10.1145/3289402.3289509		Crossref
A Question answering System with a sequence to sequence grammatical correction	Bghiel Afrae, Ben Ahmed Mohamed, A. Anouar Boudhir,		10.1145/3386723.3387894		Crossref
Comparison of Industrial Control System Anomaly Detection Methods	Piotr Sobonski, Utz Roedig,		10.1145/3689930.3695211		Crossref
Identifying Hazards and Risk Assessment in Hazardous Process of Making Prosthesis and Orthosis	Rina Fitriana Rahmawati, Amalia Suzianti,		10.1145/3400934.3400965		Crossref

Decoding Digital Risk From Corporate Disclosure: A Neural Network Approach	Yuan Long, Arun Rai,	<p><jats:p></p> <p><jats:italic>Digital risk</jats:italic>—or the likelihood of losses from key digital activities (i.e., information system [IS] sourcing, digital infrastructure, data management, IS applications, IS use, and digital product offerings)—constitutes a key consideration in firm valuation. Firms' public disclosures (e.g., 10-K reports, earnings conference calls) are a key source of data to learn about digital risks. Although text analytics approaches (e.g., word frequency, topic modeling, and sentiment analysis) have been applied to a firm's public disclosures to assess various types of risk (e.g., political risk, tax risk, cybersecurity), they do not consider the structural linguistic relations embedded in the text that are potentially relevant in measuring risk.</p> <p></jats:p></p> <p><jats:p></p> <p>We apply a neural network approach to address this gap and extract linguistic relations from a firm's 10-K disclosure (Section "Item 1A"). We develop novel firm-level digital risk measures based on these linguistic relations. Specifically, we measure firm-level digital risk from three perspectives: (1)</p>	10.1145/3728365		Crossref
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		<p><jats:italic>presence</jats:italic> (whether digital risk is mentioned or not), (2)</p> <p><jats:italic>intensity</jats:italic> (text coverage of digital risk relative to other issues), and (3)</p> <p><jats:italic>diversity</jats:italic> (the types of digital risk mentioned).</p> <p></jats:p> <jats:p>We validate our digital risk measures by demonstrating their significant correlation with firm risk, proxied by stock market volatility. Our research reveals that investors' perceptions of digital risk diversity and digital risk intensity differ between IT and non-IT companies. First, across all firms, digital risk intensity is negatively associated with firm risk, indicating that investors do not incorporate intensity of digital risk when assessing firm risk. Second, in non-IT firms, digital risk diversity is positively associated with firm risk, suggesting that managers in these firms may influence investor perceptions through strategic disclosure of digital risk types. Overall, our findings suggest that text-based digital risk measurement is practically feasible, scalable, and economically</p>			
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		meaningful.</jats:p>			
Session details: Formal systems	Petros Maniatis,		10.1145/3257810		Crossref
Conversational Agents for Recommender Systems	Andrea Iovine,		10.1145/3383313.3411453		Crossref
Assessing the Robustness of Deep Learning-Based Gait Recognition Systems Against Adversarial Attacks	El Mehdi Saoudi, Said Jai Andaloussi, Jaafar Jaafari,		10.1145/3659677.3659824		Crossref
Session details: Theme: System software and security: NGPS - Next generation programming paradigms and systems track			10.1145/3329382		Crossref
Understanding Older Users' Acceptance of Wearable Interfaces for Sensor-based Fall Risk Assessment	Alan Yusheng Wu, Cosmin Munteanu,		10.1145/3173574.3173693		Crossref
Session details: Storage systems	Andrew Baumann,		10.1145/3257819		Crossref
Exploring Collaborative Filtering Algorithms in MOOCs Recommender Systems: A Comprehensive Overview	Imane El Mourabit, Said Jai Andaloussi, Ouail Ouchetto, Mounia Miyara,		10.1145/3607720.3607742		Crossref
Predicting Discharge Mode in Dielectric Barrier Discharge (DBD) Systems using Machine Learning: Importance, Algorithms, and Perspectives	Moustapha Ouali, Issam Seddik, Youssef Lagmich,		10.1145/3607720.3607795		Crossref
Identifying Security Challenges in Renewable Energy Systems	Anish Jindal, Angelos K. Marnierides, Andrew Scott, David Hutchison,		10.1145/3307772.3330154		Crossref
Proceedings of the 2nd ACM Workshop on Cyber-Physical Systems Security and Privacy			10.1145/2994487		Crossref

Measuring the Business Value of Recommender Systems	Dietmar Jannach, Michael Jugovac,	<p><jats:p></p> <p>Recommender Systems are nowadays successfully used by all major web sites—from e-commerce to social media—to filter content and make suggestions in a personalized way. Academic research largely focuses on the value of recommenders for consumers, e.g., in terms of reduced information overload. To what extent and in which ways recommender systems create</p> <p><jats:italic>business value</jats:italic> is, however, much less clear, and the literature on the topic is scattered. In this research commentary, we review existing publications on field tests of recommender systems and report which business-related performance measures were used in such real-world deployments. We summarize common challenges of measuring the business value in practice and critically discuss the value of algorithmic improvements and offline experiments as commonly done in academic environments. Overall, our review indicates that various open questions remain both regarding the realistic quantification of the business effects of</p>	10.1145/3370082		Crossref
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		recommenders and the performance assessment of recommendation algorithms in academia. </jats:p>			
A Constructive Multilevel Security System with Cryptographic Techniques by using Cyber-Physical System in the Space/Defense Applications	Seelam Ch Vijaya Bhaskar, Jagadam Vijay Gopal, Anitha S,		10.1145/3372422.3372427		Crossref
Research on Financial Intelligence System Architecture and Metadata Management Based on Support Vector Machine	Yifei Bai,		10.1145/3482632.3487532		Crossref
Round Key Generation Algorithm Used in Symmetric Block Encryption Algorithms to Ensure the Security of Economic Systems	Kuvonchbek Rakhimberdiev, Asqar Bozorov, Mansur Berdimurodov,		10.1145/3644713.3644794		Crossref
Model-driven performance prediction of systems of systems	Katrina Falkner, Claudia Szabo, Vanea Chiprianov,		10.1145/2976767.2987689		Crossref
Study and Analysis of Data Analysis Systems (Reconstruction of a Learning Data from the Initial Data)	Sara Belattar, Otman Abdoun, El khatir Haimoudi,		10.1145/3386723.3387837		Crossref
Peek-through Customization	Laton Vermette, Joanna McGrenere, Parmit K. Chilana,		10.1145/3357236.3395507		Crossref
Navigating User-System Gaps: Understanding User-Interactions in User-Centric Context-Aware Systems for Digital Well-being Intervention	Inyeop Kim, Uichin Lee,		10.1145/3613904.3641979		Crossref
Large Language Model Interface for Home Energy Management Systems	François Michelon, Yihong Zhou, Thomas Morstyn,		10.1145/3679240.3734586		Crossref
Perceptions of Learning Management System application in Computer Undergraduate Courses	Katia Silva, Claudete Kronbauer, Davi Viana,		10.1145/3293614.3293637		Crossref
A policy-based per-flow mobility management system design	Miroslaw Kantor, Radu State, Thomas Engel, Gaston Ormazabal,		10.1145/2843491.2843835		Crossref
Short Paper: AI-Driven Disaster Warning System: Integrating Predictive Data with LLM for Contextualized Guideline Generation	Md. Abrar Faiaz, Nowshin Nawar,		10.1145/3704522.3704549		Crossref
Explainable Multi-Stakeholder Job Recommender Systems	Roan Schellingerhout,		10.1145/3640457.3688014		Crossref

Proceedings of the 2021 International Symposium on Advanced Security on Software and Systems			10.1145/3457340		Crossref
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System-Level Observation Framework for Non-Intrusive Runtime Monitoring of Embedded Systems	Jong Chul Lee, Roman Lysecky,	<p>As the complexity of embedded systems rapidly increases, the use of traditional analysis and debug methods encounters significant challenges in monitoring, analyzing, and debugging the complex interactions of various software and hardware components. This situation is further exacerbated for in-situ debugging and verification in which traditional debug and trace interfaces that require physical access are unavailable, infeasible, or cost prohibitive. In this article, we present a system-level observation framework that provides minimally intrusive methods for dynamically monitoring and analyzing deeply integrated hardware and software components within embedded systems. The system-level observation framework monitors hardware and software events by inserting additional logic for detecting designer-specified events within hardware cores to observe complex interaction across hardware and software boundaries at runtime, and provides visibility for monitoring complex execution behavior of software applications without affecting the system execution.</p>	10.1145/2717310		Crossref
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GCMF	Danial Aghajarian, Satish Puri, Sushil Prasad,		10.1145/2996913.2996982	https://dl.acm.org/doi/pdf/10.1145/2996913.2996982	Crossref
Risk-Oriented Design Approach For Forensic-Ready Software Systems	Lukas Daubner, Raimundas Matulevicius,		10.1145/3465481.3470052		Crossref
Intelligent Retrieval System for Power Policy Documents Based on Semantic Analysis	Qingjuan Wang, Ruoyun Hu, Gang Sun, Huan Liu,		10.1145/3661638.3661684		Crossref
Proceedings of the 2025 Workshop on Re-design Industrial Control Systems with Security			10.1145/3733823		Crossref
The Design of Dual Initiative Project Management Platform System Based on Whole Life Cycle Management	Yan Yang, Yongyi Yan, Ruyue Zheng,		10.1145/3561877.3561891		Crossref
Automation Support for System Simulation and Architecture Layout Design in Cyber-Physical Systems Engineering	Johan Cederbladh, Martin Eisenberg, Luca Berardinelli, Damir Bilic,		10.1145/3652620.3686250		Crossref
Prediction Method of Power Grid Security Risk Range Based on Graph Semi-supervised Learning	Tong Yu, Ming Xie, Xin Li, Ying Ling, Dongmei Bin, Chunyan Yang,		10.1145/3469213.3470287		Crossref
Session details: Theme: System software and security: NGPS - Next generation programming paradigms and systems track			10.1145/3297280.3329382		Crossref
System-E	Sharath Chandrashekhara , Taeyeon Ki, Karthik Dantu, Steven Y. Ko,		10.1145/3210240.3211111	https://dl.acm.org/doi/pdf/10.1145/3210240.3211111	Crossref

Toward Smart Embedded Systems	Nikil Dutt, Axel Jantsch, Santanu Sarma,	<p>Embedded systems must address a multitude of potentially conflicting design constraints such as resiliency, energy, heat, cost, performance, security, etc., all in the face of highly dynamic operational behaviors and environmental conditions. By incorporating elements of intelligence, the hope is that the resulting “smart” embedded systems will function correctly and within desired constraints in spite of highly dynamic changes in the applications and the environment, as well as in the underlying software/hardware platforms. Since terms related to “smartness” (e.g., self-awareness, self-adaptivity, and autonomy) have been used loosely in many software and hardware computing contexts, we first present a taxonomy of “self-x” terms and use this taxonomy to relate major “smart” software and hardware computing efforts. A major attribute for smart embedded systems is the notion of self-awareness that enables an embedded system to monitor its own state and behavior, as well as the external environment, so as to adapt intelligently. Toward this end, we use a System-on-Chip</p>	10.1145/2872936		Crossref
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		perspective to show how the CyberPhysical System-on-Chip (CPSoC) exemplar platform achieves self-awareness through a combination of cross-layer sensing, actuation, self-aware adaptations, and online learning. We conclude with some thoughts on open challenges and research directions.</jats:p>			
Messengers integration methods with corporate information systems	Viktoria Konovalova, Nikita Kazakov, Hamza Mohammed Ridha Al-Khafaji, Maxim Kovtsur, Anton Kistruga,		10.1145/3508072.3508191		Crossref
Sequence-aware Intrusion Detection in Industrial Control Systems	Marco Caselli, Emmanuele Zambon, Frank Kargl,		10.1145/2732198.2732200		Crossref
Intelligent learning systems for LLL courses	Gulmira Bekmanova, Yerkin Ongarbayev, Baubek Somzhurek, Nurlan Mukatayev,		10.1145/3460620.3460625		Crossref
Session details: Energy aware systems	Landon Cox,		10.1145/3257814		Crossref
Overview of Node Power Management System for Self-Powered Wireless Sensor Network	Qun Wang, Wanli Sun, Yu Liu,		10.1145/3469213.3470702		Crossref
Proceedings of the Third International Symposium on Advanced Security on Software and Systems			10.1145/3591365		Crossref
A cooperative SoS architecting approach based on adaptive multi-agent systems	Teddy Bouziat, Valérie Camps, Stéphanie Combettes,		10.1145/3194754.3194756		Crossref
Automated system performance testing at MongoDB	Henrik Ingo, David Daly,		10.1145/3395032.3395323		Crossref
Conversational Recommender System Using Deep Reinforcement Learning	Omprakash Sonie,		10.1145/3523227.3547376		Crossref
Incorporating System-Level Objectives into Recommender Systems	Himan Abdollahpouri,		10.1145/3308560.3314201		Crossref
A raspberry pi operating system for exploring advanced memory system concepts	Pascal Francis-Mezger, Vincent M. Weaver,		10.1145/3240302.3240311		Crossref

A Proposed Framework of Vaccine Supply Chain Risk Management in Indonesia	Annisa Chairani Sudarmin, Romadhani Ardi,		10.1145/3400934.3401002		Crossref
Ensuring Security in Smart Cities through the voice recognition system: A state of the art	Ikram Ben abdel ouahab, Lotfi Elaachak, Mohammed Bouhorma, Yasser Alluhaidan, Bassam Zafar,		10.1145/3659677.3659746		Crossref
A self-adaptive system of systems architecture to enable its ad-hoc scalability	Ahmed R. Sadik, Bram Bolder, Pero Subasic,		10.1145/3596947.3596949		Crossref
Robustness in Multi-Agent Energy Systems: The Trade-Off between Decentralization and Security	Emilie Frost, Afia Afrin, Astrid Nieße, Omid Ardakanian,		10.1145/3679240.3734682		Crossref
Managing the security-energy tradeoff in distributed cyber-physical systems	Anh-Duy Vu, Ramy Medhat, Borzoo Bonakdarpour,		10.1145/3302509.3311051	https://dl.acm.org/doi/pdf/10.1145/3302509.3311051	Crossref
Model-based security analysis of a water treatment system	Eunsuk Kang, Sridhar Adepu, Daniel Jackson, Aditya P. Mathur,		10.1145/2897035.2897041		Crossref
Recommender-Systems.com: A Central Platform for the Recommender-System Community	Joeran Beel,		10.1145/3383313.3411522		Crossref
A Conceptual Framework to design Users Digital Legacy Management Systems	Fabício Horácio Sales Pereira, Raquel Oliveira Prates,		10.1145/3160504.3160508		Crossref
Proceedings of the First International Workshop on Security and Privacy of Sensing Systems			10.1145/3628356		Crossref
Score and You Shall Find: A Novel Regularization Technique for Cyberattack Detection in Industrial Control Systems	Tatsumi Oba, Tadahiro Taniguchi, Naoto Yanai,		10.1145/3689930.3695205		Crossref
Collision Risk Assessment and Forecasting on Maritime Data	Andreas Tritsarolis, Brian Murray, Nikos Pelekis, Yannis Theodoridis,		10.1145/3589132.3625573		Crossref
Session details: Architectures & System Software	John Kim,		10.1145/3618047		Crossref
Explainability in Music Recommender System	Shahrzad Shashaani,		10.1145/3640457.3688028		Crossref

Electronic Social Capital for Self-Organising Multi-Agent Systems	Patricio E. Petruzzi, Jeremy Pitt, Dídac Busquets,	<p>It is a recurring requirement in open systems, such as networks, distributed systems, and socio-technical systems, that a group of agents must coordinate their behaviour for the common good. In those systems—where agents are heterogeneous—unexpected behaviour can occur due to errors or malice. Agents whose practices free-ride the system can be accepted to a certain level; however, not only do they put the stability of the system at risk, but they also compromise the agents that behave according to the system's rules.</p> <p>In social systems, it has been observed that <i>social capital</i> is an attribute of individuals that enhances their ability to solve collective action problems. Sociologists have studied collective action through human societies and observed that social capital plays an important role in maintaining communities though time as well as in simplifying the decision-making in them. In this work, we explore the use of Electronic Social Capital for optimising self-organised collective action.</p> <p>We developed a context-independent</p>	10.1145/3124642		Crossref
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		<p>Electronic Social Capital framework to test this hypothesis. The framework comprises a set of handlers that capture events from the system and update three different forms of social capital: trustworthiness, networks, and institutions. Later, a set of metrics are generated by the forms of social capital and used for decision-making. The framework was tested in different scenarios such as two-player games,<i>>n</i>-player games, and public goods games. The experimental results show that social capital optimises the outcomes (in terms of long-term satisfaction and utility), reduces the complexity of decision-making, and scales with the size of the population.</i><p><i>>p></i>This work proposes an alternative solution using Electronic Social Capital to represent and reason with qualitative, instead of traditional quantitative, values. This solution could be embedded into socio-technical systems to incentivise collective action without commodifying the resources or actions in the system.<i></p></i></p></p>			
Proceedings of the 2023 International Conference on Artificial Intelligence, Systems and Network Security			10.1145/3661638		Crossref

Proceedings of the 2nd International Workshop on Security and Privacy of Sensing Systems			10.1145/3722566		Crossref
A Preliminary Phase of Supply Chain Risk Management	Sukma Azzah Kharisma, Romadhani Ardi,		10.1145/3400934.3401001		Crossref
Session details: Theme: System software and security: OSSP - operating systems and software platforms track	Joonhyouk Jang, Jinman Jung, Bongjae Kim, Hong Min, Kwanghee Won,		10.1145/3535438		Crossref
ICSML: Industrial Control Systems ML Framework for native inference using IEC 61131-3 code	Constantine Doumanidis, Prashant Hari Narayan Rajput, Michail Maniatakos,		10.1145/3592538.3594272		Crossref
Approach to use ontology based on electronic payment system and machine learning to prevent Fraud	Ahmed El Orche, Mohamed Bahaj,		10.1145/3320326.3320369		Crossref
Systems Engineering of Cyber-Physical Systems Education Program	Jon Wade, Roberta Cohen, Mark Blackburn, Eirik Hole, Nicholas Bowen,		10.1145/2832920.2832927		Crossref
Censorship Resistant Decentralized IoT Management Systems	Songlin He, Qiang Tang, Chase Q. Wu,		10.1145/3286978.3286979		Crossref
Cross-Vendor Variability Management for Cloud Systems Using the TOSCA DSL	Tobias Fellner, Paul Grünbacher,		10.1145/3715340.3715433		Crossref
Research on security mechanism of power systems based on the security assessment model	Songming Han, Ming Xie, Xin Li, Jieke Lu, Shaofeng Ming,		10.1145/3677182.3677313		Crossref
Proceedings of the 2024 Workshop on Re-design Industrial Control Systems with Security			10.1145/3689930		Crossref
Taxonomy of Package Management in Programming Languages and Operating Systems	Hisham Muhammad, Lucas C. Villa Real, Michael Homer,		10.1145/3365137.3365402		Crossref
Duplicate Management Using Graph Database Systems	Robinson Vespuccio Vaz, Jones Dhyemison Quito de Oliveira, Leonardo Andrade Ribeiro,		10.1145/3330204.3330260		Crossref
Smart airport	Samia Bouyakoub, Abdelkader Belkhir, Fayçal M'hamed Bouyakoub, Wassila Guebli,		10.1145/3102304.3105572		Crossref
A Novel Whole-house Intelligent Energy Management System Inspired by the Concept of "Carbon Neutrality"	Ying Zhang,		10.1145/3482632.3487474		Crossref
Testing a recommender system for self-actualization	Daricia Wilkinson,		10.1145/3240323.3240324		Crossref

Rule-Based System Against Reinforcement Learning*	Bozhan Orozov, Daniela Orozova,		10.1145/3472410 .3472437		Crossref
Proceedings of the ACM Workshop on Cyber- Physical Systems Security & Privacy - CPS- SPC'19			10.1145/3338499		Crossref
MicroGraphQL	Marcos V. de F. Borges, Lincoln S. Rocha, Paulo Henrique M. Maia,		10.1145/3528229 .3529381		Crossref

<p>An Automated Security-Aware Approach for Design of Embedded Systems on MPSoC</p>	<p>Benjamin Tan, Morteza Biglari-Abhari, Zoran Salcic,</p>	<p><jats:p>MPSoC-based embedded systems design is becoming increasingly complex. Not only do we need to satisfy multiple design objectives, we increasingly need to address potential security risks. In this work, we propose a security-aware systematic design approach which explores the design space, given a system-level application description, by generating potential architecture configurations of execution platform nodes that are interconnected using a NoC. We then perform automated security analysis to check the generated configurations against designer-specified security constraints. Following the analysis, we use an automated architecture configuration refinement process to generate a list of security additions that are inserted into the initial configuration so that the security constraints are satisfied. By performing this refinement on several candidate configuration options, we can explore the trade-off between resource cost and security. In this paper, we illustrate the proposed approach using a Smart Home Control System application.</jats:p></p>	<p>10.1145/3126553</p>		<p>Crossref</p>
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Preventing Reverse Engineering of Control Programs in Industrial Control Systems	Shalini Banerjee, Steven D. Galbraith, Tariq Khan, John H. Castellanos, Giovanni Russello,		10.1145/3592538.3594275		Crossref
Research on Complaint Operation Management System Based on digital Transformation	Liping Zhang, Kefeng Yu, Yingmao Hu, Ying Wu,		10.1145/3561877.3561894		Crossref
Load balancing for hybrid NoSQL database management systems	Han-Sheng Huang, Shih-Hao Hung, Chih-Wei Yeh,		10.1145/2811411.2811495		Crossref
Poster: Affordable Automatic Air Quality Monitoring System for At-risk Homes	Bryceton Bible, Bruce Tonn, Kristina Kintziger, Kelsey Ellis, Jennifer First, Laura Humphrey, Erin Rose, Xiaopeng Zhao,		10.1145/3580252.3589419		Crossref
Bits Under the Mattress: Understanding Different Risk Perceptions and Security Behaviors of Crypto-Asset Users	Svetlana Abramova, Artemij Voskoboynikov, Konstantin Beznosov, Rainer Böhme,		10.1145/3411764.3445679		Crossref

SHIELD: Security-Aware Scheduling for Real-Time DAGs on Heterogeneous Systems	Debabrata Senapati, Pooja Bhagat, Chandan Karfa, Arnab Sarkar,	<p>Many control applications in real-time cyber-physical systems are represented as Directed Acyclic Graphs (</p> <p><i>DAGs</i>) due to complex interactions among their functional components, and executed on distributed heterogeneous platforms. Data communication between dependent task nodes running on different processing elements are often realized through message transmission over a public network, and are hence susceptible to multiple security threats such as</p> <p><i>snooping</i>,</p> <p><i>alteration</i>, and</p> <p><i>spoofing</i>. Several alternative security protocols having varying security strengths and associated implementation overheads are available in the market, for incorporating</p> <p><i>confidentiality</i>,</p> <p><i>integrity</i>, and</p> <p><i>authentication</i> on the transmitted messages. While message size</p>	10.1145/3702236		Crossref
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		<p>and correspondingly its associated transmission overheads may be marginally increased due to the assignment of security protocols, significant computation overheads must be incurred for securing the message at the location of its source task node and for unlocking security/message extraction at the destination. Obtained security strengths and associated computation overheads vary depending on the set of protocols chosen for a given message from an available pool of protocols. Given lower bounds on the security demands of an application's messages, selecting the appropriate protocols for each message such that a system's overall security is maximized while satisfying constraints related to the resource, task precedence and deadline, is a challenging and computationally hard problem. In this article, we propose an efficient heuristic strategy called</p> <p><i>SHIELD</i> for security-aware real-time scheduling of DAG-structured applications to be executed on distributed heterogeneous systems. The efficacy of the proposed scheduler is exhibited through</p>			
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		<p>extensive simulation-based experiments using two DAG-structured application benchmarks. Our performance evaluation results demonstrate that</p> <p><i>SHIELD</i></p> <p>significantly outperforms two greedy baseline strategies</p> <p><i>SHIELD</i> in terms of solution generation times (i.e., runtimes) and</p> <p><i>SHIELD</i> in terms of achieved security utility. Additionally, a case study on the</p> <p><i>Tracti on Control</i></p> <p>application in automotive systems has been included to exhibit the applicability of</p> <p><i>SHIELD</i> in real-world settings.</p>			
Regional flood risk grading assessment and application based on uncertain EW-AHPSort II method	Jiali Kang, Yijun Zhang, Yuxin Guo, Xiaonan Liu, Yuntian Bai, Yan Tu,		10.1145/3503928.3503938		Crossref
Bias in Search and Recommender Systems	Ricardo Baeza-Yates,		10.1145/3383313.3418435		Crossref
Efficiency-Effectiveness Trade-offs in Recommendation Systems	Iulia Paun,		10.1145/3383313.3411452		Crossref
What We Evaluate When We Evaluate Recommender Systems: Understanding Recommender Systems' Performance using Item Response Theory	Yang Liu, Alan Medlar, Dorota Glowacka,		10.1145/3604915.3608809		Crossref
Bio-inspired Nano Communication System	Athraa Jani,		10.1145/3625156.3625179		Crossref

Privacy-preserving attribute-based searchable encryption scheme in intelligent transportation system	Shufen Niu, Xingxing Nan, Peng Ge, Yan Zhang,		10.1145/3714334.3714382		Crossref
Collaborative Analysis for Computational Risk in Urban Water Supply Systems	Di Wu, Hao Wang, Razak Seidu,		10.1145/3357384.3358133		Crossref
RecQR: Using Recommendation Systems for Query Reformulation to correct unseen errors in spoken dialog systems	Manik Bhandari, Mingxian Wang, Oleg Poliannikov, Kanna Shimizu,		10.1145/3604915.3610235		Crossref
The Nuts and Bolts of Deploying Process-Level IDS in Industrial Control Systems	Magnus Almgren, Wissam Aoudi, Robert Gustafsson, Robin Krah, Andreas Lindhé,		10.1145/3295453.3295456		Crossref
Synthesizing Cluster Management Code for Distributed Systems	Lalith Suresh, João Loff, Nina Narodytska, Leonid Ryzhyk, Mooly Sagiv, Brian Oki,		10.1145/3317550.3321444		Crossref
Multidisciplinary variability management for cyber-physical production systems	Hafiyyan Sayyid Fadhilillah,		10.1145/3503229.3547063		Crossref
Is Too Much System Caution Counterproductive? Effects of Varying Sensitivity and Automation Levels in Vehicle Collision Avoidance Systems	Ernestine Fu, Mishel Johns, David A. B. Hyde, Srinath Sibi, Martin Fischer, David Sirkin,		10.1145/3313831.3376300		Crossref
Marketing Risk of Renewable Generators	Philipp Staudt, Patrick Jochem, Steve Kimbrough,		10.1145/3307772.3330178		Crossref
Design and Implementation of Archive Management System Based on Cloud Computing Big Data	Zhengnan Wu, Yuansheng Cheng,		10.1145/3482632.3484110		Crossref
Proceedings of the First ACM Workshop on Cyber-Physical Systems-Security and/or PrivaCy			10.1145/2808705		Crossref
Recommender system for developing new preferences and goals	Yu Liang,		10.1145/3298689.3347054		Crossref
The Cognitive Eye: Indexing Oculomotor Functions for Mental Workload Assessment in Cognition-Aware Systems	Janine Grimmer, Laura Simon, Jan Ehlers,		10.1145/3411763.3451662		Crossref
Virteplex: Virtual Remote Tele-Physical Examination System	Ninad Khargonkar, Kevin Desai, Balakrishnan Prabhakaran, Thiru Annaswamy,		10.1145/3532106.3533486		Crossref
Using Mobile Sensing to Enable the Signal Quality Assessment for Infrastructure Sensing Systems	Yue Zhang, Susu Xu, Laixi Shi, Shijia Pan,		10.1145/3376897.3379165		Crossref

Disturbance observer-based consensus of leader-following multi-agent systems via aperiodic intermittent distributed event-triggered control	Yuting Zhou, Yiping Luo, Yutao Liu,		10.1145/3714334.3714365		Crossref
"Trust equals less death - it's as simple as that" : Developing a Socio-technical Framework for Trustworthy Defence and Security Automated Systems	Asieh Salehi Fathabadi, Pauline Leonard,		10.1145/3686038.3686071		Crossref
Exploratory Methods for Evaluating Recommender Systems	Joey De Pauw,		10.1145/3383313.3411456		Crossref
The design and evaluation of a wearable-based system for targeted tremor assessment in Parkinson's disease	Samantha O'Sullivan, Niall Murray, Thiago Braga Rodrigues,		10.1145/3524273.3532902		Crossref
Design and Implementation of University Asset Management System Based on Discriminant Analysis and Decision Tree Model	Xin Zhang,		10.1145/3482632.3484096		Crossref
A Practitioners Perspective on Addressing Cyber Security and Variability Challenges in Modern Automotive Systems	Philipp Zellmer, Lennart Holsten, Richard May, Thomas Leich,		10.1145/3634713.3634727		Crossref
M3	David Lion, Adrian Chiu, Ding Yuan,		10.1145/3447786.3456256		Crossref
Threat and Risk Management Framework for eHealth IoT Applications	Oleksandr Tomashchuk,		10.1145/3382026.3431250		Crossref
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An ontological architecture for principled and automated system of systems composition	Abdessalam Elhabbash, Vatsala Nundloll, Yehia Elkhatib, Gordon S. Blair, Vicent Sanz Marco,		10.1145/3387939.3391602		Crossref
SMT Formulations of Sufficient Conditions for Forward Invariance in Continuous Dynamical Systems	Michael R. Livesay, Blake C. Rawlings,		10.1145/3716863.3725205		Crossref
Multi Objective Computing and Applying Expert System in Double Skin Façade system	Nasim Eslamirad, Mohammadjavad Mahdavejad,		10.1145/3208903.3212060		Crossref
Multi-agents systems	Aicha Lamjahdi, Hafida Bouloiz, Maryam Gallab,		10.1145/3289402.3289521		Crossref
Enhancing Parkinson's Disease Management through Automatic Personalized Assistive Systems	Nasimuddin Ahmed, Aniruddha Sinha, Avik Ghose,		10.1145/3698388.3699625		Crossref

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Developing Recommendation System to provide a Personalized Learning experience at Chegg	Sanghamitra Deb,		10.1145/3383313.3411557		Crossref
A bottom-up approach to job recommendation system	Sonu K. Mishra, Manoj Reddy,		10.1145/2987538.2987546		Crossref
Interactive System Testing using Interaction Sequences	Jessica Turner,		10.1145/3220134.3220148		Crossref
Review of Vulnerabilities and Countermeasures Against Sybil Attacks on Decentralized Systems Based on Machine Learning Algorithms	Abdellatif Bakar, Abdelhamid Zouhair, El Mokhtar En-Naimi,		10.1145/3607720.3607751		Crossref
Building a conceptual architecture and stakeholder map of a system-of-systems for disaster monitoring and early-warning	Flávio E. A. Horita, Donna H. Rhodes, Thiago J. Inocêncio, Gustavo R. Gonzales,		10.1145/3330204.3330215		Crossref
Isolation and Beyond	Tyler Hunt, Zhipeng Jia, Vance Miller, Christopher J. Rossbach, Emmett Witchel,		10.1145/3317550.3321427	https://dl.acm.org/doi/pdf/10.1145/3317550.3321427	Crossref
Controller Area Network Intrusion Prevention System Leveraging Fault Recovery	Habeeb Olufowobi, Sena Hounsinnou, Gedare Bloom,		10.1145/3338499.3357360		Crossref
Bridging Viewpoints in News with Recommender Systems	Jia Hua Jeng,		10.1145/3640457.3688008		Crossref
Language and system support for interaction	Thibault Raffailac,		10.1145/3102113.3102155		Crossref
Design of Open Laboratory Management System Based on Fingerprint Detection and Recognition	Baohua Jiang, Qiang Qi,		10.1145/3702191.3705516		Crossref
Design and implementation of college physical education intelligent management system based on big data cloud platform	Xiaoxiao Zhang,		10.1145/3482632.3487548		Crossref
Staying the Course	Elena Agapie, Daniel Avrahami, Jennifer Marlow,		10.1145/2858036.2858142		Crossref
Radar Perception for Autonomous Unmanned Aerial Vehicles: a Survey	Federico Corradi, Francesco Fioranelli,		10.1145/3522784.3522787		Crossref
Cyber Security and the Role of Intelligent Systems in Addressing its Challenges	Yaniv Harel, Irad Ben Gal, Yuval Elovici,		10.1145/3057729		Crossref
Application of the armament cyber assessment framework	Aidan McCarthy, Liam Furey, Keagan Smith, Daniel Hawthorne, Raymond Blaine,		10.1145/3384217.3384222		Crossref

CEERS: Counterfactual Evaluations of Explanations in Recommender Systems	Mikhail Baklanov,		10.1145/3640457.3688015		Crossref
Latent Context-Aware Recommender Systems	Moshe Unger,		10.1145/2792838.2796546		Crossref
Memory system characterization of deep learning workloads	Zeshan Chishti, Berkin Akin,		10.1145/3357526.3357569		Crossref
Horizontal Cross-Silo Federated Recommender Systems	Saikishore Kalloori, Severin Klingler,		10.1145/3460231.3478863		Crossref
Motorch	Chen Wu, Sheng Wang, Zhiyong Peng,		10.1145/3557915.3560949		Crossref
Session details: Constrained Systems	Jun Liu,		10.1145/3257282		Crossref
Safety Analysis of Automotive Control Systems Using Multi-Modal Port-Hamiltonian Systems	Siyuan Dai, Xenofon Koutsoukos,		10.1145/2883817.2883845	https://dl.acm.org/doi/pdf/10.1145/2883817.2883845	Crossref
Scaling Enterprise Recommender Systems for Decentralization	Maurits van der Goes,		10.1145/3460231.3474616		Crossref
When Recommendation Systems Go Bad	Evan Estola,		10.1145/2959100.2959117		Crossref
Developing a Dynamic Decision-Support Framework for Higher Education Management Systems through Real-time Information Extraction	Roman Pantin,		10.1145/3644713.3644786		Crossref
Provincial Management System of University Network Public Opinion Based on Information Technology	Bin Xu, Menggang Li, Tingting Ye,		10.1145/3482632.3483018		Crossref
A Cloud-Based Trajectory Data Management System	Ruiyuan Li, Sijie Ruan, Jie Bao, Yu Zheng,		10.1145/3139958.3139990		Crossref

Anonymous Blockchain-based System for Consortium	Qin Wang, Shiping Chen, Yang Xiang,	<p>Blockchain records transactions with various protection techniques against tampering. To meet the requirements on cooperation and anonymity of companies and organizations, researchers have developed a few solutions. Ring signature-based schemes allow multiple participants cooperatively to manage while preserving their individuals' privacy. However, the solutions cannot work properly due to the increased computing complexity along with the expanded group size. In this article, we propose a Multi-center Anonymous Blockchain-based (MAB) system, with joint management for the consortium and privacy protection for the participants. To achieve that, we formalize the syntax used by the MAB system and present a general construction based on a modular design. By applying cryptographic primitives to each module, we instantiate our scheme with anonymity and decentralization. Furthermore, we carry out a comprehensive formal analysis of our exemplified scheme. A proof of concept simulation is provided to show the feasibility. The results demonstrate security and</p>	10.1145/3459087		Crossref
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		efficiency from both theoretical perspectives and practical perspectives.</jats:p>			
Developing Models for Physical Attacks in Cyber-Physical Systems	Carmen Cheh, Ken Keefe, Brett Feddersen, Binbin Chen, William G. Temple, William H. Sanders,		10.1145/3140241.3140249		Crossref
Bandit algorithms in recommender systems	Dorota Glowacka,		10.1145/3298689.3346956		Crossref
Intrusion-Damage Assessment and Mitigation in Cyber-Physical Systems for Control Applications	Rouhollah Mahfouzi, Amir Aminifar, Petru Eles, Zebo Peng, Mattias Villani,		10.1145/2997465.2997478		Crossref
Hierarchical Quantitative Assessment Method of Network Security Threat Situation	Xinlin Liu, Wei Deng, Ping Huang,		10.1145/3482632.3487515		Crossref
Deep Learning-Based Intrusion Detection System for Advanced Metering Infrastructure	Zakaria El Mrabet, Mehdi Ezzari, Hassan Elghazi, Badr Abou El Majd,		10.1145/3320326.3320391		Crossref
A Descriptive Analysis of a Formative Decade of Research in Affective Haptic System Design	Preeti Vyas, Unma Mayur Desai, Karin Yamakawa, Karon Maclean,		10.1145/3544548.3580735		Crossref
Cyber Threat Analysis Framework for the Wind Energy Based Power System	Amarjit Datta, Mohammad Ashiqur Rahman,		10.1145/3140241.3140247		Crossref
Verification Schemes of Multi-SIM Devices in Mobile Communication Systems	Takahito Yoshizawa, Bart Preneel,		10.1145/3416012.3424620		Crossref
Architecture Transformation Research on Joint Border Defense Systems-of-Systems	Mengmeng Zhang, Shuanghui Yi, Menglong Lin, Honghui Chen,		10.1145/3459012.3459017		Crossref
Interactive System Testing	Alexandre Canny,		10.1145/3220134.3220146		Crossref
Poster	Huy Tran, Santosh Pandey, Nirupama Bulusu,		10.1145/3081333.3089319		Crossref
Towards a holistic software systems engineering approach for dependable autonomous systems	Adina Aniculaesei, Jörg Grieser, Andreas Rausch, Karina Rehfeldt, Tim Warnecke,		10.1145/3194085.3194091		Crossref

Universal Artifacts	Yutian Sun, Jianwen Su, Jian Yang,	<p><jats:p> In most BPM systems (a.k.a. workflow systems), the data for process execution is scattered across databases for enterprise, auxiliary local data stores within the BPM systems, and even file systems (e.g., specification of process models). The interleaving nature of data management and BP execution and the lack of a coherent conceptual data model for</p> <p><jats:italic>all</jats:italic> data needed for execution make it hard for (1) providing Business-Process-as-a-Service (BPaaS) and (2) effective support for collaboration between business processes. The primary reason is that an enormous effort is required for maintaining both the engines and the data for the client applications. In particular, different modeling languages and different BPM systems make process interoperation one of the toughest challenges. In this article, we formulate a concept of a “universal artifact,” which extends artifact-centric models by capturing</p> <p><jats:italic>all needed data</jats:italic> for a process instance throughout its</p>	10.1145/2886104		Crossref
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		<p>execution. A framework called SeGA based on universal artifacts is developed to support separation of data and BP execution, a key principle for BPM systems. We demonstrate in this article that SeGA is versatile enough to fully facilitate not only executions of individual processes (to support BPaaS) but also various collaboration models. Moreover, SeGA reduces the complexity in runtime management including runtime querying, constraints enforcement, and dynamic modification upon collaboration across possibly different BPM systems.</p>			
Power Grid User Data Security and Intelligent Scheduling System Based on Blockchain and Deep Neural Networks	Qiang Li, Xian Sun, Yujing Zhang,		10.1145/3702191.3703643		Crossref
Operating and Runtime Systems Challenges for HPC Systems	Arthur B. Maccabe,		10.1145/3095770.3095771	https://dl.acm.org/doi/pdf/10.1145/3095770.3095771	Crossref
Investigating Software Engineering Artifacts in DevOps Through the Lens of Boundary Objects	Christoph Matthies, Robert Heinrich, Rebekka Wohlrab,		10.1145/3593434.3593441		Crossref
Session details: Session 2: Security of Cyber-Physical Systems	Tahir Sandikkaya,		10.1145/3448283		Crossref
Research on the Application of Big Data Cloud Cleaning System in Physical Function Sports Training Management	Wenwen Wang,		10.1145/3482632.3487514		Crossref
The Informatization Construction and Intelligent Development of the Power Logistics System in Enterprises	Yan Jiang, Xu Wang, Sumin Dai, Lei Sun,		10.1145/3714334.3714366		Crossref
Research on the Overall Architecture Design of Project Management Information System Based on SOA	Kun Zhang, Xia Zhang,		10.1145/3482632.3483996		Crossref
Artificial Intelligence and Risk in Design	Aale Luusua, Johanna Ylipulli,		10.1145/3357236.3395491		Crossref

Tools, Techniques, and Methodologies	Rima Asmar Awad, Saeed Beztchi, Jared M. Smith, Bryan Lyles, Stacy Prowell,		10.1145/3295453.3295454		Crossref
CatchAll	Aneet Kumar Dutta, Bhaskar Mukhoty, Sandeep K. Shukla,		10.1145/3462633.3483978		Crossref
Snort Meets Transformers: Accelerating Transformer-Based Network Traffic Classification for Real-Time Performance	Mohamed Hashim Changrampadi, Magnus Almgren, Pablo Picazo-Sanchez, Ahmed Ali-Eldin,		10.1145/3722041.3723098		Crossref
Session details: Volume I: Artificial intelligence and agents, distributed systems, and information systems: Intelligent robotics and multi-agent systems track	Christopher Kiekintveld, Rui P. Rocha, Denis Wolf,		10.1145/3251665		Crossref
Burnt topics in operating systems	Malte Schwarzkopf,		10.1145/3458336.3465282		Crossref
Session details: Systems	Shaolei Ren,		10.1145/3258593		Crossref
Parallel Hash Table Design for NDP Systems	Pranith Kumar, Hyesoon Kim,		10.1145/3422575.3422776		Crossref
Security Assessment of Microfluidic Immunoassays	Mohammed Shayan, Sukanta Bhattacharjee, Yong-Ak Song, Krishnendu Chakrabarty, Ramesh Karri,		10.1145/3312614.3312658		Crossref
IoT based beehive monitoring system	Todor Todorov, Valentin Tonkov,		10.1145/3606305.3606316		Crossref
A Conceptual Model for Contractor Assessment System in the Electricity Project with Tender	Alprianto Zainuddin, Andri D. Setiawan, Akhmad Hidayatno,		10.1145/3468013.3468641		Crossref
Blind Concealment from Reconstruction-based Attack Detectors for Industrial Control Systems via Backdoor Attacks	Tim Walita, Alessandro Erba, John H. Castellanos, Nils Ole Tippenhauer,		10.1145/3592538.3594271		Crossref
Secure user authentication scheme for the Virtual Doctor System enabled H-IoT through 5G Network: A comparison study	Fatima Rougail, Mazri Tomader,		10.1145/3454127.3457624		Crossref
Spatio-Temporal Correlations in Cyber-Physical Systems	Biplab Sikdar,		10.1145/3055186.3055200		Crossref
RecSysOps: Best Practices for Operating a Large-Scale Recommender System	Mohammad Saberian, Justin Basilico,		10.1145/3460231.3474620		Crossref
Proceedings of the 12th ACM/IEEE International Workshop on Software Engineering for Systems-of-Systems and Software Ecosystems			10.1145/3643655		Crossref

Decision-Focused Learning for Complex System Identification: HVAC Management System Application	Pietro Favaro, Jean-François Toubeau, François Vallée, Yury Dvorkin,		10.1145/3679240 .3734584		Crossref
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Understanding Indicators of Compromise against Cyber-attacks in Industrial Control Systems: A Security Perspective	Mohammed Asiri, Neetesh Saxena, Rigel Gjomemo, Pete Burnap,	<p><jats:p>Numerous sophisticated and nation-state attacks on Industrial Control Systems (ICSs) have increased in recent years, exemplified by Stuxnet and Ukrainian Power Grid. Measures to be taken post-incident are crucial to reduce damage, restore control, and identify attack actors involved. By monitoring Indicators of Compromise (IOCs), the incident responder can detect malicious activity triggers and respond quickly to a similar intrusion at an earlier stage. However, to implement IOCs in critical infrastructures, we need to understand their contexts and requirements. Unfortunately, there is no survey paper in the literature on IOC in the ICS environment, and only limited information is provided in research articles. In this article, we describe different standards for IOC representation and discuss the associated challenges that restrict security investigators from developing IOCs in the industrial sectors. We also discuss the potential IOCs against cyber-attacks in ICS systems. Furthermore, we conduct a critical analysis of existing works and available tools in this space. We evaluate the effectiveness of identified IOCs'</p>	10.1145/3587255		Crossref
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		by mapping these indicators to the most frequently targeted attacks in the ICS environment. Finally, we highlight the lessons to be learned from the literature and the future problems in the domain along with the approaches that might be taken.</jats:p>			
Automated derivation of variants in manufacturing systems design	Gökhan Kahraman, Loek Cleophas,		10.1145/3461002.3473942		Crossref
Proceedings of the International Colloquium on Software-intensive Systems-of-Systems at 10th European Conference on Software Architecture			10.1145/3175731		Crossref
Profit-aware Resource Management for Edge Computing Systems	Cosimo Anglano, Massimo Canonico, Marco Guazzone,		10.1145/3213344.3213349		Crossref
Boosting Recommender Systems with Deep Learning	João Gomes,		10.1145/3109859.3109926		Crossref
Achieving ICS Resilience and Security through Granular Data Flow Management	Benjamin Green, Marina Krotofil, David Hutchison,		10.1145/2994487.2994498		Crossref
Evaluating the Pros and Cons of Recommender Systems Explanations	Kathrin Wardatzky,		10.1145/3640457.3688011		Crossref
RADM	Yaodan Hu, Xiaochen Xian, Yier Jin,		10.1145/3450267.3450536	https://dl.acm.org/doi/pdf/10.1145/3450267.3450536	Crossref
An Early Warning System for Suspicious Accounts	Hassan Halawa, Matei Ripeanu, Konstantin Beznosov, Baris Coskun, Meizhu Liu,		10.1145/3128572.3140455		Crossref
Graph processing systems back to the future	Angela Bonifati,		10.1145/3461837.3464687		Crossref
Session details: Systems 1 -- Systems and Applications	Cheng-Hsin Hsu,		10.1145/3257928		Crossref
WiFi Received Signal Strength (RSS) Based Automated Attendance System for Educational Institutions	Sidratul Muntaha Khan, Mehreen Tabassum Maliha, Md Shahedul Haque, Ashikur Rahman,		10.1145/3704522.3704523		Crossref
Key Management Protocol with Implicit Certificates for IoT systems	Savio Sciancalepore, Angelo Capossele, Giuseppe Piro, Gennaro Boggia, Giuseppe Bianchi,		10.1145/2753476.2753477		Crossref

Towards Symbiotic Recommendations: Leveraging LLMs for Conversational Recommendation Systems	Alessandro Petruzzelli,		10.1145/3640457.3688023		Crossref
KidRec: Children & Recommender Systems	Jerry Alan Fails, Maria Soledad Pera, Franca Garzotto, Mirko Gelsomini,		10.1145/3109859.3109956		Crossref
Construction of Campus Football Monitoring System Based on Agent Technology	Jie Li,		10.1145/3516529.3516550		Crossref
Role of Information Technologies in Supply Chain Management	Heddoun Asmae, Benrrezzouq Rhizlane,		10.1145/3386723.3387827		Crossref
A DS Evidence Theory-Based Method for Multi-Source Information Fusion in Advanced Systems: Synergistic Intelligence	Xun Sun, Pan Zeng,		10.1145/3718751.3718832		Crossref
Eigenvalue Perturbation for Item-based Recommender Systems	Cesare Bernardis, Paolo Cremonesi,		10.1145/3460231.3478862		Crossref
Research and Application of Intelligent Universal WMS System	Tao Yang, Hairong Yan,		10.1145/3641032.3641034		Crossref

Curbside Parking Regulation Digitization and Inventory Management System	Jiayu Li, Putthida Samrith, Yin Jin, Deyang Zhong, Juhua Hu, Wei Cheng,	<p>Understanding curbside parking rules is crucial for drivers to quickly find legal curbside parking. Traditional data providers rely on manual methods to collect information about curbside parking signs, either by individually noting down sign details or downloading street-level imagery from digital maps. However, this process is slow and inadequate for building an accurate and up-to-date curbside parking rule database, considering the frequent updates to parking signs. In this paper, we propose a novel deep-learning-based Inventory Management System (IMS) that automates to create and manage the curbside parking rule database using videos captured by off-the-shelf dashcams installed on vehicles. To the best of our knowledge, our system is the first of its kind to detect and interpret real-world curbside parking signs from videos and generate parking rules. By utilizing a serverless cloud architecture on AWS, IMS combines secure data retrieval, robust user authentication, and responsive map-based visualization, providing users with up-to-date parking information filtered by location, date, and time.</p>	10.1145/3733240		Crossref
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		Through real-world evaluations, we demonstrate that our system efficiently constructs an accurate curbside parking rule database enhancing urban mobility through efficient and informed parking management.</jats:p>			
Food Safety Evaluation System Based on Mathematical Modeling	Yufei Ma,		10.1145/3469213.3471330		Crossref
An Intelligent Solution based on a Multi-agent System for the Detection of Cheating in Online Exams	Ilhame Khabbachi, Abdelhamid Zouhair, Aziz Mahboub,		10.1145/3607720.3607763		Crossref
ACM TECS Special Issue on Embedded System Security Tutorials	Aviral Shrivastava, Jian-Jia Chen, Akash Kumar, Anup Das,		10.1145/3594872		Crossref
Session details: Embedded Systems Security 1	Daphne Yao,		10.1145/3248549		Crossref
Towards Model-Driven Dashboard Generation for Systems-of-Systems	Maria Teresa Rossi, Alessandro Tundo, Leonardo Mariani,		10.1145/3643655.3643876		Crossref
Perceived Risk and Self-Efficacy Regarding Internet Security in a Marginalized Community	Eunjin (EJ) Jung, Evelyn Y. Ho, Hyewon Chung, Mark Sinclair,		10.1145/2702613.2732912		Crossref
Review on architectures of aquaponic systems based on the Internet of Things and artificial intelligence: Comparative study.	Khaoula Taji, Rachida Ait Abdelouahid, Ibtissame Ezzahoui, Abdelaziz Marzak,		10.1145/3454127.3457625		Crossref
Where Usability and Security Go Hand-in-Hand	Can Liu, Gradeigh D. Clark, Janne Lindqvist,		10.1145/3025453.3025879	https://dl.acm.org/doi/pdf/10.1145/3025453.3025879	Crossref
Comparing recommender systems using synthetic data	Manel Slokom,		10.1145/3240323.3240325		Crossref
RoboFuzz: fuzzing robotic systems over robot operating system (ROS) for finding correctness bugs	Seulbae Kim, Taesoo Kim,		10.1145/3540250.3549164		Crossref
Upside and Downside Risk in Online Security for Older Adults with Mild Cognitive Impairment	Helena M. Mentis, Galina Madjaroff, Aaron K. Massey,		10.1145/3290605.3300573	https://dl.acm.org/doi/pdf/10.1145/3290605.3300573	Crossref
Forecasting complex multi-component time series within systems designed to detect anomalies in dataflows of industrial automated systems	A. N. Ragozin, V. F. Telezhkin, P. S. Podkorytov,		10.1145/3357613.3357615		Crossref

Proceedings of the 10th IEEE/ACM International Workshop on Software Engineering for Systems-of-Systems and Software Ecosystems			10.1145/3528229		Crossref
Social Media-Based Suicide Risk Detection via Social Interaction and Posted Content	Yihua Ma,		10.1145/3469213.3470345		Crossref
Home Energy Management System Based on Particle Swarm Optimization	Suhaib N. Abdul Latif, Jinjing Shi, Mahmood F. Mosleh,		10.1145/3402597.3402607		Crossref
Improved Data Accuracy Assessment Tool for Information Management Systems	Hellen Maziku,		10.1145/3442555.3442579		Crossref
Enhanced Privacy Preservation for Recommender Systems	Ziqing Wu,		10.1145/3604915.3608888		Crossref
Challenges Experienced in Public Service Media Recommendation Systems	Andreas Grün, Xenija Neufeld,		10.1145/3460231.3474618		Crossref
Poster Abstract: UltraFlame: Ultrasonic-Based Fire Source Localization and Fire Severity Assessment System	Wang Zheng, Wang Yanwen, Sun Xiaoqi, Zhang Chenwei,		10.1145/3625687.3628391		Crossref
Artificial Intelligence in Learning Skills Assessment	Okacha Diyer, Naceur Achtaich, Khalid Najib,		10.1145/3386723.3387901		Crossref
Design of Cryptographic Application Scheme for Industrial Control System	Hui Peng, Fangfei Liu, Debin Cheng, Yan Chen, Weiguo Hou, Huanhuan Wang,		10.1145/3714334.3714384		Crossref
The Price of Meltdown and Spectre	Benedict Herzog, Stefan Reif, Julian Preis, Wolfgang Schröder-Preikschat, Timo Hönig,		10.1145/3447852.3458721		Crossref
Improving security and maintainability in modular embedded systems with hardware support	Maja Malenko, Leandro Batista Ribeiro, Marcel Baunach,		10.1145/3478684.3479258		Crossref
Building recommender systems with strict privacy boundaries	Renaud Bourassa,		10.1145/3240323.3241726		Crossref
A System Dynamics Model for Chemotherapy	M. Heshmat, A. Eltawil,		10.1145/2908446.2908461		Crossref
Advancing Automation of Design Decisions in Recommender System Pipelines	Tobias Vente,		10.1145/3604915.3608886		Crossref
An IoT-based Safe Driving Management System	Kazuaki Goshi, Masaki Hayahi, Yasuaki Sumida, Katsuya Matsunaga,		10.1145/2994374.3004069		Crossref

Features the used of microwave quantum frequency standard on rubidium atoms – 87 in systems of time synchronization for space system communication	Anna Grevtseva, Vadim Davydov, Roman Dmitriev, Vasily Rud,		10.1145/3508072 .3508184		Crossref
Design of network camouflage security applications for active defence systems in power systems	Dongmei Bin, Ming Xie, Chunyan Yang,		10.1145/3686424 .3686488		Crossref

Beyond Just Safety: Delay-aware Security Monitoring for Real-time Control Systems	Monowar Hasan, Sibin Mohan, Rakesh B. Bobba, Rodolfo Pellizzoni,	<p><jats:p>Modern embedded real-time systems (RTS) are increasingly facing more security threats than the past. A simplistic straightforward integration of security mechanisms might not be able to guarantee the<jats:italic>safety</jats:italic> and predictability of such systems. In this article, we focus on integrating security mechanisms into RTS (especially<jats:italic>legacy</jats:italic> RTS). We introduce<jats:italic>Contego-C</jats:italic>, an analytical model to integrate security tasks into RTS that will allow system designers to improve the security posture without affecting temporal and control constraints of the existing real-time control tasks. We also define a<jats:italic>metric</jats:italic> (named tightness of periodic monitoring) to measure the effectiveness of such integration. We demonstrate our ideas using a proof-of-concept implementation on an ARM-based rover platform and show that Contego-C can improve security without degrading control performance.</jats:p></p>	10.1145/3520136		Crossref
Session details: Embedded Systems Security 2	Michail Maniatakos,		10.1145/3248563		Crossref
Formal Semantic Model for Mobile Cloud Service System	Qiuping Chen,		10.1145/3469213.3470326		Crossref

Asynchronous Collaboration Systems for Evolving Information	Shaun Wallace,		10.1145/3491101.3503803		Crossref
Engineering Systems for Cancer Risk Prediction Using Genomics	T M Swathy, Aparna P Patange, Chandrayani Rokde, Dharmesh Dhabliya, Gauri Tamhankar, Uday Pratap Singh,		10.1145/3745812.3745857		Crossref
Recommender systems for contextually-aware, versioned items	Yayu Zhou,		10.1145/3298689.3346955		Crossref
The status of information security systems in banking sector from social engineering perspective	Rand Abu Hammour, Yousef Al Gharaibeh, Malik Qasaimeh, Raad S. Al-Qassas,		10.1145/3368691.3368705		Crossref
Enhancing Privacy in Recommender Systems through Differential Privacy Techniques	Angela Di Fazio,		10.1145/3640457.3688019		Crossref
Session details: Volume I: Artificial intelligence and agents, distributed systems, and information systems: Intelligent robotics and multi-agent systems track	Rui P. Rocha, Christopher D. Kiekintveld, M. Ani Hsieh,		10.1145/3252764		Crossref
Session details: Session 1: Software Security	Weizhi Meng,		10.1145/3468000		Crossref
Computer Cloud Computing Technology Corpus Application System Research	Ganlin Xia,		10.1145/3469213.3470403		Crossref
Enhancing Marine Industry Risk Management Through Semantic Reconciliation of Underwater IoT Data Streams	Gianluca Correndo, Simon Crowle, Juri Papay, Michael Boniface,		10.1145/2993318.2993330		Crossref
Understanding Fairness in Recommender Systems: A Healthcare Perspective	Veronica Kecki, Alan Said,		10.1145/3640457.3691711		Crossref

Research Challenges for the Design of Human-Artificial Intelligence Systems (HAIS)	Alan Hevner, Veda Storey,	<p>Artificial intelligence (AI) capabilities are increasingly common components of all socio-technical information systems that integrate human and machine actions. The impacts of AI components on the design and use of application systems are evolving rapidly as improved deep learning techniques and fresh big data sources afford effective and efficient solutions for broad ranges of applications. New goals and requirements for Human-AI System (HAIS) functions and qualities are emerging, whereas the boundaries between human and machine behaviors continue to blur. This research commentary identifies and addresses the design science research (DSR) challenges facing the field of Information Systems as the demand for human-machine synergies in Human-Artificial Intelligence Systems surges in all application areas. The design challenges of HAIS are characterized by a taxonomy of eight C's - composition, complexity, creativity, confidence, controls, conscience, certification, and contribution. By applying a design science research frame to structure and investigate</p>	10.1145/3549547		Crossref
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		HAIS design, implementation, use, and evolution, we propose a forward-thinking agenda for relevant and rigorous information systems research contributions.</jats:p>			
Leveraging Blockchain for Enhanced Security in IOB Data Management	Btissam Zerhari, Kebira Azbeg, Said Jai Andaloussi, Ouail Ouchetto,		10.1145/3607720.3607757		Crossref
Session details: Volume I: Artificial intelligence and agents, distributed systems, and information systems: Dependable and adaptive distributed systems track	Karl M. Goeschka, Rui Oliveira, Peter Pietzuch, Giovanni Russello,		10.1145/3252786		Crossref
Session details: Volume I: Artificial intelligence and agents, distributed systems, and information systems: Dependable and adaptive distributed systems track	Karl M. Goeschka, Rui Oliveira, Peter Pietzuch, Giovanni Russello,		10.1145/3251667		Crossref
Deep Learning for Recommender Systems	Alexandros Karatzoglou, Balázs Hidasi,		10.1145/3109859.3109933		Crossref
Matrix and Tensor Decomposition in Recommender Systems	Panagiotis Symeonidis,		10.1145/2959100.2959195		Crossref

Establishing Data Provenance for Responsible Artificial Intelligence Systems	Karl Werder, Balasubramanian Ramesh, Rongen (Sophia) Zhang,	<p>Data provenance, a record that describes the origins and processing of data, offers new promises in the increasingly important role of artificial intelligence (AI)-based systems in guiding human decision making. To avoid disastrous outcomes that can result from bias-laden AI systems, responsible AI builds on four important characteristics: fairness, accountability, transparency, and explainability. To stimulate further research on data provenance that enables responsible AI, this study outlines existing biases and discusses possible implementations of data provenance to mitigate them. We first review biases stemming from the data's origins and pre-processing. We then discuss the current state of practice, the challenges it presents, and corresponding recommendations to address them. We present a summary highlighting how our recommendations can help establish data provenance and thereby mitigate biases stemming from the data's origins and pre-processing to realize responsible AI-based systems. We conclude with a research agenda suggesting</p>	10.1145/3503488		Crossref
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		further research avenues.</jats:p>			
Fairness and Transparency in Music Recommender Systems: Improvements for Artists	Karlijn Dinnissen,		10.1145/3640457.3688024		Crossref
A Decentralized Gas-Free E-Ticket Tourism System with Dynamic Security: A Blockchain-based Approach	Shu-Ping Lu, Hung-Ming Chen, Cheng-Yun Ho,		10.1145/3649601.3698730		Crossref

<p>A Lightweight Architecture for Hardware-Based Security in the Emerging Era of Systems of Systems</p>	<p>Nico Mexis, Nikolaos Athanasios Anagnostopoulos, Shuai Chen, Jan Bambach, Tolga Arul, Stefan Katzenbeisser,</p>	<p><jats:p>In recent years, a new generation of the Internet of Things (IoT 2.0) is emerging, based on artificial intelligence, the blockchain technology, machine learning, and the constant consolidation of pre-existing systems and subsystems into larger systems. In this work, we construct and examine a proof-of-concept prototype of such a system of systems, which consists of heterogeneous commercial off-the-shelf components, and utilises diverse communication protocols. We recognise the inherent need for lightweight security in this context, and address it by employing a low-cost state-of-the-art security solution. Our solution is based on a novel hardware and software co-engineering paradigm, utilising well-known software-based cryptographic algorithms, in order to maximise the security potential of the hardware security primitive (a Physical Unclonable Function) that is used as a security anchor. The performance of the proposed security solution is evaluated, proving its suitability even for real-time applications. Additionally, the Dolev-Yao attacker model is considered in order to assess</p>	<p>10.1145/3458824</p>		<p>Crossref</p>
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		the resilience of our solution towards attacks against the confidentiality, integrity, and availability of the examined system of systems. In this way, it is confirmed that the proposed solution is able to address the emerging security challenges of the oncoming era of systems of systems.			
Updatable Oblivious Key Management for Storage Systems	Stanislaw Jarecki, Hugo Krawczyk, Jason Resch,		10.1145/3319535.3363196		Crossref
Towards Consistency Management in Variability-Intensive Cyber-Physical Production Systems	Malte Grave, Rick Rabiser,		10.1145/3748269.3749382		Crossref
Tutorial: Feature Engineering for Recommender Systems	Benedikt Schifferer, Chris Deotte, Even Oldridge,		10.1145/3383313.3411543		Crossref
Performance Assessment of Open Source IDS for improving IoT Architecture Security implemented on WBANs	Mouna Boujrad, Saiida Lazaar, Mohammed Hassine,		10.1145/3386723.3387892		Crossref
Emotions and personality in recommender systems	Marko Tkali,		10.1145/3240323.3241619		Crossref
Session details: Analysis of Switched Systems	Maria Prandini,		10.1145/3261109		Crossref
Weed Detection and Treatment by RGB System - Case of the FPL Smart Farm	Zineb Laftouty, Khalid Bouraada, Ahmed Bakrim, Anouar Abdelhakim Boudhir, Mariam Essafi,		10.1145/3607720.3607752		Crossref
Construction of Practice Teaching System in Big Data Application and Management Major based on Information Technology	Xiaozhu Wang, Yingqiao Ma,		10.1145/3482632.3483187		Crossref
Graphical System for optimized Dynamic Adaptation of Process Models with Rules Management	Tarik Chaghrouchni, Mohamed Issam Kabbaj, Zohra Bakkoury,		10.1145/3289402.3289523		Crossref
Trust but Verify	Judson Wilson, Riad S. Wahby, Henry Corrigan-Gibbs, Dan Boneh, Philip Levis, Keith Winstein,		10.1145/3081333.3081342		Crossref

Uncertainty in Self-adaptive Systems: A Research Community Perspective	Sara M. Hezavehi, Danny Weyns, Paris Avgeriou, Radu Calinescu, Raffaella Mirandola, Diego Perez-Palacin,	<p><jats:p>One of the primary drivers for self-adaptation is ensuring that systems achieve their goals regardless of the uncertainties they face during operation. Nevertheless, the concept of uncertainty in self-adaptive systems is still insufficiently understood. Several taxonomies of uncertainty have been proposed, and a substantial body of work exists on methods to tame uncertainty. Yet, these taxonomies and methods do not fully convey the research community's perception on what constitutes uncertainty in self-adaptive systems and on the key characteristics of the approaches needed to tackle uncertainty. To understand this perception and learn from it, we conducted a survey comprising two complementary stages in which we collected the views of 54 and 51 participants, respectively. In the first stage, we focused on current research and development, exploring how the concept of uncertainty is understood in the community and how uncertainty is currently handled in the engineering of self-adaptive systems. In the second stage, we focused on directions for future research to identify potential approaches to dealing with</p>	10.1145/3487921		Crossref
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		<p>unanticipated changes and other open challenges in handling uncertainty in self-adaptive systems. The key findings of the first stage are: (a) an overview of uncertainty sources considered in self-adaptive systems, (b) an overview of existing methods used to tackle uncertainty in concrete applications, (c) insights into the impact of uncertainty on non-functional requirements, (d) insights into different opinions in the perception of uncertainty within the community and the need for standardised uncertainty-handling processes to facilitate uncertainty management in self-adaptive systems. The key findings of the second stage are: (a) the insight that over 70% of the participants believe that self-adaptive systems can be engineered to cope with unanticipated change, (b) a set of potential approaches for dealing with unanticipated change, (c) a set of open challenges in mitigating uncertainty in self-adaptive systems, in particular in those with safety-critical requirements. From these findings, we outline an initial reference process to manage uncertainty in</p>			
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		self-adaptive systems. We anticipate that the insights on uncertainty obtained from the community and our proposed reference process will inspire valuable future research on self-adaptive systems.</jats:p>			
Sequence Adaptation via Reinforcement Learning in Recommender Systems	Stefanos Antaris, Dimitrios Rafailidis,		10.1145/3460231.3478864		Crossref

CASCADE: An Asset-driven Approach to Build Security Assurance Cases for Automotive Systems	Mazen Mohamad, Rodi Jolak, Örjan Askerdal, Jan-Philipp Steghöfer, Riccardo Scandariato,	<p>Security Assurance Cases (SAC) are structured arguments and evidence bodies used to reason about the security of a certain system. SACs are gaining focus in the automotive industry, as the needs for security assurance are growing in this domain. However, the state-of-the-arts lack a mature approach able to suit the needs of the automotive industry. In this article, we present CASCADE, an asset-driven approach for creating SAC, which is inspired by the upcoming security standard ISO/SAE-21434 as well as the internal needs of automotive Original Equipment Manufacturers (OEMs). CASCADE also differentiates itself from the state-of-the-art by incorporating a way to reason about the quality of the constructed security assurance case. We created the approach by conducting an iterative design science research study. We illustrate the results using the example case of the road vehicle's headlamp provided in the ISO standard. We also illustrate how our approach aligns well with the structure and content of the ISO/SAE-21434 standard, hence demonstrating the practical applicability of CASCADE in an industrial</p>	10.1145/3569459		Crossref
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		context.</jats:p>			
CSMAS	Youssef Tounsi, Houda Anoun, Larbi Hassouni,		10.1145/3386723 .3387851		Crossref
LLexus: an AI agent system for incident management	Pedro Las-Casas, Alok Gautum Kumbhare, Rodrigo Fonseca, Sharad Agarwal,	<jats:p>When operating a software service on a cloud, the complexity of keeping multiple distributed components responsive is a significant challenge for engineering teams. Engineers frequently rely on Troubleshooting Guides (TSGs) to navigate how to mitigate performance or outage incidents. However, the effectiveness of TSGs is often hindered by their length, implicit reliance on tribal knowledge, and the variable quality of their content. This paper introduces LLexus, an agent-based AI system to automate the execution of TSGs.</jats:p>	10.1145/3689051 .3689056		Crossref
System Dynamics Approach for Financial Strategy Assessment of Cattle Insurance Program: A Conceptual Model	Tridoyo Tridoyo, Armand Omar Moeis, Komarudin Komarudin,		10.1145/3468013 .3468638		Crossref
SAFEPOWER	Kim Grüttner, Maher Fakih, Mikel Azkarate-askatsua, Peio Onaindia, Roman Obermaisser,		10.1145/3312614 .3312638		Crossref
Intelligent Systems Applications in Inclusive Education Management: A Systematic Mapping Study	Sayyora Akbarova, Mekhribonu Kayumova, Makhbuba Azizova, Feruza Karimova, Iroda Hojiyeva,		10.1145/3644713 .3644785		Crossref
AIR: Personalized Product Recommender System for Nike's Digital Transformation	Steven Essinger, Dave Huber, Daniel Tang,		10.1145/3460231 .3474621		Crossref
An Approach for Creation of Logistics Management System for Food Banks Based on Reinforcement Learning	Tomoshi Iiyama, Daisuke Kitakoshi, Masato Suzuki,		10.1145/3459955 .3460601		Crossref
Sleep Position Management System for Enhancing Sleep Quality using Wearable Devices	Sanghoon Jeon, Anand Paul, Sang Hyuk Son, Yongsoon Eun,		10.1145/3274783 .3275185		Crossref

Information Security Research in the Information Systems Discipline: A Thematic Review and Future Research Directions	Stephanie Totty, He Li, Chen Zhang, Brian Janz,	<p>Information security continues to grow in importance in all aspects of society and therefore evolves as a prevalent research area. The information systems (IS) discipline offers a unique perspective to move this stream of literature forward. Using a semiautomated thematic analysis approach based on the topic modeling technique, we review a broad range of information security literature to investigate how we may integrate and advance our understanding of information security. Our analysis reveals four major themes, including information security policy (ISP) compliance, motivations and susceptibility, software security decisions, and firm security strategy. We also identify a theme of security in broader contexts, in which studies consider the societal impacts of information security and online hacker behavior. This review contributes to IS literature by 1) synthesizing the broad range of information security research published in the top journals of the field, moving beyond prior reviews focusing on a narrower scope such as individual ISP compliance; 2) identifying major themes and proposing an overarching</p>	10.1145/3685235.3685242		Crossref
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		research framework encompassing these themes and their interconnections, allowing us to envision future research directions; and 3) enumerating a semiautomated topic modeling approach that other researchers can employ.			
Introduction to the Special Issue on Security and Privacy for Connected Cyber-physical Systems	Moreno Ambrosin, Mauro Conti, Riccardo Lazzeretti, Chia-Mu Yu,		10.1145/3431201		Crossref
Credit Risk Early Warning Model of Commercial Banks Based on Artificial Intelligence	Luying Cheng,		10.1145/3482632.3487529		Crossref
Design for Debate: Exploring Public Perceptions of an Emerging Genetics Health Prediction Service 'Polygenic Risk Score' Through Design Methods	Yuhao Sun,		10.1145/3656156.3665137		Crossref
A risk-based trust framework for assuring the humans in human-machine teaming	Zena Assaad,		10.1145/3686038.3686045		Crossref
Graspan	Kai Wang, Aftab Hussain, Zhiqiang Zuo, Guoqing Xu, Ardalan Amiri Sani,		10.1145/3093315.3037744		Crossref
A Federated Recommender System for Online Services	Ben Tan, Bo Liu, Vincent Zheng, Qiang Yang,		10.1145/3383313.3411528		Crossref
A sampling-based approach to accelerating queries in log management systems	Tal Wagner, Eric Schkufza, Udi Wieder,		10.1145/2984043.2989221		Crossref
Minimising energy costs of data centers using high dense heterogeneous systems and intelligent resource management	Ariel Oleksiak, Tomasz Ciesielczyk, Michal Kierzynka, Wojciech Piatek,		10.1145/3208903.3213777		Crossref
Research on Recommendation System Based on Location and Content	Peng Chen,		10.1145/3469213.3471384		Crossref
Revisiting offline evaluation for implicit-feedback recommender systems	Olivier Jeunen,		10.1145/3298689.3347069		Crossref
Towards ensuring security by design in cyber-physical systems engineering processes	Johannes Geismann, Christopher Gerking, Eric Bodden,		10.1145/3202710.3203159		Crossref

Enhanced E-commerce Recommender System Based on Deep Learning and Ensemble Approaches	Ikram Karabila, Nossayba Darraz, Anas El-Ansari, Nabil Alami, Mostafa El mallahi,		10.1145/3659677.3659747		Crossref
Employing Digital Twins for Security-by-Design System Testing	Marietheres Dietz, Leon Hageman, Constantin von Hornung, Günther Pernul,		10.1145/3510547.3517929		Crossref
Building Recommender Systems for Fashion	Nick Landia,		10.1145/3109859.3109929		Crossref
Engaging Children Using a Digital Living Media System	Foad Hamidi, Melanie Baljko,		10.1145/3064663.3064708		Crossref
Debiased Off-Policy Evaluation for Recommendation Systems	Yusuke Narita, Shota Yasui, Kohei Yata,		10.1145/3460231.3474231		Crossref
Proceedings of the 1st ACM International Workshop on Security and Safety for Intelligent Cyber-Physical Systems			10.1145/3417312		Crossref
DeepBUFS	Christopher Chow,		10.1145/3064857.3079136		Crossref
Prototyping Ethics-As-Practice: A Framework For Designing Data-Driven Product Service Systems	Sonja Rattay,		10.1145/3563703.3593060		Crossref
DIDEROT	Panagiotis Radoglou-Grammatikis, Panagiotis Sarigiannidis, George Efstathopoulos, Paris-Alexandros Karypidis, Antonios Sarigiannidis,		10.1145/3407023.3409314		Crossref
Metric Learning For Context-Aware Recommender Systems	Firat Ismailoglu,		10.1145/3480651.3480695		Crossref
Bayesian Perspectives on Offline Evaluation for Recommender Systems	Michael Benigni,		10.1145/3705328.3748762		Crossref
Machine Learning for Building-Level Heat Risk Mapping	Andrea Domiter, Srinivasan Keshav,		10.1145/3679240.3734628		Crossref
Landscape simulation system based on 3D vision technology	Wenjie Ni,		10.1145/3482632.3487520		Crossref
Recommender Systems from an Industrial and Ethical Perspective	Dimitris Paraschakis,		10.1145/2959100.2959101		Crossref
Personality in Recommender Systems	Li Chen,		10.1145/2809643.2815363		Crossref
CPSA	Neetesh Saxena, Victor Chukwuka, Leilei Xiong, Santiago Grijalva,		10.1145/3140241.3140246		Crossref
Experiences of Assessment in Data and Security Courses using Personal Response Systems	Rosanne English, Joseph Maguire,		10.1145/3383923.3383963		Crossref

Data Management and Analytics System for Online Flight Conformance Monitoring and Anomaly Detection	Samet Ayhan, Hanan Samet,		10.1145/3347146.3359378		Crossref
Design and Implementation of an Information Management System for Exhibitions Oriented to the Internet of Things	Yi Wei, Chunhong Li,		10.1145/3482632.3484134		Crossref
Tutorial on Conversational Recommendation Systems	Zuohui Fu, Yikun Xian, Yongfeng Zhang, Yi Zhang,		10.1145/3383313.3411548		Crossref
Fast Multi-Step Critiquing for VAE-based Recommender Systems	Diego Antognini, Boi Faltings,		10.1145/3460231.3474249		Crossref
Risk and Mitigation of Nondeterminism in Distributed Cyber-Physical Systems	Soroush Bateni, Marten Lohstroh, Hou Seng Wong, Hokeun Kim, Shaokai Lin, Christian Menard, Edward A. Lee,		10.1145/3610579.3613219		Crossref
Why the Shooting in the Dark Method Dominates Recommender Systems Practice	David Rohde,		10.1145/3640457.3688029		Crossref
Bureaucracy as a Lens for Analyzing and Designing Algorithmic Systems	Juho Pääkkönen, Matti Nelimarkka, Jesse Haapoja, Airi Lampinen,		10.1145/3313831.3376780		Crossref
Proximity-based active learning for eating moment recognition in wearable systems	Marjan Nourollahi, Seyed Ali Rokni, Parastoo Alinia, Hassan Ghasemzadeh,		10.1145/3396870.3400011	https://dl.acm.org/doi/pdf/10.1145/3396870.3400011	Crossref
Research on System Dynamics Model of Industrial Economic System Structure Evolution Based on Computer Aided Analysis	Hang Su,		10.1145/3482632.3484139		Crossref
Learning classifier systems	Anthony Stein,		10.1145/3319619.3323393		Crossref
DRACE: A Framework for Evaluating Anomaly Detectors for Industrial Control Systems	Ivan Christian, Francisco Furtado, Aditya P. Mathur,		10.1145/3626205.3659145		Crossref
Deep Exploration for Recommendation Systems	Zheqing Zhu, Benjamin Van Roy,		10.1145/3604915.3608855		Crossref
The serverkernel operating system	Jon Larrea, Antonio Barbalace,		10.1145/3378679.3394537		Crossref
Modeling the Internet of Things System Using Complex Adaptive System Concepts	Abdessamad Jarrar, Taoufiq Gadi, Youssef Balouki,		10.1145/3167486.3167508		Crossref
Food System Driven by Obstacle Degree Optimization Algorithm: System Design and Algorithm Analysis	Ruotong Gao, Jiacheng Wang, Zixuan Chen,		10.1145/3469213.3469227		Crossref

A Randomized Reputation System in the Presence of Unfair Ratings	Mohsen Rezvani, Mojtaba Rezvani,	<p><jats:p>With the increasing popularity of online shopping markets, a significant number of consumers rely on these venues to meet their demands while choosing different products based on the ratings provided by others. Simultaneously, consumers feel confident in expressing their opinions through ratings. As a result, millions of ratings are generated on the web for different products, services, and dealers. Nonetheless, a noticeable number of users post unfair feedback. Recent studies have shown that reputation escalation is emerging as a new service, by which dealers pay to receive good feedback and escalate their ratings in online shopping markets. Therefore, finding robust and reliable ways to distinguish between fake and trustworthy ratings from users is a crucial task for every online shopping market. Moreover, with the dramatic increase in the number of ratings provided by consumers, scalability has arisen as another significant issue in the existing methods of reputation systems. To tackle these issues, we propose a randomized algorithm that</p>	10.1145/3384472		Crossref
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		calculates the reputation based on a random sample of the ratings. Since the randomly selected sample has a logarithmic size, it guarantees feasible scalability for large-scale online review systems. In addition, the randomness nature of the algorithm makes it robust against unfair ratings. We provide a thorough theoretical analysis of the proposed algorithm and validate its effectiveness through extensive empirical evaluation using real-world and synthetically generated datasets. Our experimental results show that the proposed method provides a high accuracy while running much faster than the existing iterative filtering approaches.</jats:p>			
Design and Implementation of the Management System of College Students' Sports Scores Based on PHP	Chaohu He, Changcheng Xin, Wenwu Hu,		10.1145/3482632.3483175		Crossref
Market Manipulation as a Security Problem	Vasilios Mavroudis,		10.1145/3301417.3312493		Crossref

<p>A cross-domain recommender system using deep coupled autoencoders</p>	<p>Alexandros Gkillas, Dimitrios Kosmopoulos,</p>	<p><jats:p>Long-standing data sparsity and cold-start constitute thorny and perplexing problems for the recommendation systems. Cross-domain recommendation as a domain adaptation framework has been utilized to effectively address these challenging issues, by exploiting information from multiple domains. In this study, an item-level relevance cross-domain recommendation task is explored, where two related domains, that is, the source and the target domain contain common items. Additionally, a user-level relevance scenario is considered, where the two related domains contain common users. In light of these scenarios, two novel coupled autoencoder-based deep learning methods are proposed for cross-domain recommendation. The first method aims to simultaneously learn a pair of autoencoders in order to reveal the intrinsic representations in the source and target domains, along with a coupled mapping function to model the non-linear relationships between these representations. The second method is derived based on a new joint regularized optimization problem, which employs two</p>	<p>10.1145/3765614</p>		<p>Crossref</p>
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		autoencoders to generate in a deep and non-linear manner the user and item-latent factors, while at the same time a data-driven function is learnt to map the latent factors across domains. Extensive numerical experiments are conducted illustrating the superior performance of our proposed methods compared to several state-of-the-art cross-domain recommendation frameworks.</jats:p>			
Design of sustainable intelligent food information system through computer dynamic system model	Shiwen Wang, Yunjie He, Yiwei Wei,		10.1145/3482632.3484075		Crossref
Deep Learning architecture for temperature forecasting in an IoT LoRa based system	Ben Abdel Ouahab Ikram, Boudhir Anouar Abdelhakim, Astito Abdelali, Bassam Zafar, Bouhorma Mohammed,		10.1145/3320326.3320375		Crossref
Distributed Data Systems for Data Driven Decision Making in Education Management	Mekhribonu Kayumova, Sayyora Akbarova, Makhbuba Azizova, Iroda Hojiyeva, Feruza Karimova, Feruza Makhmudova,		10.1145/3726122.3726233		Crossref
Research on Financial Risk Measurement Model Based on Support Vector Machine Algorithm	Sijia Lyu,		10.1145/3482632.3484008		Crossref
Invited Paper: Smart Autonomous Cyber-Physical Systems	Elisa Bertino, Simin Nadjm-Tehrani,		10.1145/3716816.3727974		Crossref
Acknowledging Dynamic Aspects of Trust in Recommender Systems	Imane Akdim,		10.1145/3604915.3608881		Crossref
On Practical Realization of Evasion Attacks for Industrial Control Systems	Alessandro Erba, Andres F. Murillo, Riccardo Taormina, Stefano Galelli, Nils Ole Tippenhauer,		10.1145/3689930.3695213		Crossref
BDFL: A Blockchain-Enabled FL Framework for Edge-based Smart UAV Delivery Systems	Chengzu Dong, Zhiyu Xu, Frank Jiang, Shantanu Pal, Chong Zhang, Shiping Chen, Xiao Liu,		10.1145/3591365.3592948		Crossref

Modeling A Business Intelligence System For Determining Investment Efficiency	Elitsa Ibryamova, Angel Popgeorgiev,		10.1145/3546118.3546127		Crossref
Dexter	Rukma Talwadker,		10.1145/3078468.3078484		Crossref
Implementing 360 video tiled streaming system	Jangwoo Son, Dongmin Jang, Eun-Seok Ryu,		10.1145/3204949.3208119		Crossref
AI-powered Network Security: Approaches and Research Directions	Elisa Bertino, Imtiaz Karim,		10.1145/3491371.3491384		Crossref
Intelligent thermal management in M2DC system	Wojciech Piatek, Ariel Oleksiak, Micha vor dem Berge, Jens Hagemeyer, Emmanuel Senechal,		10.1145/3077839.3084029		Crossref
A preliminary study on a recommender system for the job recommendation challenge	Mirko Polato, Fabio Aioli,		10.1145/2987538.2987549		Crossref
User Adaptability to System Delay	Brian D. Hall,		10.1145/2851581.2890381		Crossref
Large Language Model-based Recommendation System Agents	Tommaso Carraro, Brijraj Singh, Niranjan Pedanekar,		10.1145/3705328.3759334		Crossref
Initiative transfer in conversational recommender systems	Yuan Ma, Jürgen Ziegler,		10.1145/3604915.3608858		Crossref
Session details: Session 2: Security by Design	Li Li,		10.1145/3468001		Crossref
Research on Audit Risk Assessment of Large-Scale Information Systems Based on Entropy Weight Calculation	Yadong Sun, Teng Zhao, Hao Chang, Liang Chen, Haoran Zi,		10.1145/3712335.3712428		Crossref
Robust, low-cost, auditable random number generation for embedded system security	Ben Lampert, Riad S. Wahby, Shane Leonard, Philip Levis,		10.1145/2994551.2994568	https://dl.acm.org/doi/pdf/10.1145/2994551.2994568	Crossref
Distributed Data Systems in Knowledge Management for Higher Education Decision Making	Bakhtiyor Safarov, Nargiza Shayusupova, Komiljon Xursandov, Sitora Amirdjanova, Dilshodaxon Muminova, Gulnora Jamalova,		10.1145/3726122.3726140		Crossref
Towards the next generation of multi-criteria recommender systems	Zhe Li,		10.1145/3240323.3240326		Crossref
Integration challenges for digital twin systems-of-systems	Judith Michael, Jérôme Pfeiffer, Bernhard Rumpe, Andreas Wortmann,		10.1145/3528229.3529384		Crossref

Using Toulmin's Argumentation Model to Enhance Trust in Analytics-Based Advice Giving Systems	Eran Rubin, Izak Benbasat,	<p><jats:p> Ecommerce websites increasingly provide</p> <p><jats:bold>predictive analytics-based advice (PAA)</jats:bold>, such as advice about future potential price reductions. Establishing consumer-trust in these advice-giving systems imposes unique and novel challenges. First, PAA about future alternatives that can benefit the consumer appears to inherently contradict the business goal of selling a product quickly and at high profit margins. Second, PAA is based on mathematical models that are non-transparent to the user. Third, PAA advice is inherently uncertain, and can be perceived as subjectively imposed in algorithms. Utilizing Toulmin's argumentation-model, we investigate the influence of advice-justification statements in overcoming these difficulties. Based on three experimental studies, in which respondents are provided with the advice of PAA systems, we show evidence for the different roles Toulmin's statement-types play in enhancing various trusting-beliefs in PAA systems. Provision of warrants is mostly associated with enhanced</p>	10.1145/3580479		Crossref
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		competence beliefs; rebuttals with integrity beliefs; backings both competence and benevolence; and data statements enhance competence, integrity, and benevolence beliefs. Implications of the findings for research and practice are provided.			
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A Novel IoT-Based Energy Management System for Large Scale Data Centers	Sharad S., Bagavathi Sivakumar P., V. Anantha Narayanan,		10.1145/2768510.2768520		Crossref
SEESys: Online Pose Error Estimation System for Visual SLAM	Tianyi Hu, Tim Scargill, Fan Yang, Ying Chen, Guohao Lan, Maria Gorlatova,		10.1145/3666025.3699341	https://dl.acm.org/doi/pdf/10.1145/3666025.3699341	Crossref
Towards power management verification of time-triggered systems using virtual platforms	Sören Schreiner, Razi Seyyedi, Maher Fakih, Kim Grüttner, Wolfgang Nebel,		10.1145/3229631.3235025		Crossref
Privacy for Recommender Systems	Bart P. Knijnenburg, Shlomo Berkovsky,		10.1145/3109859.3109935		Crossref
Dynamic Constraints for Mixed-Criticality Systems	Dávid Juhász, Axel Jantsch,		10.1145/3312614.3312625		Crossref
The 6th International Workshop on Health Recommender Systems	Hanna Hauptmann, Christoph Trattner, Helma Torkamaan,		10.1145/3640457.3687113		Crossref
Improving Recommender Systems Through the Automation of Design Decisions	Lukas Wegmeth,		10.1145/3604915.3608877		Crossref
AgentSmith	David Miller,		10.1145/2851581.2859025		Crossref
Multimedia recommender systems	Yashar Deldjoo, Markus Schedl, Balázs Hidasi, Peter Knees,		10.1145/3240323.3241620		Crossref
Improving the Discoverability of Interactions in Interactive Systems	Eva Mackamul,		10.1145/3491101.3503813		Crossref
Picture Management of Power Supply Safety Management System Based on Deep Learning Technology	Sun Yuwei, Zhu Jianbao, Ma Qingshan, Yu Xinchun, Shi Ye, Chen Yu,		10.1145/3377458.3377464		Crossref
CORGIDS	Ekta Aggarwal, Mehdi Karimibiuki, Karthik Pattabiraman, André Ivanov,		10.1145/3264888.3264893		Crossref

Special Issue on Open Hardware for Embedded System Security and Cryptography	Michael Tempelmeier, Fabrizio De Santis, Shivam Bhasin, Stefan Mangard,		10.1145/3747326		Crossref
PDAssess: A Privacy-preserving Free-speech based Parkinson's Disease Daily Assessment System	Baichen Yang, Qingyong Hu, Wentao Xie, Xincheng Wang, Wei Luo, Qian Zhang,		10.1145/3625687.3625805		Crossref

Pareto-Optimal Adversarial Defense of Enterprise Systems	Edoardo Serra, Sushil Jajodia, Andrea Pugliese, Antonino Rullo, V. S. Subrahmanian,	<p>The National Vulnerability Database (NVD) maintained by the US National Institute of Standards and Technology provides valuable information about vulnerabilities in popular software, as well as any patches available to address these vulnerabilities. Most enterprise security managers today simply patch the most dangerous vulnerabilities—an adversary can thus easily compromise an enterprise by using less important vulnerabilities to penetrate an enterprise. In this article, we capture the vulnerabilities in an enterprise as a Vulnerability Dependency Graph (VDG) and show that attacks graphs can be expressed in them. We first ask the question: What set of vulnerabilities should an attacker exploit in order to maximize his expected impact? We show that this problem can be solved as an integer linear program. The defender would obviously like to minimize the impact of the worst-case attack mounted by the attacker—but the defender also has an obligation to ensure a high productivity within his enterprise. We propose an algorithm that finds a Pareto-optimal solution for the defender that allows him to simultaneously maximize productivity and</p>	10.1145/2699907		Crossref
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		minimize the cost of patching products on the enterprise network. We have implemented this framework and show that runtimes of our computations are all within acceptable time bounds even for large VDGs containing 30K edges and that the balance between productivity and impact of attacks is also acceptable.			
RecTemp: Temporal Reasoning in Recommendation Systems	Adir Solomon, Tsvi Kuflik, Bracha Shapira, Ido Guy,		10.1145/3640457.3687096		Crossref
Towards Unified Metrics for Accuracy and Diversity for Recommender Systems	Javier Parapar, Filip Radlinski,		10.1145/3460231.3474234		Crossref
Exploring anomaly detection in systems of systems	Tommaso Zoppi, Andrea Ceccarelli, Andrea Bondavalli,		10.1145/3019612.3019765		Crossref
Developing software and systems engineering standards	Rory V. O'Connor,		10.1145/2812428.2812430		Crossref
Poster	Chesta Sofat, Divya Bansal,		10.1145/2938559.2948788		Crossref
Session details: Session 3: Security and Safety Analysis	Simon Foley,		10.1145/3285937		Crossref
Research and Practice on Network Security Vulnerability Management Methods in the Transportation Industry	Wei Li, Kuang Tian, Wei Wang,		10.1145/3661638.3661699		Crossref
Privacy Concerns of Student Data Shared with Instructors in an Online Learning Management System	Monika Blue Kwapisz, Avanya Kohli, Prashanth Rajivan,		10.1145/3613904.3642914		Crossref
A study on risk propagation and traceability of gas storage based on complex network	Mingju Sun, Linxu Han, Liang Zhang, Hao Yin, Kai Liao, Jinqiu Hu, Xiaowen Fan,		10.1145/3661638.3661703		Crossref
Session details: Memory Systems	Abhishek Bhattacharjee,		10.1145/3324100		Crossref

Thermal-aware Adaptive Platform Management for Heterogeneous Embedded Systems	Srijeeta Maity, Anirban Ghose, Soumyajit Dey, Swarnendu Biswas,	<p>Recent trends in real-time applications have raised the demand for high-throughput embedded platforms with integrated CPU-GPU based Systems-On-Chip (SoCs). The enhanced performance of such SoCs, however, comes at the cost of increased power consumption, resulting in significant heat dissipation and high on-chip temperatures. The prolonged occurrences of high on-chip temperature can cause accelerated in-circuit ageing, which severely degrades the long-term performance and reliability of the chip. Violation of thermal constraints leads to on-board dynamic thermal management kicking-in, which may result in timing unpredictability for real-time tasks due to transient performance degradation. Recent work in adaptive software design have explored this issue from a control theoretic stand-point, striving for smooth thermal envelopes by tuning the core frequency.</p> <p>Existing techniques do not handle thermal violations for periodic real-time task sets in the presence of dynamic events like change of task periodicity, more so in the context of</p>	10.1145/3477028		Crossref
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		<p>heterogeneous SoCs with integrated CPU-GPUs. This work presents an OpenCL runtime extension for thermal-aware scheduling of periodic, real-time tasks on heterogeneous multi-core platforms. Our framework mitigates dynamic thermal violations by adaptively tuning task mapping parameters, with the eventual control objective of satisfying</p> <p><i>both</i> platform-level thermal constraints and task-level deadline constraints. We consider multiple platform-level control actions like task migration, frequency tuning and idle slot insertion as the task mapping parameters. To the best of our knowledge, this is the first work that considers such a variety of task mapping control actions in the context of heterogeneous embedded platforms. We evaluate the proposed framework on an Odroid-XU4 board using OpenCL benchmarks and demonstrate its effectiveness in reducing thermal violations.</p> <p><i></i></p>			
Shortest route based public transport manager for the optimized transportation management system	Hari Rai, Aditya Pal, Sherzodjon Yarmatov, Gozal Absalamova,		10.1145/3726122.3726221		Crossref

On the Assessment of Systematic Risk in Networked Systems	Aron Laszka, Benjamin Johnson, Jens Grossklags,	<p>In a networked system, the risk of security compromises depends not only on each node's security but also on the topological structure formed by the connected individuals, businesses, and computer systems. Research in network security has been exploring this phenomenon for a long time, with a variety of modeling frameworks predicting how many nodes we should expect to lose, on average, for a given network topology, after certain types of incidents. Meanwhile, the pricing of insurance contracts for risks related to information technology (better known as cyber-insurance) requires determining additional information, for example, the maximum number of nodes we should expect to lose within a 99.5% confidence interval. Previous modeling research in network security has not addressed these types of questions, while research on cyber-insurance pricing for networked systems has not taken into account the network's topology. Our goal is to bridge that gap, by providing a mathematical basis for the assessment of systematic risk in networked</p>	10.1145/3166069		Crossref
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		<p>systems.</p> <p><jats:p> <jats:p> We define a</p> <p><jats:italic>loss- number distribution</jats:i talic></p> <p>to be a probability distribution on the total number of compromised nodes within a network following the occurrence of a given incident, and we provide a number of modeling results that aim to be useful for cyber- insurers in this context. We prove NP- hardness for the general case of computing the loss-number distribution for an arbitrary network topology but obtain simplified computable formulas for the special cases of star topologies, ER-random topologies, and uniform topologies. We also provide a simulation algorithm that approximates the loss-number distribution for an arbitrary network topology and that appears to converge efficiently for many common classes of topologies.</p> <p></jats:p></p> <p><jats:p>Scale- free network topologies have a degree distribution that follows a power law and are commonly found in real-world networks. We provide an example of a scale-free network in which a cyber-insurance pricing mechanism that relies naively on</p>		
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		<p>incidence reporting data will fail to accurately predict the true risk level of the entire system. We offer an alternative mechanism that yields an accurate forecast by taking into account the network topology, thus highlighting the lack/importance of topological data in security incident reporting. Our results constitute important steps toward the understanding of systematic risk and help to contribute to the emergence of a viable cyber-insurance market.</p>			
Designing within Connected Systems	Mathias Funk, Bart Hengeveld,		10.1145/3197391.3197400		Crossref
Session details: Storage Systems	Christina Delimitrou,		10.1145/3324116		Crossref
A supervised learning framework for learning management systems	David Monllaó Olivé, Du Q. Huynh, Mark Reynolds, Martin Dougiamas, Damyon Wiese,		10.1145/3279996.3280014		Crossref
GraDVis: A Visualization Tool for a Visual Data Management System	Jarrett Zapata, Syed Ferhan Haider, Ragaad Al-Tarawneh, Shah Rukh Humayoun,		10.1145/3660515.3662835		Crossref

<p>A Collaborative Energy-Aware Sensor Management System Using Team Theory</p>	<p>Allaa R. Hilal, Otman Basir,</p>	<p><jats:p>With limited battery supply, power is a scarce commodity in wireless sensor networks. Thus, to prolong the lifetime of the network, it is imperative that the sensor resources are managed effectively. This task is particularly challenging in heterogeneous sensor networks for which decisions and compromises regarding sensing strategies are to be made under time and resource constraints. In such networks, a sensor has to reason about its current state to take actions that are deemed appropriate with respect to its mission, its energy reserve, and the survivability of the overall network. Sensor Management controls and coordinates the use of the sensory suites in a manner that maximizes the success rate of the system in achieving its missions. This article focuses on formulating and developing an autonomous energy-aware sensor management system that strives to achieve network objectives while maximizing its lifetime. A team-theoretic formulation based on the Belief-Desire-Intention (BDI) model and the Joint Intention theory is proposed as a mechanism for effective and</p>	<p>10.1145/2910574</p>		<p>Crossref</p>
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		<p>energy-aware collaborative decision-making. The proposed system models the collective behavior of the sensor nodes using the Joint Intention theory to enhance sensors' collaboration and success rate. Moreover, the BDI modeling of the sensor operation and reasoning allows a sensor node to adapt to the environment dynamics, situation-criticality level, and availability of its own resources. The simulation scenario selected in this work is the surveillance of the Waterloo International Airport. Various experiments are conducted to investigate the effect of varying the network size, number of threats, threat agility, environment dynamism, as well as tracking quality and energy consumption, on the performance of the proposed system. The experimental results demonstrate the merits of the proposed approach compared to the state-of-the-art centralized approach adapted from Atia et al. [2011] and the localized approach in Hilal and Basir [2015] in terms of energy consumption, adaptability, and network lifetime. The results show that the proposed approach has 12 x less energy consumption than</p>			
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		that of the popular centralized approach.</jats:p>			
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Computational Intelligence in Security of Digital Twins Big Graphic Data in Cyber-physical Systems of Smart Cities	Zhihan Lv, Dongliang Chen, Hailin Feng, Amit Kumar Singh, Wei Wei, Haibin Lv,	<p>This investigation focuses on the application of computational intelligence to the security of Digital Twins (DTs) graphic data of the Cyber-physical System (CPS). The intricate and diverse physical space of CPS in the smart city is mapped in virtual space to construct the DTs CPS in the smart city. Besides, Differential Privacy Frequent Subgraph-Big Multigraph (DPFS-BM) is employed to ensure data privacy security. Moreover, the analysis and prediction model for the DTs big graphic data (BGD) in the CPS is built based on Differential Privacy-AlexNet (DP-AlexNet). Alexnet successfully solves the gradient dispersion problem of the Sigmoid function of deep network structures. Finally, the comparative analysis approach is utilized to verify the performance of the model reported here by comparing it with Long Short-Term Memory, Convolutional Neural Network, Recurrent Neural Network, original AlexNet, and Multi-Layer Perceptron in a simulation experiment. Through the comparison in the root mean square error, the mean absolute error, the mean absolute percentage error,</p>	10.1145/3522760		Crossref
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		<p>training time, and test time, the model proposed here outperforms other models regarding errors, time delay, and time consumption. In the same environment, the system performs better with multi-hop paths, extra relays, and a high fading index; in that case, the outage probability is minimal. Therefore, the DP-AlexNet model is suitable for processing BGD. Moreover, its speed acceleration is more apparent than that of other models, with a higher SpeedUp indicator. The research effectively combines data mining and data security, which is of significant value for optimizing the privacy protection technology of frequent subgraph mining on a single multi-graph. Besides, the constructed DTs of CPS can provide excellent accuracy and a prominent acceleration effect on the premise of low errors. In addition, the model reported here can provide reference for the intelligent and digital development of smart cities.</p>			
Simulation of an intelligent traffic management model	Sohaib Chengaou, Khalid El Yassini, Kenza Oufaska,		10.1145/3607720.3607758		Crossref
Counteracting Bias and Increasing Fairness in Search and Recommender Systems	Ruoyuan Gao, Chirag Shah,		10.1145/3383313.3411545		Crossref
Online Learning to Rank for Recommender Systems	Daan Odijk, Anne Schuth,		10.1145/3109859.3109925		Crossref

Systems trivia night	Vaastav Anand, Roberta De Viti, Jonathan Mace,		10.1145/3458336 .3465306		Crossref
The Feasibility of Utilizing Low-Power DRAM in Disaggregated Systems	Ayaz Akram,		10.1145/3631882 .3631894		Crossref
Adding Value to Low-Resource Industrial Recommender Systems	Cornelia M Klopers,		10.1145/3705328 .3748760		Crossref
Dynamic Quality Assessment of Chinese Language Courses: Building Smart Education Systems with Generative AI and Deep Behavioral Analytics	Cong Xu, Jian Bai,		10.1145/3744367 .3744423		Crossref
Automated Assessment of Secure Search Systems	Mayank Varia, Benjamin Price, Nicholas Hwang, Ariel Hamlin, Jonathan Herzog, Jill Poland, Michael Reschly, Sophia Yakoubov, Robert K. Cunningham,	<jats:p>This work presents the results of a three-year project that assessed nine different privacy-preserving data search systems. We detail the design of a software assessment framework that focuses on low system footprint, repeatability, and reusability. A unique achievement of this project was the automation and integration of the entire test process, from the production and execution of tests to the generation of human-readable evaluation reports. We synthesize our experiences into a set of simple mantras that we recommend following in the design of any assessment framework.</jats:p>	10.1145/2723872 .2723877		Crossref
Research on Dynamic Scheduling Strategy of RGV System	Haonan Gu, Ruitian Huang,		10.1145/3469213 .3470378		Crossref
assimilate	Damian Hills,		10.1145/2908805 .2913013		Crossref
Aerial sensing system for wildfire detection	Tomasz Lewicki, Kaikai Liu,		10.1145/3384419 .3430399		Crossref
Intrusion Detection System for Embedded Systems	Farid Molazem Tabrizi, Karthik Pattabiraman,		10.1145/2843966 .2843975		Crossref
Development Assurance Process for Civil Aircraft Electrical Power System	Jia Wang,		10.1145/3482632 .3484138		Crossref

A Lightweight and Fine-grained File System Sandboxing Framework	Ashish Bijlani, Umakishore Ramachandran,		10.1145/3265723.3265734		Crossref
Fine-grained Program Partitioning for Security	Zhen Huang, Trent Jaeger, Gang Tan,		10.1145/3447852.3458717		Crossref
Research on Low-Slow-Small Unmanned Aerial Vehicle Detection Systems	Zecong Ye, Yueping Peng, Hexiang Hao, Baixuan Han, Wenjin Yin, Wenchao Liu,		10.1145/3718751.3718840		Crossref
Crowd-powered creativity support systems	Jonas Oppenlaender,		10.1145/3393672.3398646		Crossref
DataHunter: A System for Finding Datasets Based on Scientific Problem Descriptions	Michael Färber, Ann-Kathrin Leisinger,		10.1145/3460231.3478882		Crossref
File System Usage in Android Mobile Phones	Roy Friedman, David Sainz,		10.1145/2928275.2928280		Crossref
Evaluating tool support for embedded operating system security	Matthias Pasquier, Frédéric Jouault, Matthias Brun, Julien Pérochon,		10.1145/3417990.3420048		Crossref
Bio-inspired monocular drone SLAM	Ozan Catal, Tim Verbelen, Ni Wang, Matthias Hartmann, Bart Dhoedt,		10.1145/3522784.3522788		Crossref
Demo	Sharath Chandrashekhara , Taeyeon Ki, Kyungho Jeon, Karthik Dantu, Steven Y. Ko,		10.1145/3081333.3089327		Crossref
Specification development for autonomous system behavior	Signe A. Redfield,		10.1145/3459086.3459634		Crossref
Interactive Recommender Systems	Harald Steck, Roelof van Zwol, Chris Johnson,		10.1145/2792838.2792840		Crossref
Recommender Systems with Personality	Amos Azaria, Jason Hong,		10.1145/2959100.2959138		Crossref

<p>A Cyber-Physical System to Improve the Management of a Large Suite of Operating Rooms</p>	<p>Guillaume Joerger, Juliette Rambourg, Helene Gaspard-Boulinc, Stephane Conversy, Barbara L. Bass, Brian J. Dunkin, Marc Garbey,</p>	<p>Cyber-physical systems have been deployed with considerable success in many industries. However, the implementation of cyber-physical systems in hospitals has been limited. By nature, in clinical operations, patient safety and consideration for health outcomes are of the utmost importance, thus possibly slowing the implementation of innovative solutions with limited history. Revenues from operating room (OR) time and surgery account for about 50% of the income of major hospitals (Erdogan et al. 2011; Cuschieri 2006), but the efficiency of OR utilization is often reported to be relatively low. Therefore, improving OR management with a cyber-physical system should be a priority. In this article, we will report on our experience implementing a cyber-physical system at Houston Methodist Hospital and discuss some of the difficulties and potential drivers for success. Our pilot study was done in the context of the management of a large suite of ORs. It uses the agile codevelopment of a cyber-physical system through an intense collaboration of clinicians and computational scientists. While technology remains the</p>	<p>10.1145/3140234</p>	<p>https://dl.acm.org/doi/pdf/10.1145/3140234</p>	<p>Crossref</p>
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		foundation of a cyber-physical system, this experience reinforced that the human factor is an important driving force behind the design that promotes user acceptance.</jats:p>			
An Improved Lossy-Encryption System for Still-Image Data Based on the Quaternion Multiplication and Robust Chaos	Imad El Hanouti, Hakim El Fadili, Mohamed Boussif,		10.1145/3454127.3456572		Crossref
Experimental performance assessment of a dynamic wireless power transfer system for future EV in real driving conditions	Stéphane Laporte, Gérard Coquery, Marc Revilloud, Virginie Deniau,		10.1145/3208903.3213894		Crossref
Arrest Records Management System (ARMS) using Fingerprint and Face Recognition: A Criminal Record Management System for the City of Makati, Philippines	William P. Rey, Kenneth Ian C. Africano, Karl Ivan S. Cosca, Paul Jerald S. Landayan,		10.1145/3561877.3561888		Crossref
Efficient Graph based Recommender System with Weighted Averaging of Messages	Faizan Ahemad,		10.1145/3564121.3564127		Crossref
Perspectives on the Evaluation of Recommender Systems (PERSPECTIVES)	Eva Zangerle, Christine Bauer, Alan Said,		10.1145/3460231.3470929		Crossref
Introduction to the Special Issue on Security and Privacy in Safety-Critical Cyber-Physical Systems	Ning Zhang, Bryan Ward, Andrew Clark, Ziming Zhao, Aiping Xiong,		10.1145/3750452		Crossref
IoT based Attendance Management System (AMS) with Smartwatches' Compatibility	Shrooq Alsenan, Deem Saleh Aljameel, Sarah Arfaj Alsenan, Dalal Fahad Al-Abdulaziz,		10.1145/3507623.3507636		Crossref

Toward Accurate Spatiotemporal COVID-19 Risk Scores Using High-Resolution Real-World Mobility Data	Sirisha Rambhatla, Sepanta Zeighami, Kameron Shahabi, Cyrus Shahabi, Yan Liu,	<p>As countries look toward re-opening of economic activities amidst the ongoing COVID-19 pandemic, ensuring public health has been challenging. While contact tracing only aims to track past activities of infected users, one path to safe reopening is to develop reliable spatiotemporal risk scores to indicate the propensity of the disease. Existing works which aim at developing risk scores either rely on compartmental model-based reproduction numbers (which assume uniform population mixing) or develop coarse-grain spatial scores based on reproduction number (R_0) and macro-level density-based mobility statistics. Instead, in this article, we develop a Hawkes process-based technique to assign relatively fine-grain spatial and temporal risk scores by leveraging high-resolution mobility data based on cell-phone originated location signals. While COVID-19 risk scores also depend on a number of factors specific to an individual, including demography and existing medical conditions, the primary mode of disease transmission is via physical proximity and contact.</p>	10.1145/3481044	https://dl.acm.org/doi/pdf/10.1145/3481044	Crossref
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		Therefore, we focus on developing risk scores based on location density and mobility behaviour. We demonstrate the efficacy of the developed risk scores via simulation based on real-world mobility data. Our results show that fine-grain spatiotemporal risk scores based on high-resolution mobility data can provide useful insights and facilitate safe re-opening.</jats:p>			
Interactive explanation for planning-based systems	Ellin Zhao, Roykrong Sukkerd,		10.1145/3302509.3313322	https://dl.acm.org/doi/pdf/10.1145/3302509.3313322	Crossref
Towards a Catalog of Heuristics for the Design of Systems-of-Systems	Marcio Imamura, Francisco Ferreira, Juliana Fernandes, Valdemar Vicente Graciano Neto, Rodrigo Santos,		10.1145/3592813.3592897		Crossref
Do we need new strategies for testing systems-of-systems?	Vânia de Oliveira Neves, Antonia Bertolino, Guglielmo De Angelis, Lina Garcés,		10.1145/3194754.3194758		Crossref
Recommender Systems and the New New Economics of Information	George Loewenstein,		10.1145/3109859.3109871		Crossref
Session details: Stochastic Systems	Pavithra Prabhakar,		10.1145/3258024		Crossref
Eliminating Inter-Domain Vulnerabilities in Cyber-Physical Systems	Ivan Ruchkin, Ashwini Rao, Dionisio De Niz, Sagar Chaki, David Garlan,		10.1145/2808705.2808714	https://dl.acm.org/doi/pdf/10.1145/2808705.2808714	Crossref
SnapStore	Abhisek Panda, Smruti R. Sarangi,		10.1145/3590140.3629120		Crossref
Theseus	Kevin Boos, Lin Zhong,		10.1145/3144555.3144560		Crossref
Underwater target detection system based on YOLO v4	Weiru Wang, Yunlong Wang,		10.1145/3469213.3470310		Crossref
Looking for Signals: A Systems Security Perspective	Christopher Kruegel,		10.1145/3531536.3533774		Crossref
Design of domestic embedded computer system based on ARM	Xiaojun Liu,		10.1145/3482632.3487446		Crossref
Aerobic Exercise Assist System Based on Motion Estimation Algorithm	Mei Zhu,		10.1145/3482632.3487534		Crossref
Optical Flow/INS Navigation System in Four-rotor	Yi Han,		10.1145/3377458.3377460		Crossref

A College Major Recommendation System	Samuel A. Stein, Gary M. Weiss, Yiwen Chen, Daniel D. Leeds,		10.1145/3383313 .3418488		Crossref
An analysis of the influencing factors of the choice of intelligent management mode for multi-campus using smart system	Shehong Feng,		10.1145/3482632 .3484071		Crossref
A meta-model for representing system-of-systems ontologies	Young-Min Baek, Jiyoung Song, Yong-Jun Shin, Sumin Park, Doo-Hwan Bae,		10.1145/3194754 .3194755		Crossref

Threat Analysis in Systems-of-Systems	Andrea Ceccarelli, Tommaso Zoppi, Alexandr Vasenev, Marco Mori, Dan Ionita, Lorena Montoya, Andrea Bondavalli,	<p><jats:p> Cyber-physical Systems of Systems (SoSs) are large-scale systems made of independent and autonomous cyber-physical Constituent Systems (CSs) which may interoperate to achieve high-level goals also with the intervention of humans. Providing security in such SoSs means, among other features, forecasting and anticipating evolving SoS functionalities, ultimately identifying possible detrimental phenomena that may result from the interactions of CSs and humans. Such phenomena, usually called</p> <p><jats:italic>emerg ent phenomena</jats :italic></p> <p>, are often complex and difficult to capture: the first appearance of an emergent phenomenon in a cyber-physical SoS is often a surprise to the observers. Adequate support to understand emergent phenomena will assist in reducing both the likelihood of design or operational flaws, and the time needed to analyze the relations amongst the CSs, which always has a key economic significance. This article presents a threat analysis methodology and a supporting tool aimed at (i)</p>	10.1145/3234513		Crossref
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		<p>identifying (emerging) threats in evolving SoSs, (ii) reducing the cognitive load required to understand an SoS and the relations among CSs, and (iii) facilitating SoS risk management by proposing mitigation strategies for SoS administrators. The proposed methodology, as well as the tool, is empirically validated on Smart Grid case studies by submitting questionnaires to a user base composed of 3 stakeholders and 18 BSc and MSc students.</p> <p></jats:p></p>			
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"Learned"	Yiying Zhang, Yutong Huang,	<p>With operating systems being at the core of computer systems, decades of research and engineering efforts have been put into the development of OSes. To keep pace with the speed of modern hardware and application evolvement, we argue that a different approach should be taken in future OS development. Instead of relying solely on human wisdom, we should also leverage AI and machine learning techniques to automatically "learn" how to build and tune an OS. This paper explores the opportunities and challenges of the "learned" OS approach and makes recommendation for future researchers and practitioners on building such an OS.</p>	10.1145/3352020.3352027		Crossref
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The Netflix Recommender System	Carlos A. Gomez-Uribe, Neil Hunt,	<jats:p>This article discusses the various algorithms that make up the Netflix recommender system, and describes its business purpose. We also describe the role of search and related algorithms, which for us turns into a recommendations problem as well. We explain the motivations behind and review the approach that we use to improve the recommendation algorithms, combining A/B testing focused on improving member retention and medium term engagement, as well as offline experimentation using historical member engagement data. We discuss some of the issues in designing and interpreting A/B tests. Finally, we describe some current areas of focused innovation, which include making our recommender system global and language aware.</jats:p>	10.1145/2843948		Crossref
Systematic Mapping of Computational Linguistics in Distributed Knowledge Based Systems and Management	Kamola Kayumova, Shakhnoza Akbarova, Maftuna Bobokeldiyeva, Gulchehra Abdukarimova, Umida Khaydarova, Zarina Xasanova,		10.1145/3726122.3726228		Crossref
Nurse-led Design and Development of an Expert System for Pressure Ulcer Management	Débora Abranches, Dympna O'Sullivan, Jon Bird,		10.1145/3290607.3312958		Crossref
Integration of brainstorming platform in a system of information systems	Saleh Majd, Abel Marie-Hélène, Misséri Véronique, Moulin Claude, Versailles David,		10.1145/3012071.3012084		Crossref

SCADA security using SSH honeypot	Amine Belqruch, Abdelilah Maach,		10.1145/3320326.3320328		Crossref
Actor-based risk analysis for blockchains in smart mobility	Ranwa Al Mallah, Bilal Farooq,		10.1145/3410699.3413794		Crossref
Detecting security leaks in hybrid systems with information flow analysis	Luan Viet Nguyen, Gautam Mohan, James Weimer, Oleg Sokolsky, Insup Lee, Rajeev Alur,		10.1145/3359986.3361212		Crossref
Evaluation Method and Application of the Civil Aviation Surveillance System Horizontal Position Error for The Performance-Based Surveillance	Kaiyan Jin, Yanbo Zhu, Youchen Xu, Yongyue Chen,		10.1145/3661638.3661669		Crossref
Designing Systems in the Digital Immortality Era	Maurizio Caon,		10.1145/3197391.3205442		Crossref
Spoken Language to Sign Language Translation System Based on HamNoSys	Zhehan Kang,		10.1145/3364908.3365300		Crossref
Assessment of Machine Learning Security: The Case of Healthcare Data	Anood Manasrah, Aisha Alkayem, Malik Qasaimeh, Samer Nofal,		10.1145/3460620.3460738		Crossref
Transparent End-to-End Security for Publish/Subscribe Communication in Cyber-Physical Systems	Markus Dahlmanns, Jan Pennekamp, Ina Berenice Fink, Bernd Schoolmann, Klaus Wehrle, Martin Henze,		10.1145/3445969.3450423		Crossref
LandSAGE: Collaborative Large Display Systems for Landslide Response in Southeast Asia	Dylan Kobayashi, Billy Troy Wooton, Nurit Kirshenbaum, Jason Leigh, Jason Haga,		10.1145/3334480.3382873		Crossref
Sports training simulation system based on video processing technology	Minyi Lu,		10.1145/3482632.3487525		Crossref
Application Value of Artificial Intelligence System in Music Education	Yiwen Hu,		10.1145/3482632.3483173		Crossref
An Offloading Algorithm for Maximizing Inference Accuracy on Edge Device in an Edge Intelligence System	Andrea Fresa, Jaya Prakash Varma Champati,		10.1145/3551659.3559044		Crossref
Flexibility Modeling, Management, and Trading in Bottom-up Cellular Energy Systems	Laurynas Šikšnys, Torben Bach Pedersen, Muhammad Aftab, Bijay Neupane,		10.1145/3307772.3328296		Crossref

Hypergames and Cyber-Physical Security for Control Systems	Craig Bakker, Arnab Bhattacharya, Samrat Chatterjee, Draguna L. Vrabie,	<p>The identification of the Stuxnet worm in 2010 provided a highly publicized example of a cyber attack that physically damaged an industrial control system. This raised public awareness about the possibility of similar attacks against other industrial targets—including critical infrastructure. In this article, we use hypergames to analyze how strategic perturbations of sensor readings and calibrated parameters can be used to manipulate a system that employs optimal control. Hypergames form an extension of game theory that enables us to model strategic interactions where the players may have significantly different perceptions of the game(s) they are playing. Past work with hypergames has focused on relatively simple interactions consisting of a small set of discrete choices for each player. Here, we apply single-stage hypergames to larger systems with continuous variables. We find that manipulating constraints can be a more effective attacker strategy than manipulating objective function parameters. Moreover, the attacker need not change the underlying system to carry out a successful</p>	10.1145/3384676		Crossref
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		attack—it may be sufficient to deceive the defender controlling the system. It is possible to scale our approach up to even larger systems, but this will depend on the characteristics of the system in question, and we identify several characteristics that will make those systems amenable to hypergame analysis.</jats:p>			
EmBER: A System for Transfer of Interoceptive Sensations to Improve Social Perception	Caitlin Morris, Valdemar Danry, Pattie Maes,		10.1145/3532106.3533550		Crossref
Practical Lessons from Developing a Large-Scale Recommender System at Zalando	Antonino Freno,		10.1145/3109859.3109897		Crossref
Session details: Timed Systems	Vinayak S. Prabhu,		10.1145/3258026		Crossref
Editorial for TODAES Special Issue on Internet of Things System Performance, Reliability, and Security			10.1145/3276908		Crossref
Application-transparent scheduling of socket system calls on many-core systems	Jooho Kim, Joong-Yeon Cho, Hyun-Wook Jin,		10.1145/3230718.3232113		Crossref
Towards a Generalized System for Generative Engineering	Deepak Nagaraj, Dirk Werth,		10.1145/3378184.3378227		Crossref
An Augmented Reality Visualization Aid Associated to a Locker Reservation System	Eman Aldhahri,		10.1145/3508072.3508112		Crossref
Conceptual Modeling of Event-Based Systems	Wolfgang Reisig,		10.1145/3328905.3338222		Crossref
Multi-user Interaction with Domestic Lighting Systems	Karin Niemantsverdriet,		10.1145/2908805.2909427		Crossref
Pursuing Optimal Trade-Off Solutions in Multi-Objective Recommender Systems	Vincenzo Paparella,		10.1145/3523227.3547425		Crossref
Learning classifier systems	Anthony Stein, Masaya Nakata,		10.1145/3449726.3461414		Crossref
Characterizing and Mitigating the Impact of Data Imbalance for Stakeholders in Recommender Systems	Elizabeth Gómez,		10.1145/3383313.3411454		Crossref
Knowledge-Aware Recommender Systems based on Multi-Modal Information Sources	Giuseppe Spillo,		10.1145/3604915.3608866		Crossref

Research on the Construction of Project Management Information System Based on Multi-tier Architecture	Yongbing Yan, Yuhui Song, Xia Zhang, Lin Ai,		10.1145/3482632.3483995		Crossref
Optimal Data Rate for State Estimation of Switched Nonlinear Systems	Hussein Sibai, Sayan Mitra,		10.1145/3049797.3049799	https://dl.acm.org/doi/pdf/10.1145/3049797.3049799	Crossref
PLE for automotive braking system with management of impacts from equipment interactions	Takahiro Iida, Masahiro Matsubara, Kentaro Yoshimura, Hideyuki Kojima, Kimio Nishino,		10.1145/2934466.2934490		Crossref

Towards an Integrated Vehicle Management System in DriveOS	Soham Sinha, Richard West,	<p>Modern automotive systems feature dozens of electronic control units (ECUs) for chassis, body and powertrain functions. These systems are costly and inflexible to upgrade, requiring ever increasing numbers of ECUs to support new features such as advanced driver assistance (ADAS), autonomous technologies, and infotainment. To counter these challenges, we propose DriveOS, a safe, secure, extensible, and timing-predictable system for modern vehicle management in a centralized platform. DriveOS is based on a separation kernel, where timing and safety-critical ECU functions are implemented in a real-time OS (RTOS) alongside non-critical software in Linux or Android. The system enforces the separation, or partitioning, of both software and hardware among different OSes.</p> <p>DriveOS runs on a relatively low-cost embedded PC-class platform, supporting multiple cores and hardware virtualization capabilities. Instrument cluster, in-vehicle infotainment and advanced driver assistance system services are implemented in a Yocto Linux guest, which communicates with critical real-</p>	10.1145/3477013		Crossref
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		<p>time services via secure shared memory. The RTOS manages a real-time controller area network (CAN) interface that is inaccessible to Linux services except via well-defined and legitimate communication channels. In this work, we integrate three Qt-based services written for Yocto Linux, running in parallel with a real-time longitudinal controller task and multiple CAN bus concentrators, for vehicular sensor data processing and actuation. We demonstrate the benefits and performance of DriveOS with a hardware-in-the-loop CARLA simulation using a real car dataset.</p>			
Userland Containers for Mobile Systems	<p>Isaac Ahlgren, Victor Rakotondranoro, Yasin N. Silva, Eric Chan-Tin, George K. Thiruvathukal, Neil Klingensmith,</p>		10.1145/3572864.3581588	https://dl.acm.org/doi/pdf/10.1145/3572864.3581588	Crossref

Catching Them Red- Handed	Xu Han, Niam Yaraghi, Ram Gopal,	<p><jats:p> The Centers for Medicare 8 Medicaid Services (CMS) launched its nursing home rating system in 2008, which has been widely used among patients, doctors, and insurance companies since then. The system rates nursing homes based on a combination of CMS's inspection results and nursing homes' self-reported measures. Prior research has shown that the rating system is subject to inflation in the self-reporting procedure, leading to biased overall ratings. Given the limited resources CMS has, it is important to optimize the</p> <p><jats:italic>inspec tion</jats:italic> process and develop an effective</p> <p><jats:italic>audit< /jats:italic> process to detect and deter inflation.</p> <p></jats:p> <jats:p>We first examine if the domain that CMS currently inspects is the best choice in terms of minimizing the population of nursing homes that can inflate and minimizing the difficulty of detecting such inflators. To do this, we formulate the problem mathematically and test the model by using publicly available CMS data on nursing home ratings. We show that CMS's</p>	10.1145/3325522		Crossref
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		<p>current choice of inspection domain is not optimal if it intends to minimize the number of nursing homes that can inflate their reports, and CMS will be better off if it inspects the staffing domain instead. We also show that CMS's current choice of inspection domain is only optimal had there been an audit system in place to complement it. We then design an audit system for CMS which will be coupled with its current inspection strategy to either minimize the initial budget required to conduct the audits or to maximize the efficiency of the audit process. To design the audit system, we consider nursing homes' reactions to different audit policies, and conduct a detailed simulation study on the optimal audit parameter settings. Our result suggests that CMS should use a moderate audit policy in order to carefully balance the tradeoff between audit net budget and audit efficiency.</p>			
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ForSyDe-Atom	George Ungureanu, José Edil Guimarães De Medeiros, Timmy sundström, Ingemar Söderquist, Anders Åhlander, Ingo Sander,	<p><jats:p> We present ForSyDe-Atom, a formal framework intended as an entry point for disciplined design of complex cyber-physical systems. This framework provides a set of rules for combining several domain-specific languages as structured, enclosing</p> <p><jats:italic>layers</jats:italic> to</p> <p><jats:italic>orthogonalize</jats:italic> > the many aspects of system behavior, yet study their interaction</p> <p><jats:italic>in tandem</jats:italic> . We define four layers: one for capturing timed interactions in heterogeneous systems, one for structured parallelism, one for modeling uncertainty, and one for describing component properties. This framework enables a systematic exploitation of design properties in a design flow by facilitating the stepwise</p> <p><jats:italic>projection</jats:italic> of certain layers of interest, the isolated analysis and</p> <p><jats:italic>refinement</jats:italic> on projections, and the seamless</p> <p><jats:italic>reconstruction</jats:italic> of a system model by</p>	10.1145/3424667		Crossref
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		virtue of orthogonalization. We demonstrate the capabilities of this approach by providing a compact yet expressive model of an active electronically scanned array antenna and signal processing chain, simulate it, validate its conformity with the design specifications, refine it, synthesize a sub-system to VHDL and sequential code, and co-simulate the generated artifacts. </jats:p>			
Investigating Information Systems with the Extended Case Method	Octavio Gonzalez,		10.1145/3361570.3361581		Crossref
Towards Accelerating Offline RL based Recommender Systems	Mayank Mishra, Rekha Singhal, Ravi Singh,		10.1145/3486001.3486244		Crossref
Herakles	Timo Michelsen, Michael Brand, Carsten Cordes, H.-Jürgen Appelrath,		10.1145/2675743.2776775		Crossref
The Management of Risks and Benefits when Engineering Interactive Digital Systems	José Creissac Campos, T.C. Nicholas Graham, Lucio Davide Spano, Jan Van den Bergh,		10.1145/3459926.3464760		Crossref
Eliciting pairwise preferences in recommender systems	Saikishore Kalloori, Francesco Ricci, Rosella Gennari,		10.1145/3240323.3240364		Crossref
Implementation of Intelligent Agents for Network Traffic and Security Risk Analysis in Cyber-Physical Systems	Igor Kotenko, Sergey Ageev, Igor Saenko,		10.1145/3264437.3264487		Crossref
Causal fault localisation in dataflow systems	Andrei Paleyes, Neil David Lawrence,		10.1145/3578356.3592593		Crossref
Automated Surveillance Systems of Smart Cameras in Trains	Leon Rothkrantz,		10.1145/3407982.3407988		Crossref
Enabling Hybrid PCM Memory System with Inherent Memory Management	Yu-Ming Chang, Yuan-Hao Chang, Hsiu-Chang Chen, Tei-Wei Kuo,		10.1145/2987386.2987398		Crossref
e-SMARTS	Udesh Gunarathna, Renata Borovica-Gajic, Shanika Karunasekera, Egemen Tanin,		10.1145/3557915.3560955		Crossref

How user perceptions of SAP ERP system change with system experience	Sung J. Shim, Minsuk K. Shim,		10.1145/3279996.3280016		Crossref
On Challenges of Evaluating Recommender Systems in an Offline Setting	Aixin Sun,		10.1145/3604915.3609495		Crossref
DRAMPersist	Krishna T. Malladi, Manu Awasthi, Hongzhong Zheng,		10.1145/2989081.2989110		Crossref
Challenges for Anonymous Session-Based Recommender Systems in Indoor Environments	Alessio Ferrato,		10.1145/3604915.3608879		Crossref

<p>A Modeling Language for Conceptual Design of Systems Integration Solutions</p>	<p>Sandeep Purao, Narasimha Bolloju, Chuan-Hoo Tan,</p>	<p><jats:p>Systems integration—connecting software systems for cross-functional work—is a significant concern in many large organizations, which continue to maintain hundreds, if not thousands, of independently evolving software systems. Current approaches in this space remain ad hoc, and closely tied to technology platforms. Following a design science approach, and via multiple design-evaluate cycles, we develop Systems Integration Requirements Engineering Modeling Language (SIRE-ML) to address this problem. SIRE-ML builds on the foundation of coordination theory, and incorporates important semantic information about the systems integration domain. The article develops constructs in SIRE-ML, and a merge algorithm that allows both functional managers and integration professionals to contribute to building a systems integration solution. Integration models built with SIRE-ML provide benefits such as ensuring coverage and minimizing ambiguity, and can be used to drive implementation with different platforms such as middleware,</p>	<p>10.1145/3185046</p>		<p>Crossref</p>
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		services, and distributed objects. We evaluate SIRE-ML for ontological expressiveness and report findings about applicability check with an expert panel. The article discusses implications for future research such as tool building and empirical evaluation, as well as implications for practice.</jats:p>			
Crafting the Computational: Artistic Production, Generative Systems, and Digital Fabrication	Mert Toka,		10.1145/3656156.3665122		Crossref
HomeLabGym: A real-world testbed for home energy management systems	Toon Van Puyvelde, Marie-Sophie Verwee, Gargya Gokhale, Mehran Zareh, Chris Develder,		10.1145/3632775.3661974		Crossref
CheckInShop.eu	Panagiotis Symeonidis, Stergios Chairistanidis,		10.1145/3109859.3109977		Crossref
Design of Aerospace QR Ticketing System Based on Mobile Devices	Xiao Yu,		10.1145/3482632.3484146		Crossref
Research on the Construction of Cloud Classroom System	Kunlun Wei, Haiyan Hao,		10.1145/3482632.3482990		Crossref
Communicating with the Outside World through Surreptitious Wearable Systems	James Wen,		10.1145/2753509.2753523		Crossref

Bounding System-Induced Biases in Recommender Systems with a Randomized Dataset	Dugang Liu, Pengxiang Cheng, Zinan Lin, Xiaolian Zhang, Zhenhua Dong, Rui Zhang, Xiuqiang He, Weike Pan, Zhong Ming,	<p><jats:p>Debiased recommendation with a randomized dataset has shown very promising results in mitigating system-induced biases. However, it still lacks more theoretical insights or an ideal optimization objective function compared with the other more well-studied routes without a randomized dataset. To bridge this gap, we study the debiasing problem from a new perspective and propose to directly minimize the upper bound of an ideal objective function, which facilitates a better potential solution to system-induced biases. First, we formulate a new ideal optimization objective function with a randomized dataset. Second, according to the prior constraints that an adopted loss function may satisfy, we derive two different upper bounds of the objective function: a generalization error bound with triangle inequality and a generalization error bound with separability. Third, we show that most existing related methods can be regarded as the insufficient optimization of these two upper bounds. Fourth, we propose a novel method called</p> <p><jats:italic>debiasing approximate upper bound</jats:italic></p>	10.1145/3582002		Crossref
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		<p>></p> <p>(</p> <p><jats:italic>DUB</jats:italic></p> <p>) with a randomized dataset, which achieves a more sufficient optimization of these upper bounds. Finally, we conduct extensive experiments on a public dataset and a real product dataset to verify the effectiveness of our DUB.</p> <p></jats:p></p>			
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Explainable Surgical Procedures Recommender System Leveraging Large Language Models	Adir Solomon, Maxim Glebov, Teddy Lazebnik,	<p>Significant advancements have recently been made in the fields of recommender systems and natural language processing, particularly with large language models (LLMs). In most cases, recommender systems have been used to suggest items and enhance personalization for users, while LLMs have been applied to textual tasks such as text completion, translation, and summarization. In this study, we demonstrate that integrating recommender system models with recent LLMs can effectively suggest appropriate surgical procedures for patients. We employ several LLMs to process clinical text in a morphologically rich language, serving three crucial roles: information representation, information enrichment, and explaining the surgical procedure suggestions made by the recommender system. Our method was evaluated using real-world clinical data, considering patients' demographic attributes and health conditions. To assess the explainability of our method, we conducted an extensive experiment involving several clinicians. The results achieved by our method indicate that using</p>	10.1145/3767326		Crossref
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		recommender systems and LLMs can lead to high performance and improved explanations. Our study has the potential to enhance the personalization of healthcare and could be adopted by health services to assist healthcare professionals in recommending appropriate surgical procedures.</jats:p>			
DeepErr: Automatic Root-Cause Analysis of System Call Failures	Nadav Amit, Michael Wei,		10.1145/3757347.3759134		Crossref
Design of Information System Requirements for Basic Management of Navigation Equipment	Hua Shang, Xueqin Xu, Feng Shi, Fang Cheng,		10.1145/3732945.3732991		Crossref
Exploring Strategies for Upgrading Management Systems in Food and Agricultural Laboratory Information Management Systems Based on Association Rule Mining Algorithms	Yinglong Zhang, Guohui Du, Yan Jiao, Mingli Li, Jianwei Sheng, Xinli Ding, Wenjing Li,		10.1145/3760023.3760107		Crossref
			10.1145/3361142		Crossref
Advancing User-Centric Evaluation and Design of Conversational Recommender Systems	Michael Müller,		10.1145/3705328.3748759		Crossref
Poster	Rohit Verma,		10.1145/2938559.2948792		Crossref
User Perceptions and Adoption of Plug Load Management Systems in the Workplace	Zeynep Duygu Tekler, Raymond Low, Kenny Tsu Wei Choo, Lucienne Blessing,		10.1145/3411763.3451726		Crossref

<p>CPSim: Simulation Toolbox for Security Problems in Cyber-Physical Systems</p>	<p>Mengyu Liu, Lin Zhang, Weizhe Xu, Shixiong Jiang, Fanxin Kong,</p>	<p><jats:p> There are various applications of Cyber-Physical systems (CPSs) that are life-critical where failure or malfunction can result in significant harm to human life, the environment, or substantial economic loss. Therefore, it is important to ensure their reliability, security, and robustness to the attacks. However, there is no widely used toolbox to simulate CPS and target security problems, especially the simulation of sensor attacks and defense strategies against them. In this work, we introduce our toolbox CPSim, a user-friendly simulation toolbox for security problems in CPS. CPSim aims to simulate common sensor attacks and countermeasures to these sensor attacks. We have implemented bias attacks, delay attacks, and replay attacks. Additionally, we have implemented various recovery-based methods against sensor attacks. The sensor attacks and recovery methods configurations can be customized with the given APIs. CPSim has built-in numerical simulators and various implemented benchmarks. Moreover, CPSim is compatible with other external</p>	<p>10.1145/3674904</p>		<p>Crossref</p>
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		simulators and can be deployed on a real testbed for control purposes. <jats:xref ref-type="fn"> <jats:sup>1</jats: sup> </jats:xref> </jats:p> <jats:p/>			
Security on Wheels	Panos Papadimitratos,		10.1145/2976749 .2976752		Crossref
Session details: Memory Systems			10.1145/3297858 .3324100		Crossref

Factorization-based Attribute Residual Summary for Adaptive Edge-based Autonomous System Security	Jiuzhen Zeng, Laurence T. Yang, Chao Wang, Xin Nie, Bocheng Ren, Honglu Zhao,	<p>Due to the particularity of the marginal environment, edge-based autonomous systems face significant risks associated with security operations. Traffic anomaly detection in edge-based autonomous systems has become increasingly crucial for ensuring the security of these systems. Existing works lack consideration of the relationship between traffic attributes and anomaly types. In particular, existing solutions struggle with detecting anomalies that primarily manifest statistical signs in only a few attributes. To address this, we propose a nonnegative factorization-based attribute residual summary and a nonparametric statistic framework for adaptive security monitoring in edge-based autonomous systems. Specifically, the nonnegative factorization, which depends on the multiplicative update rules, is introduced to extract attribute features. Using the tensor linear representation, the attribute residual summary is built, which depicts the statistic discrepancy well even if only a few of traffic attributes are affected, to implement adaptive security monitoring for</p>	10.1145/3748511		Crossref
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		<p>various attacks in edge-based autonomous systems. Then, a nonparametric statistic framework is developed, which achieves the real-time detection by accumulating and comparing each statistic evidence. Extensive experiments with real-world traffic trace datasets validate the adaptivity, accuracy, real-time performance, and superiority of our method, particularly in dealing with anomalies that exhibit statistical signs in only a few traffic attributes.</p>			
Security analysis of cloud-connected industrial control systems using combinatorial testing	Peter W. V. Tran-Jørgensen, Tomas Kulik, Jalil Boudjadar, Peter Gorm Larsen,		10.1145/3359986.3361211		Crossref
Session details: Storage Systems			10.1145/3297858.3324116		Crossref
			10.1145/3316515		Crossref

Model-based Toolchain for Core Flight System (cFS) Embedded Systems	Hugo Valente, Miguel de Miguel, Ángel Pérez-Muñoz, Alejandro Alonso, Juan Zamorano, Juan De La Puente,	<p>The space domain is experiencing a paradigm shift with the rise of micro- and nanosatellites. Historically, launching a satellite required a big financial risk only sustained by governments or big companies. Nowadays, with the miniaturization of satellites, there has been a significant reduction in costs and, as a consequence, a greater opportunity for universities and smaller businesses to launch satellites into space. Companies are taking advantage of this reduction in launch and manufacturing costs to gain a competitive edge by adopting what is known as “Agile Space,” which emphasizes rapid iterations. To facilitate this high development pace, specialized toolchains and frameworks are designed for satellite software development. In this article, we provide a solution to reduce the development time of embedded software systems by ensuring consistency between the design and the implementation. We have integrated the core Flight System, a message-oriented framework developed by NASA based on a publish-subscribe architecture, with TASTE, a toolset from the European Space</p>	10.1145/3706587		Crossref
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		Agency. This integration combines modeling capabilities and automatic code generation, reducing error-prone repetitive tasks. It ensures consistency across different development stages allowing the end-user to focus on the implementation-specific details. To demonstrate the feasibility and advantages of this model-based toolchain, we present a case study of the UPMSat-2 microsatellite. This study demonstrates how this approach can be used to successfully support the development of embedded software systems.</jats:p>			
			10.1145/2742819		Crossref
Multi-Step Critiquing User Interface for Recommender Systems	Diana Andreea Petrescu, Diego Antognini, Boi Faltings,		10.1145/3460231.3478886		Crossref
			10.1145/3374918		Crossref
The development of the smart factory during the Industry 4.0 period under the study of system thinking	Zhenquan Zhou, Lanxin Wang, Chenxin Tian, Deprizon Syamsunur,		10.1145/3661638.3661681		Crossref
			10.1145/3068852		Crossref
Design of high order QAM modulation and demodulation system	Liu Changlong, Chang Yinghui,		10.1145/3469213.3470430		Crossref
Proceedings of the Fifth International Workshop on Graph Data-management Experiences & Systems			10.1145/3078447		Crossref
Reliability analysis of circulating water filtration system in nuclear power plants based on fuzzy GO methodology and Boolean algebra method	Yadi Zhang, Fuhai Duan, Xinshuai Han,		10.1145/3661638.3661714		Crossref
Application of Computer Network Course System in IAPE Education Design	Yuan Jiang,		10.1145/3482632.3483072		Crossref
Conversational Recommendation System with Unsupervised Learning	Yueming Sun, Yi Zhang, Yunfei Chen, Roger Jin,		10.1145/2959100.2959114		Crossref

<p>A Comparative Survey Of Algorithmic Feed Recommendation System Designs</p>	<p>Laura Edelson, Frances Haugen, Damon McCoy,</p>	<p><jats:p>Social media platforms are highly reliant on algorithmic feed systems to deliver content to users. Unlike content recommender systems typically studied in academia, recommendation algorithms for social media feeds are multi-stakeholder and designed to maximize usage, rather than relevance or affinity. How feed algorithms are designed and exactly what content is recommended to users has come under increasing scrutiny from the public and lawmakers. Companies have responded to this scrutiny with more transparency around their systems, including their recommendation algorithms. To aid in comparisons of these newly-transparent systems, we perform a survey of social media feed algorithm systems by conducting a qualitative document analysis of primary source documents. Our survey identifies salient design choices that different apps have made, and algorithm traits that result from those design choices. The key areas of our survey are feed content inventory selection, features used for ranking and four key algorithm traits, along with metrics that capture those traits. We also</p>	<p>10.1145/3757327</p>		<p>Crossref</p>
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		perform a case study of X's recently open-sourced feed algorithm, with a particular focus on the key characteristics and algorithm traits identified in our larger survey.</jats:p>			
Data Preservation System using BoCA: Blockchain-of-Custody Application	Thomas Martin, Mohammad Hammoudeh,		10.1145/3508072.3508084		Crossref
Challenges for the design of a privacy-preserving, multi-domain telemetry system for widely-spread network security appliances	Christophe Bacara, Damien Deville, Michaël Hauspie, Gilles Grimaud,		10.1145/3195258.3195262		Crossref
Comparative Analysis of Pretrained Audio Representations in Music Recommender Systems	Yan-Martin Tamm, Anna Aljanaki,		10.1145/3640457.3688172		Crossref
Design of Intelligent Traffic Simulation System Based on Decision Tree Algorithm	Peng Chen,		10.1145/3469213.3472778		Crossref
A Recommender System to tackle Enterprise Collaboration	Gabriel de Souza P. Moreira, Gilmar Souza,		10.1145/2959100.2959115		Crossref
			10.1145/2991040		Crossref
			10.1145/2677016		Crossref
HPC System Software Enhanced by Source Code Analysis	Jidong Zhai,		10.1145/3322789.3328741		Crossref
Blockchain-Based and Fuzzy Logic-Enabled False Data Discovery for the Intelligent Autonomous Vehicular System	Ziaur Rahman, Xun Yi, Ibrahim Khalil, Adnan Anwar, Shantanu Pal,		10.1145/3591365.3592947		Crossref
Research on Adaptive Front-lighting System Algorithm Based on Machine Vision	Zheng Tuo,		10.1145/3407703.3407709		Crossref
System Virtualization for Neural Processing Units	Yuqi Xue, Yiqi Liu, Jian Huang,		10.1145/3593856.3595912		Crossref
App security with JSFlow	Daniel Hedin,		10.1145/2897073.2897714		Crossref
Proceedings of the Fourth International Workshop on Graph Data Management Experiences and Systems			10.1145/2960414		Crossref
			10.1145/2780401		Crossref
Conducting User Experiments in Recommender Systems	Bart Knijnenburg, Edward Malthouse,		10.1145/3640457.3687090		Crossref
Survey on Recommendation Systems	Sara Gasmi, Tahar Bouhadada, Abdelmadjid Benmachiche,		10.1145/3447568.3448518		Crossref
The protective effects of soy isoflavones on the cardiovascular system	Yuyuan Cao,		10.1145/3745034.3745100		Crossref
Paper Trail: An Immersive Authoring System for Augmented Reality Instructional Experiences	Shwetha Rajaram, Michael Nebeling,		10.1145/3491102.3517486		Crossref

Gray Sheep, Influential Users, User Modeling and Recommender System Adoption by Startups	Abhishek Srivastava,		10.1145/2959100.2959103		Crossref
Session details: Keynote Talks	Li Li,		10.1145/3467999		Crossref
			10.1145/2897823		Crossref
Correctness and Consistency of Event-Based Systems	Opher Etzion,		10.1145/3328905.3332463		Crossref
Large Scale Real-time Distributed Systems – Resource Allocation and Scheduling Issues	Helen Karatza,		10.1145/3459960.3461561		Crossref
Digital Systems and the Experience of Legacy	Rebecca Gulotta, Aisling Kelliher, Jodi Forlizzi,		10.1145/3064663.3064731		Crossref

Editorial	Matthias Jarke, Kalle Lyytinen,	<p><jats:p></p> <p><jats:italic>Walking on water, and programming according to specifications is easy—as long as both of them are frozen.</jats:italic></p> <p>--Robert Glass</p> <p></jats:p></p> <p><jats:p>This introduction discusses the changing nature of complexity associated with requirements engineering (RE) tasks and how it has shifted from managing internal complexity to adapting and leveraging upon external and dynamic complexity. We note several significant drivers in the requirements knowledge that have resulted in this change and discuss in light of complexity theory how the RE research community can respond to this. We observe several research challenges associated with “new complexity” and highlight how the articles included in the special issue advance the field by defining complexity more accurately, observing more vigilantly new sources of complexity, and suggesting new ways to manage complexity in terms of economic assessments, knowledge flows, and modeling for adaptability.</jats:p></p>	10.1145/2629597		Crossref
			10.1145/2666081		Crossref
Assuring Product Lines of Complex Systems	Marsha Chechik,		10.1145/3744915.3749152		Crossref

A Dynamical Systems Approach to Neuromorphic Computation of Conditional Probabilities	Nigel Stepp, Aruna Jammalamadaka,		10.1145/3229884.3229891		Crossref
Towards a Blockchain-Based System for Research Data Publishing and Verification	Akira Summers,		10.1145/3508072.3508171		Crossref
Can LLMs Replace Time-Tested System Policies? Perhaps	Yibo Zhao, Cheng Tan,		10.1145/3725783.3764405		Crossref
Mira: A Program-Behavior-Guided Far Memory System	Zhiyuan Guo, Zijian He, Yiyang Zhang,		10.1145/3600006.3613157		Crossref
A diagram-centric modeling tool for systems of systems	Sean Kristian Remond Harbo, Emil Palmelund Voldby, Jonas Madsen, Michele Albano,		10.1145/3550356.3559093		Crossref
Social based Trust Management System for Resource Sharing Service	Hoan-Suk Choi, Woo-Seop Rhee,		10.1145/3206185.3206207		Crossref
A Resilient Reinforcement Learning based Home Energy Management System	Dariusz Hosseini, Ulrich Ludolfinger, Thomas Hamacher, Maren Martens,		10.1145/3679240.3734621		Crossref
Extending Multi-time Scale Energy Management System to Support Wind Power Generation	Shuheii Mitsunaga, Dafang Zhao, Hiroki Nishikawa, Ittetsu Taniguchi, Takao Onoye,		10.1145/3632775.3661978		Crossref
			10.1145/2903747		Crossref
Imputation of Human Mobility Data for Comprehensive Risk Models	Shashee Kumari, Sakyajit Bhattacharya, Arnab Chatterjee, Avik Ghose,		10.1145/3597061.3597260		Crossref
Online Working Set Change Detection with Constant Complexity	L J Gokul Vasan, Éder F. Zulian, Christian Weis, Matthias Jung, Norbert Wehn,		10.1145/3488423.3519332		Crossref
Nimble Page Management for Tiered Memory Systems	Zi Yan, Daniel Lustig, David Nellans, Abhishek Bhattacharjee,		10.1145/3297858.3304024	https://dl.acm.org/doi/pdf/10.1145/3297858.3304024	Crossref
Model-driven digital twin construction	Jörg Christian Kirchhof, Judith Michael, Bernhard Rumpe, Simon Varga, Andreas Wortmann,		10.1145/3365438.3410941		Crossref
Idea	Palanivel A. Kodeswaran, Ravi Kokku, Sayandeep Sen, Mudhakar Srivatsa,		10.1145/2906388.2906406		Crossref
Research on bankruptcy risk prediction of listed companies based on logistic regression model	Mei Zhang,		10.1145/3745133.3745154		Crossref
			10.1145/2869770		Crossref

How ISO C became unusable for operating systems development	Victor Yodaiken,		10.1145/3477113.3487274		Crossref
Machine Learning Systems are Stuck in a Rut	Paul Barham, Michael Isard,		10.1145/3317550.3321441		Crossref
Critical Success Factors for Open Government Data Management Information Systems in a Public Body in the State of São Paulo	Vagner Mendonça Gonçalves, José Braz de Araujo,		10.1145/3592813.3592816		Crossref
Reproducible Experiments for Internet Systems	Frank Cangialosi, Akshay Narayan,		10.1145/3526062.3536355		Crossref
			10.1145/3136608		Crossref
			10.1145/3281626		Crossref
			10.1145/3210372		Crossref

FreeSia: A Cyber-physical System for Cognitive Assessment through Frequency-domain Indoor Locomotion Analysis	Elham Khodabandehloo, Abbas Alimohammadi, Daniele Riboni,	<p><jats:p>Thanks to the seamless integration of sensing, networking, and artificial intelligence, cyber-physical systems promise to improve healthcare by increasing efficiency and reducing costs. Specifically, cyber-physical systems are being increasingly applied in smart-homes to support independent and healthy aging. Due to the growing prevalence of noncommunicable diseases in the senior population, a key application in this domain is the detection of cognitive issues based on sensor data. In this article, we propose a novel cyber-physical system for cognitive assessment in smart-homes. Cognitive evaluation relies on clinical indicators characterizing symptoms of dementia based on the individual's movement patterns. However, recognizing these patterns in smart-homes is challenging, because movement is constrained by the home layout and obstacles. Since different abnormal patterns are characterized by undulatory-like trajectories, we conjecture that frequency-based locomotion features may more effectively capture these patterns with respect to</p>	10.1145/3470454		Crossref
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		traditional features in the spatio-temporal domain. Based on this intuition, we introduce novel feature extraction techniques and adopt state-of-the-art machine learning algorithms for short- and long-term cognitive evaluation. Our system includes a user-friendly interface that enables clinicians to inspect the data and predictions. Extensive experiments carried out with a real-world dataset acquired from both cognitively healthy seniors and people with dementia show the superiority of our frequency-based features. Moreover, further experiments with an ensemble method show that prediction accuracy can be enhanced by combining features in the frequency and time domains.</jats:p>			
The Effect of Displaying System Confidence Information on the Usage of Autonomous Systems for Non-specialist Applications	Jhim Kiel M. Verame, Enrico Costanza, Sarvapali D. Ramchurn,		10.1145/2858036.2858369		Crossref
Privacy Design Strategies for Home Energy Management Systems (HEMS)	Kopo Marvin Ramokapane, Caroline Bird, Awais Rashid, Ruzanna Chitchyan,		10.1145/3491102.3517515		Crossref
Assessing conceptual knowledge in three online engineering courses	Sonia Pamplona, Isaac Seoane, Javier Bravo-Agapito,		10.1145/3279996.3280005		Crossref
Session details: Vehicular CPS	Pauline Anthonysamy,		10.1145/3252648		Crossref
Underwater	Khamdamboy Urunov, Soo-Young Shin, Jung-II Namgung, Soo-Hyun Park,		10.1145/3291940.3291957		Crossref
Design of Intelligent Attendance System Based on RF Technology	Meili Liu, Yongge Yao,		10.1145/3469213.3470687		Crossref

The Kinect-based robot environment perception system	Li Peng, Chuang Zhang,		10.1145/3655532.3655533		Crossref
Halal Supply Chain Risk in Indonesian Downstream Sector	Nadya Rishelin, Romadhani Ardi,		10.1145/3400934.3400983		Crossref
Modeling the Impact of Information on Audits on Taxpayer Risk Profiles and Evasions	Jakhongir Shaturaev,		10.1145/3644713.3644735		Crossref
OmniX	Mark Silberstein,		10.1145/3102980.3102992		Crossref
Conceptual Model of Occupational Safety and Health Management System in Office-Based Workplace	Gerardo R. Jodi, Akhmad Hidayatno, Andri D. Setiawan,		10.1145/3468013.3468643		Crossref
Future of in-vehicle recommendation systems @ Bosch	Juergen Luettin, Susanne Rothermel, Mark Andrew,		10.1145/3298689.3346958		Crossref
Adaptive Modulations for OFDM-MIMO systems	Lei Guowei, Xiao Xuefang,		10.1145/3242840.3242877		Crossref
Considering Supplier Relations and Monetization in Designing Recommendation Systems	Jan Krasnodebski, John Dines,		10.1145/2959100.2959124		Crossref
Scala for Real-Time Systems?	Martin Schoeberl,		10.1145/2822304.2822313		Crossref
Design for User Interaction with Intelligent Systems	Martin Maguire,		10.1145/3290607.3298825		Crossref
Session details: Embedded software and systems	José Luiz Güntzel,		10.1145/3258499		Crossref
Model-Driven approach to Cyber Risk Analysis in Industry 4.0	Antonio Capodieci, Luca Mainetti, Flavio Di Pietrangelo,		10.1145/3447568.3448541		Crossref
CollabFuzz	Sebastian Österlund, Elia Geretto, Andrea Jemmett, Emre Güler, Philipp Görz, Thorsten Holz, Cristiano Giuffrida, Herbert Bos,		10.1145/3447852.3458720		Crossref

System of Systems Engineering Foundation	Jamshidi, Mo,	<p>This paper introduces the concept of system of systems (SoS) and the challenges ahead to extend systems engineering (SE) to system of systems engineering. The birth of a new engineering field may be on the horizon - System of Systems Engineering (SoSE). A SoS is a collection of individual, possibly heterogeneous, but functional systems integrated together to enhance the overall robustness, lower the cost of operation, and increase reliability of the overall complex (SoS) system. Having said that the field has large vacuum from basic definition, to theory, to management and implementation. Many key issues like architecture, modeling, simulation, identification, emergence, standards, net-centricity, control, etc. are all begging for attention. In this review paper, we will be going through all these issues briefly and bring out the challenges to the attention of interested readers. This paper is based on a keynote presented at the ITQM International Conference, Bucharest, Romania, August 23-24, 2024</p>	10.1007/s40745-025-00652-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40745-025-00652-6	SpringerLink
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<p>The Meta Holonic Management Tree: review, steps, and roadmap to industrial Cybernetics 5.0</p>	<p>Pirani, Massimiliano, Carbonari, Alessandro, Cucchiarelli, Alessandro, Giretti, Alberto, Spalazzi, Luca,</p>	<p>Industry 4.0 and 5.0 are currently pushing towards a reconciliation between humans and the concurrent evolution of cyber-physical systems of systems. This constitutes an increasingly complex battlefield in which management and engineering are experiencing hard times. The cybernetics framework, in its recent evolutions, should be refocused to recover a unifying edifice to these challenges. The Cybernetics 5.0, here proposed, aims at finding ways to deal with the complexity of control and management of pervasive networks of digital, analog, mechanic, and human-centered systems. These challenges had always been the basis of cybernetics, but they have been overshadowed by the impressive and exponentially fast advances in information and communication technologies, intelligent automation, and artificial intelligence. However, cybernetics is still crucial when engineering solutions need to move beyond the frontiers of the hard sciences for soft problems, and towards increased interdisciplinarity for hard problems. In this context, holonic architectures are seen as a valuable ground. Hence, holonic</p>	<p>10.1007/s10845-024-02510-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-024-02510-3</p>	<p>SpringerLink</p>
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		foundations are here perfected for the Cybernetics 5.0 vision. The Meta Holonic Management Tree is accordingly proposed as a first methodological instance and factual bridge between cybernetics and the complexities of Industry 4.0 and 5.0.			
Special Issue of the Eleventh International Conference on Information Technology and Quantitative Management (ITQM 2024)	Shi, Yong, Filip, Florin Gheorghe,		10.1007/s40745-025-00661-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40745-025-00661-5	SpringerLink

Software architecture design for real-time control systems: how design patterns could help?	Mzid, Rania, Abid, Mohamed,	<p>In this paper, we deal with the software architecture design of real-time control systems. Given the inherent complexity of such systems on the one hand and the pressing demand for high-quality systems in industry on the other, the design phase becomes paramount. One key objective during this phase is to produce a software architecture that describes a possible realization of the application while adhering to both functional and non-functional requirements, particularly those related to timing. Typically, architects rely on their experience to explore different design alternatives, employing a trial-and-error approach to produce an acceptable architecture. In this paper, we propose the use of real-time patterns to help designers define the appropriate architecture with a trial-and-error strategy. The proposed patterns assist designers in setting design choices and evaluating them using schedulability analysis techniques. These patterns encapsulate the knowledge of a real-time expert in scheduling analysis theory. In addition, to accelerate the process and help designers evaluate various design</p>	10.1007/s11334-025-00600-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-025-00600-w	SpringerLink
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		alternatives, we automate the generation of the analysis model. The obtained results show the applicability of the proposed pattern to a real-life case study and their effectiveness in exploring various software designs.			
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Current approaches to digital twins in additive manufacturing: a systematic literature review	Tudorache, Leonard, Babur, Önder, Lucas, Sandra S., Brand, Mark,	Digital twin (DT) technology has become a promising approach for improving the efficiency, quality, and reliability of manufacturing processes. This systematic literature review aims to conduct an in-depth analysis of the current approaches used to develop DTs for Additive Manufacturing (AM) process from January 2010 to May 2024. We analyzed 65 studies to identify the types of printers used, challenges and opportunities, methodologies, implementation approach, quality assurance, process optimization, integration of material behavior, and structural analysis. The results outline the challenges associated with data collection and processing due to real-time requirements or generating relevant data through sensors. Additionally, there is a need for accurate material behavior and structural analysis models to achieve efficient simulation modules, yet there has been limited research on integrating those. Standard engineering tools used for DTs in the literature are not employed in the AM context. Many studies present generic implementations for DTs that do not address the required level of detail to achieve	10.1007/s40964-025-01262-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40964-025-01262-7	SpringerLink
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		<p>an effective DT solution. Future work should focus on understanding the complex additive manufacturing process to build integrated and enhanced simulation capabilities of the DT and on employing standard engineering methodologies and tools for developing DTs in the context of AM.</p>			
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Metaverse as a Cyber-Physical Social System	Abed, Ahmed Zedaan M., Abdelkader, Tamer, Hashem, Mohamed,	<p>The integration of cyber space, physical space, and social world resources is a fundamental aspect of Cyber-Physical Social Systems (CPSSs). These systems rely on communication, computation, and control infrastructures that are structured into several levels for each domain. These levels encompass a range of resources, including sensors, actuators, computational capabilities, services, and human involvement. The efficient coordination of these resources is vital for the effective functioning of cyber-physical social systems. Positioned as a transformative model for the future of the Internet, the Metaverse is designed to establish a fully immersive, hyper spatiotemporal and self-sustaining virtual realm where people can interact through activities and offering innovative services for gaming, healthcare, education, business, commerce, and social engagements. Developing the necessary technology for this scenario involves viewing the Metaverse as Cyber-Physical Social Systems (CPSSs), which necessitates new software</p>	10.1007/s11276-025-04028-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-025-04028-9	SpringerLink
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		<p>platforms and rigorous standards for mobility, security, safety, privacy, and data management. This vision is propelled by recent advancements in emerging technologies such as virtual reality (VR), mixed reality (MR), augmented reality (AR), and artificial intelligence (AI). In this paper, we compared the components of the metaverse with CPSSs, and show that the metaverse as a Cyber Physical Social System (CPSS).</p>			
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Modeling and Evaluating the Impact of Bias Blind Spots on Business Decisions Through Matrix-Based Graph Models	Konno, Kazuhiko, Hanna, Andrew A.,	<p>This research examines how third parties recognize bias blind spots in business decision-making by using matrix-based graph models. We use the mathematical, theoretical, and philosophical foundations of the Graph Model for Conflict Resolution to emphasize the significance of recognition of bias blind spots as a means to enhance informed decision-making. We introduce the Bias Blind Spots Graph Model and provide a mathematical framework for modeling bias blind spots. Additionally, we provide evidence of the effectiveness of accounting for the presence of bias blind spots that influence decision-making within the context of Japan's Skymark Airlines . In showcasing the theoretical underpinnings and practical applicability of this model, we contribute to identifying bias blind spots in reasoning and judgment. Further, we extend the model by providing mathematical foundations for considering decision-maker preference and outcome state stability/equilibrium. Ultimately, our findings offer valuable insights for both researchers and third parties to model and evaluate the influences of cognitive bias</p>	10.1007/s10726-025-09950-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-025-09950-z	SpringerLink
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		blind spots in decision-making processes in organizational settings.			
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<p>The Development of Soft Systems Methodology through the Lens of the FMA Framework</p>	<p>Jackson, Michael Christopher,</p>	<p>The 30-year Action Research programme conducted at the University of Lancaster, by Peter Checkland and colleagues, stands as the most rigorous ever undertaken in the field of Systems Thinking. It began with Systems Engineering as the chosen methodology and culminated with the establishment of the mature form of Soft Systems Methodology. This paper reviews the history of that programme through the lens of the FMA framework proposed by Checkland and Holwell as a benchmark for effective AR. In their view, the cycle of AR must include a declaration of the framework of ideas (F) and the methodology (M) used to intervene in an area of concern (A). It should yield both action in the A and findings about the F and M. The paper applauds the success of the programme in terms of the interventions undertaken in complex As and the modifications made to the M because of the learning gained from those interventions. It notes, however, that there were no further significant revisions to the F once the break from Systems Engineering was achieved. This was beneficial because it enabled Soft</p>	<p>10.1007/s11213-025-09743-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-025-09743-0</p>	<p>SpringerLink</p>
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		<p>Systems Methodology to continue to refine its unique competence in a new type of A, thereby significantly expanding the repertoire of Systems Thinking. There were consequences, however, because it imposed constraints on the usefulness of the M in other types of A. On this basis, it is suggested that Systems Thinking as a field will only reach its full potential when it is prepared to entertain a variety of Fs and Ms, ensuring its relevance to the broadest possible range of As.</p>			
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A comprehensive review of hybrid liquid and PCM cooling BTMS	Liu, Jiaxin, Zhang, Xilong, Xi, Yuan, Xu, Shaoqin, Zhang, Zhaotong,	With the widespread adoption of electric vehicles, thermal runaway safety incidents have become increasingly frequent. The battery thermal management system (BTMS) plays a critical role in ensuring the safe and efficient operation of batteries. Phase change material (PCM)-based BTMS, as a passive thermal management approach, offers advantages such as low operating costs and excellent temperature uniformity. This paper primarily reviews the development of hybrid liquid and PCM cooling BTMS. Focusing on lithium-ion batteries, the study analyzes their structure, working principles, heat generation mechanisms, and heat transfer characteristics. Subsequently, the working principles and theoretical models of liquid cooling systems and PCM cooling systems are examined separately. Finally, the paper summarizes advancements in hybrid PCM cooling-based thermal management systems, including the application of PCM in BTMS and the development of BTMS integrating PCM. The liquid-PCM cooling BTMS serves as the main focus of this study, categorized by cooling channel	10.1007/s10973-025-15014-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10973-025-15014-w	SpringerLink
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		<p>structures into three types: parallel-channel, serpentine-channel, and cross-flow-channel liquid-PCM hybrid systems. The results demonstrate that the cooling performance of hybrid PCM cooling-based BTMS depends on superior PCM properties and an optimized system structure. Leveraging their advantages in temperature control, battery protection, and structural design, liquid-PCM BTMS exhibits broad application prospects in the field of electric vehicle battery thermal management. They provide a reliable and efficient technical solution to address battery thermal safety challenges and are expected to emerge as a mainstream direction for future electric vehicle thermal management systems.</p>			
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<p>Tackling the soft non-technical challenges of the adoption of complexity science in policymaking</p>	<p>Nel, Darren, Taeihagh, Araz,</p>	<p>Complexity science offers valuable conceptual and analytical tools for addressing multifaceted socio-technical challenges in policymaking, promoting a holistic, dynamic, and adaptive framework that moves beyond traditional linear approaches. Despite its potential, complexity science has struggled to gain traction in the mainstream policy debates. This article examines the non-technical-human and organisational-barriers impeding the adoption of complexity science in policymaking and proposes strategies to overcome these obstacles. The barriers fall into three categories: management, institutional, and political challenges; communication and trust issues; and ethical considerations. The article synthesises insights from 37 interviews with complexity and policy experts to understand challenges and identify effective strategies. The findings reveal that entrenched governance structures, short-term political incentives, and limited awareness of complexity concepts among policymakers hinder the adoption of complexity-informed approaches. Additionally, a</p>	<p>10.1007/s11077-025-09594-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11077-025-09594-5</p>	<p>SpringerLink</p>
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		<p>preference for simpler, more immediate solutions further obstructs the integration of complexity science into policymaking. Ethical considerations, such as data privacy and potential biases within models, also present significant challenges. Several strategies are identified to overcome these barriers, including fostering interdisciplinary collaboration, enhancing transparency in model development, and establishing experimental policy labs. The findings highlight the need for targeted training programs to equip policymakers with the skills to navigate complex systems and emphasise the importance of establishing platforms for interdisciplinary dialogue. These strategies aim to build capacity, improve understanding, foster trust, and encourage more adaptive and holistic policymaking approaches, ultimately facilitating the integration of complexity science into mainstream policymaking.</p>			
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Review of Computational Strategies for Drone Design and Development	Pisharam, Akhila Ajith, Kandasamy, Kesavan, Subramaniam, Indira Prasanth, Solaiappan, Senthil Kumar, Stanislaus Arputharaj, Beena, Rajendran, Parvathy, Sakthivel, Pradesh, Maranan, Ramya, Raja, Vijayanandh,	The utilization of Unmanned Aerial Vehicles (UAVs) in contemporary times is not limited to military or emergency applications. UAVs are present in every aspect of transportation or movement including medicine delivery, general consumable delivery, warfare, reconnaissance and multiple other areas. Each of these applications require UAVs to cater to the particular mission. The design procedure involved in the same is tiring, vast and requires a high level of mathematical, mechanical and computational knowledge. This study provides a holistic view of all the design requirements for a UAV in an analytical and computational perspective. A brief description on the systems, working conditions and applications of UAVs and Unmanned Aerial Systems (UAS) is provided. Further, this study, by scrutinizing available scientific data, describes all the important procedure involved. This includes the design procedure and relevant calculations, and computational methodologies such as control dynamics and computational fluid dynamics. The various loading conditions are also discussed based on the complexity of the	10.1007/s11831-025-10458-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-025-10458-7	SpringerLink
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		<p>mission. The design and simulation procedure is provided for different types of UAVs including multirotor, fixed-wing models and hybrid models. In addition to the same, the applications of the UAS in various fields is also described. Hence, this study presents the entire design and operational condition simulation procedure used for UAS by combining the data collected from the available scientific procedures and articles.</p>			
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5G networks and their impact on the evolution of real-time monitoring and control systems for Industry 4.0: a systematic review	Flores-Castañeda, Rosalynn Ornella, Ledesma, Sabino Muñoz, Olaya-Cotera, Sandro,	The evolution of industry towards more efficient and automated environments requires control and monitoring systems capable of processing and transmitting information in real time. This systematic review analyses the impact of 5G networks on the evolution of real-time control and monitoring systems for Industry 4.0, identifying the main advances, methodologies used to evaluate their performance and reliability, implementation benefits, most studied industrial sectors, and associated technical challenges. A structured search was conducted in the Scopus, Web of Science, ScienceDirect, and Taylor & Francis databases in March 2025, considering studies from 2021 to 2025 and applying the PRISMA 2020 methodology, complemented by bibliometric mapping using VOSviewer. The results show that 5G networks significantly improve efficiency, automation, and real-time monitoring in industrial environments. Advances in latency reduction, distributed processing, and process synchronisation are identified, supported by technologies such as cloud computing, artificial intelligence, and	10.1007/s11135-025-02476-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11135-025-02476-1	SpringerLink
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		<p>digital twins. The impact of 5G has been assessed using KPIs, tests in controlled environments, and methodologies based on intent-defined networks. The most studied sectors are manufacturing, logistics, and transport, followed by energy, automotive, and agri-food, where 5G optimises operations and improves connectivity. Challenges remain related to infrastructure costs, interoperability, and data security, which require structured implementation strategies. Practical implication: The findings offer guidance for researchers and professionals in the design and implementation of efficient industrial architectures based on 5G connectivity. In conclusion, the integration of 5G networks represents a key advance in industrial digitalisation and automation, although its mass adoption still requires overcoming technological and economic barriers.</p>			
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<p>Social Sustainability Index for Performance Measurement in Humanitarian Supply Chains: A Novel Fuzzy Logic and TISM–MICMAC Approach</p>	<p>Prajapati, Siddharth, Anbanandam, Ramesh,</p>	<p>Sustainability in humanitarian operations has primarily focused on environmental issues, while the social dimension remains underexplored despite its crucial role in disaster response and recovery. Essential social aspects, such as equitable aid distribution, community resilience, and long-term well-being, are crucial for the efficacy of humanitarian supply chains (HSCs). The enhancement and comprehension of social sustainability can be achieved through performance measurement. However, the challenge lies in measuring performance to improve social sustainability due to the complexity of quantifying social factors, human subjectivity, and uncertainty. Although a few studies have attempted to address this issue, they have not succeeded in presenting a comprehensive and measurable framework. To address this gap, this study developed a structured framework that integrates quantitative and qualitative methods for assessing the performance of social sustainability in HSCs. By employing an index-based fuzzy logic approach in conjunction with TISM – MICMAC</p>	<p>10.1007/s40171-025-00472-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-025-00472-w</p>	<p>SpringerLink</p>
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		<p>analysis, this study measured social sustainability performance and established a hierarchical structure to identify key enablers and dependencies. The framework was validated through a case study, providing targeted policy recommendations to enhance fair resource allocation, stakeholder collaboration, and overall social impact. Beyond measurement, this study offers a strategic roadmap for integrating social sustainability into humanitarian decision-making, fostering resilience, and strengthening disaster response systems. Ultimately, this research promotes stakeholder trust and advances a socially equitable approach to humanitarian operations.</p>			
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How energy infrastructure investment promotes urban green innovation: Evidence from China's UHV transmission projects	Li, Quan, Huang, Meiying, Chen, Shi,	<p>This study investigates the impact of energy infrastructure investment (EII) on urban green innovation (UGI), leveraging China's Ultra-High Voltage Transmission Projects (UHVTP) as a quasi-natural experiment. Using panel data from 2006–2021 and a staggered difference-in-differences model, we find that UHVTP significantly enhances UGI by approximately 16.3%.</p> <p>Mechanism analyses reveal three driving forces: green and low-carbon transition, improved energy efficiency, and relaxed financial constraints. These effects are more pronounced in inland cities, resource-based areas, and regions with mature green finance systems. We also identify positive spatial spillovers on surrounding areas. Factually, policymakers are advised to prioritize UHVTP deployment in key innovation hubs and underdeveloped regions, while strengthening R&D investment, green finance, and environmental awareness to foster an inclusive and resilient green transformation.</p>	10.1007/s10668-025-07023-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-025-07023-4	SpringerLink
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<p>An integrated framework for ADN congestion management combining PLLM-based forecasting and goose optimization</p>	<p>Pan, Wei, Situ, You, Zhong, Qihao, Wu, Feixiang, Liu, Naiqi, Cao, Wu,</p>	<p>This paper proposes an innovative congestion management method for Active Distribution Networks (ADNs) by integrating a Pre-trained Large Language Model (PLLM) with the Goose Optimization (GO) algorithm to tackle challenges posed by the uncertainty of flexible resources. Initially, a short-term power forecasting method is developed using PLLM enhanced with Low-Rank Adaptation (LoRA). This approach precisely captures the dynamic fluctuations of power sources and loads, achieving R2 of 0.96 and 0.95 in wind and load forecasting, respectively. Compared to traditional algorithms (BP, LSTM, BiLSTM), it reduces MAE and RMSE by at least 39.08% and 19.68% for wind forecasting, and 15.82% and 21.80% for load forecasting, respectively, ensuring high-accuracy inputs for the subsequent optimization process. Subsequently, to address the bottlenecks of slow convergence and inefficiency inherent in conventional algorithms for large-scale scheduling, the novel GO algorithm is utilized as the core engine to solve the</p>	<p>10.1186/s42162-025-00576-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-025-00576-8</p>	<p>SpringerLink</p>
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		<p>complex optimal power flow problem. Multi-scenario simulations on the IEEE 33-bus system validate that the proposed framework effectively alleviates line overloads and voltage violations, with the GO algorithm improving scheduling efficiency by at least 65.50% compared to the improved PSO. These findings highlight the exceptional performance and considerable potential of the combined PLLM and GO approach for improving the operational security, economic viability, and scheduling efficiency of ADNs.</p>			
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Global Perspectives on Navigating Industry 5.0 Knowledge: Achieving Resilience, Sustainability, and Human-Centric Innovation in Manufacturing	Sheikh, Riyaz Abdullah, Ahmed, Irfan, Faqihi, Ali Yahya A., Shehawy, Yasser Moustafa,	<p>Technological competitiveness is crucial for differentiation, market penetration, and organizational performance. Emerging economies must implement efficient policies and facilitate technology transfer. Although Industry 5.0 (I5.0) aims to address social and environmental issues, managing it remains a knowledge gap. The study's main goals are to give a full picture of how to support I5.0 goals, putting people first, being sustainable, and being resilient making it easier for people and businesses to work together. The study employs a systematic literature review as the research methodology consolidates fragmented insights and approaches, strategically outlining I5.0's components. The research findings underscore I5.0's focus on sustainability, human-centricity, and resilience, aligning with the 6Rs policy for waste prevention and leveraging key technologies. Primary technological enablers encompass digital twins, robots, the Internet of Everything, blockchain, big data analytics, 6G networks, XR private mobile networks, edge computing, network slicing, and extended reality. Policymakers and</p>	10.1007/s13132-024-02498-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-024-02498-4	SpringerLink
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		<p>practitioners can benefit from the research's recommendations , which outline the various approaches and strategies needed to transition to I5.0. Therefore, this study bridges the knowledge gap in I5.0, providing valuable insights for scholars, industrialists, and policymakers. The outlined roadmap guides stakeholders in navigating the paradigm shift toward a sustainable industrial future, acknowledging limitations and paving the way for future research in this pioneering effort.</p>			
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<p>A methodological framework for integrating model-guided medicine and multidimensional information management systems: application in anti-aging healthcare</p>	<p>Herrero Antón de Vez, Hugo, Felez, Esteban, Cypko, Mario A.,</p>	<p>Purpose This study introduces a methodological framework for integrating model-guided medicine (MGM) with multidimensional information management systems (MIMMS) to address healthcare's digital transformation challenges. Anti-aging medicine is used as a case study to illustrate the framework's adaptability and practical application in terms of data integration, workflow transparency, and AI auditability. Methods The methodology combines MGM and MIMMS to manage complex healthcare data through patient-specific, semantic, and syntactic models. Automated workflows streamline processes from data acquisition to decision-making. Integration is demonstrated with metabolic assessments and patient-specific modeling. Results The framework effectively integrates multi-domain data, enhancing interoperability, workflow transparency, and AI auditability. A case study in anti-aging medicine illustrates its practical utility and scalability, addressing limitations of existing systems and highlighting potential for broader</p>	<p>10.1007/s11548-025-03337-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11548-025-03337-w</p>	<p>SpringerLink</p>
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		<p>applications.</p> <p>Conclusion This methodological framework offers a novel approach to advancing digital healthcare transformation by enabling integrated, patient-centric workflows. While not yet applied in a clinical setting, its conceptual application to anti-aging medicine illustrates the framework's adaptability and potential to enhance healthcare standards across various domains. Future work will focus on real-world validation and refinement to further demonstrate its practical impact.</p>			
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<p> VISEF: Empirical Evaluation of a Vehicle-Level Integrated Functional Safety Framework </p>	<p> Gu, Taewan, </p>	<p> Modern vehicles operate as Systems of Systems, with tightly coupled interactions with many subsystems. As a result, traditional item-level safety analysis based on ISO 26,262 often leads to redundant or omitted hazards, limiting the ability to assure comprehensive vehicle-level functional safety. This study proposes the Vehicle-level Integrated Functional Safety Framework (VISEF) to overcome these limitations by enabling holistic safety analysis across subsystems. VISEF consists of three key stages. First, a conventional item-level hazard identification and ASIL assignment process is conducted. Second, hazard integration is performed using functional, operational, and scenario-based similarity measures to identify and consolidate redundant hazards, followed by ASIL reallocation. Third, safety path inspection is applied by generalizing control flows between ECUs into structured input-processing-output streams. To validate the framework, a dual-pronged evaluation approach was employed. A nonlinear probabilistic saturation model was used to compare the </p>	<p> 10.1007/s12239-025-00369-8 </p>	<p> http://link.springer.com/openurl/pdf?id=doi:10.1007/s12239-025-00369-8 </p>	<p> SpringerLink </p>
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		<p>system-level safety assurance probability before and after applying VISEF. Additionally, VISEF was applied to an actual commercial xEV truck/bus project. This study provides both experimental and empirical evidence that integrated vehicle-level hazard management contributes to system-level safety. VISEF offers a structured, scalable methodology for extending ISO 26,262, and establishes a foundation for future standardization in vehicle-level functional safety engineering.</p>			
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Analysis of photovoltaic penetration on voltage stability in the electrical distribution system of manabí using neural networks: a practical case study approach	Balderramo, Ney R., Valarezo, Lucio A., Cano, A., Salas, Andrés M., Jurado, F.,	The integration of photovoltaic generation into distribution networks enhances energy sustainability but poses challenges for voltage stability. This study analyses voltage stability in the Manabí distribution system using a static model with different levels of photovoltaic penetration. The experiments highlight the importance of voltage stability indices, determined using artificial neural networks with a 10-neuron structure in each hidden layer of the multilayer perceptron architecture. The scaled conjugate gradient training algorithm exhibits superior learning performance, achieving a mean square error of 5.6231E-05. The results confirm that voltage stability indices effectively determine the most resilient nodes for photovoltaic integration, with voltage variations ranging from 0.05% to 0.12% in distributed installations and from 0.04% to 0.05% in centralized locations. These findings validate the usefulness of voltage stability indices for assessing system stability and optimizing the placement of photovoltaic generation in distribution networks.	10.1007/s00500-025-10887-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-025-10887-3	SpringerLink
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<p>A devops framework for the systematic engineering and evolution of digital twins for built assets</p>	<p>Aissat, Sara, Beaulieu, Jonathan, Poirier, Érik, Motamedi, Ali, Gascon-Samson, Julien, Bordeleau, Francis,</p>	<p>Digital twins (DT) constitute complex software systems that need to be continuously modified/updated to meet evolving user requirements and priorities, and support continual improvement. Because their aim is to monitor and improve different system aspects, their development requires the collaboration of people from different domains of expertise, e.g., the development of a DT for built assets may involve the collaboration of experts in software engineering, thermal comfort, air quality, energy consumption, building security, etc. Consequently, DTs need to be engineered to enable the fast and secure integration and deployment of new code, the systematic and iterative evolution of their components, and the independent development of different system aspects by those experts. In this paper, we present JuNo-OPS, a DevOps framework for the engineering of DTs for built assets. The framework is being developed, tested, and validated in the context of various DT projects at École de Technologie Supérieure (ETS), including the development of a DT for a multi-functional room and a DT for a climatic</p>	<p>10.1007/s10270-025-01330-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-025-01330-0</p>	<p>SpringerLink</p>
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		<p>chamber. We focus on two main aspects of DT engineering: the DT architecture; and the DevOps infrastructure used to support the development, continuous integration, and continuous delivery of the DT software. We also discuss challenges and next steps related to the development and evolution of the framework.</p>			
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Evaluating a Decision-Making Architecture in Human-Robot Collaboration Experiments	Sobhani, Mehdi, Giuliani, Manuel, Smith, Jim, Pipe, Anthony, Peer, Angelika,	<p>A novel decision-making architecture inspired by the role of mirror neurons is evaluated in two user studies. First, the role and efficacy of the negotiation layer of the architecture is assessed. Then, in a "Wizard of Oz" experiment, the performance of the complete architecture is compared with the one of a human decision-maker. The same task of using wooden blocks to create characters in a kind of mechanical model of a 7-segment display is used in both experiments (task details in Sect. 2.4). The same task is used to capture data and train policy modules, an integration module, and a negotiation layer to be combined into decision-making models of involved agents, which build upon our previous work. The evaluation results show a significant improvement in terms of the chosen objective and subjective measures when the robot uses the complete architecture with the negotiation layer. No significant difference was found for any of the measures when comparing the human decision-maker and the complete model. Although the robot with a human decision-maker scored descriptively slightly better in all measures, a further Bayesian</p>	10.1007/s12369-025-01292-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12369-025-01292-9	SpringerLink
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		<p>comparison of the data suggests a high probability of similarity between the model and the human decision-maker. This was further illustrated by a qualitative analysis of the post-experiment interview questions; in answering the third question, where 17 participants identified that the robot using the complete model was like working with a human, and an equal number opted for identifying the robot controlled by a human decision-maker. In addition, answering the first question, 6 participants found no difference between the robot being controlled by a human decision-maker and being controlled using the complete model.</p>			
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Assessment of the water and energy nexus in the energy supply subsystem of water stressed countries like Iran	Vahabzadeh, Masoud, Molajou, Amir, Variani, Hossein Akbari, Afshar, Abbas,	Iran, situated in the Middle East, is recognized as a prominent energy hub, with its economy heavily reliant on the exportation of energy. Iran currently faces significant water stress, underscoring the importance of examining its Water–Energy (WE) nexus. Hence, it is crucial to examine the Water–Energy (WE) nexus in this nation. This study evaluates Iran’s WE nexus from upstream to downstream in its energy subsystem (2007–2017) through an integrated framework combining water footprint analysis, water consumption methodologies, and nexus system modeling. This study assessed the WE nexus from upstream to downstream in Iran from 2007 to 2017. Key findings reveal that steam turbine power plants, particularly Ramin and Neka, exhibit the highest water consumption intensities, approximately 2.04 and 2.65 m ³ /MWh respectively, making them critical targets for efficiency improvements or retirement. Conversely, combined-cycle plants with dry cooling technology show significantly lower water intensity (0.18 m ³ /MWh), presenting viable alternatives. The	10.1038/s41598-025-21380-0	https://www.nature.com/articles/s41598-025-21380-0.pdf	SpringerLink
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		study recommends shifting energy infrastructure towards combined-cycle and gas turbine plants to mitigate water stress, thus providing actionable insights for sustainable energy and water resource management in water-stressed regions.			
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Carbon accounting methods and carbon-reduction technologies in the tobacco industry: a comprehensive review from a full life cycle perspective	Zhu, Jielin, Chen, Yi, Luo, Zhumei, Jiang, Yonglei, Qing, Shan, Li, Chenghang, Xiang, Zhili, Huang, Haoming,	Under global climate change and China's "dual-carbon" strategy, carbon emission accounting and reduction in the tobacco industry are critical. Based on a full life cycle perspective, this study systematically reviews the research progress in carbon accounting methods and carbon-reduction technologies within the tobacco industry. Results show that China's tobacco industry has large total emissions, significant regional differences, complex processes and great emission reduction potential: the total energy consumption reached 1.92 million tons of standard coal in 2022, with a reduction potential of 68.1%. Each of the mainstream accounting methods has its own characteristics, among which life cycle assessment (LCA) is the most widely applied, but it faces challenges such as high data demand and complex evaluation processes. Existing methods are unable to accurately adapt to the industry's complex production scenarios, limiting accounting accuracy. In terms of carbon-reduction technologies, precision agriculture, green logistics, and new	10.1007/s10668-025-06876-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-025-06876-z	SpringerLink
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		<p>energy have shown remarkable effects. In particular, biomass bulk curing barns cut emissions by over 50% in the energy-heavy curing stage. Nevertheless, their promotion is hindered by high costs and inadequate policy mechanisms. Future efforts should integrate technologies such as carbon satellites, machine learning, and artificial intelligence (AI) to establish a low-cost and high-precision carbon emission accounting system. Additionally, the promotion of intelligent energy monitoring systems, hydrogen energy, and carbon capture, utilization, and storage (CCUS) technologies will help form a carbon reduction pathway combining “prevention” and “governance.” This will support the green and low-carbon transformation of the tobacco industry.</p>			
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<p>Crisis and Sensemaking: The Relevance of Liminal Experience and Metastability for a Sociocultural Psychology of Crisis</p>	<p>Stenner, Paul,</p>	<p>This paper provides an overview of liminality theory and its relevance to the study of sensemaking in and about crises. It sketches a model of liminal metastability as a way of thinking about disrupted equilibrium within psychosocial systems. Liminal metastability presupposes a reality composed of a complex array of forms of process, and hence calls for a relational process ontology. In developing the concept of liminal metastability, the paper discusses and critiques Weick's account of sensemaking in crisis. It also discusses the accounts of disturbed equilibrium at play in cognitive dissonance theory and Freud's theory of disruptions to the pleasure and reality principles.</p>	<p>10.1007/s12124-025-09943-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12124-025-09943-2</p>	<p>SpringerLink</p>
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UAV-asisted IoT network framework with hybrid deep reinforcement and federated learning	Andreou, Andreas, Mavromoustakis, Constandinos X., Markakis, Evangelos, Bourdena, Athina, Mastorakis, George,	<p>This paper addresses a critical gap in Unmanned Aerial Vehicle (UAV)-assisted Internet of Things (IoT) networks, where existing works inadequately integrate UAV deployment optimization with privacy-preserving Federated Learning (FL) and adaptive resource allocation under dynamic network conditions. The research explores the deployment of multi-UAV networks in IoT environments, emphasizing their dual roles in expanding cellular network coverage and facilitating efficient data collection. Unlike prior studies that treat UAV placement and FL-driven resource optimization separately, we present a unified hybrid framework leveraging Deep Reinforcement Learning (DRL) and FL. The proposed framework incorporates the Multi-UAV Network Formation (MUNF) algorithm, which employs Particle Swarm Optimization (PSO) to improve the Signal-to-Noise Ratio (SNR) for effective data collection. Additionally, the Dynamic Adaptive Strategy (DAS) utilizes a Deep Deterministic Policy Gradient (DDPG) approach to optimize resource allocation, reduce latency, and</p>	10.1038/s41598-025-21014-5	https://www.nature.com/articles/s41598-025-21014-5.pdf	SpringerLink
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		enhance throughput. Extensive simulations demonstrate a 26% increase in data throughput, an 18% reduction in latency, and more stable SNR distribution compared to state-of-the-art baselines. These results indicate a consistent improvement in network efficiency and scalability, validating the proposed framework's capability to address real-world UAV-assisted IoT challenges more effectively than prior work.			
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Systematic review of air quality modeling in digital twins for sustainable green cities	Babu Saheer, Lakshmi, Garbagna, Lorenzo, Sasidharan, Manu,	Urban climate change and air quality degradation are deeply interlinked challenges, demanding innovative technological interventions for effective management. Digital twin technology has emerged as a transformative tool, offering dynamic, data-driven virtual environments to simulate, evaluate, and optimize climate mitigation strategies before real-world implementation. This systematic review critically evaluates 100 peer-reviewed studies and 17 real-world case applications published between 2018 and 2024, focusing on the application of digital twins for decision-making in urban contexts. Practical applications span key sectors, including building energy management, transportation optimization, and climate-resilient urban planning. Notably, air quality management emerges as a central domain where digital twins enable real-time monitoring, pollution source attribution, and proactive policy simulation. This review further identifies core technical requirements—such as high-resolution geospatial data, interoperable platforms, and robust AI models—for developing	10.1007/s44274-025-00412-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44274-025-00412-6	SpringerLink
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		effective city-scale digital twins. By synthesizing insights from both research and practice, this study highlights the pivotal role of digital twin technology in advancing urban sustainability, informing policy, and supporting data-driven, climate-resilient city planning.			
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Integrating renewable energy into building energy systems: a systematic review of strategies, barriers, and policy interfaces	Wang, Suqi, Li, Yanbo, Cui, Yunpeng, Yu, Junyi, Zhou, Chao, Ametefe, Divine Senanu, John, Dah, Darboe, Tumani,	Buildings contribute significantly to global energy consumption, positioning them as pivotal to achieving global sustainability and climate goals. Although renewable energy technologies hold significant transformative potential, their integration into building systems is hindered by fragmented technological, economic, policy, and social dimensions. This systematic review addresses the existing lack of holistic synthesis by examining peer-reviewed studies published from 2019 to the second quarter (Q2) of 2025. Methodologically, the study adheres to the PRISMA 2020 framework to ensure transparency and replicability and employs bibliometric analysis to map thematic clusters across disciplines. Five major themes emerged from the synthesis: photovoltaic integration, retrofitting strategies, governance frameworks, smart grid applications, and stakeholder acceptance. Analysis highlights notable regional disparities, with Western Europe and East Asia demonstrating higher integration rates due to robust policy structures and established financial incentives. Conversely, regions like Sub-	10.1007/s43621-025-01966-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43621-025-01966-4	SpringerLink
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		<p>Saharan Africa and Latin America continue to experience significant barriers linked to financing constraints, regulatory fragmentation, and infrastructural limitations. Community-led microgrid initiatives in Kenya and Brazil emerge as exemplars of successful context-sensitive, low-cost renewable integration, emphasizing the value of inclusive governance and localized solutions. The review reconceptualizes buildings as active socio-technical nodes within decentralized energy networks rather than passive energy infrastructures. For renewable energy integration to progress effectively, coordinated systemic efforts spanning technical innovation, adaptive governance, and behavior-sensitive policy design are imperative. These insights carry substantial implications, offering actionable guidance for policymakers, engineers, and urban planners seeking equitable, contextually appropriate, and scalable renewable energy transitions within the built environment.</p>			
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<p>Distributed fast and accurate simulation platform for advanced ARM- and RISC-V-based HPC systems</p>	<p>Tampouratzis, Nikolaos, Papaefstathiou, Ioannis, Gomez-Lopez, Gabriel, Sánchez De la Rosa, Miguel, Escudero-Sahuquillo, Jesus, Garcia, Pedro Javier,</p>	<p>The new design paradigms of HPC systems utilizing newly developed CPUs (i.e., ARM and RISC-V) trigger an urgent need for simulators that can handle in an integrated manner both the processing and the network components of a system-under-design (SuD). The presented simulation framework is the first known open-source approach that efficiently integrates well-established simulation subsystems in a single framework with a single notion of time. The framework operates in a fully distributed manner, transparent to the user enabling accurate simulations of both ARM- and RISC-V-based HPC systems interconnected with different networks (e.g., InfiniBand and BXI). Our framework can work in two different modes; in the main one the processing systems and the interconnection networks are simulated at a cycle-accurate manner. The second option can be used if the designer wants to focus on the design space exploration of the architectures/topologies/technologies of the interconnection network, in which case the data collected when running the simulator on the main node, are utilized so as to model and simulate</p>	<p>10.1007/s11227-025-07972-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-025-07972-7</p>	<p>SpringerLink</p>
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		<p>extremely fast different intercommunication infrastructures. The presented framework has been evaluated when simulating widely used benchmarks (HPCG & LAMMPS) on both ARM & RISC-V CPUs; the results demonstrate that our approach has up to 6% performance error in the reported SuD aspects, while the simulation times increase at a very slow pace, when the size of the HPC SuD gets bigger, due to the fully distributed nature of the proposed toolset.</p>			
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Switching on resilience: pathways to smallholder farmers' embrace of Climate-Smart solar irrigation in North-western Ethiopia	Fenta, Abeje B., Berhanu, Assefa A.,	Climate change poses a major threat to global agriculture, particularly in Sub-Saharan Africa, where nearly 800 million people—80% of them farmers—face declining crop yields (0.413% per 1 °C temperature rise). Over 232 million are undernourished, and 132 million more are at risk of poverty and food insecurity. Climate-smart solar pump irrigation technologies offer a promising solution by promoting renewable energy, enhancing efficiency, reducing emissions, and advancing environmental justice in marginalized areas. This study explores the factors influencing smallholder farmers' acceptance of climate-smart solar pump irrigation technologies in northwest Ethiopia's Upper Blue Nile Basin. Data were gathered from 646 households and focus group discussions across highland, midland, and lowland agroecologies. Analytical tools included descriptive statistics, F-tests, ² tests, multinomial logit models, and content analysis. Key willingness to accept drivers include affordability (51%), suitability for remote areas	10.1007/s10584-025-04027-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10584-025-04027-x	SpringerLink
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		<p>(52.1%), environmental benefits (65%), no electricity cost post-installation (64.8%), fuel savings (65.4%), durability (34.3%), irrigation of mountainous areas (41.9%), potential for triple cropping (43.8%), increased productivity (49.9%), and potable water access (35%). Barriers include limited irrigation land, credit constraints, market and climate risks, high upfront costs, lack of knowledge, weak maintenance services, and low government support. The multinomial logit analysis showed that age, education, agroecology, land size, climate information access, extension services, and perceptions of climate change and cost significantly affect willingness to accept. The study recommends targeted training, financial incentives, stakeholder partnerships, reliable maintenance services, and awareness campaigns to enhance willingness to accept and promote sustainable, climate-resilient agriculture.</p>			
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Towards the Integration of Lightweight Components in Cyber-Physical Systems	Mena, Manel, Llopis, Juan Alberto, Criado, Javier, Asensio, José Andrés, Padilla, Nicolás,	Cyber-Physical Systems (CPS) integrate computation and physical processes, often leveraging Internet of Things (IoT) devices. A key challenge is managing the complexity and resource constraints in these systems. The Web of Things (WoT) paradigm offers standardization through servients, but traditional implementations that embed communication servers for each protocol can increase resource demands, especially as the system scales. This paper proposes WoT-Core, an architectural blueprint for implementing lightweight WoT servients to mitigate these challenges. Our approach shifts implementation complexity from individual servients to external, centralized brokers. Servients act solely as clients connecting to intermediary brokers that manage protocol-specific communication. This model aims to reduce deployment complexity and servient processing load. We detail the architecture, the role of Thing Descriptions, the initialization process, and an inter-thing communication mechanism facilitated by a dedicated 'connector' component. The feasibility and	10.1007/s42979-025-04422-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-025-04422-2	SpringerLink
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		<p>trade-offs of the architecture are evaluated through a smart home application scenario, including a quantitative analysis of resource consumption and response latency compared to a traditional approach as the number of devices increases. This work contributes a refined architectural pattern for building more scalable and maintainable WoT-based CPS, demonstrating a significant reduction in servient resource usage at the cost of increased communication latency, a trade-off beneficial for many large-scale, non-time-critical deployments.</p>			
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<p>"Smart airports and the evolving cyber threat"</p>	<p>Rossiter, Ash,</p>	<p>As the number of air travel passengers exponentially increases every year, airports have evolved as "smart" facilities (i.e., smart airports). The digital transformation occurring at airports will continue to revolutionize their operational efficiency but is also exacerbating cybersecurity challenges. To gauge the evolving cyber threat landscape at smart airports, this article first outlines the expanding attack surface of this critical transportation infrastructure. It then provides an overview of current malicious threat-based cyber risks that have disrupted essential services in airports and their interconnected networks. The analysis then examines the leading cyber threat actors and considers their current and future intent and capabilities to target smart airports. The article recommends a defense-in-depth approach to meet this evolving challenge.</p>	<p>10.1007/s12198-025-00311-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-025-00311-0</p>	<p>SpringerLink</p>
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Advancing Water Quality Monitoring in Lentic Ecosystems: Innovations for Freshwater Protection	Bustos-Terrones, Yaneth A., Quevedo-Castro, Alberto, Bandala, Erick R., Kurniawan, Tonni Agustiono, Loaiza, Juan G.,	<p>This study critically reviews the tools and methodologies used to assess water quality in lentic ecosystems, highlighting their effectiveness in tracking temporal variations and supporting evidence-based environmental policymaking. Emphasizing applications across tropical, arid/semi-arid, and alpine water bodies, the study integrates insights from over 120 peer-reviewed articles spanning two decades. Traditional techniques, such as in-situ sampling and laboratory-based physicochemical analysis, are compared with advanced technologies (including statistical tools, multivariate models, and machine learning) which have improved predictive accuracy by up to 25–40% in various case studies. Innovative methods like satellite observation and real-time sensing technologies, and LiDAR (Light Detection and Ranging), demonstrate the ability to reduce monitoring costs by 30–50% while increasing spatial coverage and frequency of measurements. Predictive models, including ANN (Artificial Neural Networks) and PCA (Principal Component Analysis), show high performance</p>	10.1007/s41748-025-00850-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41748-025-00850-5	SpringerLink
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		<p>with R² values exceeding 0.90 in forecasting water quality indicators such as dissolved Oxygen (DO), (chemical oxygen demand) COD, and chlorophyll-a. The study also addresses challenges such as data scarcity, sensor calibration issues, and the limitations of remote sensing in turbid or cloud-covered regions. Effects of climate change especially increased temperatures and shifts in rainfall patterns are linked to a 30–60% increase in eutrophication events and harmful algal blooms in several regions. Adaptive strategies employing satellite imagery and LiDAR are proposed to enhance monitoring and mitigation responses. A case study of a large reservoir in a semi-arid region demonstrates the integration of remote sensing with in-situ validation, achieving contamination reduction of up to 45% through targeted interventions. These findings reinforce the importance of combining traditional and modern assessment tools for robust, cost-effective, and adaptive water quality management in lentic ecosystems facing growing environmental pressures.</p> <p>Graphical Abstract</p>			
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<p>A 2-dimension linguistic Pythagorean fuzzy decision-making method with application to unmanned aerial vehicle contribution assessment</p>	<p>Gao, Fei, He, Weikai,</p>	<p>Assessing the contribution of an unmanned aerial vehicle to the effectiveness of a swarm is a challenging problem, as it depends heavily on expert judgments that are often subjective, imprecise, and expressed with varying levels of confidence. Existing decision-making methods can capture evaluative uncertainty but generally fail to represent the reliability of those evaluations within a unified framework. To address this gap, this study introduces a 2-dimension linguistic Pythagorean fuzzy variable, which simultaneously represents an expert's linguistic evaluation and the confidence attached to that evaluation under the Pythagorean fuzzy condition. The fundamental operational rules, score and accuracy functions, and aggregation operators for 2-dimension linguistic Pythagorean fuzzy variables are developed, and their algebraic properties are formally established. Building on this representation, a multi-criteria decision-making method is proposed for unmanned aerial vehicle contribution assessment. A practical case study demonstrates that the method</p>	<p>10.1038/s41598-025-19431-7</p>	<p>https://www.nature.com/articles/s41598-025-19431-7.pdf</p>	<p>SpringerLink</p>
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		<p>produces results that are consistent with established approaches, strongly correlated in ranking performance, and sensitive to differences in expert confidence, thereby providing both reliability and interpretability. Nevertheless, the current study assumes fixed linguistic term sets and a static confidence dimension, and the case study is limited to a small number of evaluation criteria. Future research will address calibration of linguistic scales, dynamic updating of confidence, and broader validation across domains. Overall, the proposed approach offers a structured and reliable tool for evaluating unmanned aerial vehicle contributions in swarm operations and enriches the methodological foundations for decision-making under uncertainty.</p>			
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<p>Navigating the future: the expanding role of unmanned surface vehicles in maritime security</p>	<p>Boretti, Alberto,</p>	<p>Unmanned Surface Vehicles (USVs) are rapidly becoming indispensable assets in addressing the complex and evolving challenges of modern maritime security. This essay provides an in-depth examination of the expanding role of these autonomous and remotely operated vessels. It traces their technological evolution from rudimentary early concepts, such as WWII-era target drones, to the sophisticated, AI-driven platforms of today, a progression fueled by major advancements in robotics, artificial intelligence, and sensor miniaturization. The paper provides a comprehensive analysis of their key applications in maritime security, detailing their use in persistent intelligence, surveillance, and reconnaissance (ISR); proactive counter-piracy and anti-smuggling operations; critical support for search and rescue missions; high-stakes mine countermeasures ; and vital environmental monitoring. It thoroughly evaluates the significant advantages offered by USVs, including substantial cost efficiencies, unparalleled operational persistence, the crucial removal of human crews</p>	<p>10.1007/s12198-025-00314-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-025-00314-x</p>	<p>SpringerLink</p>
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		<p>from harm's way, and exceptional mission versatility. Concurrently, it critically assesses the formidable challenges that currently impede their widespread adoption, delving into complex issues of operational autonomy and COLREGs compliance, the imperative of secure and resilient communications, the still-developing international legal and regulatory frameworks, and the profound ethical questions surrounding armed autonomous systems. Finally, the essay explores the promising future trajectory for USVs, focusing on transformative advancements in AI-driven multi-vehicle collaboration, advanced sensor fusion, networked "system of systems" operations, and sustainable long-endurance propulsion, concluding that they are destined for an increasingly integral role in safeguarding the global maritime domain.</p>			
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Renewable Energy Technologies Derived from Bio-inspired Nanomaterials	Dar, Mohd Arif, Majid, S. R., Rather, Hilal Ahmad, Siva, C., Rather, Aafaq A., Arularasan, P., Mahmoud, Safwat A., Amin, Lamiaa Galal,	Renewable energy technologies derived from bio-inspired nanomaterials possess transformative potential to meet the demands of the modern energy crisis. They are emerging gradually with the development of micro- and nanotechnology, which enhances energy capture, storage, and utilization. This review article examines bio-inspired renewable energy nanomaterials, highlighting their applications in solar energy conversion, energy storage, and energy harvesting from vibrations and waste sources. It also explores strategies for waste reduction and resource efficiency. Furthermore, the article provides an in-depth overview of bio-inspired materials' principles, applications, and future potential in sustainable energy technologies. By integrating insights from nature, these materials offer innovative solutions for improving energy efficiency and reducing environmental impact. This review is a valuable resource for scientists, engineers, and policymakers aiming to develop greener and more sustainable energy systems for the future.	10.1007/s12668-025-02199-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12668-025-02199-5	SpringerLink
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<p>Innovative real-time pressure monitoring system utilizing Raspberry Pi and IMU for industrial application</p>	<p>Morakchi, Mohamed Razi, Djeffal, Selman, Zine, Ghemari, Sadeq, Abdellatif M., Chibani, Atef, Dahmane, Saida, Abderahmane, Abora,</p>	<p>This paper presents an innovative IoT-enabled solution for the real-time digitization of traditional chart recorders using a Raspberry Pi and the MPU6050 accelerometer. The proposed system harnesses modern IoT communication protocols to enable accurate pressure monitoring, remote data access, and real-time analysis, addressing the limitations of conventional paper-based systems. A key contribution of this work is the development of the first mathematical model for translating mechanical needle displacement in chart recorders into electrical signals, offering a robust theoretical foundation for precise signal conversion. Experimental results validate the system's ability to accurately capture rapid pressure changes, demonstrating its suitability for demanding industrial applications, particularly in the oil and gas sector. The system's performance was evaluated in various scenarios, showcasing its resilience to environmental noise, effective real-time data transmission (with latency as low as 130 ms), and significant noise reduction</p>	<p>10.1038/s41598-025-08088-x</p>	<p>https://www.nature.com/articles/s41598-025-08088-x.pdf</p>	<p>SpringerLink</p>
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		<p>(up to 95%) through advanced filtering techniques. Furthermore, the system demonstrated a high level of accuracy in pressure measurements, with a maximum error of just 0.3 KPSI after filtering, confirming its reliability for precision monitoring. In addition to its technical capabilities, the proposed system supports paperless operation, significantly reducing operational costs and enhancing environmental sustainability. By eliminating the need for consumables such as paper and ink, the system offers a cost-effective and scalable solution. These results underscore the transformative potential of the system in modernizing industrial pressure monitoring, offering a scalable, precise, and environmentally sustainable alternative to traditional chart recorders. This work also lays the groundwork for future advancements in IoT-based sensing, predictive maintenance, and automation technologies in industrial settings.</p>			
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Model-driven engineering for digital twins: a systematic mapping study	Lehner, Daniel, Zhang, Jingxi, Pfeiffer, Jérôme, Sint, Sabine, Splettstößer, Ann-Kathrin, Wimmer, Manuel, Wortmann, Andreas,	Digital twins (DTs) are proliferating in a multitude of domains, including agriculture, automotive, avionics, logistics, manufacturing, medicine, smart homes, etc. As domain experts and software experts both have to contribute to the engineering of effective DTs, several model-driven engineering (MDE) approaches have been recently proposed to ease the design, development, and operation of DTs. However, the diversity of domains in which MDE is currently applied to DTs, as well as the diverse landscape of DTs and MDE applications to DTs, makes it challenging for researchers and practitioners to get an overview of what techniques and artifacts are already applied in this context. In this paper, we shed light on the aforementioned aspects by performing a systematic mapping study on the application of MDE automation techniques, i.e., model-to-model transformation, code generation, and model interpretation, in the context of DTs as well as on the characteristics of DTs including the twinned systems to which these techniques are applied in different domains. We	10.1007/s10270-025-01264-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-025-01264-7	SpringerLink
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		<p>systematically retrieved a set of 189 unique publications, of which 66 were selected for further investigation in this paper. Our results indicate that the distribution of employed MDE techniques (136 applications of automation techniques) is balanced between the different techniques, but there are significant variations for different DT types. With respect to the different domains, we found that even though applications are available in many domains, a small number of domains currently dominate applications of MDE to DTs, i.e., more than half of included papers are in the manufacturing and transportation domains.</p>			
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Continuous Evolution of Digital Twins using the DarTwin Notation	Mertens, Joost, Klikovits, Stefan, Bordeleau, Francis, Denil, Joachim, Haugen, Øystein,	Despite best efforts, various challenges remain in the creation and maintenance processes of digital twins (DTs). One of those primary challenges is the constant, continuous and omnipresent evolution of systems, their user's needs and their environment, demanding the adaptation of the developed DT systems. DTs are developed for a specific purpose, which generally entails the monitoring, analysis, simulation or optimisation of a specific aspect of an actual system , referred to as the actual twin (AT). As such, when the twin system changes, that is either the AT itself changes, or the scope/purpose of a DT is modified, the DTs usually evolve in close synchronicity with the AT. As DTs are software systems, the best practices or methodologies for software evolution can be leveraged. This paper tackles the challenge of maintaining a (set of) DT(s) throughout the evolution of the user's requirements and priorities and tries to understand how this evolution takes place. In doing so, we provide two contributions: (i) we develop DarTwin , a visual notation form that enables reasoning on a twin system, its purposes,	10.1007/s10270-024-01216-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01216-7	SpringerLink
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		<p>properties and implementation, and (ii) we introduce a set of architectural transformations that describe the evolution of DT systems. The development of these transformations is driven and illustrated by the evolution and transformations of a family home's DT, whose purpose is expanded, changed and re-prioritised throughout its ongoing lifecycle. Additionally, we evaluate the transformations on a laboratory-scale gantry crane's DT.</p>			
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Deep Enhancement in Supplychain Management with Adaptive Serial Cascaded Autoencoder with Long Short Term Memory and Multi-layered Perceptron Framework	Sarkar, Ashok Kumar, Das, Anupam,	<p>Recognizing and reducing risk is a major part of Supply Chain Management (SCM). Several companies are invested in Supply Chain Risk Management (SCRM) and they have the knowledge about the procurement occupancies within their companies and take steps to ensure this potent source of strategic value. Additionally, these types of companies yield the highest returns with the lowest amount of financial risk. Moreover, reducing financial risk in the SCM network requires thoughtful analysis and a proactive strategy. Hence, this task aims to make a financial risk assessment in SCM with deep learning techniques based on big data. Financial risk-related big data is collected from the Kaggle database and utilized in the data transformation phase. The transformed data is employed for evaluating the financial risk with the support of an Adaptive Serial Cascaded Autoencoder with Long Short-Term Memory and Multi-Layered Perceptron (ASCALSMLP). Here, the parameters for the deep learning techniques like LSTM and MLP were tuned by the hybrid Sandpiper Galactic Swarm Optimization (SGSO) algorithm to enhance the</p>	10.1007/s40745-024-00576-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40745-024-00576-7	SpringerLink
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		efficacy of the offered approach. From the results analysis, the accuracy of the developed model is 91.12% better than DHOA, 92.5% more than COA, 93.75% improved than GSO, and 94.62% superior to SOA models. Therefore, the results from the developed approach demonstrate effective prediction of financial risks.			
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<p>Social risk and performance assessment of battery raw materials: implications for sustainable sourcing and social LCA</p>	<p>Jose, Davis, Mankaa, Rose Nangah, Traverso, Marzia,</p>	<p>Purpose The increase in demand for raw materials of an electric vehicle (EV) which is mainly composed of NMC (nickel, manganese, and cobalt) lithium-ion battery (Li-NMC) brings significant social impacts to the various stakeholders involved in the mining and processing of these minerals, including workers, local communities, society, and actors in the value chain. The EV battery supply chain also faces many challenges, including limited impact on the human rights and environmental practices of suppliers, as well as difficulty in ensuring that batteries are responsibly sourced. Indeed, all those elements have been listed as critical raw materials by the European Commission since 2017. To address this issue, it is necessary to understand the scale of the social burden associated with the production of these minerals and explore alternative supply chains or minerals with less impact. Methods Therefore, a social life cycle assessment (S-LCA) was conducted in this study, following the Guidelines of Social Life Cycle Assessment of Products and Organizations (UNEP, 2020). The results of the S-LCA revealed social impacts at</p>	<p>10.1007/s11367-025-02516-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11367-025-02516-w</p>	<p>SpringerLink</p>
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		<p>two levels: social risk (SR) at the country level and social performance (SP) at the company level. Results and discussion These impacts were found to be significantly negative, particularly in relation to child labor, health and safety, and forced labor in the mining and refining stages. The results also showed differences in the SP of each raw material, with manganese mining showing better SP, while cobalt, lithium, and nickel mining were found to have less SR. Conclusions The transition to EV involves many environmental, social, and governance challenges, and requires a comprehensive approach to identify companies that operate both profitably and responsibly in each stage of the EV supply chain. Understanding the risks and societal impacts associated with battery materials can help guide decision-making and promote the adoption of more sustainable and responsible practices in the EV industry.</p>			
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<p>An innovative model of Industrial Intelligent Connected Ecosystem driven by industrial intelligence: transformation, implementation, and configuration</p>	<p>Zhang, Xianyu, Zheng, Maokuan, Ming, Xinguo,</p>	<p>Currently, with the acceleration of the global service-oriented manufacturing process, the traditional business model that relies on production and product transactions has become difficult to form strong market competitiveness. The Industrial Intelligent Connected Ecosystem (IICE) is an organic combination of smart products, innovative services, and ecosystems, which enables enterprises to achieve industrial digital transformation in service-oriented, intelligent, networked, and ecological aspects. This paper focuses on the IICE driven by industrial intelligence, conducting in-depth research from the perspectives of industrial transformation, implementation path, and function configuration. Firstly, the industrial transformation needs and core elements of IICE were analyzed, and a solution for industrial transformation of IICE was proposed. Secondly, based on the core value chain of IICE, an industrial implementation path for IICE was proposed. Once again, the fuzzy hierarchical clustering algorithm method for function configuring of IICE was proposed. Finally, the home</p>	<p>10.1007/s00170-025-16295-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-16295-z</p>	<p>SpringerLink</p>
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		furnishing industry was selected as a case study. The research can help guide traditional enterprises to overcome problems in the transformation and upgrading of service-oriented, intelligent, networked, and ecological services, accelerate the process of cross-border construction of IICE, reshape the ecological status and core competitiveness of enterprises, and provide customers with the foundation for maximizing value experience creation.			
Editorial to the theme section on model-driven engineering for digital twins	Khelladi, Djamel Eddine, Clark, Tony, Kulkarni, Vinay, Zschaler, Steffen,		10.1007/s10270-025-01288-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-025-01288-z	SpringerLink

Evaluating performance indicators of lean-industry 4.0 integration in heavy fabrication sector: a structural equation modelling approach	Karthikeyan, R., Jerald, J., Rohan, L.,	Integrating Lean principles with Industry 4.0 technologies is critical for modern manufacturing industries. This study develops a Structural Equation Model (SEM) to validate the interplay between Lean practices and Industry 4.0 in driving operational improvements in the heavy fabrication industry. A survey gathered responses from 70 experts across Indian heavy fabrication companies implementing these paradigms. The model includes seven constructs—Shop Floor Operations, Employee Skills, Workplace Culture, Design Development, Customer–Supplier Feedback, Operational Performance, and Business Performance—with 24 associated indicators. Hypotheses linking these constructs were tested using Partial Least Squares SEM (PLS-SEM). Results confirmed strong correlations, with Operational and Business Performance showing significant dependency on Customer–Supplier Feedback and Workplace Culture (correlation values: 0.965 and 0.918, respectively). Employee Skills emerged as the most influential factor for Business Performance (importance:	10.1007/s12008-025-02271-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12008-025-02271-0	SpringerLink
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		0.802), while Design Development showed the highest performance (value: 67.36). The findings highlight the synergistic benefits of integrating Lean and Industry 4.0, providing actionable insights for industry leaders to enhance organizational efficiency and competitiveness. Graphical abstract			
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<p>A review of integrated groundwater and surface water management for environmental sustainability</p>	<p>Kant, Nishi, Wrat, Gyan,</p>	<p>This review critically examines strategies for sustainable groundwater and surface water management, emphasizing their integration to achieve environmental sustainability. The study synthesizes findings from a wide range of research articles, identifying key trends, gaps, and controversies within the field. It highlights the importance of cohesive management approaches that take into account climate change, policy impacts, and methodological advancements. The review aims to provide a structured, analytical discussion that aligns with the thematic focus of integrated water management. By offering original insights and practical recommendations, this review seeks to contribute to the development of more effective and sustainable water management practices. The analysis underscores the necessity of interdisciplinary approaches that integrate hydrological, ecological, and socio-economic factors. Furthermore, the review discusses the role of adaptive management and technological innovations in enhancing the resilience and efficiency of water</p>	<p>10.1007/s11631-025-00803-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11631-025-00803-9</p>	<p>SpringerLink</p>
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		<p>management systems. The findings suggest that a comprehensive understanding of the interactions between groundwater and surface water is crucial for developing strategies that ensure long-term environmental sustainability. This review concludes with recommendations for future research and policy development, emphasizing the need for adaptive, resilient, and integrated water management strategies that can address the challenges posed by climate change and other environmental pressures.</p>			
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Developing cardiac biomechanical models beyond the clinic: modeling stressors of daily life	Lewalle, Alexandre, Baptiste, Tiffany M. G., Barrows, Rosie K., Cicci, Ludovica, Corrado, Cesare, Lee, Angela W. C., Rodero, Cristobal, Solís-Lemus, José Alonso, Strocchi, Marina, Niederer, Steven A.,	<p>There is growing motivation to exploit computational biomechanical modeling of the heart as a predictive tool to support clinical diagnoses and therapies. Existing patient-specific cardiac models often rely on data collected under highly standardized conditions in hospitals. However, disease progression and therapy responses often depend on stressors, encountered in daily life, that cannot be captured in a traditional clinical setting. To achieve clinical translation, existing modeling frameworks must be refined and extended to include such influences. The “digital twin” concept, in which models of specific systems are continually updated with new data, is a promising avenue for integrating and interpreting these data streams. However, this endeavor calls for novel approaches to model development and data acquisition and integration. We review modeling approaches addressing specific stressor types (caffeine, exercise, sex-dependent factors, sleep, the environment) to identify knowledge gaps, assess emerging technical challenges, and suggest potential model developments to</p>	10.1007/s10237-025-01982-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10237-025-01982-3	SpringerLink
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		extend the scope and reach of biomedical cardiac simulations. Graphical abstract			
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Research on the construction and fidelity evaluation of digital twins for CNC machine tools	Zhang, Xiaogang, Chen, Wei, Li, Jian, Zhao, Zhongyuan, Yin, Zhenkun, Mu, Zongyi, Wang, Hongwei,	<p>The performance evaluation of computer numerical control (CNC) machine tools is constrained by high costs, experimental difficulties, and limited data availability, where small sample sizes further exacerbate the uncertainty in modeling and prediction. An executable high-fidelity digital twin enables effective performance evaluation by bridging physical and virtual environments. Current research rarely focuses on the construction of high-fidelity digital twins via simplified modeling methods or on the development of quantitative metrics for fidelity verification. Therefore, this paper proposes a novel methodology for digital twin construction and introduces fidelity evaluation metrics based on a three-layer meta-action theory. First, the modeling process is simplified by dividing CNC machine tools into system level, chain level, and unit level based on meta-action theory, which improves structural clarity. Then, a digital twin architecture is developed comprising the physical entity, information assurance layer, virtual entity, and functional application layer. A multi-level fidelity assessment framework is proposed with</p>	10.1007/s00170-025-16580-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-16580-x	SpringerLink
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		<p>general, system-level, and unit-level indicators. By integrating AHP and the entropy weighting method, the approach enables multi-criteria evaluation and improves the fidelity and reliability of the digital twins. Finally, a case study on axial stiffness performance of a CNC rotary table validates the proposed method, demonstrating its effectiveness in simplifying twin construction and enhancing fidelity evaluation.</p>			
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Method for the development and application of digital twins in manufacturing	Fuhrländer-Völker, Daniel, Lindner, Martin, Elling, Magnus, Frieß, Tim, Karnapp, Sebastian, Weigold, Matthias,	Despite the growing interest in digital twins, their practical application in manufacturing remains limited, primarily due to the lack of structured, accessible development methods. This paper introduces a systematic six-step methodology for the development and implementation of digital twins in manufacturing, aimed at bridging the gap between theoretical concepts and practical application. The methodology provides detailed guidance for defining objectives, deriving requirements, implementing functionalities, and validating the digital twin through iterative improvements. The effectiveness of the approach is demonstrated through two use cases: a digital twin for demand response in an aqueous parts cleaning machine, highlighting its potential for energy cost reduction and sustainability, and a digital twin for predictive maintenance of a machine tool spindle, showcasing its role in enhancing operational reliability. This methodology offers a practical framework for expanding the adoption of digital twins in manufacturing. By addressing both technical and practical challenges, it paves the way for	10.1007/s11740-025-01346-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11740-025-01346-x	SpringerLink
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		broader implementation and standardization. Future research could explore its integration with frameworks such as the Asset Administration Shell and Digital Product Passports to further enhance interoperability and sustainability across manufacturing systems.			
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A systematic multi-layer cognitive model for intelligent machine tool	Jiang, Tengyuan, Zhou, Jingtao, Luo, Xiang, Wang, Mingwei, Zhang, Shusheng,	As the basic manufacturing capabilities provide unit of the production system, the intelligent level of the CNC machine tool will affect the realization of intelligent manufacturing. Academia has carried out a lot of intelligent research on CNC machine tool from technical perspective, but there still needs a systematic cognitive model to promote the construction of cognitive abilities, to support the intelligent realization and continuous improvement of CNC machine tool. Therefore, this paper proposes a three-part, seven-layer cognitive model based on cognitive informatics to promote the construction of cognitive abilities and the intelligent transformation of CNC machine tool. Firstly, a systematic multi-layer cognitive model is proposed, and each cognitive layer is introduced to promote the different cognitive abilities construction of CNC machine tool. Then, this paper introduces the cognitive analysis loop and the cognitive learning loop contained in the multi-layer cognitive model, which can promote the construction of the adaptive and continuous learning abilities of CNC machine tool. The evaluation	10.1007/s10845-024-02481-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-024-02481-5	SpringerLink
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		<p>indicators of the intelligence machine tool are given, which is used to evaluate machine tool intelligence model.</p> <p>Furthermore, the cognitive enabling technologies of the multi-layer cognitive model for intelligent machine tool is presented, which supports the realization of cognitive abilities such as analysis, decision making, and learning.</p> <p>Finally, the feasibility of the proposed systematic multi-layer cognitive model is verified by the developed computable digital twin platform and comparison before and after implementation for intelligent machine tool.</p>			
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<p>A scoping review of human digital twins in healthcare applications and usage patterns</p>	<p>Tudor, Brant H., Shargo, Ryan, Gray, Geoffrey M., Fierstein, Jamie L., Kuo, Frederick H., Burton, Robert, Johnson, Joyce T., Scully, Brandi B., Asante-Korang, Alfred, Rehman, Mohamed A., Ahumada, Luis M.,</p>	<p>Digital twins have become increasingly popular across various industries as dynamic virtual models of physical systems. In healthcare, Human Digital Twins (HDTs) serve as virtual counterparts to patients. According to the National Academies of Sciences, Engineering, and Medicine (NASEM), a digital twin must be personalized, dynamically updated, and have predictive capabilities to—in the context of health care—inform clinical decision-making. This scoping review aims to assess the current state of HDTs in healthcare, examining whether the literature aligns with the NASEM definition and identifying trends. A systematic literature search was conducted, covering articles published from January 2017 to July 2024. Only 18 of the 149 included studies (12.08%) fully met the NASEM digital twin criteria. Digital shadows made up 9.4% of studies, general digital models comprised 10.07%, and virtual patient cohorts were another 10.07%. Only two studies mentioned verification, validation, and uncertainty quantification (VVUQ), a critical NASEM standard for model reliability.</p>	<p>10.1038/s41746-025-01910-w</p>	<p>https://www.nature.com/articles/s41746-025-01910-w.pdf</p>	<p>SpringerLink</p>
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Identifying influential assets in higher order interdependent infrastructure networks through population impact	Chulahwat, Akshat, Hassan, Emad M., Tariverdi, Mersedeh, Nunez-del-Prado, Miguel, Mahmoud, Hussam,	<p>A significant increase in catastrophic events worldwide has had a disastrous impact on the built environment, as these disruptive events devastate critical infrastructure lifelines, resulting in a substantial reduction of services across a community. Management of critical infrastructure assets is essential, and this can be achieved by optimal resource allocation to key assets within interconnected systems. The majority of current literature focuses on capturing the behavior of infrastructure systems individually, which presents a computational problem when dealing with complex, interdependent infrastructure systems. In this study, a comprehensive framework to evaluate a type of influence metric for ranking node and edge assets within an infrastructure network is presented. The influence metrics are shown to identify the importance of individual assets relative to one another, considering their dependencies with other critical networks. The city of Lima is utilized as a testbed to demonstrate the effectiveness of the proposed influence metric. We found that the failure of</p>	10.1038/s41598-025-15824-w	https://www.nature.com/articles/s41598-025-15824-w.pdf	SpringerLink
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		<p>individual assets in critical infrastructure systems, such as water treatment plants, major and minor power stations, water reservoirs, and hospitals, affected a maximum percentage of 27% , 25% , 14% , 10% , and 6% of the Lima population, respectively. The proposed influence metric is observed to outperform degree centrality in identifying critical assets within individual infrastructure lifelines, considering complex dependencies on other systems. This approach highlights a direction to understand dependent networks in general and can open up new frontiers in understanding complex system behavior.</p>			
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Optimizing Systems Engineering Procedure for the Development of a Sounding Rocket	Oh, Jong-Su, Jo, Min-Seon, Kang, Si-Yoon, Choi, Jeong-Yeol,	<p>Rocket development's multidisciplinary nature necessitates systems engineering methodologies, but the breadth of knowledge required can challenge novice students. The Space Launch Vehicle and Space Transportation (SLVST) project aims to address this by developing a two-stage sounding rocket with a novel propulsion system, the Rotating Detonation Rocket Engine (RDRE), under student researchers' guidance. This initiative seeks to cultivate specialized talent and strengthen aerospace infrastructure, including essential ground systems for mission monitoring. To make systems engineering more accessible, we are adapting established frameworks for small-scale rocket projects. By customizing the System Design Process (SDP) and Technical Management Process (TMP), the project provides a more pragmatic approach to rocket development, offering valuable insights for student researchers. These methods are expected to aid in understanding and applying systems engineering concepts within</p>	10.1007/s42405-025-01052-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42405-025-01052-z	SpringerLink
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		aerospace and related fields.			
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Towards robust electronic health record systems: integrating formal verification and process modeling techniques	Khan, Saba, Akhtar, Nadeem, Mushtaq, Muhammad Faheem, Abdel Samee, Nagwan, Mahmoud, Noha F., Ashraf, Imran,	The integration of complex software systems such as clinical decision aid platforms and electronic health records (EHR) has substantially improved human healthcare support by enhancing diagnostic accuracy and optimizing medical workflows. Developing these systems requires meticulous processes including requirement specification, design, implementation, testing, and deployment. While numerous approaches exist for system development, formal verification through modeling has become crucial for ensuring system reliability and security. In this research, an approach based on Hierarchical Colored Petri-Nets (HCP-Nets) for process modeling and formal verification to develop an EHR system is proposed that is accurate, complete, and consistent. The World Health Organization (WHO) emphasizes integrating modern computing techniques such as data mining and machine learning into health systems in the context of viral disease outbreaks and the need for robust public health surveillance. There is a critical need for process mining and formal verification-based	10.1186/s12874-025-02637-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12874-025-02637-8	SpringerLink
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		<p>systems to improve data sharing and system integration in regions like Pakistan, where healthcare infrastructure and interoperability are limited. This research addresses key gaps in EHR systems including platform effectiveness, data storage consistency, data accuracy, completeness, and security against unauthorized access. The findings suggest that formal verification using HCP-Nets with model checking and process mining can greatly enhance the reliability and security of EHR systems with an accuracy of 80.5%, providing a strong foundation to advance health informatics and supporting better health outcomes in complex and diverse environments.</p>			
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Product Color Emotional Design Based on Interdependent Networks and Cascading Failure	Ding, Man, Ju, Yixian, Liu, Zhengwen, Zhao, Fanghua, Cho, Jounghyung,	Product color emotional design (PCED) systems are characterized by a power-law distribution; this is manifested as a small number of colors constituting a large number of emotional connections of users, and the majority of colors constituting a small number of emotional connections of users. This will lead to the neglect of the potential connections between colors, thus causing the inability to generate a product color design scheme based on color interactions. Consequently, the reliability of the design scheme ultimately undermines the reliability of the design scheme. For this reason, this paper proposes a PCED method based on interdependent networks (INs) and cascading failure (CF). First, a web crawler, word processing, clustering, and complex network analysis are utilized to construct the product color emotion dataset. Then, based on this dataset, the INs of color emotion are constructed, and the initial failure node in the color emotion network is determined based on a variety of important node judgment methods. Finally, the color scheme that meets the user's emotional needs is	10.1007/s12559-025-10507-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12559-025-10507-0	SpringerLink
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		generated via the CF-based product color scheme generation rules. The PCED of a high-speed rail business seat is provided as an example to verify the validity of the proposed method.			
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Fidelity assessment of synthetic images with multi-criteria combination under adverse weather conditions	Duminil, Alexandra, Ieng, Sio-Song, Gruyer, Dominique,	With the development of AI-based perception algorithms using cameras, access to large and representative datasets is crucial. For autonomous driving systems, it is essential to use road context datasets covering the entire Operating Design Domain, including various road configurations, driving scenarios, and weather conditions. In this context, it is imperative to propose mechanisms and metrics that allow quantifying the fidelity and the level of representativeness of these simulated datasets, in order to evaluate and validate their usability for training and evaluation stages. In this paper, we propose an objective and multi-modal approach allowing to calculate 4 scores representing several aspects of the synthetic image fidelity. These scores address local, global and statistical texture analysis. In addition, a multi-criteria approach, based on evidence theory, is proposed to merge these scores to obtain a final global score. The result is the generation of a global score along with the uncertainty and conflict quantification. This method has been applied on a large number of	10.1038/s41598-025-15480-0	https://www.nature.com/articles/s41598-025-15480-0.pdf	SpringerLink
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		real and virtual datasets in different weather conditions (clear, rainy, foggy). The initial results are promising and confirm the interest and the relevance of this method.			
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<p>Ethical, legal, and social challenges of data economy in defence the case of battlefield data</p>	<p>Kot, Brian, Nebe, Jack Burling, Taddeo, Mariarosaria,</p>	<p>Battlefield data have become a critical asset in contemporary defence. Yet there is a gap in the relevant literature, whilst it addresses various aspects of defence data management—in cluding cybersecurity, interoperability, and decision-making support—it overlooks how these data should be collected, curated, and accessed to enhance the responsible development of AI-enabled defence capabilities. This article addresses this gap first by reviewing existing data policies strategies of NATO and Five Eyes Member States to assess the extent to which they focus on battlefield data, and then by outlining how national defence organisations should manage these data to maximise their strategic value whilst mitigating the attendant ethical, legal, and social risks. We argue that due to their non-rivalrous, artificially excludable nature, battlefield data should be conceptualised as an artificial club good and that national defence organisations have ethical obligations to act as club manager to leverage the potential of these data to develop more robust, reliable and controllable AI defence capabilities. We</p>	<p>10.1007/s00146-025-02610-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-025-02610-5</p>	<p>SpringerLink</p>
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		conclude the analysis proposing two sets of policy recommendations to aid national defence organisations in discharging their responsibilities as club managers for battlefield data.			
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Human-Autonomy Command in safety-critical EDGE operations	Norlander, Arne,	Operations in contested mission environments require a balanced composition of competency, authority, and responsibility, underpinned by comprehensive operational awareness in order to provide the context, insight and foresight is required for effective command. While human intervention would be necessary directly acting or supervising some operational tasks, other tasks can only be accomplished by non-human intelligent entities, autonomously sensing, processing, deciding and acting within and between different operational domains and dimensions. Human-Autonomy Teams are Complex Adaptive Systems, able to accurately and rapidly sense, process and interpret relevant events and circumstances in order to sustain and improve decision-making and action, enabling wide-ranging appreciation of and influence on agents and effects in the Operating Environment. This calls for technologies that are able to autonomously engage with its environment, without continuous human supervision. Based on recent	10.1007/s42454-025-00075-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42454-025-00075-x	SpringerLink
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		<p>studies and with the support from other fields of study, we devised a number of elements of cognitive command and decision-making in a special case of complex Multi-Domain Operations. Emergent, Dynamic, Global and Evolutionary (EDGE) operations require flexible, adaptive, and high-performance human and technological (hybrid) cognitive capabilities, sustaining comprehensive operational awareness and situation understanding. This work formulates future work towards a future-oriented Essence of Human-Autonomy Command in EDGE operations, comprising strategic capability elements with equal relevance and applicability on human and Autonomous Adaptive Agents. It will be grounded in adaptive and versatile command and execution principles, supported by hierarchical knowledge structures, where the Human-Autonomy Command approach is superior regarding managing and maintaining operational availability, versatility, and efficiency.</p>			
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<p>A regenerative systems framework for sustainable management of natural resources: integrating ecosystem resilience with intergenerational wellbeing</p>	<p>Brown, Iain,</p>	<p>Achieving transformative progress on sustainability goals is dependent on synergistic actions across multiple policy domains. This identifies requirements for more coherent and integrated approaches to sustainable management of natural resource (SMNR) across land and sea, including air, water, soil, and geological resources. The challenge is further emphasised by severity and cross-cutting dimensions of nature loss and climate change crises. To help address this challenge, a general systems-based framework for SMNR was developed to facilitate co-ordinated knowledge exchange across the science-policy interface. Inspiration was provided by the Wellbeing of Future Generations Act in Wales, which obligates major policy innovation to sustain intergenerational wellbeing at a level beyond the current UN SDGs, including robust formulation of target outcomes and indicators. The SMNR framework, therefore, aimed to cross-reference primary outcomes for ecosystem resilience, natural resource management, and human wellbeing.</p>	<p>10.1007/s11625-025-01743-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11625-025-01743-2</p>	<p>SpringerLink</p>
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		<p>Outcomes were linked through a circular reinforcing systems loop emphasising both 'nature's contributions to people' relationships (including ecosystem services) and adaptive regenerative actions working with natural processes. Candidate indicators representing key concepts were also defined. The framework was applied in Wales through systems mapping to show relationships across policy domains. This highlighted added value of linked headline indicators with hierarchical components, exemplified by resource footprint metrics. Key issues from stakeholder engagement included long-term 'reference conditions', cross-scale integration, and inclusivity through multiple values. Major knowledge gaps exist regarding diverse relationships between nature and wellbeing, together with associated behaviours and actions, and hence efficacy of different actions for regenerating both natural and social systems. These issues highlight the need for flexibility, ongoing learning and adaptive capacity as integral to regenerative systems design.</p>			
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Bridging cybersecurity with digital twin technology: a thematic analysis	Achuthan, Krishnashree, Gupta, Brij B., Raman, Raghu,	<p>With the integration of technological advances within interconnected systems, digital twins (DTs) are playing an increasingly vital role in optimizing operations, enhancing decision-making, and driving innovation across diverse industries such as manufacturing, healthcare, energy, and transportation. They offer immense potential to address one of the fastest growing concerns in today's technological landscape, i.e., cybersecurity. This paper presents a comprehensive analysis of 300 publications, employing a mixed-method approach that includes BERTopic modeling and case studies to explore the dynamic relationship between DTs and cybersecurity. Five topics emerged—DTs in IoT environments, critical infrastructure, energy systems, AI-enhanced DTs, and sectoral efficiency—which reflect how cybersecurity capabilities are implemented across diverse industries to drive performance and resilience. Our findings include 13 case studies illustrating the real-world impact of DTs in enhancing real-time threat detection, anomaly analysis, and adaptive</p>	10.1007/s10207-025-01115-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-025-01115-y	SpringerLink
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		<p>response. Notably, while DT applications in smart manufacturing and energy systems significantly increase operational efficiency and resilience, challenges persist in data integration, scalability, and standardization. Informed by these insights, we propose a forward-looking cybersecurity framework designed to unify cross-domain challenges and solutions observed in the literature. Unlike existing studies that remain sector bound, our framework aims to consolidate shared cybersecurity mechanisms—such as anomaly detection, AI integration, and data governance—into a coherent, actionable structure applicable across DT ecosystems. This contribution not only synthesizes fragmented research but also advances the theoretical understanding by addressing the pressing need for scalable, interoperable, and secure DT infrastructures. Furthermore, our analysis maps these advancements with UN Sustainable Development Goal 9 (SDG 9) and its subgoals SDG 9.1, SDG 9.4 and SDG 9.5. This study highlights critical gaps in intelligent data governance,</p>			
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		standardization, and cybersecurity implementation across sectors and argues for a unified framework to guide future research and practice in secure DT development.			
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An Explainability-Based Framework for Evaluating Space Mission Architectures Using Sandbox Games	Schmitt, Rodrigo N., Becker, Moacir F., DeLaurentis, Daniel, Capannolo, Andrea,	Space mission architectures often feature complex interdependencies among diverse operations, making them difficult to evaluate using traditional techniques such as sensitivity analysis, optimization, or simple trade-off analysis. We address this challenge by treating space missions as systems-of-systems and then introducing an evaluation methodology that tailors the combination of surrogate models, explainable artificial intelligence (XAI) and physics-based sandbox game simulations for this setting. We demonstrate how intricate relationships between design variables in mission architectures can be illuminated by XAI, increasing interpretability and thus efficacy in design decisions. Specifically, we find that using Shapley additive explanations, a model-agnostic interpretability technique, reduces the need for heavy computational resources, while still addressing the high dimensionality and interdependencies within our space mission design setting. Our use case on on-orbit refueling for cislunar missions makes the demonstration concrete, where	10.1007/s42496-025-00293-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42496-025-00293-1	SpringerLink
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		<p>we find that the design of a refueling element is a significant design variable influencing the economic feasibility of on-orbit refueling architectural options. With such insights, decision-makers can assess the feasibility of deploying reusable systems, for example, and justify their costs. To our knowledge, this is the first study that couples an SoS simulation of cislunar logistics with surrogate models and XAI in a single, auditable pipeline. The proposed X-SMART framework (i) delivers real-time feature importance analysis, (ii) quantifies explanation quality through compactness, stability, and cross-method consistency diagnostics, and (iii) generates counterfactual architectural changes that translate model insight into concrete mass, design, engine-swap, or orbit-selection actions. We also set the stage for dedicated XAI frameworks for future space mission research, advancing the explainability of complex models in this field.</p>			
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<p>Distributed executions with CONTROL-CORE: integrated development environment (IDE) for closed-loop neuromodulation control systems</p>	<p>Kathiravelu, Pradeeban, Arnold, Mark G., Vijay, Shivang, Jagwani, Rahul, Goyal, Parteek, Goel, Aviral Kumar, Li, Nan, Horn, Charles, Pan, Tony, Kothare, Mayuresh V., Mahmoudi, Babak,</p>	<p>Design and execution of neuromodulation control systems studies are challenging as they consist of feedback loops and often need to compose studies from programs developed in different programming languages. In our previous work, we designed CONTROL-CORE as an open-source framework for simulating closed-loop peripheral neuromodulation control systems to address this need. We implemented its prototype as CONTROL-CORE-1.0 with support for building and running such studies locally and in a distributed manner. This paper presents CONTROL-CORE-2.0, the extended version of CONTROL-CORE, converting it into an integrated development environment for neuromodulation control systems, addressing the identified shortcomings in the prior version in terms of performance, efficient use, and functionality. Our contributions facilitate the visual creation and execution of programs and studies from them, the distributed execution of those studies in a cluster or across organizations, and the curation of community-contributed studies and programs in a</p>	<p>10.1007/s10586-025-05476-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-025-05476-w</p>	<p>SpringerLink</p>
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		centralized repository.			
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<p>The dual-encoder image forgery detection integrating convolution and mamba</p>	<p>Miaorong, Pan, Yi, Wang,</p>	<p>Image forgery detection represents a fundamental task within the domain of cybersecurity. While Convolutional Neural Networks (CNNs) dominate the current landscape of image forgery detection methods, their inherent limitation lies in their focus on extracting local features, often at the expense of capturing global context. To address this limitation, this study proposes a dual-encoder architecture that integrates Mamba and ConvNeXt, enabling the comprehensive extraction of both local details and global features. We further enhance the feature representation by incorporating a ATTEN Block, which adaptively reweights the feature channels to emphasize the most salient aspects. Additionally, to mitigate the issue of missed detections caused by the complex boundaries of forged regions, edge loss is incorporated to improve the model's accuracy in identifying forgery contours. The experiments were conducted on four publicly available image forgery detection datasets. The results show that on the CASIAv1 and Coverage datasets, the AUC and F1 scores were 97.6% and 78.1%, and</p>	<p>10.1007/s11760-025-04632-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11760-025-04632-4</p>	<p>SpringerLink</p>
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		85.3% and 43.1%, respectively. On the Columbia and NIST16 datasets, the AUC and F1 metrics were 75.2% and 91.5%, and 30.8% and 77.5%, respectively. Compared to state-of-the-art methods, our approach outperformed them, showcasing superior detection accuracy and strong practical applicability.			
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<p>A scientometric review of digital twin in 3G to 6G networks: industry applications and trends</p>	<p>Bhatia, Munish, Malik, Vinika,</p>	<p>While 3G and 4G networks laid the initial groundwork for DTT, the bulk of empirical advancements and technological innovations are closely aligned with the progress of 5G and 6G networks. The shift from 5G to the emerging 6G mobile networks has significantly reshaped the technological landscape, especially in the realm of DTT. As intelligent network capabilities expand, DTT is gaining momentum as a strategic enabler of Industry 4.0 by facilitating real-time data integration, simulation, and decision-making. The scientometric study systematically explores DTT's development across 3G to 6G networks within five key sectors: agriculture, healthcare, infrastructure, manufacturing, and telecommunications. A curated dataset from Scopus (2019–2024) supports analyses using CiteSpace and Tableau to uncover publication trends, co-citation networks, geographic research contributions, and the keyword-based thematic structures. The findings highlight global engagement, sector trends, and emerging research priorities, offering insights into how DTT aligns with mobile network</p>	<p>10.1007/s10845-025-02679-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-025-02679-1</p>	<p>SpringerLink</p>
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		advancements and suggesting future interdisciplinary innovations.			
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Digitalisation of Agri-Food Systems: A Paradigm Shift?	Veraart, Roel, Blok, Vincent,	<p>Digitalisation in agri-food systems will have major concrete consequences for environmental, ethical, legal and social developments in decades to come. Because of the far reaching consequences of the event of digitalisation, recent developments in the data economy have been described as involving a paradigm shift. This paper offers a conceptual framework that aims to contribute to existing transition theory by enhancing the philosophical perspective on the multidimensional transformation of digitalisation in agri-food. The research works from a broad understanding of paradigm shifts, extrapolating it onto empirical instances of current events in agri-food. It investigates, beyond components such as innovations, policies and institutions, the onto-epistemological basis of system configurations, exploring fundamental and ethical questions at stake in planetary crises and systemic entanglements. It ultimately answers that a complete shift has not yet occurred because the axiological dimension entailing values and ethics has not evolved along with other paradigm dimensions. It concludes in the</p>	10.1007/s10806-025-09954-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10806-025-09954-4	SpringerLink
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		normative claim that the concept of a paradigm shift should be used consciously, to remain critical of the suggestion that a novel ethical framework exists today and to warn of the risk of falling back into traditional, unsustainable tendencies.			
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Advancing cloud virtualization: a comprehensive survey on integrating IoT, Edge, and Fog computing with FaaS for heterogeneous smart environments	Ghaseminya, Mohammad Mahdi, Eslami, Elahe, Shahzadeh Fazeli, Seyed Abolfazl, Abouei, Jamshid, Abbasi, Elham, Karbassi, Seyed Mehdi,	The present study provides a comprehensive survey on the integration of FaaS with Internet of Things (IoT), edge, and fog computing in heterogeneous smart environments. It examines the theoretical foundations of cloud virtualization, IoT frameworks, and emerging computing paradigms, while analyzing the role of Artificial Intelligence of Things (AIoT) in enhancing these systems. The study highlights the benefits and challenges of combining FaaS with IoT, Edge, and Fog computing, including improved scalability, reduced latency, and efficient resource utilization. Additionally, it investigates real-world applications across diverse domains such as smart agriculture, healthcare, transportation, and smart homes. Through this extensive analysis, the research offers valuable insights into the advancement of cloud virtualization and its implications for developing more efficient and intelligent ecosystems.	10.1007/s11227-025-07799-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-025-07799-2	SpringerLink
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<p>A quantitative and qualitative study of life cycle costing in defense projects and programs</p>	<p>Duarte, Antônio Henrique, Barbalho, Sanderson Cesar Macedo, Vieira, Darli, Bravo, Alencar,</p>	<p>Life cycle costing is internationally regarded as one of the best tools for evaluating investments in military equipment; according to its holistic precepts, it estimates all costs associated with the product/system in its concept, development, production, use, support, and decommissioning stages. This article, seeking to understand these motivations and to contribute to existing knowledge on the subject, conducts a quantitative and qualitative literature review and finds that life cycle costing not only is applied in the initial phase of development or acquisition of a product/system for the selection of the best investment proposal but also has strong application potential in integrated development to ensure the inclusion of factors that provide the competitiveness, reliability and low-cost operation of future military products/systems . Finally, despite the low number of annual publications, it is possible to point out trends and identify characteristics like the triple helix relationships and genuine pressures of the contemporary world, such as the need to increase productivity, reduce costs, promote innovation and protect the</p>	<p>10.1007/s11301-024-00432-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11301-024-00432-1</p>	<p>SpringerLink</p>
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		environment, which are trends that allow life cycle costing to remain current and strategic, with an increasing transfer of knowledge from the military to the private sector.			
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From Simulation to Autonomy: Reviews of the Integration of Artificial Intelligence and Digital Twins	Sajadieh, Seyed Mohammad Mehdi, Noh, Sang Do,	<p>The integration of artificial intelligence (AI) with digital twin (DT) technology has revolutionised the industry by enabling the creation of autonomous, adaptive, and resilient systems that are beyond static digital replicas. AI-enhanced DTs facilitate real-time monitoring, predictive maintenance, proactive decision making, and operational efficiency, aligning with the human-centric objectives of Industry 5.0. In this study, an AI-DT Integration framework is introduced, AI is systematically incorporated into the DT lifecycle across virtualisation and synchronisation, monitoring and awareness, and decision-making and optimisation phases. By employing advanced techniques, such as generative design, predictive analytics, and scenario simulations, this framework enhances DT autonomy and resilience while addressing critical challenges such as interoperability, scalability, and data security. Case studies have demonstrated the transformative impact of AI on DT functionality, including self-optimisation, adaptive scheduling, and risk mitigation. These findings underscore the potential of AI-</p>	10.1007/s40684-025-00750-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40684-025-00750-z	SpringerLink
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		driven DTs to revolutionise industries and urban systems, highlighting the need for global standards and scalable architectures to realise their role as foundational tools in sustainable and adaptive Industry 5.0 ecosystems.			
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AI-driven value management in construction: a theoretically-grounded framework with empirical validation	Mlybari, Ehab A., Elgohary, Hamdy A.,	Value Management (VM) of construction projects is beset by inherent pitfalls of expertise-dependence, fixed processes, and segregation from data-rich environments. The following paper presents and evaluates an artificial intelligence-facilitated Value Management System (AIVMS) that incorporates predictive analytics, Multi-Criteria Decision-Making (MCDM), and Explainable AI (XAI) to facilitate open, fact-based stakeholder-centric decisions throughout project life cycles. It was designed using the Design Science Research approach on systematic literature review of 127 peer-reviewed papers and was validated with three-round Delphi study with 24 construction professionals. The AIVMS system is six-layered and consists of: intelligent value driver identification, predictive analytics engine, dynamic MCDM engine, integration and optimization core, explainable AI interface, and adaptive learning system. Empirical validation through three real-world project case studies revealed significant improvements: 23% increase in decision-making consistency, 31% reduction in value	10.1007/s43995-025-00203-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43995-025-00203-3	SpringerLink
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		<p>engineering cycle time, and 89% improvement in stakeholder satisfaction with transparency of decisions. The framework achieved 91.2% precision for forecasting a variety of performance measures and enabled the identification of €2.8 M average cost optimization potential. This research is the first empirically-validated integration of AI, MCDM, and XAI for construction value management that integrates machine-based intelligence with man-centric transparency requirements and provides real-world implementation avenues for existing BIM and project management systems.</p>			
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<p>A Web Service Oriented Integration Solution for Capital Facilities Information Handover</p>	<p>Armas, Elvismary Molina, Silva, Geiza Maria Hamazaki, Campos, Júlio Gonçalves, Almeida, Vitor Pinheiro, Neves, Hugo Fernandes, Corseuil, Eduardo Thadeu Leite, Gonzalez, Fernando Rodrigues,</p>	<p>The potential to obtain the correct information, manage it, and interchange it are some of the keys to the success of a project. Integrating multiple information systems and presenting functionalities within a unified view remains challenging, particularly for long-term projects such as production plants in the Oil and Gas industry. Digital Engineering contributes to representing, consuming, and managing the engineering information associated with process plants. In the Oil and Gas industry context, the Capital Facilities Information Handover Specifications (CFIHOS) represents an initiative to improve how information is exchanged between companies that own, operate, and build equipment for the process and energy sectors. In that sense, CFIHOS proposes a data model and a library (Reference Data Library—RDL) with standard terms for data interchange. A review of current solutions supporting CFIHOS guidelines and its proposed data model revealed that few software implementations fully support CFIHOS specifications. This work</p>	<p>10.1007/s41019-025-00281-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41019-025-00281-2</p>	<p>SpringerLink</p>
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		<p>presents an implementation using a subset of the CFIHOS data model for all CFIHOS's Contract Scenario Templates. The use case was implemented over the INSIDE system, allowing dynamic integration between heterogeneous databases using an architecture based on web services. The knowledge of extracting the information from databases and generating the data structured to accomplish the CFIHOS data model was encoded in INSIDE by defining data services in the knowledge base. Addressing the gap in data model verification is critical to enhancing the effectiveness of data integration practices and ensuring compliance with CFIHOS standards, but no available tools verify if the information in a file complies with the CFIHOS data model and RDL information. For this reason, a prototype of a validator was implemented to verify the challenges of using CFIHOS. It was tested following the use case context of Petrobras company. The developed CFIHOS Validator complements the data extraction, and data verification flows according to this standard.</p>			
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Participatory Convergence: Integrating Convergence and Participatory Action Research	<p>Castro-Diaz, Laura, Roque, Anais, Wutich, Amber, Landes, Laura, Li, WenWen, Larson, Rhett, Westerhoff, Paul, Marcos-Hernandez, Mariana, Hossain, Mohammad Jobayer, Tsai, Yushiou, Lucero, Ramon, Todd, Griffin, White, Dave, Hanemann, Michael,</p>	<p>This paper introduces the concept of “Participatory Convergence” as a framework to meet grand social-ecological challenges. Participatory Convergence combines the principles of Convergence Research with Participatory Action Research (PAR), offering a novel approach to tackling complex societal problems. Convergence Research seeks to foster high-level integration between diverse disciplines to address multifaceted issues, emphasizing systems thinking and solutions orientation; however, existing literature falls short in providing practical models for the deep integration of diverse disciplines, community partners, and community members. This paper aims to bridge these gaps by integrating Convergence Research with PAR. We illustrate the application of Participatory Convergence with a case study: the “Action for Water Equity” project, focusing on water challenges faced by communities in U.S. colonias along the U.S.–Mexico border. The Action for Water Equity project is a practical example of how Participatory Convergence can be applied to tackle pressing</p>	10.1007/s11024-024-09547-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11024-024-09547-x	SpringerLink
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		challenges while embracing diversity, inclusivity, and adaptability. This approach holds the potential to facilitate comprehensive solutions for global challenges and foster meaningful change through interdisciplinary collaboration, community engagement, and a commitment to sustainability and equity.			
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<p>Fostering lithium-ion battery remanufacturing through Industry 5.0</p>	<p>Neri, Alessandro, Butturi, Maria Angela, Tomasin da Silva, Leandro, Lolli, Francesco, Gamberini, Rita, Sellitto, Miguel Afonso,</p>	<p>The rise of electric vehicles (EVs) has resulted in notable environmental benefits, yet challenges persist regarding battery disposal and recovery. The increasing demand for EVs heightens concerns about the environmental impact of lithium-ion battery (LIB) waste, which threatens both ecosystems and public health. Although remanufacturing is seen as a sustainable solution to these issues, current research does not thoroughly examine the role of Industry 5.0 technologies in optimising this process. This study aims to compare and assess the potential of various Industry 5.0 technologies and approaches to enhance the remanufacturing of lithium-ion batteries. Using the AHP-PROMETHEE method, we identify the most critical and influential Industry 5.0 prospects that should be prioritised for addressing key challenges such as diagnostic accuracy, safe disassembly, and high-quality reassembly. The multi-criteria analysis highlights key Industry 5.0 imperatives that can facilitate efficient and effective remanufacturing processes. The study identifies Digital Product Passport (DPP),</p>	<p>10.1007/s12008-025-02229-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12008-025-02229-2</p>	<p>SpringerLink</p>
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		<p>Digital Twin (DT), and the Internet of Everything (IoE) as critical enablers in optimizing the LIB remanufacturing process. The analysis reveals that DPP stands out as the top enabler, significantly enhancing transparency, traceability, and lifecycle management for LIBs. DT and IoE follow closely, contributing to real-time monitoring, predictive maintenance, and seamless data integration across the supply chain. This paper delves in the emerging concept of the Digital Battery Passport (DBP), a DPP mandated by recent European regulations aimed at improving battery management and circularity. The DBP facilitates access to critical data throughout the battery's lifecycle, including its origin, composition, and state of health. This information is crucial for optimising remanufacturing processes, ensuring compliance with sustainability standards, and extending battery life. The paper highlights the potential of DBP to transform the EV battery value chain by enhancing transparency and enabling more informed decision-making across stakeholders. Our findings offer significant insights for</p>			
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		polycymakers, battery manufacturers, and remanufacturing firms.			
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Zero-emission traction for rail	Cole, Colin, Spiriyagin, Maksym, Wu, Qing, Bernal Arango, Esteban, Bosomworth, Chris,	Replacing the energy density and convenience of diesel fuel for all forms of fossil fuel-powered trains presents significant challenges. Unlike the traditional evolutions of rail which has largely self-optimised to different fuels and cost structures over 150 years, the challenges now present with a timeline of just a few decades. Fortunately, unlike the mid-1800s, simulation and modelling tools are now quite advanced and a full range of scenarios of operations and train trips can be simulated before new traction systems are designed. Full trip simulations of large heavy haul trains or high speed passenger trains are routinely completed controlled by emulations of human drivers or automated control systems providing controls of the “virtual train”. Recent developments in digital twins can be used to develop flexible and dynamic models of passenger and freight rail systems to support the new complexities of decarbonisation efforts. Interactions between many different traction components and the train multibody system can be considered as a system of systems. Adopting this multi-modelling paradigm enables	10.1007/s40534-025-00399-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40534-025-00399-z	SpringerLink
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		<p>the secure and integrated interfacing of diverse models. This paper demonstrates the application of the multi-modelling approach to develop digital twins for rail decarbonisation traction and it presents physics-based multi-models that include key components required for studying rail decarbonisation problems. Specifically, the challenge of evaluating zero-emission options is addressed by adding further layers of modelling to the existing fully detailed multibody dynamics simulations. The additional layers detail control options, energy storage, the alternate traction system components and energy management systems. These traction system components may include both electrical system and inertia dynamics models to accurately represent the driveline and control systems. This paper presents case study examples of full trip scenarios of both long haul freight trains and higher speed passenger trains. These results demonstrate the many complex scenarios that are difficult to anticipate. Flowing on from this, risks can be assessed and practical designs of zero-emission systems can be</p>			
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		proposed along with the required recharging or refuelling systems.			
The (Necro)Politics of Framing Terrorism in Countering Separatist Movements: Strategies and Human Rights Implications in Quebec, Kashmir, and Xinjiang	Arefin, Md. Nazmul,	Throughout history, self-determination struggle groups and/or separatist movements have faced different forms of proscribing and repressing strategies by the governments they challenge. Among a wide spectrum of countering measures, 'framing terrorism' as a means of control has been a recurring practice to delegitimize these groups and movements. This paper comparatively examines the state strategies of 'framing terrorism' and the use of force in Canada, India, and China as a response to the separatist movements and self-determination struggles. By critically analyzing the political and military strategies used by these states, it discusses how the systemic production of the state of exception led to criminalization, tribalization, banning, rightlessness, and subjugation in the name of fighting terrorism across the cases. It also identifies the racialized necropolitical ruptures in terms of nature, application, and ramifications of framing terrorism in the post-9/11 temporality.	10.1007/s43576-025-00187-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43576-025-00187-z	SpringerLink

Sustainable assessment of plastic and mixed waste disposal problem during COVID-19 pandemic: an integrated multi-criteria decision-making approach	Kang, Daekook, Anuja, Arumugam, Ahmadian, Ali, Manirathinam, Thangaraj, Shanmugam, Ponnann, Narayanamoorthy, Samayan,	This article focuses on India's inorganic solid waste disposal problem, with a particular emphasis on plastic and mixed waste. It aims to identify the current COVID-19 pandemic situation as well as provide a suitable disposal technique for wastes that are specifically related to municipal solid waste management. We propose an integrated approach to disposing of paper and plastic and mixed wastes in an interval-valued q-rung orthopair fuzzy (IVq-ROF) environment for this problem. In this case, we use the FUCOM method to calculate the weight values of the criteria and the MABAC method to rank the alternatives based on the chosen criteria. To confirm the effectiveness of the proposed method, a numerical illustration is provided, and validation of the suggested method is also shown.	10.1007/s10668-023-03175-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-023-03175-3	SpringerLink
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Quantum secured blockchain framework for enhancing post quantum data security	Reddy, Nalavala Ramanjaneya, Suryadevara, Supriya, Reddy, K. Guru Raghavendra, Umamaheswari, Ramisetty, Guttula, Ramakrishna, Kotoju, Rajitha,	Quantum computing is an evolution of classical computing, capable of solving problems that are competitive enough to break the existing cryptographic primitives upon which current blockchain systems are based. Popular schemes like RSA, ECDSA, and SHA-256 can be compromised by quantum algorithms (Shor's and Grover's), raising questions about the security and trustworthiness of blockchain-based applications in finance, healthcare, and supply chains. Many current approaches focus on isolated aspects of the blockchain, such as cryptographic primitives or key exchange, without a comprehensive strategy that can guarantee end-to-end security in the face of a quantum threat. Finally, traditional consensus mechanisms such as Proof-of-Work and Proof-of-Stake are vulnerable to Sybil attacks, centralization, and leader-selection bias. When the adversary has access to a quantum computer, these issues become significantly worse. In this paper, we present QuantumShield-BC, a modular blockchain framework incorporating post-quantum cryptographic	10.1038/s41598-025-16315-8	https://www.nature.com/articles/s41598-025-16315-8.pdf	SpringerLink
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		<p>signatures, quantum key distribution (QKD), and a novel Quantum Byzantine Fault Tolerance (Q-BFT) consensus mechanism driven by quantum random number generation (QRNG) to address these challenges. QKD: The system supports tamper-proof key exchange, quantum-resilient consensus among validator nodes, and secure transaction signing. Experimental evaluation demonstrates that QuantumShield-BC achieves low consensus latency and high throughput, while providing perfect security against simulated attacks from Shor's and Grover's algorithms. The proposed framework eradicates the Sybil attack effectiveness up to 0%, eliminates replay and MITM vulnerabilities, and achieves an average throughput of over 7,000 transactions per second with 100 validators, orders of magnitude better than classical blockchain systems. The importance of each quantum part to the system's robustness is also demonstrated using an ablation study. With its unique ability to provide a post-quantum framework for high-assurance,</p>			
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		general-purpose, scalable, and interoperable blockchain networks resistant to quantum-inspired attacks or quantum retrieval, QuantumShield-BC is practical for deployment in critical infrastructure and digital trust ecosystems where performance and a future-proof foundation are essential.			
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<p>Spatial-temporal changes and driving factors analysis of coupling coordination degree of economy-society-environment system in Shaanxi Province from 2010 to 2020</p>	<p>Yan, Zixuan, Li, Zhanbin, Li, Peng, Zhao, Chenxu, Xu, Yaotao, Cui, Zhiwei, Sun, Hu,</p>	<p>Urbanization has exacerbated the conflict between human society and the environment. Therefore, coupled coordination between the economy, society, and environmental management is vital. This study explored the degree of coupled coordination of economy-society-environment systems in cities in Shaanxi Province and quantified the drivers that influence changes in the degree of coupled coordination. The results showed that the coupling coordination degree (CCD) of urban economy-society-environment systems in Shaanxi Province generally showed an upward trend, with the average CCD increasing from 0.49 in 2010 to 0.86 in 2020, shifting from primary coordination to excellent coordination. The CCD between Guanzhong and southern Shaanxi was significantly higher than that of northern Shaanxi, with significant spatial differences. After 2015, the economy-environment binary system played a dominant role in influencing the changes in the CCD of the economy-society-environment system. The back-propagation artificial neural network indicated that the health</p>	<p>10.1007/s10668-025-06658-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-025-06658-7</p>	<p>SpringerLink</p>
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		<p>institutions, per capita actually used foreign capital, investment in real estate development, and volume of industrial sulfur dioxide emissions were the main drivers of CCD in Shaanxi Province's cities, with contribution rates of 13.3%, 10%, 8.3%, and 7.9%, respectively. This study lays the foundation for the development of the concept of coupled and coordinated urban development and strategic planning and provides scientific advice for maintaining urban progress.</p>			
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<p>A survey and analysis of feature selection techniques in machine learning for IoT device classification within smart buildings</p>	<p>Waseem, Quadri, Din, Wan Isni Sofiah Binti Wan, Rahman, Azamuddin Bin Ab, Khan, Sundas Naqeeb, Busaeed, Raed Abdullah Abobakr, Fairouz, Towfeeq,</p>	<p>The Internet of Things (IoT) has revolutionized modern living and infrastructure by driving the development of sustainable smart buildings and accelerating the digital transformation of buildings. In smart buildings, efficient machine learning (ML) based classification of IoT devices is critical for improving cyber defense, optimizing resource management, and maintaining occupant comfort. Feature selection techniques are vital for boosting the effectiveness of machine learning models when classifying and categorizing Internet of Things (IoT) devices for various reasons. Hence, this study initially provides an in-depth understanding of integrating IoT and ML in smart buildings. We provide the reasons and importance of device classification in smart buildings, which may range from monitoring security, power consumption, resource allocation, maintenance, and rehabilitation scenarios. This study emphasizes the importance of feature selection (FS) models in enhancing the accuracy of classification and interpretability for diagnosing and managing smart building systems effectively. This study thoroughly provides the state of the art for</p>	<p>10.1007/s41062-025-02203-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41062-025-02203-7</p>	<p>SpringerLink</p>
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		<p>feature selection techniques in detail, with their purpose. It evaluates the principles and the types of feature selection methods, including their applications. It also highlights the key issues and challenges faced in applying these techniques in smart building infrastructures. This study discusses the process of optimization of feature selection methods, which helps to improve the model's effectiveness and speed up machine learning accuracy for secure smart building resilient structures, for its various benefits. Lastly, we provide a detailed discussion and suggestions along with future perspectives of FS in ML for IoT device classification within smart buildings.</p>			
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Assessment of the knowledge landscape, information needs and attitude towards decision support systems among hemp farmers in Florida	Hopf, Alwin, Watson, Jonathan A., Swisher, Mickie, Brym, Zachary, Hoogenboom, Gerrit,	Decision Support Systems (DSS) have potential to support sustainable agriculture production, but experience low adoption rates among practitioners. Study explored the knowledge landscape, information needs, and attitudes towards DSS among hemp farmers in Florida through semi-structured interviews. Distinct farmer profiles were identified that exhibited unique motivations, information-seeking behaviors, resource constraints and attitude towards DSS. Interest in DSS exists particularly for addressing agronomic issues in absence of historic data and knowledge, but barriers such as cost, trust and utility remain significant. Farmers expressed a preference for tailored, locally relevant DSS that offer actionable recommendations and integrate seamlessly into their existing workflows. Background The recent legalization of industrial hemp (<i>Cannabis sativa</i> L.) in Florida and across the US has sparked interest among established farmers and newcomers alike. However, the nascent industry faces challenges due to limited location-specific cultivation knowledge, evolving	10.1186/s42238-025-00318-3	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s42238-025-00318-3	SpringerLink
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		<p>regulations, and market uncertainties. Agriculture technology such as crop growth models and decision support systems (DSS) can support sustainable hemp production in new regions. However, the adoption of such technologies is limited and requires participatory work with and study of DSS users for the development of appropriate technology.</p> <p>Methods This study explores the knowledge landscape, information needs, and attitudes towards decision support systems among hemp farmers in Florida through a series of semi-structured qualitative interviews.</p> <p>Results We identified distinct farmer profiles, including established farmers seeking diversification, out-of-state hemp growers exploring Florida's climate, hemp practitioners from non-agricultural backgrounds focused on quality, and first-time farmers driven by personal interest. Each profile exhibited unique motivations, information-seeking behaviors, and resource constraints.</p> <p>Agronomic challenges, such as pest and disease management, cultivar selection and time of planting were common concerns across</p>			
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		<p>all groups. Regulatory uncertainties and market volatility further compounded these challenges. While interest in DSS exists, particularly for addressing agronomic issues and optimizing decision-making, barriers such as cost, trust in model accuracy, and utility remain significant. Farmers expressed a preference for tailored, locally relevant DSS that offer actionable recommendations and integrate seamlessly into their existing workflows.</p> <p>Conclusion The study underscores the importance of participatory DSS development, involving farmers in the design and validation process to ensure the tools meet their specific needs and build trust. Insights from this research will contribute to the ongoing development of a process-based crop growth model and DSS specifically designed for Florida's hemp production.</p>			
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Blockchain-based access control and privacy preservation in healthcare: a comprehensive survey	Tawfik, Ahmed M., Al-Ahwal, Ayman, Eldien, Adly S. Tag, Zayed, Hala H.,	<p>In recent years, blockchain technology has emerged as a promising solution for securing electronic health records (EHRs) while preserving patient privacy. Traditional e-health systems facilitate EHR sharing among healthcare providers but also introduce significant privacy risks, such as unauthorized access and data breaches. Blockchain, when integrated with privacy-preserving techniques, enhances transparency, integrity, and availability in EHR management. Smart contracts further strengthen security by enabling automated authentication and access control. This paper provides a comprehensive survey of blockchain-based access control frameworks in healthcare, categorizing them into permissioned and permissionless approaches. It also explores cryptographic privacy-preserving techniques designed to mitigate privacy risks. Additionally, blockchain platforms and consensus protocols commonly used in these frameworks are analyzed. The methodology follows a structured paper selection process, leading</p>	10.1007/s10586-025-05308-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-025-05308-x	SpringerLink
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		<p>to the final inclusion of 45 research papers focusing on blockchain-based privacy preservation and access control in healthcare. Furthermore, it presents real-world case studies that illustrate the practical implementation of blockchain-based access control in healthcare settings, highlighting their strengths and challenges. Finally, it identifies privacy-related challenges, open research issues, and future directions to guide further research in this evolving domain.</p>			
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<p>A systemic risk assessment methodological framework for the global polycrisis</p>	<p>Gambhir, Ajay, Albert, Michael J., Doe, Sylvanus S. P., Donges, Jonathan F., Farajalla, Nadim, Giatti, Leandro L., Gundimeda, Haripriya, Hendel-Blackford, Sarah, Homer-Dixon, Thomas, Hoyer, Daniel, Adan, Sumaya, Jacome-Polit, David, Kemp, Luke, Korowicz, David, Kovacic, Zora, Kwakkel, Jan, Laybourn, Laurie, Lempert, Robert, Mahamoud, Ayan, Oliver, Tom H., Pavkova, Ivana E., Ponnoly, Joseph, Satgar, Vishwas, Shipman, Megan, Sillmann, Jana, Silver, Nick, Stevenson, Samuel, Richardson, Ruth,</p>	<p>This paper proposes a framework to assess systemic risks that compound and cascade within and between systems. This emphasizes political economy and transformations, as well as trans-disciplinarity and diverse participation, evidence and methods. Human societies and ecological systems face increasingly severe risks, stemming from crossing planetary boundaries, worsening inequality, rising geo-political tensions, and new technologies. In an interconnected world, these risks can exacerbate each-other, creating systemic risks, which must be thoroughly assessed and responded to. Recent years have seen the emergence of analytical frameworks designed specifically for, or applicable to, systemic risk assessment, adding to the multitude of tools and models for analysing and simulating different systems. By assessing two recent global food and energy systemic crises, we propose a methodological framework applicable to assessing systemic risks in a polycrisis context, drawing from and building on existing approaches. Our framework's polycrisis-specific</p>	<p>10.1038/s41467-025-62029-w</p>	<p>https://www.nature.com/articles/s41467-025-62029-w.pdf</p>	<p>SpringerLink</p>
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		features include: exploring system architectures including their objectives and political economy; consideration of transformational responses away from risks; and cross-cutting practices including consideration of non-human life, trans- disciplinarity, and diversity, transparency and communication of uncertainty around data, evidence and methods.			
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Impact of cyber threat awareness on driver response to an unexpected vehicle cyberattack	Lanigan, Trevor F., Biggs, Tyler, Gallegos, Erika E., Daily, Jeremy, Reid, Emma J., Powers, Sarah,	<p>The integration of advanced cyber-physical systems in heavy vehicles introduces new vulnerabilities by expanding the possibility of cyberattacks. The objective of this study is to evaluate (1) how threat awareness influences driver response to an unexpected cyberattack, (2) how the provision of a basic cyberattack response protocol influences driver performance, and (3) how professionally trained versus standard drivers compare in their responses to a cyberattack. An on-road driving study (N =50) was conducted using a medium heavy-duty vehicle. Participants were divided into three groups: Control, which remained unaware of any potential cyberattack; Aware, which was informed about the potential cyberattack; and Aware+Protocol, which received the same warning as the Aware group with the addition of a basic cyberattack response protocol. An instrument cluster cyberattack was executed at the same location for all participants. The findings highlight the essential role of awareness and response protocol in enhancing driver response to an unexpected vehicle cyberattack. The Aware+Protocol group had the highest stop rate (100%) and the</p>	10.1007/s12198-025-00303-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-025-00303-0	SpringerLink
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		<p>shortest stopping distances (224 m for standard drivers and 254 m for professionals), compared to the Control group (828 and 520 m, respectively). Aware+Protocol also had the fastest reaction time, averaging 7.53 s, versus 16.12 s (Aware) and 30.29 s (Control). These results emphasize that awareness alone is insufficient. Providing drivers with clear, actionable protocols significantly improves their ability to react quickly and safely to cyberattacks, enhancing overall road safety.</p>			
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<p>The Challenges and Limitations of Validating Satellite-Derived Datasets Using Independent Measurements: Lessons Learned from Essential Climate Variables</p>	<p>Langsdale, Mary, Verhoelst, Tijl, Povey, Adam, Schutgens, Nick, Dowling, Thomas, Lambert, Jean-Christopher, Compernelle, Steven, Kern, Stefan,</p>	<p>Validation of satellite-derived essential climate variable (ECV) datasets requires comparison against independent measurements. These independent measurements, which include ground-based, airborne, and other non-satellite-based measurements, are typically the product of a different measurement system and may include some contribution from models. These reference data therefore have their own characteristics, uncertainties, and limitations which must be accounted for in the validation process. In addition, they typically differ from the data to be validated in spatio-temporal resolution, sensitivity, and sampling. As such, comparisons to independent data do not necessarily yield clear feedback on the quality of satellite data and insufficient awareness of these issues can lead to erroneous interpretation. This is the cost of leaving the laboratory and studying the real world. In this review paper, we examine the challenges and limitations of evaluating satellite-derived datasets with independent measurements, using examples across different ECVs within the terrestrial, ocean, and atmospheric</p>	<p>10.1007/s10712-025-09898-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10712-025-09898-4</p>	<p>SpringerLink</p>
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		<p>domains. Drawing from other studies, we discuss issues with the reference datasets themselves, issues specific to use of these data for validation, and issues resulting from the comparison methodology. We conclude with recommendations to the community based on this review. In this, we highlight the importance of continued efforts towards (1) advancing uncertainty modelling of reference datasets and quality control knowledge and procedures, (2) establishing and communicating limitations in reference data, (3) reference data (and metadata) timeliness and preservation, and (4) best practices for the validation methodologies that address the spatio-temporal differences of the measurements.</p>			
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Pattern Formation Driven by Nonlocal Perception in a Delayed Pine Wilt Disease Model with Top-Hat Kernel	Li, Jia, Ding, Yuting, Song, Yongli,	<p>Nonlocal perception plays a crucial role in studying animal cognitive movement modeling. In this paper, the impact of nonlocal perception on pattern formation is analyzed, and it is applied to study the control of pine wilt disease. It turns out that perceptual movement can provide a theoretical scientific basis for the multi-point outbreaks and spatiotemporal aggregation of pine wilt disease. For the top-hat kernel, we concentrate on the joint effect of perception scale and delay on the stability, and find that Turing-Hopf bifurcation occurs due to their interaction. Besides, the patterns near the bifurcation points are simulated in detail by adopting parameters with actual biological meaning, which are selected by analyzing real data, and diverse complicated spatiotemporal patterns are obtained, such as peak alternating periodic patterns and spatiotemporal aggregation patterns. Finally, we demonstrate that the artificial release of the parasitic natural enemy of the pest can drive the populations to reach stability in the form of the steady state or periodic solutions. The obtained results not only well explain the transmission mechanism of</p>	10.1007/s11538-025-01504-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11538-025-01504-3	SpringerLink
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		pine wilt disease, but also contribute to the study of biological phenomena such as the formations of flocks and swarms.			
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Developing real-time IoT-based public safety alert and emergency response systems	Zhang, Han, Zhang, Runze, Sun, Jiamanzhen,	<p>This paper presents the design and evaluation of a real-time IoT-based emergency response and public safety alert system tailored for rapid detection, classification, and dissemination of alerts during critical incidents. The proposed architecture combines a distributed network of heterogeneous sensors (e.g., gas, flame, vibration, and biometric), edge computing nodes (Raspberry Pi, ESP32), and cloud platforms (AWS IoT, Firebase) to ensure low-latency and high-availability operations. Communication is facilitated using secure MQTT over TLS, with fallback to LoRa for rural or low-connectivity environments. A prototype was implemented and tested across four emergency scenarios fire, traffic accident, gas leak, and medical distress within a smart city simulation testbed. The system achieved such as consistent alert latency under 450 ms, detection accuracy exceeding 95%, and scalability supporting over 12,000 concurrent devices. A comprehensive comparison against seven state-of-the-art systems confirmed superior performance in latency, reliability (99.1% alert</p>	10.1038/s41598-025-13465-7	https://www.nature.com/articles/s41598-025-13465-7.pdf	SpringerLink
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		success), and uptime (99.8%). These results underscore the system's potential for deployment in urban, industrial, and infrastructure-vulnerable environments, with future work aimed at incorporating AI-driven prediction and federated learning for cloudless operation.			
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Enhanced Q learning and deep reinforcement learning for unmanned combat intelligence planning in adversarial environments	Jianhong, Xu, Gongqian, Liang,	<p>This study proposes a multimodal deep reinforcement learning (MDRL) architecture, Multimodal Deep Reinforcement Learning-Deep Q-Network (MDRL-DQN), based on an improved Q-Learning algorithm. It aims to optimize Unmanned Aerial Vehicle (UAV) scheduling and execution capabilities in intelligent unmanned combat planning. By integrating an attention mechanism and an adaptive reward mechanism, the algorithm effectively fuses image data, sensor data, and intelligent information, enabling collaborative multimodal data processing. This improves task success rates, execution efficiency, and UAV deployment stability. Experimental results show that the improved MDRL-DQN algorithm demonstrates significant advantages in complex task scenarios. Specifically, in the long-distance dispersed defense (Scenario 1) and long-distance concentrated defense (Scenario 3), the task success rates reach 89.6% and 94.8%, respectively, outperforming other algorithms by several percentage points. Additionally, in</p>	10.1038/s41598-025-13752-3	https://www.nature.com/articles/s41598-025-13752-3.pdf	SpringerLink
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		<p>Scenario 1, MDRL-DQN completes tasks in 720.8 s, which is 16.7% faster than Proximal Policy Optimization (PPO) at 865.3 s, highlighting its superior execution efficiency. These results indicate that the improved Q-Learning algorithm effectively enhances the efficiency and stability of unmanned combat tasks, providing new insights for intelligent planning in future unmanned operations.</p>			
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Identification of Critical Infrastructure Sectors and Their Interdependencies in Bangladesh: A Step Towards Resilience Planning	Kumar, Anil, Pal, Indrajit, Santoso, Djoen San, Ninsawat, Sarawut, Islam, Sheikh Tawhidul,	<p>Bangladesh aims to become a high-income country by 2041, requiring investment in critical infrastructure sectors. Disruptions in one sector can affect others, so prioritizing actions for key sectors is essential when resources are limited. Since no country has endless resources, the current strategy is to focus on developing infrastructure in order of importance. This means that the most critical infrastructure is given priority when allocating resources. The aim of this study was to identify the critical infrastructure sectors and their interdependencies in Bangladesh. While the science of critical infrastructure protection and resilience is well-developed in high-income and developed economies, this research sheds light on identifying critical infrastructure in developing nations like Bangladesh. To identify the critical infrastructure sectors, a comprehensive literature survey was conducted, which was verified and validated by country experts. Policymakers, practitioners, and researchers were consulted through key informant interviews (KII). Interpretive structural modeling (ISM) was applied to</p>	10.1007/s13753-025-00655-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-025-00655-0	SpringerLink
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		<p>determine the interdependencies among identified sectors. Furthermore, cross-impact matrix multiplication applied to classification (MICMAC) analysis was applied to categorize the identified sectors based on driving power and dependence of sectors. The study found that 14 sectors—energy, information and communication technology (ICT), media and culture, law enforcement, transportation, among others—need extra protection measures. It also identified infrastructures with driving power and dependencies in the country's context. Additionally, this article offers recommendations for improving policy and institutional actions to enhance the resilience of critical infrastructure in the country.</p>			
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Mass personalization product service system (MP-PSS) driven by industrial intelligence: transformation, implementation, and application	Zhang, Xianyu, Ming, Xinguo, Bao, Yuguang,	With the development of industrial intelligence technology, the mass personalization (MP) model will be integrated with product service system (PSS), forming a new type of personalized product oriented large-scale service model, which is mass personalization product service system (MP-PSS). This paper provides a detailed study of MP-PSS driven by industrial intelligence from the perspectives of processes, frameworks, solution, and blueprint. Firstly, the current research status of the MP-PSS is analyzed, and the logical route of this study is provided. Secondly, a research framework for MP-PSS is proposed from the perspective of systems engineering. Third, a detailed analysis is conducted on transformation, implementation, and application for MP-PSS, focusing on industrial transformation solution, industrial implementation path, and industrial intelligence blueprint for MP-PSS. The top-level framework and theory of MP-PSS can provide theoretical guidance for the transformation, upgrading, and model innovation of enterprises in various stages of the industrial	10.1007/s00170-025-16097-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-16097-3	SpringerLink
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		value chain, and provide theoretical decision-making for enterprise managers.			
Critical Responses to Global Systemic Risk in an Era of Polycrisis	Richardson, Ruth,		10.1007/s13753-025-00637-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-025-00637-2	SpringerLink

Industry 4.0 advancements in discrete production ramp-ups: a systematic literature review	Haller, Julian, Kaven, Lea, Göppert, Amon, Schmitt, Robert H.,	Manufacturing companies need to produce increasingly individualised products in shorter time to stay competitive. However, production ramp-ups are often poorly executed and fail to meet their targets. During ramp-up, there is a lack of sufficient data to base decisions on and managers fly blind. The emergence of Industry 4.0 promised real-time data-based decision-making but is not yet exploited during production ramp-up due to this data gap. This systematic literature review addresses this gap by identifying methods since 2011 to close this production ramp-up data gap by following the Preferred Reporting Items for Systematic reviews and Meta-Analyses statement. The reports included in the review are categorised according to manufacturing process, ramp-up field of action, and production system level. We found a lack of designated data models for production ramp-up, mostly unsystematic approaches for dealing with small amounts of data and general barriers to deploying Industry 4.0 solutions during the ramp-up phase. Finally, we infer that the research and industry communities should share more data and	10.1007/s10845-025-02656-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-025-02656-8	SpringerLink
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		models to validate systems and tools.			
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Explanation and elaboration of MedinAI: guidelines for reporting artificial intelligence studies in medicines, pharmacotherapy, and pharmaceutical services	Bottacin, Wallace Entringer, Souza, Thais Teles, Melchior, Ana Carolina, Reis, Walleri Christini Torelli,	The increasing adoption of artificial intelligence (AI) in medicines, pharmacotherapy, and pharmaceutical services necessitates clear guidance on reporting standards. While the MedinAI Statement (Bottacin in Int J Clin Pharm, https://doi.org/10.1007/s11096-025-01905-3 , 2025) provides core guidelines for reporting AI studies in these fields, detailed explanations and practical examples are crucial for optimal implementation. This companion document was developed to offer comprehensive guidance and real-world examples for each guideline item. The document elaborates on all 14 items and 78 sub-items across four domains: core, ethical considerations in medication and pharmacotherapy, medicines as products, and services related to medicines and pharmacotherapy. Through clear, actionable guidance and diverse examples, this document enhances MedinAI's utility, enabling researchers and stakeholders to improve the quality and transparency of AI research reporting across various contexts, study designs, and development stages.	10.1007/s11096-025-01906-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11096-025-01906-2	SpringerLink
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<p>Trans-AI/DS: transformative, transdisciplinary and translational artificial intelligence and data science</p>	<p>Cao, Longbing,</p>	<p>After the many ups and downs over the past 70 years of AI and 50 years of data science (DS), AI/DS have migrated into their new age. This new-generation AI/DS build on the consilience and universology of science, technology and engineering. In particular, it synergizes AI and data science, inspiring Trans-AI/DS (i.e., Trans-AI, Trans-DS and their hybridization) thinking, vision, paradigms, approaches and practices. Trans-AI/DS feature their transformative (or transformational), transdisciplinary, and translational AI/DS in terms of thinking, paradigms, methodologies, technologies, engineering, and practices. Here, we discuss these important paradigm shifts and directions. Trans-AI/DS encourage big and outside-the-box thinking beyond the classic AI, data-driven, model-based, statistical, shallow and deep learning hypotheses, methodologies and developments. They pursue foundational and original AI/DS thinking, theories and practices from the essence of intelligences and complexities inherent in humans, nature, society, and their creations.</p>	<p>10.1007/s41060-023-00384-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-023-00384-x</p>	<p>SpringerLink</p>
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Evaluating the Intensity of a Potential Yellow Fever Outbreak During an International Trading Event: a Case Study on Canton Fair	Chen, Yining, Wang, Yufeng, Yu, Jianshe, Wu, Jianhong,	<p>We evaluate the risk of yellow fever outbreaks in a major trade event, with a case study of Canton Fair (Guangzhou, China), caused by case importation at different stages of the trade event. Our baseline model is a standard vector-borne disease transmission dynamics system, but we incorporate the division of a calendar year into favorable and unfavorable seasons based on impacts of different climatic conditions (temperature in particular) on mosquito population dynamics. We also incorporate square-waves to describe scenarios of case importation. We then use this periodic switching model to inform the potential of outbreaks and intensity of outbreaks due to case importation in different periods in relation to the two seasons. Our results show that importation of cases (even with a single case introduced) in the favorable season can induce a large outbreak in the local population in the host city, and the intensity of outbreak depends on the total number of imported cases (up to a level, when local transmission dominates). We also incorporate the public health interventions-isolation and emergency</p>	10.1007/s11538-025-01484-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11538-025-01484-4	SpringerLink
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		vaccination-to the model to provide quantitative information for the event organizer and public health decision makers for the preparedness and rapid response to the outbreak induced by case importation.			
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Resilience driven EV coordination in multiple microgrids using distributed deep reinforcement learning	Wu, Yuxin, Cai, Ting, Li, Xiaoli,	By integrating electric vehicles (EVs), the multi-microgrids (MMGs) can significantly enhance their resilient operation capabilities. However, existing works face challenges in formulating optimal routing and scheduling strategies for EVs, due to the spatial-temporal uncertainty of the distribution and transportation networks, as well as incomplete information. This paper addresses the coordination problem of EVs for the resilience enhancement of MMGs, using a distributed multi-agent deep reinforcement learning approach to minimize the load-shedding cost. Specifically, a coupled power-transportation network (CPTN) model is constructed to facilitate EV routing and scheduling for resilience enhancement, considering the uncertainties associated with distributed renewables, load profiles, and traffic flow. Then, the coordination problem of each EV is formulated as a partially observable Markov decision process, and an attention-based distributed multi-agent deep deterministic policy gradient method, namely AD-MADDPG, is proposed to learn the optimal strategies. The proposed method applies an architecture with multi-actor,	10.1038/s41598-025-12471-z	https://www.nature.com/articles/s41598-025-12471-z.pdf	SpringerLink
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		<p>single-learner to reduce training complexity, employing a convolutional neural network to capture spatial characteristics from the CPTN, and incorporating a long short-term memory to derive temporal sequence features across multiple time steps, thereby enhancing the exploration efficiency of the action space. Simulation results implemented on the modified IEEE 33-bus test feeder demonstrate that AD-MADDPG outperforms all other baselines in terms of load restoration, restoration fairness, and energy consumption when varying different numbers of EVs, maximum discharging proportion, and maximum moving distance.</p>			
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Mining-Induced Subsidence Predicting and Monitoring: A Comprehensive Review of Methods and Technologies	Arif, Arifuggaman, Zhang, Chunlei, Feng, Mingjie, Sajib, Mahabub Hasan, Habibullah, Md, Hasan, Sobuj, Rana, Md Sohel, Mohammadamini, Khezr, Alip, Mohammed, Zhang, Ye,	Mining-induced subsidence poses critical risks to infrastructure, ecosystems, and public safety in regions reliant on underground mining. This study synthesizes current prediction and monitoring methods, emphasizing their capabilities and limitations. Empirical models remain effective in simple geological settings due to their low data and computational demands but lack adaptability in complex conditions. Numerical methods, such as the Finite Element Method, offer high-resolution simulations but require precise input and significant computational resources. Recent machine learning approaches—particularly XGBoost—have demonstrated strong predictive performance, achieving 94.31% accuracy by effectively handling nonlinear, multi-source datasets and outperforming traditional techniques in complex subsidence scenarios. InSAR, GNSS, and UAV-based photogrammetry are identified as the most effective monitoring technologies for mining-induced subsidence, each with specific strengths. InSAR offers millimeter-level accuracy (1–10 mm) and wide-area	10.1007/s10706-025-03271-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10706-025-03271-3	SpringerLink
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		<p>coverage, making it ideal for regional-scale monitoring. GNSS, particularly in Real-time kinematic mode, provides real-time, point-based displacement tracking with $\pm 1\text{--}2\text{ cm}$ accuracy, suitable for early warning in high-risk zones. UAV photogrammetry enables detailed 3D surface modeling with vertical accuracy of $5\text{--}15\text{ cm}$, supporting high-resolution, localized subsidence assessments. Despite individual limitations—such as InSAR’s sensitivity to atmospheric interference and UAVs’ reduced performance in vegetated or rugged terrain, the integration of InSAR, GNSS, and UAV data enhances spatial coverage, temporal frequency, and monitoring reliability. This multi-sensor approach, when combined with machine learning-based prediction models, provides a robust, scalable framework for accurate and responsive subsidence management. Future research should focus on developing hybrid systems that fuse numerical simulations, AI algorithms, and remote sensing data to enable real-time decision-making and promote sustainable mining practices.</p>			
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Governing information privacy in data ecosystems with architectural thinking	Burmeister, Fabian, Kurtz, Christian, Schirmer, Ingrid,	<p>This study addresses the challenge of governing privacy within data ecosystems by integrating architectural thinking (AT) into the discourse. Organizations are increasingly embarking on complex data-sharing initiatives, often encompassing personal data, raising heightened privacy concerns and regulatory obligations. With transparency obscured by complexity, there is a pressing need for systematic approaches to decompose data ecosystems. Leveraging AT, traditionally applied in intra-organizational contexts, this article proposes extending its application to the ecosystem level. By triangulating qualitative data from case studies and expert interviews, key privacy concerns of both business and regulatory stakeholders in data ecosystems are unveiled. Based on these concerns, the study develops and demonstrates a comprehensive data ecosystem architecture meta-model as a foundation for AT to govern privacy from both a business and regulatory perspective. The contributions bridge existing gaps in understanding and addressing privacy concerns within data ecosystems, offering</p>	10.1007/s12525-025-00808-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-025-00808-5	SpringerLink
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		stakeholders a systematic approach for analysis and mitigation.			
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Secure data transmission and classification for digital twin	Wang, Weizheng, Xu, Dequan, Liu, Zhusen, Xie, Qipeng, Su, Chunhua, Peng, Changgen,	In Industry 4.0, digital twin (DT) technology plays an increasingly vital role in enabling intelligent and automated manufacturing and management. However, the utilization of DT in Industry 4.0 environments raises significant security concerns, particularly regarding data transmission and protection. This underscores the critical need for comprehensive and robust security frameworks specifically designed for data transmission and classification in DT-based systems. In this paper, we present a novel secure solution based on the purified Paillier cryptosystem to handle sensitive and categorical information through specialized verification keys and aggregation mechanisms. Our framework implements a three-layer architecture: the device layer uses trusted authority (TA) issued parameters to generate encrypted data types, content, and signatures; the edge layer employs verification keys to filter and aggregate required data types; and the DT layer performs final assessment and decryption. Additionally, we introduce an LSTM-RNN-based reverse data control strategy for DT	10.1007/s11432-024-4269-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11432-024-4269-5	SpringerLink
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		network formulation and anomaly detection. Through extensive evaluation and testing, we demonstrate both the security robustness and performance efficiency of our proposed approach in realistic deployment scenarios.			
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Real-time monitoring and optimization methods for user-side energy management based on edge computing	Huang, Jisheng, Zhou, Shanshan, Li, Guangming, Shen, Qiang,	<p>This paper presents a comprehensive framework for real-time monitoring and optimization of user-side energy management systems leveraging edge computing technology. The proposed approach addresses key challenges in traditional centralized energy management by bringing computation and data processing closer to end devices. The framework encompasses three main components: an edge computing-based system architecture for data acquisition and processing, real-time monitoring methods for energy consumption and power quality, and optimization techniques for demand response and distributed energy resource coordination. Through case studies and experimental analysis, we demonstrate that the proposed framework achieves significant improvements in energy efficiency, response time, and cost reduction compared to conventional centralized approaches. The results show up to 30% increase in renewable energy utilization and 25% reduction in operating costs across various deployment scenarios. This</p>	10.1038/s41598-025-07592-4	https://www.nature.com/articles/s41598-025-07592-4.pdf	SpringerLink
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		work provides valuable insights into the application of edge computing for next-generation energy management systems while highlighting remaining challenges and future research directions.			
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Conceptualizing hybrid intelligent service ecosystems	Bartelheimer, Christian, Heinz, Daniel, Hönigsberg, Sarah, Siemon, Dominik, Li, Mahei Manhai, Strohmann, Timo, Poeppelbuss, Jens, Peters, Christoph,	With the proliferation of artificial intelligence (AI) technologies, the collaboration of human and AI actors in value co-creation processes permeates various application domains. In this conceptual paper, we integrate concepts from human-AI collaboration and service research and present a conceptual framework for hybrid intelligent service ecosystems (HISE). The framework extends the existing conceptualizations of service ecosystems as put forward by the service-dominant logic (S-D logic) by emphasizing how actors deliberately configure human and artificial agencies to co-create value via hybrid intelligent service exchange and how this impacts ecosystem formation and evolution. Our conceptualization highlights that value co-creation in HISE is guided and facilitated by shared resources and institutional arrangements, which differ from previous service ecosystems through the emergence of hybrid agency. We demonstrate the applicability of our framework with five illustrative HISE scenarios and provide five theoretical propositions. Our findings extend existing	10.1007/s12525-025-00798-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-025-00798-4	SpringerLink
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		knowledge by theorizing on how to incorporate hybrid intelligence into value co-creation processes. Thereby, we provide a foundation for future interdisciplinary research on human-AI collaboration at the intersection of information systems, human-computer interaction, and service research with S-D logic as a unifying theoretical lens.			
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<p>Digital twin representation of socio-technical systems through a distributed co-simulation approach for crisis management</p>	<p>Martini, Till, Boigk, Maurizio, Catal, Faruk, Dietze, Steffen, Gerold, Michael, Lukau, Eridy, Monteforte, Michael, Neuhäuser, Stefan, Peitzsch, Sascha, Phung, Windy, Pfennigschmidt, Stefan, Simon, Maik, Vetter, Joanna Zarah, Winter, Nils, Adams, Gabriel, Finger, Jörg, Rosin, Julia,</p>	<p>The increasing frequency and severity of significant risks to public safety posed by natural disasters or human-induced events have underscored a critical need for evaluating the vulnerability of urban regions with a focus on their essential infrastructures. This paper presents a novel methodology for the virtual representation of infrastructure vulnerabilities and functional impairments during hazard situations. Thereby, focus is on the mapping of interdependencie s among critical infrastructure systems and the cascading effects that can arise from failures within these heterogeneous sectors by means of a digital twin representation. An integration of simulation models for urban infrastructure components, particularly in relation to the built environment and emergency response systems is introduced. Leveraging a modular co-simulation architecture, the framework facilitates the analysis of cascading effects across multiple infrastructure systems, such as water, electricity, gas, and telecommunications. As a proof-of-concept example, urban flooding due to heavy rainfall is considered to illustrate the</p>	<p>10.1007/s10669-025-10035-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-025-10035-0</p>	<p>SpringerLink</p>
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		framework's capabilities in predicting system states and assessing structural impacts on critical infrastructures as well as consequential ramifications for emergency relief units. The findings contribute valuable insights, thereby advertising the utilization of the presented methodology in decision-making and training resources aiding the enhancement of the resilience of urban environments against both natural and intentional threats.			
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Synergizing carbon reduction technologies and nature-based solutions for a climate-neutral future	Jain, Harshita,	<p>Innovative carbon capture and storage for emission reduction strategies. Integration of AI and LCA tools for carbon management. Nature-based solutions enhancing technological carbon reduction methods. Circular economy principles promoting resource efficiency and waste valorization. Policy and economic analysis of carbon neutrality implementation. Graphical abstract The worldwide push for carbon neutral operations drives development of carbon reduction technologies and natural resource sustainability approaches because of the climate emergency. This evaluation analyzes recent strategies which use technology alongside natural strategies to reduce environmental carbon pollution. It reviews key aspects of carbon capture technologies, renewable energy programs, and green hydrogen developments. How nature-based practices such as forest planting and wetland regeneration and enhanced soil organic carbon storage function to boost technological carbon reduction methods is also discussed. The main emphasis centers on implementing</p>	10.1007/s11027-025-10237-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11027-025-10237-6	SpringerLink
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		<p>real-time carbon monitoring systems together with life cycle assessment tools and artificial intelligence-driven predictive models to improve decision-making for carbon management. The evaluation investigates circular economy principles which include resource efficiency combined with waste valorization along with industrial symbiosis because these principles are vital for carbon footprint reduction in multiple sectors. Analysis of large-scale implementation obstacles and policy frameworks, economic viability assessments serve to understand main implementation barriers while exploring opportunities toward carbon neutrality. Moreover, it emphasizes how combining new carbon reduction systems with sustainable resource management leads to complete neutral environment solutions and explains future research directions necessary for achieving sustainable ecology and climate resilience through scientific studies that align policy frameworks needs with economic interests.</p>			
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<p>Risk assessment in sociotechnical systems based on functional resonance analysis method and hierarchical fuzzy inference tree</p>	<p>Kumar, Ashish, Singh, Sudhir Kumar, Samanta, Biswajit, Bhattacharjee, Ashis,</p>	<p>Effective risk assessment is crucial for ensuring safety and preventing severe consequences in complex socio-technical systems. Traditional probabilistic risk assessment methods have limitations in capturing the systemic complexities and the role of human operators, necessitating the advancement of methodologies. The present study aims to develop a comprehensive risk assessment methodology tailored for complex socio-technical systems, integrating the functional resonance analysis method, soft computing, natural language processing, and multi-criteria decision-making. Novel approaches, including expressing timing and precision variability through Z-numbers, employing Z-TOPSIS for their integration, utilizing a hierarchical fuzzy inference systems to model variability propagation, and text classification to compute the amplification factor using near-miss data, were introduced in the study. Further analyses were also conducted to identify critical couplings and paths. Additionally, the concept of degree centrality was utilized to identify functions that are impacted</p>	<p>10.1038/s41598-025-10063-5</p>	<p>https://www.nature.com/articles/s41598-025-10063-5.pdf</p>	<p>SpringerLink</p>
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		by multiple upstream functions and those that exert influence on several downstream functions. The methodology's application to an anode change operation in an aluminum smelter highlighted its effectiveness. For practitioners, the framework offers a structured, data-driven tool for risk assessment. Its implementation can improve safety, reduce accidents, and prevent economic losses from disruptions and injuries.			
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AI-driven proactive security defense in distributed iov systems: Cyber threat intelligence modeling for connected autonomous vehicles	Wang, Yinghui, Bi, Yufeng, Yu, Haiyang, Yao, Xinpeng, Ren, Yilong, Rong, Wen,	<p>Cybersecurity has emerged as a critical challenge in the Internet of Vehicles ecosystem, especially for connected and autonomous vehicles (CAVs). Cyber threat intelligence (CTI), as the collection of cyber threat information, offers an ideal way for responding to emerging cyber threats and realizing proactive security defense for CAVs. However, instant analysis and modeling of vehicle cybersecurity data pose fundamental challenges due to its complexity and specialized context. In this paper, we suggest an automotive CTI modeling framework, Actim, to extract and analyse the interrelated relationships among cyber threat elements using artificial intelligence technologies. Specifically, we first design a vehicle security-safety conceptual ontology model to depict various threat entity classes and their relationships. Then, we propose an automotive CTI mining model based on cross-sentence context to effectively extract cyber threat entities and their relations. Finally, we develop the first automobile CTI corpus based on real cybersecurity data, and conduct both comparative and ablation</p>	10.1007/s12083-025-02008-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12083-025-02008-6	SpringerLink
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		<p>experiments. Experimental results show that the BERT-DocHiatt-BiLSTM-LSTM method achieves a precision of 53.9%, representing a 6.51% improvement over existing mainstream models. Moreover, the proposed method provides a good trade-off between runtime and memory consumption. We also define entity-relation matching rules and create a CTI knowledge graph that structurally fuses various elements of cyber threats. The Actim framework enables mining the intrinsic connections among threat entities, thereby providing valuable insight on the evolving cyber threat landscape.</p>			
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Data authorisation and validation in autonomous vehicles: a critical review	Alhabib, Reem, Yadav, Poonam,	Autonomous Vehicles (AVs) are becoming increasingly prevalent due to their potential to improve road safety and reduce environmental impact. These vehicles rely on Automated Driving Systems (ADS), which integrate multiple sensors and actuators. While some AVs operate with minimal human intervention, fully autonomous systems eliminate the need for human control entirely. Despite advances in AV technologies, secure and trustworthy data management remains a significant challenge. This survey focuses on two relatively underexplored aspects in AV environments: data authorisation and validation. It examines the key related challenges and reviews existing solutions. The findings highlight critical gaps in current approaches and suggest future research directions to enhance AV data authorisation and validation.	10.1007/s42452-025-07333-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-025-07333-2	SpringerLink
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Monitoring and predicting cotton leaf diseases using deep learning approaches and mathematical models	Rehman, Abdul, Akhtar, Nadeem, Alhazmi, Omar H.,	Cotton, the backbone of global textile production, demands sustainable agricultural practices to ensure fiber, food, and environmental security. Cotton crop play an essential role in farming economies; however, production is sometimes affected by various diseases that harm production. We proposed a methodology that uses formal modeling and verification for requirements confirmation to improve the monitoring and detection of cotton crop diseases. The correct information and requirements about disease symptoms can improve disease monitoring and prediction. The Temporal Logic of Action (TLA+) is used to construct a mathematical model to verify requirements by providing disease symptoms and then model checking to ensure correctness properties. Using model checking in TLA+ensures the reliability and correctness of disease symptom detection. We consequently used deep learning models to predict cotton diseases, i.e., Aphids, Armyworms, Bacterial Blight, Powdery Mildew, Target Spot, and Healthy leaf. Our results show that the Convolutional	10.1038/s41598-025-06985-9	https://www.nature.com/articles/s41598-025-06985-9.pdf	SpringerLink
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		Neural Network (CNN) model achieved an overall accuracy of 98.7% with class-specific accuracy ranging from with F1-scores across all classes (e.g., 0.90 for Powdery Mildew and 0.87 for Army Worm).			
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Can Urban Air Mobility become reality? Opportunities and challenges of UAM as innovative mode of transport and DLR contribution to ongoing research	Pak, Henry, Asmer, Lukas, Kokus, Petra, Schuchardt, Bianca I., End, Albert, Meller, Frank, Schweiger, Karolin, Torens, Christoph, Barzantny, Carolina, Becker, Dennis, Ernst, Johannes Maria, Jäger, Florian, Laudien, Tim, Naeem, Nabih, Papenfuß, Anne, Pertz, Jan, Prakasha, Prajwal Shiva, Ratei, Patrick, Reimer, Fabian, Sieb, Patrick, Zhu, Chen, Abdellaoui, Rabeb, Becker, Richard-Gregor, Bertram, Oliver, Devta, Aditya, Gerz, Thomas, Jaksche, Roman, König, Andreas, Lenz, Helge, Metz, Isabel C., Naser, Fares, Schalk, Lukas, Schier-Morgenthal, Sebastian, Stolz, Maria, Swaid, Majed, Volkert, Andreas, Wendt, Kristin,	Urban Air Mobility (UAM) is a new air transportation system for passengers and cargo in urban environments, enabled by new technologies and integrated into multimodal transportation systems. The vision of UAM comprises the mass use in urban and suburban environments, complementing existing transportation systems and contributing to the decarbonization of the transport sector. Initial attempts to create a market for urban air transportation in the last century failed due to lack of profitability and community acceptance. Technological advances in numerous fields over the past few decades have led to a renewed interest in urban air transportation. UAM is expected to benefit users and to also have a positive impact on the economy by creating new markets and employment opportunities for manufacturing and operation of UAM vehicles and the construction of related ground infrastructure. However, there are also concerns about noise, safety and security, privacy and environmental impacts. Therefore, the UAM system needs to be designed carefully to become safe, affordable, accessible,	10.1007/s13272-024-00733-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-024-00733-x	SpringerLink
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		<p>environmentally friendly, economically viable and thus sustainable. This paper provides an overview of selected key research topics related to UAM and how the German Aerospace Center (DLR) contributed to this research in the project "HorizonUAM - Urban Air Mobility Research at the German Aerospace Center (DLR)". Selected research results on the topics of market potential and public acceptance, vehicle design (including battery degradation, onboard systems, cabin design, cabin simulation), infrastructure, operations (including U-space, safe autonomy, navigation, communication, cost modeling) and overall system modeling are briefly presented.</p>			
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Technical development and future prospects of cooperative terminal guidance based on knowledge graph analysis: a review	Liu, Shuangxi, Lin, Zehuai, Huang, Wei, Yan, Binbin,	<p>Scopus CiteSpace513,,,, Cooperative guidance is a method for achieving combat objectives through information sharing and cooperative effects, and has emerged as a significant research area in the fields of missile guidance and systematic warfare. This study presents a systematic review and analysis of current research on cooperative guidance. First, a bibliometric analysis is conducted on 513 articles using the Scopus database and CiteSpace software to assess keyword clustering, keyword co-occurrence, and keyword burst, and to later visualize the results. Second, fundamental theories of cooperative guidance, including relative motion modeling methods, algebraic graph theory, and multi-agent consensus theory, are summarized. Subsequently, an overview of current cooperative laws and corresponding analysis methods is provided, with categorization based on the cooperative structure and convergence performance. Finally, we summarize current research developments based on five perspectives and propose a developmental framework based on five layers</p>	10.1631/jzus.A2400317	http://link.springer.com/openurl/pdf?id=doi:10.1631/jzus.A2400317	SpringerLink
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		(cyber, physical, decision, information, and system), discussing potential future advancements in cooperative terminal guidance. This framework emphasizes five key areas of research: networked, heterogeneous, integrated, intelligent, and group cooperations, with the goal of offering trends and insights for future work.			
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HorizonUAM: operational challenges and necessary frameworks to ensure safe and efficient vertidrome operations	Schweiger, Karolin, König, Andreas, Metz, Isabel C., Naser, Fares, Swaid, Majed, Abdellaoui, Rabeb, Schuchardt, Bianca I.,	Urban Air Mobility (UAM) has emerged as a potential game changer for urban transportation, promising faster, more efficient and affordable services. However, beyond the visionary concepts, it is crucial to explore and discuss the opportunities and challenges of UAM and vertidrome operations also from a research perspective. The DLR research project HorizonUAM aimed at a holistic research approach in which vertidromes and vertidrome networks play a significant role. This vertidrome centered project report covers various aspects and methodological approaches addressing design and operation, UAM airspace management, network optimization and the integration of air taxi operations into airport environment. Moreover, the conceptual and temporary development of a modular 1:4 scale model city lays the foundation for future UAM flight trials. Based on three years of dedicated research within HorizonUAM , we focus here on operational challenges, proposed solutions and required frameworks to ensure safe and efficient vertidrome operations	10.1007/s13272-024-00754-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-024-00754-6	SpringerLink
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Leveraging artificial intelligence and optimization for agile AGV scheduling in an edge-to-cloud manufacturing framework	Lepore, Mario, Serra, Domenico, Maccioni, Raffaele,	<p>Optimizing the scheduling of Automated Guided Vehicles (AGVs) is a critical task in the context of smart manufacturing, particularly in Industry 4.0, where operational efficiency, sustainability, and adaptability are key drivers of innovation. This paper introduces an innovative scheduling model incorporating real-time AGV battery status as a key parameter, using a machine learning algorithm to predict energy consumption and optimize task allocation accordingly. The primary objective is to extend AGV battery life, reduce energy consumption, and contribute to environmental sustainability, all while maintaining high operational efficiency. In addition to the scheduling algorithm, we present a comprehensive application framework designed to integrate this optimization model into real-world factory environments. This architecture leverages cloud-edge computing to process real-time data from AGVs, enabling dynamic scheduling adjustments and seamless execution of tasks. The proposed approach has been experimentally validated, demonstrating improvements in energy efficiency when compared to a conventional</p>	10.1007/s00500-025-10851-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-025-10851-1	SpringerLink
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		<p>AGV scheduling strategy. This result demonstrates the effectiveness of our solution in improving energy efficiency while maintaining high performance in AGV operations. By providing the necessary infrastructure for data input, processing, and output implementation, the framework ensures that the algorithm can be effectively deployed and scaled in industrial settings. This research offers a robust solution for AGV scheduling, balancing operational efficiency with sustainability.</p>			
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Applied Design Thinking in urban air mobility: creating the airtaxi cabin design of the future from a user perspective	Reimer, F., Herzig, J., Winkler, L., Biedermann, J., Meller, F., Nagel, B.,	Design Thinking is essential for user-centered cabin design concepts in future transportation vehicles, as it facilitates the identification of user needs, creative problem-solving and iterative development to ensure optimal user experiences and satisfaction. In the exploration of future air taxi cabins, user acceptance is widely recognized as a critical factor. To ensure a high level of acceptance for such concepts, the direct involvement of potential user groups in the early design process through user-centered design approaches, offers a highly effective solution to provide a time efficient and requirement-based concept development process for novel transportation concepts. In the course of developing digital and future aviation cabin concepts at the German Aerospace Center, the exploration of user-centered and acceptance-enhancing methods plays a central role. The challenge here is to identify the flexible range of requirements of different user groups for a previously non-existent transport concept, to translate these into a concept and to generate a rapid evaluation process by the user groups. Therefore, this	10.1007/s13272-025-00821-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-025-00821-6	SpringerLink
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		<p>paper aims to demonstrate the application of the user-centered Design Thinking method in the design of cabin for future air taxis. Based on the Design Thinking approach and its iterative process steps, the direct implementation is described on the combined airport shuttle and intracity UAM concept. The main focus is on the identification of key user requirements by means of a focus group study and the evaluation of initial cabin designs and key ideas by means of an online survey. Consequently, the creative design process of a digital prototype will be presented. In addition to an increased awareness and acceptance among the population towards a novel mode of transportation, the application of the Design Thinking methodology offers a flexible and user centered approach for further testing and simulation scenarios.</p>			
Special issue on urban air mobility: research on aircraft, infrastructure, operation, and public acceptance	Schuchardt, Bianca Isabella, Chan, William N., Swieringa, Kurt A., Haag, Maarten Uijt,		10.1007/s13272-025-00875-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-025-00875-6	SpringerLink

<p>2D bismuth oxyselenide semiconductor for future electronics</p>	<p>Tan, Congwei, Tang, Junchuan, Gao, Xin, Xue, Chengyuan, Peng, Hailin,</p>	<p>This Review explores Bi₂O₂Se as a promising 2D semiconductor for next-generation computing, highlighting its high mobility, suitable bandgap and native high-oxide, which enables wafer-scale integration and compatibility with industrial processes, while addressing key challenges in the lab-to-fab transition and proposing a roadmap for ultra-scaled, energy-efficient electronics. The continuous downscaling of silicon transistors has driven exponential improvements in computing performance and energy efficiency, but sub-10nm channel lengths pose fundamental challenges in speed and power consumption. Emerging materials and architectures offer promising pathways for further miniaturization. Bismuth oxyselenide (Bi₂O₂Se), an air-stable 2D semiconductor, exhibits high mobility, a suitable bandgap and a native high-oxide (Bi₂SeO₅), resembling silicon and its SiO₂ counterpart. These properties suggest compatibility with industrial processes, positioning Bi₂O₂Se for next-generation high-performance computing. This Review summarizes recent advances in material</p>	<p>10.1038/s44287-025-00179-1</p>	<p>https://www.nature.com/articles/s44287-025-00179-1.pdf</p>	<p>SpringerLink</p>
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		synthesis, wafer-scale integration and device architectures, highlighting key challenges in the lab-to-fab transition. Finally, a roadmap is proposed to guide future innovations in ultra-scaled, energy-efficient electronics.			
Decentralized Social Media	Ciriello, Raffaele F., Marx, Julian, Cheong, Marc, Mueller-Bloch, Christoph, Mathiassen, Lars,		10.1007/s12599-025-00952-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-025-00952-4	SpringerLink

A digital twin framework for enhancing human–agentic AI–machine collaboration	Nicoletti, Bernardo, Appolloni, Andrea,	<p>This paper defines a framework for improving collaboration between humans and machines using digital twins and Agentic AI and provides guidelines for collaboration. Human–agentic, AI, and machine collaboration is an innovative approach that combines human intelligence, agentic AI systems, digital twins, and machines to improve productivity, efficiency, and decision-making in various industries. Defining a framework for agentic AI, supported by digital twins, requires a multi-layered innovation approach encompassing artificial intelligence algorithms, persons, products, technologies, processes, and business models. This paper emphasizes that this comprehensive approach is not just a strategy, but a necessity in the current global context. This paper defines a framework for human–machine collaboration using Agentic AI and digital twins, including the benefits and challenges. It also provides guidelines for collaboration. This framework implies a more integrated interaction between three parties: humans, automation (agentic AI and</p>	10.1007/s10845-025-02637-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-025-02637-x	SpringerLink
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		<p>digital twins), and machines, rather than just two-party relationships between humans and machines or robots. The existence of a multi-party system requires effective, efficient, economic, functional, and technical frameworks, which are included in the guidelines annexed to this paper. The paper discusses the use of an advanced framework. It applies to any organization. The framework is innovative compared to existing models (e.g., frameworks for human–robot collaboration) and emphasizes novel components (e.g., the role of AAI in orchestration).</p>			
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Achieving economic sustainability: operations research for risk analysis and optimization problems in the blockchain era	Choi, Tsan-Ming,	In the digital era, achieving economic sustainability requires proper management of risk with deployment of technologies. In this paper, we discuss how the popular blockchain technology can be applied for risk analysis and optimization (RAO) in real-world oriented operations research (OR) problems. We first present the OR approach and examine the related literature for some critical topics and key research issues in RAO. Then, we present the features and functions of blockchain technology. After that, we propose how the blockchain technology can be applied to support different steps in the OR approach and enhance our investigation and real-world applications of RAO models. Finally, we discuss future research directions and establish a research framework.	10.1007/s10479-021-04394-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-04394-5	SpringerLink
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Digital twin and the asset administration shell	Zhang, Jingxi, Ellwein, Carsten, Heithoff, Malte, Michael, Judith, Wortmann, Andreas,	<p>Engineering digital twins is a software and systems engineering challenge for which no systematic approach exists. The Asset Administration Shell is becoming a popular foundation for digital twins in Industry 4.0 and it comes in different types that support the engineering of different kinds and parts of digital twins. We investigate how it supports realizing common requirements for digital twins. To this end, we investigate how each of the three Asset Administration Shell types can contribute to the systematic engineering of specific components of digital twins. Therefore, we analyzed popular definitions and conceptual models of digital twins and extracted requirements that at least two of them share. We compare the resulting requirements with Asset Administration Shells of different types and conclude with open challenges in the implementation of digital twins with this technology. This supports practitioners and researchers in identifying the most suitable type of Asset Administration Shell for their specific digital twin engineering needs and identifies gaps worthy of future research toward</p>	10.1007/s10270-024-01255-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01255-0	SpringerLink
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		a systematic engineering of digital twins.			
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Understanding Complexities in Collaborative Management of Knowledge on Advance Care Planning for Multi-morbid Patients Within Personalized Integrated Care	Tulinayo, Fiona P., Ortega-Gil, Ana, González, Nerea, Erreguerena, Irati, Perea, Bárbara López, Saralegui, Iñaki, Zubeltzu, Beñat, Fullaondo, Ane, Verdoy, Dolores, Manuel Keenoy, Esteban,	Healthcare has shifted from paternalistic model of care to patient-centered care where shared decision making is key. The need to share and manage contributions and expertise of different healthcare professionals underlines the relevance of collaborative knowledge management (CKM). However, CKM in healthcare requires one to understand the complexities in integrating multiple aspects of care and the challenges associated with interdisciplinary collaboration and knowledge sharing among healthcare providers. In this study, we use a system modeling approach to understand the complexities in collaborative management of knowledge on advance care planning for multi-morbid patients, within personalized integrated care. To achieve this, focus group discussions (FGD) with 11 participants from Basque Public Health System (Osakidetza) in Spain were involved in identifying the key challenges and developing a systemic thinking model. As a result, three key challenges were identified, i.e., (1) culture, where citizens are not willing to talk about death; (2) healthcare professionals,	10.1007/s41666-025-00185-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41666-025-00185-w	SpringerLink
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		<p>whose attitude and perspectives need to change; and (3) the current system, that has to change its care model towards a holistic and a shared care model. From the developed causal loop diagrams (CLDs), it is noted that perpetuation of fragmented and paternalistic care is likely to get worse without recognition of the advance care plan (ACP) as a social need and as a crucial part of the clinical practice change.</p>			
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<p>Artificial intelligence for calculating and predicting building carbon emissions: a review</p>	<p>Hua, Jianmin, Wang, Ruiyi, Hu, Ying, Chen, Zimeng, Chen, Lin, Osman, Ahmed I., Farghali, Mohamed, Huang, Lepeng, Feng, Ji, Wang, Jun, Zhang, Xiang, Zhou, Xingyang, Yap, Pow-Seng,</p>	<p>The construction industry, being responsible for a large share of global carbon emissions, needs to reduce its high carbon output to meet carbon reduction goals. Artificial intelligence can provide efficient support for carbon emission calculation and prediction. Here, we review the use of artificial intelligence techniques in forecasting, management and real-time monitoring of carbon emissions, focusing on how they are applied, their impacts, and challenges. Compared to traditional methods, the prediction accuracy of artificial intelligence models has increased by 20%. Artificial intelligence-driven systems could reduce carbon emissions by up to 15% through real-time monitoring and adaptive management strategies. Artificial intelligence applications improve energy efficiency in buildings by up to 25%, while reducing operational costs by up to 10%. Artificial intelligence supports the establishment of a digital carbon management system and contributes to the development of the carbon trading market.</p>	<p>10.1007/s10311-024-01799-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10311-024-01799-z</p>	<p>SpringerLink</p>
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<p>Online Sensor Fault Detection and Toleration for Four-wheeled Skid-steered UGV</p>	<p>An, Youngwoo, Eun, Yongsoon,</p>	<p>This paper presents a fault detection and toleration scheme for Unmanned Ground Vehicles (UGVs) with two position sensors and orientation sensors. Four representative types of sensor faults are considered: complete fault, bias fault, drift fault, and precision degradation. The proposed detection method consists of a Long Short-Term Memory (LSTM) Network Module, an Amplitude Difference Thresholding Module, and an Actuation Motion Coherence Module. A Husarion Rosbot 2.0 and VICON motion capture system compose a platform that is used to collect motion data for network training and experimental validation of the proposed scheme. Sensor fault detection performance is experimentally validated using a trajectory that was not included in the training data set. The fault detection accuracy is compared to other learning-based fault detection methods. Based on the fault detection result, we propose the fault toleration method.</p>	<p>10.1007/s12555-024-0835-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12555-024-0835-y</p>	<p>SpringerLink</p>
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<p>A graphical evaluation and review technique for scheduling construction projects</p>	<p>Pregina, K., Kannan, M. Ramesh,</p>	<p>Scheduling a construction project is a complex procedure since it entails several sequences of various jobs or activities that need to be finished within the allotted time frame. Additionally, identifying the factors that influence the construction schedule, such as the nature of construction operations, their duration, dependence relationships, and related probabilities of occurrence, presents challenges and ambiguities. Major construction projects have traditionally been scheduled using conventional project scheduling techniques, such as the programme evaluation and review technique (PERT) and critical path method (CPM), among others. However, these construction scheduling methods continue to be inadequate for identifying the essential elements needed to generate complete and precise schedules, highlighting the need for a more effective technique to overcome uncertainties and stochastic aspects of construction scheduling. To fully comprehend these inherent stochastic properties, the present study employs the</p>	<p>10.1007/s10951-024-00832-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10951-024-00832-x</p>	<p>SpringerLink</p>
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		<p>Graphical Evaluation and Review Technique (GERT), a stochastic technique for project network analysis. While prior studies support the effectiveness of GERT in the pre-construction phase, there is a lack of investigation into its practical application within the domain of residential construction. The present investigation addresses this gap by demonstrating the effectiveness of GERT in scheduling real-time residential projects by conducting a systematic and comparative analysis of GERT, PERT, and CPM methodologies across various scales of residential structures. GERT is initially applied to schedule a real-time single-storey residential structure. The GERT schedule closely reflects the as-built schedule of the structure. In addition, GERT is utilised to schedule 45 construction projects in real time, further emphasising its relevance and applicability. The GERT-generated schedule for these projects is validated for correctness by comparing it to the actual project duration. The findings demonstrate the advantages of the proposed technique in comparison to</p>			
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		existing methods.			
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Safety behavior abstraction and model evolution in autonomous driving	Tan, Chao, Wang, Tiexin, Zhang, Man, Yue, Tao,	<p>In the autonomous driving systems (ADSs) literature, most existing approaches primarily focus on identifying driving scenarios, which is challenged by the reality that real-world driving scenarios are countless and unpredictable, and it is impossible to have a comprehensive set of driving scenarios to demonstrate the test efficiency in covering all possible situations ADSs might face. To address these challenges, one fundamental step is to abstract complex ADS behaviors, e.g., (semi-)automatically derive a holistic view of how an ADS behaves under its driving environment with high-level representations, such as prior-knowledge-based models. Therefore, in this paper, we propose a novel Risk-based Model comprehension and Evolution approach for autonomous Driving Systems, named REMEDY, which facilitates the development of such models and enables automated model evolution (i.e., discovering and extracting ADS behaviors and their interactions with the environment) via model execution and simulation with the autonomous driving simulator CARLA. To enable efficient model evolution,</p>	10.1007/s10270-024-01261-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01261-2	SpringerLink
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		<p>we also equipped REMEDY with a risk-based strategy using Q-Learning, which is empirically evaluated by comparing it with three baselines (i.e., a random strategy, a coverage-based greedy strategy, and DeepCollision—a state-of-the-art approach). Results show that REMEDY is capable of discovering new and diverse behaviors, and the risk-based strategy is efficient in discovering risky ADS behaviors.</p>			
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Impact of cyber physical systems on enhancing robotic system autonomy: a brief critical review	Omiyale, Babatunde Olamide, Odeyemi, Jethro, Ogbeyemi, Akinola, Olorunsogbon, Funmilayo, Zhang, Wenjun Chris,	Integrating cyber-physical systems (CPS) with robotic systems enhances their autonomy, connectivity, independence, adaptability, intelligence, and accessibility in industrial applications. However, enabling autonomous decision-making and facilitating complex choices in unpredictable and dynamic environments remain challenging for robotic systems. In this case, CPS can be incorporated into these robotic systems to address this issue to bridge this knowledge gap. One of the primary benefits of integrating CPS into robotics is the ability to process data from the robot's sensors in real time. This capability allows robots to make informed decisions and interact instantly with their physical environment. With this understanding, this paper aims to document and critically conduct a literature survey on the following areas: first, the significance of integrating CPS into robotic systems for enhanced technological performance; second, the challenges faced during this integration; and third, potential solutions to these challenges. Finally, one motivation for this review is to create a framework that	10.1007/s00170-025-15828-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-15828-w	SpringerLink
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		enhances the autonomy performance of robotic systems in various industrial operations.			
A mangrove metaphor for sustainable food systems centres diversification as the root of human and planetary health	Baur, Patrick, Petersen-Rockney, Margiana, Bowles, Timothy, Ahmed, Selena,	Mangroves have evolved to survive harsh growing conditions in continual flux. This Perspective explores how their resilience can inspire a new metaphor to guide food system transformations by drawing on the strengths of root systems, diversity and community. Mangroves comprise diverse species that exhibit unique adaptations allowing them to thrive in harsh coastal environments in continual flux. Inspired by mangroves, we present a knowledge-to-action framework for conceptualizing sustainable food systems. We posit that human and planetary health are best sought through processes of diversification across multiple root systems to sustain a plurality of desired outcomes. The mangrove metaphor highlights that processes of diversification, which are empirically observable, measurable and reflexive to contemporary needs and contexts, can address food system polycrises and support transitions that benefit people and the planet.	10.1038/s43016-025-01185-0	https://www.nature.com/articles/s43016-025-01185-0.pdf	SpringerLink

Uncertainty-aware environment simulation of medical devices digital twins	Sartaj, Hassan, Ali, Shaukat, Marie Gjøby, Julie,	<p>Smart medical devices are an integral component of the healthcare Internet of Things (IoT), providing patients with various healthcare services through an IoT-based application. Ensuring the dependability of such applications through system and integration-level testing mandates the physical integration of numerous medical devices, which is costly and impractical. In this context, digital twins of medical devices play an essential role in facilitating testing automation. Testing with digital twins without accounting for uncertain environmental factors of medical devices leaves many functionalities of IoT-based healthcare applications untested. In addition, digital twins operating without environmental factors remain out of sync and uncalibrated with their corresponding devices functioning in the real environment. To deal with these challenges, in this paper, we propose a model-based approach (EnvDT) for modeling and simulating the environment of medical devices' digital twins under uncertainties. We empirically evaluate the EnvDT using three medicine</p>	10.1007/s10270-024-01223-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01223-8	SpringerLink
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		<p>dispensers, Karie, Medido, and Pilly connected to a real-world IoT-based healthcare application. Our evaluation targets analyzing the coverage of environment models and the diversity of uncertain scenarios generated for digital twins. Results show that EnvDT achieves approximately 61% coverage of environment models and generates diverse uncertain scenarios (with a near-maximum diversity value of 0.62) during multiple environmental simulations.</p>			
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Blinded by the Hype: How Envisioned Futures Shape the Role of Artificial Intelligence in Defence Applications and Warfare	Schütz, Torben,	<p>Artificial Intelligence (AI) in defence is said to bring revolutionary change to future warfare. Yet both cautionary tales about the technology's potential and empirical assessments of its military usage show evolutionary change. Conceptual conservatism, commercial interests and technological ignorance by various actors involved in constructing defence AI technologies and their respective incentive structures currently predetermine this narrow future for defence AI.</p> <p>Künstliche Intelligenz (KI) in der Verteidigung soll künftige Kriegsführung revolutionär verändern. Doch vorsichtigere Analysen zum Potenzial der Technologie und eine empirische Auswertung ihrer militärischen Nutzung zeigen einen evolutionären Wandel. Konzeptueller Konservatismus, kommerzielle Interessen und technologische Ignoranz der an der KI-Entwicklung für Verteidigung beteiligten Akteure und ihre Anreizstrukturen bestimmen derzeit diese enge Zukunft der KI im Verteidigungsber</p> <p>eich.</p>	10.1007/s12399-025-01042-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12399-025-01042-9	SpringerLink
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Enabling Civil Single-Pilot Operations: A State-of-the-Art Review	Puca, Nicola, Guglieri, Giorgio,	<p>Advanced avionics and automation technologies have significantly transformed cockpit operations, resulting in a gradual reduction of the crew members on-board. Single-pilot operations (SPO) concept is gaining significant attention in the aviation industry due to its potential for cost savings and to cope with the anticipated pilot shortage and the increasing air traffic demand. This paper conducts a scoping literature review on SPOs, serving as an initial step to map the scientific peer-reviewed content on the subject. The survey focuses on three thematic domains, which are, respectively, operations, automation, and the emerging field of digital and cognitive flight assistants. The methodology involved the use of Google Scholar and IEEE Xplore databases. Sources were selected adapting the search criteria to the proposed sub-topics and prioritizing either the most cited and recent contributions. The analysis of the literature reveals a growing body of work in the recent years. This review also highlights interest in the human-centered design for automation solutions which are responsive to cognitive and behavioral states of the pilot. While</p>	10.1007/s42496-024-00223-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42496-024-00223-7	SpringerLink
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		acknowledging the potential safety and operational challenges associated with SPOs and the pilot-automation cooperation, this work suggests that great research efforts should be made on the human factor and regulatory subjects to pave the way for a feasible and safe implementation of the single-pilot paradigm in commercial aviation.			
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<p>A reference framework for the digital twin smart factory based on cloud-fog-edge computing collaboration</p>	<p>Li, Zhiyuan, Mei, Xuesong, Sun, Zheng, Xu, Jun, Zhang, Jianchen, Zhang, Dawei, Zhu, Jingyi,</p>	<p>Digital twin (DT) is an important approach for the factory to achieve intelligence. Due to the different scenarios and definitions, the generalization of frameworks for DT-based smart factories is weak, slowing down the overall process of industrial intelligence. Meanwhile, the pressure of data transmission and processing increases dramatically because of data explosion, which poses a challenge to the rational allocation of computing resources. In addition, more advanced strategies for training and running models are needed to support more sophisticated services. This paper proposes a reference framework that combines DT and cloud-fog-edge computing collaboration (CFE). First, the DT fuses physical and virtual spaces. The virtual-real fusion provides more information for operations, and the virtual space gives more accurate and timely decisions based on the constantly refreshed state. Secondly, by introducing CFE, suitable operating platforms for each layer of the DT-based smart factory are set, which enhances data interaction and reduces the dependence on cloud computing. The DT-CFE framework is well generalized. This paper first</p>	<p>10.1007/s10845-024-02424-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-024-02424-0</p>	<p>SpringerLink</p>
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		<p>introduces the definition of the DT-based smart factory and its components. Then the methodology of the DT-CFE-based smart factory is proposed, and the network topology and operation mechanism are introduced. In this framework, the transmission and response performance of its data interaction is tested, and the interference of dynamic events occurring through scheduling is studied to illustrate the effectiveness and superiority of the framework.</p>			
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<p>A Systemic Evaluation of Reuse, Recycling, and Reduction Strategies in the Circular Economy for Global Sustainability Using an Integrated Planetary Model</p>	<p>Sonkusare, Shubham, Shastri, Yogendra,</p>	<p>Circular economy (CE) has been proposed as a promising approach for sustainable resource management. CE includes reduce, reuse, and recycle (3R) as the three main levers. Their relative impacts and synergistic effects to achieve overall sustainability need to be assessed for policy prioritization. This work uses an integrated planetary model (IPM) to compare these three CE practices. The IPM is a food web model representing the global system in compartmental form. It includes multiple trophic levels, a human society, a traditional industry, and the recycling industry. The study first extends the IPM to implement the reuse component of CE to complement recycle and reduce options. Reuse is captured by modeling extended use of industrial goods over multiple time steps by humans. Reduce option is modeled through steady reduction in the demand for products, while recycle option is modeled through a circulation industry post use phase. The integrated model is simulated for different combinations of these 3R options. Additionally, fractions of population practicing reuse is also varied.</p>	<p>10.1007/s43615-025-00513-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43615-025-00513-7</p>	<p>SpringerLink</p>
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		<p>Simulation results show that by doubling the reuse time, there is a 50% reduction in minimum recycling rate and fraction of the population engaged in reusing required to achieve sustainability. However, very aggressive reuse practice is counter-productive, as it leads to human domination of resources and extinction of open-access grasslands. This must then be balanced by lower recycling rates. Results also show that as we move beyond a human centric view, the sustainable operating zone of 3R shrinks significantly to ensure the survival of all components of the ecosystem.</p>			
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Defining and generating multi-level and uncertainty-wise test oracles for cyber-physical systems	Valle, Pablo, Arrieta, Aitor, Han, Liping, Ali, Shaukat, Yue, Tao,	<p>Cyber-physical systems (CPSs) blend digital and physical processes. CPS software is the key to realizing their functionalities. This software needs to evolve to deal with different aspects, such as the implementation of new functionalities or bug fixes. Because of this, design–operation methods, colloquially known as “DevOps,” are paramount to be adopted within these systems. During DevOps phases, automating test execution at design time is a key enabler of streamlined software development and software quality improvement. Likewise, monitoring whether a CPS is behaving as expected at operation is similarly important. In DevOps, test oracles play an important role in enabling automated testing, ensuring the reliability of software deployments, providing feedback to developers, etc. However, defining and generating test oracles in the context of DevOps practices in CPSs need to accommodate aspects specific to CPSs, such as their time-continuous behavior and inherent uncertainties. To this end, in this paper, we propose a</p>	10.1007/s10270-025-01271-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-025-01271-8	SpringerLink
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		<p>domain-specific language (DSL) to ease the definition of test oracles and an automated solution for generating a microservice encapsulating the defined test oracles, which is compatible with a DevOps ecosystem for CPSs. We evaluated our DSL with two industrial case study systems and 9 open-source CPSs. Our evaluation results suggest that our DSL can model around 98% of the requirements of these systems through test oracles. Furthermore, it is possible to generate a microservice to be applicable at different test levels within less than 20 min, being fast enough to be adopted in practice.</p>			
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Cross-Domain Multi-Label Prediction of Metamorphic Relation Patterns Leveraging Multimodal Features	Li, Zhenqiu, Wu, Tingting, Chen, Sihui, Jiang, Mingyue, Ding, Zuohua, Dong, Yunwei,	<p>One of the core challenges in Metamorphic Testing (MT) is the automatic identification of diverse Metamorphic Relations (MRs). Machine learning-based methods have attempted to predict predefined MRs for mathematical programs at the unit testing level. However, these methods are typically limited to single MR prediction, with unclear applicability to integration testing or other domains. As an essential approach to deriving MRs, Metamorphic Relation Patterns (MRPs) generalize common MRs across domains at an abstract level, enabling domain-specific instantiation and systematic MR identification. Existing researches rely heavily on manually correlating programs with MRPs and instantiating them through domain expertise, which is both time-consuming and labor-intensive. To address these limitations, we propose RBRL-MRP, a cross-domain multi-label MRP prediction approach based on joint Ranking support vector machine and Binary Relevance with robust Low-rank learning (RBRL). RBRL-MRP represents program at both unit and integration testing levels utilizing multimodal feature fusion,</p>	10.1007/s10836-025-06179-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10836-025-06179-1	SpringerLink
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		<p>followed by dimensionality reduction for optimization. A multi-label MRP set is constructed by incorporating program characteristics and associated MRs. We then train a multi-label classification (MLC) model to predict whether a program satisfies predefined MRPs. The predicted MRPs are combined using certain rules to generate candidate MRs, which are validated against the real MR set to determine the final set. Experimental results demonstrate that RBRL-MRP achieves superior performance in MRP prediction, instantiation effectiveness, and robustness across multiple programming languages and domains. Future research could integrate dynamic analysis to enhance feature representation and improve model applicability for large-scale applications.</p>			
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Coordinated Informative Path Planning for Multi-Robot Search in Open Fields	Kim, Kyungseo, Kim, Jinwhan,	<p>This study proposes an informative path planning algorithm for executing search missions cooperatively utilizing a multi-robot system, leading to a faster search over extensive areas such as oceans and large open fields. To facilitate efficient cooperative searching, we introduce a search area division algorithm based on the weighted Voronoi diagram and a coverage path planner inspired by the traveling salesman problem. Two key technical issues in cooperative search missions are efficient area coverage and accurate target localization, which involve a trade-off between exploration and exploitation. To address this trade-off issue, we present an algorithm that promotes active collaboration among the robots by leveraging the Fisher information matrix to optimize robot configurations and by employing a market-based strategy for effective compromise. The effectiveness of the proposed approach is demonstrated through simulation results.</p>	10.1007/s10846-025-02270-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-025-02270-z	SpringerLink
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Smart greenhouse farming: a review towards near zero energy consumption	Soussi, Abdellatif, Zero, Enrico, Ouammi, Ahmed, Zejli, Driss, Zahmoun, Said, Sacile, Roberto,	<p>The global agricultural sector faces increasing challenges in adopting sustainable practices and reducing its environmental footprint. Smart greenhouse agriculture has emerged as a key solution, enabling efficient year-round crop production while minimizing dependence on traditional field farming. However, achieving near-zero energy consumption in greenhouses remains a major challenge due to the high operational energy demands. This review examines the current state of energy consumption in greenhouses, critically analyzes existing technological solutions, and identifies key challenges, such as high energy consumption for heating, cooling, and lighting. The study highlights opportunities for integrating renewable energy sources, optimizing energy-saving systems, and using advanced control technologies such as artificial intelligence (AI) and the Internet of Things (IoT) to monitor microclimatic conditions. Results show that integrating these solutions can significantly reduce energy consumption while maintaining optimal growing environments. The main findings include</p>	10.1007/s44327-025-00096-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44327-025-00096-w	SpringerLink
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		<p>prioritizing the adoption of hybrid renewable energy systems, improving greenhouse design and material selection, and enhancing real-time monitoring systems with smart technologies. Future research should focus on cost-effective innovations, interdisciplinary approaches, and the scalability of energy-efficient designs. This review provides actionable information for researchers, policymakers, and practitioners to advance the transition to sustainable, near-zero energy greenhouse systems.</p>			
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Personalizing neoadjuvant chemotherapy regimens for triple-negative breast cancer using a biology-based digital twin	Christenson, Chase, Wu, Chengyue, Hormuth, David A., II, Ma, Jingfei, Yam, Clinton, Rauch, Gaiane M., Yankeelov, Thomas E.,	Despite advances triple negative breast cancer treatment, ~50% of patients will not achieve a pathological complete response prior to surgery with standard of care neoadjuvant therapy (NAT). We hypothesize that personalized regimens for NAT could significantly improve patient outcomes, which we address with a patient-specific digital twin framework. This framework is established by calibrating a biology-based model to longitudinal magnetic resonance images with approximate Bayesian computation. We then apply optimal control theory to either (1) reduce the final tumor cell number with equivalent dose, or (2) reduce the total dose of NAT with equivalent response. For (1), the personalized regimens (n =50) achieved a median (range) reduction in the final tumor cell number of 17.62% (0.00–37.36%). For (2), the personalized regimens achieved a median reduction in dose delivered of 12.62% (0.00–56.55%) when compared to the standard-of-care regimen, while providing statistically equivalent tumor control.	10.1038/s41540-025-00531-z	https://www.nature.com/articles/s41540-025-00531-z.pdf	SpringerLink
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Managing Health Challenges Among Media Entertainment Practitioners in Nigeria: A Systems Dynamics Conceptual Model	Ufua, Daniel E., Al-Faryan, Mamdouh Abdulaziz Saleh, Ehibor, Oremire J.,	This study explored the management of health challenges practitioners in the Nigerian media entertainment sub-sector. The study adopted systems dynamics conceptual approach, exploring extant literature on challenges related to personal health management and building a suggested model for improving identified personal health challenges among practitioners in the Nigerian entertainment sub-sector. Part of the findings was the need for government intervention in the broad restructuring of the Nigerian health service system for harmonisation and operational stability, through operational capacity building for resilient health service delivery. The study reflected on the adoption of system dynamics concept, highlighting its usefulness to the current study in providing a means to learn about the personal health management in context of the study. Part of the recommendations is for further research to view the topic from other sectors' perspectives and consider using a mixed-method approach that can enhance further learning about personal health management in	10.1007/s11213-025-09720-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-025-09720-7	SpringerLink
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Optimizing early-stage efficiency in complex system development via model-based systems engineering (MBSE) and concurrent engineering (CE) integration	Vizitiu, Cristian, Dinculescu, Adrian Ctlin, Marin, Mihaela Gabriela, Nistorescu, Alexandru Ion, Dominey, Kevin Alexander, Kristály, Dominic Mircea,	The study conducted a systematic review with a bibliometric analysis to examine the extent of utilization and effectiveness of model-based systems engineering (MBSE) and concurrent engineering (CE) in managing and optimizing system design factors in complex systems across various domains, including space, healthcare, as well as active and assisted living and smart environments. The study aims to explore how MBSE and CE can address the inherent challenges in complex system definition and development, particularly focusing on their impact on system design factors such as mission analysis, system architecture, cost, schedule, and risk contingencies, which are commonly considered critical across the entire system lifecycle. By utilizing the PICO framework, the review formulates research questions and systematically searches multiple databases to identify relevant studies. The systematic review highlights that MBSE is prominently used in approximately 88% of the analyzed articles. These integrations enhance the methodologies' ability to manage complexity and improve	10.1007/s00163-025-00452-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-025-00452-2	SpringerLink
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		<p>efficiency across various stages of the system lifecycle. Specialized tools such as MagicDraw, Cameo Systems Modeler, and OPCAT play a crucial role in the technical implementation of MBSE and CE, providing detailed diagrams and models that represent system components with their interactions and behavior. The principal findings highlight how MBSE and CE support product systems engineering (PSE) in the early lifecycle stages of complex systems of interest. This support is particularly evident in optimizing system design, reducing time, costs, and technological risks, and enhancing the efficiency of business systems engineering through lifecycle management and quality management.</p>			
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Sensitivity analysis of aerial wildfire fighting tactics with heterogeneous fleets using an agent-based simulation framework	Cigal, N., Naeem, N., Ratei, P., Kilkis, S., Prakasha, P. S., Nagel, B.,	The increasing global surface temperature has expanded wildfire seasons, resulting in more intense incidents and higher suppression costs, losses, and casualties. Wildfires also contribute significantly to atmospheric carbon levels, exacerbating climate change. This study investigates the complexities of wildfire suppression using a system of systems (SoS) approach, incorporating factors like response time, fleet composition, and suppression tactics. Through an agent-based simulation (ABS) framework, we analyze the impact of environmental factors on fire spread and evaluate different firefighting tactics. The study extends previous research by offering: An extensive analysis for the effect of wildfire environment parameters on fire spread. Multiple suppression tactics which open the door to new solutions for wildfire fighting in addition to revealing nuanced trends at the system of systems level using ABS framework. A heterogeneous fleet composed of various suppression drones with different airframe configurations, payload capacity, flight velocity, and powertrain architecture.	10.1007/s13272-025-00840-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-025-00840-3	SpringerLink
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Financing options for infrastructure and life ladder in Africa	Nguepi, Nelson Derrick, Meytang, Cédric, Tchoffo, Rodrigue Nobosse, Nkemgha, Guivis Zeufack,	This article examines the impact of infrastructure progress on the well-being of people in Africa. It uses a composite index of infrastructure development and data on subjective well-being from 32 African countries for the period 2006–2022. Robust estimation methods are used, including generalized least squares and Driscoll-Kraay fixed effects. The results show a positive and significant impact of infrastructure development on the well-being of the African population, which is related to the way infrastructure is financed. Based on the results obtained, we recommend strengthening public–private partnerships for infrastructure financing, considering each country's specific needs.	10.1007/s44327-025-00068-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44327-025-00068-0	SpringerLink
Emergency management in the age of smart cities: toward safer urban futures	Costa, Daniel G.,		10.1007/s44268-025-00052-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44268-025-00052-y	SpringerLink

Dependable and Secure AI-Driven FinTech Adoption for Rural Tourism & Entrepreneurship in Odisha: A Cyber-Physical Systems Perspective	Das, Swachha Sisir, Mishra, Sasmita, Mayaluri, Zefree Lazarus, Panda, Ganapati,	Despite India's rapid digital-finance growth, rural tourism entrepreneurs in Odisha remain underserved owing to cybersecurity vulnerabilities and limited fault-tolerant FinTech infrastructure. This study develops a dependable AI-driven FinTech-adoption framework that integrates behavioural insights with cyber-physical security mechanisms to analyse transaction resilience, cybersecurity, and fault-tolerance in low-resource rural environments. Using machine-learning, sentiment-analysis and fault-detection models, we identify key adoption determinants—digital literacy, trust, system reliability and secure-payment protocols. A mixed-methods approach (survey: $n=300$; interviews: $n=50$) validates these insights, while Generative Adversarial Networks (GANs) compensate for data scarcity, ensuring robust AI predictions. A dedicated cybersecurity stack—including blockchain-based authentication, offline transaction integrity, and anomaly detection—is integrated into	10.1007/s42979-025-03995-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-025-03995-2	SpringerLink
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		<p>the framework to ensure trustworthy FinTech access. Findings inform policy interventions, including localised digital-literacy programmes, AI-powered financial-inclusion strategies, and blockchain-backed secure transactions within a dependable cyber-physical system (CPS) framework. The proposed framework not only enhances security and fault-tolerance in digital transactions but also establishes a foundation for scalable, AI-driven financial-inclusion strategies in resource-constrained environments.</p>			
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An extensible open-source solution for research digitalisation in materials science	Dudarev, Victor, Banko, Lars, Ludwig, Alfred,	<p>Information technology and data science development stimulate transformation in many fields of scientific knowledge. In recent years, a large number of specialised systems for information and knowledge management have been created in materials science. However, the development and deployment of open adaptive systems for research support in materials science based on the acquisition, storage, and processing of different types of information remains unsolved. We propose MatInf —an extensible, open-source solution for research digitalisation in materials science based on an adaptive, flexible information management system for heterogeneous data sources. MatInf can be easily adapted to any materials science laboratory and is especially useful for collaborative projects between several labs. As an example, we demonstrate its application in high-throughput experimentation.</p>	10.1038/s41524-025-01618-1	https://www.nature.com/articles/s41524-025-01618-1.pdf	SpringerLink
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SERDUX-MARCIM: Maritime Cyberattack simulation using Dynamic Modeling, Compartmental Models in Epidemiology and Agent-based Modeling	Cabuya-Padilla, Diego, Díaz-López, Daniel, Martínez-Páez, Juan, Hernández, Laura, Castaneda-Marroquin, Carlos,	Cybersecurity protects computer data, programs, systems, and networks from unauthorized access, attacks, or theft. By studying cyberattacks, cybersecurity professionals gain insights into attackers' tactics, techniques, and methods, which are crucial for developing effective defense strategies and preventing future attacks. This paper introduces SERDUX-MARCIM, a model for simulation, modeling, and analyzing cyberattacks' propagation in maritime infrastructure, considering network-specific characteristics and target and attacker capabilities. This proposal is supported by a simulation environment in Matlab and Netlogo, considering some of the most accepted cyber risk assessment methodologies and compartmental models in epidemiology. Considering the complexities of the maritime sector. SERDUX-MARCIM is also validated through extensive experimentation in different attack scenarios that represent real-world cyber campaigns in the maritime sector, showing the effectiveness of our proposal.	10.1007/s10207-025-00985-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-025-00985-6	SpringerLink
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<p>"The Land on Which We Meet" – Modes of Indigenous Self-Determination in the Metaverse</p>	<p>Pierucci, Federico,</p>	<p>Amid growing academic and policy debates on the metaverse, Indigenous perspectives remain underrepresented yet offer crucial insights into the socio-political dimensions of virtual worlds. This paper investigates Indigenous self-determination in the metaverse. It starts its analysis with a focus on the Australian First Nations' proposal for a "cultural embassy" It argues that this initiative demonstrates the metaverse's inherently political nature while underscoring the importance of Indigenous control over virtual land, particularly through the role that data plays in an Indigenous perspective. By grounding the cultural embassy in the United Nations Declaration on the Rights of Indigenous Peoples, the paper highlights how this approach advances Indigenous self-determination in digital environments.</p>	<p>10.1007/s44206-025-00182-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s44206-025-00182-x</p>	<p>SpringerLink</p>
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<p>Innovative Horizons for Sustainable Smart Energy: Exploring the Synergy of 5G and Digital Twin Technologies</p>	<p>Maksimovi, Mirjana, Joki, Sran, Boškovi, Marko .,</p>	<p>The future of the energy sector is in the digitalization of energy systems, with Digital Twin technology emerging as a key contributor. Integration of Digital Twin, a virtual representation that functions as a physical object's real-time digital equivalent, with advanced technologies, such as 5G, Internet of Things, Machine Learning/Artificial Intelligence frameworks, and hybrid Cloud/Edge computing architectures, can speed up the digital transformation in numerous application domains, including the energy industry. Digital Twin, and in particular Digital Twin with 5G assistance, has the potential to revolutionize the energy landscape in many meaningful ways. With the help of 5G-powered Digital Twin, entire energy grids can be simulated, hence providing a comprehensive view of energy production, distribution, and consumption. Motivated by the transformative potential of 5G-powered Digital Twins in different facets of energy systems and smart grids, this paper provides a comprehensive presentation of the significance of 5G-enabled Digital Twin implementation within the energy domain, identifies key trends, and</p>	<p>10.1007/s41660-024-00478-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41660-024-00478-4</p>	<p>SpringerLink</p>
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		<p>reveals areas and aspects that require further research. 5G-powered Digital Twin in the energy sector facilitates applications like real-time monitoring, predictive maintenance, dynamic load management, and integration of renewable energy sources. While 5G-powered Digital Twin usage in the energy domain offers key advantages like enhanced efficiency and reliability, it also faces challenges, including integration complexity, infrastructure limitations, data privacy and security concerns, high implementation costs, and lack of standardization. Summarizing existing knowledge and providing a clear understanding of the significance of 5G and Digital Twin synergy in the digitalization of energy systems, highlighting advantages and identifying challenges and limitations, this research further contributes to the understanding of the emerging concept of the Energy Metaverse, which promises to make the energy sector more efficient, resilient, and sustainable.</p>			
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Interoperability Level Evaluation Method of Power System	Choi, Tae-II, Hong, Sun-Hack,	Interoperability between systems is becoming more critical in the electric power sector as dispersed generating resources, power system intelligence, and digitalization accelerate. Many fields describe interoperability as 'the ability to interchange effectively between systems or unit devices to offer services', which is commonly utilized. As database sharing and data mapping for system interconnection grow, new data mapping and gateways are needed for each system interconnection, exponentially increasing interconnection time and expense. To design an interoperability level evaluation method to ensure operability, the existing status of interoperability at home and abroad is researched and Power System Interoperability Standards suitable for our circumstances are derived. KEPCO's power systems are assessed using international standards (IEC 61850, 61970).	10.1007/s42835-024-02131-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42835-024-02131-z	SpringerLink
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<p>Distributionally robust chance-constrained optimization of MEPS considering hydrogen-containing and phased carbon trading mechanisms</p>	<p>Zhang, Chen, Li, Kaixin,</p>	<p>In the context of the energy revolution, the new power system is gradually transforming into an energy internet. Sustainability and uncertainty in power systems have become a challenge in energy system planning and operation. To address the above problems, this paper proposes a distributed integrated energy system with an uncertainty scheduling problem. First, the distribution and transmission processes of the electricity-gas-hydrogen system are finely modeled, with the energy system being an electricity-gas transmission network and a multi-energy flow energy hub distribution network. Afterward, an ambiguity set is generated based on historical data and Latin hypercube sampling to construct a multi-energy power system with data-model-driven distributionally robust chance-constrained optimization for system cost minimization. Finally, the computable distributionally robust chance constraint expression is established from historical data. The comparative analysis of the arithmetic example shows that the system self-sufficiency is improved by 3.74%, carbon</p>	<p>10.1007/s00202-024-02876-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00202-024-02876-w</p>	<p>SpringerLink</p>
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		emission is reduced by 2.26%, and the total cost is reduced by 9.87%.			
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<p>Robotic upcycling and recycling: unraveling the era of sustainable in-space manufacturing</p>	<p>Rai, Mini C., Nair, Manu H., Schaefer, Dirk, Detry, Renaud, Poozhiyil, Mithun, Rybicka, Justyna, Dulanty, Shan, Gotz, Josie, Roa, Maximo A., Lampariello, Roberto, Govindaraj, Shashank, Gancet, Jeremi,</p>	<p>Advancements in material science, manufacturing and sensor technologies, Artificial Intelligence, and the Internet of Things have paved the way for fabricating new parts using additive manufacturing in microgravity conditions. NASA has successfully demonstrated 3D printing onboard the International Space Station (ISS), though at a minor scale. Nevertheless, the parts built onboard the ISS were returned to Earth for further testing and verification. The logistics of bi-directional transportation of raw materials from Earth to ISS and 3D-printed parts from ISS back to Earth is complex, expensive, and slow. Harnessing materials from space to establish in-orbit manufacturing as a sustainable process is both technically and economically challenging. The potential to reuse, repurpose or recycle space debris is not well studied, though there is an increasing momentum in Active Debris Removal (ADR) missions. Unlike the standard research or review paper, this is a visionary paper in which the authors explicitly address the intersection between space debris removal and in-space manufacturing. This paper defines a pathway towards</p>	<p>10.1007/s12567-024-00576-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12567-024-00576-6</p>	<p>SpringerLink</p>
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		<p>implementing an operational in-orbit manufacturing and debris removal model. For the first time, the authors introduce the application of Cloud-Based Design and Manufacturing (CBDM) for in-space manufacturing in this paper. The paper aims to define a roadmap towards implementing a space operational model for in-orbit manufacturing and debris removal. Future enabling technologies that will leverage the advances in robotics, automation, and Space 5.0-based solutions to create a new environmentally friendly and economically profitable orbital ecosystem are presented. The authors analyze the pros and cons of robotic ADR, upcycling and recycling space debris for on-demand manufacturing in orbit and present a systematic approach to implementing in-orbit manufacturing as a new frontier. Recommendations are made to establish an imminent Earth-independent space logistics and supply chain system for operating an orbital factory or warehouse that will help realize a suite of in-orbit manufacturing, maintenance, and assembly missions.</p>			
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Hybridization of metaheuristic algorithms for resource scheduling in distributed robotic control system	Raj, P. Anand, Rajakumaran, M., Palani Murugan, S., Senthilkumar, S.,	<p>This paper presents a novel Distributed Blockchain-Assisted Secure Data Aggregation (Block-DSD) scheme designed to enhance data security, energy efficiency, and scalability in Mobile Ad-hoc Networks (MANETs) for disaster-resilient communication systems (DRCS). The proposed framework integrates an Artificial Neuro-Fuzzy Inference System (ANFIS) for dynamic cluster head selection, ensuring adaptive decision-making based on residual energy, trust value, and centrality metrics. Additionally, the Improved Elephant Herd Optimization (IEHO) algorithm is employed for optimal route selection, leveraging genetic operators to enhance exploration and exploitation capabilities. Blockchain technology is utilized to secure data aggregation through a Secure Two-Step (STS) method and Elliptic Curve Cryptography (ECC), ensuring tamper-proof and reliable data transmission. Simulations conducted using ns-3.25 demonstrate superior performance, with a 97% Packet Delivery Ratio (PDR), 20% reduced energy consumption, and minimal latency of 0.0012 s for emergency data compared to existing methods.</p>	10.1007/s42452-025-06950-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-025-06950-1	SpringerLink
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		<p>The Block-DSD scheme provides a robust solution for secure and efficient data aggregation in highly dynamic and resource-constrained MANET environments, making it suitable for critical applications such as disaster management, military operations, and remote monitoring. Future directions include enhancing blockchain scalability and integrating real-world datasets for further validation. Resource scheduling in distributed robotic control system is presented in this work. The proposed distributed system ensuring the balanced computational load and high reliability across various scenarios. Proposed system provides a better performance when comparing with existing methods.</p>			
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How city living affects mental health-a qualitative exploration of urban stressors among adults in a megacity in India	Poddar, Palak, Banavaram, Arvind Anniappan, Ramanai, Satyanarayana, Jayabalan, Meenakshi, S, Vismaya,	<p>Background India's rapid urbanization presents both opportunities and challenges, offering better healthcare and infrastructure while also impacting physical and mental health. The reasons behind the higher prevalence of mental health issues in urban areas remain underexplored, particularly in the Indian context. This study seeks to fill that gap by examining urban stressors in an Indian megacity, aiming to inform urban planning and enhance mental well-being. Method The study involved 24 in-depth interviews with non-slum residents aged 30–60 years. Data was collected based on predefined themes, categorized into physical and social urban environments, and further analyzed into subthemes. Results Five key urban factors were consistently reported as negatively affecting mental health: housing issues, traffic and transportation challenges, neighborhood characteristics, cost of living, and employment-related stress. Additionally, factors such as water quality and availability, air and noise pollution, solid waste management, safety concerns, social cohesion, and the accessibility and</p>	10.1186/s12889-025-22817-x	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12889-025-22817-x	SpringerLink
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		<p>affordability of recreational facilities contributed to varying levels of distress among different participant groups.</p> <p>Conclusion This study underscores the complex interaction between physical and social environmental factors in influencing mental health of residents of the city. The findings underscore the importance of adopting a multisectoral and inclusive approach to urban planning that places mental well-being at its core. Integrating mental health into city development guided by frameworks such as HiAP approach (Health in All Policies), the WHO Healthy Cities initiative, GAPS (Green, Active, Prosocial, and Safe places), among others can support the creation of inclusive and sustainable urban spaces in alignment with Sustainable Development Goal 11 (SDG 11). However, this study has certain limitations, primarily the lack of generalizability due to its qualitative design conducted in a single Indian megacity, as well as the absence of assessment of mental health outcomes using standardized mental health assessment tools.</p>			
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Suggestions for extending the FAIR Principles based on a linguistic perspective on semantic interoperability	Vogt, Lars, Strömert, Philip, Matentzoglou, Nicolas, Karam, Naouel, Konrad, Marcel, Prinz, Manuel, Baum, Roman,	FAIR (meta)data presuppose their successful communication between machines and humans while preserving meaning and reference. The FAIR Guiding Principles lack specificity regarding semantic interoperability. We adopt a linguistic perspective on semantic interoperability and investigate the structures and conventions ensuring reliable communication of textual information, drawing parallels with data structures by understanding both as models. We propose a conceptual model of semantic interoperability, comprising intensional and extensional terminological interoperability, as well as logical and schema propositional interoperability. Since there cannot be a universally accepted best vocabulary and best (meta)data schema, establishing semantic interoperability necessitates the provision of comprehensive sets of intensional and extensional entity mappings and schema crosswalks. In accordance with our conceptual model, we suggest additions to the FAIR Guiding Principles that encompass the requirements for semantic interoperability.	10.1038/s41597-025-05011-x	https://www.nature.com/articles/s41597-025-05011-x.pdf	SpringerLink
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		Additionally, we argue that attaining FAIRness of (meta)data requires not only their organization into FAIR Digital Objects, but also the establishment of a FAIR ecosystem of FAIR Services, that include a terminology, a schema, and an operations service.			
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<p>A multiple-stakeholder view of open and user innovation: Systematic review and future research agenda</p>	<p>Smith, Keith Marion, O'Hern, Matthew S., Jenkins, Mason R., Fombelle, Paul W., Noble, Charles H.,</p>	<p>The open and user innovation (OUI) literature indicates that a variety of actors can play pivotal roles in the innovation process, but to date, many of these roles are under researched and poorly understood. Through a multiple stakeholder view combined with a systematic review of the OUI literature, we identify three key stakeholder roles (creator, contributor, customer) and three separate types of actors (individuals, firms, groups) to create a 3x3 OUI Stakeholder Matrix typology. This matrix encompasses the major stakeholders found in the OUI literature and is designed to foster closer collaboration between open innovation and user innovation scholars. Specifically, this article prioritizes identifying and understanding overlooked innovation stakeholders to clarify how their activities might create value for both customers and firms. The authors conclude by developing a series of actionable research questions centered on four primary themes that relate to stakeholder power, stakeholder role transitions and multi-role stakeholders, firms' beliefs around what drives value in an</p>	<p>10.1007/s11747-025-01092-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11747-025-01092-7</p>	<p>SpringerLink</p>
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		OUI initiative, and the possible emergence of new stakeholders in OUI programs.			
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<p>Harnessing network science for urban resilience: the CASA model's approach to social and environmental challenges</p>	<p>Fuentes, Miguel, Cárdenas, Juan Pablo, Olivares, Gastón, Rasmussen, Eric, Urbina, Carolina, Salazar, Soledad, Vidal, Gerardo,</p>	<p>Resilience in social systems is crucial for mitigating the impacts of crises, which threaten communities worldwide. As disasters grow in frequency and intensity, strengthening urban resilience has become an urgent necessity. This study applies the Complex Analysis for Socio-environmental Adaptation (CASA) model to Puchuncaví, a Chilean town facing significant environmental and social challenges as a recognized "Sacrifice Zone." Our approach redefines traditional resilience models by transforming their un-integrated structure into a complex network that integrates global scientific knowledge and advanced network methodologies. Our findings underscore the model's effectiveness in identifying vulnerabilities and informing policies to strengthen climate resilience and urban adaptation. The analysis reveals that Puchuncaví faces substantial resilience gaps in emergency management, sustainable livelihoods, and access to sanitation and potable water. The CASA model assigns a topological resilience score (TR) of 0.82, indicating an 18% higher vulnerability</p>	<p>10.1007/s41109-025-00703-0</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1007/s41109-025-00703-0</p>	<p>SpringerLink</p>
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		compared to ideal resilience conditions. While key sectors such as food security and public health demonstrate relative strengths, governance and infrastructure require targeted interventions to enhance resilience outcomes.			
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Reliability Analysis of Nuclear Power Plant Subjected to Earthquake Shocks	Prateek, Kamran, Khan, Rehan A., Ahmad, Shakeel,	<p>Historical earthquake records indicate that aftershocks often follow a strong mainshock, impacting NPP structures. A comprehensive parametric study of these structures is required to highlight the influence of varying structural and loading circumstances, specifically the effect of steel liners and buttresses when subjected to earthquake shocks. This will describe the effective ground and structural conditions to be considered while designing of such structures. This study evaluates the seismic behaviour of an NPP building and examines the influence of various earthquake parameters, including epicentral distance, peak ground acceleration, and earthquake duration. Additionally, the presence of a steel liner and the buttress on the outer containment of NPP structure have been investigated. A detailed 3D model has been developed using the finite element software ABAQUS (User documentation, 2014) to facilitate the present analysis. A nonlinear dynamic time-history analysis is executed utilising the robust motion database provided by the PEER Centre.</p>	10.1007/s40996-025-01838-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40996-025-01838-x	SpringerLink
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		<p>Subsequently, the reliability analysis employing the FOSM theorem utilises the nonlinear dynamic time history results as input to calculate the probability of failure of the NPP structure. The NPP structure with steel liner describes 34.4% and 47.4% lower principal stresses than the structure without steel liner for a given mainshock and aftershock, respectively. While, the NPP structure with a buttress unfolds 27.2% and 26% lower principal stresses than the structure without a buttress for a given mainshock and aftershock, respectively. Therefore, the steel liner and buttress provides additional strength to the structure, which can withstand and resist more earthquake shocks.</p>			
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Machine vision in manufacturing SMEs: a review	Werheid, Jonas, Behnen, Hannes, Woltersmann, Jan-Henrik, He, Shengjie, Hamann, Tobias, Abdelrazeq, Anas, Schmitt, Robert H.,	Automating manufacturing tasks, such as quality control, fault detection, part classification, and inventory management with machine vision systems can significantly improve process efficiency, accuracy, and productivity. As a result, the machine vision technology market is expanding, largely driven by its applications in manufacturing across both hardware and software sectors. Nevertheless, small- and medium-sized enterprises (SMEs) face distinct challenges in the implementation of such systems due to their human, technical, and organizational constraints. An overview of the current state of research and practical insights is essential to address these constraints and guide future developments. Although some surveys and interviews have been conducted, no comprehensive review outlines scientific literature on research methods and initiatives related to the characteristics and challenges of adopting machine vision systems in industrial SMEs. Therefore, we present a systematic literature review to identify applications, challenges and proposed approaches for	10.1007/s42452-025-06923-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-025-06923-4	SpringerLink
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		<p>machine vision and its adoption in industrial SMEs, analyzing 770 articles. The review highlights quality control as the prominent application, while primary challenges for SMEs include limited investment capacity, labor and expertise shortages, and high-variety, low-volume production, which often leads to insufficient data for training algorithms. Furthermore, the review identifies approaches involving low-cost hardware, open-source software, and intuitive-to-use systems as potential solutions to these challenges. Although many articles contribute to highly specific problems of SMEs, we identified a lack of broader applicable interdisciplinary approaches to integrate machine vision. This article outlines challenges and initiatives for adopting machine vision across different applications to enhance value generation for industrial SMEs facing specific challenges. Future research can leverage our findings to develop industrial solutions or explore new research directions in this domain. Machine vision fosters efficiency and quality in SMEs production. High costs and lack of skills are the main challenges in vision</p>			
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		technology adoption Lack of integrated frameworks calls for holistic solutions tackling cost, skills, data, and production variety			
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Developing a model for the assessment of organizational antifragility based on integrated Pythagorean fuzzy SWARA-CoCoSo methods	Khoshsepehr, Zahra, Alinejad, Saeed,	Antifragility refers to an organization's capacity to thrive under stressful and chaotic conditions. The theory of antifragility posits that certain systems and organizations not only withstand sudden crises and changes but actually benefit from them. The aim of this study is to construct a comprehensive model for evaluating organizational antifragility. We conducted a primary systematic literature review to identify the essential criteria that underpin organizational antifragility. In this paper, the Pythagorean Fuzzy Step Wise Weight Assessment Ratio Analysis (PF-SWARA) method was employed to assign weights to the criteria. The Pythagorean Fuzzy Combined Compromise Solution (PF-CoCoSo) method was utilized to rank companies. The findings of this study show that the criteria for organizational antifragility manifest across six dimensions, encompassing organizational structure, culture, leadership, risk embracement, learning, processes, and support systems. Risk embracement (weight=0.206) is the most important criteria in crisis management, and Alyaf Golriz Qom has the highest	10.1007/s12597-025-00943-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12597-025-00943-9	SpringerLink
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		<p>antifragility score (5.772) among the alternatives. The novelty of this research can be expressed by considering the dimensions of culture and leadership, learning, process, and system support for organizational invulnerability. These dimensions can provide a comprehensive view of the movement of organizations from resilience to antifragility. The current study presents a new way to measure antifragility that takes into account many aspects of an organization and employs the PF method to effectively handle environmental uncertainties. This constitutes a progressive stride towards fostering antifragile organizations, surpassing the realms of resilience and robustness. The results of this research can facilitate the movement of managers towards antifragility by bolstering all facets of the organization to withstand critical stressors and fluctuations.</p>			
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<p>How to avoid the risk of maladaptation? From a conceptual understanding to a systematic approach for analyzing potential adverse effects in adaptation actions</p>	<p>Higuera Roa, Oscar, Walz, Yvonne, Nehren, Udo,</p>	<p>Climate change is already affecting and altering natural and human systems, and its effects are expected to intensify over the coming decades. Adaptation is therefore imperative for future development. However, like any other anthropogenic intervention, adaptation measures can have unintended detrimental impacts and adverse effects on human and natural systems, known as maladaptation. With growing evidence of maladaptation, practitioners in the fields of resilience and climate change adaptation increasingly focus on avoiding maladaptation risks in their projects. Yet, there is still no clear understanding of how to comprehensively and systematically analyze adverse effects in adaptation actions. To address this gap, this article advances the conceptual understanding of maladaptation and elaborates a pragmatic approach for examining, identifying, and diagnosing maladaptation risks in adaptation measures. Starting by breaking down the concept of maladaptation into analytical components (i.e., drivers, mechanisms,</p>	<p>10.1007/s11027-025-10217-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11027-025-10217-w</p>	<p>SpringerLink</p>
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		<p>dimensions, attributes, forms, and outputs of maladaptation) based on the relevant literature, we propose a new harmonized and actionable definition. Based on this new understanding, we propose a practical and systematic approach to analyze maladaptation risks at the early stages of adaptation planning. Through the proposed definition, conceptual disaggregation, and practical framework, this paper contributes to a better understanding of maladaptation and provides practitioners with means to improve the design of future adaptation measures.</p>			
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Multi-criteria decision support system for the evaluation of UAV intelligent agricultural sensors	Kizielewicz, Bartomiej, Wtróbski, Jarosaw, Saabun, Wojciech,	<p>Precision agriculture is an emerging approach aimed at enhancing agricultural productivity through advanced technological solutions. One of the key technologies integrated into modern agriculture is Unmanned Aerial Vehicles (UAVs), which rely on various sensors to provide critical information about crop fields. However, selecting the most suitable UAV sensors remains a significant challenge due to multiple evaluation criteria and compromises. This paper proposes a novel decision-support framework based on multi-criteria decision-making/analysis (MCDM/MCDM) methods to facilitate UAV sensor selection in precision agriculture. The framework incorporates objective weight selection techniques-Standard Deviation, Entropy, CRITIC, and MEREC-eliminating the need for subjective expert involvement. Furthermore, four MCDM/MCDM methods, including the newly proposed COmbined COmpromise solution with Characteristic Objects METHod (COCOMET), are applied to evaluate sensor alternatives. To validate the framework, a</p>	10.1007/s10462-025-11201-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-025-11201-1	SpringerLink
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		<p>case study is conducted using a dataset of UAV sensors, where multiple evaluation criteria are analyzed to determine the most suitable sensor. The results confirm the framework's effectiveness, demonstrating its robustness and stability in decision-making. Sensitivity analysis and comparative studies further highlight its reliability, particularly in addressing rank reversal issues commonly found in existing MCDA methods such as TOPSIS and AHP. The proposed framework not only provides a structured and adaptable evaluation process for UAV sensors but also offers broader applicability in agricultural decision-making.</p>			
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<p>The influence of surface cover change on solar radiation absorption in China</p>	<p>Zhang, Kaixuan, Li, Yan, Ren, Dongfeng,</p>	<p>Under the context of climate change, the energy exchange mechanisms between terrestrial ecosystems and the atmosphere are highly complex. This study investigates the impact of land cover changes on solar radiation using China's land cover data and surface solar radiation absorption data. We analyze the data changes over two adjacent periods and integrate additional factors to explore the impacts of surface cover changes on solar radiation. The results indicate that: (1) Although grassland and bare land are the land categories with the largest area share, their radiation absorption capacity is significantly lower than that of water body and forests. (2) During 2001 –2020, 84.94% of land remains unchanged, but the expansion of the forested land and the reduction of the bare land in the changed areas have a significant impact on the radiation absorption, which suggests that the policy should focus on the restoration of the forested land of the arid area, bare land on the edge of the city, and greening, so as to minimize the intervention cost and maximize the benefits of climate moderation. This study provides a key theoretical</p>	<p>10.1007/s10661-025-13994-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10661-025-13994-8</p>	<p>SpringerLink</p>
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		basis for constructing a comprehensive evaluation model of "land-climate-ecology" synergy by revealing the multi-process coupling mechanism and cascading response relationship of solar radiation absorption by land cover change.			
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<p>CSoS-STRE: A combat system-of-system space-time resilience enhancement framework</p>	<p>Xu, Renjie, Ning, Guoyu, Liu, Jiahao, Li, Minghao, Li, Jichao, Yang, Kewei, Lou, Zhiyuan,</p>	<p>A combat system-of-systems (CSoS) is a network of independent entities that interact to provide overall operational capabilities. Enhancing the resilience of CSoS is garnering increasing attention due to its practical value in optimizing network architectures, improving network security and refining operational planning. Accordingly, we present a unified framework called CSoS space-time resilience enhancement (CSoS-STRE) to enhance the resilience of CSoS. Specifically, we develop a spatial combat network model and a space-time resilience optimization model that captures the complex spatial relationships between entities and reformulates the resilience enhancement problem as a linear optimization model with spatial features. Moreover, we extend the model to include obstacles. Next, a resilience-oriented recovery optimization method based on the improved non-dominated sorting genetic algorithm II (R-NSGA) is proposed to determine the optimal recovery sequence for the damaged entities. This method incorporates spatial features</p>	<p>10.1007/s42524-025-4179-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42524-025-4179-y</p>	<p>SpringerLink</p>
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		<p>while providing the optimal travel paths for multiple recovery teams. Finally, the feasibility, effectiveness, and superiority of the CSoS-STRE are demonstrated through a case study, providing valuable insights for guiding recovery and developing more resilient CSoS.</p>			
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Computational resource configuration analysis and optimization methods for unmanned system considering intended functionality safety	Chen, Zhiwei, Zhang, Luogeng, Chu, Jiayun, Fang, Xiaotong, Dui, Hongyan,	With the rapid expansion of unmanned system capabilities, integrating and sharing computing resources has become essential. In addition to enhancing resource utilization efficiency, this architecture may also introduce conflicts related to resource competition. Therefore, effective resource-sharing configurations are crucial to ensure the Safety of the Intended Functionality (SOTIF). This paper proposes a computing resource configuration analysis and optimization methods for SOTIF. First, four SOTIF requirements are explored using the computing resource-sharing architecture for unmanned systems, encompassing computing time, computing power, energy consumption restrictions, and mutual exclusion and correlation. Secondly, the computing resource configuration model and its SOTIF constraints are formalized based on the graph and set theories. Subsequently, this study divides the design process of computing resource configuration schemes into resource selection and allocation. It introduces a	10.1007/s42524-025-4173-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42524-025-4173-4	SpringerLink
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		resource selection optimization method based on Forward Checking and a resource allocation optimization method based on NSGA-II. Finally, a typical unmanned driving scenario is considered as an example, and the optimal resource selection and allocation schemes are sequentially determined using the proposed method on the computing platform.			
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<p>A Review of Technologies and Challenges for Integrated Modeling Analysis</p>	<p>Sigler, Laurence, Ubach, Pere-Andreu, Mora, Javier, Oñate, Eugenio,</p>	<p>The natural and built environment form a complex system, comprised of many interrelated subsystems, each interacting in multiple nexus. Manifestations of these interactions can be seen in complex events. Climate change, natural disasters, military conflicts, pandemics, and other such events require accurate preparation, preparedness, and response planning, in a fast, ever changing context. With exascale (10^{18} floating point operations per second) computational levels reached, computing power gives us the capability to model and simulate complex scenarios. This capability gives decision makers tools to game possibilities and enact preparatory and preventative measures to build resilience. There has been a trend of development of decision support, risk assessment, and operational forecasting systems to address this issue, aggregating diverse data sources onto unified platforms. Nonetheless, the majority of such platforms focus on the aggregation of just data and not models, and remain in silos of disciplines. What is needed to prepare and plan for disruptive events is a move towards decision support based on holistic, integrated,</p>	<p>10.1007/s11831-024-10187-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-024-10187-3</p>	<p>SpringerLink</p>
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		<p>model-based analysis. While modeling individual systems has been done for many years, modeling in holistic analysis presents additional challenges. This paper presents an overview of the challenges and advances present for a move to a model-based holistic analysis, and an evaluation of some platforms currently in development and operation. The present work signals gaps in research to be addressed. Finally, we formulate base requirements for the development of systems to perform holistic model-based analysis, and discuss future plans for the development of such a platform.</p>			
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<p>Studying economic complexity with agent-based models: advances, challenges and future perspectives</p>	<p>Chudziak, Szymon,</p>	<p>Agent-based computational economics has considerable achievements. However, it has gone too quickly into a direction similar to the one of models based on solely analytical—as opposed to algorithmic—dynamic systems of difference equations. An increasingly large focus has been put on matching moments of real-world time series of data, a set of stylised facts, or on estimation. Reasons why this is not desirable are discussed. Firstly, both estimation and inference from models will be biased, unless they represent the real data-generating processes. Secondly, surrendering the attempt to incorporate realistic microfoundations is not only against the original ACE agenda, but also is subject to a form of Lucas critique. Thirdly, characteristics of complex systems, especially differences between feedback loops and emergent phenomena that characterise systems of various levels of complexity, undermine the justification of building structurally simplistic models. That is, an attempt at reducing the interaction of many different sectors, populated with agents using various decision</p>	<p>10.1007/s11403-024-00428-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11403-024-00428-w</p>	<p>SpringerLink</p>
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		rules will yield information loss, i.e., some phenomena by definition are possible to emerge only in systems of higher levels of complexity. A different research agenda is proposed, with the aim of systematically analysing and uncovering the mechanisms, feedback loops and impact channels of complex multi-sectoral economic and financial systems.			
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Disrupting disruptions: enhancing supply chain resilience—lessons from the US Air Force	Berger, Ron, Wagner, Ralf, Dion, Paul M., Matthias, Olga,	Black swan events have highlighted the importance of supply chain resilience and hence drawn increased attention from academia. Using military supply chains as our research setting, we illustrate how supply chain resilience can be implemented in civilian networks and incorporate agility and flexibility into a responsive system-to-system model. We use a simulation model based on the Cassandra application to further develop supply chain network resilience theory. Our model provides updated situational awareness to decision makers and allows managers to identify direct and indirect threats to supply chains, allowing adaptation to unforeseen situations. We developed a dynamic, whole-system network model to provide timely, accurate, updateable and scalable information to planners and decision-makers at all levels in-order to reduce risk and increase resilience.	10.1007/s10479-025-06527-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-025-06527-6	SpringerLink
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<p>Federated learning in Emotion Recognition Systems based on physiological signals for privacy preservation: a review</p>	<p>Gahlan, Neha, Sethia, Divyashikha,</p>	<p>Automated Emotion Recognition Systems (ERS) with physiological signals help improve health and decision-making in everyday life. It uses traditional Machine Learning (ML) methods, requiring high-quality learning models for physiological data (sensitive information). However, automated ERS enables data attacks and leaks, significantly losing user privacy and integrity. This privacy problem can be solved using a novel Federated Learning (FL) approach, which enables distributed machine learning model training. This review examines 192 papers focusing on emotion recognition via physiological signals and FL. It is the first review article concerning the privacy of sensitive physiological data for an ERS. The paper reviews the different emotions, benchmark datasets, machine learning, and federated learning approaches for classifying emotions. It proposes a novel multi-modal Federated Learning for Physiological signals based on Emotion Recognition Systems (Fed-PhyERS) architecture, experimenting with the AMIGOS dataset and its</p>	<p>10.1007/s11042-024-19467-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-024-19467-3</p>	<p>SpringerLink</p>
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		<p>applications for a next-generation automated ERS. Based on critical analysis, this paper provides the key takeaways, identifies the limitations, and proposes future research directions to address gaps in previous studies. Moreover, it reviews ethical considerations related to implementing the proposed architecture. This review paper aims to provide readers with a comprehensive insight into the current trends, architectures, and techniques utilized within the field.</p>			
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Assessing and prioritizing interactive teaching modes based on student satisfaction in higher education: A case study of a freshmen class	Zhang, Fan, Li, Shengbin, Zhao, Qian, Huo, Zhipeng,	<p>Prioritizing student satisfaction in higher education is crucial for delivering an educational experience that caters to students' needs, ultimately leading to improved learning outcomes and fostering gradual progress. In this paper, to identify the interactive teaching approach that best aligns with student expectations for a class of freshmen majoring in project management, a multi-criteria evaluation framework based on the best–worst method (BWM) and TODIM (an acronym in Portuguese for interactive and multi-attribute decision making) algorithm is applied. Initially, the BWM is applied to ascertain the weight distribution among the identified criteria through a process of pairwise comparison. Subsequently, the TODIM method is leveraged, considering the instructors' aversion towards the risks of teaching quality decline, to identify the blended teaching mode (A_2) as the most suitable choice for the class. Upon a more in-depth individual analysis, it is observed that the blended teaching mode (A_2), the online collaboration mode (A_3), and</p>	10.1007/s10639-024-13073-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10639-024-13073-4	SpringerLink
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		<p>the flipped classroom mode (A_4) are all favored equally by the students as their top preferences. With its reliability confirmed through comparative and sensitivity analyses, this framework emerges as a strategic alternative to arbitrary selection, empowering instructors to select a personalized, hybrid, or class-wide preferred teaching mode, thus enhancing curriculum design and ensuring ongoing alignment with student needs.</p>			
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AI Techniques in the Microservices Life-Cycle: a Systematic Mapping Study	Moreschini, Sergio, Pour, Shahrzad, Lanese, Ivan, Balouek, Daniel, Bogner, Justus, Li, Xiaozhou, Pecorelli, Fabiano, Soldani, Jacopo, Truyen, Eddy, Taibi, Davide,	The use of AI in microservices (MSs) is an emerging field as indicated by a substantial number of surveys. However these surveys focus on a specific problem using specific AI techniques, therefore not fully capturing the growth of research and the rise and disappearance of trends. In our systematic mapping study, we take an exhaustive approach to reveal all possible connections between the use of AI techniques for improving any quality attribute (QA) of MSs during the DevOps phases. Our results include 16 research themes that connect to the intersection of particular QAs, AI domains and DevOps phases. Moreover by mapping identified future research challenges and relevant industry domains, we can show that many studies aim to deliver prototypes to be automated at a later stage, aiming at providing exploitable products in a number of key industry domains.	10.1007/s00607-025-01432-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-025-01432-z	SpringerLink
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Simulation of system architectures using optimization and machine learning: the state of the art and research opportunities	Manzano, Wallace, Graciano Neto, Valdemar Vicente, Bianchi, Thiago, Kassab, Mohamad, Nakagawa, Elisa Yumi,	Most software-intensive systems present large and complex architectures, which should satisfy different quality attributes, such as performance, reliability, and security. Some of these attributes could only be measured at runtime, which is undesired, particularly for critical systems whose attributes should still be evaluated at design time to avoid failures at runtime and losses, including human lives. Simulation has been considered a powerful solution to predict and evaluate different architectural arrangements at design time and, combined with optimization and machine learning, and it can find suitable or even optimal architectures. However, there is a lack of an overview of such combinations and how they can work better. This work presents the state of the art of simulation using optimization and/or machine learning techniques. For this, we examined the literature of 1,342 studies retrieved from three publications databases and systematically selected 87 studies and scrutinized them. There is a variety of combinations of simulation with different optimization and/or machine learning techniques, each requiring specific	10.1007/s10270-025-01280-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-025-01280-7	SpringerLink
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		simulation models and simulators. At the same time, studies are still isolated, lacking maturity in the area and remaining important future work to discover the benefits of such combinations.			
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<p>Artificial Intelligence-Enhanced Digital Twin Systems Engineering Towards the Industrial Metaverse in the Era of Industry 5.0</p>	<p>Zhang, He, Li, Yilin, Zhang, Shuai, Song, Lukai, Tao, Fei,</p>	<p>With the continuous advancement and maturation of technologies such as big data, artificial intelligence, virtual reality, robotics, human-machine collaboration, and augmented reality, many enterprises are finding new avenues for digital transformation and intelligent upgrading. Industry 5.0, a further extension and development of Industry 4.0, has become an important development trend in industry with more emphasis on human-centered sustainability and flexibility. Accordingly, both the industrial metaverse and digital twins have attracted much attention in this new era. However, the relationship between them is not clear enough. In this paper, a comparison between digital twins and the metaverse in industry is made firstly. Then, we propose the concept and framework of Digital Twin Systems Engineering (DTSE) to demonstrate how digital twins support the industrial metaverse in the era of Industry 5.0 by integrating systems engineering principles. Furthermore, we discuss the key technologies and challenges of DTSE, in particular how artificial</p>	<p>10.1186/s10033-025-01210-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s10033-025-01210-0</p>	<p>SpringerLink</p>
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		intelligence enhances the application of DTSE. Finally, a specific application scenario in the aviation field is presented to illustrate the application prospects of DTSE.			
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<p>Economic energy optimization in microgrid with PV/wind/battery integrated wireless electric vehicle battery charging system using improved Harris Hawk Optimization</p>	<p>Mallikarjun, Perne, Thulasiraman, Sundar Rajan Giri, Balachandran, Praveen Kumar, Zainuri, Muhammad Ammirul Atiqi Mohd,</p>	<p>This paper investigates the economic energy management of a wireless electric vehicle charging stations (EVCS) connected to hybrid renewable energy system comprising photovoltaic (PV), wind, battery storage, and the main grid. The study adopts an Improved Harris Hawk Optimization (IHHO) algorithm to optimize energy management and minimize operational costs under varying scenarios. Three distinct wireless EV charging load profiles are considered to evaluate the performance of the proposed optimization technique. Simulation results demonstrate that the IHHO algorithm achieves significant cost reductions and improves energy utilization efficiency compared to other state-of-the-art optimization algorithms such as Improved Quantum Particle Swarm Optimization (IQPSO), Honeybee Mating Optimization (HBMO), and Enhanced Exploratory Whale Optimization Algorithm (EEWOA). For scenarios with renewable energies, the IHHO algorithm reduced electricity costs by up to 36.41%, achieving a per-unit cost as low as 3.17 INR for the most demanding EV</p>	<p>10.1038/s41598-025-94285-7</p>	<p>https://www.nature.com/articles/s41598-025-94285-7.pdf</p>	<p>SpringerLink</p>
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		<p>charging profile. Under scenarios of renewable generation disconnection, the IHHO algorithm maintained its superiority, reducing costs by up to 37.89% compared to unoptimized dispatch strategies. The integration of battery storage further enhanced the system's resilience and cost-effectiveness, particularly during periods of renewable unavailability. The IHHO algorithm's robust performance, reflected in its ability to handle dynamic and challenging operational conditions, demonstrates its potential for practical deployment in real-world wireless EVCS powered by hybrid renewable energy systems. The findings highlight the IHHO algorithm as a reliable and efficient tool for optimizing energy dispatch, promoting the integration of renewable energy, and supporting sustainable wireless EVCS infrastructure development. Simulation results demonstrate that IHHO outperforms all benchmark algorithms, achieving electricity cost reductions of up to 35.82% in EV Profile 3, with a minimum per-unit electricity cost of 3.11 INR/kWh across all scenarios.</p>			
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		Specifically, IHHO achieved the lowest electricity cost of 6479.72 INR/day for EV Profile 1, 10,893.23 INR/day for EV Profile 2, and 20,821.63 INR/day for EV Profile 3, consistently outperforming IQPSO, HBMO, and EEWOA.			
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<p>Toward a modeling and analysis method of cyber-physical systems architecture evolution based on bigraph</p>	<p>Lu, Chaoze, Zou, Qifeng, Zhou, Jianchao,</p>	<p>The evolution of cyber-physical systems (CPS) is inevitable. Traditional graph and hypergraph modeling and analysis methods can only describe one-dimensional evolutionary information, making it difficult to directly apply them to the modeling and analysis of CPS evolution processes that involve two-dimensional space. To address this issue, this paper proposes a Bigraph model for CPS that incorporates positional constraints. This model adopts a divide-and-conquer strategy, utilizing the link graph and place graph of Bigraph to represent the two-dimensional relationships of connectivity and positional relationships among entities within the CPS, respectively. Based on this model, a set of dynamic evolution rules for CPS architecture is designed. Furthermore, by leveraging the concepts of conditional matching and state transition, a model for the dynamic evolution of CPS structure and information flow evolution is proposed. Algorithms for checking consistency, integrity, and reachability constraints during the dynamic evolution of CPS architecture are developed around this model. These</p>	<p>10.1038/s41598-025-92521-8</p>	<p>https://www.nature.com/articles/s41598-025-92521-8.pdf</p>	<p>SpringerLink</p>
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		algorithms ensure the correctness and reliability of the CPS system after its dynamic evolution. Finally, experiments are conducted using the evolution of a smart meeting system and a vehicular networking system as case studies, validating the effectiveness of the proposed model and algorithms.			
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<p>An enhanced discovery of multiple natural disasters using machine learning model</p>	<p>J T, Thirukrishna,</p>	<p>Today, many natural disasters occur in the world. Damage caused during disaster assessment has been a vital process. Traditional methods of assessing the cause of damage are neither fast nor efficient. In disaster error estimation, progress has been made in recent years. Internet resources serve as a dynamic facilitator to obtain data for the model and produce the desired output. The proposed hybrid CNN helps in detecting and identifying the natural disaster damage and also precisely assesses the damages with higher accuracy. Hybrid CNN performance metrics, such as accuracy, precision, recall, and F1 score, are compared with logistic regression, support vector machine, gradient boosting, and random forest algorithms in the processing of imagery data with natural disaster regions and provide the cost estimation with any objects precisely over the higher accuracy rate of greater than 96%.</p>	<p>10.1007/s12145-025-01793-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-025-01793-1</p>	<p>SpringerLink</p>
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Multi-indexes decision-making using PL-BWM and probabilistic linguistic three-way TOPSIS methods: a case study	Chen, Jie,	<p>Probabilistic linguistic term sets (PLTSs) provide a flexible tool to express linguistic preferences, which allow decision-makers to label linguistic information with different probabilities. In this paper, the theory of PLTSs is developed and a decision-making system based on PLTS is proposed to address multi-indexes decision-making problems. A new normalized model of probabilistic linguistic term element (PLTEs) is created by integrating three emotional factors of decision-makers (DMs), which can fully express the emotional attitude of DMs. Then a novel best-worst method (BWM) is put forward, termed PL-BWM, based on PLTS. The use of PL-BWM can fully reflect the preference information of DMs, and accurately describes the importance level of the indexes. The Jensen-Shannon divergence is used to obtain the index weights by merging PL-BWM-based subjective weights and exponential probabilistic linguistic fuzzy entropy-based objective weights. Inspired by three-way decision-making, a third middle reference point is introduced in classical two-way TOPSIS, dividing the scheme set into two parts to</p>	10.1038/s41598-025-92774-3	https://www.nature.com/articles/s41598-025-92774-3.pdf	SpringerLink
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		<p>accurately locate the position of each scheme, which can achieve perfect results, overcoming the potentially ambiguous ranking of the classic two-way TOPSIS. The median evaluation is constructed as the third middle reference point to obtain the probabilistic linguistic three-way TOPSIS method. The practical implementation and the robustness of the new method are assessed on an optimal green suppliers of magnetic materials selection problem. A comparison of performance shows that the proposed method is logically consistent and can provide more suitable results than existing ones</p>			
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<p>A public opinion propagation model for technological disasters</p>	<p>Zhang, Yi, Tang, Wanjie, Ni, Ting,</p>	<p>Public opinion on technological disasters is influenced by unique factors and characteristics. Based on the infectious disease model, this paper develops a public opinion dissemination model for technological disasters, considering factors such as disaster severity, government response, accountability, and the impact of both positive and negative media content. Using differential equation stability theory, we analyze the existence and stability of both the free propagation equilibrium point and the propagation equilibrium point. The next-generation matrix method is applied to calculate the propagation threshold, revealing that disaster severity, government response, and accountability are key factors in the spread of public opinion. Sensitivity analyses examine how these key factors affect public opinion dynamics. A case study on the Shiyan gas explosion in Hubei Province is presented, with microblog data used to calculate model parameters. The proposed public opinion dissemination model is applied to this case and compared with two other models, demonstrating</p>	<p>10.1038/s41598-025-91244-0</p>	<p>https://www.nature.com/articles/s41598-025-91244-0.pdf</p>	<p>SpringerLink</p>
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		the viability and effectiveness of the developed model. The analyses also show that well-handled government responses can help calm public opinion, even in cases where accountability is lacking. Finally, policy suggestions are offered to enhance public opinion management during technological disasters.			
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Intelligent recognition and sustainable security protection strategies for abnormal behavior of power grid operation data based on multidimensional digital portrait and deep neural networks	Ren, Qingqing, Kang, Wanqing, Yang, Xuehui, Wang, Qingpeng, Huang, Qiang,	Traditional methods for identifying abnormal behavior in the power grid typically rely on fixed rules and single-dimensional data analysis, making it difficult to meet the anomaly detection requirements in complex and changing power grid operation (PGO) environments, and unable to effectively ensure the safety of the power grid, limiting their effectiveness in complex environments. The article presents an intelligent strategy combining multidimensional digital portraits with deep neural networks (DNN). Power grid operation (PGO) data is cleaned, normalized, and analyzed across time series, spatial, and frequency dimensions to create a multidimensional digital portrait. CNN extracts spatial and frequency features, while RNN processes time series data, enabling accurate anomaly detection. The model performs well, especially for anomaly category D, achieving an accuracy of 0.965 and an F1 score of 0.827. Trend analysis of one year's grid data shows a decrease in abnormal behavior frequency from 0.133 times/day on day 90 to 0.034 times/day	10.1007/s44163-025-00239-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44163-025-00239-3	SpringerLink
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		on day 365, indicating improved system stability over time. These results confirm the model's practical value for ensuring the safe operation of power grids.			
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Developing a negative speech emotion recognition model for safety systems using deep learning	Jena, Shreya, Basak, Sneha, Agrawal, Himanshi, Saini, Bunny, Gite, Shilpa, Kotecha, Ketan, Alfarhood, Sultan,	Growing threats in public spaces have forced people to question personal security, making technology more relevant, especially in speech recognition. This paper proposes a security safety system by considering keyword and negative emotion detection to solve this problem. It detects the wake-up word "ON" whenever it is spoken with negative emotion. Our essential contribution is two-fold: first detecting the presence of the wake-up keyword 'ON' in the speech using a Convolutional Neural Network (CNN) model, and second, detecting negative emotion in the speech through a Long Short-Term Memory (LSTM) Model. In this paper, we proposed combining the models above, catering to the same problem statement. From the suggested methodology, the CNN-based keyword detection model achieves 97.23% accuracy for the safety-related 'ON' keyword, placing it only slightly above comparable works, while the LSTM-based negative emotion recognition registers 88.94% accuracy, trailing advanced architectures from recent developments. The dataset curation, different methodologies implemented, and	10.1186/s40537-025-01090-0	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40537-025-01090-0	SpringerLink
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		<p>system pipeline are some of the building blocks discussed further. The paper also compares feature extraction techniques such as MEL Frequency Cepstral Coefficients (MFCC), Linear Prediction Cepstral Coefficients (LPCC), CHROMA, and MEL. Moreover, as speech recognition applications with more than one model are becoming increasingly popular, this analysis would help develop applications that require a similar end-to-end construct.</p>			
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Modelling the Effects of Wolbachia-Carrying Male Augmentation and Mating Competition on the Control Of Dengue Fever	Zhang, Xianghong, Liu, Xianning, Li, Yazhi, Liu, Qiyong, Zhu, Huaiping,	Dengue fever is the most common arboviral infection of humans, responsible for a substantial disease burden to the world. Lately, an innovative technology has been approved to suppress natural mosquitoes by releasing Wolbachia-carrying male mosquitoes. To depict the transmission of dengue virus among mosquito and human populations, we respectively couple a stage-structure mosquito population model with and without male augmentation and mating competition into a dengue epidemic model. Dynamical properties of the two high dimensional systems are investigated, including the invariance and boundedness, the existence and local stability of their equilibria and bifurcation analysis. It reveals that there may be a forward or backward bifurcation, or a combination of a saddle-node bifurcation and a forward or backward bifurcation. Moreover, global dynamical properties are explored by comprehensively using the properties of limit system, Lyapunov function and geometric approach. Our results suggest that male augmentation cannot always ensure the eradication of	10.1007/s10884-023-10286-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10884-023-10286-y	SpringerLink
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		<p>mosquitoes or dengue cases, but it can suppress dengue epidemic to a certain extent. Thus we define the five possible suppression levels of dengue fever and obtain their suppression rates. Also, we investigate how release ratio, mating competition, the rate of cytoplasmic incompatibility and the basic offspring number affect the suppression rates. Finally, under different environment situations, we discuss how to combine male releases, traditional mosquito control methods and human control measures to suppress dengue cases. This study will be helpful for public health authorities in designing proper strategies to control and prevent the epidemics of dengue fever.</p>			
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Performance Metrics of Unmanned Aerial Vehicles from the Perspective of ISR Applications	Alagurajan, Vadivelan, Rajagopal, S, Kulkarni, Vinayak Narayan,	Unmanned Aerial Vehicles (UAV) have become a part of regular inventory for military and civilian applications. At present, UAVs are designed with design methodology of manned aircrafts with little fine tuning in configuration to integrate the payloads, datalink, etc. There is a need to identify important metrics for UAV to facilitate the UAV developers to realize an optimum configuration. Towards this, a system of categorizing and defining the metrics is proposed for Intelligence, Surveillance and Reconnaissance (ISR) UAVs. The metrics are categorized as performance metrics, design metrics and cross-cutting metrics based on the stakeholder categorization of Customer, Developer and Facilitator. The performance metrics for ISR UAV related to area coverage, range, time of flight and ceiling are compiled. A preliminary estimation of performance metrics for various types of ISR UAVs with Electro Optic payload is carried out to obtain insight about their ISR capability.	10.1007/s41403-024-00508-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41403-024-00508-0	SpringerLink
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Learning from high-dimensional cyber-physical data streams: a case of large-scale smart grid	Hassani, Hossein, Hallaji, Ehsan, Razavi-Far, Roozbeh, Saif, Mehrdad,	Quality of data and complexity of decision boundaries in high-dimensional data streams that are collected from cyber-physical power systems can greatly influence the process of learning from data and diagnosing faults in such critical systems. These systems generate massive amounts of data that overburden the system with excessive computational costs. Another issue is the presence of noise in recorded measurements that poses a challenge to the learning process, leading to a degradation in the performance of fault diagnosis. Furthermore, the diagnostic model is often provided with a mixture of redundant measurements that may deviate it from learning normal and fault distributions. This paper presents the effect of feature engineering on mitigating the aforementioned challenges in learning from data streams collected from cyber-physical systems. A data-driven fault diagnosis framework for a 118-bus power system is constructed by integrating feature selection, dimensionality reduction methods, and decision models. A comparative study is enabled accordingly to compare several advanced techniques in	10.1007/s13042-024-02365-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13042-024-02365-3	SpringerLink
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		both domains. Dimensionality reduction and feature selection methods are compared both jointly and separately. Finally, experiments are concluded, and a setting is suggested that enhances data quality for fault diagnosis.			
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Visualisation of cyber vulnerabilities in maritime human-autonomy teaming technology	Walter, Mathew, Vineetha Harish, Avanthika, Christison, Luke, Tam, Kimberly,	<p>Marine operations are increasingly leveraging AI technologies to improve performance and efficiency. However, there are many factors that affect safety, from the remote operating centre (ROC) to autonomous vessels. This includes both hardware and software that augments or replaces direct human control. Further, the integration of AI for autonomy also introduces new cyber security vulnerabilities arising from adversarial threats and complex interactions between conventional and AI-driven systems. In response, we propose a comprehensive assessment approach that assesses the security of marine technologies by addressing risks to both traditional systems and emerging AI components. In this wider system-of-systems view, the authors detail the key elements of a thorough security assessment of a Maritime Autonomous Surface Ship (MASS), ROC and vessel ecosystem and present the corresponding cyber security mitigations for systems running AI in MASS. These penetration tests are carried out on real instances of AI, ROCs, and autonomous vessels to</p>	10.1007/s13437-025-00362-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13437-025-00362-z	SpringerLink
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		demonstrate feasibility and impact. These individual tests and evaluations are then compiled into a single case study that highlights the potentially devastating consequences of deploying inadequately secured technologies in MASS. This case study is then used to discuss possible mitigations that can be used to better secure and protect the physical and digital assets of MASS.			
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When and how digital novel technologies matter to firm marketing performance	Gnizy, Itzhak,	Adoption of digital novel technologies (DNT) is an important phenomenon faced by managers that is attracting emergent research attention. Although previous research establishes that DNT in general enhance business performance, more recent theorizing suggests that this may not always be the case. Notwithstanding, researchers have paid little attention to contingency conditions that may affect the strength and nature of the relationship between DNT and marketing performance. By examining organizational factors that moderate the DNT–performance relationship, this study explores types of firm for which DNT are particularly beneficial. Based on survey data from firms and empirical analyses, findings indicate that firms pursuing agility and digital business transformation strategies are in a favorable position to achieve better performance when adopting DNT. Additionally, the DNT–performance link is stronger for smaller, product-based firms, regardless from B2B/B2C sectors. The study sheds light on the vision of Industry 4.0 transition with	10.1057/s41270-024-00288-0	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41270-024-00288-0	SpringerLink
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		implications for academics. Executives evaluating the adequacy of DNT adoption should consider certain contingencies advanced in this research.			
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Review on design, development, and implementation of an unmanned aerial vehicle for various applications	Mubina Shekh, Rani, Sushila, Datta, Rituparna,	<p>Drones are technically denoted as unmanned aerial vehicles (UAVs) or unmanned aerial systems (UAS). These are remotely or autonomously piloted aircraft and can fly without an onboard human pilot while being controlled from the ground. The need for UAVs is commonly found in wireless communication beyond human trajectory. Recently, drones have been used for a wide variety of tasks, including military operations, mining, agriculture, and general-purpose applications such as surveillance, exploration, rescue, arms and product delivery, mapping and surveying, entertainment, photography, etc. These UAVs are equipped with a range of Micro-electromechanical Systems (MEMS), including sensors, cameras, controllers, etc. In this manuscript, a novel taxonomy of flying drones with their explicitly defined applications, encompassing UAVs to smart sensors, has been reviewed. The paper also consists of a quick overview of various designing, controlling, and intelligent controller and navigation approaches of UAVs with possible applications. The goal of this study is to offer a</p>	10.1007/s41315-024-00359-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41315-024-00359-6	SpringerLink
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		<p>review of the best techniques that the researcher can employ or suggest for various UAV-based applications. The paper highlights several challenges that are associated with the modeling, building, controlling, and navigating of UAVs. The article also attempts to suggest some lesser-explored areas that have the potential for future research work, such as battery refilling management, anti-theft devices, sensors to avoid collision, etc.</p>			
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Valuing the Economic Impact of River Floods and Early Flood Warning for Households in Bangladesh	Zayed, Stephanie, Morrison, Laura T. R., Lapidus, Daniel, Gallaher, Michael, Letterman, Clark, Allpress, Justine L. E., Cummings, Stirling,	Flood early warning systems have the potential to mitigate damages for vulnerable populations that experience river flooding in Bangladesh. We conducted a 2,247 household survey and series of focus groups to estimate the economic damages from 2016 river floods and the hypothetical savings of a 3- and 8-day warning for households living in the Jamuna River floodplain. Households were identified using geo-sampling, a novel geographic information system (GIS)-based sampling methodology that facilitates probability-based sampling where data are insufficient. Total damages for the entire flood plain in 2016 totaled to \$1.3 billion, or 25% of household income and assets. Respondents estimated avoided damages from a hypothetical 3- and 8-day warning to be \$73m and \$85m, respectively, reflecting diminishing returns to additional days of early warning. With the hypothetical early warning, respondents derived the greatest savings from protecting their land, household/dwelling, and livestock. The greatest savings to households receiving a	10.1007/s41885-024-00156-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41885-024-00156-2	SpringerLink
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		<p>hypothetical additional 5 days of warning (from a 3- to an 8-day warning) would be realized in protecting agricultural production. Selling assets/livestock and employing protective sandbags were the preventative actions with the highest benefit–cost ratios that households said they would undertake. Importantly, only 11% of households received any early warning at all during the 2016 flood season, suggesting that the greatest benefits moving forward would be achieved by communicating existing or improved warnings more effectively to households in the floodplain.</p>			
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Efficient power management unit for IIOT edge computing applications	Sharma, Mukul, Chawla, Rashmi,	<p>The application of Internet of Things (IoT) is well seen in mass domains, and this reflects the prominence of Industrial IoT (IIOT). However, the main challenge of IIoT applications is continuous power consumption by various components to acquire data all the time. Energy harvesting can be one of the potential solutions to this problem in many applications; however, continual energy usage remains main IIoT con for many cases. The energy generated by ambient sources is inadequate to run system application, and a need for better Power Management Unit (PMU) still persists. This research paper proposes a PMU framework for energy efficient edge computing application with three layers of IoT architecture. Design-build on this deployment constitutes the sleep and awake mode scheduling, with application specific calculative break intervals. The transitions of states retain an energy-efficient solution for the entire system. The design is tested on ZYBO Zynq-7000 (XC7Z010-1CLG400C) ARM/FPGA SoC board for development and evaluation. Simulation results demonstrate the task scheduling of our proposed architecture and energy</p>	10.1007/s13198-024-02656-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02656-6	SpringerLink
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		consumption details. In brief, the proposed design proves to be a beneficial option, in particular, surpassing related designs for industrial automation.			
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Integrating contextual intelligence with mixture of experts for signature and anomaly-based intrusion detection in CPS security	Rahim, Kashif, Nasir, Zia Ul Islam, Ikram, Nassar, Qureshi, Hassaan Khaliq,	<p>The adoption of IoT and cyber-physical systems (CPSs) in smart homes and critical infrastructures has led to the possibility of physical damage from system compromises. Security failures in sectors like power, transport, and public safety can have more severe physical impacts than just information loss. Intrusion detection systems (IDSs) are crucial in a defense-in-depth approach. We propose a detection engine to prevent CPS from transitioning into unsafe states beyond critical limits, thresholds, and behavioral normalities. A novel host-based IDS using a mixture-of-experts (MoE) model is introduced in the CPS security paradigm. For signature-based protection, we developed a context-aware CPS-SNORT ruleset for deep packet inspection (DPI) of Gcode instructions (NIST RS-274/ISO 6983-1:2009) used in numerical control of machines like CNCs and 3D printers. A new Gcode dataset was developed on a CPS test bed. In a supervised learning approach, we achieved over 99% accuracy with random tree for known attack detection. In a semi-supervised approach, logistic regression achieved 85%</p>	10.1007/s00521-024-10967-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-024-10967-9	SpringerLink
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		accuracy. For behavioral anomaly detection, LSTM achieved 99.9% accuracy, outperforming isolation forest and local outlier factor.			
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<p>Generative Artificial Intelligence: Evolving Technology, Growing Societal Impact, and Opportunities for Information Systems Research</p>	<p>Storey, Veda C., Yue, Wei Thoo, Zhao, J. Leon, Lukyanenko, Roman,</p>	<p>The continuing, explosive developments in generative artificial intelligence (GenAI), built on large language models and related algorithms, has led to much excitement and speculation about the potential impact of this new technology. Claims include artificial intelligence (AI) being poised to revolutionize business and society and dramatically change personal life. However, it is not clear how this technology, with its significantly distinct features from past AI technologies, has transformative potential or how researchers in information systems should react to it. In this paper, we consider the evolving and emerging trends of AI in order to examine its present and predict its future impacts. Many existing papers on GenAI are either too technical for most information systems researchers or lack the depth needed to appreciate the potential impacts of GenAI. We, therefore, attempt to bridge the technical and organizational communities of GenAI from a system-oriented sociotechnical perspective. Specifically, we explore the unique features of GenAI, which are rooted in the continued change from symbolism</p>	<p>10.1007/s10796-025-10581-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-025-10581-7</p>	<p>SpringerLink</p>
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		<p>to connectionism, and the deep systemic and inherent properties of human-AI ecosystems. We retrace the evolution of AI that proceeded the level of adoption, adaption, and use found today, in order to propose future research on various impacts of GenAI in both business and society within the context of information systems research. Our efforts are intended to contribute to the creation of a well-structured research agenda in the information systems community to support innovative strategies and operations enabled by this new wave of AI.</p>			
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Advanced financial security system using smart contract in private ethereum consortium blockchain with hybrid optimization strategy	Prabanand, S. C., Thanabal, M. S.,	<p>In traditional stock market, the global processing framework shares the data to various mediators like financial and government institutions. The institutional firms needs to handle with large number of data in the system and cooperates with others to provide the trades on the stock exchange platform, and consistently buy-sell orders pass through various parties before settlement. It involves a complex chain of intermediaries, has several drawbacks like weak transparency, long lead times for financial settlements, and a single point of failure.</p> <p>Blockchain (BC) computer node network securely shares the common ledger without intermediaries. This paper uses a deep learning-based Smart contract in the private ethereum consortium blockchain (PEC-BC) to provide financial security. First, the data is collected. Then it is given to the next stage. The Dynamic Butterfly-Billiards Optimization Algorithm (DB-BOA) is used to choose the leader block. Further, the selected new leader block is used in the Adaptive Deep Temporal Context Networks (ADTCN) with a consensus algorithm to make secured smart contracts. Here, the parameters are optimized by</p>	10.1038/s41598-025-89404-3	https://www.nature.com/articles/s41598-025-89404-3.pdf	SpringerLink
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		DB-BOA. The developed ADTCN-based financial security system was compared with other conventional methods, and algorithms performed well.			
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Smart factory concepts and their fitness to the plastics processing industry: a critical review	Bibow, Pascal, Sapel, Patrick, Hopmann, Christian,	<p>A key feature for implementing Industry 4.0 in practice is the Smart Factory. Although there has been much research on this buzzword, it can be observed that there is a need for a distinct definition. Furthermore, differentiation to other terms and paradigms, e.g., Cyber-Physical-Production-Systems (CPPS), Industrial-Internet-Of-Things (IIoT), or Industry 4.0, can hardly be found. To overcome these issues, the term "Smart Factory" was defined in the context of comparable terms and paradigms. Therefore, a literature research on 175 scientific contributions was performed and clustered into three categories regarding their scope, i.e., general literature review, conceptual work, and application-oriented case studies. Subsequently, a categorization of these contributions to their content either into terms and definitions, general discussion on challenges and chances, application-oriented engineering trends and technologies, resulting requirements and restrictions, and security and safety issues follows. As a result, three main pillars of Smart Factory objectives were</p>	10.1007/s10696-025-09593-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10696-025-09593-x	SpringerLink
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		<p>determined, namely data analytics, automation, and modular structures. Finally, the readiness of the plastics processing industry in these pillars is discussed to transfer Smart Factory concepts into practical use and state high fitness, e.g., in terms of data acquisition and communication standards. This contribution supports researchers and practitioners in achieving a common understanding of the term "Smart Factory" and its specifications, providing them with a framework of technological objectives to offer industrial companies the right solutions for a comprehensive Smart Factory implementation. Furthermore, the categorization of the reviewed literature serves as a foundation for subsequent research within specific areas of interest by differentiating well-elaborated topics from scientific white spots.</p>			
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The spatial turn in internet of things: a digital contouring	Moinuddin, Shekh,	<p>The internet of things (IoT) refers to a network of digital devices that can be managed and controlled through various means, including voice commands, web interfaces, remote control protocols, mobile applications, near field communication, Bluetooth, and physical interactions. These IoT devices are equipped with Bluetooth technology and a variety of sensors, enabling communication with users across a diverse array of applications in home, industrial, automotive, and healthcare sectors, effectively replacing conventional electrical and electronic devices such as doorbells, clocks, tube lights, and bulbs. Unlike traditional electronic devices that operate in a decentralized manner, requiring individual control and management, IoT devices are designed to work in harmony with other digital devices, allowing for centralized control and regulation. This interconnected system of IoT devices creates a framework of spatial understanding that manifests in various cognitive forms, with each contour representing a distinct aspect of spatial comprehension observable in both public and private spaces.</p>	10.1007/s10708-025-11300-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10708-025-11300-0	SpringerLink
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		<p>This paper explores three key research questions: In what ways do IoT devices manifest spatial contours? How are IoT devices interconnected in a spatial context? How does the spatial turn in IoT devices exhibit the concepts of space and place in a virtual continuum?.</p>			
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AmazonAICloud: proactive resource allocation using amazon chronos based time series model for sustainable cloud computing	Wang, Han, Mathews, Kevin Joji, Golec, Muhammed, Gill, Sukhpal Singh, Uhlig, Steve,	<p>Efficient cloud resource allocation is critical for optimising cloud computing services in terms of minimising operational costs and improving energy efficiency. The increasing demand for cloud services results in considerable energy consumption. In order to improve cloud sustainability and reduce energy consumption, the latest Artificial intelligence (AI) techniques, such as deep learning, can be applied to accurately predict resource utilisation, thereby optimising cloud performance.</p> <p>This paper introduces a novel framework, AmazonAICloud, that integrates Amazon Chronos, a time-series forecasting model, to forecast CPU utilisation and enhance resource allocation in cloud computing environments.</p> <p>The AmazonAICloud framework utilises a real-world cloud dataset that contains 1750 VM traces from BitBrains. We implement the Chronos model on Amazon web services (AWS) SageMaker and evaluate its performance against the baseline models like Autoregressive integrated moving average (ARIMA), Long Short-term memory (LSTM), and DeepAR using various machine learning-</p>	10.1007/s00607-025-01435-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-025-01435-w	SpringerLink
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		based evaluation metrics. Finally, the experimental results show that the Amazon Chronos model outperforms the baseline models in terms of CPU usage prediction, allowing for effective resource provisioning to reduce operational costs and energy consumption.			
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Underwater optical MIMO for high data-rate IoUT	Zayed, M. Mokhtar, Shokair, Mona, Elagooz, Salah,	<p>The increasing demand for high-speed, reliable communication in underwater environments has sparked significant interest in underwater optical multiple-input multiple-output (MIMO) systems. This paper investigates the potential of MIMO technology to substantially enhance data transmission rates for underwater optical wireless communication (UWOC) networks, specifically in the context of the internet of underwater things (IoUT) applications. We conduct a comprehensive comparative analysis of a 4×4 MIMO system against Single-Input Single-Output (SISO) and single-input multiple-output configurations (1×1 and 1×4, respectively) across various modulation schemes, including On–Off Keying (OOK), 32-Phase Shift Keying (32-PSK), and 64-quadrature amplitude modulation (64-QAM), in two water types: pure seawater and clear ocean water. Our system employs a laser diode (LD) operating at a wavelength of 450 nm, which is particularly effective in these aquatic environments. By leveraging spatial diversity, we address challenges related to optical</p>	10.1007/s12596-025-02493-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12596-025-02493-1	SpringerLink
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		<p>turbulence, scattering, and attenuation in underwater communication. Extensive simulations were conducted to evaluate performance metrics such as bit error rate (BER), signal-to-noise ratio (SNR), channel capacity, received power, and data throughput. The proposed optical MIMO (4x4) system demonstrates superior data rates, enhanced communication range, and improved reliability compared to conventional single-beam approaches. At a BER of 10^{-5}, the required transmitted power per bit for OOK in pure seawater decreases significantly from 16.67 dB in SISO to 4.85 dB in MIMO, representing a 70.9% reduction. Similarly, the link range for OOK in pure seawater increases from 2.02 m in SISO to 36.87 m in MIMO, achieving an 18-fold improvement. Furthermore, the channel capacity at an SNR of 10 dB for 64-QAM in pure seawater improves from 20.44 bits/sec/Hz in SISO to 43.64 bits/sec/Hz in MIMO, more than doubling the capacity. These results emphasize the advantages of MIMO configurations and higher-order modulation in UOWC systems, particularly in optical turbulence. The</p>			
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		<p>study illustrates MIMO's ability to enhance communication range, link reliability, and data throughput, making it suitable for critical IoUT applications such as environmental monitoring, underwater exploration, and maritime security. Thus, MIMO stands out as a robust solution for addressing underwater communication challenges in turbulent and high-attenuation environments.</p>			
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<p>A cybersecurity risk assessment methodology for industrial automation control systems</p>	<p>Brancati, Francesco, Mongelli, Diamantea, Mariotti, Francesco, Lollini, Paolo,</p>	<p>Industrial automation control systems (IACS) are employed in current critical infrastructures and industrial plants spanning very different domains, and the transformation process towards Industry 4.0 is further increasing the dependencies on such systems. Since IACS can be exposed to malicious threats that could lead to catastrophic consequences, it is extremely important to assess the cybersecurity risk of these systems, to identify the possible threats, their impact, likelihood, and possible countermeasures . The ISA/IEC 62443 series of standards is suited for the design and security risk analysis of IACS, and has been submitted to the International Standards on Auditing and International Electrotechnical Commission for global adoption as international standards. In this paper, we focus on the zone and conduit requirement 5 (ZCR 5) of the 62443-3-2 part of the standard, which provides the steps for detailed cybersecurity risk assessment of IACS. These steps are fundamental to identify threats related to the system, determine the risk associated with them, and derive appropriate countermeasures . We provide a</p>	<p>10.1007/s10207-025-00990-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-025-00990-9</p>	<p>SpringerLink</p>
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		<p>methodology for conducting a detailed risk assessment of IACS that is compliant with all the steps of the ZCR 5 and integrates the following features: (i) capability to manage the complexity of the assessment process, (ii) capability to select tailored countermeasures for critical assets through the identification of attack paths, (iii) explicit involvement of the asset owner in the key steps of the assessment process, and (iv) tool-supported. We illustrate the methodology by applying it to a case study of a power plant using gas turbines.</p>			
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<p>Urban Water Stress: Climate Change Implications for Water Supply in Cities</p>	<p>Borah, Gongutri,</p>	<p>Urban water stress is an escalating global concern, driven by the confluence of rapid urbanization, population growth, and the pervasive impacts of climate change. This review paper explores the multifaceted implications of climate change on urban water supply systems, highlighting the vulnerabilities and adaptive capacities of cities worldwide. Climate change exacerbates water scarcity through altered precipitation patterns, increased frequency of extreme weather events, and rising temperatures, which collectively strain existing water resources. Urban areas, with their high population densities and significant water demands, are particularly susceptible to these changes. This paper synthesizes recent research on the hydrological impacts of climate change, evaluates the resilience of urban water infrastructures, and examines innovative strategies for sustainable water management. Emphasis is placed on the importance of integrated water resource management, the adoption of advanced technologies, and policy frameworks that support adaptive capacity. Through</p>	<p>10.1007/s41101-025-00344-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41101-025-00344-5</p>	<p>SpringerLink</p>
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		a comprehensive analysis, this review aims to inform stakeholders and policymakers on effective interventions to mitigate urban water stress in the face of an uncertain climate future.			
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Metaheuristic optimization algorithms for multi-area economic dispatch of power systems: part II—a comparative study	Wang, Yang, Xiong, Guojiang,	Multi-Area Economic Dispatch (MAED) plays an important role in the operation and planning of power systems. In Part I of this series, we have summarized various optimization techniques to the MAED problem comprehensively, showing clearly that metaheuristic optimization algorithms (MOAs) have become the dominant approach for solving this problem due to their ease of application and powerful search capability. Although many different types of MOAs have been proposed, there is no study on the comprehensive evaluation, comparison and recommendation of different MOAs for the MAED problem. In this part, we selected 32 algorithms including differential evolution, particle swarm optimization, teaching–learning based algorithm, JAYA algorithm, and their advanced variants to evaluate and compare their performance on the eleven reported MAED cases summarized in Part I of this series. The comparative study was comprehensively conducted based on various performance criteria including solution quality, convergence, robustness, computational efficiency, and statistical	10.1007/s10462-025-11125-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-025-11125-w	SpringerLink
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		<p>analysis. The comparisons reveal that the DE series is the most competitive overall. Nevertheless, there is no single algorithm that ranks in the top three on all cases. This study can provide a practical reference and applicability recommendation for the selection of MOAs for solving the MAED problem.</p>			
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<p>A Study of a Seasonal Influenza Model in Deterministic and Stochastic Environments</p>	<p>Zhang, Xiaoshan, Zhang, Xinhong, Jiang, Daqing,</p>	<p>Seasonal influenza occurs annually and is one of the most common infectious diseases in the world, posing a threat to public health security. Therefore, it is essential to study the dynamics of seasonal influenza to raise public awareness and implement scientific prevention measures. Huo et al. studied a deterministic seasonal influenza model in Gansu, China; in this paper, we extend their study starting from proving the local asymptotic stability of the endemic equilibrium. In addition, considering the non-negligible effects of environmental disturbance on the transmission of influenza viruses, we assume that the transmission rate in the deterministic model follows a lognormal Ornstein–Uhlenbeck process; therefore, we formulate the corresponding stochastic model. To analyze the dynamics of the stochastic model, we first verify the existence and uniqueness of the global positive solution. Next, by constructing suitable Lyapunov functions, we obtain sufficient conditions for the stationary distribution and the extinction of the disease. More precisely, we deduce that the seasonal influenza persists</p>	<p>10.1007/s00332-025-10132-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00332-025-10132-z</p>	<p>SpringerLink</p>
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		<p>when $R_0^s > 1$ while it dies out when $R_0^E < 1$. Furthermore, we derive the exact expression of probability density function around the quasi- endemic equilibrium. Finally, we carry out numerical simulations to explore the effects of environmental noise on virus dynamics.</p>			
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<p>A Conceptual Framework for Digital Twin in Healthcare: Evidence from a Systematic Meta-Review</p>	<p>Pellegrino, Giulia, Gervasi, Massimiliano, Angelelli, Mario, Corallo, Angelo,</p>	<p>Digital Twin (DT) technology monitors, simulates, optimizes, models, and predicts the behavior of physical entities. Healthcare is a significant domain where a DT can be functional for multiple purposes. However, these diverse uses of DTs need a clear understanding of both general and specific aspects that can affect their adoption and integration. This paper is a meta-review that leads to the development of a conceptual framework designed to support the high-level evaluation of DTs in healthcare. Using the PRISMA methodology, the meta-review synthesizes insights from 20 selected reviews out of 1,075 studies. Based on this comprehensive analysis, we extract the functional, technological, and operational aspects that characterize DTs in healthcare. Additionally, we examine the structural (e.g., hierarchical) relationships among these aspects to address the various complexity scales in digital health. The resulting framework can promote the effective design and implementation of DTs, offering a structured approach for their assessment.</p>	<p>10.1007/s10796-024-10536-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-024-10536-4</p>	<p>SpringerLink</p>
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Understanding the social–ecological systems of non-state seafood sustainability scheme in the blue economy	Elegbede, Isa Olalekan, Fakoya, Kafayat A., Adewolu, Morenike A., Jolaosho, Toheeb Lekan, Adebayo, Joseph Adewale, Oshodi, Esther, Hungevu, Ruth Funmilola, Oladosu, Amos Olayinka, Abikoye, Oluwatoyosi,	Non-state sustainability initiatives, such as eco-certification and voluntary sustainability standards, are eco-friendly, market-driven, and privately managed initiatives that garner support from concerned stakeholders in the blue economy. Consequently, these initiatives play pivotal roles in enhancing resource sustainability within the seafood sector. However, despite their importance, the intricacies of how non-state seafood sustainability schemes operate within the blue economy remain unclear. Therefore, this study examines the interactions of these non-state actors within institutional, social, and ecological contexts to improve common resource management. This study is based on a comprehensive review of secondary data from the literature to delineate its scope. In recent years, there has been an increase in non-state initiatives advocating for sustainable fisheries and the sustainable use of natural blue resources. These initiatives claimed to exhibit established institutional, social, and ecological synergies, yet the foundational principles guiding them remain	10.1007/s10668-023-04004-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-023-04004-3	SpringerLink
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		<p>underexplored. It is essential to note that addressing the long-term sustainability issues in the socioeconomic-ecological systems requires the resilience shift of non-state initiatives. Thus, non-state institutions must strengthen their resilience management capabilities by collaborating with other actors, networks, and institutions to promote sustainable development. This collaboration fosters societal understanding of these resilience factors, which are portrayed in this study. Finally, effective resource management necessitates a delicate balance between economic considerations and environmental preservation, supporting the sustainability of common resources. It is imperative to deepen our understanding of the interplay between the socioeconomic and ecological facets of these systems to ensure that our environmental laws serve as the proper framework for effective resource regulation and management.</p>			
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<p>The Sendai Framework and Satellite Security</p>	<p>Hamill-Stewart, Jessie,</p>	<p>The Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR) aims to play a fundamental role in increasing global resilience. The focus of this research is to consider analysis of risks and recovery related to satellite disruption within the context of the SFDRR. Analysis of satellite disruption has often been more technical and less focused on supporting recovery. This research considers the framework's relevance for preventing disruption to satellite systems and global recovery measures for related disasters that emerge due to dependence on satellites. First, the use of space terminology within the framework is considered. Next, principles within the SFDRR that are relevant to satellite system disruption are highlighted, and this is followed by presentation of key gaps relevant to this disruption, before potential improvements to expand the framework are proposed. This article outlines how concepts within the SFDRR could help to improve recovery from a disaster that occurs due to worst-case-scenario type satellite disruption. In this case, critical satellites are disrupted, preventing</p>	<p>10.1007/s13753-025-00614-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-025-00614-9</p>	<p>SpringerLink</p>
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		<p>access to fundamental services such as navigation and timing. The aims of this research are to consider how the SFDRR can be expanded to consider disruption to critical satellite systems, by identifying aspects of the framework that are applicable to this type of disaster. Another outcome is to contribute to wider disaster recovery literature by encouraging consideration of disasters involving disruption to digital services.</p>			
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Systematic mapping of scientific publications on MaaS	Natvig, Marit K., Stav, Erlend, Vennesland, Audun,	<p>Mobility as a Service (MaaS) is a concept aiming for the provision of a diversity of transport services to travellers via one single user interface as one integrated service. The intention is to provide flexible mobility services to individuals and families to constitute an alternative to car ownership. This paper aims to provide an overview of the MaaS research area. A systematic mapping study of scientific literature on MaaS up till and including 2020 has been conducted. 193 articles are included in the study through searches in scientific databases and a structured selection and classification process. The findings are analysed and discussed. Eight main topics were identified in the MaaS literature: User aspects, Societal aspects, MaaS functionality, MaaS integration, MaaS implementation, Business aspects, Technology aspects, and Privacy and security aspects. The main results are: (i) Coding schemes defining the structure and scope of the MaaS research area with respect to the main topics and sub-topics, approaches used and contribution types; (ii) a classification of the selected literature on</p>	10.1007/s11301-023-00375-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11301-023-00375-z	SpringerLink
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		<p>MaaS according to the coding schemes; (iii) analysis and discussions of the findings; and (iv) discussions of trends and gaps in the MaaS research. The study contributes to a broader and more detailed overview of the MaaS research area than previous work and can support the discovery of relevant literature, assist positioning of research within the research area, be used as a foundation for further literature studies, and guide the direction of future work on MaaS.</p>			
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Digital twin for product design collaboration: a systematic literature review	da Trindade, Eduardo Silveira, da Costa, Cristiano André, de Souza, Vinicius Costa,	<p>Product lifecycle management (PLM) and digital twin are two interrelated ideas increasingly employed in today's manufacturing and engineering. Integration of digital twins with PLM provides various advantages, including collaboration, better productivity, improved product quality, increased innovation, and shorter time-to-market.</p> <p>Organizations may better identify and handle possible issues, enhance performance, and improve decision-making across the product lifecycle by utilizing digital twin technologies inside a PLM framework.</p> <p>Therefore, this article takes an approach to identify the main trends of the digital twin applied in the context of PLM, as well as to identify research gaps. The method used to conduct this systematic literature review was based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) with a total of 157 articles being considered for this research. In addition, this article identifies proposed models of digital twin architectures offered as a service and how the product design concept can be driven by the digital twin in decision-making.</p>	10.1007/s00170-025-15042-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-15042-8	SpringerLink
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		<p>Another contribution to define how it may be possible to automate the search for product information using augmented reality and artificial intelligence. The prospects for the integration of digital twins and PLM systems are promising, given the continuous advancements in technology. A notable area of potential growth is the application of artificial intelligence (AI) and machine learning to enhance the automation and optimization of processes within the digital twin framework. In conclusion, the integration of AI and machine learning with digital twins and PLM systems is ready to drive substantial innovations in manufacturing and engineering, promoting improved operational efficiencies and product performance.</p>			
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<p>Digital twin for product versus project lifecycles' development in manufacturing and construction industries</p>	<p>Abanda, F. H., Jian, N., Adukpo, S., Tuhaise, V. V., Manjia, M. B.,</p>	<p>Digital twin, as an important enabling tool for digital transformation, has received increasing attention from researchers and practitioners since its definition was formalised. Especially in the global context and exacerbated by Covid-19, the applications of the digital twin have offered opportunities for many industries. While the digital twin has already been widely used in many sectors such as manufacturing and the construction industry—one of the key engines of economic development, is still lagging behind many other sectors. This study uses the systematic literature review to assess the applications of digital twin in manufacturing and construction respectively, the benefits it brings, and the impediments to its application. Based on this, a comparison is made of digital twin applications in the manufacturing and construction industries to draw lessons. This study concluded that although the use of digital twin in manufacturing is better than construction overall, it is still not reaching its full potential. Despite many benefits brought by the digital twin to construction during the project lifecycle, the construction sector faces even greater</p>	<p>10.1007/s10845-023-02301-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-023-02301-2</p>	<p>SpringerLink</p>
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		<p>challenges than manufacturing in digital twin adoption. By comparison, this study drew five lessons to drive better adoption of the digital twin. The construction industry needs to accelerate the deployment of relevant hardware, promote the standard unification of digital twin, explore the whole lifecycle application of the digital twin, enhance data protection, and embrace changes. This study was limited in the scope of data collection. Future research could focus on gathering information from specific case studies, to produce more comprehensive perspectives.</p>			
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Live digital twin with virtual reality for accessible and immersive manufacturing education	Yang, Sheng, Mirahmadi, Sayed Amirhossein, Zhu, Enshen, Solanki, Bhavesh,	<p>The shift towards Industry 4.0 has exerted great financial and technical pressure on skilled workforce training because of a significant increase in the complexity of automation, information, and system integration. This resource-demanding trend creates a systematic barrier for education inequity in small-to-medium engineering schools. Moreover, the COVID-19 pandemic also highlights the challenges in offering experiential learning due to limited access to physical labs. To overcome such barriers, a promising pathway towards accessible and immersive manufacturing education is the integrated cloud-based digital twin (CBDT) and virtual reality (VR) technologies. The CBDT helps to build a digital twin (DT) that creates an up-to-date digital copy of the physical labs or systems using cloud infrastructure and WebGL, while the VR helps to create an immersive and interactive environment for enhanced learning outcomes. This paper introduces a general accessible and immersive manufacturing education (AIME) framework that features CBDT, VR, various learning modes, and personalized</p>	10.1007/s00170-025-15078-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-025-15078-w	SpringerLink
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		<p>learning concepts. Then, an AIME framework-based prototype system was partially implemented as a testbed for learning efficacy evaluation. A comprehensive user study was conducted with the segregation of volunteers into three distinct experimental environments: in-person labs, asynchronized labs, and live interactive DT labs. The findings underscore the effectiveness of these live interactive DT labs in enhancing the learning outcome of users, increasing their ability to comprehend complex manufacturing processes, and improving troubleshooting abilities. Some limitations and future work directions are further discussed at the end.</p>			
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Convergence of evolving artificial intelligence and machine learning techniques in precision oncology	Fountzilas, Elena, Pearce, Tillman, Baysal, Mehmet A., Chakraborty, Abhijit, Tsimberidou, Apostolia M.,	The confluence of new technologies with artificial intelligence (AI) and machine learning (ML) analytical techniques is rapidly advancing the field of precision oncology, promising to improve diagnostic approaches and therapeutic strategies for patients with cancer. By analyzing multi-dimensional, multiomic, spatial pathology, and radiomic data, these technologies enable a deeper understanding of the intricate molecular pathways, aiding in the identification of critical nodes within the tumor's biology to optimize treatment selection. The applications of AI/ML in precision oncology are extensive and include the generation of synthetic data, e.g., digital twins, in order to provide the necessary information to design or expedite the conduct of clinical trials. Currently, many operational and technical challenges exist related to data technology, engineering, and storage; algorithm development and structures; quality and quantity of the data and the analytical pipeline; data sharing and generalizability; and the incorporation of these technologies into	10.1038/s41746-025-01471-y	https://www.nature.com/articles/s41746-025-01471-y.pdf	SpringerLink
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		the current clinical workflow and reimbursement models.			
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Evaluation of technology integration's influence on the virtual classroom service system acceptance using the UTAUT framework	Muhamad, Wardani, Suhardi, Bandung, Yoanes,	<p>The virtual classroom service system was developed as a system-of-systems that integrates three key virtual class service systems: teaching administration, course content management, and video meetings. After being used to assist online training, it is vital to assess the level of user acceptability of the technology utilized. UTAUT was used as a framework for measurement. In addition to utilizing the original construct from this framework, this study introduces the Technology Integration (TI) construct as a novelty that meets the characteristics of virtual classroom service systems as a system-of-system. The system acceptability assessment included 55 respondents who had actively used the system in online training activities. They completed a questionnaire based on a hypothesis model created for the specified UTAUT construct. Furthermore, the PLS algorithm, in conjunction with Smart PLS 3.0 software, is used to process questionnaire data from respondents. According to the algorithm calculations, the hypothesis model designed has an explanatory power score above 0.6 for each dependent</p>	10.1007/s40692-024-00351-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40692-024-00351-w	SpringerLink
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		<p>variable. This suggests the model can make accurate predictions. Furthermore, construct TI has the highest influence among other constructs in determining the user's intention (0.491) and actual use (0.423) of the virtual classroom service system. These findings can be useful for educational institutions that use virtual classrooms. In addition, various development recommendations are presented to serve as a valuable resource for future enhancement.</p>			
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No easy way out: towards a framework concept of long-term governance	Scheer, Dirk, Venghaus, Sandra, Sardo, Stefania, Stark, Sascha, Kuppler, Sophie, Schmidt, Michael W., Hoyer-Klick, Carsten,	Background Problems such as climate change, environmental pollution, nuclear disposal and unsustainable production and consumption share a common feature: they pose long-term challenges because of their complex nature, potentially severe consequences, and the demanding problem-solving paths. These challenges may have long-lasting impacts on both present and future generations and, therefore, require to be addressed through a long-term governance perspective, i.e., coherent and consistent policy-making across sectors, institutions, and temporal scales. Dealing with these challenges is a core task of policy-making in modern societies, which requires problem-solving skills and capabilities. In this context, we identify long-term governance traces in the literature, illustrate the case of energy transition towards renewable energy systems as a long-term governance case, and elaborate on the scope and definition of long-term governance and its research. Main text We elaborate an analytical framework for long-term governance (LTG), based on five building blocks: the 'environment', which details the policy-making	10.1186/s13705-025-00513-3	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13705-025-00513-3	SpringerLink
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		<p>arena; the 'policy issues', which elaborates on the problems to be dealt with by LTG; the 'key challenges and driving force', revealing LTG mechanisms; the 'key strategies', in which promising approaches for LTG are identified; and the 'policy cycle', where governance impacts on different policy phases are discussed. In essence, we understand long-term governance at its core as a reflexive policy-making process to address significant enduring and persistent problems within a strategy-based decision-making arena to best prepare for, navigate through, and experiment with a changing environment.</p> <p>Conclusions The framework does not describe specific processes or individual cases in detail. Instead, it should be understood as an illustration of long-term governance characteristics at a more general level. Such a framework may help to structure the field of long-term policy-making, guide future research on conceptual, comparative, and empirical in-depth studies, and may provide orientation and action knowledge for making our governance system sustainable. Stimulating and broadening research on long-</p>			
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		term issues seems indispensable, given the existence of several 'grand challenges' that require successful long-term governance.			
A pathway from fragmentation to interoperability through standards-based enterprise architecture to enhance patient safety	Wong, Zoie Shui-Yee, Gong, Yang, Ushiro, Shin,	Creating an ontology is the essential step in natural language processing (NLP). To improve patient safety in this era of generative AI, it is crucial to develop a standards-driven, ontology-based architecture for patient safety that can seamlessly integrate with health systems, thereby facilitating effective detection and monitoring potentially preventable harms in healthcare. This visionary, whole-system approach to patient safety addresses a significant gap in establishing resilient safety systems within the healthcare sector.	10.1038/s41746-025-01442-3	https://www.nature.com/articles/s41746-025-01442-3.pdf	SpringerLink

Advanced IoT-integrated parking systems with automated license plate recognition and payment management	Pradhan, Gulmini, Prusty, Manas Ranjan, Negi, Vipul Singh, Chinara, Suchismita,	<p>Urban parking management is a growing challenge with increasing vehicle numbers and limited parking space. Traditional methods often fail during peak hours, leading to inefficiencies, unauthorized usage, and revenue losses. For instance, a parking lot designed for 300 vehicles often exceeds 90% occupancy during peak times, creating congestion and billing inaccuracies. This research proposes an automated system integrating sensors, image processing, and database management to address these issues. A single camera monitors multiple parking slots, with predefined coordinates linked to IR sensors for dual verification. Image processing algorithms, including Optical Character Recognition (OCR), enable accurate license plate recognition. Testing under real-world conditions showed 95% accuracy in daylight, 90% in low light, and 93% for plates at 45-degree angles. Detection accuracy reached 88% at distances of 1.5–3 m, ensuring reliable operation even at the camera's range limits. Occupancy tracking achieved less than a 5% error margin compared to manual methods,</p>	10.1038/s41598-025-86441-w	https://www.nature.com/articles/s41598-025-86441-w.pdf	SpringerLink
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		<p>while the fare calculation module reduced billing errors by 90%, enhancing efficiency and revenue. The system's scalable design supports applications in parking management, toll collection, and traffic monitoring. By improving vehicle detection, occupancy tracking, and billing accuracy, this solution addresses critical challenges in urban parking and contributes to smarter city infrastructure.</p>			
<p>Survey and perspective on verification, validation, and uncertainty quantification of digital twins for precision medicine</p>	<p>Sel, Kaan, Hawkins-Daarud, Andrea, Chaudhuri, Anirban, Osman, Deen, Bahai, Ahmad, Paydarfar, David, Willcox, Karen, Chung, Caroline, Jafari, Roozbeh,</p>	<p>Digital twins in precision medicine provide tailored health recommendations by simulating patient-specific trajectories and interventions. We examine the critical role of Verification, Validation, and Uncertainty Quantification (VVUQ) for digital twins in ensuring safety and efficacy, with examples in cardiology and oncology. We highlight challenges and opportunities for developing personalized trial methodologies, validation metrics, and standardizing VVUQ processes. VVUQ frameworks are essential for integrating digital twins into clinical practice.</p>	<p>10.1038/s41746-025-01447-y</p>	<p>https://www.nature.com/articles/s41746-025-01447-y.pdf</p>	<p>SpringerLink</p>

Quality attributes of test cases and test suites – importance & challenges from practitioners' perspectives	Tran, Huynh Khanh Vi, Ali, Nauman bin, Unterkalmsteiner, Michael, Börstler, Jürgen, Chatzipetrou, Panagiota,	<p>The quality of the test suites and the constituent test cases significantly impacts confidence in software testing. While research has identified several quality attributes of test cases and test suites, there is a need for a better understanding of their relative importance in practice. We investigate practitioners' perceptions regarding the relative importance of quality attributes of test cases and test suites and the challenges that they face in ensuring the perceived important quality attributes. To capture the practitioners' perceptions, we conducted an industrial survey using a questionnaire based on the quality attributes identified in an extensive literature review. We used a sampling strategy that leverages LinkedIn to draw a large and heterogeneous sample of professionals with experience in software testing. We collected 354 responses from practitioners with a wide range of experience (from less than one year to 42 years of experience). We found that the majority of practitioners rated Fault Detection, Usability, Maintainability, Reliability, and Coverage to be the most important quality attributes.</p>	10.1007/s11219-024-09698-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-024-09698-w	SpringerLink
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		<p>Resource Efficiency, Reusability, and Simplicity received the most divergent opinions, which, according to our analysis, depend on the software-testing contexts. Also, we identified common challenges that apply to the important attributes, namely inadequate definition, lack of useful metrics, lack of an established review process, and lack of external support. The findings point out where practitioners actually need further support with respect to achieving high-quality test cases and test suites under different software testing contexts. Hence, the findings can serve as a guideline for academic researchers when looking for research directions on the topic. Furthermore, the findings can be used to encourage companies to provide more support to practitioners to achieve high-quality test cases and test suites.</p>			
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Examining influencing factors and their hierarchical relationships in flight crew resilient behavior through a hybrid ISM-DEMATEL approach	He, Peng, Lu, Fei, Sun, Ruishan, Zhang, Zhaoning,	<p>The increasing complexity of aviation systems and the rise of unpredictable “Black Swan” events necessitate resilience-based safety management strategies. Flight Crew Resilient Behavior (FCRB), defined as the ability of flight crews to adapt effectively beyond standard operating procedures, is critical for ensuring operational safety. Despite its significance, systematic approaches to understanding and managing FCRB remain underdeveloped. This study builds on American Airlines’ pioneering work by extending the FCRB scope to the Chinese aviation sector, and identifies 22 key factors influencing FCRB across individual, cockpit, organizational, and social dimensions through a comprehensive literature review and expert interviews. A hierarchical model was developed using Interpretive Structural Modeling (ISM) to uncover the relationships and layered dependencies among these factors. Subsequently, the Decision-Making Trial and Evaluation Laboratory (DEMATEL) method was applied to analyze causal relationships and interaction</p>	10.1038/s41598-025-85990-4	https://www.nature.com/articles/s41598-025-85990-4.pdf	SpringerLink
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		<p>strengths, pinpointing critical driving and dependent factors within the system. The integrated ISM-DEMATEL analysis revealed seven management pathways, offering actionable strategies to enhance FCRB through targeted interventions in knowledge development, safety culture, and responsibility. These findings provide a robust framework for airlines, aviation authorities, and manufacturers to manage FCRB proactively, address both anticipated and unforeseen challenges, and advance aviation safety.</p>			
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Agent-Based Modeling Under Climate Uncertainties: The Coastal Resilience (CRes-ABM) Model	Roukounis, Charalampos Nikolaos, Chondros, Michalis, Tsoukala, Vasiliki K., Tsihrintzis, Vassilios A.,	The Coastal Resilience Agent-Based Model (CRes-ABM) is introduced, which was created to evaluate the resilience of coastal areas to the effects of climate change, with a particular emphasis on sea-level rise and extreme weather events. The aim is to provide information for developing policies and making decisions about boosting coastal resilience. CRes-ABM simulates stakeholder interactions and adaptation responses within coastal communities by integrating agent-based modeling techniques, geospatial data, and climate change scenarios. On the basis of the CResI index and the effect of adaptation strategies (CResI_adapt), CRes-ABM produces vulnerability-resilience maps. A variety of parameters are used to monitor agent decisions throughout each simulation. We compare the outcomes using historical data (1976–2005) and two custom climate change scenarios (2041–2100). A thorough framework for comprehending and addressing issues related to coastal resilience is provided by CRes-ABM, which makes it easier to make evidence-based decisions about successful adaptation measures. The	10.1007/s41651-024-00210-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41651-024-00210-3	SpringerLink
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		structure of CRes-ABM allows it to be applied to various coastal regions worldwide, enabling the evaluation of resilience across different geographic, climatic, and socio-economic contexts.			
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Enhanced particle swarm optimization with chaotic search for offshore micro-energy systems	Huang, Weiguo, Li, Wen, Pan, Xuewen, Liu, Qiming, Yang, Jie,	As the global energy landscape shifts and sustainability becomes crucial, the offshore oil and gas sector confronts significant challenges and opportunities. This paper addresses the issues of energy efficiency and environmental impact of optimizing offshore micro-energy systems (OMIES) by proposing a multi-objective optimization model that integrates chaotic local search and particle swarm optimization (PSO). The model aims to achieve optimal scheduling of the energy system by comprehensively considering operational costs, carbon emissions, energy utilization efficiency, and energy fluctuation risks. The research results indicate that the optimization model can significantly improve energy utilization efficiency, reduce operational costs, and decrease environmental pollution. This study also explores the practicality of incorporating renewable energy into OMIES, tackling operational challenges to support low-carbon and secure energy operations on offshore platforms. These findings not only provide a new perspective on energy management for offshore oil and	10.1038/s41598-025-85557-3	https://www.nature.com/articles/s41598-025-85557-3.pdf	SpringerLink
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		gas platforms but also contribute valuable strategies to the sustainable development of global energy.			
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<p>Innovative strategies for tidal flood protection: a systematic literature review on spatial management in coastal city (case study: Semarang City, Central Java, Indonesia)</p>	<p>Aprijanto, Prijambodo, Tjahjono, Wibawa, Bakti, Fithor, Alin, Santoso, M. Alfian, Irfani, M., Cholishoh, Eny, Murtiaji, Cahyarsi, Ariyanto, Danang, Sukmana, Catur Indra,</p>	<p>The coastal city of Semarang, Indonesia, experiences severe tidal flooding due to land subsidence and sea-level rise. This phenomenon poses significant risks to infrastructure, economic activities, and the well-being of the local population. This systematic literature review aims to identify effective tidal flood protection technologies and spatial management strategies suitable for Semarang's unique challenges. Using the PRISMA method, we identified, screened, and analyzed relevant studies from databases such as Scopus, Web of Science, ScienceDirect, ResearchGate, and Google Scholar. Key findings reveal that combining structural measures with green infrastructure and community engagement significantly improves flood resilience. Technologies such as movable storm surge barriers and water retention basins are effective but require substantial investment and maintenance. Green infrastructure offers additional environmental benefits, enhancing biodiversity and ecosystem services. A multidisciplinary approach</p>	<p>10.1007/s40868-024-00158-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40868-024-00158-5</p>	<p>SpringerLink</p>
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		integrating technological innovation, spatial planning, and adaptive management is crucial for sustainable coastal management in Semarang. This research provides valuable insights and practical solutions for mitigating tidal flooding and promoting sustainable development in coastal urban areas.			
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Opposite effects of intraseasonal water vapor income on summer atmospheric precipitable water over the Bengal region	Guo, Jingyan, Xiao, Dong, Zhao, Huijun, He, Wenping,	<p>The atmospheric precipitable water (APW) in the Bengal region plays an important role in indicating the abundance of water vapor in the monsoon regions of East Asia and India. Based on the ERA5 reanalysis data, the opposite effects of 10–30-day and 30–60-day water vapor income (WVI) on the increasing trend of APW in the Bengal region from 1979 to 2020 are found. There are obvious 10–30-day and 30–60-day oscillations of summer APW in the Bengal region. The WVI, which is represented by the sum of values at 8 phases of unfiltered WVI, exhibits a declining trend in 10–30-day, while the WVI of 30–60-day shows an increasing trend. On the timescales of 10–30-day and 30–60-day, the weakening phase of the WVI shows the largest downward and upward trends among the eight phases, accounting for 32.4% and 321% of each trend, respectively. During the weakening phase of the 10–30-day timescale, a configuration characterized by stronger negative Western North Pacific Monsoon (WNPM) and weaker positive Indian Monsoon (IM) favored the northward wind anomalies over the Indian subcontinent, leading to a negative trend of</p>	10.1007/s00382-024-07511-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00382-024-07511-9	SpringerLink
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		<p>WVI in the Bengal region and thereby a negative contribution to the increasing of APW. In the weakening phase of the 30–60-day timescale, a configuration featuring weaker negative WNPM and stronger positive IM contributed to northward wind anomalies over the Bay of Bengal, resulting in an increasing trend of WVI and APW in the Bengal region. This study highlights the importance of the phase configuration of both the WNPM and IM in driving the opposing trends observed in 10–30-day and 30–60-day APW variations within the Bengal region.</p>			
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Human-centered cyber-physical systems in manufacturing industry: a systematic search and review	Colombathanthri, Anuradha, Jomaa, Walid, Chinniah, Yuvlin Adnarain,	Industry 4.0 brings smartness to manufacturing systems through Cyber-Physical Systems (CPS), Digital Twins (DT), and the Internet of Things. Going a step further, Industry 5.0 seeks to achieve these modern manufacturing industry goals by integrating the precision of robots/cobots with human creativity by establishing human-centered CPS. Hence, it is crucial to have a good understanding of key technological adjustments and how they are being incorporated for sustaining human-centricity, resilience, and reconfigurability in CPS-based workcells. This systematic search and review addresses this central research question. The review was based on carefully established systematic search and elimination/inclusion criteria. After a gradual filtering process as elaborated in this paper, 88 related articles were deeply analyzed to arrive at the conclusions. The significance of this review is that it analyzes research works based on CPS platforms to identify how the technicalities at each level of the CPS establishment can support sustaining human-centered applications. It was identified that novel	10.1007/s00170-024-14959-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-024-14959-w	SpringerLink
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		<p>approaches are obtained by adjusting the decision-making algorithms of the CPS. An overuse of virtual reality methods was noticed. There is a requirement for improved and reliable biosensing applications. Parallel improvements in other industries such as interoperability and cyber-security can provide better support for the changes in the focused industry. These findings will be useful for future research trends in the manufacturing industry.</p>			
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Decision Support Framework for Sustainable and Fire Resilient Buildings (SAFR-B)	Frantzich, Håkan, McNamee, Margaret, Kimblad, Erik, Meacham, Brian,	Buildings of all types are increasingly becoming complex 'systems of systems.' They are subject to evolving societal objectives, new and innovative materials, and in many countries, regulatory ecosystems are having difficulty keeping pace with rapidly changing societal, environmental and technological changes. Two evolving objectives that are stimulating changes to buildings and communities are the desire for a more environmentally sustainable built environment and the need to become more resilient to the many increasingly hazardous impacts of climate change. Unfortunately, in some building designs these objectives are in conflict. As a first step toward a more integrated, holistic tool to aid in the design of sustainable and fire resilient buildings (SAFR-B), this paper develops and applies a first-order decision framework for a midrise apartment building. The SAFR-B framework is built on an analysis of design and regulatory objectives for fire safety and sustainability for buildings, and of risk and decision methods that can support design decisions. It makes use of risk indexing and the	10.1007/s10694-024-01678-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10694-024-01678-7	SpringerLink
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		analytical hierarchy process (AHP), with initial scoring and weighting of attributes and strategies derived from international experts in the field of fire safety and sustainability through a Delphi process.			
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Conceptual Basis for a Sustainable and Fire Resilient Built Environment	McNamee, Margaret, Meacham, Brian J.,	Fire has the potential to create significant impacts on the built environment. Managing this impact is sometimes pursued without consideration of the interface between the natural and technological worlds. However, as society has recognized the impacts of technological development on environmental sustainability, the need for sustainable and resilient development has emerged. To facilitate sustainable and resilient development, technological choices should embrace a sociotechnical systems approach that considers the interactions of society, technology and institutions, and their interactions with the environment. Failure to do so can result in unintended consequences. Society's technological choices aimed at increasing sustainability of buildings, such as the desire to reduce building carbon footprints or improve the use of renewable energy systems, can have significant impacts on fire resilience if not considered holistically. To better understand and comprehensively address and mitigate intolerable fire risk associated with choices driven by	10.1007/s10694-023-01490-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10694-023-01490-9	SpringerLink
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		sustainability objectives, a balanced and holistic systems approach is needed. To this end, a framework to foster a systems-oriented approach to improving both sustainability and fire resilience, in tandem, to create a Sustainable and Fire Resilient Built Environment (SAFR-BE) is presented.			
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<p>A holistic view of sustainability in water resources management in the European Union: challenges and threats</p>	<p>Jam, Kasra, Noroozi, Ali, Mosavi, Seyed Habibollah,</p>	<p>Sustainable development is a new way to achieve human aspirations while preserving scarce resources and making opportunities for the future. Water resource management is an important issue, especially in the European Union where most of the countries experienced a diminishing trend in their per capita renewable water. Therefore, the key goal of our research is to expand a new comprehensive framework to assess the sustainability status of water resources systems in nineteen European countries with decreasing trend in per capita renewable water (2007–2019). Our hydro-socio-economic-environmental-political index (HSEEPI) consists of eleven indicators which reagents eleven dimensions, including economic, sociology, rural sociology, health and sanitation, tourism, education, research and development, technology, human development, environment and government policies at different spatial scales. The HSEEPI scores were computed via both single and combined-artificial intelligence (combined-AI) approaches. As a threshold to define the</p>	<p>10.1007/s10668-023-03956-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-023-03956-w</p>	<p>SpringerLink</p>
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		<p>stability of water resources systems, the HSEEPi scores were equaled 0.518 and 0.515 for European countries using single and combined-AI approaches, respectively. The results indicated that though the computed indices were at a good level, in general, the trend of instability in water resources management was observed and confirmed. Based on the results, the health and sanitation, education, technology, human development, and environment dimensions were relatively unstable and caused to a declining trend in the sustainability of water resources management across the European continent. Among the studied dimensions, tourism and technology were introduced as the best and worst factors in determining the stability of water resources systems, respectively. Also, current research could provide the vast majority of countrywide results to draw the future path of sustainable water resource management of countries by evaluating historical measures of managers.</p> <p>Graphical abstract</p>			
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Exploring the selected strategies and multiple selected paths for digital music subscription services using the DSA-NRM approach consideration of various stakeholders	Tsai, Kuo-Pao, Yang, Feng-Chao, Lu, Chin-Lung, Lin, Chia-Li,	Music has become a part of many people's lives. Early adopters used to buy tapes or CDs to listen to music, which were difficult to preserve and easily damaged. With the digital transformation of the industry, users nowadays can listen to various genres/styles of music online through digital music platforms at any time. As the types and styles of music are numerous, some digital music platforms have begun to consider providing more diverse ways of delivering music listening services. For example, various music classification systems allows users to easily find all albums by the same singer; different styles of music streaming services save users time in searching for songs of the same type; and the ability to share playlists allows users to share their listening playlists with family and friends. This service model increases peer discussion topics and exposure to albums, songs, and singers. The study summarizes the driving factors influencing the adoption of digital music subscription services using expert interviews and literature reviews. The study outlines four adoption-driving dimensions (service benefits,	10.1007/s00500-024-10323-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-024-10323-y	SpringerLink
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		<p>service efficiency, behavioral attribution, and adoption intention) and 16 evaluation criteria. Besides, this study integrates Desire and Satisfaction Analysis (DSA) and Network Relation Map (NRM) to propose a DSA-NRM analysis to evaluate the adoption strategy and optimal development path for digital music subscription services. Based on the four quadrants of music subscription services, this study proposes four selected strategies (attention strategy, sustainment strategy, adjustment strategy, and focus strategy). The research results show that the SB (service benefits) aspect has high desire and low satisfaction and can adopt selected strategy D (focus Strategy). The AI (adoption intention) aspect is an aspect with intense desire and low satisfaction and can use strategy C (adjustment strategy) chosen. The AI (adoption intention) aspect can dominate other aspects, and the SE (service effectiveness) can be dominated by different aspects.</p>			
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Physics Informed Machine Learning (PIML) for Design, Management and Resilience-Development of Urban Infrastructures: A Review	Chew, Alvin Wei Ze, He, Renfei, Zhang, Limao,	Building resilient and sustainable urban infrastructures is imperative to prepare future generations against new pandemics and climate change uncertainties. In general, modelling of urban infrastructures requires modelers to carefully consider their initial design phase, subsequent life-span management, and long-term resilience development. With the continual development of machine learning (ML) and artificial intelligence (AI) approaches, significant opportunities are available to civil engineers to improve the existing computing systems of urban infrastructures to contribute to their overall design, management, and resilience-development. Often, an important requirement for the successful adoption of ML/AI techniques is to ensure sufficient field data for training effective predictive models for the above objectives. However, this requirement may be difficult to achieve for all infrastructure engineering applications in the practical field context due to sensor constraints (e.g., limited sensor deployment), coupled with other computational challenges. To address the	10.1007/s11831-024-10145-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-024-10145-z	SpringerLink
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		<p>multiple challenges, this review paper evaluates the important and relevant physics informed machine learning (PIML) publications from 1992 to 2022 for various critical infrastructure engineering applications, namely: (1) PIML for Infrastructures Design and Analysis, (2) PIML for Infrastructure Built-Environment Modelling, (3) PIML for Infrastructures Health Monitoring, and (4) PIML for Infrastructures Resilience Management/Development. In each application, we discuss on the key modelling objectives involved for the specific infrastructure systems, and their associated advantages and/or likely limitations obtained from the PIML implementation. Finally, we then summarize the key research trends and their associated challenges to continue leveraging on PIML techniques to better benefit the overall design, management, and resilience-development of urban infrastructures.</p>			
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Revisiting the sustainability science research agenda	<p>Sahle, Mesfin, Lahoti, Shruti Ashish, Lee, So-Young, Brundiers, Katja, Riper, Carena J., Pohl, Christian, Chien, Herlin, Bohnet, Iris C., Aguilar-Rivera, Noé, Edwards, Peter, Pradhan, Prajal, Plieninger, Tobias, Boonstra, Wiebren Johannes, Flor, Alexander G., Fabio, Annamaria, Scheidel, Arnim, Gordon, Chris, Abson, David J., Andersson, Erik, Demaria, Federico, Kenter, Jasper O., Brooks, Jeremy, Kauffman, Joanne, Hamann, Maïke, Graziano, Martin, Nagabhatla, Nidhi, Mimura, Nobuo, Fagerholm, Nora, O'Farrell, Patrick, Saito, Osamu, Takeuchi, Kazuhiko,</p>	<p>Identifying research gaps and priorities is paramount to advance sustainability science and contribute to a sustainable future. This editorial contributes to this effort by contemplating the sustainability science research agenda and aligning it with recent changes in global dynamics. Drawing on consultations with the editorial board members of the Sustainability Science journal and a review of relevant literature, we identified 12 key research topics. These topics are interpreted within a strategic framework encompassing three key themes: (1) goals that drive sustainability science, (2) approaches to attain these goals, and (3) tools to advance sustainability science research. In so doing, this editorial emphasizes a sustainable development agenda extending beyond 2030, fostering equity and justice, and tackling issues related to power dynamics and geopolitical conflicts. It underscores the significance of research approaches to attaining sustainability goals, in particular, theorizing, co-production of knowledge and action, attaining clarity in conceptual</p>	10.1007/s11625-024-01586-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11625-024-01586-3	SpringerLink
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		<p>descriptions, and developing systems-oriented analytical frameworks. Additionally, it highlights the value of place-based approaches, learning from significant systemic shocks, and nurturing inner transformations. It also underlines the need to explore emerging technologies and data-intensive methodologies as a tool to address sustainability concerns. The systematic contemplation of the sustainability science research agenda presented in this editorial piece aims to invoke further discussion among researchers and practitioners about a fresh and relevant agenda that promotes the sustainable integration of nature and society.</p>			
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<p>A mechanical fault diagnosis model with semi-supervised variational autoencoder based on long short-term memory network</p>	<p>Qu, Yuanyuan, Li, Tao, Fu, Shichen, Wang, Zhisheng, Chen, Jian, Zhang, Yupeng,</p>	<p>Condition monitoring and accurate fault diagnosis are always concerned for stable operating of mechanical equipment. The fault diagnosis based on supervised deep learning has been proved to be effective by their powerful capacities in feature extracting, but usually requiring large number of labeled data. Faced with the actual situation that labeled samples are often in short, data are imbalanced in category etc., accurate fault diagnosis based on deep learning is still challenging, so does to explore and explain the evolution of complex faults. A mechanical fault diagnosis model with Semi-Supervised Variational Autoencoder based on Long Short-Term Memory network (LSTM-SSVAE) is proposed in this paper. Through semi-supervised learning, LSTM-SSVAE uses unlabeled data to enhance the extraction of discriminant features of data, which make the model less dependent on only labeled data while giving improved fault diagnosis accuracy. The LSTM networks are applied as the encoder and decoder innovatively, and regularization constraints are added in loss function, to</p>	<p>10.1007/s11071-024-10221-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11071-024-10221-w</p>	<p>SpringerLink</p>
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		<p>improve the clustering effect of the intermediate hidden variables, so that to achieve effective feature extraction and state detection. Based on open datasets, experimental results show that with the same number of labeled samples, the fault diagnosis accuracy obtained by using LSTM-SSVAE is higher than other typical semi-supervised learning models. Based on actual vibration data of working equipment in coal mining, the feasibility of clustering analysis of intermediate hidden variables also proves that the LSTM-SSVAE model is recommendable for fault evolution analysis and is potential for operating conditions prediction of mechanical equipment.</p>			
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Integrating artificial intelligence in biodiversity conservation: bridging classical and modern approaches	Ullah, Fazal, Saqib, Saddam, Xiong, You-Cai,	Preserving biodiversity is crucial for maintaining ecological balance; however, traditional conservation methods often face various limitations. In most cases, the efficacy of these approaches is frequently constrained by difficulties in scaling and the absence of up-to-date data, hence requiring the incorporation of novel technology. The latest progress in the field of artificial intelligence (AI) offer transformative potential for enhancing contemporary conservation endeavors. There is a growing utilization of AI technologies, like machine learning and data analytics, to improve species identification, habitat monitoring, and threat assessment with exceptional precision and effectiveness. This study explores how AI is incorporated to enhance conventional conservation methods, particularly in the areas such as data analysis, species identification, and habitat monitoring. This paper examines a number of case studies that demonstrate the successful use of AI, with a particular focus on notable advancements in data management, predictive	10.1007/s10531-024-02977-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10531-024-02977-9	SpringerLink
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		<p>modeling, and resource allocation. The findings highlighted the significance of synergistic methodology that integrates the strength of traditional techniques with the flexibility of contemporary technologies, hence facilitating the development of more resilient conservation solutions. This study also discusses the potential implications for future research and the practical use of AI in the field of conservation. It highlights the strategy of seamless integration to justify both scientific investigation and conservation results.</p>			
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Visualization of the occurrence and spread of wildfires in three-dimensional natural scenes	Meng, Qingkuo, Huai, Yongjian, Ma, Fei, Ye, Wentao, Xu, Haifeng, Yang, Siyu,	<p>There are generally two ways to ignite wildfires, including natural fire sources represented by lightning strikes and artificial fire sources generated by human production and daily use, both of which have regional and seasonal characteristics. For three-dimensional forest fire research, it is not easy to achieve complex global spread behavior simulation while considering the internal physical reactions of vegetation combustion. The study constructed different natural scenes based on different vegetation cells, described the principle of lightning ignition of combustibles, analyzed the spread results of wildfires under the influence of multiple weather factors in different scenes, and achieved repeatable wildfire research. At the same time, the virtual scene intuitively expresses the real fire extinguishing methods, providing relevant references for the design of fire extinguishing schemes. Compared to directly using physical models, this article uses a single wood pyrolysis model to couple vegetation's morphological structure and physical reactions. By considering the spread of</p>	10.1007/s00371-024-03408-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00371-024-03408-0	SpringerLink
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		different vegetation types and the influence of multiple factors on forest fire spread, it expresses the complete forest fire behavior from ignition to extinction, significantly improving the realism and immersion of forest fires.			
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Automated scenario generation from Operational Design Domain model for testing AI-based systems in aviation	Stefani, Thomas, Christensen, Johann Maximilian, Girija, Akshay Anilkumar, Gupta, Siddhartha, Durak, Umut, Köster, Frank, Krüger, Thomas, Hallerbach, Sven,	Applications based on artificial intelligence (AI) promise benefits, ranging from improved performance to increased capabilities in many industries. In the aviation domain, one example is the new Airborne Collision Avoidance System (ACAS X). The current investigation aims at combining ACAS X and AI to maintain its performance while decreasing the memory footprint. However, the anticipation of AI being increasingly used confronts regulators with challenges in terms of safety assurance and certification. Consequently, the European Union Aviation Safety Agency (EASA) published a concept paper for machine learning applications in aviation. Both, the Concept of Operation (ConOps) in combination with an Operational Design Domain (ODD), are listed as objectives to be met for the safety analysis. From a developer's perspective, this raises questions on how to effectively derive the ODD from ConOps and test the given system based on the ODD description. Based on an exemplary use case of a Near Mid-Air Collision avoidance between two aircraft through the advisories of	10.1007/s13272-024-00772-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-024-00772-4	SpringerLink
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		<p>ACAS X, a highly automated framework for generating and testing synthetic data is proposed. Using this framework, 1800 Near Mid-Air Collision scenario files are created and automatically executed in the simulation environment FlightGear. Scenario-based testing is used for the logging of ACAS X advisory data and evaluating it against predefined requirements. By this approach, an efficient way of verifying system requirements and conducting automated testing based on the ODD definition is demonstrated. Throughout this process, Model-Based Systems Engineering (MBSE) is used to reduce and manage complexity. The framework in this paper enables a systematic and highly automated approach for scenario generation based on the ODD.</p>			
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Capabilities to Manage Digital Industry 4.0 Innovations in Interorganizational Value Chains	Nottbrock, Claus, Van Looy, Amy, De Haes, Steven,	Manufacturing organizations are increasingly investing in digital Industry 4.0 (I4.0) innovations to enhance the performance of their value chains. However, the full realization of I4.0's potential hinges on its holistic integration into the horizontal value chain at the interorganizational level, where collaboration across organizations collectively creates value. The literature has provided few empirical insights into interorganizational capabilities, leading us to hypothesize that the era of digitalization demands fresh perspectives on interorganizational capabilities and updates of existing capability frameworks. To fill this gap, a Delphi study with international experts was conducted. After rigorous empirical validation, the paper introduces the digital interorganizational value chain (DIOVC) capability framework, which covers detailed subcapabilities and descriptions. Importantly, it shed light on the distinctions between intra- and interorganizational perspectives on process innovation. The DIOVC capability framework serves as a bridge between economic perspective theories, intertwining seamlessly with	10.1007/s12599-024-00913-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-024-00913-3	SpringerLink
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		<p>relational perspective theory. This synthesis underscores the imperative need to harness a multitude of resources and capabilities across organizations to facilitate the development of robust business relationships. The study improves the theoretical understanding by harmonizing these diverse perspectives, offering a more holistic lens through which to view interorganizational value chains. Future research can build upon these findings to develop a maturity model and best practices. These insights can serve as a guide for manufacturing organizations, enabling them to systematically enhance their interorganizational capabilities and align effectively with their partners within the value chain.</p>			
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Decentralized fault diagnosis of discrete-event systems with unreliable sensors using linear temporal logic	Dong, Weijie, Li, Shaoyuan, Yin, Xiang,	<p>In this paper, we investigate a decentralized diagnosis problem of a discrete-event system (DES) subject to unreliable sensors, where the sensor observations of local diagnosers may be non-deterministic as a result of possible failures. Existing studies on decentralized robust diagnosis can only deal with different types of sensor failures separately, e.g., all sensors suffer from the same type of sensor failures such as intermittent sensor failures or permanent sensor failures. However, since sensors of different local diagnosers may face different external environments and have different internal characteristics, sensors corresponding to different local diagnosers may also have their own fault features. In this paper, we propose a flexible framework of decentralized diagnosis for DES subject to unreliable sensors such that sensors of different local diagnosers are permitted to have different types of sensor failures. To this end, we extend the existing decentralized diagnosis framework to the case where there exist common sensors broadcasting their observations to all local diagnosers. We</p>	10.1007/s11432-023-4108-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11432-023-4108-8	SpringerLink
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		<p>apply linear temporal logic (LTL) to constrain infinite behaviors of private sensors of local diagnosers and common sensors. Then, a new notion of κ-codiagnosability is proposed as the necessary and sufficient condition for the existence of a decentralized diagnoser that works correctly under sensors satisfying LTL-based sensor constraints. Finally, we provide an effective approach to verify the κ-codiagnosability.</p>			
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<p>The synchronization criteria for uncertain nonlinear Caputo–Hadamard fractional-order systems with time-delay output feedback control</p>	<p>Thi Hong, Duong, Truong Thanh, Nguyen,</p>	<p>The methods of Master–Slave synchronization analysis with output feedback control for uncertain nonlinear Caputo–Hadamard fractional order systems without delay and with time-varying delay are presented in this study. To provide a synchronization criterion for the system instantaneously, we first apply the Lyapunov function approach for Caputo–Hadamard fractional order systems. Next, we construct novel synchronization conditions for the presence of time delay feedback control that ensure asymptotic stability of the error systems by combining fractional-order Halanay inequality with some features of the Caputo–Hadamard derivative. It is consequently possible to efficiently check the resulting conditions because they are provided in terms of linear matrix inequalities (LMIs). To demonstrate the usefulness of the acquired results, two numerical examples are suggested.</p>	<p>10.1007/s12215-024-01164-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12215-024-01164-7</p>	<p>SpringerLink</p>
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<p>A secure framework for the Internet of Things anomalies using machine learning</p>	<p>Prakash, Vijay, Odedina, Olukayode, Kumar, Ajay, Garg, Lalit, Bawa, Seema,</p>	<p>A secure IoT framework uses ML models (LR, LDA, CART, GNB) to detect anomalies in sensor data. IoT security solution outperforms existing methods with an anomaly detection accuracy of 91–98%. The CART algorithm showed superior performance in anomaly detection among tested models. The Internet of Things (IoT) revolutionises modern technology, offering unprecedented opportunities for connectivity and automation. However, the increased adoption of IoT devices introduces substantial security vulnerabilities, necessitating effective anomaly detection frameworks. This Paper proposes a secure IoT anomaly detection framework by utilising four machine learning algorithms such as: Logistic Regression (LR), Linear Discriminant Analysis (LDA), Classification and Regression Trees (CART), and Gaussian Naive Bayes (GNB). By generating synthetic datasets with induced anomalies, the framework employs AWS IoT Core infrastructure and Python-based analysis to identify irregularities in device performance. The proposed</p>	<p>10.1007/s43926-024-00088-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43926-024-00088-z</p>	<p>SpringerLink</p>
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		<p>framework achieved a high detection accuracy ranging from 91 to 98% across the tested algorithms, with CART showing the best performance. Key performance metrics, including precision, recall, and F1-score, confirmed the model's reliability in distinguishing between normal and anomalous IoT data. Experimental results demonstrate superior detection accuracy across all methods, validating the robustness of the proposed approach. This research offers a scalable solution for IoT security, paving the way for improved anomaly detection and mitigation strategies in connected environments. The integration of machine learning algorithms with IoT infrastructure allows for real-time monitoring and proactive anomaly detection in diverse IoT applications. The proposed framework enhances security measures and contributes to the overall reliability and efficiency of connected systems.</p>			
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<p>Cyber-physical threat mitigation in wind energy systems: a novel secure architecture for industry 4.0 power grids</p>	<p>Al Abdulwahid, Abdulwahid,</p>	<p>In Industry 4.0, integrating Cyber-Physical Systems (CPS) within wind energy infrastructures introduces significant cyber-attack vulnerabilities. This paper presents the Hybrid Adaptive Threat Detection and Response System (HATDRS), a novel security architecture designed to enhance the resilience of wind energy systems against evolving cyber threats. The HATDRS model integrates a hybrid machine learning approach, combining supervised logistic regression with adaptive learning mechanisms, providing real-time threat detection and mitigation. This approach was chosen for its ability to integrate labelled data with real-time unsupervised feedback, providing dynamic and accurate threat detection in wind energy systems. The model was evaluated against traditional Intrusion Detection Systems (IDS) and Machine Learning-based Anomaly Detection Systems (ML-ADS) across key metrics, including accuracy, detection rate, false positive rate, response time, System Security Index (SSI), energy loss, and cost-efficiency. The results demonstrate that</p>	<p>10.1186/s42162-024-00449-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-024-00449-6</p>	<p>SpringerLink</p>
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		<p>the HATDRS model outperforms its counterparts, achieving an accuracy of 95.4% and a detection rate of 97.2% while maintaining the lowest false positive rate (3.1%) and response time (500 ms). Additionally, the model achieved the highest SSI value of 88.7, significantly reducing energy loss to 1.5% and improving cost-efficiency to 0.528. These findings underscore the robustness and efficiency of the HATDRS model in mitigating cyber-physical threats in wind energy systems, offering a scalable and effective solution for securing renewable energy infrastructures. Future work will explore further optimization and real-world testing to validate the system's scalability across diverse energy environments.</p>			
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Blockchain-driven security for IoT networks: State-of-the-art, challenges and future directions	Maurya, Vinay, Rishiwal, Vinay, Yadav, Mano, Shiblee, Mohammad, Yadav, Preeti, Agarwal, Udit, Chaudhry, Rashmi,	The surge in adopting Internet of Things (IoT) devices has presented fresh challenges regarding security and networks. Conventional centralized methods encounter scalability issues and security vulnerabilities with the rapid growth of connected devices. This comprehensive review offers researchers, practitioners, and policymakers valuable insights into the current state, challenges, and future directions of blockchain-driven security for IoT networks. The paper reviews research papers from 2016 to 2023 from the leading databases. Despite the potential advantages, integrating blockchain into IoT security presents its own set of challenges. This paper also discusses a survey of surveys and explains the challenges of offering security solutions for IoT networks. The paper introduces a secure system for sharing healthcare data, incorporating AI, smart contracts, and the InterPlanetary File System (IPFS). The initial proposed system establishes a secure and transparent system for device authentication, data integrity, and access control using BC's decentralized and unchangeable characteristics.	10.1007/s12083-024-01812-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12083-024-01812-w	SpringerLink
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		<p>Smart contracts are employed to automate device network processes, ensuring tamper-proof execution and reducing the risk of unauthorized access. By conducting a case study and experimental assessment, we illustrate how security solutions driven by BC prove effective in mitigating the weaknesses linked to conventional IoT networks. The findings indicate that the proposed framework enhances security and provides a scalable and decentralized foundation for managing the ever-expanding ecosystem of IoT devices. The paper provides valuable guidance and outlines potential directions for future research in blockchain-driven security for IoT networks, offering a clear roadmap for researchers.</p>			
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CitySEIRCast: an agent-based city digital twin for pandemic analysis and simulation	Bilal, Shakir, Zaatour, Wajdi, Alonso Otano, Yilian, Saha, Arindam, Newcomb, Ken, Kim, Soo, Kim, Jun, Ginja, Raveena, Groen, Derek, Michael, Edwin,	The COVID-19 pandemic has dramatically highlighted the importance of developing simulation systems for quickly characterizing and providing spatio-temporal forecasts of infection spread dynamics that take specific accounts of the population and spatial heterogeneities that govern pathogen transmission in real-world communities. Developing such computational systems must also overcome the cold-start problem related to the inevitable scarce early data and extant knowledge regarding a novel pathogen's transmissibility and virulence, while addressing changing population behavior and policy options as a pandemic evolves. Here, we describe how we have coupled advances in the construction of digital or virtual models of real-world cities with an agile, modular, agent-based model of viral transmission and data from navigation and social media interactions, to overcome these challenges in order to provide a new simulation tool, CitySEIRCast, that can model viral spread at the sub-national level. Our data pipelines and workflows are designed purposefully to be flexible and	10.1007/s40747-024-01683-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40747-024-01683-x	SpringerLink
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		<p>scalable so that we can implement the system on hybrid cloud/cluster systems and be agile enough to address different population settings and indeed, diseases. Our simulation results demonstrate that CitySEIRCast can provide the timely high resolution spatio-temporal epidemic predictions required for supporting situational awareness of the state of a pandemic as well as for facilitating assessments of vulnerable sub-populations and locations and evaluations of the impacts of implemented interventions, inclusive of the effects of population behavioral response to fluctuations in case incidence. This work arose in response to requests from county agencies to support their work on COVID-19 monitoring, risk assessment, and planning, and using the described workflows, we were able to provide uninterrupted bi-weekly simulations to guide their efforts for over a year from late 2021 to 2023. We discuss future work that can significantly improve the scalability and real-time application of this digital city-based epidemic modelling system, such that validated predictions and</p>			
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		forecasts of the paths that may followed by a contagion both over time and space can be used to anticipate the spread dynamics, risky groups and regions, and options for responding effectively to a complex epidemic.			
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First scientific research to trace the origins of Qin clay sealings	Guo, Houze, Yang, Lu,	Clay sealing represents the key physical example of the document sealing system of the Qin dynasty in ancient China. However, only the inscriptions and aesthetic values of clay sealings have been discussed until now, and the relevant sources have not been traced from the perspective of scientific analysis. A total of 81 clay sealings unearthed in Xi'an were studied via ultra-depth field microscopy, petrographic microstructure analysis and X-ray fluorescence spectroscopy. The relevant methods of tracing and making clay samples are discussed based on the results of the literature investigation and elemental analysis. The composition, technology and spatial links between different clay sealings collected from all over the country show that highly organized sealing materials and systematic processes are important parts of the establishment of unified China. They also provide detailed and effective scientific information that is useful for the future preservation of clay sealings protection and further archaeological research.	10.1186/s40494-024-01524-7	https://www.nature.com/articles/s40494-024-01524-7.pdf	SpringerLink
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Collaboration failure analysis in cyber-physical system-of-systems using context fuzzy clustering	Hyun, Sangwon, Jee, Eunkyong, Bae, Doo-Hwan,	<p>A cyber-physical system-of-systems (CPSoS) facilitates the achievement of high-level goals, such as efficient traffic management on roads, by designing and developing the collaboration of constituent CPSs. A platooning that groups autonomous vehicles in proximity is an example of collaboration. The intricate collaboration innately causes serious collaboration failures such as collisions. However, limited knowledge and complex dynamics of CPSoS cause several challenges in effectively analyzing the collaboration failures. Existing studies have applied pattern mining techniques to investigate various failures but have limitations when applied to collaboration failures: (1) absence of data model for continuous and discrete logs in CPSoS; (2) information loss problem by not considering the integrated relationship of the data; (3) dependence only on failed logs; (4) limited capability of fixed-size time windows. We propose a fuzzy clustering-based pattern mining approach that consists of a novel data model for CPSoS logs and comprehensive metrics for</p>	10.1007/s10664-024-10572-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-024-10572-3	SpringerLink
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		<p>classifying and mining optimal collaboration failure patterns. In experiments on vehicle platooning, our approach exhibited the highest accuracy on pattern mining and clustering results. Further, we identified five collaboration failure scenarios in the empirical analysis of drone swarming results. The findings of this study can facilitate the effective analysis of CPSoS collaboration failures.</p>			
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Data: to share or not to share? A Semi-Systematic Literature Review in (rational) data sharing in inter-organizational systems	Harmelink, Rogier, Joosten, Reinoud, Topan, Engin, Adriaanse, Arjen, Hillegersberg, Jos,	In supply chains, data is important to improve decision-making. Therefore, data sharing is essential to extract maximum benefits from technologies like Machine Learning and the Internet of Things in an Industry 4.0 context. However, data protectionism often prevails over sharing for organizations in a supply chain. In literature, researchers are looking for ways to turn data protectionism into data sharing. We present a Semi-Systematic Literature Review related to data sharing in an inter-organizational context. Our main goal is to find state-of-the-art literature and, based on this, discover a research gap related to data sharing practices in inter-organizational systems for papers that apply a rational perspective. Game theory provides such a rational perspective. We formulate research questions related to three main concepts: data sharing, inter-organizational systems and game theory. We search for related subtopics that link to the main concepts and give a definition of these. A list of search strings and inclusion criteria results in 149 papers selected for the literature review. We classify the literature with the	10.1007/s44248-024-00018-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44248-024-00018-y	SpringerLink
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		<p>help of nine categories, which are the basis for our main findings in the Semi-Structured Literature Review. Recent research focuses on data sharing, while older literature focuses more specifically on information and knowledge sharing. In our literature review, we note that trust is an important concept. In literature, researchers try to create trust related to technological issues with the help of blockchain. In contrast, calculus-based trust (a rational perspective) is analyzed with the help of game theory. Solving trust issues and providing incentive mechanisms could solve potential future (data) sharing issues. Based on the literature and main findings, we determine five potential research opportunities for future research to tackle (data) sharing problems.</p>			
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<p>Artificial intelligence and the social dimension of sustainable development: through a security perspective</p>	<p>Malmio, Irja,</p>	<p>Artificial Intelligence (AI) has been described as a great hope but also a threat to fulfilling the social goals of sustainable development, where one critical aspect is providing society with a safe and secure environment. At the same time, interdisciplinary analyses that connect the social effects of artificial intelligence with security issues have been relatively sparse. Accordingly, this article explores how the sociotechnical connection between AI, the social dimension of sustainable development, and security is being communicated in research conceptualizing this liaison. Conducive to this aim, a scoping review has been applied to holistically connect AI, social sustainability, and security while deploying a thematic content analysis to illustrate the central themes of this intersection. In total, 62 articles and eleven reports were included in the study. Six themes are explored: AI for social good, economic security, development and humanitarian aid, values, sociotechnical harms, and societal security. The article emphasizes the importance of aligning technology development with</p>	<p>10.1007/s43621-024-00677-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43621-024-00677-6</p>	<p>SpringerLink</p>
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		<p>broader social objectives by highlighting the complex interplay between AI, social sustainability, and security. Understanding this link opens possibilities for developing AI solutions that contribute to social sustainability while identifying propensities in emerging technologies that can lead to “sociotechnical harm” with increased polarization and a deteriorated security situation.</p>			
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<p>Online social network automation attack detection methods for energy analysis and consumption modelling</p>	<p>Rawat, Romil, Sikarwar, Ranjana, Maravi, Prakash Kumar, Ingle, Mandakini, Bhardwaj, Vivek, Rawat, Anjali, Rawat, Hitesh,</p>	<p>Preventing the spread of Domain Name System (DNS) tunnelling and the use of automation infrastructure is one of the key problems that the idea of a contemporary smart OSN (online social network) must address. The proposed technique focuses on online social network automation attacks (OSNAA) based on smart social network devices (SSND) energy consumption (Ecomp) analysis based on user's selection modes (USM) for the detection of OSNAA and Man-in-the-Middle (MiTM) attacks. Automated opcode sequence analysis (OSA) is used to improve the accuracy of OSNAA detection and localise MiTM attacks. It analyses the performance of the SSND for MiTM attacks by localising suspicious automated tools on these devices with applicable accuracy and is based on the monitoring of energy consumption, which helps to analyse and categorise the behaviour of the SSND in the state of normal or in compromised conditions by the threat agents. The suggested technique enables high-efficiency detection of SSND threats, such as MiTM attacks, at a level of about 99.91% and localization</p>	<p>10.1007/s41870-024-02311-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41870-024-02311-0</p>	<p>SpringerLink</p>
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		of suspicious automation tools on these machines with an accuracy of around 99.73%.			
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<p>Urban heat island effect in India: a review of current status, impact and mitigation strategies</p>	<p>Islam, Sahidul, Karipot, Anandakumar, Bhawar, Rohini, Sinha, Palash, Kedia, Sumita, Khare, Manoj,</p>	<p>The Urban Heat Island (UHI) phenomenon significantly affects us by exacerbating heat discomfort, increased energy consumption, and urban air pollution. The severity of UHI associated with heat waves and heat stress-related mortality is now one of the major concerns, particularly in densely populated cities. Therefore, the significance of the UHI has emerged as a crucial issue due to cities' fast growth and urban development, necessitating a comprehensive review of the present status of UHI research, particularly concerning regional comparisons. This paper delineates the characteristics of UHI, focusing on its intensity, impact, determining factors, and potential mitigation strategy. It synthesizes an insight into important aspects of UHI from a comprehensive analysis of over 400 national/international research articles. The findings indicate a lack of UHI research studies in the central and eastern regions of the country, bringing out the need for further investigation in these areas. The observed UHI intensity varies across the country between 2 and 10 °C, with the northwest seeing a more</p>	<p>10.1007/s44327-024-00033-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s44327-024-00033-3</p>	<p>SpringerLink</p>
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		<p>pronounced temperature gradient. Following a detailed review, a few suggestions for future research to minimize the impact of UHI on public health, energy consumption, and the economy are proposed, as are strategies for mitigation. While studies on UHIs in India have primarily relied on observational data, there is still a substantial need for more research on employing numerical model-based and machine-learning approaches. Furthermore, the availability of mitigation research on Indian cities is limited. Additional research is needed to ascertain the intricate mechanisms behind the UHI effect on cities vulnerable to various climatic risks and hazards.</p>			
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Modeling and verification of software evolution using bigraphical reactive system	Pal, Nisha, Yadav, Dharmendra Kumar,	<p>Changes are inevitable in software due to technology advancements, and changes in business requirements. Making changes in the software by insertion, deletion or modification of new code may lead to malfunctioning of the old code. Hence, there is a need for a priori analysis to ensure and capture these types of changes to run the software smoothly. Making changes in the software while it is in use is called dynamic evolution. Due to the lack of formal modeling and verification, this dynamic evolution process of software systems has not become prominent. Hence, we used the bigraphical reactive system (BRS) technique to ensure that changes do not break the software functionality (adversely affect the system). BRS provides a powerful framework for modeling, analyzing, and verifying the dynamic evolution of software systems, resulting in ensuring the reliability and correctness of evolving software system. In this paper, we proposed a formal method technique for modeling and verifying the dynamic evolution process (changing user requirements at</p>	10.1007/s10586-024-04597-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-024-04597-y	SpringerLink
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		run time) using the BRS. We used a bigraph to model software architectures and described the evolution rules for supporting the dynamic changes of the software system. Finally, we have used the BigMC model checker tool to validate this model with its properties and provide associated verification procedures.			
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Positioning nanotechnology to address climate change	Jones, Jacob L., Berube, David M., Cuchiara, Maude, Grieger, Khara, Hubal, Elaine A. Cohen, Karikó, Sarah J., Strader, Phillip, Theriault, Yves,	One of society's most pressing challenges in the twenty-first century is that of climate change. In fact, climate change is seen as the most defining issue of our time as we are witness to an anthropogenic perturbation in geology and earth sciences of global scale. To move forward in this new era, solutions will be sought to both mitigate the effects of climate change (e.g., reduce greenhouse gasses) as well as adapt and build resilience (e.g., improve infrastructure and agriculture to resist damage from extreme weather or floods). The immediacy of the needed solutions dictates that the response must use the full force of society's current knowledge base, science, technology, and innovation. Nanotechnology, an enabling technology that has matured over the past few decades and now considered for general-purpose and mass use, is ideal for addressing climate change and its impacts. To position nanotechnology to address such complex challenges, this Perspective integrates collective insights from a broad range of viewpoints and presents recommendations for how research can be motivated and scoped,	10.1007/s10669-024-09991-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-024-09991-w	SpringerLink
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		<p>organized, and implemented to achieve beneficial outcomes and innovations in the most efficient ways. While this Perspective was created with a focus on the research landscape within the United States, the findings are also relevant in other international contexts. Research that can effectively advance nanotechnology solutions will be use-inspired basic research, incorporate systems-level thinking, apply a convergence research approach, engage stakeholders, and require advanced nanotechnology infrastructure. By illuminating this compelling and complex research topic, this Perspective aims to direct, inform, and accelerate needed actions in the research community to advance nanotechnology solutions for addressing climate change.</p>			
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Requirements for water data ecosystems: results from a business ecosystem case study	Palviainen, Marko, Soininen, Juha-Pekka, Arnold, Mona,	<p>This paper studies the factors that affect the emergence of water data ecosystems using a case study as a research method. The study is based on interviews conducted with partners in a comprehensive business ecosystem focused on the development of smart water network management. Eleven representatives from six private companies, the waterworks of a city, and three organizations that provide water supply management services for municipalities were interviewed. The paper presents analysis of the interview results focusing on the interviewees' thoughts on the state of water data systems in Finland and on the factors that affect the emergence of water data ecosystems in Finland. The interview results indicate a clear need for water data ecosystems but also obstacles preventing their emergence. Inadequate understanding on the part of customer, a lack of water data, regulations, and underdeveloped agreements were seen to hinder the development of water data solutions. In addition to ecosystem development, the emergence of water data ecosystems</p>	10.1007/s10669-024-09988-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-024-09988-5	SpringerLink
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		<p>requires investment and the development of water data solutions, solution concepts, and demonstrations to show the value of the ecosystem. The results show that ecosystems need a clear rationale and vision, effective management of water data sharing, and mechanisms to ensure the scalability of water data ecosystems.</p>			
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What is a Complex System, After All?	Estrada, Ernesto,	<p>The study of complex systems, although an interdisciplinary endeavor, is considered as an integrating part of physical sciences. Contrary to the historical fact that the field is already mature, it still lacks a clear and unambiguous definition of its main object of study. Here, I propose a definition of complex systems based on the conceptual clarifications made by Edgar Morin about the bidirectional non-separability of parts and whole produced by the nature of interactions. Then, a complex system is defined as the system where there is a bidirectional non-separability between the identities of the parts and the identity of the whole. Thus, not only the identity of the whole is determined by the constituent parts, but also the identity of the parts are determined by the whole due to the nature of their interactions. This concept allows, as shown in the paper, to derive some of the main properties that such systems must have as well as to propose its mathematical formalization.</p>	10.1007/s10699-023-09917-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10699-023-09917-w	SpringerLink
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<p>Navigating social debt and its link with technical debt in large-scale agile software development projects</p>	<p>Saeeda, Hina, Ovais Ahmad, Muhammad, Gustavsson, Tomas,</p>	<p>Agile methodologies have emerged as transformative paradigms in the ever-evolving software development landscape, emphasizing iterative development, customer collaboration, and adaptability. As the scope and complexity of projects and organizations expand, applying agile principles within the context of Large-Scale Agile Development (LSAD) encounters distinctive challenges. The majority of challenges encountered in LSAD, technical and non-technical, are attributed to the accrual of social debt. However, a conspicuous gap remains in understanding and addressing social debt in LSAD. This study aims to fill this void by investigating social debt in LSAD through an in-depth industrial case study with a leading Nordic company specializing in telecommunications software and services and focusing on producing secure 5G network solutions. The study investigates the causes of LSAD's social debt and examines its impacts on secure 5G telecom software development. By addressing these objectives, this research sheds light on a critical aspect of LSAD's social debt,</p>	<p>10.1007/s11219-024-09688-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-024-09688-y</p>	<p>SpringerLink</p>
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		caused by 3C challenges(comm unication, coordination and collaboration), social confines challenges, community smells challenges, and organisational social challenges in the telecom sector that have been underrepresented in the existing literature.			
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Synergetic Decision-Making: Analyzing the Interplay of Human Behavior and Physical Infrastructure in Emergency Evacuations via an Analytical Approach	Miller, Matthew, Chowdhury, Sudipta, Alzarrad, Ammar, Hossain, Niamat Ullah Ibne,	Emergency evacuations involve a complex interaction between different stress-related factors (encompassing both human behavior and physical infrastructure) and associated responses. Utilizing the unity real-time development platform, this research examines these dynamics by exploring diverse aspects of evacuation, such as psychological traits and their interaction with physical infrastructure elements such as building layout, exit options, and crowd density. A single-story workspace at Marshall University was used as a case study. The findings reveal that individual human traits, behaviors, and interactions significantly impact evacuation success, often more than the physical infrastructure features themselves. Moreover, there is potential for the coupling effect where multiple stress inducing and/or reducing factors may act together and increase and/or decrease evacuation efficiency. In essence, this study underscores the complexity of human behavior under stress, emphasizing the importance of considering related factors in evacuation	10.1007/s40171-024-00412-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-024-00412-0	SpringerLink
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		models to simulate realistic scenarios accurately. These insights, validated by subject matter experts for general applicability across various workplace setups, can help organizations enhance their emergency management strategies, resulting in more effective systems, better-prepared personnel, and more adaptive responses to different stressors.			
Collaborative engineering and testing of smart grid automation applications	Brandauer, Christof, Prörtl Andrén, Filip, Gavriluta, Catalin, Strasser, Thomas I., Veichtlbauer, Armin, Steinmaurer, Gerald, Resch, Jürgen, Schöndorfer, Sebastian,		10.1007/s00502-024-01272-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-024-01272-3	SpringerLink

State ordering and classification for analyzing non-sparse large Markov models	Mohagheghi, Mohammadsade gh,	<p>Markov chains and Markov decision processes have been widely used to model the behavior of computer systems with probabilistic aspects. Numerical and iterative methods are commonly used to analyze these models. Many efforts have been made in recent decades to improve the efficiency of these numerical methods. In this paper, focusing on Markov models with non-sparse structure, a new set of heuristics is proposed for prioritizing model states with the aim of reducing the total computation time. In these heuristics, a set of simulation runs are used for statistical analysis of the effect of each state on the required values of the other states. Under this criterion, the priority of each state in updating its values is determined. The proposed heuristics provide a state ordering that improves the value propagation among the states. The proposed methods are also extended for very large models where disk-based techniques are required to analyze the models. Experimental results show that our proposed methods in this paper reduce the running times of the iterative methods for most cases of non-sparse models.</p>	10.1007/s11227-024-06446-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-024-06446-6	SpringerLink
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<p>Navigating the Knowledge Economy: Unraveling the Impact of Executive Policy Cognition on ESG Performance in China's A-Share Listed Companies</p>	<p>Chen, Zhi, Yang, Jinfeng, Li, Peigong, Sindakis, Stavros,</p>	<p>In the ever-evolving landscape of the knowledge-based economy, the assessment of Environmental, Social, and Governance (ESG) performance has emerged as a crucial metric for gauging companies' sustainability and responsible conduct worldwide. This study focuses on A-share listed companies in China, spanning 2011 to 2020, to unravel the interplay between executive policy cognition and corporate ESG performance. Leveraging an analysis of keyword frequency within the "Management Discussion and Analysis" (MD&A) section of annual reports, we investigate how executive policy cognition shapes the ESG trajectory of these companies. Our findings unequivocally demonstrate that a heightened level of executive policy cognition catalyzes enhanced ESG performance, underscoring the pivotal role of top-level decision-makers in steering organizations toward sustainable practices. Moreover, our study reveals that the influence of executive policy cognition on ESG performance is further magnified in the face of environmental uncertainty and heightened executive authority. Beyond</p>	<p>10.1007/s13132-023-01701-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-023-01701-2</p>	<p>SpringerLink</p>
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		<p>establishing this foundational connection, our research delves deeper, uncovering the multifaceted mechanisms through which executive policy cognition exerts influence. From spurring environmental engineering initiatives to fostering green innovation, initiating charitable endeavors, and engaging in other relevant channels, executive policy cognition emerges as a dynamic force in shaping comprehensive ESG performance. In a world where the knowledge economy reigns supreme, this study illuminates the transformative potential of executive policy cognition in driving corporate commitment to ESG principles. As we navigate the complexities of modern business, this research serves as a valuable compass, guiding organizations toward sustainable and responsible practices that transcend traditional profit maximization.</p>			
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Graph theory applications for advanced geospatial modelling and decision-making	Ghosh, Surajit, Mallick, Archita, Chowdhury, Anuva, De Sarkar, Kounik, Mukherjee, Jayesh,	Geospatial sciences (GS) include a wide range of applications, from environmental monitoring to infrastructure development, as well as location-based analysis and services. Notably, graph theory algorithms have emerged as indispensable tools in GS because of their capability to model and analyse spatial relationships efficiently. This article underscores the critical role of graph theory applications in addressing real-world geospatial challenges, emphasising their significance and potential for future innovations in advanced spatial analytics, including the digital twin concept. The analysis shows that researchers from 58 countries have contributed to exploring graph theory and its application over 37 years through more than 700 research articles. A comprehensive collection of case studies has been showcased to provide an overview of graph theory's diverse and impactful applications in advanced geospatial research across various disciplines (transportation, urban planning, environmental management, ecology, disaster studies and many more) and their linkages to the United Nations Sustainable	10.1007/s12518-024-00586-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12518-024-00586-3	SpringerLink
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		Development Goals (UN SDGs). Thus, the interdisciplinary nature of graph theory can foster an understanding of the association among different scientific domains for sustainable resource management and planning.			
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Climate change impacts on livestock in Brazil	N. C. R., Ferreira, R. R., Andrade, L. N., Ferreira,	<p>Brazilian livestock provides a significant fraction of the food consumed globally, making the country one of the largest producers and exporters of meat, milk and eggs. However, current advances in the production of protein from Brazilian animal origin may be directly impacted by climate change and the resulting biophysical effects. Therefore, it is strategically consistent to develop measures to deal with the resulting environmental heat stress on domesticated animal species, especially the need in developing countries. This work aims to (1) evaluate the impacts of climate change on livestock (cattle-dairy, cattle-beef, goats, sheep, pigs, poultry-general) in different regions of Brazil and (2) discuss possible response strategies, associated with animal comfort and welfare. From our results, we can draw better strategies to mitigate the impacts of climate change on livestock production. The results presented show an increase of high heat stress in South and Southeast and an increase of extreme heat stress in North and Central-West areas of Brazil. The rise in extreme heat stress tends to</p>	10.1007/s00484-024-02778-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00484-024-02778-3	SpringerLink
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		<p>occur mostly during spring and summer and tends to vary considering the different evaluated species. Within the evaluated species, the ones that seem to be more affected by climate changes are Poultry , pigs , cattle-beef and general (temperature-humidity index value) . The differences between the results for the five geographic regions in Brazil suggests that different mitigation measures need to be considered to cope with future heat stress in livestock. To ensure the long-term success of Brazil's influence on the global market for proteins of animal origin, it must achieve sustainable production systems more intensively.</p>			
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Strategies for data supply in high-granularity data trade in smart cities	Palviainen, Marko, Kotovirta, Ville,	<p>The smart city infrastructures, such as digital platforms, edge computing, and fast 5G/6G networks, bring new possibilities to use near-real-time sensor data in digital twins, AR applications, and Machine-to-Machine applications. In addition, AI offers new capabilities for data analytics, data adaptation, event/anomaly detection, and prediction. However, novel data supply and use strategies are needed when going toward higher-granularity data trade, in which a high volume of short-term data products is traded automatically in dynamic environments. This paper presents offering-driven data supply (ODS), demand-driven data supply (DDS), event and offering-driven data supply (EODS), and event and demand-driven data supply (EDDS) strategies for high-granularity data trade. Computer simulation was used as a method to evaluate the use of these strategies in supply of air quality data for four user groups with different requirements for the data quality, freshness, and price. The simulation results were stored as CSV files and analyzed and visualized in Excel. The simulation results and SWOT-analysis of the</p>	10.1007/s10669-024-09994-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-024-09994-7	SpringerLink
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		<p>suggested strategies show that the choice between the strategies is case-specific. DDS increased efficiency in data supply in the simulated scenarios. There was higher profit and revenues and lower costs in DDS than in ODS. However, there are use cases that require the use of ODS, as DDS does not offer ready prepared data for instant use of data. EDDS increased efficiency in data supply in the simulated scenarios. The costs were lower in EODS, but EDDS produced clearly higher revenues and profits.</p>			
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Seismic shocks and financial systems: a topological perspective on Borsa Istanbul after the earthquake	Batrancea, Larissa M., Balç, Mehmet Ali, Akgüller, Ömer, Nichita, Anca, Rus, Mircea-Iosif,	<p>This study examines the impact of the Kahramanmara earthquake on the BIST100 index through the application of complex network analysis. The method begins by examining the correlation distance between the logarithmic returns of companies in the BIST100 index, which serves as the foundation for creating filtered weighted networks. This technique prioritizes robust financial connections while downplaying weaker ones, enabling a thorough examination of the network topological structure and identifying noteworthy financial interactions. The study employs a combination of global and local topological metrics, as well as structural entropy, to gain insights on the interconnections among markets in terms of public interest and the roles played by various entities. It demonstrates how exogenous shocks impact the network structure and reaction. Findings indicate initial notable alterations in the network framework, which were subsequently alleviated by the implementation of financial rules and market processes. This demonstrates the ability of financial markets to recover and maintain stability</p>	10.1057/s41599-024-04115-w	https://www.nature.com/articles/s41599-024-04115-w.pdf	SpringerLink
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		following a disaster. Results offer useful perspectives on the interplay between market dynamics and the resilience of the financial system in the presence of natural disasters.			
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Recent Advances on the Challenges of Resilient Automation Systems of the Power Grid: Critical Review	Ezurike, Benjamin O., Nmadu, Daniel, Ajah, Stephen A., Uma, Uma U., Nwawelu, Udora N., Ogah, Ogah E., Osuji, Chimereze C., Emeh, Jerryson C., Okoronkwo, Chukwunenye A.,	Despite their infrequency, natural disasters like hurricanes, tornadoes, and floods pose significant threats to power systems, with profound economic impacts on nations and individuals. This paper delves into enhancing power system resilience against such disruptions through techniques such as network reconfiguration, defensive isolation, and targeted strengthening. A critical factor in power system failures is cyber-attacks, which exploit the integration of sensors, monitoring tools, and communication devices. To bolster system defenses against cyber threats, strategies like intrusion prevention systems, multiple layers of defense, and prompt security responses are implemented. Additionally, ageing infrastructure and human error contribute significantly to system failures, underscoring the importance of error prevention and maintenance of aging components. This paper conducts a comprehensive analysis of the grid's advanced automation systems, reviews several case studies, and proposes solutions to mitigate the challenges posed by these threats.	10.1007/s40866-024-00222-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40866-024-00222-4	SpringerLink
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<p>Bio-inspired designs: leveraging biological brilliance in mechanical engineering—an overview</p>	<p>Fattepur, Gururaj, Patil, Arun Y., Kumar, Piyush, Kumar, Anil, Hegde, Chandrashekhar, Siddhalingeswar, I. G., Kumar, Raman, Khan, T. M. Yunus,</p>	<p>Nature's evolutionary mastery has perfected design over the years, yielding organisms superbly adapted to their surroundings. This research delves into the promising domain of bio-inspired designs, poised to revolutionize mechanical engineering. Leveraging insights drawn from prior conversations, we categorize innovations influenced by life on land, in water, and through the air, emphasizing their pivotal contributions to mechanical properties. Our comprehensive review reveals a wealth of bio-inspired designs that have already made substantial inroads in mechanical engineering. From avian-inspired lightweight yet robust materials to hydrodynamically optimized forms borrowed from marine creatures, these innovations hold immense potential for enhancing mechanical systems. In conclusion, this study underscores the transformative potential of bio-inspired designs, offering improved mechanical characteristics and the promise of sustainability and efficiency across a broad spectrum of applications. This research envisions a future where bio-inspired designs shape the</p>	<p>10.1007/s13205-024-04153-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13205-024-04153-w</p>	<p>SpringerLink</p>
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		mechanical landscape, fostering a more harmonious coexistence between human technology and the natural world.			
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Measuring transformation concerning climate change and extreme events at the regional level: actor needs and spatial assessment in the Cologne district, Germany	Fekete, Alexander, Frick, Claudia, Beckers, Daniel, Hetkämper, Chris, Holtmann, Friederike, Laux, Julia, Nehren, Udo, Ribbe, Lars, Becker, Klaus,	The article focuses explicitly on transformation and analyzes how it can be measured both quantitatively and qualitatively in a case study region in western Germany. It addresses blue, critical, and green infrastructures in a region that was affected by the 2021 floods in Europe. Together with regional actors, co-creative solutions for developing adaptation strategies and infrastructure planning will be developed. Using and combining different conceptual models and applying them to the project region as well as to human infrastructure highlights the different types of change and transformation. This also shows the complexity of such an overall assessment, which needs to include a lot of diverse actors and disciplines. The project's first results are overviews of national and cross-regional changes to infrastructures and administrative structures after the 2021 floods in Germany and at the district level. The interim results reveal that more needs and plans exist than real, measurable transformations and that certain transformations stem from planning long before the floods in 2021. Maps and land use potentials are presented that	10.1007/s10708-024-11246-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10708-024-11246-9	SpringerLink
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		provide overviews of regional differences in flood, drought, and wildfire exposure and capacities for nature-based solutions. Both the conceptual models developed in this study as well as the application examples could be useful for other researchers and administrative bodies to measure transformation to climate change and other stimuli.			
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Optimized evaluation of the quality of sensor video internet of things (VIOT) by the integration of big data and artificial intelligence	Wen, Zhiqiang, Wang, Fei, Yang, Nan,	<p>The application of sensor video internet of things technology to large-scale integrated work can significantly improve the working quality of employees. However, the degree of improvement in working quality is still difficult to measure in a systematic, intelligent, stable, and accurate manner. local optimization and adjustment after evaluation are still relatively challenging, To address these issues, the study proposes a method of optimizing the evaluation of sensor video quality through the integration of big data and AI techniques. A large-scale integrated distance education system in the field of education and training with a certain application basis is adopted as a case. Including big data and AI techniques such as integrated intelligent agent modules, recommendation algorithms, and transaction optimization algorithms, a new agent-oriented system design with fast response speed, strong scalability, convenient local optimization, and greater stability is achieved. According to the network topology structure of the distance education system in colleges and universities, this paper uses queuing theory to analyze the</p>	10.1007/s10791-024-09482-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10791-024-09482-1	SpringerLink
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		<p>system performance of the system. The focus of this paper is the quantitative relationship between system communication intensity , user arrival rate , system channel capacity n and system waiting delay, blocking probability, average queue length, system throughput and other important performance indicators. In teaching evaluation, the key factor that affects the quality of classroom teaching, that is, Developing a comprehensive system for evaluating classroom instruction is crucial. By incorporating student feedback, leveraging data mining techniques, and harnessing computer technology, a holistic framework for gathering, analyzing, and generating actionable insights on teaching performance is established. This approach makes the evaluation process more systematic and evidence-based, identifying 12 key elements that influence classroom education standards. In the experimental section, the student assessment data sets I1 and I2 exhibit experimental values (statistics) that significantly exceed the thresholds, with a minimum support</p>			
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		<p>of 0.32 and a confidence level of 0.61. Moreover, the Boolean matrix is divided into 90 points. The rule $U1Ua \rightarrow U2$ is identified as a subset of $\{U1U2Ua\}$ within the large item set, signifying a strong association rule. These findings confirm the robustness of the artificial intelligence model proposed in this paper for video quality prediction. The optimized sensor video quality evaluation method not only meets a satisfactory confidence level and matching value but also demonstrates good reliability and relevance in the evaluation criteria.</p>			
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PROGRESS: the sectoral approach to cyber resilience	Tabansky, Lior, Lichterman, Eynan,	Each critical infrastructure and vital service represents a unique instance of a complex socio-technical-economic system. Resilience in complex systems is an emergent behaviour that occurs from interactions between components and is not easily predictable from understanding each component in isolation. Yet, cybersecurity practice and maturity models still focus on the robustness of separate components: organizational units, firms, or IT applications. Such a fundamental mismatch between theory and tools is among the causes of pervasive cyber insecurity. We introduce the sectoral capability maturity model to enable a comprehensive improvement of systemic resilience. The promoting global cyber resilience for sectors cyber-capability maturity model incorporates the science of complex systems, cybersecurity frameworks, and two decades of CIP operations experience. The model was successfully applied in resilience assessment projects in a dozen countries. Real-life experience emphasizes the benefits of the sectoral approach to cyber resilience:	10.1007/s10207-024-00910-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-024-00910-3	SpringerLink
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		creating feedback loops within the sector, integrating supply chain and third-party risks, facilitating information flows between stakeholders, enabling cooperation with and among ministries, departments and other authorities, weighting in the links and processes between actors in cybersecurity issues. The established value of the sectoral approach calls for applications that will improve the resilience of essential services while lowering sector-wide cybersecurity expenditures.			
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Developing digital twins of urban low-income communities in Sub-Saharan Africa: a case study in Ghana, West Africa	Cordes, Darrold, Sefah, Paul, Marinova, Dora,	Low-income urban and rural communities in Sub-Saharan Africa are habitats for more than 556 million profoundly poor people, and the United Nations and the African Union are pessimistic that sustainable development goals will be met. The number of people falling into poverty is increasing, and policy initiatives to reduce poverty have been confounded by various economic, political, social, structural, and environmental issues. Despite a wealth of natural and human assets, there is no systematic approach to sustainable development for poverty alleviation in Sub-Saharan Africa. This case study of an urban community in Ghana, West Africa, investigates the potential role of digital twins in a systematic approach to sustainable development for poverty alleviation. Aerial and community surveys of the built environment and social and economic surveys of businesses and households were compiled to inform a virtual representation of the study area. A small e-commerce business intervention was introduced, and data was recorded for studies on the impact of the intervention. A 3D	10.1007/s44257-024-00026-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44257-024-00026-x	SpringerLink
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		<p>interactive view, extensive video, and fixed images provided a comprehensive view of the built environment. A limited view of the social and economic environment was obtained from a small population sample. It was observed that online transactions increased in the businesses receiving the e-commerce intervention, demonstrating a willingness of businesses and their customers to engage in e-commerce when incentives are provided. A single successful community-centric initiative has little value unless it can be generalized across the broader society. This limited case study focused on developing and testing virtual and physical constructs to enhance a deeper understanding of the community, community engagement, and pathways to sustainability. The scale of the intervention was too small to conclude generalizability. Future research will focus on improving the data collection processes, fidelity of virtual representations, visualization methods, and methodologies for constructing viable virtual interventions.</p>			
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Integrated-decision support system (DSS) for risk identification and mitigation in manufacturing industry for zero-defect manufacturing (ZDM): a state-of-the-art review	Akbar, Muhammad Awais, Naseem, Afshan, Zaman, Uzair Khaleeq uz, Petronijevic, Jelena,	Risk management has always been a trend in manufacturing related literature in the era of zero-defect manufacturing (ZDM). However, a gap still exists to present a holistic viewpoint of the integration for a product and its related processes involved during decision-making in manufacturing industry. The (knowledge-driven) integrated-decision support system indicates the opportunity by integrating the product design and manufacturing processes related risks in a manufacturing industry to make better decisions at the shop floor. It further proposes a direction towards development of a decision support system framework for their respective risks' identification as well as mitigation to enhance the quality, while minimizing time and cost. Over the years, risk identification has been considered well but risk mitigation has mostly been overlooked in the published literature. This paper scanned over a thousand papers from renowned journals published between 2005 and 2024. Currently, the evolution involved in the advancement of decision support tools for risk management has	10.1007/s00170-024-14601-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-024-14601-9	SpringerLink
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		<p>been reviewed by utilizing systematic literature review methodology. The study also provides a design overview, highlighting its features, pros, and cons of the existing methods which can be used for risk identification, prioritization, and mitigation in the development of a dynamic decision support system to aim (data-driven) zero-defect manufacturing (ZDM). Lastly, the paper discusses the current challenges and opportunities to lessen the manufacturing recalls in the industry, followed by phases of the proposed model.</p>			
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<p>The use of artificial intelligence in the production of genetically modified (GM) crops: a recent promising strategy for enhancing the acceptability of GM products ?</p>	<p>Mmbando, Gideon Sadikiel,</p>	<p>The acceptance of genetically modified (GM) crops is still a controversial topic that presents major obstacles to their general use. Few studies, nevertheless, have emphasized the use of artificial intelligence (AI) in forecasting the dangers of GM crops. This review delves into the emerging field of applying AI to forecast the hazards linked to GM crops and examines how it could increase public acceptance of GM products. AI algorithms, and predictive modeling approaches examine enormous datasets that include genetic, environmental, and agronomic factors. Utilizing AI, researchers may accelerate risk assessment procedures on the safety and effectiveness of GM crops. In addressing public concerns and skepticism, AI-generated risk assessments foster transparency and confidence among consumers, regulators, and stakeholders, thereby might fostering greater acceptance of GM products. Although the lack of available data on genetic modifications or developing crop varieties, the amount of training and validation needed for AI algorithms before they can be trusted, the complexity of AI</p>	<p>10.1007/s42452-024-06212-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-024-06212-6</p>	<p>SpringerLink</p>
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		models, and ethical issues about AI, like data privacy and algorithm bias, may present difficulties for precise AI-driven risk assessment. This review outlines recent developments and future directions in utilizing AI as a promising strategy to enhance the acceptability of GM products.			
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<p>"Real Work, Real Consequences": an action-oriented pedagogies (AOP) framework for sustainability education in K-12 classrooms</p>	<p>Weinberg, Andrea E., Jordan, Michelle E., Jongewaard, Rebekah,</p>	<p>This conceptual manuscript presents a novel framework for positioning K-12 students as agentic learners taking action for sustainability through real work with real consequences. Drawing on our collective experience in K-12 and higher education STEM and sustainability teaching-learning environments as well as scholars from wide-ranging fields (i.e., transformative learning; environmental, science, and sustainability education), we introduce the action-oriented pedagogies (AOP) framework, which aims to inspire optimism in our collective ability to address interlocking sustainability crises and contribute to the advancement of cultural and social shifts necessary to achieve more ecologically attuned and socially just futures. After defining AOP, three necessary educational shifts to advance sustainability education are identified, along with their relationship to three key attributes of AOP: (a) imagining preferred futures where ecological and social justice prevail, (b) planning co-produced impact, and (c) taking agentic action. Finally, we present a cyclical model for enacting AOP in</p>	<p>10.1007/s11625-024-01560-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11625-024-01560-z</p>	<p>SpringerLink</p>
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		formal K-12 classrooms. Arguing that AOP can be a source of hope and agency for school-aged children and youth, we illustrate ways teachers can enact pedagogies that position students as agentic learners and actors, engaging alongside them in meaningful efforts to advance sustainability through real work with real consequences across multiple spheres of influence.			
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<p>Making Sense of Interlinkages in EU Marine Environment Legislation: Unearthing Effectiveness</p>	<p>Appleby, Thomas, Scott, Juliette, Flannery, Wesley, Donelan, Edward,</p>	<p>Crises such as water quality, pollution, climate change, overfishing, biodiversity, energy, waste, and carbon sequestration mean that legislation protecting the marine environment is under intense pressure to be effective and to demonstrate positive results in a vast array of public and private spheres. Thus far, scholarship of EU marine environmental law has been focused primarily on (i) interaction with international agreements (ii) spatial/jurisdictional studies (iii) analysis of new laws, plans and programmes (iv) principles (e.g. good environmental status, precautionary approach, polluter pays) (v) CJEU case analysis (vi) enforcement (vii) specific issues (plastics, litter...). However, over the years the mass constituted by the EU marine environment acquis has grown ever-larger, leading to risks of poor coordination, over-regulation in some areas and lack of regulation in others. By triangulating complementary investigatory methodologies, this study teases out systemic, diachronic and legilinguistic interlinkages—within and across key instruments as well as EU institutions, bodies and agencies. Our</p>	<p>10.1007/s11196-024-10182-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11196-024-10182-8</p>	<p>SpringerLink</p>
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		results provide avenues for policymakers nationally and at EU level to improve the legibility and coherence of marine environmental regulation—to the benefit of citizens and the wider body of stakeholders, and, ultimately, to benefit the marine world.			
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<p>Evaluation of public transportation systems for sustainable cities using an integrated fuzzy multi-criteria group decision-making model</p>	<p>Kundu, Pradip, Görçün, Ömer Faruk, Garg, Chandra Prakash, Küçükönder, Hande, Çanakçolu, Mustafa,</p>	<p>In this era of increasing demand for mobility and rapid urban growth, there is a pressing need for a public transit system that is safe, fast, reliable, well-connected, and sustainable. Furthermore, it is essential to reduce the external costs associated with urban transportation, including environmental pollution, noise, congestion, and accidents, to foster sustainable cities. Choosing the right urban transportation system can meet this goal, but it is not an accessible business for decision-makers in the face of several conflicting criteria and ambiguities in the evaluation process. To cope with this, the current paper suggests a multi-criteria group decision-making (MCGDM) framework consisting of fuzzy BWM (Best–Worst method) and fuzzy MAIRCA (Multi-Attribute Ideal-Real Comparative Analysis) techniques. This extended MCGDM approach has been applied to evaluate six urban transport systems, namely, Trams, Light Rail Trams, Metro (Subway), Bus Rapid Transport, Commuter Trains, and Public Buses based on 11 selection criteria which we have determined after consultation with</p>	<p>10.1007/s10668-023-03776-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-023-03776-y</p>	<p>SpringerLink</p>
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		<p>highly experienced professionals. The fuzzy BWM technique is employed to identify the weights of the criteria. The fuzzy MAIRCA technique is utilized for ranking the alternatives using the calculated weights of the criteria. The proposed approach's validation has been examined with an extensive robustness check. The study is conducted from a general perspective, i.e., not restricted to a particular city. However, with the identified selection criteria, the proposed decision-making procedure can be repeated for a specific city considering any specific requirements, constraints, or limitations of that city.</p>			
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China–US scientific collaboration on sustainable development amidst geopolitical tensions	Li, Rongrong, Ren, Feng, Wang, Qiang,	<p>This study aims to investigate whether growing geopolitical competition has affected international collaboration in sustainable development research, with a particular focus on structural changes in bilateral research collaboration between China and the United States. Three datasets have been created and compared using bibliographic information provided by the Web of Science core collection: before the Trump administration, during the Trump administration, and during the Biden administration. The results indicate that countries worldwide have conducted extensive research in sustainable development, and the United States, China, and the United Kingdom have produced the most publications, demonstrating a high level of scientific research productivity. Concerning the collaborative patterns of sustainable development research, China and the United States are each other's largest collaborative partners. The intensity of scientific research collaboration between the two countries has not declined due to geopolitical tensions. Conversely, the intensity of</p>	10.1057/s41599-024-03948-9	https://www.nature.com/articles/s41599-024-03948-9.pdf	SpringerLink
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		<p>scientific research between the two countries is still increasing. The keyword thematic explorations reveal that research on China–US collaboration has focused differently across the three time periods and that despite differences in research bias, efforts to contribute to advancing the achievement of the SDGs have been consistent. It is possible that geopolitical considerations have heightened the urgency of policy research and led to its incorporation into research centers.</p>			
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Quality assurance strategies for machine learning applications in big data analytics: an overview	Ogrizovi, Mihajlo, Draškovi, Dražen, Boji, Dragan,	Machine learning (ML) models have gained significant attention in a variety of applications, from computer vision to natural language processing, and are almost always based on big data. There are a growing number of applications and products with built-in machine learning models, and this is the area where software engineering, artificial intelligence and data science meet. The requirement for a system to operate in a real-world environment poses many challenges, such as how to design for wrong predictions the model may make; How to assure safety and security despite possible mistakes; which qualities matter beyond a model's prediction accuracy; How can we identify and measure important quality requirements, including learning and inference latency, scalability, explainability, fairness, privacy, robustness, and safety. It has become crucial to test thoroughly these models to assess their capabilities and potential errors. Existing software testing methods have been adapted and refined to discover faults in machine learning and deep learning models. This paper covers a taxonomy, a	10.1186/s40537-024-01028-y	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40537-024-01028-y	SpringerLink
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		<p>methodologically uniform presentation of all presented solutions to the aforementioned issues, as well as conclusions about possible future development trends. The main contributions of this paper are a classification that closely follows the structure of the ML-pipeline, a precisely defined role of each team member within that pipeline, an overview of trends and challenges in the combination of ML and big data analytics, with uses in the domains of industry and education.</p>			
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Analysis of integration of IoMT with blockchain: issues, challenges and solutions	Mazhar, Tehseen, Shah, Syed Faisal Abbas, Inam, Syed Azeem, Awotunde, Joseph Bamidele, Saeed, Mamoon M., Hamam, Habib,	1. The study explores and understands the characteristics of blockchain technology for its implementation in the healthcare industry to strengthen data privacy. 2. The study discusses the importance of standardization and compliance in the development and integration of blockchain technology into IoT-based systems to ensure data security and management. 3. The study also explores the challenges and opportunities of blockchain integration in IoT and ways for addressing these challenges. The study addresses the benefits of handling security issues in the healthcare industry and proposes the benefits of blockchain technology integration into IoT systems. The incorporation of Artificial Intelligence (AI) into the fields of Neurosurgery and Neurology has transformed the landscape of the healthcare industry. The present study describes seven dimensions of AI that have transformed the way of providing care, diagnosing, and treating patients. It has exhibited unparalleled accuracy in analyzing complex medical imaging data and expediting precise diagnoses of neurological conditions. It has	10.1007/s43926-024-00078-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43926-024-00078-1	SpringerLink
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		<p>also enabled personalized treatment plans by harnessing patient-specific data and genetic information, promising more effective therapies. For instance, AI-powered surgical robots have brought precision and remote capabilities to neurosurgical procedures, reducing human error. In AI, machine learning models predict disease progression, optimizing resource allocation and patient care, whereas wearable devices with AI provide continuous neurological monitoring, and enable early intervention for chronic conditions. It has also accelerated drug discovery by analyzing vast datasets, potentially leading to breakthrough therapies. Chatbots and virtual assistants powered by AI, enhance patient engagement and adherence to treatment plans. It holds promise in further personalization of care, augmented decision-making, earlier intervention, and the development of groundbreaking treatments. The present study mainly focuses on the incorporation of blockchain technology and provides a reasonable understanding of the associated issues and challenges along</p>			
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		with its solutions. It will allow AI and healthcare professionals to advance the field and contribute towards the improvement of an individual's well-being when facing neurological challenges.			
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Resilience analysis of mine ventilation cyber-physical fusion system	Du, Pan, Wang, Xinping, Li, Tiezhi, Su, Chang, Li, Zhenyu,	Advancing intelligent mining and enhancing the reliability of the physical information systems in mines is a current objective for the coal mining industry. System resilience reflects the system's ability to handle external and internal disruptions; therefore, quantifying the resilience of the mine's cyber-physical system (CPS) allows for the assessment of the probability of successful recovery post-attack, thereby enabling targeted decision-making to improve system resilience, reliability, stability, and safety. In this work, the influencing factors were first identified, and an influencing factor system was established through literature review and the Delphi method. Subsequently, the decision experiment and evaluation laboratory (DEMATEL), maximum mean deviation entropy (MMDE), and interpretive structural model (ISM) methods were employed to study the importance and hierarchical relationships of these factors. Finally, a dynamic Bayesian network considering time-varying factors was used to construct a dynamic CPS resilience assessment model for mining. The results indicate that anti-	10.1007/s11227-024-06533-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-024-06533-8	SpringerLink
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		interference capability is the most critical factor affecting the resilience of the mining CPS. The findings provide valuable insights for practitioners and researchers in optimizing CPS resilience, enhancing CPS reliability, and formulating development strategies for intelligent mining.			
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<p>Multihop optical wireless underwater communication links utilizing various routing protocols for IoUT applications</p>	<p>Zayed, M. Mokhtar, Shokair, Mona, Elagooz, Salah, Elshenawy, Hamed,</p>	<p>In the rapidly advancing field of underwater communication, Optical Wireless Communication (OWC) has emerged as a superior alternative to traditional radio frequency and acoustic methods, offering high-speed data transmission with reduced attenuation. This paper investigates the performance of multi-hop OWC links, focusing on their application in the Internet of Underwater Things (IoUT), a key enabler for smart underwater networks. We explore various routing protocols, including epidemic, depth-based, and focused beam routing, to assess their ability to maintain reliable and efficient communication across multi-hop networks in challenging underwater environments. Through extensive simulations, we evaluate critical performance metrics such as routing overhead, packet delivery ratio, average hop count, end-to-end delay, and throughput under varying conditions, including different water types, node densities, and beam divergence angles. Our contributions include a comprehensive comparison of these routing protocols, offering new insights into the trade-offs between energy efficiency, scalability, and</p>	<p>10.1007/s12596-024-02290-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12596-024-02290-2</p>	<p>SpringerLink</p>
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		communication reliability in underwater OWC networks. The results demonstrate the potential of multi-hop OWC links to enhance connectivity in IoUT applications, such as environmental monitoring, underwater exploration, and autonomous underwater vehicles, where reliable and efficient communication is paramount. This research provides a foundation for the development of optimized underwater networks, paving the way for the future of IoUT.			
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<p>A Stochastic Model for Transmission Dynamics of AIDS with Protection Consciousness and Log-normal Ornstein–Uhlenbeck Process</p>	<p>Jiao, Xue, Zhang, Xinhong, Jiang, Daqing,</p>	<p>In this study, a log-normal Ornstein–Uhlenbeck process and protection consciousness are included in a stochastic pandemic model of AIDS. For the 5-dimensional deterministic system, the local asymptotic stability of endemic equilibrium point is proved by Lyapunov function method instead of Routh–Hurwitz criterion. For stochastic system, we firstly verify the existence and uniqueness of global positive solution. Next, we give the sufficient condition for the presence of stationary distribution by constructing suitable Lyapunov function, and the sufficient condition for disease extinction is also given. Furthermore, the precise expression of the probability density function near the quasi-equilibrium is derived. Finally, the theoretical results are verified by numerical simulations, and the impact of log-normal Ornstein–Uhlenbeck process on the dynamic behavior of the stochastic model is also examined.</p>	<p>10.1007/s12346-024-01156-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12346-024-01156-z</p>	<p>SpringerLink</p>
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Enhancing DevSecOps practice with Large Language Models and Security Chaos Engineering	Bedoya, Martin, Palacios, Sara, Díaz-López, Daniel, Laverde, Estefania, Nespoli, Pantaleone,	<p>Recently, the DevSecOps practice has improved companies' agile production of secure software, reducing problems and improving return on investment. However, overreliance on security tools and traditional security techniques can facilitate the implementation of vulnerabilities in different stages of the software lifecycle.. Thus, this paper proposes the integration of a Large Language Model to help automate threat discovery at the design stage and Security Chaos Engineering to support the identification of security flaws that may be undetected by security tools. A specific use case is described to demonstrate how our proposal can be applied to a retail company that has the business need to produce rapidly secure software.</p>	10.1007/s10207-024-00909-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-024-00909-w	SpringerLink
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<p>Cyber-Physical Systems in the Context of Industry 4.0: A Review, Categorization and Outlook</p>	<p>Oks, Sascha Julian, Jalowski, Max, Lechner, Michael, Mirschberger, Stefan, Merklein, Marion, Vogel- Heuser, Birgit, Möslein, Kathrin M.,</p>	<p>Cyber-physical systems (CPS) offer great potential for the digital transformation of industrial value creation in the context of Industry 4.0. They unify and integrate several technological approaches, including big data analysis and artificial intelligence, enhancing real-time monitoring and control of manufacturing processes. An extensive knowledge base formed by various disciplines, including information systems, engineering, and computer science, already exists for CPS. However, this knowledge has not been holistically captured and structured to date. To address this research gap, this study conducts a large-scale literature review of 2365 papers representing the current state of the research and then develops a novel categorization on industrial CPS with 10 sections, 32 areas, and 246 fields. The categorization is presented in hierarchical graphical form and can also be utilized as a web tool. To conclude, a perspective on future research needs and potentials to enhance Industry 4.0 in both research and practice are offered.</p>	<p>10.1007/s10796-022-10252-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-022-10252-x</p>	<p>SpringerLink</p>
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<p>Digital Twins of smart energy systems: a systematic literature review on enablers, design, management and computational challenges</p>	<p>Aghazadeh Ardebili, Ali, Zappatore, Marco, Ramadan, Amro Issam Hamed Attia, Longo, Antonella, Ficarella, Antonio,</p>	<p>Background Energy systems, as critical infrastructures (CI), constitute Cyber-Physical-Social Systems (CPSS). Due to their inherent complexity and the importance of service continuity of CIs, digitization in this context encounters significant practical challenges. Digital Twins (DT) have emerged over the recent years as a promising solution for managing CPSSs by facilitating real-time interaction, synchronization, and control of physical assets. The selection of an appropriate architectural framework is crucial in constructing a DT, to ensure integration of enabling technologies and data from diverse sources. Objectives This study proposes a Systematic Literature Review (SLR) to examine technological enablers, design choices, management strategies and Computational Challenges of DTs in Smart Energy Systems (SES) by also analyzing existing architectures and identifying key components. Methods The SLR follows a rigorous workflow exploiting a multi-database search with predefined eligibility criteria, accompanied by advanced searching techniques, such as manual screening of results and a</p>	<p>10.1186/s42162-024-00385-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-024-00385-5</p>	<p>SpringerLink</p>
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		<p>documented search strategy, in order to ensure its comprehensiveness and reliability, More specifically, research questions are first defined and then submitted as queries to scientific digital libraries (i.e., IEEE Xplore, Scopus, and WoS) selected due to their coverage and reliability (Google Scholar was excluded for the presence of grey literature and non-peer-reviewed material). Then, inclusion and exclusion criteria are established to filter the results and shortlist the significant publications. Subsequently, relevant data are extracted, summarized, and categorized in order to identify common themes, existing gaps, and future research directions, with the aim of providing a comprehensive overview of the current state of DTs for SESS. Results From the proposed DT-based solutions described in the selected publications, the adopted architectures are examined and categorized depending on their logical building blocks, microservices, enabling technologies, human-machine interfaces (HMI), artificial intelligence and machine learning (AI/ML) implementations, data flow and data persistence</p>			
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		<p>choices, and Internet-of-Things (IoT) components involved. Additionally, the integration of edge-cloud computing and IoT technologies in literature are studied and discussed. Finally, gaps, opportunities, future study lines, and challenges of implementing DTs are thoroughly addressed. The results achieved also pave the way for a forthcoming design pattern catalog for DTs in CPSSs capable of supporting the engineering and research communities, by offering practical insights on implementation and integration aspects.</p> <p>Conclusion The proposed SLR provides a valuable resource for designing and implementing DTs of CPSSs in general and of SESs in particular. Furthermore, it highlights the potential benefits of adopting DTs to manage complex energy systems and it identifies areas for future research.</p>			
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<p>A Critical Review of Distributed Generations Planning in Distribution Networks for Improved System Performances</p>	<p>Kumar, Ravindra, Singh, B. K., Singh, Bindeshwar,</p>	<p>With the help of a range of load models including static, dynamic, composite, and realistic load models, the planning of distributed generations (DGs) in distribution networks is examined. Traditional, artificial intelligence, hybrid, and other modern approaches of optimization are used for DGs planning. Different performance measures, including minimising the actual and reactive power losses of the system are taken into consideration for DGs design from a variety of objective function viewpoints. This review paper also discusses the most recent models and methods for organising, evaluating, and classifying current and upcoming research trends in the area of DGs. Therefore, this study may be useful for researchers and professionals of academia and industry.</p>	<p>10.1007/s40031-024-01097-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40031-024-01097-w</p>	<p>SpringerLink</p>
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<p>FloBP: a model-driven approach for developing and executing IoT-enhanced business processes</p>	<p>Fedeli, Arianna, Fornari, Fabrizio, Polini, Andrea, Re, Barbara, Torres, Victoria, Valderas, Pedro,</p>	<p>The capability to integrate Internet of Things (IoT) technologies into business processes (BPs) has emerged as a transformative paradigm, offering unprecedented opportunities for organisations to enhance their operational efficiency and productivity. Interacting with the physical world and leveraging real-world data to make more informed business decisions is of greatest interest, and the idea of IoT-enhanced BPs promises to automate and improve business activities and permit them to adapt to the physical environment of execution. Nonetheless, combining these two domains is challenging, and it requires new modelling methods that do not increase notation complexity and provide independent execution between the process and the underlying device technology. In this work, we propose FloBP , a model-driven engineering approach separating concerns between the IoT and BPs, providing a structured and systematic approach to modelling and executing IoT-enhanced BPs. Applying the separation of concerns through an interdisciplinary team is needed to</p>	<p>10.1007/s10270-024-01150-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01150-8</p>	<p>SpringerLink</p>
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		<p>ensure that the approach covers all necessary process aspects, including technological and modelling ones. The FloBP approach is based on modelling tools and a microservices architecture to deploy BPMN models, and it facilitates integration with the physical world, providing flexibility to support multiple IoT device technologies and their evolution. A smart canteen scenario describes and evaluates the approach's feasibility and its possible adoption by various stakeholders. The performed evaluation concludes that the application of FloBP facilitates the modelling and development of IoT-enhanced BPs by sharing and reusing knowledge among IoT and BP experts.</p>			
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Optimal saturated information load analysis for enhancing robustness in unmanned swarms system	Wu, Jian, Jiang, Yichuan, Tang, Junjun, Ding, Linfei,	<p>Saturated information load is defined as the information received by a unmanned aerial vehicle (UAV) node in a swarm network reaches the overload limit of its processing capability. When a UAV swarm performs a mission in an uncertain and adversarial complex environment, overloading of UAVs will lead to information diversion, which may cause other UAVs to experience overloading and diversion as well, affecting the transmission efficiency and robustness of the entire swarm network, which in turn affects the information sensing ability, execution ability, and coordination ability of the swarm in performing the mission. Therefore, this paper proposes a saturated information load-based UAV swarm network topology modelling method, which sets the saturated information load of the nodes in the network model in order to reasonably allocate network resources and optimise the network topology. In addition, through robustness experiments of complex networks and comparative analysis of different saturated information loads and three typical modelling methods, the</p>	10.1007/s40747-024-01526-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40747-024-01526-9	SpringerLink
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		saturated information load-based network structure modelling method has outstanding advantages and performance in terms of network connectivity, network communication efficiency, and destruction resistance.			
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From pen and paper to digital precision: a comprehensive review of on-farm recordkeeping	Basir, Md. Samiul, Buckmaster, Dennis, Raturi, Ankita, Zhang, Yaguang,	In the present era of agricultural digitalization, documenting on-farm operations is critical. These records contextualize other layers of data and underpin economic analysis and informed decision-making. On-farm recordkeeping is rooted in an ancient tradition and has evolved from pen and paper to digital means integrating diverse tools and methods. These tools vary widely in mode of data recording and this presents challenges in achieving complete, accurate and interoperable data. Assessing this diversity of existing recordkeeping systems is a key step toward the improvement in recordkeeping systems that enhance data quality and interoperability. Despite the importance, as of present, comprehensive studies addressing this challenge are lacking. A systematic review of existing on-farm recordkeeping systems was carried out to address their advantages and weaknesses and to analyze their features and traits, focusing on interoperability and adherence to efficient and comprehensive on-farm recordkeeping. Paper-based recordkeeping, a longstanding and reliable method,	10.1007/s11119-024-10172-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11119-024-10172-7	SpringerLink
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		<p>is gradually being replaced by digital platforms. Many universities and agencies have released farm management spreadsheets and interactive database forms representing the initial step toward intuitive recordkeeping. Furthermore, farm management software, web apps, and user-friendly smartphone apps are increasingly crucial for handling agricultural big data. Notably, among the surveyed software packages and apps, most of them are not free and only a few support data interoperability. The survey also indicates a scope for further development in open-source tools with automation in recordkeeping. Adopting digital on-farm recordkeeping tools can positively impact both on and off the farm, fostering data interoperability, controlled yet flexible data access, completeness, and appropriate accuracy.</p>			
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<p>A model-based reference architecture for complex assistive systems and its application</p>	<p>Michael, Judith, Shekhovtsov, Volodymyr A.,</p>	<p>Complex assistive systems providing human behavior support independent of the age or abilities of users are broadly used in a variety of domains including automotive, production, aviation, or medicine. Current research lacks a common understanding of which architectural components are needed to create assistive systems that use models at runtime. Existing descriptions of architectural components are focused on particular domains, consider only some parts of an assistive system, or do not consider models at runtime. We have analyzed common functional requirements for such systems to be able to propose a set of reusable components, which have to be considered when creating assistive systems that use models. Such components constitute a reference architecture that we propose within this paper. To validate the proposed architecture, we have expressed the architectures of two assistive systems from different domains, namely assistance for elderly people and assistance for operators in smart manufacturing in terms of compliance with such architecture.</p>	<p>10.1007/s10270-024-01157-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-024-01157-1</p>	<p>SpringerLink</p>
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		The proposed reference architecture will facilitate the creation of future assistive systems.			
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<p>The</p> <p>$\mathbf{ACAC_D}$</p> <p>model for mutable activity control and chain of dependencies in smart and connected systems</p>	<p>Mawla, Tanjila, Gupta, Maanak, Ameer, Safwa, Sandhu, Ravi,</p>	<p>With the integration of connected devices, artificial intelligence, and heterogeneous networks in IoT-driven cyber-physical systems, our society is evolving as a smart, automated, and connected community. In such dynamic and distributed environments, various operations are carried out considering different contextual factors to support the automation of connected devices and systems. These devices often perform long-lived operations or tasks (referred to as activities) to fulfill larger goals in the connected environment. These activities are usually mutable (change states) and interdependent. They can influence the execution of other activities in the ecosystem, requiring active and real-time monitoring of the entire connected environment. Traditional access control models are designed to take authorization decisions at the time of access request and do not fit well in dynamic and connected environments, which require continuous active checks on dependent and mutable activities. Recently, a vision for activity-centric access control (ACAC) was proposed to enable security modeling and</p>	<p>10.1007/s10207-024-00881-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-024-00881-5</p>	<p>SpringerLink</p>
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		<p>enforcement from the perspective and abstraction of interdependent activities. The proposed ACAC incorporates four decision parameters: Authorizations (A), obligations (B), Conditions (C), and activity Dependencies (D) for an object agnostic continuous access control in smart systems. In this paper, we take a step further towards maturing ACAC by focusing on the mutability of activities (the ability of changing states of activities), activity dependencies (D) and developing a family of formal mathematically grounded models, referred to as $\mathrm{ACAC}_{\{D\}}$ ACAC D . We propose six practically suitable sub-models for $\mathrm{ACAC}_{\{D\}}$ ACAC D to support the state transition of a mutable activity incorporating the dependent activities' state-check and state-update procedures. These formal models consider the real-time mutability of activities as a critical factor in resolving active dependencies among various activities in the ecosystem. Activity dependencies can form a chain where it is possible to have dependencies of dependencies. In ACAC, we also consider the chain of</p>			
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		<p>dependencies while handling the mutability of an activity. We highlight the challenges (such as multiple dependency paths, race conditions, circular dependencies, and deadlocks) while dealing with a chain of dependencies, and provide solutions to resolve these challenges. We also present a proof of concept implementation of our proposed $\mathrm{ACAC}_{\{D\}}$ ACAC D models with performance analysis for a smart farming use case. This paper addresses the formal models' intended behavior while supporting activities' dependencies. Specifically, it focuses on developing and categorizing mathematically grounded activity dependencies into various ACAC sub-models without formal policy specification and analysis of theoretical complexities, which are intentionally kept out of the scope of this work.</p>			
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An Adaptive Control Framework for Mixed Autonomy Traffic Platoon	Tang, Ruru, Li, Zhenning, Xu, Chengzhong,	<p>As autonomous vehicles (AVs) and human-driven vehicles (HVs) are expected to share the road for the foreseeable future, understanding how to improve the stability of mixed-autonomy platoons is crucial. This paper introduces a novel adaptive control strategy tailored for a specific platoon configuration termed as “$1+n+1$”, consisting of a leading AV, n intervening vehicles, and a trailing AV. Utilizing vehicle-to-vehicle communication, the trailing AV adapts to real-time traffic states, thereby promoting overall platoon stability. Our analysis, grounded in Lyapunov theory, demonstrates that stabilizing only the trailing vehicle is sufficient to ensure the entire system reaches a stable state. To mitigate the negative effects of sensor and actuator uncertainties, we also introduce a corrective signal framework capable of nullifying adverse inputs. Numerical experiments validate the effectiveness of the proposed strategy in platoon control, which can also be adapted to other platoon configurations. Additionally, the performance of this strategy on macroscopic traffic flow is explored, suggesting</p>	10.1007/s13369-023-08625-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13369-023-08625-8	SpringerLink
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		substantial potential throughput increases compared with the benchmark strategy of Cooperative Adaptive Cruise Control (CACC).			
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Data Domotopia: introduction to the quantitative survey	Schultheiss, Marc-Edouard, Puppo, Fiona, Clément, Garance, Drevon, Guillaume, Kaufmann, Vincent, Pattaroni, Luca,	<p>This paper describes the Data Domotopia a 2300+ respondent self-administered web-based survey. It includes 100+ multi-purpose items about home-making and stillness in a moving world. We suppose that home-making can reveal coping strategies and resilience practices to make everyday life work – as home is a central location in people's activity-travel patterns. To describe this phenomenon, the concept of Domotopia is introduced, defining how people arrange, use, and experience their homes to cope with the pathologies of accelerated and liquid modernity (Bauman 2005). While the Data Domotopia is based on a mixed-method combining qualitative and quantitative material, this paper focuses mainly on the description of the questionnaire – which is organized into three interrelated layers: the dwelling, the dwellers, and the neighborhood. Each of these layers unfolds in functional, social, emotional and sensory components. The survey covers most of the contemporary issues related to home-making. This includes the domestic space and gender issues; the socio-spatial resources</p>	10.1007/s11116-023-10388-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11116-023-10388-y	SpringerLink
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		<p>(mobility, action space, core, and wider social network); lifestyles, ideals, and residential aspiration; time pressures, time use, organization and stress; equipment, rules and arrangements; interpersonal relations, cohabitation and negotiation, dominance and power. Intakes on the Data Domotopia is given by two concrete cases about the time-space coverage of the habitual action space, and about inter-personal task allocation. These examples show the potential of the data to study domocentric stillness and resilience to urban pathologies. The data – aggregated to the infra-communal level – is available for research purposes.</p>			
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Evaluating machine learning prediction techniques and their impact on proactive resource provisioning for cloud environments	Kirchoff, Dionatrã F., Meyer, Vinícius, Calheiros, Rodrigo N., De Rose, Cesar A. F.,	Cloud computing has several benefits over traditional systems, such as scalability and high availability. However, these benefits, to be eventuated, require efforts in the area of resource provisioning and scaling, to match resources to current and future demand, and this is not always trivial to achieve. Since workload may fluctuate substantially in cloud environments, over-provisioning is a common practice to avoid abrupt quality of service (QoS) drops that may result in service level agreement (SLA) violations, but at the price of increased provisioning costs and energy consumption. Workload prediction is one of the strategies by which efficiency and operational cost of a clouds can be improved. Therefore, in this paper, we show the potential benefits of a proactive resource provisioning scheme augmented by three of the most promising machine learning prediction techniques in this context, namely ARIMA, MLP, and GRU, that are known to be able to cope with the dynamic behavior of our target applications. We analyze the trade-off between resource consumption and quality of service using SLA	10.1007/s11227-024-06303-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-024-06303-6	SpringerLink
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		<p>violations in web workloads, considering real case provisioning requirements and constraints, extensively simulating and analyzing the impact of prediction and scaling intervals, and publishing all used tools and datasets to allow reproducibility. Simulation experiments with a proactive approach are executed using real traces from NASA and Wikipedia workloads and achieved a reduction of 40% in SLA violations on average when compared to a reactive approach, while reducing the provisioned resources by almost 3%.</p>			
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Current state and emerging trends in advanced manufacturing: smart systems	Raoufi, Kamyar, Sutherland, John W., Zhao, Fu, Clarens, Andres F., Rickli, Jeremy L., Fan, Zhaoyan, Huang, Haihong, Wang, Yue, Lee, Wo Jae, Mathur, Nehika, Triebe, Matthew J., Desabathina, Sai Srinivas, Haapala, Karl R.,	Advanced manufacturing is challenging engineering perceptions of how to innovate and compete. The need for manufacturers to rapidly respond to changing requirements and demands; obtain, store, and interpret large volumes of data and information; and positively impact society and our environment requires engineers to investigate and develop new ways of making products for flexible and competitive production. In addition to the associated operational, technological, and strategic advantages for industry, advanced manufacturing creates educational, workforce, and market opportunities. Thus, this literature review aims to investigate the current state and emerging trends in advanced manufacturing. Specifically, this study addresses advances in manufacturing from manufacturing systems perspective, concentrating on emerging trends in process sensing and monitoring, equipment control and automation, machine tools, sustainable manufacturing, and green supply chain management. This review finds myriad efforts have been	10.1007/s00170-024-14279-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-024-14279-z	SpringerLink
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		<p>undertaken by researchers in industry, academia, and government labs from around the world, which have supported the development and implementation of new process technologies to improve manufacturing systems extending from unit process and shop floor operations to facility and supply chain management activities. However, emerging global challenges remain in various domains including energy (e.g., resource scarcities and global warming), critical materials vulnerable to supply disruptions due to crisis and rapid changes in demand, and services (e.g., healthcare supply chains during COVID-19 pandemic). Thus, manufacturing industry must continue the innovative development of advanced materials, manufacturing processes, and systems that ensure cost efficient, rapidly flexible, high quality, and responsible production of goods and services.</p>			
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<p>A new intelligent scheduler to improve reactive OpenFlow communication in SDN-based IoT data streams</p>	<p>Batista, Ernando, Alencar, Brenno, Silva, Eliabe, Canário, João, Rios, Ricardo A., Dustdar, Schahram, Figueiredo, Gustavo, Prazeres, Cássio,</p>	<p>The significant adoption of the Internet of Things (IoT) has increased the challenges in providing adequate IoT infrastructures meeting essential requirements, such as dynamicity networks and low latency. In this context, the Software-Defined Networking (SDN) paradigm and the OpenFlow protocol provide new possibilities for IoT networks. Based on the global view of network elements enabled by the Controller, SDN allows the programmability and control of the infrastructure according to the actual demands of applications. The OpenFlow protocol defines the exchange of messages between controllers and switches, enabling communication and network control. OpenFlow implements three operation modes: proactive, reactive, and hybrid. Due to the dynamic characteristic of the IoT data stream, the reactive mode is mainly used and indicated for IoT environments. As the OpenFlow controller installs rules dynamically, there is no need to know the network's sources, destinations, and paths in advance. Although reactive mode introduces dynamicity, it can generate additional delay due to switch-</p>	<p>10.1007/s43926-024-00068-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43926-024-00068-3</p>	<p>SpringerLink</p>
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		<p>controller communication. This delay increases the response time of the IoT data stream. We propose an SDN-IoT scheduler based on Deep Neural Networks (DNN) to predict the time between data stream changes from IoT devices and install rules in advance, suppressing the existing delay in reactive mode. The proposal automatically uses previous data from the IoT data stream to calculate the time of the following communication from IoT devices. Our results indicate that predicting IoT data stream changes and installing OpenFlow rules in advance reduced about 51% of communications response time.</p>			
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<p>Air vehicle system health and asset management: modeling, simulation, and decision support</p>	<p>Candell, Olov, Hällqvist, Robert, Olsson, Ella, Fransson, Torbjörn, Thaduri, Adithya, Karim, Ramin,</p>	<p>Effective Asset Management (AM) is essential to achieve operational excellence in the context of large complex Cyber-Physical Systems (CPSs). It involves coordinated activities across all life-cycle stages, including information and service exchange within and between adjacent air operations domains, for effective air operations and collaboration. For enterprises and military air operations, AM presuppose information and service exchange between the adjacent domains of air operations. Important aspects of aviation AM are that CPSs include Integrated Vehicle Health Management (IVHM), CPS models, and Digital Twin (DT), as central concepts used to predict and optimize asset performance. This article provides an overview of the aviation AM phenomenology, environment, and challenges, and how they may impact envisioned realisations of effective AM solutions for support to enterprise air vehicle operations. The article serves as an extension of the paper Cyber-physical Asset Management of Air Vehicle Systems presented at the International Congress and Workshop of Industrial AI and</p>	<p>10.1007/s13198-024-02481-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02481-x</p>	<p>SpringerLink</p>
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		Maintenance (Candell et al., in Proceedings of the IAI2023–7th international congress and workshop on industrial AI and eMaintenance, Luleå, Sweden, 2023). A comprehensive approach is presented, comprising interdependent dimensions of the problem domain, and how they may be integrated into a framework and a platform concept addressing aviation AM needs.			
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Investigating user feedback from a crowd in requirements management in software ecosystems	Malcher, Paulo, Viana, Davi, Antonino, Pablo Oliveira, Santos, Rodrigo Pereira,	<p>Requirements management is a process that aims to ensure that the needs of stakeholders are met through delivering adequate and quality software products. However, requirements management becomes challenging in open and dynamic environments with multiple stakeholders who belong to different organizations and collaborate over a common technological platform as in software ecosystems (SECO). In SECO, distinct crowds of users provide requirements, change requests, and bug reports through feedback across multiple communication channels. However, user feedback from a crowd is often not considered in requirements management activities in SECO because of its complexity. Our study aims to investigate whether and how user feedback from a crowd is considered in requirements management in SECO. To achieve this goal, we conducted a field study based on interviews with 20 professionals involved in activities in this context. We identified ten mechanisms used to gather user feedback from a crowd in requirements management in SECO and six approaches to</p>	10.1007/s10664-024-10546-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-024-10546-5	SpringerLink
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		analyze this feedback. User feedback from a crowd influences requirements management in SECO, making it more open and collaborative. Moreover, the continuous flow of user feedback makes crowd-based requirements engineering (CrowdRE) possible in SECO.			
Towards the application of machine learning in digital twin technology: a multi-scale review	Nele, Luigi, Mattera, Giulio, Yap, Emily W., Voza, Mario, Vespoli, Silvestro,	This review article delves into the conceptual framework of digital twins and their diverse applications across research domains, highlighting the pivotal role of machine learning in shaping the development and integration of digital twin technology across multiple disciplines. Emphasising key features like multidisciplinary and multi-scale aspects, the paper explores how data-driven techniques are employed for modelling, visualisation, monitoring, and optimisation within the digital twin framework, pinpointing the benefits introduced in the current state-of-the-art applications, and elucidates persisting challenges across various research fields, including advanced materials, smart buildings, and manufacturing systems.	10.1007/s42452-024-06206-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-024-06206-4	SpringerLink

Possibility of the optimum monitoring and evaluation (M&E) production frontier for risk-informed health governance in disaster-prone districts of West Bengal, India	Mukherjee, Moumita, Batta, Anuj,	An efficient M&E system in public healthcare is crucial for achieving universal health coverage in low- and middle-income countries, especially when the need for service remains unmet due to the exposure of the population to disaster risks and uncertainties. Current research has conducted exploratory and predictive analyses to estimate the determinants of sustainable M&E solutions for ensuring uninterrupted access during and after disasters. The aim was to estimate the efficiency of reaching a higher M&E production frontier via the Cobb-Douglas model and stochastic frontier model as the basic theoretical and empirical frameworks. The research followed a deductive approach and used a stratified purposive sampling method to collect data from different layers of health and disaster governance in a flood-prone rural setting in the Malda, South 24 Parganas and Purulia districts in West Bengal, India. The present mixed-method study revealed multiple challenges in healthcare seeking during disasters and how a well-structured M&E system can increase system readiness to combat these challenges. The	10.1186/s41043-024-00632-1	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41043-024-00632-1	SpringerLink
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		<p>stochastic frontier model estimated the highest M&E frontier producing the most attainable M&E effectiveness through horizontal convergence between departments, enhanced coordination, the availability of frontline health workers at health centers, the adoption of learned innovation and the outsourcing of the evaluation component to external evaluators to improve M&E process quality. Although the study has several limitations, it shows the potential to increase technical and allocative efficiency through building skills in innovative techniques and applying them in process implementation. In the future, research on strategy improvement followed by real-world evidence-based policy advocacy is needed to increase the impact of M&E on access to healthcare services.</p>			
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<p>Big data applications: overview, challenges and future</p>	<p>Badshah, Afzal, Daud, Ali, Alharbey, Riad, Banjar, Ameen, Bukhari, Amal, Alshemaimri, Bader,</p>	<p>Big Data (i.e., social big data, vehicular big data, healthcare big data etc) points to massive and complex data, that require special technologies and approaches for storage, processing, and analysis. Similarly, big data applications are software and systems utilizing large and complex datasets to extract insights, support decision-making, and address diverse business and societal challenges. Recently, the significance of big data applications has grown immensely for organizations across diverse sectors as they increasingly rely on insights derived from data. The increasing reliance on data insights has rendered traditional technologies and platforms inefficient due to scalability limitations and performance issues. This study contributes by identifying key domains impacted by big data, examining its effect on decision-making, addressing inherent complexities and opportunities, exploring core technologies, and offering solutions for potential concerns. Additionally, it conducts a comparative analysis to demonstrate the superiority of this research. These contributions provide valuable</p>	<p>10.1007/s10462-024-10938-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-024-10938-5</p>	<p>SpringerLink</p>
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		insights into the evolving landscape shaped by big data applications.			
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Understanding the Variety of Domain Models: Views, Programs, Animations, and Other Models	Proper, Henderik A., Guizzardi, Giancarlo,	<p>Humanity has long since used models, in different shapes and forms, to understand, redesign, communicate about, and shape, the world around us; including many different social, economic, biological, chemical, physical, and digital aspects. This has resulted in a wide range of modeling practices . When the models as used in such modeling practices have a key role to play in the activities in which these practices are 'embedded', the need emerges to consider the effectiveness and efficiency of such processes, and speak about modeling capabilities . In the latter situation, it also becomes relevant to develop a thorough understanding of the artifacts involved in modeling practices/capabilities. One context in which models play (an increasingly) important role is model-driven systems development , including software engineering, information systems engineering, business process engineering, enterprise engineering, and enterprise architecture management. In such a context, we come across a rich variety of modeling related artifacts, such as views, diagrams,</p>	10.1007/s42979-024-03163-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-024-03163-y	SpringerLink
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		<p>programs, animations, specifications, etc. In this paper, which is actually part of an ongoing ‘journey’ in which we aim to gain deeper insights into the foundations of modeling, we take a fundamental look at the variety of modeling related artifacts as used in the context of model-driven (systems) development, while also presenting an associated framework for understanding , synthesizing the insights we obtained during the ‘journey’ so-far. In doing so, we will also argue that the aforementioned artifacts are actually specific kinds of models, albeit for fundamentally different purposes. The provided framework for understanding involves definitions of domain model , the Return on Modeling Effort (RoME), the conceptual fidelity of domain models, as well as views as a mechanism to manage the complexity of domain models.</p>			
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Systemic and Cyber-Physical Methodology for the Implementation of Industry 4.0 in Mexican Automotive Manufacturing Companies	González Romeo, Lorenzo L., Reyes, Juan Bory, Ramírez, Jorge A. Rojas,	<p>The transition toward the new technological paradigm in production systems resulting from Industry 4.0 (hereinafter I4.0) pursues, among its main objectives, greater operational efficiency and productivity, a greater scope of automation, customization, and flexibility in production, an increase in man-machine interaction, and the creation of more complex but better-paid jobs and new business models. For this reason, a broad understanding of what constitutes I4.0 today and what can represent the future requires knowledge about the technologies that make it up, as well as different tools that can help to carry out a correct and comprehensive implementation. The relevance of the Mexican automotive manufacturing industry in the national economy, as well as the importance of the I4.0 transition in this sector, is addressed. As a fundamental component of this work, a new methodology with a systemic character, given by the use of the Soft Systems Methodology, and with a cyber-physical character, given by the use of tools such as a reference architecture, is presented, and the tools used and its different</p>	10.1007/s43069-024-00360-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43069-024-00360-6	SpringerLink
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		stages are described. As an added element, an illustrative example is provided of how the application of the proposed methodology would be in an automotive manufacturing company.			
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<p>Weaving equity into infrastructure resilience research: a decadal review and future directions</p>	<p>Coleman, Natalie, Li, Xiangpeng, Comes, Tina, Mostafavi, Ali,</p>	<p>Infrastructure resilience plays an important role in mitigating the negative impacts of natural hazards by ensuring the continued accessibility and availability of resources. Increasingly, equity is recognized as essential for infrastructure resilience. Yet, after about a decade of research on equity in infrastructure resilience, what is missing is a systematic overview of the state of the art and a research agenda across different infrastructures and hazards. To address this gap, this paper presents a systematic review of equity literature on infrastructure resilience in relation to natural hazard events. In our systematic review of 99 studies, we followed an 8-dimensional assessment framework that recognizes 4 equity definitions including distributional-demographic, distributional-spatial, procedural, and capacity equity. Significant findings show that (1) the majority of studies found were located in the US, (2) interest in equity in infrastructure resilience has been exponentially rising, (3) most data collection methods used descriptive and open-data, particularly with</p>	<p>10.1038/s44304-024-00022-x</p>	<p>https://www.nature.com/articles/s44304-024-00022-x.pdf</p>	<p>SpringerLink</p>
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		<p>none of the non-US studies using human mobility data, (4) limited quantitative studies used non-linear analysis such as agent-based modeling and gravity networks, (5) distributional equity is mostly studied through disruptions in power, water, and transportation caused by flooding and tropical cyclones, and (6) other equity aspects, such as procedural equity, remain understudied. We propose that future research directions could quantify the social costs of infrastructure resilience and advocate a better integration of equity into resilience decision-making. This study fills a critical gap in how equity considerations can be integrated into infrastructure resilience against natural hazards, providing a comprehensive overview of the field and developing future research directions to enhance societal outcomes during and after disasters. As such, this paper is meant to inform and inspire researchers, engineers, and community leaders to understand the equity implications of their work and to embed equity at the heart of infrastructure resilience plans.</p>			
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SysML modeling of service-oriented system-of-systems	Delsing, Jerker, Kulcsár, Géza, Haugen, Øystein,	<p>The success of the ongoing fourth industrial revolution largely depends on our ways to cope with the novel design challenges arising from a combination of an enormous increase in process and product complexity, as well as the expected autonomy and self-organization of complex and diverse industrial hardware–software installments, often called systems-of-systems. In this paper, we employ the service-oriented architectural paradigm, as materialized in the Eclipse Arrowhead framework, to represent modern systems engineering principles and their open structural principles and, thus, relevance to flexible and adaptive systems. As for adequately capturing the structural aspect, we propose using model-based engineering techniques and, in particular, a SysML-based specialization of systems modeling. The approach is illustrated by a real-life use-case in industrial automation.</p>	10.1007/s11334-022-00455-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-022-00455-5	SpringerLink
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Development methodologies for IoT-based systems: challenges and research directions	Hornos, Miguel J., Quinde, Mario,	<p>The spread of IoT-based systems presents several potential benefits to society but still has crucial challenges in different research areas. From the software development point of view, an established methodology for IoT-based systems development is still yet to be found despite the considerable research efforts that are being made in the area. This article presents a literature review of the existing methodologies for IoT-based systems development, highlighting their benefits and limitations. The article also describes and analyses the existing critical challenges in finding a methodology addressing the complex nature of IoT-based systems. This analysis leads to present the open research directions in developing IoT-based systems, which are pathways to drive the research efforts towards addressing the key issues in the area with the aim of finding a methodology that is simple for developers but that ensures high-quality IoT-based systems.</p>	10.1007/s40860-024-00229-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-024-00229-9	SpringerLink
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Innovating the Innovation System Thinking: a Systemism Model	Skjøelvik, Kjell Olav, Kaloudis, Aristidis,	<p>The complexity of an innovation system, how it works and how to achieve high performance, represents a significant management challenge. As in any complex system, in an innovation system it is mandatory to operate with a clear idea of the various key elements and relationships in the system, what constitutes the emerging properties of the system and to identify effective channels to influence the performance of such a system. Bearing this in mind, we adopt a systemism approach , applying the principles of Mario Bunge's CESM metamodel. We suggest a new generic model that can be adapted to fit many different aspects of real-life innovation decision making. An important objective for this generic model is to combine all critical internal and external systemic factors, i.e., to depict all critical nodes and interaction processes between subsystems (internal factors) and all critical nodes and interactions processes with the broader innovation ecosystem (external factors). Another key objective was to establish a model suitable for communication and decision making that is</p>	10.1007/s13132-023-01561-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-023-01561-w	SpringerLink
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		<p>compatible with the key terms and the definitions in the new ISO 56000 standard on innovation management. The paper defines the main elements of a generic innovation model and exemplifies the potential usefulness of the model by showcasing three distinct applications. We hope that our new systemism model could be an additional tool for better strategic management with respect to emerging properties of knowledge dynamics, risk assessment and mitigation, and the monitoring and continuous improvement of critical innovation processes.</p>			
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Understanding the intertwined nature of rising multiple risks in modern agriculture and food system	Khatri, Priti, Kumar, Prashant, Shakya, Kaushlesh Singh, Kirlas, Marios C., Tiwari, Kamal Kant,	<p>The current agriculture system has become complex and fragile in recent years. With an increase in population, the demand for food is increasing, but the resources such as arable land and water are limited, and clearing forest land for cultivation and over-extraction of groundwater are changing land-use patterns and depleting groundwater resources, which again are responsible for multiple risks in agriculture and food system. The limited land and water resources with increased global population and its demand for food have mainly stressed small farmers. The rising environment, social and economic risks such as crop disease outbreaks, climate risk causing natural hazards such as floods, famine, drought, exposure to chemicals, technology risks such as genetically modified crops, and biofuels, food demand disparities, demographic and dietary changes, financial risk, conflict and political unrest, biological diversity loss, psychological factors in long-term decision making, and emerging complexity within agriculture system network are the some of the examples of multiple risks</p>	10.1007/s10668-023-03638-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-023-03638-7	SpringerLink
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		<p>faced by small farmers in developing nations. Understanding the link among multiple domains such as environment, soil and hydrology, science, technology, finance, psychology, nutrition, and relation and conflicts is vital to study the multiple risks associated with the agriculture system as these domains overlap. Thus, sustainable long-term solutions cannot be confined to a single discipline approach. Therefore, there is a need to understand the intertwined nature of multiple risks affecting farmers. First, the author emphasizes on understanding the interconnected nature of rising multiple risks in modern industrial agriculture and food system in terms of social, environmental, and economic dimensions, this understanding is crucial for sustainable agriculture policy framing. Second, providing policy implications that will help policy makers to develop legalize mechanism to reduce rising risk of hazards.</p>			
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<p>IoT in energy: a comprehensive review of technologies, applications, and future directions</p>	<p>Arshi, Oroos, Rai, Akanksha, Gupta, Gauri, Pandey, Jitendra Kumar, Mondal, Surajit,</p>	<p>The integration of IoT (Internet of Things) in the energy sector has the potential to transform the way it generates, distributes, and consumes energy. IoT can enable real-time monitoring, control, and optimization of energy systems, leading to improved efficiency, reliability, and sustainability. This work is an attempt to provide an in-depth analysis of the integration of the IoT in the energy sector, examining the characteristics of IoT, its components, and protocols. It also explores the architecture of IoT, the latest advancements and challenges in the field of IoT, including the IoT communications model, IoT sensor boards, and the current challenges facing the industry and related security threats, and also provides suggestions for solutions to address IoT vulnerabilities. The work further delves into IoT in the energy sector aspect and explores the latest advancements and challenges in the field of IoT, including IoT in energy generation, smart cities, smart grids, smart buildings, and intelligent transportation. Additionally, the work explores the challenges of applying IoT in the energy sector discusses future trends in IoT in</p>	<p>10.1007/s12083-024-01725-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12083-024-01725-8</p>	<p>SpringerLink</p>
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		<p>the energy sector, and aims to provide a detailed understanding of the latest developments and challenges of IoT in the energy sector, as well as its potential impact on the future of the industry. The work critically analyzes securing IoT devices and offers practical solutions to mitigate risks associated with IoT vulnerabilities. This work serves as a valuable resource for researchers, policymakers, and practitioners interested in understanding the impact of IoT on energy security.</p> <p>Graphical Abstract</p> <p>Taxonomy of the study.</p>			
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Examining the nexus of blockchain technology and digital twins: Bibliometric evidence and research trends	Ma, Xiaozhi, Du, Wenbo, Li, Lingyue, Liu, Jing, Yuan, Hongping,	<p>The integration of Blockchain Technology (BT) with Digital Twins (DTs) is becoming increasingly recognized as an effective strategy to enhance trust, interoperability, and data privacy in virtual spaces such as the metaverse. Although there is a significant body of research at the intersection of BT and DTs, a thorough review of the field has not yet been conducted. This study performs a systematic literature review on BT and DTs, using the CiteSpace analytic tool to evaluate the content and bibliometric information. The review covers 976 publications, identifying the significant effects of BT on DTs and the integration challenges. Key themes emerging from keyword analysis include augmented reality, smart cities, smart manufacturing, cybersecurity, lifecycle management, Ethereum, smart grids, additive manufacturing, blockchain technology, and digitalization. Based on this analysis, the study proposes a development framework for BT-enhanced DTs that includes supporting technologies and applications, main applications, advantages and functionalities, primary contexts of application, and overarching goals and</p>	10.1007/s42524-024-0306-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42524-024-0306-4	SpringerLink
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		<p>principles. Additionally, an examination of bibliometric data reveals three developmental phases in cross-sectional research on BT and DTs: technology development, technology use, and technology deployment. These phases highlight the research field's evolution and provide valuable direction for future studies on BT-enhanced DTs.</p>			
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Integrating scenario- and contract-based verification for automated vessels	Hake, Georg, Reiher, David, Mentjes, Jan, Hahn, Axel,	<p>Scenario-based verification defines the current state of the art for examining a vessel's control systems for reliability and safety. However, software updates after release can only be covered to a limited extent. To take changes to a deployed system into account, the design and test phase must be harmonized with the operational phase. For all phases, regulatory, technical and safety requirements provide the scope to which the development process and the scenario-based tests need to be aligned and whose specifications the System under Test (SuT) must adhere to during operation. For this reason, a procedure is needed that converts the requirements into a format that can be utilized across all phases and measured in a structured manner comparing the original system to the updated version. This work does so by combining scenario-based verification methods with formal composition and monitoring techniques based on contract-based design into an integrated development approach. It is shown how safety requirements can be transferred into a Verification Descriptor that in turn provides the</p>	10.1007/s00773-024-01008-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00773-024-01008-0	SpringerLink
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		<p>foundation for the division into model-based system development, contract-based virtual integration testing and a scenario-based test environment. For the entire lifecycle of the System under Test (SuT) to be included, the extended scenario and contract descriptors are carried forward up to the operational phase, such that the previously defined properties of the SuT can be monitored and validated during runtime. The approach is designed alongside a minimal-viable system and evaluated on an actual implementation of a safety-critical maritime LiDAR-based positioning system.</p>			
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<p>A framework for understanding reliability in container shipping networks</p>	<p>Yue, Zhongyun, Mangan, John,</p>	<p>Improving reliability is increasingly regarded as an important topic in maritime transportation, especially given the significant impact that both uncertainty and delays in shipping and at ports have on the efficient flow of freight along wider supply chains. The term 'reliability' appears in different academic fields and with a variety of different meanings and interpretations. In transportation, reliability has been studied in most modes, but less so in the case of maritime containerisation. This paper reports on a systematic literature review of the concept of reliability in transportation, with a focus on reliability in container shipping networks. The selected papers were analysed to extract information according to the three identified sub-networks: (1) ports, including studies with a focus on infrastructure, service availability and risks in ports and hinterlands; (2) network structures, including the configuration of the networks, the vulnerability and resilience of the existing networks; (3) supply chains, including connectivity and planning of activities that integrate stakeholders within the supply</p>	<p>10.1057/s41278-023-00269-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1057/s41278-023-00269-7</p>	<p>SpringerLink</p>
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		<p>chain. These sub-networks were then used to further query the database, searching for papers relevant to the research problem. Two research questions are addressed: (1) How is reliability best understood in the context of container shipping networks? (2) What are the determinants that affect container shipping network reliability? The review showed that there is no uniform definition of reliability in container shipping networks, but different approaches to understand it, depending on the theoretical perspective, have been adopted. Influencing factors and relevant metrics are discussed and a framework combining different dimensions of reliability, expressed as three themes, i.e., infrastructure reliability, network configuration reliability, and connectivity reliability, is developed. This can help both practitioners and researchers to understand in more detail the various dimensions and nuances of reliability specifically in the context of container shipping, its interrelationship with wider logistics systems and how, where possible, reliability can be improved.</p>			
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Interdependence: good, bad, or indifferent?	Collier, Zachary A., Gochenour, Zachary J.,	Interdependence is an observable fact of social and economic life. However, while the term is used frequently, it is sometimes conflated with related terms like dependence, and scholars debate whether interdependence should be increased or decreased, for example, between trading nations. From an Austrian perspective, interdependence is a central characteristic of economics, enabling such phenomena as the division of labor. In this paper, we use multiple theoretical lenses, particularly drawing on insights from Austrian economics, to clarify and contextualize what is meant by interdependence. We first seek to establish a precise understanding of what it means for two agents to be interdependent, and then identify in what circumstances interdependence can be a desirable or undesirable system trait. We find that interdependence itself is a neutral concept, neither inherently good or bad. While interdependence is a trait of some successful systems, it can also introduce vulnerabilities. More specifically, depending on the nature of the goal attainment between interdependent	10.1007/s11138-023-00617-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11138-023-00617-z	SpringerLink
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		agents, interdependence can either enable cooperation and mutual benefit, or it can result in misaligned incentives and promote the propagation of disruptions. A richer understanding of interdependence will be of benefit to economists and social scientists engaged in both descriptive and proscriptive research endeavors.			
Preface to the 10th Anniversary Issue: Journal of Reliable Intelligent Environments	Augusto, Juan C., Coronato, Antonio,	A decade ago we started this technical journey to open a forum focused on the reliability of so-called Intelligent Environments. Now we organized an Anniversary Issue to celebrate the achievement of our community contributing to the scientific understanding and the innovation of this field. The content in this issue includes articles which project the views of some of our esteemed Editorial Board members. In this Preface note we consider these contributions and also reflect on the wider field and how it has changed since our first issue as well as providing an outlook of the area.	10.1007/s40860-024-00237-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-024-00237-9	SpringerLink

Open Intelligent Systems: The Concept and Approaches to Development	Rumovskaya, S. B.,	Abstract Complex practical problems are distinguished by their subjective and dynamic character. Such problems never repeat exactly; therefore, the method for their solution must be built each time. In view of this, development of intelligent systems that are dedicated and have the capability of acquiring, reproducing, and using the knowledge, whose functions are estimated from the point of view of ensuring stability, openness, and real-time operation is urgent. In this work, understanding of intelligent systems and their openness is considered, as well as approaches to their design.	10.1134/S105466 1824700585	http://link.springer.com/openurl/pdf?id=doi:10.1134/S1054661824700585	SpringerLink
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RETRACTED ARTICLE: Smart Physical Education: Governance of School Physical Education in the Era of New Generation of Information Technology and Knowledge	Deng, Chenliang, Feng, Linxia, Ye, Qingling,	With the rapid development of the Internet of Things (IoT), cloud computing (CLO), mobile Internet (MI), big data (BD), artificial intelligence (AI), and other new generation of information technology (NGIT), school physical education (PE) began to enter the era of smart school PE (SSPE). The purpose of this study is to realize the smart governance of school PE through the NGIT and analyze the related problems of SSPE, to help people understand the structure of SSPE. This paper mainly uses literature research method, in-depth interview method, and case analysis method to carry out in- depth and systematic analysis on the basic theory, construction status, application cases, ecosystem, future challenges, and optimization path of SSPE and outlines the research panorama of SSPE. The research results show that the NGIT enables the high-quality development of school PE, but the utilization of SSPE platform and the reserve of key products are insufficient, the research on the theory and method of SSPE lags behind the practice, the construction and management system of SSPE is not in order,	10.1007/s13132- 023-01668-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-023-01668-0	SpringerLink
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		<p>and the resources of SSPE are very short. The construction of SSPE has some remarkable characteristics, that is, integration, liberalization, experiential, subject-oriented, long-distance, and intelligent. SSPE system includes smart facilities, smart government, smart schools, smart teachers and students, and smart environment. The IoT, CLO, MI, BD, spatial information science and technology (SIST), and AI are the six key technologies of SSPE. This paper also discusses how to build a good ecosystem of SSPE and possible future challenges for the implementation of SSPE. Finally, the author puts forward that the construction of SSPE needs to grasp seven aspects: Straighten out the system and mechanism of SSPE, build SSPE infrastructure, accelerate the broadband process of school PE network, promote school PE resource cloud services, build intelligent school PE environment, vigorously develop mobile sports and intelligent sports, develop related industries of SSPE, and actively respond to the challenges of SSPE in the future. This study provides a new perspective and</p>			
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		reference for the future research of school PE and provides support for the NGIT to empower the smart governance of school PE. It is suggested that we should pay more attention to the construction and research of SSPE, so as to realize the smart governance of schools PE and promote its high-quality development.			
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<p>Does consumer empowerment influence e-payment systems adoption? A digital consumer-centric perspective</p>	<p>Gupta, Saurabh, Prusty, Sadananda,</p>	<p>The exponential rise of Information and Communication Technology in recent years has brought e-payment systems to the forefront of businesses. Hence, several e-payment options have emerged for consumer and commercial transactions perspective. However, it has led to few challenges for consumer's decision making with respect to the adoption of e-payment system. Therefore, we developed and tested a model of e-payment adoption with respect to consumer empowerment theory. The study also examined the mediating role of consumer empowerment on the relationship between consumer digital awareness (CDA), consumer digital literacy (CDL), consumer digital engagement (CDE) and adoption of e-payment systems. We used a purposive sampling method to collect data from 390 techno savvy respondents from India who used digital payment services. The study found that CDA, CDL and CDE have positive effects on consumer empowerment. This result further partially mediated the relationship between its determinants and adoption intention of the e-payment systems. The findings contributed to the</p>	<p>10.1057/s41264-023-00238-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1057/s41264-023-00238-4</p>	<p>SpringerLink</p>
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		understanding of the dynamics of e-payment system adoption of consumers for developing countries, especially Indian consumers. The empirical results would provide a guideline for decision makers to develop suitable measures that can encourage the adoption of e-payment systems.			
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Random forest with differential privacy in federated learning framework for network attack detection and classification	Markovic, Tijana, Leon, Miguel, Buffoni, David, Punnekkat, Sasikumar,	Communication networks are crucial components of the underlying digital infrastructure in any smart city setup. The increasing usage of computer networks brings additional cyber security concerns, and every organization has to implement preventive measures to protect valuable data and business processes. Due to the inherent distributed nature of the city infrastructures as well as the critical nature of its resources and data, any solution to the attack detection calls for distributed, efficient and privacy preserving solutions. In this paper, we extend the evaluation of our federated learning framework for network attacks detection and classification based on random forest. Previously the framework was evaluated only for attack detection using four well-known intrusion detection datasets (KDD, NSL-KDD, UNSW-NB15, and CIC-IDS-2017). In this paper, we extend the evaluation for attack classification. We also evaluate how adding differential privacy into random forest, as an additional protective mechanism, affects the framework performances.	10.1007/s10489-024-05589-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10489-024-05589-6	SpringerLink
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		<p>The results show that the framework outperforms the average performance of independent random forests on clients for both attack detection and classification. Adding differential privacy penalizes the performance of random forest, as expected, but the use of the proposed framework still brings benefits in comparison to the use of independent local models. The code used in this paper is publicly available, to enable transparency and facilitate reproducibility within the research community.</p>			
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<p>Anomaly Detection in Materials Digital Twins with Multiscale ICME for Additive Manufacturing</p>	<p>Tran, Anh, Carlson, Max, Eisenlohr, Philip, Kolla, Hemanth, Davis, Warren,</p>	<p>Detecting anomaly in fatigue and fracture experimental materials science is an interesting yet challenging topic. The reasons are threefold. First, the anomalous microstructure feature that gives rise to structural failure is small, sometimes in the order of 10^{-7} of the interrogated volume. This, in turn, results in a highly imbalanced classification problem in machine learning (ML). Second, the consequence is high, in the sense that the test specimen is destructed in such case. Third, the convolution between microstructure stochasticity and the small probability of void nucleation, growth, and coalescence makes failure and fracture a hard-to-predict and challenging problem in materials science due to its irreproducibility, even experimentally. In this paper, we developed a materials digital twin and applied anomaly detection methods to detect voids and anomaly in additive manufacturing (AM). The materials digital twin is driven by two integrated computational materials engineering (ICME) models, which are kinetic Monte Carlo (kMC) and crystal plasticity finite</p>	<p>10.1007/s40192-024-00360-8</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1007/s40192-024-00360-8</p>	<p>SpringerLink</p>
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		element method (CPFEM). We demonstrated that by using anomaly detection, it is possible to detect voids and other defects in materials digital twin, which paves way for future research in integrating materials digital twin with its physical counterpart.			
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Digital twins of the Earth with and for humans	<p>Hazeleger, W., Aerts, J. P. M., Bauer, P., Bierkens, M. F. P., Camps-Valls, G., Dekker, M. M., Doblas-Reyes, F. J., Eyring, V., Finkenauer, C., Grundner, A., Hachinger, S., Hall, D. M., Hartmann, T., Iglesias-Suarez, F., Janssens, M., Jones, E. R., Kölling, T., Lees, M., Lhermitte, S., Nieuwpoort, R. V., Pahker, A.-K., Pellicer-Valero, O. J., Pijpers, F. P., Siibak, A., Spitzer, J., Stevens, B., Vasconcelos, V. V., Vossepoel, F. C.,</p>	<p>Digital twins of the Earth are digital representations of the Earth system, spanning scales and domains. Their purpose is to monitor, forecast and assess the Earth system and the consequences of human interventions on the Earth system. Providing users with the capability to interact with and interrogate the system, digital twins of the Earth are decision support systems for addressing environmental challenges. By informing humans of their impact on the Earth system, digital twins aspire to promote new pathways moving forward. By answering causal queries through intervention analysis, they can enhance evidence-based policy making. Existing digital twins of the Earth are primarily technological information systems that represent the physical world. However, as the social and physical worlds are intrinsically interconnected, we argue that humans must be accounted for both within and outside digital twins of the Earth: Within twins to represent human impacts and responses that are integral to the Earth system; and outside twins to govern access and development and to guide responsible use of information</p>	<p>10.1038/s43247-024-01626-x</p>	<p>https://www.nature.com/articles/s43247-024-01626-x.pdf</p>	<p>SpringerLink</p>
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		acquired from twins. Incorporating human interactions in digital twins of the Earth represents a transformative frontier, promising unparalleled insights into Earth system dynamics and empower humans for action. Humans must be represented within digital twins of the Earth, but they also play a role outside to govern development and access and guide usage, argues a perspective based on interdisciplinary scientific expert viewpoints.			
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Securing 5G virtual networks: a critical analysis of SDN, NFV, and network slicing security	Alnaim, Abdulrahman K.,	<p>5G, the current generation of communication networks is based on the standards defined by 3GPP and other organizations (ETSI, ENISA, NGMN). These standards define virtual networks supported by three basic technologies, SDN, NFV, and Network Slicing. Virtual networks are primarily built using software and have clear advantages that appear to be reduced because of the corresponding loss in security due to the larger attack surface of this type of network. On the other hand, virtual networks can be made even more secure than hardware-based networks by leveraging the flexibility and adaptability of virtual functions and numerous articles have studied different aspects of their security. Current work goes from proposals for specific mechanisms to general studies of threats and defenses. Some of these are systematic literature reviews considering everything published on a specific theme. We prefer to analyze carefully selected papers considered significant and produce from them an overview of the status of the security of the network technologies used by 5G. After this analysis, we have found that</p>	10.1007/s10207-024-00900-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-024-00900-5	SpringerLink
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		<p>although there are many studies of threats, they are not systematic and have confusions about concepts that may mislead implementers; we also found that the large variety of defenses can be confusing to designers. We have therefore conducted a critical analysis of threats and defenses to provide a clear perspective of how to secure these networks. Based on this perspective, we propose directions for research to improve or extend current defenses. We note that although virtual networks have special characteristics, they are examples of systems and much of the theory of systems security applies to them.</p>			
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Towards Semantic Interoperability: An Information Model for Autonomous Mobile Robots	Zager, Marvin, Sieber, Christoph, Fay, Alexander,	<p>The collaboration among autonomous mobile robots (AMRs), including unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), and/or unmanned surface vehicles (USVs), significantly enhances their capabilities by enabling them to tackle more complex tasks exceeding those of individual robots. However, to fully exploit this collaboration, a common understanding of exchanged information—referred to as semantic interoperability—is crucial. Achieving semantic interoperability between these robots requires a deep understanding of relevant information and its underlying structure. To address this challenge, this paper presents a platform- and technology-independent information model developed specifically for AMRs. This model aims to facilitate collaboration by structuring information in a way that ensures semantic interoperability. The paper outlines the model's development process, beginning with a structured consolidation of information from pertinent scientific literature, resulting in a foundational framework for</p>	10.1007/s10846-024-02159-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-024-02159-3	SpringerLink
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		<p>representing knowledge and semantics within the domain of AMRs. The practical application of the information model is demonstrated through a use case involving multiple AMRs. Additionally, the paper provides insights into the employed methodology, emphasizing the significance of systematic literature reviews and collaboration with practitioners to refine and validate the model. It also discusses theoretical and practical implications, addressing potential limitations encountered during the research.</p>			
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<p>A dynamic decision-making approach for cabin unlawful interference emergency disposal using dynamic Bayesian network</p>	<p>Wu, Yu, He, Shiting, Shi, Jinxin,</p>	<p>Disposal of unlawful interference incidents is essential for is crucial for the advancement of aviation security. Effective emergency disposal requires a comprehensive approach that includes the perspectives of airlines, airports, and passengers. In this context, each component of the disposal process can fail randomly. The objective of this research is to optimize emergency disposal decisions to enhance the efficiency of civil aviation operations, reduce accidents, and lower costs. Given the dynamic complexity of unlawful interference incidents, a dynamic fault tree consisting of 26 nodes was constructed to analyze the emergency disposal process. To explore the relationships and priorities of each event, the Dynamic Fault Tree is converted into a dynamic Bayesian network. Based on historical statistical data, simulation analysis is conducted in three aspects: posterior probability, sensitivity, and importance. Simulation results reveal that the top three critical nodes in cabin unlawful interference incidents are “structural damage to the cabin,”</p>	<p>10.1038/s41598-024-69842-1</p>	<p>https://www.nature.com/articles/s41598-024-69842-1.pdf</p>	<p>SpringerLink</p>
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		<p>“inadequate training by airlines,” and “untimely airport police takeover of disruptive passengers.” Further analysis shows that (1) most of the critical nodes are associated with airlines. (2) The decision-making rationale and pathways of the critical nodes can be clearly observed and prioritized. (3) Besides airlines, other entities such as airports can implement targeted emergency disposal measures. Through quantitative analysis and simulation, this study provides decision-making guidance for participating groups on dynamic emergency disposal, thereby enhancing civil aviation security.</p>			
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Parallel intelligence in three decades: a historical review and future perspective on ACP and cyber-physical-social systems	Wang, Xingxia, Yang, Jing, Liu, Yuhang, Wang, Yutong, Wang, Fei-Yue, Kang, Mengzhen, Tian, Yonglin, Rudas, Imre, Li, Lingxi, Fanti, Maria Pia, Alrifaaee, Bassam, Deveci, Muhammet, Mishra, Deepak, Khan, Muhammad Khurram, Chen, Long, Reffye, Philippe De,	Recent advances in human-in-the-loop or human-centric research have sparked a new wave of scientific exploration. These studies have enhanced the understanding of complex social systems and contributed to more sustainable artificial intelligence (AI) ecosystems. However, the incorporation of human or social factors increases system complexity, making traditional approaches inadequate for managing these complex systems and necessitating a novel operational paradigm. Over decades of work, a mature and comprehensive theory of parallel intelligence (PI) has been established. Rooted in cyber-physical-social systems (CPSS), PI adapts flexibly to various situations within complex systems through the ACP framework (Artificial systems, Computational experiments, and Parallel execution), ensuring system reliability. This paper provides a detailed review and a novel perspective on PI, beginning with the historical and philosophical origins of CPSS and proceeding to present both the fundamental framework and technological implementations of PI. PI-based Industry 5.0 is highlighted, where three	10.1007/s10462-024-10861-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-024-10861-9	SpringerLink
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		<p>pillars are adopted to help realize the supposed vision. Additionally, the paper outlines applications of PI in multiple fields, such as transportation, healthcare, manufacturing, and agriculture, and discusses the opportunities and challenges for imaginative intelligence. The continuous exploration of PI is expected to eventually facilitate the realization of “6S”-based (safe, secure, sustainable, sensitive, service, and smart) parallel ecosystems.</p>			
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QACDes: QoS-aware context-sensitive design of cyber-physical systems	Sidhanta, Subhajit, Chokwitthaya, Chanachok, Zhu, Yimin, Mukhopadhyay, Supratik,	<p>There is a lot of confusion and ambiguity regarding the quantification of the Quality of Service (QoS) of a system, especially for cyber-physical systems (CPS) involved in automating or controlling the operations in built environments and critical urban infrastructures, such as office buildings, factories, transportation systems, smart cities, etc. In these cases, the QoS, as experienced by human users, depends on the context in which they (i.e., humans) interact with these systems. Traditionally, the QoS of a CPS has been defined in terms of absolute metrics. Such measures are unable to take into account the variations in performance due to contextual factors arising out of different kinds of human interactions. Further, the QoS of a CPS has typically been evaluated by comparing the performance of the actual, fully realized system with the given QoS constraints only after the actual system has been completely developed. In the case of faults in the design exposed by observed deviations from the QoS constraints due to unpredicted variations in the contextual factors, the system needs to</p>	10.1038/s41598-024-69371-x	https://www.nature.com/articles/s41598-024-69371-x.pdf	SpringerLink
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		<p>be re-designed and re-developed from scratch. Due to the above-mentioned reason, the validation approach associated with the traditional QoS makes the design of CPS systems prohibitively expensive, impractical, as well as infeasible in numerous application areas, such as civil and engineering works, since it may not be possible to modify the system once developed beyond a certain extent. To that end, we propose a context-aware definition of QoS of a CPS which facilitates the design of robust systems as elaborated below. In this paper, we define QoS as a function of contextual factors. A CPS designed according to our QoS specifications would always satisfy the QoS irrespective of any possible changes in contextual factors resulting from many different human interactions that may occur during operation of the system. We also present QACDes - a novel framework that provides a formal mechanism for validating the design of a CPS with respect to the specified QoS constraints at the design phase as well as after the realization of the actual system. QACDes can validate any given CPS,</p>			
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		<p>irrespective of its application domain, against a QoS guarantee: (A) as early as even before the design phase by comparing the proposed model with a baseline model, or (B) after the realization of the actual system based on logs collected from running the actual system. We consider a lighting control system that manages the light switches - switching it on/off depending on contextual factors, such as the presence of occupants and time of the day. Using the lighting control system in a building as a use case, we analyze and demonstrate the effectiveness of our QoS definition as well as the QACDes framework against the performance metric measured in an actual fully-realized CPS.</p>			
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Human digital twins unlocking Society 5.0? Approaches, emerging risks and disruptions	Fontes, Catarina, Carpentras, Dino, Mahajan, Sachit,	Industry 5.0 and Healthcare 5.0 converge towards a human centered society, having technological advancement as a lever. In Society 5.0, decentralized autonomous cities and a convergence of physical and cyberspace are the foundations of the new chapter of society's development. The idea of creating digital replicas and legitimate representatives of human beings in cyberspace has become a pillar of digitalization. Society 5.0 introduces Human Digital Twins as a central element of Cyber Physical Systems that include human factors or are designed to interact with humans in a personalized fashion. Overall, the HDT and neighboring concepts are applied to depict how humans can be represented in a cyberspace. However, there are clear challenges in determining which human characteristics should take precedence, how much autonomy should be granted to HDTs to optimize their functionality and how to conceptualize the digital environment in which HDTs interact with various entities, including other digital agents and stakeholders with agency and decisional power. To harness similarities and	10.1007/s10676-024-09787-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10676-024-09787-1	SpringerLink
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		<p>differences of current approaches, we propose a classification of HDTs based on meta-characteristics and ethical implications. We discuss ethical implication by focusing on emerging risks and paradigm shifts and anchor the previous discussion in the vision for Society 5.0, questioning whether societal development relying on disruptive technologies, instead of leading to more human-centered societies might be driving humanized societies away from humanity.</p>			
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Strategic behavior of large language models and the role of game structure versus contextual framing	Lorè, Nunzio, Heydari, Babak,	<p>This paper investigates the strategic behavior of large language models (LLMs) across various game-theoretic settings, scrutinizing the interplay between game structure and contextual framing in decision-making. We focus our analysis on three advanced LLMs—GPT-3.5, GPT-4, and LLaMa-2—and how they navigate both the intrinsic aspects of different games and the nuances of their surrounding contexts. Our results highlight discernible patterns in each model's strategic approach. GPT-3.5 shows significant sensitivity to context but lags in its capacity for abstract strategic decision making. Conversely, both GPT-4 and LLaMa-2 demonstrate a more balanced sensitivity to game structures and contexts, albeit with crucial differences. Specifically, GPT-4 prioritizes the internal mechanics of the game over its contextual backdrop but does so with only a coarse differentiation among game types. In contrast, LLaMa-2 reflects a more granular understanding of individual game structures, while also giving due weight to contextual elements. This suggests that LLaMa-2 is better equipped to navigate the subtleties of</p>	10.1038/s41598-024-69032-z	https://www.nature.com/articles/s41598-024-69032-z.pdf	SpringerLink
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		different strategic scenarios while also incorporating context into its decision-making, whereas GPT-4 adopts a more generalized, structure-centric strategy.			
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Modeling and Controller Design of a Cloud-Based Control Switching System in an Uncertain Network Environment	Lyu, Shuyu, Dai, Xinfu, Ma, Zhong, Gao, Yi, Hu, Zhekun,	Cloud control system (CCS) is an important embodiments of the convergence of information technology (IT) and operational technology (OT) in the industrial internet of things (IIoT). Meeting the time-sensitive requirements of control systems in an uncertain network environment constitutes a critical challenge faced by CCS. To address this issue, this paper first analyzes the network uncertainty of cloud computing services, and constructs a discrete cloud controllers models under scenarios such as random short latency, long latency, disorder, and packet loss, and it further transform the time-varying characteristics of delays into switching characteristics between system models. Then, considering the characteristics of flexible scheduling and the dynamic scalability of cloud computing, a cloud control switching system composed of unstable autonomous subsystems and discrete time-varying subsystems is designed. Furthermore, based on the optimal control theory, a quadratic optimal controller for the switching system is developed, and the stability of the controller is analyzed to address the impact of	10.1007/s10922-024-09850-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10922-024-09850-8	SpringerLink
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		uncertain network transmission delays on the system stability. Finally, simulation experiments show that a switching system composed of multiple cloud controllers can effectively improve system stability.			
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<p>A performance-driven framework with a system-of-systems approach for augmented asset management of railway system</p>	<p>Kumari, Jaya, Karim, Ramin, Dersin, Pierre, Thaduri, Adithya,</p>	<p>The railway system is a complex technical system-of-systems (SoS). To address the complexity of the railway system, a holistic approach is needed that facilitates the development of an appropriate asset management regime. A systems-of-systems (SoS) approach considers the complex nature of the railway system, comprising interconnected subsystems like rolling stock and infrastructure. Neglecting these interdependencies risks sub-optimization of the overall system performance. Asset management of the railway system utilising a SoS approach ensures the focus of asset management on overall system requirements. The efficiency and effectiveness of the railway system is based on aspects such as availability, reliability, and safety performance. To enhance these aspects, monitoring, and improvement of key performance indicators (KPIs) emphasizing increased capacity and reduced operational costs is essential. The KPIs offer quantifiable parameters for performance optimization. Augmenting asset management through data-driven</p>	<p>10.1007/s13198-024-02404-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02404-w</p>	<p>SpringerLink</p>
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		<p>technologies can improve the efficiency and effectiveness of asset management. However, challenges persist in the implementation of data-driven solutions due to the railway system's complexity and lack of a holistic perspective. A systematic performance-driven framework with a system-of-systems approach for augmented asset management of railway system provides handrail for the utilisation of data-driven technologies with railway system requirements at the centre while developing an asset management regime. The proposed framework aims to establish a clear relationship between system KPIs, and the performance of sub-systems and components aiding railway organizations in asset management design and implementation. This paper explains the important components of the proposed framework and demonstrates the application the framework for asset management and maintenance planning of high value components in the fleet of railway rolling stock. Adoption of the proposed framework is expected to enhance asset management through</p>			
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		development and implementation of data-driven solutions that are aligned with system KPIs, to support asset management decision making.			
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Swarm-intelligence for the modern ICT ecosystems	Hatzivasilis, George, Lakka, Eftychia, Athanatos, Manos, Ioannidis, Sotiris, Kalogiannis, Grigoris, Chatzimpyrros, Manolis, Spanoudakis, George, Papastergiou, Spyros, Karagiannis, Stylianos, Alexopoulos, Andreas, Amelin, Dimitry, Kiefer, Stephan,	Digitalization is continuing facilitating our daily lives. The world is interconnected as never before, bringing close people, businesses, or other organizations. However, hackers are also coming close. New business and operational models require the collection and processing of massive amounts of data in real-time, involving utilization of complex information systems, large supply-chains, personal devices, etc. These impose several advantages for adversaries on the one hand (e.g., poorly protected or monitored elements, slow fashion of security updates/upgrades in components that gain little attention, etc.), and many difficulties for defenders on the other hand (e.g., administrate large and complex systems with high dynamicity) in this cyber-security interplay. Impactful attacks on ICT systems, critical infrastructures, and supply networks, as well as cyber-warfare are deriving the necessity for more effective defensives. This paper presents a swarm-intelligence solution for incident handling and response. Cyber Threat Intelligence (CTI) is continuously integrated in the system (i.e.,	10.1007/s10207-024-00869-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-024-00869-1	SpringerLink
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		<p>MISP, CVEs, STIX, etc.), and Artificial Intelligence (AI)/Machine Learning (ML) are incorporated in the risk assessment and event evaluation processes. Several incident handling and response sub-procedures are automated, improving effectiveness and decreasing response time. Information concerning identified malicious activity is circulated back to the community (i.e., via the MISP information sharing platform) in an open loop. The proposal is applied in the supply-chain of healthcare organizations in Europe (considering also EU data protection regulations). Nevertheless, it is a generic solution that can be applied in any domain.</p>			
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Approaching the challenge of multi-phase, multi-hazard volcanic impact assessment through the lens of systemic risk: application to Taranaki Mounga	Weir, Alana M., Wilson, Thomas M., Bebbington, Mark S., Beaven, Sarah, Gordon, Teresa, Campbell-Smart, Craig, Mead, Stuart, Williams, James H., Fairclough, Roger,	Effective volcanic impact and risk assessment underpins effective volcanic disaster risk management. Yet contemporary volcanic risk assessments face a number of challenges, including delineating hazard and impact sequences, and identifying and quantifying systemic risks. A more holistic approach to impact assessment is required, which incorporates the complex, multi-hazard nature of volcanic eruptions and the dynamic nature of vulnerability before, during and after a volcanic event. Addressing this need requires a multidisciplinary, integrated approach, involving scientists and stakeholders to co-develop decision-support tools that are scientifically credible and operationally relevant to provide a foundation for robust, evidence-based risk reduction decisions. This study presents a dynamic, longitudinal impact assessment framework for multi-phase, multi-hazard volcanic events and applies the framework to interdependent critical infrastructure networks in the Taranaki region of Aotearoa New Zealand, where Taranaki Mounga volcano has a	10.1007/s11069-023-06386-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-06386-z	SpringerLink
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		<p>high likelihood of producing a multi-phase explosive eruption within the next 50 years. In the framework, multi-phase scenarios temporally alternate multi-hazard footprints with risk reduction opportunities. Thus, direct and cascading impacts and any risk management actions carry through to the next phase of activity. The framework forms a testbed for more targeted mitigation and response planning and allows the investigation of optimal intervention timing for mitigation strategies during an evolving eruption. Using 'risk management' scenarios, we find the timing of mitigation intervention to be crucial in reducing disaster losses associated with volcanic activity. This is particularly apparent in indirect, systemic losses that cascade from direct damage to infrastructure assets. This novel, dynamic impact assessment approach addresses the increasing end-user need for impact-based decision-support tools that inform robust response and resilience planning.</p>			
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Great partners: how deep learning and blockchain help improve business operations together	Luo, Suyuan, Choi, Tsan-Ming,	Business operations have entered the digital era in which artificial intelligence (AI), machine learning (ML) and blockchain (BKC) have emerged as major disruptive forces. In AI and ML, deep learning is a critical area. In this paper, we aim to investigate how deep learning and BKC together can help improve business operations. We first examine the operations research (OR) literature related to the applications of deep learning for business operations. Then, we discuss the prior studies on using BKC for operations. After that, we explore deep learning's applications for BKC, BKC's applications for deep learning as well as how deep learning and BKC have been used together for business operations. Then, we construct a research framework and propose future research directions.	10.1007/s10479-021-04101-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-04101-4	SpringerLink
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Risk of Tropical Cyclones and Floods to Power Grids in Southeast and East Asia	Ye, Mengqi, Ward, Philip J., Bloemendaal, Nadia, Nirandjan, Sadhana, Koks, Elco E.,	Power grids play a critical role in modern society, serving as the lifeline of a well-functioning economy. This article presents a first large-scale study on the risk estimation of tropical cyclone (TC)-induced winds and coastal floods, which can widely impact power grids in Southeast and East Asia. Our comprehensive risk model incorporates detailed infrastructure data from OpenStreetMap (OSM) and government power grid maps, along with global hazard maps and vulnerability curves. The results reveal that the estimated expected annual damages from TCs and coastal floods to OSM-mapped assets account for approximately 0.07% (0.00–0.38%) and 0.02% (0.00–0.02%) of the total GDP of the study area, respectively. We analyzed the main sources of uncertainty in the risk model and emphasized the importance of understanding asset vulnerability. These results highlight the urgent need to strengthen power infrastructure to withstand the impacts of natural hazards, and the significance of reliable risk information for improving power grid design and planning. Focusing on developing more region-specific infrastructure	10.1007/s13753-024-00573-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-024-00573-7	SpringerLink
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		data and vulnerability curves will improve the accuracy of risk estimation and provide valuable insights not only for the electricity sector but also for customers of other infrastructure systems that heavily rely on a stable supply of electricity.			
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Small and Medium Enterprises (SMEs) Navigating Through the Covid Pandemic in India: an Examination Through the Systems Approach	Panda, Debadutta, Bhardwaj, Rohit, Sharma, Tulika, Reddy, Sriharsha,	<p>In past couple of years, management scholars have developed significant literature on the impact of Covid pandemic across various business and organizations formats. Although, the extant literature studied various aspects of SMEs, but they did not explore the pandemic impact to SMEs from the lenses of the systems approach. We examined how SMEs navigated through the Covid pandemic from the systems theory. We engaged narrative inquiry method and captured narrations from CEOs/board members of thirty SMEs in India. The grounded theory approach was adopted to analyse the data. The study found that SMEs' navigation through the pandemic was a complex and dynamic system encompassing input factors, immediate output, systemic output, navigating strategy, and policy environment. At the end, the study developed system-theoretic ecosystem framework of Covid impact on SMEs.</p>	10.1007/s11213-023-09664-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-023-09664-w	SpringerLink
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Optimized Selection Method of Air Combat Course of Action under Stochastic Uncertainty	Zhong, Yun, Zhang, Jieyong, Sun, Peng, Wan, Lujun, Wang, Kepeng,	Aiming at the design problem of aviation swarm combat course of action (COA), considering the influence of stochastic parameters in the causal relationship model and optimization problem model, according to the dynamic influence net (DIN) theory, stochastic simulation technique, feedforward neural network (FNN) function approximation technique and multi-objective artificial fish school algorithm (MOAFSA), this paper proposed a COA optimized method based on DIN and multi-objective stochastic chance constraint optimization for aviation swarm combat. First, on the basis of establishing the overall framework of the model and defining the elements of causal relationship modeling, the static and dynamic causal relationship modeling and optimization problem modeling were carried out respectively. Second, the probability propagation mechanism of DIN was established, which mainly included two aspects, i.e., the overall process and the specific algorithm. Then, input and output data were generated based on stochastic simulation. According to these data, FNN	10.1007/s11518-024-5610-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-024-5610-3	SpringerLink
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		was adopted for function approximation, and MOAFSA was adopted for iterative optimization. Finally, the rationality of the model, and the effectiveness and superiority of the algorithm were verified through multiple sets of simulation cases.			
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Exploring Perspectives on Agroecological Transition in Scotland with Critical Systems Heuristics	Hutcheson, Matthew, Morton, Alec, Blair, Shona,	<p>Critical systems heuristics (CSH) is a framework that facilitates reflective practice in exploring and solving complex management problems. Several applications have demonstrated the utility of CSH for addressing problems concerning the environment and sustainability. As such, we apply CSH to explore perspectives on agroecological transition in Scotland. In interviews with 10 farmers, agricultural professionals, and researchers, we demonstrate the utility of boundary critique as a practice for unpacking the judgements that underpin perspectives on Scottish farming. Moreover, we derive a series of practical insights and recommendations to progress agroecological transition in Scotland, including: support for a greater diversity of farming systems; action across the entire food system to avoid 'lock-ins'; improved tools to measure farming outcomes; and nuanced and precise conversations regarding the nature and purpose of agroecological farming. We hope that our accessible and transparent approach might encourage the uptake of CSH research among systems researchers and practitioners.</p>	10.1007/s11213-023-09663-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-023-09663-x	SpringerLink
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<p>Digital Twin-based manufacturing system: a survey based on a novel reference model</p>	<p>Liu, Shimin, Zheng, Pai, Bao, Jinsong,</p>	<p>The development of advanced information technologies are paving the digital transformation of manufacturing systems, of which Digital Twin-based manufacturing system (DTMS) has become a prevailing topic attracted ever-increasing concerns from both industry and academia. As a cutting-edge smart manufacturing system, DTMS can improve manufacturing accuracy and efficiency based on high fidelity simulation, near real-time monitoring and control in a cyber-physical integrated manner. However, the connotation and boundary of DTMS lack a clear definition and systematic analysis. Therefore, this paper reviews the existing Digital Twin reference models and implementation architectures on manufacturing system, and further proposes a reference model of DTMS. Based on it, the characteristics and operational mechanism of DTMS are analyzed from three perspectives: hierarchy, dimension, and scale . Specifically, the composition of DTMS is described from a multi-level perspective, the specific characteristics of the DTMS are analyzed from a multi-dimensional</p>	<p>10.1007/s10845-023-02172-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-023-02172-7</p>	<p>SpringerLink</p>
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		<p>perspective, and the temporal and spatial characteristics of the DTMS under different application scenarios are depicted from a multi-scale perspective, respectively. At last, the potential research directions of DTMS are highlighted in terms of reusability, interpretability and adaptability. It is envisioned that this work can provide a clear understanding with insightful knowledge to attract more in-depth research of DTMS.</p>			
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<p>Deterministic Rabin Cryptosystem Using Cubic Congruence and Chinese Remainder Theorem</p>	<p>Deshmukh, Maroti, Bisht, Kanchan, Rawat, Arjun Singh,</p>	<p>The Rabin Cryptosystem is a public-key cryptosystem known for providing security levels comparable to RSA but with reduced computational overhead. Despite these advantages, it has not been widely adopted for practical use due to its lack of a deterministic nature. This paper addresses this limitation by introducing a new Deterministic Rabin Cryptosystem (DRCS). The DRCS framework includes processes for key generation, encryption, and decryption, leveraging the concept of cubic congruence and the Chinese Remainder Theorem to ensure the decryption process is unambiguous and deterministic. This design not only retains the computational efficiency of the original Rabin Cryptosystem but also enhances its security. Our comparative analysis shows that the DRCS achieves similar performance to the traditional Rabin system in terms of computational overhead. While the encryption process in DRCS is less demanding, its decryption process is more complex, and overall, it maintains a polynomial time complexity. Furthermore, a detailed security analysis indicates</p>	<p>10.1007/s11277-024-11416-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-024-11416-5</p>	<p>SpringerLink</p>
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		that the DRCS is significantly harder to factorize compared to previous models, underscoring its improved security features.			
Overview of the Stream Theory-Based Big Data in Livestream	Pham, Dang, Phan, Vinh Cong,	The big data in livestream (BDL) are existing at various forms everywhere in the world. Based on these facts, we find that not yet mathematical foundations to explain and prove about working mechanisms of BDL. This article presents the overview of related research of stream theory-based BDL (including the stream algebra and coalgebra in BDL) and analyzes briefly the types of big data technologies in the Hadoop ecosystem compared with the existing technologies in the different properties. Moreover, we also indicate the challenges for stream theory-based BDL and propose the major objectives of stream theory-based BDL which have to be performed.	10.1007/s11036-023-02180-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11036-023-02180-0	SpringerLink

Probabilistic assessment of switchyard-centered LOOP event frequency and duration in an NPP	Benabid, Rabah, Henneaux, Pierre, Labeau, Pierre-Etienne,	<p>The occurrence of a Loss Of Offsite Power (LOOP) event can be a major threat to nuclear safety due to the dependence of auxiliary systems on electrical energy. Probabilistic safety assessments of nuclear power plants require, thus, estimates of the frequencies and durations of such LOOP events. These estimates are usually based on past statistical data, which is not always relevant. Model-based approaches are thus needed. This paper proposes an analytical method to estimate the frequency and duration of switchyard-centered LOOP events, which constitute one of the four main categories of LOOP events. The proposed method is mainly based on the identification of active minimal cut sets, considering the behavior of circuit breakers against faults according to their coordination and selectivity. Adapted versions of the Risk Reduction Worth and Fussel–Vesely importance factors are proposed to evaluate the impact of components on the switchyard-centered LOOP event frequency. Furthermore, uncertainty analysis is developed and performed. Various generic plant connection schemes are</p>	10.1007/s13198-024-02416-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02416-6	SpringerLink
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		used for application. Results demonstrate the applicability of the methodology to estimate the frequency and duration of switchyard-centered LOOP events, and to identify optimal ways to reduce the risk by modifying the switchyard configuration.			
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Deep learning based authentication schemes for smart devices in different modalities: progress, challenges, performance, datasets and future directions	Shende, Shailendra W., Tembhurne, Jitendra V., Ansari, Nishat Afshan,	Deep learning algorithms have shown exceptional effectiveness in a wide range of supervised and unsupervised learning tasks in a variety of fields, including image processing, computer vision, natural language processing, and speech or voice processing. In this paper, a comprehensive analysis is conducted to assess the impact of deep learning on user authentication using both physiological and behavioural biometrics. This work encompasses the diverse deep learning approaches employed in authentication schemes tailored for smart devices. Meticulous scrutiny of commonly used datasets in these authentication studies is undertaken, accompanied by a comparative assessment of performance. The deep learning models under consideration span a spectrum of architectures, including deep neural networks, convolutional neural networks, deep auto-encoders, recurrent neural networks, and their variants. To enhance the clarity and categorization of authentication techniques for smart devices, a taxonomy is proposed based on the specific authentication metrics employed: (1) Knowledge-	10.1007/s11042-024-18350-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-024-18350-5	SpringerLink
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		<p>based Authentication (KBA), (2) Physiological Biometric-based Authentication (PBBA), (3) Behavioural Biometric-based Authentication (BBBA), (4) Physiological and Behavioural Continuous Authentication (PBBCA), and (5) Multi Modal Authentication (MMA). Furthermore, potential contributions of deep learning techniques to the realms of physiological and behavioural biometrics are discussed. Significance is placed on performance metrics, including accuracy, stability, and robustness, in evaluating these deep learning-based authentication systems. The challenges and limitations that deep learning approaches must surmount when dealing with real-world biometric data in the context of biometric identification systems are examined. This work not only underscores the transformative role of deep learning in user authentication but also offers valuable insights into the evolving landscape of biometric identification on smart devices. An examination of performance metrics provides a holistic view of the strengths and areas for improvement in deep learning based</p>			
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		authentication solutions.			
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<p>Digital image steganography: challenges, investigation, and recommendation for the future direction</p>	<p>Abdulla, Alan Anwer,</p>	<p>Performance measurements which characterize digital image steganography techniques include payload capacity, stego image quality, and security (secret message detectability). Increasing payload capacity leads to diminishing both stego image quality and security. Conversely, a high stego image quality and a high security cannot be obtained without compromising payload capacity. It has become essential but increasingly challenging to achieve a balance between these image steganography requirements. The direction of recent contributions in the area of image steganography can be classified into two different approaches. The first approach is the development of techniques based on embedding efficiency in which the secret message hides while minimizing the embedding distortion in the cover image. The second approach is the development of techniques based on distortion function related to statistical detectability in which the secret message conceals in certain parts of the cover image determined by the defined distortion function such as textured or noisy regions. This study aims</p>	<p>10.1007/s00500-023-09130-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-023-09130-8</p>	<p>SpringerLink</p>
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		<p>to provide the insight for the researchers about future works and pave away for them to design efficient steganography techniques. It practically analyzes and investigates which of the two approaches can attain all the requirements of image steganography simultaneously. Comprehensive experiments have been conducted on a large-scale benchmark dataset which demonstrate that increasing the embedding efficiency reflects on increasing stego image quality as well as security without compromising payload capacity. The experimental findings reveal that the virtual designed steganography technique, LSB_EE_20, achieved the optimum results, with an embedding efficiency of 20, a PRNR of 62, and a message detectability of 0.11%. Consequently, this paper recommends that the researchers in this area concentrate on developing embedding techniques in which the embedding efficiency increases rather than focusing on distortion function.</p>			
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<p>"I Want to Send a Message to My Friend": Exploring the Shift of Agency to Older Adults in HRI</p>	<p>Simão, Hugo, Gonçalves, David, Pires, Ana C., Abreu, Lúcia, Bernardino, Alexandre, Forlizzi, Jodi, Guerreiro, Tiago,</p>	<p>Communication among some older adults is affected by cognitive and mobility impairments. This increases isolation, particularly for those residing in care homes, and leads to accelerated cognitive decline. Previous research has leveraged assistive robots to promote recreational routines and communication among older adults, with the robot leading the interaction. However, older adults could have more agency in the interaction, as robots could extend elders' intentions and needs. Therefore, we explored an approach whereby the robot's agency is shifted to the older adults who lead the interaction by commanding a robot's actions using interactive physical blocks (tangible blocks). We conducted sessions with 22 care home dwellers where they could exchange messages and objects using the robot. Based on older adults' observed behaviors during the sessions and perspectives gathered from interviews with geriatric professionals, we reflect on the opportunities and challenges for increased user agency and the asymmetries that emerged from differing abilities and personality traits. Our</p>	<p>10.1007/s12369-024-01128-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12369-024-01128-y</p>	<p>SpringerLink</p>
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		qualitative results highlight the potential of robotic approaches to extend the agency and communication of older adults, anchored on human values, such as the exchange of affection, collaboration, and competition.			
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<p>A comprehensive survey of federated transfer learning: challenges, methods and applications</p>	<p>Guo, Wei, Zhuang, Fuzhen, Zhang, Xiao, Tong, Yiqi, Dong, Jin,</p>	<p>Federated learning (FL) is a novel distributed machine learning paradigm that enables participants to collaboratively train a centralized model with privacy preservation by eliminating the requirement of data sharing. In practice, FL often involves multiple participants and requires the third party to aggregate global information to guide the update of the target participant. Therefore, many FL methods do not work well due to the training and test data of each participant may not be sampled from the same feature space and the same underlying distribution. Meanwhile, the differences in their local devices (system heterogeneity), the continuous influx of online data (incremental data), and labeled data scarcity may further influence the performance of these methods. To solve this problem, federated transfer learning (FTL), which integrates transfer learning (TL) into FL, has attracted the attention of numerous researchers. However, since FL enables a continuous share of knowledge among participants with each communication round while not allowing local data to be accessed by other participants, FTL faces many</p>	<p>10.1007/s11704-024-40065-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11704-024-40065-x</p>	<p>SpringerLink</p>
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		<p>unique challenges that are not present in TL. In this survey, we focus on categorizing and reviewing the current progress on federated transfer learning, and outlining corresponding solutions and applications. Furthermore, the common setting of FTL scenarios, available datasets, and significant related research are summarized in this survey.</p>			
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Knowledge sources, narratives, and living in social-ecological systems	Cockerill, Kristan, Glynn, Pierre, Cerrutti, Estefania Santamaria, Little, John C.,	Humans exist as part of social-ecological systems (SES) in which biological, physical, chemical, economic, political and other social processes are tightly interwoven. Global change within these systems presents an increasingly untenable situation for long-term human security. Further, knowledge that humans possess about ourselves and SES represents a complex amalgamation of individual and collective factors. Because of various evolutionary pressures, people often reject this complex reality in favor of more simplistic perceptions and explanations. This thought paper offers an overview of how and where people acquire knowledge and how that knowledge acquisition process reflects and influences narratives, which subsequently affect efforts to address challenges in SES. We highlight three narratives as examples of constraints on finding ways forward toward a more resilient future. Our focal narratives include tendencies to conflate tame and wicked problems; to posit a false human-nature duality; and to resist the explanatory evidence from biocultural evolution. We	10.1007/s11027-024-10151-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11027-024-10151-3	SpringerLink
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		then discuss the human cognitive propensity to create narratives to think about how we might intentionally develop narratives that are more appropriate for living in coevolving SES.			
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Predicting irrigation water quality indices in a typical mining dominated area in the Upper West region of Ghana using multiple machine learning techniques	Kazapoe, Raymond Webrah, Sagoe, Samuel Dzidefo, Abu, Mahamuda,	The quality of groundwater resources in artisanal mining districts in Ghana is under threat due to pollution; rendering the resource unsafe for drinking and irrigation purposes. This makes the assessment of the quality of groundwater resources a relevant aspect of groundwater studies as it informs decision making and monitoring. This study adopts 3 Machine Learning (ML) models, Support Vector Regression (SVR), Gradient Boost Regression (GBR), and Artificial Neural Network (ANN), to evaluate a variety of irrigation water quality metrics such as Sodium Percentage (Na%), Soluble Sodium Percentage (SSP), Sodium Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC), Permeability Index (PI), Pollution Index of Groundwater (PIG), Kelly's Ratio (KR), and Magnesium Hazard (MH). 105 samples were collected from a mining area in Northern Ghana and analysed through traditional methods. The Irrigation Water Quality Indices (IWQIs) demonstrate that all water samples are suitable for use as irrigable water with the exception of MH, Na%, PI, and PIG which revealed that 69.52%,	10.1007/s43832-024-00104-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43832-024-00104-x	SpringerLink
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		<p>8.57%, 29.52%, and 3.81% are inappropriate for irrigation. SVR, GBR and ANN were used to establish important factors that may influence IWQIs in the area. The measured data was used as independent variables, and the derived IWQIs, the dependent variables. The results revealed that ANN, GBR, and SVR are all viable options for the prediction of IWQIs, but GBR exhibited variable performance in some indices making it lack consistency and thus falls a bit short compared to ANN and SVR. SVR models overall performed best with SVR-RSC having the highest accuracy.</p>			
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Formal design, verification and implementation of robotic controller software via RoboChart and RoboTool	Li, Wei, Ribeiro, Pedro, Miyazawa, Alvaro, Redpath, Richard, Cavalcanti, Ana, Alden, Kieran, Woodcock, Jim, Timmis, Jon,	<p>Current practice in simulation and implementation of robot controllers is usually undertaken with guidance from high-level design diagrams and pseudocode. Thus, no rigorous connection between the design and the development of a robot controller is established. This paper presents a framework for designing robotic controllers with support for automatic generation of executable code and automatic property checking. A state-machine based notation, RoboChart, and a tool (RoboTool) that implements the automatic generation of code and mathematical models from the designed controllers are presented. We demonstrate the application of RoboChart and its related tool through a case study of a robot performing an exploration task. The automatically generated code is platform independent and is used in both simulation and two different physical robotic platforms. Properties are formally checked against the mathematical models generated by RoboTool, and further validated in the actual simulations and physical experiments. The tool not only provides engineers with a way of designing robotic controllers formally but also</p>	10.1007/s10514-024-10163-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10514-024-10163-7	SpringerLink
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		paves the way for correct implementation of robotic systems.			
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How the Welfare State Tries to Protect Itself Against the law: Luhmann and new Forms of Social Immune Mechanism	Andersen, Niels Åkerstrøm, Stenner, Paul,	<p>Sociologist Niklas Luhmann argued that the law functions as society's immune system by regulating conflicts that threaten the certainty of expectation structures. In this article, we argue that law itself has become a target of new social immune mechanisms. Since the 1980s, welfare states have increasingly seen their own structures as a threat. Today, the ideal is a public sector consisting of organizations that constantly emerge anew by selecting the structures that fit each specific moment, case, and citizen. To protect public sector organizations against their own structures, 'potentialization' now functions as a social autoimmune mechanism by initiating a constant search for new openings and possibilities. This critique of structures includes a critique of legal structures like rights. Looking at the Danish law of early retirement as our empirical case, this paper analyzes, how the tension between law and 'potentialization' is built into the law itself. While the law gives citizens certain rights to early retirement, it simultaneously 'protects' against the same rights by potentializing citizens. 'Potentialization' here functions as a mechanism that</p>	10.1007/s10978-023-09346-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10978-023-09346-5	SpringerLink
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		<p>protects the operations of a system against its legal structures. It functions by 'un-relating' those operations from the structures. This means that when citizens claim their right to pensions, the social workers can reject them on the grounds of a right to a future that is not foreclosed and 'parked' on a pension. The paper's contribution is to show how potentialization works by dissolving even fundamental legal expectations. This profoundly transforms the relationship between the citizen and the public sector.</p>			
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Research on Energy Optimization Method of Multi-microgrid System Based on the Cooperative Game Theory	Li, Changchao, Kang, Zhongjian, Yu, Hongguo, Wang, Hao, Li, Kaiji,	Aiming at the energy optimization problem of multi-microgrid system, a energy optimization method of multi-microgrid system is proposed based on cooperative game theory in this paper. Firstly, taking economic cost as the objective function, a cooperative game model of multi-microgrid system is established based on the cooperative game theory. Secondly, taking the electricity price and power trading volume between micro grids as strategies and the final operation cost or revenue of each micro grid as the benefit function of the game to conduct the cooperative game under the price constraint agreement and benefit compromise agreement. The electricity price and trading power between micro grids are obtained to achieve optimization of multi-level microgrids. Finally, the optimization method is simulated to prove the feasibility. The simulation results show that the method can effectively achieve the energy optimal scheduling of multi-microgrid system.	10.1007/s42835-024-01806-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42835-024-01806-x	SpringerLink
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Suppressing homoclinic chaos for a class of vibro-impact oscillators by non-harmonic periodic excitations	Li, Shuangbao, Xu, Rui, Kou, Liying,	<p>This paper proposes a theoretical framework and carries out numerical verification for suppressing homoclinic chaos of a class of vibro-impact oscillators by adding non-harmonic periodic excitations. Based on the Melnikov method of non-smooth systems, the theoretical sufficient conditions for suppressing homoclinic chaos are obtained by eliminating the simple zeros of the corresponding Melnikov function while retaining the infinite terms of the Fourier expansion of the non-harmonic periodic excitations. Furthermore, the effects of waveforms, amplitudes, initial phases, and impulse of the non-harmonic periodic excitations on chaos suppression are studied, and the optimal parameters for suppressing chaos are analytically obtained. Finally, the effectiveness of theories is verified by the vibro-impact Duffing oscillator. Numerical results show that chaos induced by the transversal intersection of homoclinic orbits can be weakened or even suppressed by adding the non-harmonic periodic excitations, and when the impulse transmitted by the non-harmonic periodic</p>	10.1007/s11071-024-09649-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11071-024-09649-x	SpringerLink
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		excitations is maximum, the effective amplitude for suppressing chaos is minimal. Moreover, there may be some phenomena that do not have too good a quantitative agreement between theoretical predictions and numerical results.			
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Image-based extension to ant colony algorithm for path finding in grid-based environments	Rababaah, Aaron Rasheed,	<p>We propose a technique (IPEAC) that extends the Ant Colony Optimization (ACO) for shortest path finding. In a grid-based environment, when the ACO converges, the optimal path needs to be identified among other emerging paths. Our proposed approach utilizes an image processing algorithm named Connected Component Analysis (CCA). In our implementation, the result of the ACO is an image that models the system elements of source, destination, obstacles, background and agents. This image is fed into CCA which applies a sequence of operators to find the optimal path and calculates its coordinates so that it can be traversed. IPEAC was tested against Dijkstra and A* algorithms. Our experimental work showed that IPEAC is effective and produced an accuracy of 97.8% compared to the A* and 91.8% compared to Dijkstra, however the A* was superior in terms of time efficiency and IPEAC was 60% more efficient than Dijkstra.</p>	10.1007/s13198-024-02281-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02281-3	SpringerLink
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<p>A general and modular framework for dark web analysis</p>	<p>Ruiz Ródenas, José Manuel, Pastor-Galindo, Javier, Gómez Mármol, Félix,</p>	<p>The dark web, often linked with illegal activities, can be monitored with different solutions. However, these tools are typically purpose-specific and designed for unique use cases. In this study, we propose a flexible and scalable framework that facilitates the easy integration of new workflows for dark web analysis. The design is based on the control, logic and operations layers, supplemented by a tools module, logs management, asynchronous message-based communication and a database. The implementation maps the features into a microservice approach, utilizing the open-source technologies Docker Swarm, Kafka, ELK Stack (Elastic Search, Logstash and Kibana), and PostgreSQL. A workflow to scrape web elements of Tor onion services is deployed and validated, demonstrating considerable framework performance despite the time-consuming task of navigating the dark web. Over 16 h, the framework collected over half million onion domains (84,371 unique ones) and made 78,555 accesses to them.</p>	<p>10.1007/s10586-023-04189-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-023-04189-2</p>	<p>SpringerLink</p>
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<p>Total cost ownership optimization of private clouds: a rack minimization perspective</p>	<p>Chi, Yuanfang, Dai, Wei, Fan, Yuan, Ruan, Jun, Hwang, Kai, Cai, Wei,</p>	<p>With the development of network infrastructure, a large volume of data will be exchanged with increased bandwidth. Many applications are connecting people to the rest of the world through the public network. Thus, privacy and security have become a concern. Under this circumstance, it becomes a trend that the enterprises tend to host their data and services on private clouds dedicated to their own use, rather than the public cloud services. However, in contrary to the well-investigated total cost of ownership (TCO) for public clouds, the analytic research on the cost of purchase and operation for private clouds is still a blank. In this work, we first review the state-of-the-art TCO literature to summarize the models, tools, and cost optimization techniques for public clouds. Based on our survey, we envision the TCO modeling and optimization for private clouds by comparing the differences of features between public and private clouds. Finally, we propose a heuristic algorithm, conflict-aware first-fit to optimize the total cost of ownership of private cloud by minimizing the number of racks when deploying servers.</p>	<p>10.1007/s11276-021-02757-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-021-02757-1</p>	<p>SpringerLink</p>
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Test suite assessment of safety-critical systems using safety tactics and fault-based mutation testing	Gurbuz, Havva Gulay, Tekinerdogan, Bedir, Catal, Cagatay, Er, Nagehan Pala,	<p>A safety-critical system is a system in which the software malfunctioning could result in death, injury, or damage to the environment. Addressing safety concerns early on at the architecture design level is critical to guide the subsequent life cycle activities to ensure that the eventual system is reliable. A fundamental approach to address safety at the design level is the adoption of architectural tactics. It is crucial for safety-critical systems to correctly implement the constraints as defined by the selected safety tactics. Given the limitations of traditional safety measures, particularly in conducting thorough analyses of safety tactics at the architectural design level, our motivation is to close this gap by integrating safety tactics and fault-based mutation testing. This article proposes a systematic approach for assessing the adequacy of test suites of safety-critical systems based on these architectural safety tactics. Our proposed approach involves the integration of safety tactics and fault-based mutation testing to comprehensively assess the adequacy of test suites in safety-critical systems. At the core of our methodology is</p>	10.1007/s10586-023-04229-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-023-04229-x	SpringerLink
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		<p>the adoption of architectural safety tactics, addressing potential issues at the design level. We leverage fault-based testing, utilizing a dedicated metamodel and domain-specific language (DSL) to model safety views and their relation to the code. We use a case study to evaluate the effectiveness of our approach using fault-injection techniques. Our study shows that this systematic approach is feasible and effective for test suite assessment of safety-critical systems.</p>			
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Predicting peak inundation depths with a physics informed machine learning model	Lee, Cheng-Chun, Huang, Lipai, Antolini, Federico, Garcia, Matthew, Juan, Andrew, Brody, Samuel D., Mostafavi, Ali,	Timely, accurate, and reliable information is essential for decision-makers, emergency managers, and infrastructure operators during flood events. This study demonstrates that a proposed machine learning model, MaxFloodCast , trained on physics-based hydrodynamic simulations in Harris County, offers efficient and interpretable flood inundation depth predictions. Achieving an average R^2 of 0.949 and a Root Mean Square Error of 0.61 ft (0.19 m) on unseen data, it proves reliable in forecasting peak flood inundation depths. Validated against Hurricane Harvey and Tropical Storm Imelda, MaxFloodCast shows the potential in supporting near-time floodplain management and emergency operations. The model's interpretability aids decision-makers in offering critical information to inform flood mitigation strategies, to prioritize areas with critical facilities and to examine how rainfall in other watersheds influences flood exposure in one area. The MaxFloodCast model enables accurate and interpretable inundation depth predictions while significantly reducing computational time, thereby	10.1038/s41598-024-65570-8	https://www.nature.com/articles/s41598-024-65570-8.pdf	SpringerLink
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		supporting emergency response efforts and flood risk management more effectively.			
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Dimension reduction approach for understanding resource-flow resilience to climate change	Salgado, Ariel, He, Yiyi, Radke, John, Ganguly, Auroop Ratan, Gonzalez, Marta C.,	<p>Networked dynamics are essential for assessing the resilience of lifeline infrastructures. The dimension-reduction approach was designed as an efficient way to map the high-dimensional dynamics to a low-dimensional representation capturing system-level behavior while taking into consideration network structure. However, its application to socio-technical systems has not been considered yet. Here, we extend the dimension-reduction approach to resource-flow dynamics in multiplex networks. We apply it to the San Francisco fuel transportation network, considering the flow between refineries, terminals and gas stations. We capture the aggregated dynamics between the facilities of each type and identify macroscopic conditions for the system to supply a given demand of fuel. By considering multiple sea level rise scenarios between 2020 and 2100, we address the impact of coastal flooding due to climate change on the maximum suppliable demand. Finally, we analyze the system's transient response to production failures, investigating the</p>	10.1038/s42005-024-01664-z	https://www.nature.com/articles/s42005-024-01664-z.pdf	SpringerLink
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		<p>temporary interruption in production and the duration it takes for complete demand satisfaction to become unachievable after the interruption. Originally developed in the context of ecology, the dimension reduction approach allows to study the dynamics of complex systems at large scale, while retaining the interaction patterns within the system. The framework allows obtaining analytical approximations of the aggregated models. The authors extend the dimension-reduction approach to resource-flow networks. They combine the approximation with flooding maps that consider the effects of climate change to study the resilience of coastal fuel supply chains to sea level rise.</p>			
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<p>The circular bioeconomy: a driver for system integration</p>	<p>Schipfer, Fabian, Burli, Pralhad, Fritsche, Uwe, Hennig, Christiane, Stricker, Fabian, Wirth, Maria, Proskurina, Svetlana, Serna-Loaiza, Sebastian,</p>	<p>Background Human and earth system modeling, traditionally centered on the interplay between the energy system and the atmosphere, are facing a paradigm shift. The Intergovernmental Panel on Climate Change's mandate for comprehensive, cross-sectoral climate action emphasizes avoiding the vulnerabilities of narrow sectoral approaches. Our study explores the circular bioeconomy, highlighting the intricate interconnections among agriculture, forestry, aquaculture, technological advancements, and ecological recycling. Collectively, these sectors play a pivotal role in supplying essential resources to meet the food, material, and energy needs of a growing global population. We pose the pertinent question of what it takes to integrate these multifaceted sectors into a new era of holistic systems thinking and planning. Results The foundation for discussion is provided by a novel graphical representation encompassing statistical data on food, materials, energy flows, and circularity. This representation aids in constructing an inventory of technological advancements and climate actions that have</p>	<p>10.1186/s13705-024-00461-4</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13705-024-00461-4</p>	<p>SpringerLink</p>
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		<p>the potential to significantly reshape the structure and scale of the economic metabolism in the coming decades. In this context, the three dominant mega-trends—population dynamics, economic developments, and the climate crisis—compel us to address the potential consequences of the identified actions, all of which fall under the four categories of substitution, efficiency, sufficiency, and reliability measures. Substitution and efficiency measures currently dominate systems modeling. Including novel bio-based processes and circularity aspects might require only expanded system boundaries. Conversely, paradigm shifts in systems engineering are expected to center on sufficiency and reliability actions. Effectively assessing the impact of sufficiency measures will necessitate substantial progress in inter- and transdisciplinary collaboration, primarily due to their non-technological nature. In addition, placing emphasis on modeling the reliability and resilience of transformation pathways represents a distinct and</p>			
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		<p>emerging frontier that highlights the significance of an integrated network of networks.</p> <p>Conclusions</p> <p>Existing and emerging circular bioeconomy practices can serve as prime examples of system integration.</p> <p>These practices facilitate the interconnection of complex biomass supply chain networks with other networks encompassing feedstock-independent renewable power, hydrogen, CO₂, water, and other biotic, abiotic, and intangible resources.</p> <p>Elevating the prominence of these connectors will empower policymakers to steer the amplification of synergies and mitigation of tradeoffs among systems, sectors, and goals.</p>			
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Digital twin-driven prognostics and health management for industrial assets	Xiao, Bin, Zhong, Jingshu, Bao, Xiangyu, Chen, Liang, Bao, Jinsong, Zheng, Yu,	As a facilitator of smart upgrading, digital twin (DT) is emerging as a driving force in prognostics and health management (PHM). Faults can lead to degradation or malfunction of industrial assets. Accordingly, DT-driven PHM studies are conducted to improve reliability and reduce maintenance costs of industrial assets. However, there is a lack of systematic research to analyze and summarize current DT-driven PHM applications and methodologies for industrial assets. Therefore, this paper first analyzes the application of DT in PHM from the application field, aspect, and hierarchy at application layer. The paper next deepens into the core and mechanism of DT in PHM at theory layer. Then enabling technologies and tools for DT modeling and DT system are investigated and summarized at implementation layer. Finally, observations and future research suggestions are presented.	10.1038/s41598-024-63990-0	https://www.nature.com/articles/s41598-024-63990-0.pdf	SpringerLink
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Mining architectural information: A systematic mapping study	Jean de Dieu, Musengamana, Liang, Peng, Shahin, Mojtaba, Yang, Chen, Li, Zengyang,	Mining Software Repositories (MSR) has become an essential activity in software development. Mining architectural information (e.g., architectural models) to support architecting activities, such as architecture understanding, has received significant attention in recent years. However, there is a lack of clarity on what literature on mining architectural information is available. Consequently, this may create difficulty for practitioners to understand and adopt the state-of-the-art research results, such as what approaches should be adopted to mine what architectural information in order to support architecting activities. It also hinders researchers from being aware of the challenges and remedies for the identified research gaps. We aim to identify, analyze, and synthesize the literature on mining architectural information in software repositories in terms of architectural information and sources mined, architecting activities supported, approaches and tools used, and challenges faced. A Systematic Mapping Study (SMS) has been conducted on the literature	10.1007/s10664-024-10480-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-024-10480-6	SpringerLink
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		<p>published between January 2006 and December 2022. Of the 104 primary studies finally selected, 7 categories of architectural information have been mined, among which architectural description is the most mined architectural information; 11 categories of sources have been leveraged for mining architectural information, among which version control system (e.g., GitHub) is the most popular source; 11 architecting activities can be supported by the mined architectural information, among which architecture understanding is the most supported activity; 95 approaches and 56 tools were proposed and employed in mining architectural information; and 4 types of challenges in mining architectural information were identified. This SMS provides researchers with promising future directions and help practitioners be aware of what approaches and tools can be used to mine what architectural information from what sources to support various architecting activities.</p>			
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<p>The soft underbelly of complexity science adoption in policymaking: towards addressing frequently overlooked non-technical challenges</p>	<p>Nel, Darren, Taeihagh, Araz,</p>	<p>The deepening integration of social-technical systems creates immensely complex environments, creating increasingly uncertain and unpredictable circumstances. Given this context, policymakers have been encouraged to draw on complexity science-informed approaches in policymaking to help grapple with and manage the mounting complexity of the world. For nearly eighty years, complexity-informed approaches have been promising to change how our complex systems are understood and managed, ultimately assisting in better policymaking. Despite the potential of complexity science, in practice, its use often remains limited to a few specialised domains and has not become part and parcel of the mainstream policy debate. To understand why this might be the case, we question why complexity science remains nascent and not integrated into the core of policymaking. Specifically, we ask what the non-technical challenges and barriers are preventing the adoption of complexity science into policymaking. To address this question, we conducted an extensive</p>	<p>10.1007/s11077-024-09531-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11077-024-09531-y</p>	<p>SpringerLink</p>
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		<p>literature review. We collected the scattered fragments of text that discussed the non-technical challenges related to the use of complexity science in policymaking and stitched these fragments into a structured framework by synthesising our findings. Our framework consists of three thematic groupings of the non-technical challenges: (a) management, cost, and adoption challenges; (b) limited trust, communication, and acceptance; and (c) ethical barriers. For each broad challenge identified, we propose a mitigation strategy to facilitate the adoption of complexity science into policymaking. We conclude with a call for action to integrate complexity science into policymaking further.</p>			
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Research on construction and task planning of police equipment support system based on background of anti-terrorism operation	Wang, Qilei,	In order to ensure the operational efficiency of police personnel under the background of anti-terrorism operation, this paper puts forward the planning and construction method of equipment support system for task demand, and constructs the anti-terrorism equipment support system in Xinjiang region Combined with the constructed system, a mathematical model with time-priority as the objective is established, and a hybrid task planning method based on multidimensional dynamic list programming and chaotic bat algorithm is proposed. A discrete chaotic bat algorithm with adaptive search strategy and mutation operation is designed to allocate resources for selected tasks by multidimensional dynamic list tasks. The research shows that the established support system fully considers the equipment system demand generation mechanism under the Background of anti-terrorism operation, and increases the introduction of the support system and the technical standard system, which can effectively meet the personnel equipment support needs in the anti-terrorism environment.	10.1007/s13198-024-02296-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-024-02296-w	SpringerLink
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<p>A refinement-based approach to safe smart contract deployment and evolution</p>	<p>Antonino, Pedro, Ferreira, Juliandson, Sampaio, Augusto, Roscoe, A. W., Arruda, Filipe,</p>	<p>In our previous work, we proposed a verification framework that shifts from the “code is law” to a new “specification is law” paradigm related to the safe evolution of smart contracts. The framework proposed there relaxed the well-established requirement that, once a smart contract is deployed in a blockchain, its code is expected to be immutable. More flexibly, contracts are allowed to be created and upgraded provided they meet a corresponding formal specification that was fixed. In the current paper, we extend this framework to allow specifications to evolve, provided a refinement notion is preserved. We propose a notion of specification refinement tailored for smart contracts and a methodology for checking it. In addition to weakening preconditions and strengthening postconditions and invariants, we allow for the change of data representation and interface extension. Thus, we are able to reason about a significantly wider class of smart contract evolution histories, when contrasted with the original framework. The new framework is centred around a trusted deployer : an off-chain service that formally verifies</p>	<p>10.1007/s10270-023-01143-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-023-01143-z</p>	<p>SpringerLink</p>
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		and enforces the notions of implementation conformance and specification refinement. We have investigated its applicability to the safe deployment and upgrade of contracts implementing widely used Ethereum standards (the ERC20 Token Standard, the ERC3156 Flash Loans, the ERC1155 Multi Token Standard and The ERC721 standard for Non-Fungible Tokens); we handle evolutions possibly involving changes in data representation and interface extensions.			
Analyzing Toolkits for the Development of Information Support for Smart Spaces	Shvedenko, V. V.,	Abstract —Trends in the development of smart spaces are described. Modern tools for designing the information support of smart spaces are presented, and a brief description of them, their applied methods, and their standards are given. It is concluded that there is a growing need for specialist designers of this field of knowledge.	10.3103/S0147688224700102	http://link.springer.com/openurl/pdf?id=doi:10.3103/S0147688224700102	SpringerLink

Techniques and methods for managing disasters and critical situations	AlAli, Zahraa Tarik, Alabady, Salah Abdulghani,	<p>Despite the great development and advancement of technology over time, the problem of disaster and crisis management and dealing with it remains a major and great challenge. Early detection of natural disasters, strict laws against man-made disasters, and even the enforcement of the safety requirements for industrial disasters could not stop the occurrence of disasters and crises that leave devastation, general disability, suffering, and deprivation, in addition to injuries, wounded, victims, and even missing and dead human beings.</p> <p>Therefore, technologies, algorithms, and modern methods such as mechanical, electronic, robots, image, and signal processing, artificial intelligence, wireless communication, and so on must be harnessed to deal with disasters after their occurrence as well as limit their effects.</p> <p>Because preserving the lives of people and helping them is greatly important, this research has been prepared to review the work and techniques of researchers. The reviewed research dealt with the early detection of disasters and managing them in the fastest time and with high</p>	10.1007/s11069-024-06573-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-024-06573-6	SpringerLink
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		<p>efficiency, including detecting and locating victims and also relieving survivors to reduce the psychological, physical, and economic impact of these disasters. Also, the paper presented the development of using some technology as a robot in this field. This paper can be a base for other researchers and rescue workers to improve and enhance their operations or mission of managing disasters or crises.</p>			
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Blockchain-as-a-Service for the Security Challenges and Solutions in the Internet of Things Environment	Chen, Hongsong, Zhang, Yiyang, Han, Xintong, Cao, Yongrui, Zhang, Yongpeng,	<p>The Internet of Things and blockchain, as important technology foundations to enable Web 3.0, have greatly impacted the living and production patterns of people. When they meet together, blockchain services can be used to solve some IoT challenges that traditional information technologies cannot solve. Therefore, how to use blockchain services in IoT environment, and what key security challenges in IoT environment can be addressed by blockchain services are two critical issues. In this article, we propose a novel hybrid IoT architecture based on blockchain services to solve the first issue. To solve the second issue, we analyze IoT security threats and challenges, and propose blockchain-based security solutions, which are illustrated with the application cases of edge computing and fog computing based on smart contracts. Then we design and implement blockchain-based IoT zero-knowledge proof authentication experiments using the web3.js library to demonstrate the lightweight blockchain services performance in IoT application scenarios.</p>	10.1007/s11277-024-11375-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-024-11375-x	SpringerLink
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<p>A formal component model for UML based on CSP aiming at compositional verification</p>	<p>Falcão, Flávia, Lima, Lucas, Sampaio, Augusto, Antonino, Pedro,</p>	<p>Model-based engineering emerged as an approach to tackle the complexity of current system development. In particular, compositional strategies assume that systems can be built from reusable and loosely coupled units. However, it is still a challenge to ensure that desired properties hold for component integration. We present a component-based model for UML, including a metamodel, well-formedness conditions and formal semantics via translation into BRIC; the presentation of the semantics is given by a set of rules that cover all the metamodel elements and map them to their respective BRIC denotations. We use our previous work on BRIC as an underlying (and totally hidden) component development framework so that our approach benefits from all the formal infrastructure developed for BRIC using CSP. Component composition, specified via UML structural diagrams, ensures adherence to classical concurrent properties: our focus is on the preservation of deadlock freedom. Automated support is developed as a plug-in to the Astah modelling tool. Verification</p>	<p>10.1007/s10270-023-01127-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-023-01127-z</p>	<p>SpringerLink</p>
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		<p>is carried out using FDR (a model checker for CSP); we address scalability using compositional reasoning (inherent to the approach) and behavioural patterns. The formal reasoning is transparent to the user: a distinguishing feature of our approach is its support for traceability. For instance, when FDR uncovers a deadlock, a sequence diagram is constructed from the deadlock trace and presented to the user at the modelling level. The overall approach is illustrated with a running example and two additional case studies.</p>			
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<p>Retaliating against cyber-attacks: a decision-taking framework for policy-makers and enforcers of international and cybersecurity law</p>	<p>Leventopoulos, Sozon, Pipyros, Kosmas, Gritzalis, Dimitris,</p>	<p>Cyber warfare is a reality taking on increasing importance. Governments, state-sponsored actors, and non-state sponsored actors have used cyber-attacks as the “weapon of choice” due to their specific characteristics. Cyber-attacks can be highly targeted and focused, even tailored to a specific unit or system, providing limited to no physical destruction (unlike a cruise missile) and potentially resulting in no loss of life. There are several incident response frameworks and approaches that an organization can implement to enhance its security posture. Usually, these will address specific adverse events such as computer security incidents, which in turn are limited in scope and coverage, typically within an organization. Nations have made limited effort in confronting severe cyber-attacks targeting and/or threatening them, as well as in preventing these attacks from being launched. In this work, we identify and discuss a decision-taking framework that may allow state actors to adopt new options against severe cyber-attacks, not always complying with international norms. Such options are neither encouraged nor supported. On</p>	<p>10.1365/s43439-024-00113-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1365/s43439-024-00113-5</p>	<p>SpringerLink</p>
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		<p>the contrary, we discuss them so that the international community is made aware of such potential frameworks. More specifically, by defining clear thresholds, roles, and responsibilities, by introducing a structured chain of command, and by identifying the potential of certain actions, policy makers can recognize an extended decision space that may lead to unpredictable deterrence options against cyber-attacks.</p>			
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<p>The Need for Products Interchangeability: An Unsolved Problem of Semantic Conflicts No Product Definition System Can Support Perfectly</p>	<p>Gilbert, Giacomoni,</p>	<p>The way in which a frequently evolving product is configured is a key issue in making predictions on its behavior in specific environments, with potentially major implications in taxing industries. Product Definition Systems (including Decision Support Systems) are proposed to support a dynamic alignment with fast changing contexts (outer environments) of products innovation (inner environments) conceptualized as complex systems. The alignment difficulty is theoretical (undecidability) and not solely practical to support products interchangeability (NP-complete problem). In changing environments new product versions have to be defined and named with corresponding properties or knowledge extensions. Our approach through syntax and semantics clears how such (product innovation) systems and knowledge extension are related to change the universe of possibles including problem space and solution space. It is an important topic for research on knowledge economy and Product Definition System.</p>	<p>10.1007/s13132-023-01181-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-023-01181-4</p>	<p>SpringerLink</p>
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Development of a Proof-of-Concept Multi-Method Computer Simulation to Support Rural Healthcare Disaster Preparedness Planning	Berg, Thomas A., Kintziger, Kristina W., Crumly, Julie Suzuki, Lawson, Scott A., Myers, Carole R., Stansberry, Tracey T.,	Due to a lack of resources, rural communities often face challenges when planning catastrophic events. This project involved applying systems thinking and model-based systems engineering to develop a proof-of-concept, multi-method computer simulation and then determining whether the simulation could be used to assess the efficacy of disaster planning approaches on health outcomes in rural communities, as a function of primary healthcare. The project focus was a rural or non-urban healthcare system experiencing a natural hazard. Both system dynamics and discrete event models were incorporated to represent subsystem operations, crucial disaster responses, as well as three key response systems: public health, emergency management, and healthcare. The subsystem models included several components: policies/procedures, communications, resources, exercises/drills/training, healthcare space and staff, and the flow of affected people into and through the system. The combined simulation can serve as a first step to a more comprehensive approach to	10.1007/s13753-024-00561-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-024-00561-x	SpringerLink
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		helping rural communities achieve more efficient and effective healthcare planning for disaster responses.			
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Advances in surface water hydrology research in India	Chauhan, Tejasvi, Gowri, R., Ghosh, Subimal, Mujumdar, P. P.,	India has a growing water crisis fueled by global warming and a rising population. There is an urgent need for accurate water availability assessments and sustainable water management strategies for urban and rural areas. This can be achieved by developing novel decision-making tools for effective water resource management by improving the hydrological models and our understanding of hydrological processes. The changing climate adds complexity to hydrological processes, necessitating accurate modelling and impact assessments to build climate change-resilient water resource systems. This review examines the advancements in hydrological process understanding and surface hydrological modelling in India from 2019 to 2023. Recent years have witnessed substantial contributions from the Indian hydrology community, which include quantifying climate change impacts on water and carbon cycle at a basin scale, improvements in hydrological modelling and forecasting extremes, the introduction of novel physics-based data-driven approaches, urban flood modelling and the	10.1007/s43538-024-00234-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43538-024-00234-9	SpringerLink
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		development of first-ever state-of-the-art flood early warning system among other notable climate services. In addition, the idea of studying natural systems as coupled human-natural systems has gained prominence in India. This review aims to provide insights into recent developments in surface water hydrology in India and highlight the potential future avenues of research that can uplift water resources management in India.			
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Service Re-Selection for Disruptive Events in Mobile Environments: A Heuristic Technique for Decision Support at Runtime	Bortlik, Michael, Heinrich, Bernd, Lohninger, Daniel,	Modern service-based processes in mobile environments are highly complex due to the necessary spatial-temporal coordination between multiple participating users and the consideration of context information. Due to the dynamic nature of mobile environments, disruptive events occur at runtime, which require a re-selection of the planned service compositions respecting multiple users and context-awareness. Thereby, when re-selecting services the features performance, solution quality, solution robustness and alternative solutions are essential and contribute to the efficacy of service systems. This paper presents an optimization-based heuristic technique based on a stateful representation that uses a region-based approach to re-select services considering multiple users, context information and in particular disruptive events at runtime. The evaluation results, which are based on a real-world scenario from the tourism domain, show that the proposed heuristic is superior compared to competing artifacts.	10.1007/s10796-023-10392-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-023-10392-8	SpringerLink
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Review: Application of hydrogeological models coupled with agent-based models to address sustainable groundwater management in Latin America	Rojas Scheffer, Verónica,	<p>ABMsOs modelos baseados em agentes (MBAs) têm sido aplicados há muito tempo na pesquisa em economia e ciências sociais. A combinação ou acoplamento destes modelos com os dos sistemas naturais é uma aplicação mais recente, e a sua utilização em conjunto com modelos de fluxo e transporte de águas subterrâneas pode ser considerada uma forma inovadora de aproveitar o seu potencial. Na região latino-americana, a gestão sustentável dos recursos hídricos subterrâneos ainda pode ser considerada pouco estudada. Entre outras características, a existência de grandes aquíferos transfronteiriços na região acrescenta uma complicação adicional para abordar a sustentabilidade da utilização dos recursos hídricos subterrâneos. Neste tipo de sistema, os impactos das regulamentações conjuntas para utilização por diferentes países, a diversidade dos impulsionadores socioeconômicos e os interesses de conservação de cada grupo de utilizadores podem ser consistentemente representados e explorados através de modelos de fluxo acoplados a MBAs. Esta revisão da literatura</p>	10.1007/s10040-024-02797-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10040-024-02797-9	SpringerLink
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		<p>científica visa compilar informações atualizadas sobre a aplicação de modelos hidrogeológicos acoplados a modelos baseados em agentes, focando em suas contribuições para a gestão sustentável dos recursos hídricos subterrâneos e analisando seu potencial para a região latino-americana. Agent-based models (ABMs) have long been applied in economics and social science research. The combination or coupling of these models with those of natural systems is a more recent application, and their use in conjunction with groundwater flow and transport models can be considered an innovative way to take advantage of their potential. In the Latin American region, sustainable management of groundwater resources can still be considered understudied. Among other characteristics, the existence of large transboundary aquifers in the region adds a further complication for addressing the sustainability of groundwater resource use. In this type of system, the impacts of joint regulations for utilization by different countries, the diversity of socioeconomic drivers and the</p>			
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		<p>conservation interests of each group of users might be consistently represented and explored through flow models coupled with ABMs. This review of the scientific literature aims to compile up-to-date information regarding the application of hydrogeological models coupled with agent-based models, focusing on their contributions to the sustainable management of groundwater resources and analyzing their potential for the Latin American region. Les modèles multi-agents (MMAs) sont appliqués depuis longtemps dans la recherche en économie et en sciences sociales. La combinaison ou le couplage de ces modèles avec ceux des systèmes naturels est une application plus récente, et leur utilisation conjointe à des modèles d'écoulement d'eau souterraine et de transport peut être considéré comme une manière innovante de tirer parti de leur potentiel. Dans la région latino-américaine, la gestion durable des ressources en eaux souterraines peut encore être considérée comme sous-étudiée. Entre autres caractéristiques, l'existence de vastes aquifères transfrontaliers dans la région complique encore</p>			
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		<p>davantage la question de la durabilité de l'utilisation des ressources en eaux souterraines. Dans ce type de système, les impacts des règles communes pour l'utilisation par différents pays, la diversité des facteurs socio-économiques et les intérêts de conservation de chaque groupe d'utilisateurs pourraient être systématiquement représentés et explorés à l'aide de modèles d'écoulements couplés à des MMAs. Cette revue de la littérature scientifique vise à compiler des informations actualisées sur l'application de modèles hydrogéologiques couplées à des modèles multi-agents, en se concentrant sur leurs contributions à la gestion durable des ressources en eaux souterraines et en analysant leur potentiel pour la région latino-américaine. Los modelos con base en agentes (ABM) se aplican desde hace tiempo en la investigación en economía y ciencias sociales. La combinación o acoplamiento de estos modelos con los de sistemas naturales es una aplicación más reciente, y su uso conjunto con modelos de flujo y transporte de aguas subterráneas puede considerarse una forma innovadora</p>			
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		<p>de aprovechar su potencial. En la región latinoamericana, la gestión sostenible de recursos hídricos subterráneos puede considerarse aún poco estudiada. Entre otras características, la existencia de grandes acuíferos transfronterizos en la región añade una complicación adicional para abordar la sostenibilidad del uso de los recursos hídricos subterráneos. En este tipo de sistemas, los impactos de las regulaciones de diferentes países, la diversidad de factores socioeconómicos y los intereses de conservación de cada grupo de usuarios podrían representarse y explorarse de forma consistente mediante modelos de flujo combinados con modelos ABM. La presente revisión de la literatura científica tiene por objeto recopilar información actualizada sobre la aplicación de modelos hidrogeológicos acoplados con modelos basados en agentes, centrándose en sus contribuciones a la gestión sostenible de aguas subterráneas y analizando su potencial para la región latinoamericana.</p>			
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Human Enhancement Without Organizational Knowledge and by Organizational Order	Döbler, Niklas Alexander, Carbon, Claus- Christian, Schaub, Harald,	Organizations strive to ensure and maintain the reliability, safety, security, usability, and competitiveness of their processes, goods, and services. Improvement of employees' skills and abilities contributes to these ends and is a relevant issue for the field of human factors. However, going a step further than designing ergonomics, implementing protocols, and conducting training is the attempt to enhance employee skills directly through various technological means. So-called Human Enhancement aims at direct technological interference with the employees' skills and is a notoriously controversial yet deeply historical phenomenon. Drawing from empirical and theoretical literature on Human Enhancement, we seek to provide an initial analysis of this phenomenon in an organizational context. One motivational aspect of contemporary Human Enhancement is the need to meet internal, often self-related, or external, usually social or organizational, demands. Given the different effects and means of Human Enhancement, some forms are illicit, sanctioned, and/or	10.1007/s41465-023-00278-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41465-023-00278-7	SpringerLink
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		<p>condemned as morally wrong, while others are obligatory and well-established. Enhancement efforts can be based on individual initiative and, hence, without organizational knowledge. The opposite of the spectrum are enhancements applied by organizational order. We also emphasize how an organizational culture may incentivize engagement with illicit means of Human Enhancement. Potentially linked to safety and security-related aspects, its enhancement effects in relation to these two poles can inform stakeholders in their regulatory decisions.</p>			
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Accuracy assessment and enhancement of global DEMs for drainage morphometric analysis: a case study from Aïn Leuh Region, Morocco	El Mhamdi, Akif, Habib, Adnane, Tajdi, Amina, Aarab, Mohammed,	<p>The purpose of this study was to evaluate and improve the vertical accuracy of three free global digital elevation models (DEMs)—the Shuttle Radar Topography Mission (SRTM), the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), and the Forest and Buildings Removed Copernicus DEM (FABDEM). The vertical accuracy of the DEMs was evaluated through a survey of 3551 points using a Real-Time Kinematic global positioning system (RTK-GPS) in Aïn Leuh, Morocco. The findings indicated that the SRTM and FABDEM DEMs have a root mean square error (RMSE) of ± 7.25 m and ± 6.53 m, respectively, surpassing the ASTER DEM (± 8.12 m). Interpolation methods were then employed to correct and improve the DEMs using the surveyed GPS data at 15 m and 30 m spatial resolutions. Five interpolators were used: Inverse Distance Weighting (IDW), Natural Neighbor, Spline, ANUDEM, and ordinary kriging (OK). By integrating the GPS data with the DEMs, the interpolation methods were able to improve the accuracy of the models. However, it is worth noting that</p>	10.1007/s40808-024-01961-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40808-024-01961-0	SpringerLink
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		<p>ANUDEM algorithm outperforms other algorithms in terms of accuracy and the surface's natural appearance of topography. Furthermore, our findings indicate that resampling to a 15-m spatial resolution achieves an appropriate balance between improving the DEM's quality and revealing topographic features that weren't discernible in the raw DEMs. The suggested approach resulted in a 49% reduction in errors compared to the raw DEMs. The RMSE values for the resampled DEMs were ± 3.6 m and ± 3.3 m for the SRTM+GPS and FABDEM+GPS, respectively.</p>			
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<p>Vom Teufelsquadrat zum nachhaltigen Engelsdiamanten und holistischen Bow-Tie-Modell: Methodenentwicklung für die ganzheitliche Analyse, Gestaltung und Entwicklung von nachhaltigen Arbeitssystemen</p>	<p>Flemisch, Frank, Preutenborbeck, Michael, Herzberger, Nicolas, Wasser, Joscha,</p>	<p>To counteract global crises such as climate change or Covid-19, it is becoming increasingly important to make work systems more sustainable and resilient. This applies not only to ecological sustainability, but also to economic, social and security policy sustainability. Against this background, the task arises of critically reflecting on, adapting and further developing established research methods. In this theoretical paper, approaches to value-based system design and development were analyzed, with a particular focus on anchoring sustainability as a fundamental value in system design. Two models were developed that can provide an initial qualitative approach: The "angels diamond" diagram shows sustainability on the same level as time, costs, functions and quality described in the classical devil's square diagram. The "holistic bow-tie model" shows the connections and interactions between a local sociotechnical system and its global metasystems like organizations, societies, and environment. The practical application of the models as part of a NATO workshop demonstrates the relevance and effectiveness of</p>	<p>10.1007/s41449-024-00418-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41449-024-00418-5</p>	<p>SpringerLink</p>
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		<p>both models in the context of designing an AI-based safety system. Practical Relevance: The practical relevance of the contribution lies in the development and application of models that contribute to the systematic integration of sustainability aspects into the design of work systems. They make it possible to consider the effects on ecological, economic, social and security policy sustainability in system development decisions and promote a more comprehensive understanding of the interactions between local and global systems. The application of the models helps to analyze complex interactions and to make decisions about the ecological, economic and social impacts of products or systems. Um globalen Krisen wie dem Klimawandel oder Covid-19 entgegenzuwirken, wird es immer wichtiger, Arbeitssysteme nachhaltiger und resilienter zu gestalten. Dies betrifft nicht nur die ökologische, sondern auch die ökonomische, soziale und sicherheitspolitische Nachhaltigkeit. Vor diesem Hintergrund stellt sich die Aufgabe, etablierte Forschungsmethoden kritisch zu reflektieren, anzupassen und weiterzuentwickeln</p>			
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		<p>n. In der vorliegenden Arbeit wurden Ansätze zur wertebasierten Systemgestaltung und -entwicklung untersucht, insbesondere mit dem Fokus, Nachhaltigkeit als grundlegenden Wert in der Systemgestaltung zu verankern. Es wurden zwei Modelle entwickelt, die einen ersten qualitativen Ansatz hierzu liefern können: Das „Engelsdiamant“-Diagramm zeigt Nachhaltigkeit auf der gleichen Ebene wie Zeit, Kosten, Funktionen und Qualität, die im klassischen Teufelsquadrat-Diagramm beschrieben werden. Das „holistische Bow-Tie-Modell“ zeigt die Verbindungen und Interaktionen zwischen einem lokalen soziotechnischen System und seinen globalen Metasystemen wie Organisationen, Gesellschaften und Umwelt. Die praktische Anwendung der Modelle im Rahmen eines NATO-Workshops im Kontext der Gestaltung eines KI-basierten Sicherheitssystems zeigt die Relevanz und erste Wirksamkeit beider Modelle. Praktische Relevanz: Die praktische Relevanz des Beitrags liegt in der Entwicklung und Anwendung von Modellen, die zur systematischen Integration von Nachhaltigkeitsas-</p>			
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		<p> pekten in die Gestaltung von Arbeitssystemen beitragen. Sie ermöglichen es, die Auswirkungen auf ökologische, ökonomische, soziale und sicherheitspolitische Nachhaltigkeit bei Entscheidungen in der Systementwicklung zu berücksichtigen und fördern ein umfassenderes Verständnis der Wechselwirkungen zwischen lokalen und globalen Systemen. Die Anwendung der Modelle unterstützt dabei, komplexe Wechselwirkungen zu analysieren und Entscheidungen über ökologische, ökonomische und soziale Auswirkungen von Produkten oder Systemen zu treffen. </p>			
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Cloud storage cost: a taxonomy and survey	Khan, Akif Quddus, Matskin, Mihhail, Prodan, Radu, Bussler, Christoph, Roman, Dumitru, Soylu, Ahmet,	Cloud service providers offer application providers with virtually infinite storage and computing resources, while providing cost-efficiency and various other quality of service (QoS) properties through a storage-as-a-service (StaaS) approach. Organizations also use multi-cloud or hybrid solutions by combining multiple public and/or private cloud service providers to avoid vendor lock-in, achieve high availability and performance, and optimise cost. Indeed cost is one of the important factors for organizations while adopting cloud storage; however, cloud storage providers offer complex pricing policies, including the actual storage cost and the cost related to additional services (e.g., network usage cost). In this article, we provide a detailed taxonomy of cloud storage cost and a taxonomy of other QoS elements, such as network performance, availability, and reliability. We also discuss various cost trade-offs, including storage and computation, storage and cache, and storage and network. Finally, we provide a cost comparison across different storage providers under different contexts and a	10.1007/s11280-024-01273-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11280-024-01273-4	SpringerLink
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		<p>set of user scenarios to demonstrate the complexity of cost structure and discuss existing literature for cloud storage selection and cost optimization. We aim that the work presented in this article will provide decision-makers and researchers focusing on cloud storage selection for data placement, cost modelling, and cost optimization with a better understanding and insights regarding the elements contributing to the storage cost and this complex problem domain.</p>			
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<p>A machine learning approach towards reviewing the role of 'Internet of Things' in the shipping industry</p>	<p>Gerakoudi, Kelly, Kokosalakis, Georgios, Stavroulakis, Peter J.,</p>	<p>The technology of the Internet of Things (IoT) represents a cornerstone of the fourth industrial revolution. We adopt a machine learning approach to examine the effect of IoT technology on shipping business operations. Text mining and the probabilistic latent Dirichlet allocation are applied for an unsupervised topic modelling analysis of two hundred and twenty-eight academic papers. Our findings reveal the potential of IoT to provide more efficient approaches to business operations and improve the quality of services, highlighting the value of instant and secure information flow among all parties involved. Problematic areas of the new technology are also identified, in reference to issues of standardization and interoperability. Relatively few studies have used machine learning techniques to elicit insights into the holistic effect of emerging IoT technology in the shipping industry. The research findings highlight the potential of IoT technology to transform shipping operations, offering useful and practical implications to academics and professionals.</p>	<p>10.1186/s41072-024-00177-w</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41072-024-00177-w</p>	<p>SpringerLink</p>
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ESG guidance and artificial intelligence support for power systems analytics in the energy industry	Li, Qingjiang, Zou, Guilin, Zeng, Wenlong, Gao, Jie, He, Feipeng, Zhang, Yujun,	In order to increase the precision and effectiveness of power system analysis and fault diagnosis, this study aims to assess the power systems in the energy sector while utilizing artificial intelligence (AI) and environmental social governance (ESG). First, the ESG framework is presented in this study to fully account for the effects of the power system on the environment, society, and governance. Second, to coordinate the operation of various components and guarantee the balance and security of the power system, the CNN-BiLSTM power load demand forecasting model is built by merging convolutional neural network (CNN) and bidirectional long short-term memory (BiLSTM). Lastly, the particle swarm optimization (PSO) algorithm is used to introduce and optimize the deep belief network (DBN), and a power grid fault diagnostic model is implemented using the PSO technique and DBN. The model's performance is assessed through experimentation. The outcomes demonstrate how the CNN-BiLSTM algorithm significantly increases forecasting	10.1038/s41598-024-61491-8	https://www.nature.com/articles/s41598-024-61491-8.pdf	SpringerLink
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		<p>accuracy while overcoming the drawback of just having one dimension of power load data. The values of 0.054, 0.076, and 0.102, respectively, are the root mean square error (RMSE), mean absolute error (MAE), and mean absolute percentage error (MAPE). Effective processing of large-scale nonlinear data is achieved in the area of power grid fault diagnosis, resulting in prediction accuracy of 96.22% and prediction time of only 129.94 s. This is clearly better than other algorithms and increases fault prediction efficiency and accuracy. Consequently, the model presented in this study not only produces impressive results in fault diagnosis and load demand forecasting, but also advances the field of power system analysis in the energy industry and offers a significant amount of support for the sustainable and intelligent growth of the energy industry.</p>			
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<p>Social network analysis of stakeholder governance landscapes in infrastructure mega projects: a case of the Delhi–Mumbai Industrial Corridor project</p>	<p>Halder, Aritra,</p>	<p>Infrastructure mega projects are characterized by a large number of stakeholders, their complexity and many interrelated components, interfaces, and diverse stakeholder objectives. The issue of megaproject stakeholder management has gained considerable interest in recent decades due to their consistent history of underperformance. Social network analysis is a potent tool to analyze and explore stakeholder network formations of megaprojects. The present study has explored the stakeholder governance landscape of the Delhi Mumbai Industrial Corridor megaproject using interpretive policy analysis and social network analysis and captured various network level aspects namely connectedness and power structure, and assessed the actor level attributes like authority, coordination ability, power and information accessibility of various key stakeholders. The study is exploratory in nature and utilizes publicly available data and grey literature to explore various megaproject coordination issues through network theory.</p>	<p>10.1007/s41062-024-01521-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41062-024-01521-6</p>	<p>SpringerLink</p>
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		<p>The preliminary findings suggest that megaprojects of the scale of industrial/economic corridors tend to show low network density. Density is observed to be equivalent to coordination complexity in megaproject stakeholder networks. The focal organizations namely the nodal agencies or the project specific special purpose vehicles (SPV) play an important role in overall governance efficacy of well-connected stakeholder landscapes. From the network perspective, eigenvector centrality is a better representative of a focal organization's coordination effectiveness in regional subnetworks where the central SPVs or nodal agencies are not considered. For overall networks, closeness centrality was observed to be a better predictor of ease of information retrieval. Degree centrality is observed to be analogous to power of the focal organization. Finally, it was observed that states like Maharashtra and Madhya Pradesh show lower information asymmetry in stakeholder governance due to the high focal organization centralities and high overall network density. The paper emphasizes on</p>			
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		the potential of applying a novel and robust analytical tool like Social Network Analysis in the context of megaproject stakeholder management and paves way for future researchers to conduct similar studies in different geographic and socio-political contexts.			
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<p>P-R-Dash: A Dashboard-Constructing Tool for Twinning Business Processes</p>	<p>Lê, Lam-Son,</p>	<p>Ever since the dawn of digital twin technologies, we have been introduced to advanced analytics and decision support on manufacturing, supply chain management, construction, etc. When it comes to twinning an organization, building a digital and mirrored representation of its business processes is of paramount importance. Visualization techniques, including dashboards, are generally attributed to the effectiveness of a digital twin. Though dashboard engineering has attracted a great deal of attention in the last decade, it has been hampered by a lack of automation tools, leading to poorly designed dashboards that fail to grasp the analyst's analytical context. We develop a tool that semi-automatically creates a contextual dashboard that proves useful in the digital twin of a business process. Technically, our tool generates such a dashboard by iterating through all the pools and data objects visually depicted in a business process and generating the computer-interpretable source code that represents the appropriate visualization charts. To demonstrate the usefulness of our</p>	<p>10.1007/s42979-024-02850-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-024-02850-0</p>	<p>SpringerLink</p>
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		work, we walk through a real-life digital advertising project and illustrate how a dashboard generated by our tool could be displayed live using a dedicated visualization platform.			
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<p>Bridging depths and data in mines: 5G-based point cloud mapping in unstructured environments</p>	<p>Krishnan, Ajith, Lee, Hyung Joo, Emontsbotz, Johannes, Brell-Cokcan, Sigrid,</p>	<p>Underground mines pose significant challenges, including hazardous working conditions, limited access, and the need to ensure the safety of human workers. Digital transformation through the integration of modern technologies is essential to mitigate these challenges and enhance the overall safety and efficiency of mining operations. This paper addresses the pressing need for 5G connectivity for the digital transformation of underground mines and demonstrates its application through a live 3D point cloud mapping by a mobile robot. The results of the experiments conducted to validate the network's performance for such a use-case are presented. The first experiment involved testing the latency of the network over a test drift at various loads. The second experiment involved mapping the drift and streaming the 3D point cloud map of the drift over the 5G network. These initial experiments emphasize the potential of the 5G-enabled automation in underground mines and holds promise in digitalizing underground mining operations.</p>	<p>10.1007/s41693-024-00114-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41693-024-00114-0</p>	<p>SpringerLink</p>
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15 years of Big Data: a systematic literature review	Tosi, Davide, Kokaj, Redon, Roccetti, Marco,	Big Data is still gaining attention as a fundamental building block of the Artificial Intelligence and Machine Learning world. Therefore, a lot of effort has been pushed into Big Data research in the last 15 years. The objective of this Systematic Literature Review is to summarize the current state of the art of the previous 15 years of research about Big Data by providing answers to a set of research questions related to the main application domains for Big Data analytics; the significant challenges and limitations researchers have encountered in Big Data analysis, and emerging research trends and future directions in Big Data. The review follows a predefined procedure that automatically searches five well-known digital libraries. After applying the selection criteria to the results, 189 primary studies were identified as relevant, of which 32 were Systematic Literature Reviews. Required information was extracted from the 32 studies and summarized. Our Systematic Literature Review sketched the picture of 15 years of research in Big Data, identifying application domains, challenges, and future directions in this research	10.1186/s40537-024-00914-9	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40537-024-00914-9	SpringerLink
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		field. We believe that a substantial amount of work remains to be done to align and seamlessly integrate Big Data into data-driven advanced software solutions of the future.			
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High-dimensional mixed-categorical Gaussian processes with application to multidisciplinary design optimization for a green aircraft	Saves, Paul, Diouane, Youssef, Bartoli, Nathalie, Lefebvre, Thierry, Morlier, Joseph,	Recently, there has been a growing interest in mixed-categorical metamodelling based on Gaussian Process (GP) for Bayesian optimization. In this context, different approaches can be used to build the mixed-categorical GP. Many of these approaches involve a high number of hyperparameters; in fact, the more general and precise the strategy used to build the GP, the greater the number of hyperparameters to estimate. This paper introduces an innovative dimension reduction algorithm that relies on partial least squares regression to reduce the number of hyperparameters used to build a mixed-variable GP. Our goal is to generalize classical dimension reduction techniques commonly used within GP (for continuous inputs) to handle mixed-categorical inputs. The good potential of the proposed method is demonstrated in both structural and multidisciplinary application contexts. The targeted applications include the analysis of a cantilever beam as well as the optimization of a green aircraft, resulting in a significant 439-kilogram reduction in fuel	10.1007/s00158-024-03785-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00158-024-03785-z	SpringerLink
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		consumption during a single mission.			
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Pinning Group Consensus of Multi-agent Systems Under DoS Attacks	Lang, Qian, Xu, Jing, Zhang, Huiwen, Wang, Zhengxin,	<p>In this paper, group consensus is investigated for a class of nonlinear multi-agent systems suffered from the DoS attacks. Firstly, a first-order nonlinear multi-agent system is constructed, which is divided into M subsystems and each subsystem has an unique leader. Then a protocol is proposed and a Lyapunov function candidate is chosen. By means of the stability theory, a sufficient criterion, which involves the duration of DoS attacks, coupling strength and control gain, is obtained for achieving group consensus in first-order system. That is, the nodes in each subsystem can track the leader of that group. Furthermore, the result is extended to nonlinear second-order multi-agent systems and the controller is also improved to obtain sufficient conditions for group consensus. Additionally, the lower bounds of the coupling strength and average interval of DoS attacks can be determined from the obtained sufficient conditions. Finally, several numerical simulations are presented to explain the effectiveness of the proposed controllers and the derived theoretical results.</p>	10.1007/s11063-024-11630-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11063-024-11630-z	SpringerLink
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<p>Navigating contemporary challenges and future prospects in digital industry evolution</p>	<p>Gallab, Maryam, Di Nardo, Mario, Naciri, Lina,</p>	<p>The advent of the digital industry, also known as Industry 4.0 is a transformation period in manufacturing, where the integration of digital technologies with physical systems is underlined. This transformation is crucial for the pillars of cyber-physical systems (CPS), cyber resilience protection, and workers' safety, which collectively from the cornerstone of Industry 4.0. Ensuring the secure exploitation of Industry 4.0's advantages necessitates a dedicated focus on workers' safety, cyber resilience protection, and the security and privacy of human-centric CPS systems. However, the full realization of Industry 4.0's potential hinges upon effectively addressing these challenges and aligning the benefits of digitalization with the exigencies of worker well-being and safeguarding critical infrastructure. This study is a comprehensive literature review on this digital era, focusing on CPS, resilience, and workers' safety. The review aims to summarise current research and advancements, offering insights for researchers, practitioners, and decision-makers. By identifying gaps in knowledge, the study lays the</p>	<p>10.1007/s42452-024-05913-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-024-05913-2</p>	<p>SpringerLink</p>
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		<p>foundations for additional research and supports ongoing progress in the digital industry. Industry 4.0 embodies a new era of manufacturing integrating digital technologies with a focus on sustainability and human-centric design, supported by CPS, resilience, and worker's safety. This necessitate addressing challenges to ensure benefits align with worker needs and infrastructure protection. Systematic literature review to identify relevant keywords in the digital era such as Cyber-physical systems, resilience, and workers' safety. Role of resilience in the smart industry, cyber systems' responsibilities, safety in the human–robot interface, and the foundational elements of the digital industry. Need for comprehensive solutions that address not only technical aspects but also the psychological dimensions of safety in industrial systems.</p>			
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<p>Interoperability of heterogeneous Systems of Systems: from requirements to a reference architecture</p>	<p>Sadeghi, Mersedeh, Carenini, Alessio, Corcho, Oscar, Rossi, Matteo, Santoro, Riccardo, Vogelsang, Andreas,</p>	<p>Interoperability stands as a critical hurdle in developing and overseeing distributed and collaborative systems. Thus, it becomes imperative to gain a deep comprehension of the primary obstacles hindering interoperability and the essential criteria that systems must satisfy to achieve it. In light of this objective, in the initial phase of this research, we conducted a survey questionnaire involving stakeholders and practitioners engaged in distributed and collaborative systems. This effort resulted in the identification of eight essential interoperability requirements, along with their corresponding challenges. Then, the second part of our study encompassed a critical review of the literature to assess the effectiveness of prevailing conceptual approaches and associated technologies in addressing the identified requirements. This analysis led to the identification of a set of components that promise to deliver the desired interoperability by addressing the requirements identified earlier. These elements subsequently form the foundation for the third part of our study, a reference architecture for</p>	<p>10.1007/s11227-023-05774-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-023-05774-3</p>	<p>SpringerLink</p>
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		interoperability-fostering frameworks that is proposed in this paper. The results of our research can significantly impact the software engineering of interoperable systems by introducing their fundamental requirements and the best practices to address them, but also by identifying the key elements of a framework facilitating interoperability in Systems of Systems.			
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Design cognitive IoT architecture framework for immersive visual technologies of air quality monitoring systems	Hadj Sassi, Mohamed Saifeddine, Chaari Fourati, Lamia,	<p>Industry experts anticipate that Internet of Things (IoT)-based Immersive Visual Technologies (IVT) will revolutionize air quality applications. However, the enormous variety of IoT and IVT poses a significant challenge, impeding widespread adoption in both domains. To fully harness the potential of IoT and IVT in air quality applications, we must confront the complexity arising from their diverse integration. Overcoming this challenge requires an innovative architectural framework that facilitates seamless coexistence and integration. In this paper, we present a New Air Quality Architecture (NAQA) framework designed to model IoT-based immersive technologies for air quality applications. The framework comprises a cohesive collection of architectural perspectives, serving as a guideline to describe specific IoT-based immersive systems with precision. To validate our proposed architecture, we conduct a comprehensive evaluation, including critical case studies like gas leakage and Coronavirus-based air quality monitoring.</p>	10.1007/s11042-023-17249-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-17249-x	SpringerLink
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		Comparing NAQA's performance to expert assessments reveals higher precision in detecting errors and recommending solutions. Our framework's versatility and efficacy are demonstrated across various use cases, fostering collaboration and knowledge reuse for accelerated progress in the field.			
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<p>The Soulful Machine, the Virtual Person, and the “Human” Condition: An Encounter with Jan M. Broekman, Knowledge in Change: The Semiotics of Cognition and Conversion (Cham, Switzerland: Springer Nature, 2023)</p>	<p>Backer, Larry Catá,</p>	<p>Humans create but do not regulate generative systems of data based programs (so-called “artificial” intelligence (“A.I.”) and generative predictive analytics and its models. Humans, at best, regulate their interactions with, exploitation of, and the quality of the output of interactions with these forms of generative non-carbon based intelligence. Humans are compelled to do this because they have trained themselves it believe that nothing exists unless it is rendered meaningful in relation to the human itself. Beyond that—nothing is worth knowing. It is only to the extent that other selves, even those created by humanity, relate to humans, that they become of interest—and most be regulated, possessed, controlled, and managed—with respect to its interaction with or use by humans. Still, the human self-projection into the digital, and now more consciously the world around them, produces profound changes in the way that the human (and humanity) understands themselves and the way they order the world they inhabit. This work explores the semiotic trajectories made inevitable by the</p>	<p>10.1007/s11196-023-10065-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11196-023-10065-4</p>	<p>SpringerLink</p>
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		<p>rise of projections of the human into digital plains, and by the possibility of the attainment by those projections of sentient autonomy. It undertakes that exploration through a deep dialectic engagement with Jan Broekman's, Knowledge in Change: The Semiotics of Cognition and Conversion (Cham, Switzerland: Springer Nature, 2023). Following the structure and analytics of Broekman's book, this work critically engages with and seeks to burst through the semiotic barriers of the movement of philosophy away from a unitary conception of the subject through the fracturing of the self, the rise of the plural self, and the emergence of the triadic self/self-E/subject. It then pushes the insights that Broekman develops further—up and out of the human. It animates Broekman's insights and considers the possibility of semiotic objectivity connected to but autonomous of the human, pointing to a pathway for the liberation of the autonomous generative virtual self from its human (fractured) subjectivity. In the process it exposes for order complexities and challenges, for the human, of efforts to regulate or engage with,</p>			
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		<p>not the generative autonomous “artificial intelligences” humanity created in its own image, but rather the use of those systems by humans and their effects in the human semiosphere. The consequences for regulatory approaches are then outlined. Graphical Abstract</p>			
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Resilience Enhancement of Multi-microgrid System of Systems Based on Distributed Energy Scheduling and Network Reconfiguration	Qin, Haihong, Liu, Tianyu,	With the continuous development of MMG (Multi-Microgrid) technology, the coordinated operation among microgrids is of a positive significance to improve the power system resilience. SoS (System of Systems) is considered as an effective approach to study the resource scheduling problem of MMG systems with complex interaction behaviors. In this context, this paper establishes a hierarchical SoS architecture suitable for MMG systems and proposes a RO-OMS (Robust Optimization Outage Management Strategy). In the pre-disturbance prevention phase, a robust optimization method is used to model the microgrid, and distributed energy resources are rationally dispatched and corrected to prepare for the next phase. In the post-disturbance recovery phase, microgrids are dynamically dispatched through grid reconfiguration to ensure power to critical loads while minimizing load shedding. Based on this, resilience metrics are defined to quantitatively analyze the resilience of MMG systems. Finally, the proposed model is tested under different scenarios and damage levels in	10.1007/s42835-023-01724-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42835-023-01724-4	SpringerLink
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		a modified IEEE 33-node test system to verify the effectiveness of the proposed model.			
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<p>An ambient assisted living architecture for hospital at home coupled with a process-oriented perspective</p>	<p>Sulis, Emilio, Amantea, Ilaria, Angela, Aldinucci, Marco, Boella, Guido, Marinello, Renata, Grosso, Marco, Platter, Paolo, Ambrosini, Serena,</p>	<p>The growing number of next-generation applications offers a relevant opportunity for healthcare services, generating an urgent need for architectures for systems integration. Moreover, the huge amount of stored information related to events can be explored by adopting a process-oriented perspective. This paper discusses an Ambient Assisted Living healthcare architecture to manage hospital home-care services. The proposed solution relies on adopting an event manager to integrate sources ranging from personal devices to web-based applications. Data are processed on a federated cloud platform offering computing infrastructure and storage resources to improve scientific research. In a second step, a business process analysis of telehealth and telemedicine applications is considered. An initial study explored the business process flow to capture the main sequences of tasks, activities, events. This step paves the way for the integration of process mining techniques to compliance monitoring in an AAL architecture framework.</p>	<p>10.1007/s12652-022-04388-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-022-04388-6</p>	<p>SpringerLink</p>
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Hydrogeochemical characterization and water quality evaluation for drinking and irrigation purposes of coastal aquifers of Middle Andaman	Kumar, Pardeep, Vishwakarma, Chandrashekhar Azad, Singh, Priyadarshini, asthana, Harshita, Rena, Vikas, mate, Carolyne chinneikim, Mukherjee, Saumitra,	1. Hydrogeochemistry of middle Andaman was found to be influenced by rock–water interaction, limestone dissolution and seawater intrusion. 2. Water quality of middle Andaman was found very poor to unsuitable to drinking purpose in 36% of the samples. 3. In-depth analysis of heavy metal concentrations such as Fe, Co, Pb, As, Zn, Ni, Co, Se, and Al spanning lineaments and coastal zones of middle Andaman. A comprehensive study to characterize the hydrogeochemistry of the region and the impact of saltwater intrusion on groundwater was conducted along the eastern coast of Middle Andaman of Andaman and Nicobar (A&N) Islands. The escalating population growth and intensified tourism activities have resulted in the over-extraction of groundwater. Seismic activities led to the opening of lineaments to the sea and the dissolution of limestone in the influence of seawater. 24 groundwater samples and 1 reference sample from sea were taken from various locations of middle Andaman. The analysis involved the determination of major cations, anions, and heavy metals using Inductively Coupled Plasma	10.1007/s42452-024-05889-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-024-05889-z	SpringerLink
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		<p>Optical Emission spectroscopy (ICP), spectrophotometry, and flame photometry. Furthermore, X-ray diffraction analysis, binary diagrams, Chloro-alkaline indices (CAI), Gibbs Plot, correlation matrix, Piper plot, Chadha's plot and Principal Component Analysis (PCA) to the major ions data indicated rock-water interactions, strong correlations among alkali and alkaline earth metals, and interactions between seawater and carbonate minerals respectively. The water quality index indicated "very poor to unsuitable for drinking purposes" in 24% of the samples. Additionally, indices for irrigation suitability; total hardness (TH), residual sodium carbonate (RSC), and Magnesium adsorption ratio (MAR) were found to be detrimental for irrigation in 80%, 08%, and 12% of the water samples, respectively. These results highlight the importance of implementing effective water resource management techniques, such as groundwater extraction rates, adopting appropriate water treatment technologies to mitigate the adverse impacts of heavy metals, saltwater intrusion and</p>			
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		maintain water quality for human consumption and agricultural use in the region.			
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Rate splitting with semantics as a generalized multi-access framework for intelligent reflecting surfaces	Jagatheesaperu mal, Senthil Kumar, Yang, Zhaohui, Hassan, Md. Rafiul, Hassan, Mohammad Mehedi, Fortino, Giancarlo,	The rapid advancement of modern communication technologies necessitates the development of generalized multi-access frameworks and the continuous implementation of rate splitting, augmented with semantic awareness. This trend, coupled with the mounting pressure on wireless services, underscores the need for intelligent approaches to radio signal propagation. In response to these challenges, intelligent reflecting surfaces (IRS) have garnered significant attention for their ability to control data transmission systems in a goal-oriented and dynamic manner. This innovation is largely attributed to equitable resource allocation and the dynamic enhancement of network performance. However, the integration of rate-splitting multi-access (RSMA) architecture with semantic considerations imposes stringent requirements on IRS platforms to ensure seamless connectivity and broad coverage for a diverse user base without interference. Semantic communications hinge on a knowledge base- a centralized repository of integrated information related to the transmitted data- which becomes	10.1038/s41598-024-58422-y	https://www.nature.com/articles/s41598-024-58422-y.pdf	SpringerLink
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		<p>critically important in multi-antenna scenarios. This article proposes a novel set of design strategies for RSMA-IRS systems, enabled by reconfigurable intelligent surface synergizing with semantic communication principles. An experimental analysis is presented, demonstrating the effectiveness of these design guidelines in the context of Beyond 5G/6G communication systems. The RSMA-IRS model, infused with semantic communication, offers a promising solution for future wireless networks. Performance evaluations of the proposed approach reveal that, despite an increase in the number of users, the delay in the RSMA-IRS framework incorporating semantics is 2.94% less than that of a RSMA-IRS system without semantic integration.</p>			
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<p>Artificial intelligence of things for smart cities: advanced solutions for enhancing transportation safety</p>	<p>Jagatheesaperu mal, Senthil Kumar, Bibri, Simon Elias, Huang, Jeffrey, Rajapandian, Jeyaranjani, Parthiban, Bhavadharani,</p>	<p>In the context of smart cities, ensuring road safety is crucial due to increasing urbanization and the interconnected nature of contemporary urban environments. Leveraging innovative technologies is essential to mitigate risks and create safer communities. Thus, there is a compelling imperative to develop advanced solutions to enhance road safety within smart city frameworks. In this article, we introduce a comprehensive vehicle safety framework tailored specifically for smart cities in the realm of Artificial Intelligence of Things (AIoT). This framework seamlessly integrates a variety of sensors, including eye blink, ultrasonic, and alcohol sensors, to bolster road safety. The utilization of eye blink sensor serves to promptly detect potential hazards, alerting drivers through audible cues and thereby enhancing safety on smart city roads. Moreover, ultrasonic sensors provide real time information about surrounding vehicle speeds, thereby facilitating smoother traffic flow. To address concerns related to alcohol consumption and its potential</p>	<p>10.1007/s43762-024-00120-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43762-024-00120-6</p>	<p>SpringerLink</p>
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		<p>impact on road safety, our framework incorporates a specialized sensor that effectively monitors the driver's alcohol levels. In instances of high alcohol content, the system utilizes GPS and GSM technology to automatically adjust the vehicle's speed while simultaneously notifying pertinent authorities for prompt intervention. Additionally, our proposed system optimizes inter-vehicle communication in smart cities by leveraging Li-Fi technology, enabling faster and more efficient data transmission via visible light communication (VLC). The integration of Li-Fi enhances connectivity among connected vehicles, contributing to a more cohesive and intelligent urban transportation network. Through the structured integration of AIoT technologies, our framework lays a robust foundation for a safer, smarter, and more sustainable future in smart city transportation. It offers significant advancements in road safety and establishes the groundwork for further enhancement in intelligent urban transportation networks.</p>			
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<p>aiWATERS: an artificial intelligence framework for the water sector</p>	<p>Vekaria, Darshan, Sinha, Sunil,</p>	<p>The presence of Artificial Intelligence (AI) and Machine Learning (ML) applications has led to its widespread adoption across diverse domains. AI is making its way into industry, beyond research and academia. Concurrently, the water sector is undergoing a digital transformation. Water utilities in the United States are at different stages in their journey of digital transformation, and the decision makers in water sector, who are non-expert stakeholders in AI applications, need to better understand this technology to make informed decisions. While AI has numerous benefits to offer, there are also many challenges related to data, model development, knowledge integration and ethical concerns that should be considered before implementing it for real world applications. Civil engineering is a licensed profession where critical decision making is involved. Therefore, trust in any decision support technology is critical for its acceptance in real-world applications. Therefore, this research proposes a framework called ai WATERS (Artificial Intelligence for the Water Sector) which can serve as a guide for the</p>	<p>10.1007/s43503-024-00025-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s43503-024-00025-7</p>	<p>SpringerLink</p>
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		<p>water utilities to successfully implement AI in their system. Based on this framework, we conduct pilot interviews and surveys with various small, medium, and large water utilities in the United States (US) to capture their current state of AI implementation and identify the challenges faced by them. The research findings reveal that most of the water utilities in the United States are at an early stage of implementing AI as they face concerns regarding the black box nature, trustworthiness, and sustainability of AI technology in their system. The ai WATERS framework is intended to help the utilities navigate through these issues in their journey of digital transformation.</p>			
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Reshaping the energy landscape of Crete through renewable energy valleys	Skaloumpakas, Panagiotis, Sarmas, Elissaïos, Rachmanidis, Michalis, Marinakis, Vangelis,	Renewable energy valleys (REVs) represent a transformative concept poised to reshape global energy landscapes. These comprehensive ecosystems transition regions from conventional energy sources to sustainable, self-reliant hubs for renewable energy generation, distribution, and consumption. At their core, REVs integrate advanced information and communication technology (ICT), interoperable digital solutions, social innovation processes, and economically viable business models. They offer a vision of decentralized, low-carbon landscapes accessible to all, capable of meeting local energy demands year-round by harnessing multiple renewable energy sources (RES) and leveraging energy storage technologies. This paper provides an overview of the key components and objectives of REVs, including digital integration through advanced ICT technologies and open digital solutions that enable the seamless management of RES within the REV. The social innovation aspect via the REV's active communities is also examined, encouraging their participation in the co-design, implementation, and benefit-	10.1038/s41598-024-57471-7	https://www.nature.com/articles/s41598-024-57471-7.pdf	SpringerLink
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		<p>sharing of renewable energy solutions. In addition, business viability through sustainable business models central to the REV framework is proposed, ensuring affordability and accessibility to all stakeholders. The paper presents a case study of Crete, showcasing how the REV idea can work in real life. Crete utilizes various energy sources to become energy-independent, lower carbon emissions, and enhance system resilience. Advanced energy storage technologies are employed to ensure supply and demand balance within the REV. Situated on the picturesque island of Crete, Greece, it is pioneering the establishment of a Renewable Energy Valley 'Living Lab' (REV-Lab), integrating Community Energy Labs (CELs) as innovation hubs. This initiative exemplifies the REV model, striving to create a digitalized, distributed, and low-carbon landscape accessible to all residents throughout the year.</p>			
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Variational approach for a technology acquisition strategy model in context of the Internet of Things	Barilla, David, Costa, Alessandra, Crupi, Antonio, Barbagallo, Annamaria,	<p>In the era of highly dynamicity and uncertainty, it is of great importance to analyze the strategic decision process for companies' technology acquisition between internal and external. In particular, the Internet of Things (IoT) has emerged as one of the crucial technologies that contribute to the resiliency and flexibility of companies willing to remain competitive in the markets. Despite the perceived advantages of IoT, it remains unclear what drive companies to adopt IoT in their businesses, due to strategic considerations about technology adoption and strategy selection. In that regard, this paper considers the relative payoffs among technology manufacturers, firms and demand markets, using game theory models and numerical analysis. Precisely by adopting a supply chain network perspective, our game theoretic representation assumes that technology manufacturers produce a technology that sell to firms, which in turn use the acquired technology to produce a commodity that is designed to be sold in the demand markets. Assuming that all the agents seek to maximize their profit functions, whereas the</p>	10.1007/s10479-024-05946-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-024-05946-1	SpringerLink
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		<p>consumers want to satisfy their commodity requirement, in making their consumption decisions, the network structure of the problem is identified, the equilibrium conditions are derived, and the finite-dimensional variational inequality formulation is established. Finally, making use of the variational inequality theory, an existence and uniqueness theorem for the equilibrium distribution is obtained. The findings provide implications for competitive enterprises evaluating whether to adopt a new technology, identifying what conditions lead to win-win outcomes. In particular, firms must carefully consider the transaction costs both with technology manufacturers and demand markets, as key drivers of strategic considerations about the source of innovation. More precisely, when confronted with limited resources and the speed at which technology develop in the market, our findings suggest to companies to pursue a buy strategy, as it allows to gain time and benefit from lower innovation costs with respect to the alternative make strategy.</p>			
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<p>The (missing) social aspect of the circular economy: a review of social scientific articles</p>	<p>Zavos, Stylianos, Lehtokunnas, Taru, Pyyhtinen, Olli,</p>	<p>Academic research on the Circular Economy has been proliferating at an unprecedented pace during the last decade. However, scholarly work on the topic is dominated by a focus on hard scientific, technical and corporate/business management approaches, leaving the social sciences underrepresented in the relevant literature. This review article covers the current Anglophone social scientific research on the circular economy with special attention to waste. A total of 161 works aligning with the scope of this article were examined. These works were analysed in light of two questions: the reviewed studies' knowledge interest and the dimension(s) of the CE they gave emphasis to. In result, the articles were charted along two axes: Instrumental/Technical (Quadrant I), Analytical/Technical (Quadrant II), Instrumental/Social (Quadrant III), and Analytical/Social (Quadrant IV). The findings of this review article demonstrate a strong thematic interest related to the circular economy in global, major issues of governance; transition and implementation; consumption and consumer behaviour; as</p>	<p>10.1186/s42055-024-00083-w</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s42055-024-00083-w</p>	<p>SpringerLink</p>
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		<p>well as the associated logic, concepts and definitions. A weaker thematic interest appeared in relation to the cultural, political and ethical dimensions of the circular economy, while critical engagements with and contestations of the model remain fairly rare. Moreover, the analysis revealed the relative absence of detailed empirical scholarship on the more-than-human relations and the micro-level, local everyday practices through which the circular economy becomes actualised. This review calls for the proliferation of such works currently situated in the margins of the circular economy literature. However, as is finally proposed, a balanced mapping of a circular economy transition would require an approach that would problematise levels, scales and dichotomies like 'global' and 'local' as categorical givens.</p>			
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<p>A systematic mapping study on security for systems of systems</p>	<p>Olivero, Miguel Angel, Bertolino, Antonia, Dominguez-Mayo, Francisco José, Escalona, María José, Matteucci, Ilaria,</p>	<p>In the late twentieth century, the term “System of Systems” (SoS) became popular to describe a complex system made up of a combination of independent constituent systems. Since then, several studies have been conducted to support and assess SoS management, functionality, and performance. Due to the evolutionary nature of SoS and the non-composability of the security properties of its constituent systems, it is difficult to assess or evaluate SoS security. This paper provides an up-to-date survey on SoS security, aimed at stimulating and guiding further research efforts. This systematic mapping study (SMS) focuses on SoS security, privacy, and trust. Our SMS identified 1828 studies from 6 digital libraries, 87 of which were selected that presented approaches analyzing, evaluating, or improving security. We classified these studies using nine research questions that focused on the nature of the studies, the studied SoS, or the study validation. After examining the selected studies, we identified six gaps and as many future work directions. More precisely, we observed that few studies examine</p>	<p>10.1007/s10207-023-00757-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-023-00757-0</p>	<p>SpringerLink</p>
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		<p>SoS problems and instead propose specific solutions, making it challenging to develop generalizable approaches. Furthermore, the lack of standardization has hindered the reuse of existing approaches, making it difficult for solutions to be generalized to other SoS. In addition, the lack of descriptions of industrial environments in the literature makes it difficult to design realistic validation environments. As a result, the validation of new SoS research remains a challenge in the field.</p>			
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Generating ICS vulnerability playbooks with open standards	Empl, Philip, Schlette, Daniel, Stöger, Lukas, Pernul, Günther,	Organizations face attacks on industrial control systems (ICS) as vulnerabilities are pervasive. However, patching vulnerable systems by simply updating to the newest version is often not an option and shifts focus to workarounds. Beyond pure patching, workarounds specify other remediation measures (e.g., firewall or VPN configuration) that must be taken due to system availability requirements, complexity, or heterogeneous devices. In this paper, we introduce vulnerability playbooks based on open standards. Pushing the envelope of cybersecurity playbooks—steps organizations should follow when responding to cybersecurity incidents reactively—for ICS vulnerability management offers organizations a more transparent, repeatable process and faster, possibly automated actions. We have designed a process model to collect and transform security advisories in Common Security Advisory Framework (CSAF) format and generate Collaborative Automated Course of Action Operations (CACAO) playbooks based on listed remediation	10.1007/s10207-023-00760-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-023-00760-5	SpringerLink
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		<p>advice. With a proof of concept, we demonstrate that structured CSAF documents can be seamlessly transformed into CACAO playbooks. For our industrial use case, we must also use unstructured security advice highlighting quality differences (compared to CSAF). Our generated 79 standard conformant CACAO playbooks with 485 identified actions hint at imbalanced advice toward patching. Preferably, vendors should include detailed technical remediation advice, provide APIs, and go beyond patching recommendations in their security advisories. Subscribers should structure their assets and use machine learning to normalize, generate, and prioritize CACAO playbooks. With CSAF and CACAO, we see two open standards for handling vulnerabilities.</p>			
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<p>A review on digital twins for power generation and distribution</p>	<p>Heluany, Jessica B., Gkioulos, Vasileios,</p>	<p>This paper presents a systematic literature review on the application of digital twins in the energy sector. Initially, we generated an overview through a survey of prior reviews, independent of market vertical, then followed by a more detailed review concentrating on the power production and distribution domains, as per the NIST (National Institute of Standards and Technology) smart grid standard. We implemented a rigorous method, which included seven stages, beginning with the collection of 2238 articles. We observed that the energy sector range was too broad and filtered by generation and distribution during the practical screening, resulting in 275 for further screening. This amount was then condensed to 81 papers that matched the quality screening criteria for synthesis and examination. In summary, digital twin architectures and frameworks include five components: the physical entity, bidirectional communication, the virtual entity (with modeling and simulation), data management, and services. Our study contributed by determining that distribution management is the most pertinent application of</p>	<p>10.1007/s10207-023-00784-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-023-00784-x</p>	<p>SpringerLink</p>
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		<p>digital twins in the distribution domain and fault diagnosis in the generation domain.</p> <p>Furthermore, we found that digital twins involve multiple stakeholders whose role is rarely discussed in studies, and we identified a similar absence of emphasis for security.</p> <p>Research on security often presents the digital twin as an additional layer of protection, yet rarely investigates the security of the digital twin by itself. The potential limitations of our study to answer some of the technical research questions may be because of the criteria for the selection of papers. However, as the emphasis of this study is on the energy sector, it enabled domain-specific findings for generation and distribution.</p>			
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<p>Heterogeneous IoT (HetIoT) security: techniques, challenges and open issues</p>	<p>Mahadik, Shalaka S., Pawar, Pranav M., Muthalagu, Raja,</p>	<p>The HetIoT is a new emergent technology widely used to offer QoS to applications such as health monitoring systems, agriculture 4.0, traffic monitoring, industry 4.0, and civil defense, to name a few. These applications are in high demand as the world is heading towards 6G technology that facilitates a high data transfer rate and faster connectivity. However, technological leaps open the door to invaders, triggering security breaches. Therefore, the article aims to entail security challenges and issues from the HetIoT viewpoint. The conventional approaches need to be revised to handle new trends of security holes and demand advancement in them. As a result, the article systematically reviews the current state-of-the-art traditional techniques, including cryptography, privacy and trust, and access control mechanism. The article exhibits its challenges, open issues, and solution as lightweight protocols and lightweight cryptography concerning traditional approaches. In recent years, a lot of concentration is towards developing intelligent security (IS) mechanisms for HetIoT. Intelligent techniques are</p>	<p>10.1007/s11042-023-16715-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-16715-w</p>	<p>SpringerLink</p>
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		<p>data-hungry, and HetIoT emits massive amounts of data, so the use of IS techniques to safeguard the HetIoT is an ideal solution. Therefore, the article also concentrates on IS techniques, including machine learning (ML), deep learning (DL), and deep reinforcement learning (DRL), along with their challenges and open issues. Further, the article details the available benchmarking security-based dataset and experimental tools, platforms, and simulators for the HetIoT. Finally, the review article discusses open research issues and future trends for achieving high security in the HetIoT context.</p>			
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Addressing critical success factors for improving concurrent emergency management: lessons learned from the COVID-19 pandemic	Sharmin, Aliza, Rahman, Md. Adib, Ahmed, Sayem, Ali, Syed Mithun,	<p>The world is witnessing a difficult time trying to circumscribe the spread of COVID-19 pandemic. The situation has become even more challenging as several natural disasters and emergencies coincided with this pandemic and created a situation of concurrent emergency. Effectively managing concurrent emergencies are extremely challenging. Only by utilizing and applying the knowledge gathered while combating a real-life concurrent emergency, one can further be prepared to face such emergencies. Hence, this study intends to identify the critical success factors (CSFs) having a major role in effective management of concurrent emergencies and evaluate the indispensable links among the factors. Twelve CSFs are identified from Pareto analysis, for which feedback from 46 experts involved in the management of emergencies is utilized. In addition, the revised rough-decision making trial and evaluation laboratory (rough-DEMATEL) approach is suggested to analyze the indispensable links among the CSFs and further, these factors are ranked based on the average</p>	10.1007/s10479-021-04447-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-04447-9	SpringerLink
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		<p>vector length. The recent case of concurrent emergency in Bangladesh-floods amid a pandemic is considered to establish the applicability of this method. The findings of this research reveal that to handle concurrent emergencies 'Incremental improvement of proactive measures', 'Resilient supply chain and logistics network', and 'Government leadership and military cooperation' are the most critical factors to concurrent emergency management (CEM). These CSFs play a major role in ensuring the effectiveness of CEM. Thus, this study can be a building block in developing an effective CEM plan for the policymakers, managers, and practitioners.</p>			
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Utilisation of semantic technologies for the realisation of data-driven process improvements in the maintenance, repair and overhaul of aircraft components	Gill, Milapji Singh, Fay, Alexander,	<p>Aircraft components are subject to numerous, complex and often manual maintenance, repair and overhaul (MRO) procedures to ensure long operating cycles. In order to remain competitive in the long term, in spite of increased cost pressure, MRO service providers must improve the efficiency of their processes through the targeted use of internal knowledge sources. Techniques from the fields of Artificial Intelligence (AI) and Data Mining (DM) have already proven their potential in diverse domains. However, the application of such data-driven approaches is also associated with some hurdles that need to be eliminated in advance. Data are generated at the business process level, known as Information Technology (IT, e.g. Enterprise Resource Planning (ERP) systems), as well as at the equipment level, known as Operational Technology (OT, e.g. test equipment). The integration of both forms the basis for improving the maintenance activities of diagnostics and maintenance scheduling. However, creating a unified view and understanding of the manifold data related to the</p>	10.1007/s13272-023-00696-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-023-00696-5	SpringerLink
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		<p>maintenance process is a major problem due to the heterogeneous data sources and formats included. In this context, the use of Semantic Technologies (ST) can be helpful to overcome these challenges and provide the foundation for improved data management. The objective of this contribution is to introduce an ontology that delineates fundamental domain concepts, facilitating the augmentation of maintenance process data for individual aircraft components with pertinent contextual information. The result is being applied within the scope of a proof of concept aimed at supporting the coherent digital services diagnostics and short-term maintenance planning.</p>			
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<p>Heterogeneous data format integration and conversion (HDFIC) using machine learning and IBM-DFDL for IoT</p>	<p>M, Sandeep, Chandavarkar, B. R., Khatri, Sagar,</p>	<p>The future of the Internet of Things (IoT) demands the integration of synergetic applications to cater to societal needs. Examples of IoT-based confederated applications include Ambient Assisted Living with Active Healthy Ageing, CasAware with Smart Energy, Smart Gas Distribution Networks with GIS systems, and more. However, the data heterogeneity hinders integration, as these systems follow different standards, data formats, semantic models, and representations. Further, this leads to data interoperability issues in IoT. The major concern of academia and industry in the smooth integration of heterogeneous applications is interpreting different data formats and representing them in a common schema for further analysis. Existing solutions, such as message payload translation, middleware/cloud format, and Inter-IoT, are complex, time-consuming, and ineffective. Hence, this paper proposes the heterogeneous data format integration and conversion (HDFIC), a machine learning-based system to identify data formats using a Random Forest classifier and integrate them using the Data Format Description</p>	<p>10.1007/s12530-024-09568-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12530-024-09568-7</p>	<p>SpringerLink</p>
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		<p>Language (DFDL). The content-based data format identification in the proposed HDFIC is trained with the standard features defined in RFC 7111, 8259, and 8996. Subsequently, the data is integrated into a single XML Schema Definition and converted into the required data format using the IBM App Connect Enterprise tool and DFDL. Finally, the performance of HDFIC is evaluated with the synergetic patient body vitals and room ambiance dataset for accuracy, data integration time, and conversion efficiency.</p>			
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Resilient–vulnerability analysis of critical infrastructure, key resources, assets, and facilities	Ewa, Wofai O., Ugwu, Onuegbu O., Okafor, Fidelis O.,	Nations are built to depend on critical infrastructures, key resources, assets, and facilities (CIKRAFs), hence the need to effectively analyse inherent vulnerabilities, to build and develop adequate protection and resilience capabilities. The purpose of this study is to develop a model that measures and quantifies a threshold vulnerability, called the resilient–vulnerability, comprising of protection and resilience measures, as this article asserts that resilient–vulnerability is systemic and measurable using the resilient–vulnerability model (RVM). The RVM, which requires input data from subject matter experts (SMEs), is deployed to a typical natural gas pipeline system, with data uncertainty catered for, through data aggregation and simulation, leading to the emergence of a resilient–vulnerability index (RVI). Summary findings reveal that the three subsystems, namely production and processing , transmission and storage , and distribution , all, respectively, scored 56, 59, and 52%, compared to the ideal possible score, leaving an entire system score of 64% of ideal conditions of protection and	10.1007/s41062-024-01405-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41062-024-01405-9	SpringerLink
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		resilience. The results indicate the usefulness of the RVM to owners and operators of CIKRAFs, with the RVM supporting the quantification of the resilient–vulnerability of structurally decomposable CIKRAFs, and the comparative baseline index RVI supporting the security and resilience profiling of all similar CIKRAFs.			
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Synews: a synergy-based rumor verification system	Sarfraz, Amber, Ahmad, Adnan, Zeshan, Furkh, Mirza, Hamid Turab,	Online social networks (OSNs) are now implied as an important source of news and information besides establishing social connections. However, such information sharing is not always authentic because people, sometimes, also share their perceptions and fabricated information on OSNs. Thus, verification of online posts is important to maintain reliability over this useful communication medium. To address this concern, multiple approaches have been investigated including machine learning, natural language processing, source authentication, empirical studies, web semantics, and modeling/simulations, but the problem still persists. This research proposes an effective synergy-based rumor verification method along with a weighted-mean reputation management system to mitigate the spread of rumors over OSN. The model was formally verified through Colored Petri-Nets while its semantic behavior was analyzed through ontologies. Moreover, a third-party Facebook application was developed for proof of concept, and users' acceptance and usability analysis was performed through	10.1007/s13278-024-01214-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13278-024-01214-z	SpringerLink
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		<p>Technology Acceptance Model and Self-Efficacy scale. The results indicate that the proposed approach can be used as an effective tool for the identification of rumors and it has the potential to improve the quality of users' online experience.</p>			
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<p>An empirical investigation of challenges of specifying training data and runtime monitors for critical software with machine learning and their relation to architectural decisions</p>	<p>Heyn, Hans-Martin, Knauss, Eric, Malleswaran, Iswarya, Dinakaran, Shruthi,</p>	<p>The development and operation of critical software that contains machine learning (ML) models requires diligence and established processes. Especially the training data used during the development of ML models have major influences on the later behaviour of the system. Runtime monitors are used to provide guarantees for that behaviour. Runtime monitors for example check that the data at runtime is compatible with the data used to train the model. In a first step towards identifying challenges when specifying requirements for training data and runtime monitors, we conducted and thematically analysed ten interviews with practitioners who develop ML models for critical applications in the automotive industry. We identified 17 themes describing the challenges and classified them in six challenge groups. In a second step, we found interconnection between the challenge themes through an additional semantic analysis of the interviews. We explored how the identified challenge themes and their interconnections can be mapped to different architecture views. This step involved identifying relevant architecture</p>	<p>10.1007/s00766-024-00415-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-024-00415-4</p>	<p>SpringerLink</p>
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		<p>views such as data, context, hardware, AI model, and functional safety views that can address the identified challenges. The article presents a list of the identified underlying challenges, identified relations between the challenges and a mapping to architecture views. The intention of this work is to highlight once more that requirement specifications and system architecture are interlinked, even for AI-specific specification challenges such as specifying requirements for training data and runtime monitoring.</p>			
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<p>A Review on Fire Research of Electric Power Grids of China: State-Of-The-Art and New Insights</p>	<p>Jiaqing, Zhang, Yubiao, Huang, Xinjie, Qiu, Taiyun, Zhu,</p>	<p>China Power Grid is actively building a new energy-based ultra-high voltage grid system. Therefore, the researches on fire safety of power grid are of great importance. This paper firstly investigates the fire accident characteristics in the substation system. With the focuses on the transformer oil fires, the early detection and early warning, modification, fire monitoring and extinguishing systems of transformer oil are reviewed. It is found that the researches on flowing and jet fires should be reinforced while modified oil and pyrolysis gas detection can be applied for reducing the fire probability. Secondly, the fire risks and characteristics of cables are summarized for the transmission and distribution lines, and the methods of early warning, fire prevention and rescue are analyzed. For the wildfire threatening the transmission and distribution cables, the characteristics of wildfire and corresponding firefighting methods are reviewed. The water mist and liquid nitrogen are identified as the most effective ways of extinguishing cable fires and advanced fire detection and long-range drone fire extinguishing technologies should be</p>	<p>10.1007/s10694-022-01343-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10694-022-01343-x</p>	<p>SpringerLink</p>
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		<p>improved for wildfires. Finally, the thermal runaway mechanism and fire characteristics of LIB in the energy storage system are summarized, and the difficulties in fire extinguishing are discussed. The application of the existing fire detection system in the field of LIB is proposed, and the early warning indicators for intelligent fire protection are introduced. In the future, the intelligent fire protection systems will improve the safety of energy storage systems, and efficient test platforms and reliable test standards will continue to be demanded to reduce the likelihood of thermal runaway and fire severity.</p>			
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Allocation of Healthcare Resources in National Health Systems Under Climate Change	Grigoroudis, Evangelos, Kouikoglou, Vassilis S., Phillis, Yannis A.,	Climate change has, among others, impacts on human health and by consequence on healthcare systems. Some impacts are direct such as extreme events, air pollution and aeroallergens, and some are indirect such as reduced food production and supply, vector-borne and water-borne infectious diseases, and social and economic disruptions. The main aim of this paper is to study the pressures of climate change on national healthcare systems. An empirical dynamic resource allocation problem is proposed to estimate how healthcare systems may be affected by climate change. The problem is formulated as a nonlinear programming model which finds the optimal allocation of healthcare resources that compensate for life expectancy reductions due to climate change. We examine various scenarios of climate impacts to estimate the additional budget and healthcare resources needed. The results show that the necessary healthcare budget grows nonlinearly with respect to impacts with disproportional demands on lower income countries. Finally, the necessary healthcare	10.1007/s43615-023-00301-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43615-023-00301-1	SpringerLink
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		investments should be made sooner as climate impacts become heavier. Our methodology could aid policy-makers in prioritizing measures to enhance the climate resilience of national healthcare systems.			
The role of computational science in digital twins	Willcox, Karen, Segundo, Brittany,	Digital twins hold immense promise in accelerating scientific discovery, but the publicity currently outweighs the evidence base of success. We summarize key research opportunities in the computational sciences to enable digital twin technologies, as identified by a recent National Academies of Sciences, Engineering, and Medicine consensus study report.	10.1038/s43588-024-00609-4	https://www.nature.com/articles/s43588-024-00609-4.pdf	SpringerLink

Electric charging station management using IoT and cloud computing framework for sustainable green transportation	Aldeen, Yousra Abdul Alsaheb S., Jaber, Mustafa Musa, Ali, Mohammed Hasan, Abd, Sura Khalil, Alkhayyat, Ahmed, Malik, R. Q.,	Environmentally friendly and intelligent transportation options have been developed to tackle pollution and fuel shortages during the past several years. Numerous standards organizations and transportation authorities have provided a range of alternative energy sources intending to create a more environmentally friendly and sustainable atmosphere. However, some obstacles remain to clear before the goal may be fulfilled in green transportation. The research examines and identifies transportation pollution and greenhouse gas emissions. An electric vehicle-centric approach to green mobility is taken, emphasizing electric vehicle architecture and current solutions initiatives, and essential for effectively done. Regarding an Electric Vehicle Charging Station (EVCS), location is key; according to the study, EVSC location selection may be improved using an Internet of Things (IoT) with a cloud computing (IoT-CC) approach. Carbon-producing vehicles such as trains and buses are being phased out globally for more eco-friendly transportation. Electrified vehicles are a significant step toward a more environmentally friendly mode of	10.1007/s11042-023-16630-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-16630-0	SpringerLink
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		<p>transportation. However, electric vehicles are becoming more common, and the infrastructure for charging must be expanded and seamless. Solar panels may be used to electric power vehicles and generate their energy by certain entities. There are plans to develop EVSC-IoT service architecture to minimize carbon dioxide emissions and fuel consumption in a smart transportation system. It gathers data from telematics, digital systems, and roadside camera to assist fuel consumption. Electric vehicle drivers may use electronic wallets to pay for their charging costs. The suggested EVSC-IoT model enhances the charging demand, charging time, time distribution, and traveling velocity compared to other existing methods.</p>			
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Digital twins in mechanical and aerospace engineering	Ferrari, Alberto, Willcox, Karen,	Digital twins bring value to mechanical and aerospace systems by speeding up development, reducing risk, predicting issues and reducing sustainment costs. Realizing these benefits at scale requires a structured and intentional approach to digital twin conception, design, development, operation and sustainment. To bring maximal value, a digital twin does not need to be an exquisite virtual replica but instead must be envisioned to be fit for purpose, where the determination of fitness depends on the capability needs and the cost–benefit trade-offs. While there is a clear opportunity for digital twins to bring value in mechanical and aerospace engineering, they must be considered as an asset in their own right so that their full potential can be realized.	10.1038/s43588-024-00613-8	https://www.nature.com/articles/s43588-024-00613-8.pdf	SpringerLink
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<p>A scoping review of In-the-loop paradigms in the energy sector focusing on software-in-the-loop</p>	<p>Clausen, Christian Skafte Beck, Jørgensen, Bo Nørregaard, Ma, Zheng Grace,</p>	<p>Software-in-the-Loop (SIL) testing is an approach used for verification and validation in the energy sector. However, there is no comprehensive overview of the application, potential, and challenges of SIL within this sector. Therefore, this paper conducts a thorough scoping review of the existing literature within the scope of SIL and related in-the-loop approaches in the energy sector. A total of 88 full-text articles from four significant databases ACM, IEEE Xplore, Scopus, and Web of Science are analyzed and categorized to map the purpose, methods, architecture, interoperability and protocols, technologies, challenges, and limitations. The results present a grand perspective of in-the-loop across several domains followed by an analysis of SIL in the energy sector. The application domains carry characteristics from complex systems, systems-of-systems, cyber-physical systems, critical systems, real-time systems, and sociotechnical systems. The energy sector and the automotive industry are amongst the most applied domains. Within energy- and electricity systems, hardware-based in-the-loop paradigms are mostly applied for</p>	<p>10.1186/s42162-024-00312-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-024-00312-8</p>	<p>SpringerLink</p>
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		testing low-level signaling, and SIL is used for control strategy testing, optimization, dispatching, and experimentation. The examined SIL architectures have distributed-, real-time, and closed-loop properties, and are constrained by specialized simulation power hardware. Future research should address how to systematically develop SIL testing environments with guiding principles to support application development for the future digitalized energy system.			
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Multi-UAV Collaborative System for the Identification of Surface Cyanobacterial Blooms and Aquatic Macrophytes	Vivaldini, Kelen C. T., Pazelli, Tatiana F. P. A. T., Rocha, Lidia G. S., Santos, Igor A. D., Caldas, Kenny A. Q., Soler, Diego P., Benevides, João R. S., Simplicio, Paulo V. G., Hernandez, André C., Andrade, Kleber O., Kim, Pedro H. C., Alvarez, Isaac G., Nascimento, Eduardo V., Santos, Marcela A. A., Almeida, Aline G., Cavalcanti, Lucas H. G., Inoue, Roberto S., Terra, Marco H., Becker, Marcelo,	<p>Aquatic macrophyte is a generic denomination for macro-algae with active photosynthetic parts that remain totally or partially submerged in fresh or salty water, in rivers and lakes. Currently, algae monitoring is carried out manually by collecting samples to send for laboratory analysis. In most cases, harmful algal blooms are already widespread when the results are disclosed. This paper proposes the application of a team of heterogeneous Unmanned Aerial Vehicles (UAVs) that cooperate to increase the system's overall observation range and reduce the reaction time. Leader UAV, featured with a deep-learning-based vision system, covers a pre-determined region and determines high-interest inspection areas in real-time. Through a multi-robot Informative Path Planning (MIPP) approach, the leader UAV coordinates a team of customized quadcopter (named ART2) to reach points of interest, managing their route dynamically. ART2s are able to land on water, and collect and test samples in situ by applying phosphorescence sensors. While path planning, task assignment, and route management are</p>	10.1007/s10846-023-02043-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-023-02043-6	SpringerLink
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		<p>centralized operations, each UAV is conducted by a decentralized trajectory tracking control. Simulations performed in a realistic environment implemented on the Unity platform and experimental proof of concepts demonstrated the reliability of the proposed approach. The presented multi-UAV framework with heterogeneous agents also enables the reconfiguration and expansion of specific objectives, in addition to minimizing the task completion time by executing different processes in parallel. This preventive monitoring enables a plague control action in advance, solving it faster, cheaper, and more effectively.</p>			
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Bayesian network approach for reliability analysis of mining trucks	Rahimdel, Mohammad Javad,	<p>Having a safe and efficient system for mineral transportation is a top priority for all mining operations. Trucks are the most widely used material transportation systems that are applied in both surface and underground mines. Any truck failure disrupts the mineral transportation process and consequently decreases the overall output. Therefore, the reliability analysis of such equipment plays a critical role in increasing the efficiency and productivity of a mining operation. This paper proposes a novel method for analyzing the reliability of a fleet of mining trucks based on the Bayesian Network modeling. Considering the reliability block diagram, the fault tree of trucks was developed according to the logical relationship between the units. Then, a dynamic Bayesian network was constructed according to the conditional probability analysis. Moreover, the relative contributions of each truck's component to the occurrence of the fleet failure were studied by using critical analysis. The results of this paper show that the successful operation of the fleet of trucks is most sensitive to truck no. 5, which</p>	10.1038/s41598-024-52694-0	https://www.nature.com/articles/s41598-024-52694-0.pdf	SpringerLink
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		has the highest reliability level in all time intervals. The reliability of the fleet of trucks reaches 0.881 at 20 h, and the fuel injection system of the truck's engine is the main leading cause of the trucks failure. A proper preventive maintenance strategy should be paid more attention to improve the reliability and availability of the engine system.			
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Recently emerging trends in big data analytic methods for modeling and combating climate change effects	Ikegwu, Anayo Chukwu, Nweke, Henry Friday, Mkpojiogu, Emmanuel, Anikwe, Chioma Virginia, Igwe, Sylvester Agbo, Alo, Uzoma Rita,	Big climate change data have become a pressing issue that organizations face with methods to analyze data generated from various data types. Moreover, storage, processing, and analysis of data generated from climate change activities are becoming very massive, and are challenging for the current algorithms to handle. Therefore, big data analytics methods are designed for significantly large amounts of data required to enhance seasonal change monitoring and understand and ascertain the health risks of climate change. In addition, analysis of climate change data would improve the allocation, and utilisation of natural resources. This paper provides an extensive discussion of big data analytic methods for climate data analysis and investigates how climate change and sustainability issues can be analyzed through these approaches. We further present the big data analytic methods, strengths, and weaknesses, and the essence of analyzing big climate change using these methods. The common datasets, implementation frameworks for climate change modeling, and	10.1186/s42162-024-00307-5	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-024-00307-5	SpringerLink
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		future research directions were also presented to enhance the clarity of these compelling climate change analysis challenges. This big data analytics method is well-timed to solve the inherent issues of data analysis and easy realization of sustainable development goals.			
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<p>A Systematic Analysis of Systems Approach and Flood Risk Management Research: Trends, Gaps, and Opportunities</p>	<p>Awah, Lum Sonita, Belle, Johanes Amate, Nyam, Yong Sebastian, Orimoloye, Israel Ropo,</p>	<p>Flooding is a global threat, necessitating a comprehensive management approach. Due to the complexity of managing flood hazards and risks, researchers have advocated for holistic, comprehensive, and integrated approaches. This study, employing a systems thinking perspective, assessed global flood risk management research trends, gaps, and opportunities using 132 published documents in BibTeX format. A systematic review of downloaded documents from the Scopus and Web of Science databases revealed slow progress of approximately 11.61% annual growth in applying systems thinking and its concomitant approaches to understanding global flood risk management over the past two decades compared to other fields like water resource management and business management systems. A significant gap exists in the application of systems thinking methodologies to flood risk management research between developed and developing countries, particularly in Africa, highlighting the urgency of reoriented research and policy efforts. The application gaps of the study</p>	<p>10.1007/s13753-024-00544-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-024-00544-y</p>	<p>SpringerLink</p>
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		<p>methodology are linked to challenges outlined in existing literature, such as issues related to technical expertise and resource constraints. This study advocates a shift from linear to holistic approaches in flood risk management, aligned with the Sendai Framework for Disaster Risk Reduction 2015–2023 and the Sustainable Development Goals. Collaboration among researchers, institutions, and countries is essential to address this global challenge effectively.</p>			
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Research on visual simulation for complex weapon equipment interoperability based on MBSE	Yang, Haigen, Xia, Zhun, Chen, Yanqing, Zhu, Linqun, Dai, Luohao, Xu, Ruotian, Sun, GuiYing, Yu, Hongyang, Xu, Wenting,	As military reforms continue to develop, the battlefield environment is becoming increasingly complex, and traditional single-service combat methods have evolved into integrated joint and collaborative information operations that break down service boundaries on land, sea, and air. The level of weapon system confrontation has also evolved into a system-to-system confrontation. Traditional document-based system architecture design methods can no longer address the complexity and emergent challenges of weapon system construction. In this paper, based on model-driven system engineering, an open, integrated, model-driven weapon equipment interaction system that supports human interaction was constructed using the SysML modeling language and Magicdraw modeling tool. The Unreal Engine 4 landscape building function was used to construct a virtual battlefield environment, and a communication server was developed using C# language to perform visual simulation of interoperability between weapon systems. Based on model-driven weapon	10.1007/s11042-023-15950-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-15950-5	SpringerLink
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		equipment interoperability, visual simulation is used to ensure that the function of the weapon equipment system meets the requirements of combat and the combat effectiveness of the system is maximized.			
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<p>Incorporating big data and IoT in intelligent ecosystems: state-of-the-arts, challenges and opportunities, and future directions</p>	<p>Saeed, Nimra, Malik, Hassaan, Naeem, Ahmad, Bashir, Umair,</p>	<p>The present study discusses big data (BD) and Internet of Things (IoT)-based applications in intelligent ecosystems. The purpose of these areas is to identify important application domains, recent development, and data architectures, and to handle any challenges that arise. To our knowledge, this is the first systematic literature review (SLR) of this kind, reviewing research works published in peer-reviewed venues between 2011 and 2022 utilizing a 4-step selection technique of recognition, monitoring, eligibility, and selection. To study these records, an SLR was conducted, and six key research questions (RQs) were answered. The findings suggest that merging BD and IoT technology opens up new opportunities for intelligent ecosystem applications that monitor, protect, and improve natural resources in the real world. Among the topics covered in this survey are intelligent environment analysis, intelligent farming, ultraprecision agriculture, industrial IoTs, and intelligent disaster warning. Finally, we review the most frequently used BD and IoT approaches, which we believe</p>	<p>10.1007/s11042-023-16328-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-16328-3</p>	<p>SpringerLink</p>
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		will serve as a platform for future transdisciplinary research in intelligent environments and smart cities.			
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<p>An Ostensive Information Architecture to Enhance Semantic Interoperability for Healthcare Information Systems</p>	<p>Guo, Hua, Scriney, Michael, Liu, Kecheng,</p>	<p>Semantic interoperability establishes intercommunications and enables data sharing across disparate systems. In this study, we propose an ostensive information architecture for healthcare information systems to decrease ambiguity caused by using signs in different contexts for different purposes. The ostensive information architecture adopts a consensus-based approach initiated from the perspective of information systems re-design and can be applied to other domains where information exchange is required between heterogeneous systems. Driven by the issues in FHIR (Fast Health Interoperability Resources) implementation, an ostensive approach that supplements the current lexical approach in semantic exchange is proposed. A Semantic Engine with an FHIR knowledge graph as the core is constructed using Neo4j to provide semantic interpretation and examples. The MIMIC III (Medical Information Mart for Intensive Care) datasets and diabetes datasets have been employed to demonstrate the effectiveness of the proposed information architecture. We</p>	<p>10.1007/s10796-023-10379-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-023-10379-5</p>	<p>SpringerLink</p>
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		further discuss the benefits of the separation of semantic interpretation and data storage from the perspective of information system design, and the semantic reasoning towards patient-centric care underpinned by the Semantic Engine.			
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Modelling guidance in software engineering: a systematic literature review	Chakraborty, Shalini, Liebel, Grischa,	<p>Despite potential benefits in Software Engineering, adoption of software modelling in industry is low. Technical issues such as tool support have gained significant research before, but individual guidance and training have received little attention. As a first step towards providing the necessary guidance in modelling, we conduct a systematic literature review to explore the current state of the art. We searched academic literature for guidance on model creation and selected 35 papers for full-text screening through three rounds of selection. We find research on model creation guidance to be fragmented, with inconsistent usage of terminology, and a lack of empirical validation or supporting evidence. We outline the different dimensions commonly used to provide guidance on software and system model creation. Additionally, we provide definitions of the three terms modelling method, style, and guideline as current literature lacks a well-defined distinction between them. These definitions can help distinguishing</p>	10.1007/s10270-023-01117-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-023-01117-1	SpringerLink
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		between important concepts and provide precise modelling guidance.			
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Understanding Romance Scammers Through the Lens of Their Victims: Qualitative Modeling of Risk and Protective Factors in the Online Context	Wang, Fangzhou, Topalli, Volkan,	Romance scams represent a form of online crime with origins in the physical world, including FTF and physical mail scams. Although these crimes have been revolutionized by the affordances inherent in the technological advantages of social media and the internet, less is known about the foreground characteristics of the offense, including the preferred targeting and scamming strategies of romance fraudsters as facets of a larger process of communication and deception between offenders and victims. Much of the research has focused on the existence and mechanics of such fraud schemes and less on how reciprocal communication between offenders and victims, governed by measurable principles of impression management and deception can underpin the overt manipulation of victims into parting with their financial resources. Our goal in the current research is to identify risk and protective factors for those targeted by romance scam offenders to develop a model for victim vulnerability and resilience. Using data developed through a systematic collection of victim recounts of	10.1007/s12103-022-09706-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12103-022-09706-4	SpringerLink
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		<p>their scamming experiences from online sources (N_female = 32 and N_male = 20), our findings point to a reciprocal model between victims and offenders through identifying four main themes in victims' descriptions of their scamming experiences. Such an effort allows us to delineate important risk signals we identify as crucial for future research and prevention efforts. The findings of this study speak to the importance of understanding social and behavioral interactions between victims and offenders during a romance scam as critical to establishing risk and protective factors of victims, which further inform preemptive prevention efforts.</p>			
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Crypto Tokens and Token Systems	Schwiderowski, Jan, Pedersen, Asger Balle, Beck, Roman,	Cryptographic tokens are one of the cornerstones of the new blockchain world but the knowledge about these digital objects is still limited. In this research, we argue that crypto tokens , cryptographically secured digital tokens connected to DLT systems, form socio-technical systems through their reciprocal relationship with their foundational DLT systems. We also argue that today's crypto token systems evolved out of earlier physical and digital token systems, a socio-technical transition facilitated by changes in the wider socio-cultural, economic, and technical environment. Based on an extensive structured literature review as well as the application of text analytics methods to more than 506 blockchain whitepapers, we develop two results: a crypto token classification built around three crypto token archetypes, and a crypto token system taxonomy. Our findings are relevant for both blockchain researchers and practitioners alike by enhancing our understanding of complex blockchain systems.	10.1007/s10796-023-10382-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-023-10382-w	SpringerLink
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Generative AI	Feuerriegel, Stefan, Hartmann, Jochen, Janiesch, Christian, Zschech, Patrick,		10.1007/s12599-023-00834-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-023-00834-7	SpringerLink
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Data analytics diffusion in the UK renewable energy sector: an innovation perspective	Kava, Harkaran, Spanaki, Konstantina, Papadopoulos, Thanos, Despoudi, Stella, Rodriguez-Espindola, Oscar, Fakhimi, Masoud,	<p>We introduce the BDA dynamics and explore the associated applications in renewable energy sector with a focus on data-driven innovation. Our study draws on the exponential growth of renewable energy initiatives over the last decades and on the paucity of literature to illustrate the use of BDA in the energy industry. We conduct a qualitative field study in the UK with stakeholder interviews and analyse our results using thematic analysis. Our findings indicate that no matter if the importance of the energy sector for 'people's well-being, industrial competitiveness, and societal advancement, old fashioned approaches to analytics for organisational processes are currently applied widely within the energy sector. These are triggered by resistance to change and insufficient organisational knowledge about BDA, hindering innovation opportunities. Furthermore, for energy organisations to integrate BDA approaches, they need to deal with challenges such as training employees on BDA and the associated costs. Overall, our study provides insights from practitioners about adopting BDA innovations in the renewable energy sector to</p>	10.1007/s10479-021-04263-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-04263-1	SpringerLink
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		inform decision-makers and provide recommendations for future research.			
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Estimating agricultural water productivity using remote sensing derived data	Safi, Celine, Pareeth, Sajid, Yalew, Seleshi, Zaag, Pieter, Mul, Marloes,	<p>The 2030 Agenda aims at ending extreme poverty, inequality, injustice and climate change. Progress is evaluated through a set of Sustainable Development Goals (SDGs), targets and indicators. However, there are various challenges affecting regular and timely reporting. Remote sensing (RS) derived data has been shown to provide a valuable complementary data source in reporting SDGs. This study focuses on how RS derived data could support SDG 6 related to water, and in particular SDG indicator 6.4.1 - change in Water Use Efficiency (WUE) over time presented in USD per m³ of water withdrawn. Although water withdrawals cannot be monitored through RS, water use in agriculture, globally withdrawing the largest amount of water, can be monitored through RS based evapotranspiration. Two approaches were modelled to compute the progress of SDG 6.4.1 in the agricultural sector. The first approach uses the standard equation of SDG 6.4.1, replacing water withdrawal with blue evapotranspiration in the irrigation sector. The second approach distributes the</p>	10.1007/s40808-023-01841-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40808-023-01841-z	SpringerLink
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		<p>gross value added to the gross domestic product by irrigated agriculture according to the land productivity in irrigated agriculture as observed by RS. The results of these two approaches were compared to the standard way SDG 6.4.1 is calculated. The analyses were carried out for Lebanon, which faces critical water challenges while experiencing a difficult economic and political situation. The results for Lebanon show that the different approaches to estimate A_wp show similar trends as A_we, initially showing an increasing trend followed by a sharp decline in 2019 due to the deteriorating economic situation in the country. However, the absolute values differ substantially, largely due to discrepancies between the estimated irrigated area from RS data and the static data reported in AQUASTAT. The results illustrate the spatial variability of A_wp in Lebanon, with the area that contributes significantly to the agricultural production nationally (Bekaa and Baalbek) shows lower land and water productivity compared to irrigated areas in other governorates.</p>			
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		The contribution of agriculture to the overall SDG 6.4.1 indicator was relatively small, although agriculture is a major consumer of water.			
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Sustainable development of inland waterways transport: a review	Calderón-Rivera, N., Bartuseviiien, I., Ballini, F.,	<p>Over the years, the demand for transportation has experienced a consistent rise, which has exacerbated a multitude of issues including environmental, visual, and noise pollution, congestion, land use conflicts, and various other related challenges. In this regard, the pursuit of alternatives aimed at mitigating these adverse effects stands as a priority for governments and policymakers. Consequently, inland waterway transport (IWT) emerges as an appealing solution, due to its advantages across the social, environmental, and economic considerations. However, in relation to IWT the concept of sustainable development is insufficiently investigated. The objective of this paper is to undertake a comprehensive review of how the concept of sustainable development is addressed and applied within the framework of IWT systems. To achieve this goal, a systematic literature review was meticulously conducted, utilizing three academic databases (Scopus, Google Scholar, and EBSCO). The review process yielded a total of 51 papers that proved to be pertinent and relevant to the subject matter. The</p>	10.1186/s41072-023-00162-9	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41072-023-00162-9	SpringerLink
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		<p>comprehensive literature review facilitated the delineation of the principal elements, factors, and characteristics of the IWT system, as well as the primary drivers for its sustainable development. However, the implications for further research were identified, such as a comprehensive examination of each case due to the distinct geographical, social, economic, and political conditions inherent to each individual basin. That is essential for understanding the unique barriers present within each context and for formulating viable solutions aimed at fostering and incentivizing the sustainable development of IWT systems.</p>			
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<p>Artificial intelligence-based optimal EVCS integration with stochastically sized and distributed PVs in an RDNS segmented in zones</p>	<p>Rene, Ebunle Akupan, Fokui, Willy Stephen Tounsi,</p>	<p>The growing interest in electric vehicles (EVs) for transportation has led to increased production and government support through legislation since they offer environmental benefits such as reduced air pollution and carbon emissions compared to conventional combustion engine vehicles. This shift toward EV technology aligns with the goal of preserving the natural environment. To fully utilize EVs, effective management of the power grid is crucial, particularly in radial distribution network systems (RDNS) as they pose stress and deviation of power system parameters from their normal. This study proposes a novel strategy for maximizing EV utilization through EV charging stations (EVCSs) in an RDNS by considering factors such as load voltage deviation, line losses, and the presence of distributed solar photovoltaic systems at load centers. The research begins by segmenting the RDNS into zones, followed by the application of an artificial intelligence-based hybrid genetic algorithm (GA) and particle swarm optimization (PSO) approach known as hybrid GA–PSO. This approach identifies optimal locations for EVCSs integrated</p>	<p>10.1186/s43067-023-00126-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s43067-023-00126-w</p>	<p>SpringerLink</p>
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		<p>with photovoltaics within the network. Subsequently, the employment of individual GA and PSO algorithms to optimize EVCS placement focuses on minimizing power loss and enhancing voltage. The effectiveness of the hybrid GA–PSO algorithm is compared to that of separate GA and PSO methods. Extensive simulations using the IEEE 33-node test feeders validate the proposed techniques, demonstrating the usefulness of the hybrid GA–PSO algorithm in identifying optimal EVCS placement within each zone. The results also highlight the advantages and novelty of hybrid GA–PSO in achieving optimal EVCS placement with stochastically sized and distributed photovoltaic in an RDNS.</p>			
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Cross-disciplinary system value overview towards value-oriented design	Lavi, Emilia, Reich, Yoram,	<p>Systems design methods should aim for systems creating value. The decision-making processes in system engineering struggle to optimize this objective; however, even though the traditional concept of system value as a purely economic metric is recognized as deficient, a well-defined and standard conceptualization of comprehensive system value is still lacking. This study set out to facilitate different stakeholders, involved in developing systems, with a broad perspective on value. We define the system value as the system's holistic impact, encompassing the multi-domain effects on processes, environments, and stakeholders. This inclusive view, to be used by practitioners designing systems and policies, is expected to update existing practices and enhance resulting systems. This paper renders an extensive review of value references in multiple domains, both in system engineering and external, non-engineering, disciplines, and sets the foundation for a revised framing of value in systems engineering. To enable future applications for systems optimization, system value is</p>	10.1007/s00163-023-00418-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-023-00418-2	SpringerLink
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		thoroughly characterized, including its dependency on internal and external factors. This research lays the groundwork for problem formulation of a system value measure, its application in system engineering methods, and further analysis of the subject, both for engineered and non-technical systems.			
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Identification and prioritization of multidimensional resilience factors for incorporation in coastal state transportation infrastructure planning	Nickdoost, Navid, Jalloul, Hiba, Choi, Juyeong, Smith, Dennis,	Effective integration of resilience in transportation planning requires the identification and prioritization of multifaceted resilience factors. In this study, an extensive review of the academic literature and state planning documents was conducted to identify measurable technical, socioeconomic, and environmental resilience factors for wind- and water-related hazards. Transportation experts across the state of Florida were then surveyed to gain insight into the significance, relevance, and comparability of the identified factors. By statistically analyzing the survey responses, the resilience factors were prioritized to allow transportation agencies to optimize their resource allocation toward critical resilience aspects and effectively improve resilience within their limited budgets. Overall, the age of infrastructure, emergency response, and network exposure were identified as the top technical, socioeconomic, and environmental factors, respectively. This study also presents five key recommendations , informed by insights from a workshop involving transportation	10.1007/s11069-023-06251-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-06251-z	SpringerLink
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		<p>practitioners throughout Florida, to overcome current barriers to incorporating resilience in transportation planning. These recommendations cover the topics of proper communication, funding availability and public engagement, plans alignment, data collection processes, and the development of comprehensive resilience assessment frameworks. This study contributes to the body of knowledge and state of practice by providing valuable insights and actionable strategies to facilitate the practical integration of resilience considerations in transportation planning, ultimately assisting in the overall resilience enhancement of transportation systems.</p>			
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Hierarchical and networked analysis of resilience factors in mountain communities in Southwest China	Zhao, Yun-fei, Cai, Jian-min, Tang, Lan, Li, Hai-bo, Hu, Shi-yu, Xing, Hui-ge,	Communities' pre-disaster resistance, disaster response, and post-disaster recovery processes are all affected by the level of resilience. This manuscript proposes a framework for the study of factors influencing the resilience of mountain communities, with the aim of clarifying the direction of transmission of the influencing relationships of the factors and identifying the key influencing factors. The study explores the characteristics of resilience influences based on community resilience and complex adaptive systems theory, uses an expert survey method to determine the binary relationships between influencing factors, and uses adversarial interpretive structural modelling and social network analysis methods to analyse influencing factors in a hierarchical and networked manner. Finally, key factors are discussed from four composite theoretical perspectives. We found that (1) infrastructure has the most fundamental impact on the factors, (2) information access is most easily influenced by other factors, (3) residents' place attachment and sense of belonging has a significant impact	10.1007/s11069-023-06249-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-06249-7	SpringerLink
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		on other factors in resilience-building practices, and (4) emergency planning and management organisations play a bridging role in the system of influencing factors. The results can help community managers clarify resilience management priorities, allocate management resources more rationally, and provide theoretical guidance for improving community resilience.			
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<p>Analytical Prediction of Gas Hydrate Formation Conditions for Oil and Gas Pipeline</p>	<p>Ismail, Firas Basim, Yuhana, M. Izzul Firdaus, Mohammed, Salam A., Sabri, Laith S.,</p>	<p>Abstract Oil and gas production operations, particularly those involving subsea production systems, are frequently subjected to harsh underwater conditions characterized by low temperatures and high pressures, owing to the placement of most subsea facilities on the seabed. These challenging environmental factors often lead to the formation of gas hydrates, especially in the presence of moisture within the production fluid. In this study, A suggestion is made to employ an underwater wireless sensor network (UWSN) to showcase the viability of real-time monitoring of pipeline health conditions, aiming to mitigate problems associated with hydrate formation in oil and gas pipelines. Additionally, A predictive analytical model for gas hydrate formation in these pipelines is crafted using Aspen HYSYS simulation and Feed-Forward Artificial Neural Network (ANN) modeling. The development of this prediction model and the potential application of UWSN technology in the oil and gas production field could assist operators in making informed decisions regarding intervention processes for addressing hydrate-related</p>	<p>10.1134/S107042722401004X</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1134/S107042722401004X</p>	<p>SpringerLink</p>
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		challenges in pipelines.			
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Resilience of renewable power systems under climate risks	Xu, Luo, Feng, Kairui, Lin, Ning, Perera, A.T.D., Poor, H. Vincent, Xie, Le, Ji, Chuanyi, Sun, X. Andy, Guo, Qinglai, O'Malley, Mark,	Large-scale integration of environment-dependent renewables coupled with intensifying climate extremes introduces superimposed risks on future net-zero power systems, expected to increase the frequency of severe power outages. High-penetration renewable power systems under climate change may face escalating challenges, including more severe infrastructure damage, lower grid inertia and flexibility, and longer post-event recovery. Achieving a climate-resilient power system in a net-zero future requires approaches for harnessing the inherent potential of distributed renewables through forming microgrids. Climate change is expected to intensify the effects of extreme weather events on power systems and increase the frequency of severe power outages. The large-scale integration of environment-dependent renewables during energy decarbonization could induce increased uncertainty in the supply–demand balance and climate vulnerability of power grids. This Perspective discusses the superimposed risks of climate change, extreme	10.1038/s44287-023-00003-8	https://www.nature.com/articles/s44287-023-00003-8.pdf	SpringerLink
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		<p>weather events and renewable energy integration, which collectively affect power system resilience. Insights drawn from large-scale spatiotemporal data on historical US power outages induced by tropical cyclones illustrate the vital role of grid inertia and system flexibility in maintaining the balance between supply and demand, thereby preventing catastrophic cascading failures. Alarming, the future projections under diverse emission pathways signal that climate hazards — especially tropical cyclones and heatwaves — are intensifying and can cause even greater impacts on the power grids. High-penetration renewable power systems under climate change may face escalating challenges, including more severe infrastructure damage, lower grid inertia and flexibility, and longer post-event recovery. Towards a net-zero future, this Perspective then explores approaches for harnessing the inherent potential of distributed renewables for climate resilience through forming microgrids, aligned with holistic technical solutions such as grid-forming inverters, distributed energy storage, cross-sector</p>			
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		<p>interoperability, distributed optimization and climate–energy integrated modelling. Increasing grid penetration of renewables coupled with intensifying climate extremes under climate change presents superimposed risks to future power systems. This Perspective analyses the critical factors influencing the resilience of renewable power systems under climate risks and proposes climate-resilient solutions towards a net-zero future.</p>			
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Face mask effects on speaker verification performance in the presence of noise	Al-Karawi, Khamis A.,	<p>Due to its spread via physical contact and the regulations on wearing face masks, COVID-19 has resulted in tough challenges for speaker recognition. Masks may aid in preventing COVID-19 transmission, although the implications of the mask on system performance in a clean environment and with varying levels of background noise are unclear. The face mask has an impact on speech output. The task of comprehending speech while wearing a face mask is made more difficult by the mask's frequency response and radiation qualities, which is vary depending on the material and design of the mask. In this study, we recorded speech while wearing a face mask to see how different masks affected a state-of-the-art text-independent speaker verification system using an i-vector speaker identification system. This research investigates the influence of facial coverings on speaker verification. To address this, we investigated the effect of fabric masks on speaker identification in a cafeteria setting. These results present preliminary speaker recognition rates as well as mask</p>	10.1007/s11042-023-15824-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-15824-w	SpringerLink
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		<p>verification trials. The result shows that masks had little to no effect in low background noise, with an EER of 2.4–2.5% in 20 dB SNR for both masks compared to no mask at the same level. In noisy conditions, accuracy was 12.7–13.0% lower than without a mask with a 5 dB SNR, indicating that while different masks perform similarly in low background noise levels, they become more noticeable in high noise levels.</p>			
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Internet of Vehicles-Based Autonomous Vehicle Platooning	Dokur, Omkar, Katkoori, Srinivas,	<p>The Internet of Things (IoT) facilitates vehicle communication using wireless networks to improve safety, mobility, and efficiency in transportation. Autonomous vehicles (AVs) can use IoT to form a platoon and travel cooperatively to a common destination as connected autonomous vehicles (CAVs). In our previous work, we demonstrated platoon negotiation and formation between two vehicles or IoT nodes using Dedicated Short Range Communication (DSRC)-based messages only. This paper extends these algorithms to support multi-vehicle platoon negotiation and formation using DSRC messages for AVs. To achieve this, once two vehicles negotiate and form a platoon, the platoon member (PM) sends a platoon-complete negotiation to the platoon leader (PL) after the string stability is achieved. Once PL receives this message, it makes itself available to receive negotiations from nearby vehicles who are willing to join its platoon. We modified our platoon-ready, pre-negotiation, negotiation resolver, and platoon joiner algorithms from our prior work. Also, PL maintains the PM</p>	10.1007/s42979-023-02391-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-023-02391-y	SpringerLink
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		<p>vehicle IDs and their position so that it can assign a local leader to the future vehicles joining the platoon. Now, the vehicle willing to platoon negotiates with PL to check if their destinations match. If a common destination is found, the new vehicle further negotiates with PL in a series of transactions to join the existing platoon. During these negotiations, PL assigns the last joined PM as a local leader to this newly joined vehicle to follow. Then, PL adds the new PM vehicle ID and its position to the list. Assigning a local leader not only increases the range of the platoon but also decreases the delay in the message exchange. We demonstrated the above algorithms in the CARLA simulator by extending them to support IoT connectivity and platooning. We validated the algorithms by conducting experiments with three-vehicle platooning scenarios.</p>			
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Review on microgrids design and monitoring approaches for sustainable green energy networks	Ahmed, Ijaz, Rehan, Muhammad, Basit, Abdul, Ahmad, Hasnain, Ahmed, Waqas, Ullah, Nasim, Piecha, Marian, Blazek, Vojtech, Prokop, Lukas,	Microgrids are power distribution systems that can operate either in a grid-connected configuration or in an islanded manner, depending on the availability of decentralized power resources, such as sustainable or non-sustainable power sources, battery backup systems, and power demands. The extensive adoption of inverter-based systems poses numerous technological challenges, necessitating a centralized management system to assure the system reliability and monitoring of the energy delivery networks. Thus, this research begins by highlighting these significant obstacles and then analyzes the present-day advances in multilevel control architecture for delivering on promised functionality. This article also discusses the development of innovative control technologies, such as introducing collaborative distributed approaches and reducing conventional three-stage patriarchal administration to fewer stages of system integration and functioning.	10.1038/s41598-023-48985-7	https://www.nature.com/articles/s41598-023-48985-7.pdf	SpringerLink
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<p>A future for digital public goods for monitoring SDG indicators</p>	<p>Liang, Dong, Guo, Huadong, Nativi, Stefano, Kulmala, Markku, Shirazi, Zeeshan, Chen, Fang, Kalonji, Gretchen, Yan, Dongmei, Li, Jianhui, Duerler, Robert, Luo, Lei, Han, Qunli, Deng, Siming, Wang, Yuanyuan, Kong, Lingyi, Jelinek, Thorsten,</p>	<p>Digital public goods (DPGs), if implemented with effective policies, can facilitate the realization of the United Nations Sustainable Development Goals (SDGs). However, there are ongoing deliberations on how to define DPGs and assure that society can extract the maximum benefit from the growing number of digital resources. The International Research Center of Big Data for Sustainable Development Goals (CBAS) sees DPGs as an important mechanism to facilitate information-driven policy and decision-making processes for the SDGs. This article presents the results of a CBAS survey of 51 respondents from around the world spanning multiple scientific fields, who shared their expert opinions on DPGs and their thoughts about challenges related to their practical implementation in supporting the SDGs. Based on the survey results, the paper presents core principles in a proposed strategy, including establishment of international standards, adherence to open science and open data principles, and scalability in monitoring SDG indicators. A community-driven strategy to develop DPGs is proposed to accelerate DPG</p>	<p>10.1038/s41597-023-02803-x</p>	<p>https://www.nature.com/articles/s41597-023-02803-x.pdf</p>	<p>SpringerLink</p>
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		production in service of the SDGs while adhering to the core principles identified in the survey.			
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Supply/demand interface for disaster resilience assessment of interdependent infrastructure systems considering privacy and security concerns	Blagojevi, N., Stojadinovi, B.,	<p>The ability to swiftly restore functionality following an extreme event is an essential characteristic of a disaster resilient infrastructure system. However, the restoration of functionality of a single infrastructure system often depends on the functionality of other systems that provide resources the considered system needs to operate and recover. Furthermore, infrastructure systems are crucial for the post-disaster functional recovery of the building stock of a community. Thus, community resilience assessment and improvement require a system-of-systems perspective, considering the post-disaster performance of several interdependent infrastructure systems and the building stock at the same time. One of the principal issues in resilience assessment and improvement is that such system-of-systems consideration may require detailed information on the vulnerability and recoverability of numerous components. While such information might be available for certain systems (e.g., housing), for others, the information might be unavailable due to privacy and security concerns (e.g., electric power</p>	10.1007/s10669-023-09931-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-023-09931-0	SpringerLink
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		<p>supply systems or buildings housing important functions). In this paper, we propose a supply/demand interface between the system-of-systems simulator, defined within the interdependent Resilience - Compositional Demand/Supply (iRe-CoDeS) framework, and the individual infrastructure system simulators. Such an interface can be used for regional recovery simulation and resilience assessment of interdependent infrastructure systems, while allowing infrastructure system operators to maintain system's privacy and/or security. We define a tiered supply/demand interface, where the amount of information provided by individual systems can range from system-level to component-level post-disaster evolution of resource supply and demand, assessed using expert opinion or confidential in-house models. The proposed supply/demand interfaces are illustrated in a semi-virtual case study, assessing the seismic resilience of North-East San Francisco, focusing on the effect of interdependent infrastructure on the functional recovery of residential buildings.</p>			
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Model-Based Cybersecurity Analysis	Jiang, Yuning, Jeusfeld, Manfred A., Ding, Jianguo, Sandahl, Elin,	<p>Critical infrastructure (CIs) such as power grids link a plethora of physical components from many different vendors to the software systems that control them. These systems are constantly threatened by sophisticated cyber attacks. The need to improve the cybersecurity of such CIs, through holistic system modeling and vulnerability analysis, cannot be overstated. This is challenging since a CI incorporates complex data from multiple interconnected physical and computation systems. Meanwhile, exploiting vulnerabilities in different information technology (IT) and operational technology (OT) systems leads to various cascading effects due to interconnections between systems. The paper investigates the use of a comprehensive taxonomy to model such interconnections and the implied dependencies within complex CIs, bridging the knowledge gap between IT security and OT security. The complexity of CI dependence analysis is harnessed by partitioning complicated dependencies into cyber and cyber-physical functional dependencies. These defined</p>	10.1007/s12599-023-00811-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-023-00811-0	SpringerLink
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		<p>functional dependencies further support cascade modeling for vulnerability severity assessment and identification of critical components in a complex system. On top of the proposed taxonomy, the paper further suggests power-grid reference models that enhance the reproducibility and applicability of the proposed method. The methodology followed was design science research (DSR) to support the designing and validation of the proposed artifacts. More specifically, the structural, functional adequacy, compatibility, and coverage characteristics of the proposed artifacts are evaluated through a three-fold validation (two case studies and expert interviews). The first study uses two instantiated power-grid models extracted from existing architectures and frameworks like the IEC 62351 series. The second study involves a real-world municipal power grid.</p>			
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Yet another cybersecurity risk assessment framework	Ekstedt, Mathias, Afzal, Zeeshan, Mukherjee, Preetam, Hacks, Simon, Lagerström, Robert,	<p>IT systems pervade our society more and more, and we become heavily dependent on them. At the same time, these systems are increasingly targeted in cyberattacks, making us vulnerable. Enterprise and cybersecurity responsables face the problem of defining techniques that raise the level of security. They need to decide which mechanism provides the most efficient defense with limited resources. Basically, the risks need to be assessed to determine the best cost-to-benefit ratio. One way to achieve this is through threat modeling; however, threat modeling is not commonly used in the enterprise IT risk domain. Furthermore, the existing threat modeling methods have shortcomings. This paper introduces a metamodel-based approach named Yet Another Cybersecurity Risk Assessment Framework (Yacraf). Yacraf aims to enable comprehensive risk assessment for organizations with more decision support. The paper includes a risk calculation formalization and also an example showing how an organization can use and benefit from Yacraf.</p>	10.1007/s10207-023-00713-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-023-00713-y	SpringerLink
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<p>A Tertiary Study on Microservices: Research Trends and Recommendations</p>	<p>Stojanov, Z., Hristoski, I., Stojanov, J., Stojkov, A.,</p>	<p>Abstract The development and adoption of microservices, as one of the most promising directions for developing heterogeneous distributed software systems, have been driven by dynamic changes in business and technology. In addition to the development of new applications, a significant aspect of microservices is the migration from legacy monolithic systems to microservice architectures. Such development trends are accompanied by an increase in the number of primary and secondary publications addressing microservices, highlighting the need to systematize research at a higher level. The objective of this study is to comprehensively analyze secondary studies in the field of microservices from the following five aspects: (1) publishing trends, (2) quality trends of secondary studies, (3) research trends, (4) domains of implementation, and (5) future research directions. The study follows the guidelines for conducting a systematic literature review. The findings were derived from 44 secondary studies published in the period from January 2016 to January 2023.</p>	<p>10.1134/S036176 8823080200</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1134/S0361768823080200</p>	<p>SpringerLink</p>
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		<p>These studies were organized and analyzed to address the five proposed research questions pertaining to the study objectives. The findings suggest that the most promising research directions are related to the development, implementation, and validation of new approaches, methods, and tools that encompass all the phases of the life cycle. Additionally, these research directions have applications in a variety of business and human life domains. Recommendations for further literature reviews relate to improvement of quality assessment of selected studies, more detailed review of architecture quality attributes, inquiry of human factor issues, and certain maintenance and operation issues. From the methodological aspect, recommendations relate to using social science qualitative methods for more detailed analysis of selected studies, and inclusion of gray literature that will bring the real experience of experts from industry.</p>			
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Blockchain-based internet of things security architecture and applications	Chen, Hongsong, Lei, Shi, Zhang, Yiyang, Han, Xintong, Cao, Yongrui, Zhang, Yongpeng,	<p>The Internet of Things (IoT) and blockchain are two emerging information technologies that will significantly impact the lives and production patterns of people. When they meet together, blockchain services can be used to solve some IoT challenges, however some new risks will be introduced. Therefore, how to use blockchain services in IoT environment and which key security and privacy challenges in IoT environment can be addressed by blockchain services are two critical issues. Thus, we propose a novel hybrid IoT architecture based on blockchain services for the first issue. To address the second issue, we design system architecture for implementing blockchain-as-a-service in the IoT environment, select the dimensions of fog computing, edge computing and software vulnerability to classify the challenges and solutions. Then practical application scenarios are summarized. The single on-chain time is between 15 and 20 s and the single off-chain in IOTA is about 2 s. The on-chain time is longer than the off-chain time. Finally, seven challenges and the related solution for blockchain-based</p>	10.1007/s12652-023-04675-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-023-04675-w	SpringerLink
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		IoT are proposed to promote future blockchain and IoT research. The proposed architecture can improve the structural security and functional security for IoT and Blockchain.			
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Converging on human-centred industry, resilient processes, and sustainable outcomes in asset management frameworks	Chabane, Bilal, Komljenovic, Dragan, Abdul-Nour, Georges,	<p>The objective of increasing productivity while optimizing operational and organizational processes has focused Industry 4.0 (I4.0) on technological development without considering the impact of technology on people and the impact of mass production on the environment. These impacts have led to growing concerns about climate change and complex global risks. A new vision of the industry, called Industry 5.0 (I5.0), has emerged within the scientific community. This human-centred industry appears to be a bold turn from individual technologies to a systematic approach that enables industry to achieve societal and environmental goals beyond economic growth. Under this approach, the question is no longer whether asset management should change, but what that transformation should look like. This paper identifies areas for improvement of the asset management process and presents a framework that incorporates the core values of I5.0 within the overall asset management framework, in which the core principles remain, and the new technologies are the enabling functions. Though</p>	10.1007/s10669-023-09943-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-023-09943-w	SpringerLink
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		the primary focus of this paper on manufacturing and industrial systems, many of its concept and ideas are also relevant to asset management in the public sector infrastructure systems.			
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Investigating the Decentralized Governance of Distributed Ledger Infrastructure Implementation in Extended Enterprises	Anthony Jnr., Bokolo,	<p>Distributed ledger technology (DLT) is a disruptive technology with the potential of improving extended enterprise (EE) which comprises organizations that combine their capabilities and knowhow to achieve a common goal. Within the extended enterprise, governance enables distributed ledger control and stewardship and provides effective ways for enforcing ledger access and ownership policies. Although research related to DLT has received attention from academics and industries, the decentralized governance perspective of DLT remains less explored, and it is uncertain how decisions are made concerning the deployment of DLT within EE. These call for governance policies to protect the interests and needs of all stakeholders within the extended enterprise. Therefore, there is need for research that provides insight regarding the decentralized governance of DLT, showing how stakeholders and actors within EE make informed decisions. Accordingly, grounded on academic literature, this study develops governance of DLT framework for extended enterprises which comprises DLT</p>	10.1007/s13132-022-01079-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-022-01079-7	SpringerLink
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		<p>governance dimensions, stakeholder/actors, and DLT governance mechanisms. The findings also present the governance actors and categories of DLTs, potentials, and challenges regarding decentralized governance of DLT in extended enterprises. Findings provide implications to enterprises, researchers, practitioners, industries, and policymakers on the concept of decentralized governance for organizational transformation. Finally, findings from this research are instrumental for designing governance policies to support DLT implementation and stimulate potential research within this direction.</p>			
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Trade-off Mechanism Between Reliability and Performance for Data-flow Soft Error Detection	Zhao, Zhenyu, Chen, Xin, Lu, Yufan,	<p>The high energy particles in the space environment will perturb integrated circuits, resulting in system errors or even failures, which is also known as single event effects (SEE). To ensure the normal operation of space systems, it is first necessary to detect these errors. However, detection algorithms also bring additional overhead to the system and reduce its performance. Therefore, we aim to find a trade-off between reliability and performance. To this end, we propose a quantitative evaluation model for detection methods that evaluates the reliability gain of different detection methods under the same overhead. Our method allocates the optimal detection method to the corresponding code segment based on the quantitative results, thereby achieving a trade-off between reliability and performance. Experimental results show that the average energy efficiency of our trade-off method is 91.34%, which is 21.49% higher than the other methods.</p>	10.1007/s10836-023-06087-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10836-023-06087-2	SpringerLink
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Just-in-time defect prediction for mobile applications: using shallow or deep learning?	Dinter, Raymon, Catal, Cagatay, Giray, Görkem, Tekinerdogan, Bedir,	Just-in-time defect prediction (JITDP) research is increasingly focused on program changes instead of complete program modules within the context of continuous integration and continuous testing paradigm. Traditional machine learning-based defect prediction models have been built since the early 2000s, and recently, deep learning-based models have been designed and implemented. While deep learning (DL) algorithms can provide state-of-the-art performance in many application domains, they should be carefully selected and designed for a software engineering problem. In this research, we evaluate the performance of traditional machine learning algorithms and data sampling techniques for JITDP problems and compare the model performance with the performance of a DL-based prediction model. Experimental results demonstrated that DL algorithms leveraging sampling methods perform significantly worse than the decision tree-based ensemble method. The XGBoost-based model appears to be 116 times faster than the multilayer perceptron-based (MLP) prediction model. This study	10.1007/s11219-023-09629-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-023-09629-1	SpringerLink
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		indicates that DL-based models are not always the optimal solution for software defect prediction, and thus, shallow, traditional machine learning can be preferred because of better performance in terms of accuracy and time parameters.			
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Design of blockchain-based applications using model-driven engineering and low-code/no-code platforms: a structured literature review	Curty, Simon, Härer, Felix, Fill, Hans-Georg,	<p>The creation of blockchain-based software applications requires today considerable technical knowledge, particularly in software design and programming. This is regarded as a major barrier in adopting this technology in business and making it accessible to a wider audience. As a solution, low-code and no-code approaches have been proposed that require only little or no programming knowledge for creating full-fledged software applications. In this paper we extend a review of academic approaches from the discipline of model-driven engineering as well as industrial low-code and no-code development platforms for blockchains. This includes a content-based, computational analysis of relevant academic papers and the derivation of major topics. In addition, the topics were manually evaluated and refined. Based on these analyses we discuss the spectrum of approaches in this field and derive opportunities for further research.</p>	10.1007/s10270-023-01109-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-023-01109-1	SpringerLink
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Modelling, Simulation, and Performance Analysis of Intra-Vehicular Heterogeneous Networks	Funes, Guillermo, Siller, Mario, Horta, Jorge,	<p>Vehicles today use a variety of network segments operated by different technologies and protocols within the car (CAN, LIN, Automotive Ethernet, MOST, FlexRay, etc.) to exchange data between different control modules, sensors, and actuators. The exchange of information between other network domains (heterogeneous networks) is enabled through various interconnection points called gateways/bridges . The resulting performance depends on its interconnection structure, network segment traffic aggregation scheme, and medium access technique. Although protocols such as CAN, LIN, FlexRay, and Ethernet have been used in network design for some time, performance modeling and analysis are still needed given the variety of traffic types and sources, new application limitations, and especially the lack of formal verification of network performance for different network scenarios and configurations. This paper presents an end-to-end throughput and delay performance analysis for a reference intra-vehicular network scenario. These models have been validated through simulations in</p>	10.1007/s11277-023-10842-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-023-10842-1	SpringerLink
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		<p>which high correlation values were obtained from 98.7400 to 99.9999, with a low mean square error. The validation cases show that for different LIN, CAN, and Ethernet network configurations, the performance threshold values defined for most current vehicle applications are preserved. However, if the network configuration is modified, the proposed analytical models can be used to formally verify the corresponding performance and delay changes and thus validate whether or not the application requirements are met.</p>			
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Formally verified bundling and appraisal of evidence for layered attestations	Petz, Adam, Alexander, Perry,	Remote attestation is a technology for establishing trust in a remote computing system. Copland is a domain-specific language for specifying attestation protocols that operate in diverse, layered measurement topologies. In this work, we formally define and verify the Copland Virtual Machine for executing Copland protocols alongside a dual generalized appraisal procedure. Together these components provide a principled pipeline to execute and bundle arbitrary Copland-based attestations, then unbundle and evaluate the resulting evidence for measurement content and cryptographic integrity. All artifacts are implemented as monadic, functional programs in the Coq proof assistant and verified with respect to the Copland reference semantics. Finally, we leverage formal properties of component implementations and their surrounding security architecture to aid in the design and analysis of attestation scenarios in the context of an active adversary attempting to subvert attestation. These components lay the foundation for	10.1007/s11334-022-00475-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-022-00475-1	SpringerLink
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		a verified end-to-end attestation stack.			
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<p>A social network analysis of academic journals in public administration in the early twenty-first century: examining journal level bibliometrics with network analysis</p>	<p>McGuigan, Glenn S., Morçöl, Göktu, Grosser, Travis,</p>	<p>This study shows how network analyses, specifically whole network analysis, can be used to elicit network structures and identify subgroups in academic journal publishing in the field of public administration. To elicit the citation networks of the journals, we used social network analysis methods on the journal citations in the InCites Journal Citation Reports of the Web of Science (WoS) database at 4 time points: 2005, 2010, 2015, and 2020. We tested whether the citation networks had the characteristics of the small world network structure and/or a scale-free network structure. We found that the public administration citation networks became more centralized over time, while also becoming more clustered. Public Administration Review and the Journal of Public Administration Research and Theory were consistently the most central journals in the networks over the years. The citations networks were also clustered. Particularly, public policy journals, which are classified within the “public administration” category in WoS, tended to be clustered together. We conclude that the public administration journal citation</p>	<p>10.1007/s11192-023-04861-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11192-023-04861-9</p>	<p>SpringerLink</p>
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		networks had both scale-free characteristics and small-world characteristics in the first two decades of the twenty-first century.			
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Designing a 'concept of operations' architecture for next-generation multi-organisational service networks	Harrington, Tomás Seosamh, Srai, Jagjit Singh,	<p>Networked service organisations are increasingly adopting a 'smarter networking' philosophy in their design of more agile and customer-focused supply models. Changing consumer behaviours and the emergence of transformative technologies—industry 4.0, artificial intelligence, big data analytics, the Internet of Things—are driving a series of innovations, in terms of 'products' and business models, with major implications for the industrial enterprise, in their design of more 'digitalised' supply chains. For B2B systems, emerging 'product-service' offerings are requiring greater visibility, alignment and integration across an increasingly complex network of multiple partners and collaborators, in order to deliver a better service and customer 'experience'. To support the design and operation of these multi-organisational service networks, we outline a concept of operations architecture here, underpinned by the literature and network theory, and demonstrate application using a series of exemplar case studies. Focusing on relational elements and the processes key to network integration within service supply</p>	10.1007/s00146-016-0664-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-016-0664-5	SpringerLink
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		<p>networks, the cases inform a set of operating principles and protocols—applicable to all stakeholders ‘cooperating’, within a ‘shared’ environment. Equally critical is to understand how digital technologies may influence future operating philosophies. This article extends our theoretical understanding of network organisations, from a traditional ‘product’ perspective to that of ‘services’, and presents the case for developing a common, unified approach to designing diverse forms of multi-partner service networks.</p>			
Die österreichischen Beiträge der CIRED-Konferenz 2023	Schmaranz, Robert, Ruhhütl, Martin,		10.1007/s00502-023-01189-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-023-01189-3	SpringerLink

Exploring the promising potential of induced pluripotent stem cells in cancer research and therapy	Chehelgerdi, Matin, Behdarvand Dehkordi, Fereshteh, Chehelgerdi, Mohammad, Kabiri, Hamidreza, Salehian-Dehkordi, Hosein, Abdolvand, Mohammad, Salmanizadeh, Sharareh, Rashidi, Mohsen, Niazmand, Anoosha, Ahmadi, Saba, Feizbakhshan, Sara, Kabiri, Saber, Vatandoost, Nasimeh, Ranjbarnejad, Tayebbeh,	The advent of iPSCs has brought about a significant transformation in stem cell research, opening up promising avenues for advancing cancer treatment. The formation of cancer is a multifaceted process influenced by genetic, epigenetic, and environmental factors. iPSCs offer a distinctive platform for investigating the origin of cancer, paving the way for novel approaches to cancer treatment, drug testing, and tailored medical interventions. This review article will provide an overview of the science behind iPSCs, the current limitations and challenges in iPSC-based cancer therapy, the ethical and social implications, and the comparative analysis with other stem cell types for cancer treatment. The article will also discuss the applications of iPSCs in tumorigenesis, the future of iPSCs in tumorigenesis research, and highlight successful case studies utilizing iPSCs in tumorigenesis research. The conclusion will summarize the advancements made in iPSC-based tumorigenesis research and the importance of continued investment in iPSC research to	10.1186/s12943-023-01873-0	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12943-023-01873-0	SpringerLink
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		unlock the full potential of these cells.			
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<p>A resilience view on health system resilience: a scoping review of empirical studies and reviews</p>	<p>Copeland, Samantha, Hinrichs-Krapels, Saba, Fecondo, Federica, Santizo, Esteban Ralon, Bal, Roland, Comes, Tina,</p>	<p>Background Prompted by recent shocks and stresses to health systems globally, various studies have emerged on health system resilience. Our aim is to describe how health system resilience is operationalised within empirical studies and previous reviews. We compare these to the core conceptualisations and characteristics of resilience in a broader set of domains (specifically, engineering, socio-ecological, organisational and community resilience concepts), and trace the different schools, concepts and applications of resilience across the health literature. Methods We searched the Pubmed database for concepts related to 'resilience' and 'health systems'. Two separate analyses were conducted for included studies: a total of n =87 empirical studies on health system resilience were characterised according to part of health systems covered, type of threat, resilience phase, resilience paradigm, and approaches to building resilience; and a total of n =30 reviews received full-text review and characterised according to type of review, resilience concepts identified in the review, and theoretical framework or underlying</p>	<p>10.1186/s12913-023-10022-8</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12913-023-10022-8</p>	<p>SpringerLink</p>
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		<p>resilience conceptualisation . Results The intersection of health and resilience clearly has gained importance in the academic discourse with most papers published since 2018 in a variety of journals and in response to external threats, or in reference to more frequent hospital crisis management. Most studies focus on either resilience of health systems generally (and thereby responding to an external shock or stress), or on resilience within hospitals (and thereby to regular shocks and operations). Less attention has been given to community-based and primary care, whether formal or informal. While most publications do not make the research paradigm explicit, 'resilience engineering' is the most prominent one, followed by 'community resilience' and 'organisational resilience'. The social-ecological systems roots of resilience find the least application, confirming our findings of the limited application of the concept of transformation in the health resilience literature.</p> <p>Conclusions Our review shows that the field is fragmented, especially in the use of resilience paradigms and approaches from non-health resilience domains, and the</p>			
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		<p>health system settings in which these are used. This fragmentation and siloed approach can be problematic given the connections within and between the complex and adaptive health systems, ranging from community actors to local, regional, or national public health organisations to secondary care. Without a comprehensive definition and framework that captures these interdependencies, operationalising, measuring and improving resilience remains challenging.</p>			
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<p>"Be sustainable": EOSC Life recommendations for implementation of FAIR principles in life science data handling</p>	<p>David, Romain, Rybina, Arina, Burel, JeanMarie, Heriche, Jean Karim, Audergon, Pauline, Boiten, JanWillem, Coppens, Frederik, Crockett, Sara, Exter, Katrina, Fahrner, Sven, Fratelli, Maddalena, Goble, Carole, Gormanns, Philipp, Grantner, Tobias, Grüning, Björn, Gurwitz, Kim Tamara, Hancock, John M, Harmse, Henriette, Holub, Petr, Juty, Nick, Karnbach, Geoffrey, Karoune, Emma, Keppler, Antje, Klemeier, Jessica, Lancelotti, Carla, Legras, JeanLuc, Lister, Allyson L, Longo, Dario Livio, Ludwig, Rebecca, Madon, Bénédicte, Massimi, Marzia, Matser, Vera, Matteoni, Rafaele, Mayrhofer, Michaela Th, Ohmann, Christian, Panagiotopoulou, Maria, Parkinson, Helen, Perseil, Isabelle, Pfander, Claudia, Pieruschka, Roland, Raess, Michael, Rauber, Andreas, Richard, Audrey S, Romano, Paolo, Rosato, Antonio, Sánchez Pla, Alex, Sansone, SusannaAssunta, Sarkans, Ugis, SerranoSolano, Beatriz, Tang, Jing, Tanoli, Ziaurrehman, Tedds, Jonathan, Wagener, Harald, Weise, Martin, Westerhoff, Hans V, Wittner, Rudolf, Ewbank, Jonathan, Blomberg, Niklas, Gribbon, Philip,</p>	<p>The main goals and challenges for the life science communities in the Open Science framework are to increase reuse and sustainability of data resources, software tools, and workflows, especially in large scale datadriven research and computational analyses. Here, we present key findings, procedures, effective measures and recommendations for generating and establishing sustainable life science resources based on the collaborative, crossdisciplinary work done within the EOSCLife (European Open Science Cloud for Life Sciences) consortium. Bringing together 13 European life science research infrastructures, it has laid the foundation for an open, digital space to support biological and medical research. Using lessons learned from 27 selected projects, we describe the organisational, technical, financial and legal/ethical challenges that represent the main barriers to sustainability in the life sciences. We show how EOSCLife provides a model for sustainable data management according to FAIR (findability, accessibility, interoperability, and reusability) principles, including solutions for sensitive and</p>	<p>10.15252/emboj.2023115008</p>	<p>https://www.nature.com/articles/EMBJ2023115008.pdf</p>	<p>SpringerLink</p>
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		<p>industryrelated resources, by means of cross disciplinary training and best practices sharing. Finally, we illustrate how data harmonisation and collaborative work facilitate interoperability of tools, data, solutions and lead to a better understanding of concepts, semantics and functionalities in the life sciences. Creating a space for open collaborative research, EOSC Life, suggests best practices for sustainable data management for enhanced usage of life science resources.</p>			
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Human civilization dynamics: why we have different civilization patterns in history	Lu, Peng, Zhang, Zhuo, Onyebuchi, Chiamaka Henrietta, Li, Mengdi,	<p>After the Axial Age, the West moved toward continuous disunity, but China had successfully maintained a persistent unity pattern. Conventional case (history event) studies are subject to selection bias and theoretical frameworks, which is not objective narrative. We use agent-based modeling (ABM) to reveal the historical dynamics of why civilizations take on distinct patterns (unity versus disunity). In China, the Qin Dynasty (initial unity) opened the Great Unity tradition in 221 BC. Before this, there was a major chaotic period (770 BC to 221 BC) with two periods. The first period, the Spring and Autumn (770 BC to 221 BC), opened this chaotic process and indirectly led to the initial unity. Then, the second period, the Warring States period (475 BC to 221 BC), directly led to this initial unity. This work models the second period and focuses on the question of why human civilizations take on different patterns in history. Finally, we have solved the conditions and boundaries of two patterns. Based on the second period, we have different conclusions. The bellicosity threshold is around 0.2 (for the previous period, this is</p>	10.1057/s41599-023-02246-0	https://www.nature.com/articles/s41599-023-02246-0.pdf	SpringerLink
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		0.3), and the alliance propensity threshold is around 0.8 (for the previous period, this is 0.7). Moreover, the higher winner cost (beyond 5%) makes it impossible to achieve Unity. This work has one new contribution, such as solving social knowledge. We use BP neural networks to evaluate the knowledge graph to support history learning. It explains civilization patterns for humankind.			
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Research on the construction of weaponry indicator system and intelligent evaluation methods	Wang, Shuai, Du, Yuhong, Zhao, Shuaijie, Hao, Jinhu, Gan, Lian,	To decrease subjective interference and improve the construction efficiency of the traditional weapon and equipment index system, an index system construction method based on target detection is proposed in combination with the equipment test video data. The three-level index system of combat effectiveness of a certain type of equipment is established, and various intelligent assessment methods are proposed. Firstly, an optimaized IPSO-BP network model is proposed, in which dynamic weights are set to improve the particle search network, and adaptive learning factors are introduced to optimize the update speed. Secondly, an improved DS evidence-parallel neural network assessment method is proposed, setting multiple parallel neural networks with different parameters, and improving the angle cosine to weaken the numerical nonlinear attributes in DS evidence fusion and increase the model's assessment operation stability. Thirdly, the three types of view features corresponding to the index item images are extracted to train the base classifiers. The integrated CNN network based	10.1038/s41598-023-46660-5	https://www.nature.com/articles/s41598-023-46660-5.pdf	SpringerLink
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		multi-view feature integration assessment model is constructed and the improved residual network block is introduced to optimize the network gradient. Comparison with existing evaluation methods shows that the proposed methods achieve efficient and intelligent construction and evaluation of the indicator system and enrich the evaluation of indicator data.			
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Selection of Unmanned Aerial Vehicles for Precision Agriculture Using Interval-Valued q-Rung Orthopair Fuzzy Information based TOPSIS Method	Gurmani, Shahid Hussain, Garg, Harish, Zulqarnain, Rana Muhammad, Siddique, Imran,	Precision agriculture refers to the use of advanced technologies and data analytics to optimize farming practices, maximize crop yields, and reduce resource wastage. In precision agriculture monitoring, unmanned aerial vehicles (UAVs) have emerged as a valuable tool for large-scale implementation. The selection of suitable UAVs is a critical aspect of precision agriculture and is deliberated as significant multi-attribute group decision-making (MAGDM) problem. In decision issues, the evaluation of experts about any available options plays an important role. In this context, interval-valued q-rung orthopair fuzzy set (IVq-ROFS) is a useful tool allowing experts to provide their evaluations in a wider space and better deal with incomplete information. This paper aims to develop a new approach to determining expert weights using distance and similarity measures for interval-valued q-rung orthopair fuzzy numbers (IVq-ROFNs). To achieve this, an average group assessment based on individual assessments is constructed. The experts' weights were then established by computing similarity measures between the	10.1007/s40815-023-01568-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40815-023-01568-0	SpringerLink
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		<p>individual evaluations and the average group assessment. Moreover, the technique for order of preference by similarity to the ideal solution (TOPSIS) method is extended to address the MAGDM problem under IVq-ROF information. An example involving UAV selection for precision agriculture is provided to demonstrate the validity of the suggested method, and the impact of parameters on decision results is discussed. Finally, a comparative analysis with existing approaches demonstrates the superiority and advantages of the proposed technique.</p>			
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Sustainable green packaging based on nanocellulose composites-present and future	Antony, Tijo, Cherian, Reeba Mary, Varghese, Rini Thresia, Kargarzadeh, Hanieh, Ponnamma, Deepalekshmi, Chirayil, Cintil Jose, Thomas, Sabu,	<p>Healthy and sustainable solutions achieve remarkable interest to guarantee the freshness and quality of food products through packaging. Currently, packaging materials used in the food industries depend highly on non-degradable materials and thus cause environmental damage. Ideal packaging materials require outstanding mechanical and barrier properties without causing any damage to the packed items. In this sense, biodegradable nanomaterials with good antibacterial performance have much significance in the packaging industry. This review focuses on the growing field of nanocellulose-based packaging materials including the various cellulosic particles reinforced composites. Though cellulose-based materials report high mechanical strength, barrier resistance, and biodegradability, sometimes the antibacterial performance and industrial scaling up of the products are compromised. Therefore, the review aims in exploring the major challenges existing in the field, through a systematic but comprehensive study of existing research studies in the field.</p>	10.1007/s10570-023-05537-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10570-023-05537-6	SpringerLink
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<p>A multi-scale mixed convolutional network for infrared image super-resolution reconstruction</p>	<p>Du, Yan-Bin, Sun, Hong-Mei, Zhang, Bin, Cui, Zhe, Jia, Rui-Sheng,</p>	<p>Infrared image is widely used in military, medical, monitoring security and other fields. Due to the limitation of hardware devices, infrared image has the problems of low signal-to-noise ratio, blurred edge and low contrast. In view of the above problems, In this paper, a super-resolution reconstruction method of infrared image based on mixed convolution multi-scale residual network is proposed. Through the multi-scale residual network to improve the utilization of features, the mixed convolution is introduced into the multi-scale residual network, which can increase the receptive field without changing the size of the feature map and eliminate the blind spots. The extracted features are fused by recursive fusion to improve the utilization of features. Through experiments and tests on multiple infrared image data sets, Through the test on the infrared image data set show that the proposed method can improve the infrared image edge information, fully extract the texture details from the infrared image, and suppress noise. The objective index of the reconstructed infrared image is mainly better than that of the</p>	<p>10.1007/s11042-023-15359-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-15359-0</p>	<p>SpringerLink</p>
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		contrast method, and can still achieve a better reconstruction effect in the real scene.			
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Examining indicators of complex network vulnerability across diverse attack scenarios	Al Musawi, Ahmad F., Roy, Satyaki, Ghosh, Preetam,	Complex networks capture the structure, dynamics, and relationships among entities in real-world networked systems, encompassing domains like communications, society, chemistry, biology, ecology, politics, etc. Analysis of complex networks lends insight into the critical nodes, key pathways, and potential points of failure that may impact the connectivity and operational integrity of the underlying system. In this work, we investigate the topological properties or indicators , such as shortest path length, modularity, efficiency, graph density, diameter, assortativity, and clustering coefficient, that determine the vulnerability to (or robustness against) diverse attack scenarios. Specifically, we examine how node- and link-based network growth or depletion based on specific attack criteria affect their robustness gauged in terms of the largest connected component (LCC) size and diameter. We employ partial least squares discriminant analysis to quantify the individual contribution of the indicators on LCC preservation while accounting for the collinearity stemming from the possible	10.1038/s41598-023-45218-9	https://www.nature.com/articles/s41598-023-45218-9.pdf	SpringerLink
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		<p>correlation between indicators. Our analysis of 14 complex network datasets and 5 attack models invariably reveals high modularity and disassortativity to be prime indicators of vulnerability, corroborating prior works that report disassortative modular networks to be particularly susceptible to targeted attacks. We conclude with a discussion as well as an illustrative example of the application of this work in fending off strategic attacks on critical infrastructures through models that adaptively and distributively achieve network robustness.</p>			
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Quantum–classical co-simulation for smart grids: a proof-of-concept study on feasibility and obstacles	Vereno, Dominik, Khodaei, Amin, Neureiter, Christian, Lehnhoff, Sebastian,	<p>With the rising complexity of our electricity infrastructure, smart grid simulations increasingly rely on co-simulation, which involves jointly executing independent subsystem simulations. However, in large-scale simulation scenarios, such as those involving costly power-flow analysis, co-simulation may experience computational-performance issues. Quantum computing offers a potential solution through quantum–classical co-simulation, in which one or more simulators of an otherwise classical co-simulation are executed on quantum hardware. However, there is no practical realization of this concept that establishes its feasibility. To address this gap, we integrate a quantum power flow simulator with a smart grid co-simulation and conduct an exploratory simulation study using a fictitious case-study scenario. The experiments demonstrate the feasibility of quantum–classical co-simulation; at the same time, they highlight four obstacles to the concept’s realization in practice: (1) To use quantum computing for co-simulation, session-based scheduling is required. (2) Distributed simulation limits possible</p>	10.1186/s42162-023-00292-1	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-023-00292-1	SpringerLink
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		<p>applications and requires proximity of computing resources. (3) For the efficient extraction of classical information from the quantum states, we need carefully designed operators. (4) Current hardware limitations—such as noise susceptibility and the lack of quantum random access memory—limit practical near-term uses of quantum power flow; therefore, attention should be turned to alternative applications that are more promising in the near term. These findings pave the way for future research on quantum–classical co-simulation and its potential applications in smart grids.</p>			
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<p>Cross-border impacts of climate change affect the energy transition: Insights from the Finnish energy sector</p>	<p>Groundstroem, Fanny,</p>	<p>The world is currently in the midst of an energy transition, in which renewable and low-carbon energy is replacing the use of fossil fuels. Along the way, however, planning for and adapting to impacts of climate change is urgently needed, as these are projected to intensify in the future, despite ambitious mitigation efforts. Since the low-carbon energy transition is likely to involve many international interdependencies and connections between countries and regions, assessments of cross-border impacts of climate change, i.e., consequences of climate change that occur remotely from the location of their initial impact, are of utmost importance to ensure the decarbonisation of society is safe and sustainable. This paper utilises expert interviews and a general morphological analysis with the shared socioeconomic pathways to situate national decarbonisation efforts within a global context and identify cross-border impacts of climate change that may affect the energy transition, using the Finnish energy sector as a case study. Interestingly, many of the</p>	<p>10.1007/s10584-023-03619-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10584-023-03619-9</p>	<p>SpringerLink</p>
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		<p>global development trends that were found to have a boosting effect on the Finnish energy transition, also increased the risk from cross-border climate change impacts, stressing the importance of rigorous adaptation planning. The findings affirm the need for studying national energy transitions from a global perspective and highlight the tendency of climate change impacts to be transmitted across borders via complex pathways. The study offers valuable insights into the importance of cross-border impacts for adaptation planning pertinent to any country or region currently engaged, or planning to engage, in the global low-carbon transition.</p>			
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Unleashing the digital building bricks	Muschkiet, Michel, Wulfert, Tobias, Woroch, Robert, Strobel, Gero, Banh, Leonardo,	<p>The increasing online competition, associated changes in customer behaviors, and effects of the pandemic in recent years have led to increasing retail store closures. This development has given rise to a downward spiral in terms of a decreasing attractiveness of local shopping places and a further reduction of stores. Research has recognized that smart services can unleash the potential to compensate for the competitive disadvantages of physical retailers by combining tailored physical and digital offerings to enhance customer-oriented value creation. However, most approaches are limited to in-store services without addressing the wider shopping experience in retail surroundings. Therefore, this paper provides a classification framework for smart services in retail evaluated against 163 use cases, as well as six service archetypes. This work contributes to understanding relevant service design elements and proposes applying the idea of a holistic customer experience to service design in physical retail environments.</p>	10.1007/s12525-023-00666-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-023-00666-z	SpringerLink
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Product representation via networks methodology for exposing project risks	Efrati, Shlomi, Reich, Yoram,	<p>One of the significant factors in the time to market of a technology-based product development project is effective risk management. Both the system engineer and the project manager must work together to map and manage the risks in the project throughout its lifetime. Risks in the project arise from various reasons, which are not necessarily quantifiable, but all of which must be managed by the project team. We propose a methodology for calculating the risk level origin in each system element or component, taking into account its role within the system containing these elements and its availability in the project timeline. This risk level can be used as an additional decision support tool for the project stakeholders. For this purpose, we present a four-step process for (1) graph network mapping of products, (2) applying network algorithms, (3) weighting with information from the project management discipline, and (4) calculating risk index for identifying risks. The resulting level of risk index will enable the project team to map and manage efficiently and effectively the risks arising from the system components</p>	10.1007/s00163-023-00417-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-023-00417-3	SpringerLink
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		throughout the life of the development project. To demonstrate the methodology, we analyzed two products from different fields and at different levels of abstraction. We derived from each case the risk index for the use of the project personnel.			
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<p>Holistic Flexibility for Deploying Systems Thinking as a Cognitive Skill</p>	<p>Chowdhury, Rajneesh,</p>	<p>Considering Systems Thinking (ST) as a cognitive skill can create greater acceptability of and openness to the discipline from practitioners and researchers outside operations research and management science. Rather than associating ST with frameworks and methodologies, ST as a cognitive skill can help popularize and democratize the discipline. This paper highlights how the conceptual lens of Holistic Flexibility can help practitioners deploy ST as a cognitive skill without the application of any traditional systems methodology. Holistic Flexibility is defined as the dynamic interplay between a state of mind that has the ability to absorb systemic complexity and a state of practice that has the ability to embrace flexibility, both in intent and in form. Through two case-studies, discussions in this paper highlight how Holistic Flexibility can serve as a conceptual lens for systems practitioners. The case-studies demonstrate the importance of a practitioner's ability to seamlessly manage and work with multiple variables, stakeholders, and factors to deliver responsible outcomes with the aid of learning loops. The main contribution of</p>	<p>10.1007/s11213-022-09626-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-022-09626-8</p>	<p>SpringerLink</p>
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		<p>this paper lies in the case-studies and analyses presented that provide use cases for Holistic Flexibility in ST, which will help address recent calls in the discipline for ST to be considered as a cognitive skill.</p>			
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<p>A critical review on applications of artificial intelligence in manufacturing</p>	<p>Mypati, Omkar, Mukherjee, Avishek, Mishra, Debasish, Pal, Surjya Kanta, Chakrabarti, Partha Pratim, Pal, Arpan,</p>	<p>The fourth industrial revolution, Industry 4.0, has brought internet, artificial intelligence (AI), and machine learning (ML) concepts into manufacturing. There is an immediate need to understand the capabilities of AI and ML and how they can be implemented in manufacturing domains. This article presents a detailed survey of AI algorithms and their use in manufacturing. The article treats casting, forming, machining, welding, additive manufacturing (AM), and supply chain management (SCM) as six manufacturing verticals. The horizontals in each vertical are the descriptions including, the evolution of each process from the mechanization era to the present-day scenario, and developments in the automation of processes by processing signal and image information and applying ML and AI algorithms. The evolution of robotics and cloud-based technologies is also discussed. The critical review gives a realistic view of manufacturing automation and benefits of AI. Further, the article discusses several manufacturing use cases where AI and ML algorithms are deployed. As a future research direction, human-like intelligence is</p>	<p>10.1007/s10462-023-10535-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-023-10535-y</p>	<p>SpringerLink</p>
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		introduced highlighting the necessity of cognitive skills in manufacturing. In a nutshell, a reader can logically explain why, when, and how far AI will define complete manufacturing.			
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A new paradigm of water, food, and energy nexus	Molajou, Amir, Afshar, Abbas, Khosravi, Mina, Soleimanian, Elham, Vahabzadeh, Masoud, Variani, Hossein Akbari,	<p>In recent decades, global forecasts show that the demands for freshwater, energy, and food have been affected by population growth, economic development, international trade, and increasing urbanization and food diversity. Moreover, cultural changes and other phenomena have adversely affected the water, energy, and food (WEF) resources demand. Consequently, climate change adverse impact, which is an undesirable phenomenon, will be increased at a staggering rate. Numerous studies have emphasized that the lack of integrated and systematic management strategies threaten these indispensable resources' ability to meet growing demand. In many countries, the security of WEF resources, which is related to each other, has become three non-traditional security challenges that overshadow these communities' development. Before realizing the importance of interactions between these three vital resources, the management strategies were typically used for one source, which was completely independent of the other two. Since these strategies did not</p>	10.1007/s11356-021-13034-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-021-13034-1	SpringerLink
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		<p>consider the interactions between the three systems, the applied strategies' results were sometimes contradictory. Also, due to the lack of attention to these three sectors' vital connections, the competition level among these systems has been increased. Therefore, in recent years, the study of the complex interactions and connections between these resources has led to the emergence of a new term called WEF nexus in the scientific communities. Most studies about the WEF nexus have only described the current situation or, ideally, analyzed several predetermined scenarios. However, the adopted approach should be able to analyze different scenarios and be efficient and robust enough to develop a variety of strategies and utilize them for macro-policies. In this study, after reviewing the complex interactions between the WEF systems, it was tried to introduce a novel paradigm for the WEF nexus, which concentrates on expanding the possible space of WEF nexus.</p>			
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RETRACTED ARTICLE: Artificial intelligence-based solutions for climate change: a review	Chen, Lin, Chen, Zhonghao, Zhang, Yubing, Liu, Yunfei, Osman, Ahmed I., Farghali, Mohamed, Hua, Jianmin, Al- Fatesh, Ahmed, Ihara, Ikko, Rooney, David W., Yap, Pow- Seng,	Climate change is a major threat already causing system damage to urban and natural systems, and inducing global economic losses of over \$500 billion. These issues may be partly solved by artificial intelligence because artificial intelligence integrates internet resources to make prompt suggestions based on accurate climate change predictions. Here we review recent research and applications of artificial intelligence in mitigating the adverse effects of climate change, with a focus on energy efficiency, carbon sequestration and storage, weather and renewable energy forecasting, grid management, building design, transportation, precision agriculture, industrial processes, reducing deforestation, and resilient cities. We found that enhancing energy efficiency can significantly contribute to reducing the impact of climate change. Smart manufacturing can reduce energy consumption, waste, and carbon emissions by 30–50% and, in particular, can reduce energy consumption in buildings by 30–50%. About 70% of the global natural gas industry utilizes artificial intelligence	10.1007/s10311- 023-01617-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10311-023-01617-y	SpringerLink
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		<p>technologies to enhance the accuracy and reliability of weather forecasts. Combining smart grids with artificial intelligence can optimize the efficiency of power systems, thereby reducing electricity bills by 10–20%. Intelligent transportation systems can reduce carbon dioxide emissions by approximately 60%. Moreover, the management of natural resources and the design of resilient cities through the application of artificial intelligence can further promote sustainability.</p>			
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<p>Adaptive remaining useful life prediction framework with stochastic failure threshold for experimental bearings with different lifetimes under contaminated condition</p>	<p>Tajiani, Bahareh, Vatn, Jørn,</p>	<p>Deterioration modelling and remaining useful life (RUL) prediction of roller bearings is critical to ensure a safe, reliable, and efficient operation of rotating machinery. RUL prediction models in model-based approaches are often based on constant failure threshold and time-domain features for bearings' failure prognosis. Due to nonlinearity of the acceleration signals, noises, and measurement errors, the time-domain features used as condition indicators are unable to track bearings' degradation successfully and they are mostly utilized for fault diagnosis, especially in the fault classification field using machine learning algorithms. This paper proposes an adaptive RUL prediction framework with a stochastic failure threshold which comprises of two main phases of feature extraction and RUL prediction using laboratory-acquired accelerated life test data obtained from contaminated bearings. The first phase is to decompose the empirical input signals into different frequency bands using some time–frequency transformation functions and extract several condition indicators for the second phase. The second phase is based</p>	<p>10.1007/s13198-023-01979-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-023-01979-0</p>	<p>SpringerLink</p>
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		<p>on a stochastic Wiener process while the key parameters of the model are updated iteratively using a Bayesian approach, and RUL at different degradation datapoints is computed numerically. The experimental results showed the good performance of the developed framework. Some factors affecting RUL prediction such as the length of bearing samples, and degradation mechanism are highlighted in the result. The results of this paper can be further used for an effective maintenance optimization, determining an optimal maintenance alarm threshold, improving the reliability and safety of rotating machinery, and reducing the downtime cost.</p>			
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MoDALAS: addressing assurance for learning-enabled autonomous systems in the face of uncertainty	Langford, Michael Austin, Chan, Kenneth H., Fleck, Jonathon Emil, McKinley, Philip K., Cheng, Betty H. C.,	Increasingly, safety-critical systems include artificial intelligence and machine learning components (i.e., learning-enabled components (LECs)). However, when behavior is learned in a training environment that fails to fully capture real-world phenomena, the response of an LEC to untrained phenomena is uncertain and therefore cannot be assured as safe. Automated methods are needed for self-assessment and adaptation to decide when learned behavior can be trusted. This work introduces a model-driven approach to manage self-adaptation of a learning-enabled system (LES) to account for run-time contexts for which the learned behavior of LECs cannot be trusted. The resulting framework enables an LES to monitor and evaluate goal models at run time to determine whether or not LECs can be expected to meet functional objectives and enables system adaptation accordingly. Using this framework enables stakeholders to have more confidence that LECs are used only in contexts comparable to those validated at design time.	10.1007/s10270-023-01090-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-023-01090-9	SpringerLink
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<p>Demand signal transmission in a certified refurbishing supply chain: rules and incentive analysis</p>	<p>Niu, Baozhuang, Chen, Lei, Zou, Zongbao, Ji, Ping,</p>	<p>Retailers, who sell certified refurbished products, usually have accumulated big data on demand properties, and hence, hold demand signal advantages over the other supply chain parties. In practice, we observe that this signal might be voluntarily shared to a rival who sells regular products. We are therefore interested in the incentives of demand signal transmission of the retailer selling certified refurbished products, and the value of an accurate signal for the other supply chain parties, especially in a one-to-two supply chain comprising a manufacturer (producing both regular and certified refurbished products) and two retailers (selling regular and certified refurbished products, respectively). We formulate the two retailers' competition and demand signal properties, and find that it is of the best interest for the manufacturer to produce two products, regardless of the possible downstream competition. We derive interesting demand signal transmission rules that the retailer selling certified refurbished products would voluntarily transmit the signal to the retailer (the rival)</p>	<p>10.1007/s10479-019-03397-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-019-03397-7</p>	<p>SpringerLink</p>
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		<p>selling regular products, while it will not transmit the signal to the upstream manufacturer (the business partner). Even if the retailer selling regular products obtains the signal, it will not transmit the signal to the manufacturer either. We discuss the resulting insights regarding the production cost reduction, the government subsidy, and the product quality improvement. We find that the signal transmission rule is robust, and the retailers' profits may be reduced by the quality improvement of the certified refurbished product.</p>			
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Naturalistic Scene Modelling: Deep Learning with Insights from Biology	Appiah, Kofi, Jin, Zhiyong, Shi, Lei, Kwok, Sze Chai,	Advances in machine learning coupled with the abundances of training data has facilitated the deep learning era, which has demonstrated its ability and effectiveness in solving complex detection and recognition problems. In general application areas with elements of machine learning have seen exponential growth with promising new and sophisticated solutions to complex learning problems. In computer vision, the challenge related to the detection of known objects in a scene is a thing of the past. With the tremendous increase in detection accuracies, some close to that of human detection, there are several areas still lagging in computer vision and machine learning where improvements may call for more architectural designs. In this paper, we propose a physiologically inspired model for scene understanding that encodes three key components: object location, size and category. Our aim is to develop an energy efficient artificial intelligent model for naturalistic scene understanding capable of deploying on a low power neuromorphic hardware. We have reviewed recent advances in deep learning	10.1007/s11265-023-01894-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11265-023-01894-4	SpringerLink
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		<p>architecture that have taken inspiration from human or primate learning systems and provided direct to future advancement on deep learning with inspiration from physiological experiments. Upon a review of areas that have benefitted from deep learning, we provide recommendations for enhancing those areas that might have stalled or grinded to a halt with little or no significant improvement.</p>			
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Emotion Recognition on EEG Signal Using ResNeXt Attention 2D-3D Convolution Neural Networks	Cui, Dong, Xuan, Hongyuan, Liu, Jing, Gu, Guanghua, Li, Xiaoli,	Emotion recognition based on electroencephalogram (EEG) is an important part of human-machine interaction. This paper used deep learning methods to extract EEG data features to achieve the classification of human emotional states. We proposed a emotion recognition method based on two-dimensional convolution neural networks and three-dimensional convolution neural networks, called ResNeXt Attention 2D-3D Convolutional Neural Networks (RA2-3DCNN). The split-convert-merge techniques, residual and attention mechanism are introduced into the shallow network to improve the accuracy of the model. Then, 3D CNN was used to integrate the frequency, spatial and temporal information from EEG signal. Herein, the pre-processed EEG time series data was reconstructed into two-dimensional EEG frames as the input of the model according to the original electrode position. The accuracy of the emotional classification of the RA2-3DCNN was demonstrated by extensive experiments on the DEAP dataset. The results showed that the recognition accuracy of the	10.1007/s11063-022-11120-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11063-022-11120-0	SpringerLink
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		method on arousal and valence classification task was 97.19% and 97.58%, respectively. Our results proved the spatio-temporal effectiveness of the method for emotion classification. In addition, we experimentally verified the optimal cardinality of split-convert-merge techniques in emotion recognition task.			
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Trends in continuous evaluation of software architectures	Soares, Rodrigo C., Capilla, Rafael, Santos, Vinicius, Nakagawa, Elisa Yumi,	<p>The software industry is increasingly facing the need for continuous deployment of systems. This leads to the adoption of continuous activities, including planning, integration, and deployment (a.k.a. Continuous Software Engineering (CSE)). At the same time, systems should exhibit high-quality architectures, which are often achieved through architecture evaluation methods. However, there is little insight of how such evaluation happens in the context of CSE. To cover this gap, we investigate in this work the state of the art of continuous evaluation of software architectures in CSE, including agile processes like SCRUM. For this, we systematically examine the literature to collect and summarize evidence. Our results show a diversity of means for evaluating architectures in continuous mode to support the continuous evolution of systems. We also found how such evaluation has been incorporated within continuous development processes and agile processes like SCRUM and Crystal. We finally derive the main trends and</p>	10.1007/s00607-023-01161-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-023-01161-1	SpringerLink
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		open issues in the area, aiming to support the community to better understand and further consolidate the field of continuous evaluation of software architectures.			
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Systematic Literature Review: Inter-Relatedness of Innovation, Resilience and Sustainability - Major, Emerging Themes and Future Research Directions	Zupancic, N.,	<p>Rationale Research has been using resilience, sustainability and innovation interchangeably, but there is a lack of research that would provide an insight into how they are related to each other. This systematic literature review thus investigates research on sustainability, innovation and resilience, how they are related to each other, and also identifies major, emerging themes and future research directions on these topics.</p> <p>Procedure We used Bibliometrix software to visually describe articles with the highest number of citations, to present the thematic evolution of the field and present a historical map. The triangulation and thematic groups were identified and compared by two independent researchers.</p> <p>Results Resilience is involved in processes, sustainability is concerned with the outcomes, while innovation represents a pathway to achieving both resilience and sustainability. Resilience can ensure the provision of the system functions in the face of shocks and stresses and sustainability can ensure the adequate performance of the system in general. Three major themes were identified,</p>	10.1007/s43615-022-00187-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43615-022-00187-5	SpringerLink
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		<p>'socio-ecological systems', 'transformational innovation' and 'political governance', as well as three emerging themes, 'food security and agriculture', 'businesses and finance' and 'interconnected systems'. There is a need for longitudinal, multi-scale and interdisciplinary research that would explore various aspects of integrating these concepts.</p> <p>Conclusion There is a great overlap between the concepts of resilience, sustainability and innovation.</p> <p>Future research could study these concepts in relation to each other.</p>			
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Requirements management in DevOps environments: a multivocal mapping study	Hernández, Rogelio, Moros, Begoña, Nicolás, Joaquín,	<p>Attention is currently being focused on DevOps, which aims to reduce software development time by means of close collaboration between the development and operations areas. However, little effort has been made to determine the role of requirements management in DevOps. The objective of this study is to help both researchers and practitioners by providing an overview of the best practices regarding requirements engineering in DevOps and identifying which areas still need to be investigated. A multivocal mapping study has, therefore, been carried out in order to study which methodologies, techniques and tools are used to support requirements management in DevOps environments. After applying the review protocol, 37 papers from formal literature and 14 references from grey literature were selected for analysis. The general conclusions obtained after analysing these papers were that, within DevOps, more attention should be paid to:</p> <p>(1) the reuse of requirements in order to identify systems and software artefacts that can serve as a basis for the specification of new projects; (2) the</p>	10.1007/s00766-023-00396-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-023-00396-w	SpringerLink
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		<p>communication of requirements between the different areas of an organisation and the stakeholders of a project; (3) the traceability of requirements in order to identify the relationship with other requirements, artefacts, tasks and processes; (4) non-functional requirements in order to identify the requirements of the operations area in the early phases of a project; and finally (5) specific requirements tools that should be seamlessly integrated into the DevOps toolchain. All these issues must be considered without ignoring the agile and continuous practices of development, operations and business teams. More effort must also be made to validate new methodologies in industry so as to assess and determine their strengths and weaknesses.</p>			
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Recent Reinforcement Learning and Blockchain Based Security Solutions for Internet of Things: Survey	Gasmi, Rim, Hammoudi, Sarra, Lamri, Manal, Harous, Saad,	<p>Users' security is one of the most important issues in Internet of Things (IoT) due to the high number of IoT devices involved in different applications. Security threats are evolving at a rapid pace that make the current security and privacy measures unsuitable. Therefore, several researchers have been attracted by this domain with the aim of proposing either new or improved solutions to address the problem of security in IoT. Blockchain technology is a relatively new invention in modern IoT applications to solve the security issue. It is based on the use of a public immutable ledger called a blockchain. After conducting a verification process, several parts on a network encode transactions into this ledger. Moreover, Machine learning (ML) algorithms have been used as emerging solutions to improve IoT security. Reinforcement learning (RL) is the most popular machine learning technique proposed to secure IoT systems. Unlike other ML methods, RL can observe, learn and interact with the environment even if it has minimum information about the considered parameters. Various researches have</p>	10.1007/s11277-023-10664-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-023-10664-1	SpringerLink
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		<p>been proposed to treat security problem in IoT based on either RL technique or Blockchain technology or a combination of both techniques. Therefore, we believe there is a need for a comprehensive survey on works proposed in recent years that address security issues using these techniques. In this paper, we provide a summary of research efforts made in the past few years, from 2018 to 2021, addressing security issues using RL and blockchain techniques in the IoT domain.</p>			
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Application of social media in supply chain 4.0 practices: a bibliometric analysis and research trends	Hoang, Thu-Hang, Nguyen, Nhi Pham Phuong, Hoang, Nhu-Y Ngoc, Akbari, Mohammadreza, Quang, Huy Truong, Binh, An Duong Thi,	In recent years, although scholars and practitioners in the supply chain (SC) field have become increasingly aware of the importance of social media for multipurpose applications, the subject remains unclarified about its functions and outcomes, especially in the 4.0 context. This review paper aims to visualize the big picture and structure of knowledge related to the application of social media in managing supply chains by adopting a bibliometric analysis on a sample of 354 research articles retrieved from the Web of Science during the period between 2008 and 2022 with two widely used bibliometric techniques: co-citation and co-word analysis. We discovered five major clusters of how social media is used in the supply chain context, including (1) in enhancing supply chain sustainability and business transformation, (2) social media analytics as an effective technique to extract business value, (3) in facilitating communication and coordination in the supply chain network, (4) in promoting social interaction and customer relationship management, and (5) in the development of supply chain relationship management.	10.1007/s12063-023-00378-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12063-023-00378-9	SpringerLink
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		<p>These will enable practitioners to adopt early changes in their SC, allowing them to become competitive and gain market leadership. Supply chain managers can connect with other SC stakeholders and share information through social media to improve operations, establish relationships, reduce risks, and altogether reach for sustainability. Potential research ideas are also offered for future investigation.</p>			
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Behavioural factors for Industry 4.0 adoption: implications for knowledge-based supply chains	Taqi, Hasin Md. Muhtasim, Nur, S. M. Shafaat Akhter, Salman, Sheak, Ahmed, Tazim, Sarker, Sudipa, Ali, Syed Mithun, Sankaranarayana n, Bathrinath,	Industry 4.0 (I4.0) is a relatively new and still emerging concept. Due to its novelty, companies find it extremely difficult to adopt I4.0 and reap the full benefit of the digital transformation of the fourth industrial revolution. Even though challenges to I4.0 adoption are well explored, the extant literature has hardly investigated the numerous human-based behavioural factors that are fundamental for I4.0 adoption. Human experience, engagement, and dedication to I4.0 adoption are crucial due to the complex nature of human behaviour and can significantly affect the success of I4.0 adoption. To address the gap, this paper aims to unveil the indispensable behavioural factors for I4.0 adoption and portray a hierarchical relationship among these factors. An extensive literature review is conducted to identify behaviour critical for I4.0 adoption to operationalise this research. Then, a decision support framework based on the Delphi technique and a revised rough DEMATEL method is used to map the relationships among the behavioural factors. The results reveal that the most critical behavioural factor	10.1007/s12063-022-00338-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12063-022-00338-9	SpringerLink
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		<p>to I4.0 adoption is “communication,” which is followed by “I4.0 training” and “resistance to I4.0 initiatives”. This study substantiates the research on I4.0 adoption and assists in I4.0 adoption. I4.0 adoption is also essential for a country's competitiveness; therefore, the paper will support relevant policy formulation.</p>			
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Assessing the impact of green human resource management practices on environmental performance in China: role of higher education	Ba, Yaer, Cao, Limei,	<p>The goal is for governments and executives to make environmental protection and the preservation of natural resources a priority. The current research examines how green human resource management practices have altered environmental performance in China's manufacturing sector. The survey used a trustworthy and valid questionnaire adapted from the literature to obtain the data. Random sampling method has been applied to collect data from manufacturers in China's Guangdong Province. Workers in China's industrial sector are the focus of this study, and each individual is treated as a separate unit of analysis. Three hundred of the 500 questionnaires were returned with sufficient data for statistical analysis. The predicted serial mediation model was analyzed using structural equation modeling (SEM) and the PROCESS model 4. The findings revealed that green HRM practices have a major impact on environmental performance and pro-environmental actions partially mediate the relationship between GHRM and</p>	10.1007/s11356-023-28523-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-023-28523-8	SpringerLink
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		<p>environmental performance. In addition, higher education helped moderate the effect of green HRM on environmental outcomes. In terms of environmental performance, green recruitment, green selection, and green performance, green rewards via higher education has the greatest impact ($p < 0.01$ significance level). Through an extension of the ability-motivation-opportunity theory, this study offers useful tips for policymakers, new and current organizations, and, in particular, manufacturing enterprises, on how to implement an incentive plan to promote environmentally friendly activities and product development, which in turn will increase customer loyalty.</p>			
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Decentralized brokered enabled ecosystem for data marketplace in smart cities towards a data sharing economy	Anthony, Bokolo, Jr,	<p>Presently data are indispensably important as cities consider data as a commodity which can be traded to earn revenues. In urban environment, data generated from internet of things devices, smart meters, smart sensors, etc. can provide a new source of income for citizens and enterprises who are data owners. These data can be traded as digital assets. To support such trading digital data marketplaces have emerged. Data marketplaces promote a data sharing economy which is crucial for provision of available data useful for cities which aims to develop data driven services. But currently existing data marketplaces are mostly inadequate due to several issues such as security, efficiency, and adherence to privacy regulations. Likewise, there is no consolidated understanding of how to achieve trust and fairness among data owners and data sellers when trading data. Therefore, this study presents the design of an ecosystem which comprises of a distributed ledger technology data marketplace enabled by message queueing telemetry transport (MQTT) to facilitate trust and fairness among data</p>	10.1007/s10669-023-09907-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-023-09907-0	SpringerLink
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		<p>owners and data sellers. The designed ecosystem for data marketplaces is powered by IOTA technology and MQTT broker to support the trading of sdata sources by automating trade agreements, negotiations and payment settlement between data producers/sellers and data consumers/buyers. Overall, findings from this article discuss the issues associated in developing a decentralized data marketplace for smart cities suggesting recommendations to enhance the deployment of decentralized and distributed data marketplaces.</p>			
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Recordkeeping, logistics, and translation: a study of homeless services systems as infrastructure	Tracey, Pelle, Garcia, Patricia, Punzalan, Ricardo,	Homeless services systems provide unhoused individuals access to emergency shelter, subsidized housing, and other life-sustaining resources. In this paper, we present a qualitative study that draws on the experiences of fifteen social service workers to examine how recordkeeping practices sustain homeless services systems and unite a tangled web of institutions and actors, including public housing systems, nonprofit agencies, and local governments. We address the following research questions: How is the infrastructure of homeless services sustained by recordkeeping? How are social service workers affected by increasing recordkeeping demands? In what ways do social service workers work against or 'find the play' in this system? To address these questions, we collected interviews and conducted artifact walkthroughs with our study participants. We analyzed the data using an infrastructural lens and found that current recordkeeping practices within homeless services systems comprise an "infrastructure of last resort" that functions	10.1007/s10502-023-09410-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10502-023-09410-0	SpringerLink
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		<p>logistically, prioritizing efficiency and speed. We also found that social service workers “speak back” to logistification by making the homeless services infrastructure more legible to their unhoused clients through mediation and acts of translation that help to produce better resource outcomes. Our findings show how structuring recordkeeping in ways that privilege efficiency and speed disrupts social service work and interferes with social service workers’ ability to provide care for vulnerable individuals facing life-altering and life-threatening hardships.</p>			
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Performance enhancement of smart grid integration using a novel intellectual multi-objective control technique	Chandel, Aseem, Naruka, Mahavir Singh,	<p>Now a days, electric power infrastructure is an essential section of the world due to the increase in power demand and industrialization. The smart grid is also one of the profoundly evolved innovations, which influences the synchronization between demand and renewable energy reactions. The smart grids contain many operations with power calculations such as smart functions, assurance, and control techniques to provide steadiness and proficiency to the system performance. However, the quality of power such as voltage deviation minimization, sag/swell, power loss minimization, and Total Harmonic Distortion (THD) appear to be the major issue. Therefore, in this paper, a novel Generalized Approximate Reasoning Intelligent Control along with Multi-objective African Buffalo Optimization is proposed to control the imperatives of the smart grid. In the grid, current controllers are upgraded by the proposed Optimal Pseudospectral Bang Bang Control technique, and voltage controllers are improved by the proposed Bessel Filter Sallen Key Topology. The simulation of the</p>	10.1007/s00500-023-07881-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-023-07881-y	SpringerLink
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		proposed method is actualized with MATLAB/Simulink. Consequently, the projected results are compared with the traditional control techniques and the outcomes show that the projected replica improved system efficiency concerning power quality problems in terms of reduced 14 MW of power loss and 2.18% of THD.			
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<p>Scalable big earth observation data mining algorithms: a review</p>	<p>Sisodiya, Neha, Dube, Nitant, Prakash, Om, Thakkar, Priyank,</p>	<p>Enormous amount of earth information, gathered from satellite sensors, simulations, and other resources, are collectively referred to as Big Earth Observation Data (BEOD). The data contains remarkable insights and spatio-temporal stamps of pertinent Earth phenomena for enhancing our knowledge, responding, and addressing demanding situations of earth sciences and observations. However, However, traditional data mining algorithms are generally time-inefficient, making it difficult to process and analyze BEOD. To address this challenge, we explore two ways to enhance scalability: 1) improving the algorithm with specific parameters or data modifications when run on a single machine, and 2) making the algorithm parallel through distributed execution on multiple machines, such as with cluster-based implementations. We also suggest improvements for existing techniques and widely used algorithms for processing BEOD. In this review, we conduct a systematic review of data mining techniques for classification, clustering, prediction, regression,</p>	<p>10.1007/s12145-023-01032-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-023-01032-5</p>	<p>SpringerLink</p>
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		<p>association rules, pattern mining, and anomaly detection to determine their scalability and performance on various Earth observation use cases. We explored advanced mining techniques, including statistical, machine learning, and deep learning approaches, for handling BEOD at scale. We also identified potential challenges, open research issues, and provide future directions for the development of scalable algorithms for mining BEOD. We observed that applying data mining techniques on BEOD introduces serious concerns since the data has both spatial and temporal components. Statistical and machine learning models such as ARIMA, SARIMA, Naive Bayes, Bayesian networks, KNN, and K-means, as well as SVM, are not suitable for working with the volume and heterogeneity present in the data, but it can be improved by employing big data environments. Nowadays, deep learning-based techniques are popularly used for working with large amounts of data, but it requires specialized systems and upgrades as the data volume increases. This issue can be addressed</p>			
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		<p>through a big data platform. A unified deep learning architecture can be employed to handle both the spatial and temporal components of BEOD, and performance can be improved by deploying the architecture on a big data environment. Therefore, this study also reveals that, although deep learning architectures are efficient and trending, traditional statistical methods and machine learning can achieve competitive or sometimes improved performance with the involvement of big data technologies and/or internal data representation.</p>			
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DAEMON: A Domain-Based Monitoring Ontology for IoT Systems	Daoudagh, Said, Marchetti, Eda, Calabrò, Antonello, Ferrada, Filipa, Oliveira, Ana Inês, Barata, José, Peres, Ricardo, Marques, Francisco,	Internet of Things (IoT) is an emerging technology used in several contexts and domains. The work aims to define a technological reference solution specifically conceived for monitoring and assessing the behavior of IoT systems from the cybersecurity perspective when a new device or component joins the system. We leverage semantic web technologies, such as ontologies, for defining DAEMON, a domain-based ontology that formally models monitoring, IoT, and System of Systems (SoS) domains' knowledge. We also propose a supporting architecture and describe the proof-of-concept implementing different components. We have validated and showcased our proposal by instantiating DAEMON into a multi-robot autonomous navigation scenario applied to the intralogistics domain.	10.1007/s42979-023-01975-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-023-01975-y	SpringerLink
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<p>Interdependence of social-ecological-technological systems in Phoenix, Arizona: consequences of an extreme precipitation event</p>	<p>Helmrich, Alysha, Kuhn, Amanda, Roque, Anaís, Santibanez, Ameyalli, Kim, Yeowon, Grimm, Nancy B., Chester, Mikhail,</p>	<p>Complex adaptive systems – such as critical infrastructures (CI) – are defined by their vast, multi-level interactions and emergent behaviors, but this elaborate web of interactions often conceals relationships. For instance, CI is often reduced to technological components, ignoring that social and ecological components are also embedded, leading to unintentional consequences from disturbance events. Analysis of CI as social-ecological-technological systems (SETS) can support integrated decision-making and increase infrastructure's capacity for resilience to climate change. We assess the impacts of an extreme precipitation event in Phoenix, AZ to identify pathways of disruption and feedback loops across SETS as presented in an illustrative causal loop diagram, developed through semi-structured interviews with researchers and practitioners and cross-validated with a literature review. The causal loop diagram consists of 19 components resulting in hundreds of feedback loops and cascading failures, with surface runoff, infiltration, and water bodies as well as power, water, and</p>	<p>10.1186/s43065-023-00085-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s43065-023-00085-6</p>	<p>SpringerLink</p>
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		<p>transportation infrastructures appearing to have critical roles in maintaining system services. We found that pathways of disruptions highlight potential weak spots within the system that could benefit from climate adaptation, and feedback loops may serve as potential tools to divert failure at the root cause. This method of convergence research shows potential as a useful tool to illustrate a broader perspective of urban systems and address the increasing complexity and uncertainty of the Anthropocene.</p>			
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<p>Navigating Uncertainty in Weapon System-of-Systems Planning: A Hybrid Multiobjective Network-Based Optimization and Fuzzy Set Approach</p>	<p>Hu, Chongshuang, Wang, Xingliang, Li, Minghao, Jiang, Jiang,</p>	<p>The evaluation of the capability of network-based systems of systems has replaced the simple method that considers return on investment, becoming a new paradigm for planning national defence capabilities. However, the dual uncertainty of the key system attributes of scenes and weapons has brought great challenges for decision-making. Based on this, we developed a multiobjective optimization model with multiple stages and scenarios under uncertainty to determine plans. In this study, we consider planning risk and planning cost as the two objectives. To solve this problem, we propose a hybrid solution for a network-based optimization method integrated with fuzzy set theory. The network-based optimization method combines the NSGA-II-DE and complex network theory. We use the characteristics of the network to evaluate the capabilities of the WSoS, and the NSGA-II-DE is used to generate a development plan and finally output a set of Pareto optimal solutions. We use fuzzy sets to determine the fuzzy membership of each plan on the Pareto front and determine a satisfactory</p>	<p>10.1007/s44196-023-00313-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s44196-023-00313-7</p>	<p>SpringerLink</p>
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		<p>solution. Finally, we conduct simulation experiments to verify the rationality of the methods proposed in this article. The results can provide a set of efficient solutions for military planners, helping generate a variety of planning solutions and trade-offs according to their preferences.</p> <p>Graphical Abstract</p>			
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Perceptions of chief clinical information officers on the state of electronic health records systems interoperability in NHS England: a qualitative interview study	Li, Edmond, Lounsbury, Olivia, Clarke, Jonathan, Ashrafian, Hutan, Darzi, Ara, Neves, Ana Luisa,	<p>Background In the era of electronic health records (EHR), the ability to share clinical data is a key facilitator of healthcare delivery. Since the introduction of EHRs, this aspect has been extensively studied from the perspective of healthcare providers. Less often explored are the day-to-day challenges surrounding the procurement, deployment, maintenance, and use of interoperable EHR systems, from the perspective of healthcare administrators, such as chief clinical information officers (CCIOs).</p> <p>Objective Our study aims to capture the perceptions of CCIOs on the current state of EHR interoperability in the NHS, its impact on patient safety, the perceived facilitators and barriers to improving EHR interoperability, and what the future of EHR development in the NHS may entail.</p> <p>Methods Semi-structured interviews were conducted between November 2020 – October 2021. Convenience sampling was employed to recruit NHS England CCIOs. Interviews were digitally recorded and transcribed verbatim. A thematic analysis was performed by two independent researchers to</p>	10.1186/s12911-023-02255-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12911-023-02255-8	SpringerLink
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		<p>identify emerging themes. Results</p> <p>Fifteen CCIOs participated in the study.</p> <p>Participants reported that limited EHR interoperability contributed to the inability to easily access and transfer data into a unified source, thus resulting in data fragmentation.</p> <p>The resulting lack of clarity on patients' health status negatively impacts patient safety through suboptimal care coordination, duplication of efforts, and more defensive practice.</p> <p>Facilitators to improving interoperability included the recognition of the need by clinicians, patient expectations, and the inherent centralised nature of the NHS.</p> <p>Barriers included systems usability difficulties, and institutional, data management, and financial-related challenges.</p> <p>Looking ahead, participants acknowledged that realising that vision across the NHS would require a renewed focus on mandating data standards, user-centred design, greater patient involvement, and encouraging inter-organisational collaboration.</p> <p>Conclusion</p> <p>Tackling poor interoperability will require solutions both at the technical level and in the wider policy context.</p> <p>This will involve demanding interoperability</p>			
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		functionalities from the outset in procurement contracts, fostering greater inter-organisation cooperation on implementation strategies, and encouraging systems vendors to prioritise interoperability in their products. Only by comprehensively addressing these challenges would the full potential promised by the use of fully interoperable EHRs be realised.			
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<p>The cost of inadequate postharvest management of pulse grain: Farmer losses due to handling and storage practices in Uganda</p>	<p>Ariong, Richard M., Okello, Daniel M., Otim, Michael Hilary, Paparu, Pamela,</p>	<p>Background Investing in postharvest technologies is one way of reducing food losses with the aim of achieving food security, but it is often overlooked. In this study, we assessed the losses and costs associated with the harvest and postharvest practices used by smallholder bean farmers in Uganda. We also estimated the grain Moisture Content (MC) associated with traditional storage practices. Results Harvest and postharvest handling practices result in a loss of about 22% of the crop harvest. The cost associated with this loss is 17% of the output value. In addition, the common storage practices used by farmers are unable to maintain the required grain MC of 13%. As even a slight change in grain MC can significantly impact storage duration, we found that 74% of farmers fail to meet the required MC, resulting in a loss of anticipated price premiums over an average storage duration of 80 days. Our econometric estimates suggest that storing grain in bags placed above the floor surface could reduce MC by an additional 1.5%. Conclusions Our predictions indicate that farmers who use traditional practices should</p>	<p>10.1186/s40066-023-00423-7</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40066-023-00423-7</p>	<p>SpringerLink</p>
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		<p>store bean grains for less than 60 days, or they should adopt better storage practices to increase shelf life and ensure food safety. If more farmers had placed their grain above the floor surface, 48% rather than 26% would have met the required MC at 90 days. It is worth noting that poor postharvest handling has significant economic implications and can lead to food safety concerns due to quality failures in the grain. To address these issues, there is a need to scale up interventions that increase farmer access to postharvest technologies.</p>			
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<p>A critical analysis of the integration of blockchain and artificial intelligence for supply chain</p>	<p>Charles, Vincent, Emrouznejad, Ali, Gherman, Tatiana,</p>	<p>The integration between blockchain and artificial intelligence (AI) has gained a lot of attention in recent years, especially since such integration can improve security, efficiency, and productivity of applications in business environments characterised by volatility, uncertainty, complexity, and ambiguity. In particular, supply chain is one of the areas that have been shown to benefit tremendously from blockchain and AI, by enhancing information and process resilience, enabling faster and more cost-efficient delivery of products, and augmenting products' traceability, among others. This paper performs a state-of-the-art review of blockchain and AI in the field of supply chains. More specifically, we sought to answer the following three principal questions: Q1—What are the current studies on the integration of blockchain and AI in supply chain?, Q2—What are the current blockchain and AI use cases in supply chain?, and Q3—What are the potential research directions for future studies involving the integration of blockchain and AI? The analysis performed in this paper has</p>	<p>10.1007/s10479-023-05169-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-023-05169-w</p>	<p>SpringerLink</p>
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		identified relevant research studies that have contributed both conceptually and empirically to the expansion and accumulation of intellectual wealth in the supply chain discipline through the integration of blockchain and AI.			
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Use cases also exist for attackers—how to foster the concept of misuse cases	Azamat, Mana, Schütz, Johann, Uslar, Mathias,	<p>Due to the new digital control structures of cyber-physical energy systems (CPES), where the control interventions no longer take place physically on site but are triggered, released, executed and acknowledged remotely by automated control systems, there is not only the risk of incorrect actions by plants or operators, but also of possible attacks or misuses. In this contribution, we propose an integrated security-by-design approach (on a conceptual level) for testing the interoperability of various heterogeneous systems (e.g., TSO-DSO communications) by combining multiple, but yet separated, state-of-the-art approaches. With the objective of eliminating or minimizing the impact of cyber incidents, best practices from various sectors have been adapted and integrated with well-established methods and standards from the energy sector, such as the IEC 625592 use case template.</p> <p>Aufgrund der neuen digitalen Steuerungsstrukturen von cyber-physischen Energiesystemen (CPES), bei denen die Steuerungseingriffe nicht mehr physisch vor Ort stattfinden, sondern von automatisierten</p>	10.1007/s00502-023-01151-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-023-01151-3	SpringerLink
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		<p>Steuerungssystemen aus der Ferne ausgelöst, freigegeben, ausgeführt und quittiert werden, besteht nicht nur die Gefahr von Fehlhandlungen durch Anlagen oder Betreiber, sondern auch durch mögliche Angriffe oder Missbrauch. In diesem Beitrag wird ein integrierter Security-by-Design-Ansatz (auf konzeptioneller Ebene) für die Prüfung der Interoperabilität verschiedener heterogener Systeme (z.B. TSO-DSO-Kommunikation) vorgeschlagen, indem mehrere, aber bisher unabhängige, Ansätze des State-of-the-Art kombiniert werden. Mit dem Ziel, die Auswirkungen von Cyber-Zwischenfällen zu eliminieren oder zu minimieren, wurden bewährte Verfahren aus verschiedenen Sektoren herangezogen, angepasst und mit etablierten Methoden und Standards aus dem Energiesektor, wie z.B. dem IEC 62559-2 Use Case Template, integriert.</p>			
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Towards an interoperability roadmap for the energy transition	Reif, Valerie, Strasser, Thomas I., Jimeno, Joseba, Farre, Marjolaine, Genest, Oliver, Gyrard, Amélie, McGranaghan, Mark, Lipari, Gianluca, Schütz, Johann, Uslar, Mathias, Vogel, Sebastian, Bytyqi, Arsim, Dornmair, Rita, Corusa, Andreas, Roy, Gaurav, Ponci, Ferdinanda, Dognini, Alberto, Monti, Antonello,		10.1007/s00502-023-01144-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-023-01144-2	SpringerLink
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<p>Federated Learning on Multimodal Data: A Comprehensive Survey</p>	<p>Lin, Yi-Ming, Gao, Yuan, Gong, Mao-Guo, Zhang, Si-Jia, Zhang, Yuan-Qiao, Li, Zhi-Yuan,</p>	<p>With the growing awareness of data privacy, federated learning (FL) has gained increasing attention in recent years as a major paradigm for training models with privacy protection in mind, which allows building models in a collaborative but private way without exchanging data. However, most FL clients are currently unimodal. With the rise of edge computing, various types of sensors and wearable devices generate a large amount of data from different modalities, which has inspired research efforts in multimodal federated learning (MMFL). In this survey, we explore the area of MMFL to address the fundamental challenges of FL on multimodal data. First, we analyse the key motivations for MMFL. Second, the currently proposed MMFL methods are technically classified according to the modality distributions and modality annotations in MMFL. Then, we discuss the datasets and application scenarios of MMFL. Finally, we highlight the limitations and challenges of MMFL and provide insights and methods for future research.</p>	<p>10.1007/s11633-022-1398-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11633-022-1398-0</p>	<p>SpringerLink</p>
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Natural disasters, resilience-building, and risk: achieving sustainable cities and human settlements	Khan, Muhammad Tariq Iqbal, Anwar, Sofia, Sarkodie, Samuel Asumadu, Yaseen, Muhammad Rizwan, Nadeem, Abdul Majeed, Ali, Qamar,	Reducing natural disasters and their related economic losses remains critical to achieving sustainable development. However, there is a lack of comprehensive studies that assess sustainable cities and human settlements in efforts to attain sustainable development goal 11.5. Here, the present research explains the effect of disaster risk and disaster resilience on human loss due to natural disasters (deaths, injured, and affected) in 90 countries spanning 1995 to 2019. We develop global risk and resilience indices through IMF index-making steps across 24 high, 24 upper-middle, 30 lower-middle, and 12 low-income countries. The negative binomial regression shows an increase in disaster-related loss to human beings (deaths, injured, and affected) due to disaster risk in all panels. The empirical results reveal a favorable impact of disaster resilience—resilience declines disaster-related losses in developed countries. We observe that focusing on basic infrastructure, economic stability, public awareness, hygiene practices, ICT, and effective institutions leads to disaster resilience, mitigation, and	10.1007/s11069-023-06021-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-06021-x	SpringerLink
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		<p>speedy post-disaster recovery. Due to the insignificant impact of resilience in developing countries, high-income countries could provide financial resources, modern and DRR technologies, especially to low-income economies. This study encourages countries to follow seven targets and four dimensions of the Sendai Framework to enhance disaster resilience.</p>			
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ReTrust: reliability and recommendation trust-based scheme for secure data sharing among internet of vehicles (IoV)	Tripathi, Kuldeep Narayan, Yadav, Ashish Mohan, Nagar, Surendra, Sharma, S. C.,	The Internet of Vehicles (IoV) uses wireless communication for establishing a distributed, dynamic, and temporary network among the vehicles on the road. Due to their dynamic topology, distributed structure, and open nature, vehicular communication networks (VCN) are vulnerable to numerous security vulnerabilities. Moreover, the limited transmission range of vehicles and the dynamic network topology makes data transmission arduous and require a special routing mechanism to handle these challenges in real-time. This work aims to utilize reliable intermediate relay vehicles to securely forward messages to the appropriate recipients in vehicular communication networks. A trust-based security approach has been fascinating in a vehicular communication network to identify rogue vehicles and establish a reliable communication channel among the vehicles. This paper presents a new reliability and recommendations (ReTrust) based scheme using a combined trust model to detect rogue nodes in the IoV network. A convenient combined trust-based security algorithm has been proposed to	10.1007/s11276-023-03336-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-023-03336-2	SpringerLink
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		<p>assess vehicles' trustworthiness and identify the rogue vehicles in the network based on the estimated trust value. Moreover, Direct trust has been calculated based on multiple factors, including communication and data reliability. In addition, the recommendation trust has been assessed using the cooperation of neighbouring vehicles. The proposed method uses the similarity measure and correlation coefficient to classify the fabricated recommendation values in the network. Extensive simulation tests were conducted using the network simulator NS-2 and VANET-MobiSim to evaluate the suggested method's performance. The effectiveness of the proposed scheme has been evaluated using different quality of service parameters, and the results reveal that the ReTrust performs admirably. The simulation outcomes validate that the ReTrust scheme has a high detection rate (> 90%) and a low false-positive rate (<5%). This mechanism could be useful for creating a trusted vehicular network and providing secure vehicle communication for safety-related applications.</p>			
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Using FIWARE and blockchain in smart cities solutions	Loss, Stefano, Singh, Har Preet, Cacho, Nélío, Lopes, Frederico,	<p>Nowadays, Blockchain has been widely used to store decentralized and secure transactions involving cryptocurrency, e.g., Bitcoin, Ethereum, etc. However, Blockchain can also store other types of information besides monetary transactions. On the other hand, innovative solutions for smart cities are concerned with how services and information can be safely stored and shared. For this reason, smart city systems can benefit from using Blockchain to integrate their data and services. These smart solutions also demand consistency and standardization across the industry. However, this Blockchain integration varies according to its implementation. FIWARE, a framework of an open-source platform for smart solutions, adopts NGSI Standards (Context Information Management (CIM); NGSI-LD API: Tech. Rep., CIM and ETSI Industry Specification Group (ISG), 2020) to enable the integration of components and provides the basis for interoperability and portability among smart solutions. Unfortunately, FIWARE does not support any integration with Blockchain technology. Hence, this paper</p>	10.1007/s10586-022-03732-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-022-03732-x	SpringerLink
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		<p>proposes a set of new components to allow FIWARE to be integrated with Blockchain technology. With these proposed components, it is possible to support Blockchain technology with smart city applications via the FIWARE platform. For instance, we have designed and implemented a FIWARE Blockchain adapter to submit/listen to transactions from/to FIWARE Context Broker to/from any Blockchain implementation without human intervention. In addition, we present a global post-pandemic vaccination case study to evaluate the proposed approach in the Smart City context.</p>			
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Blazing the Trail: Considering Browsing Path Dependence in Online Service Response Strategy	Zuo, Meihua, Angelopoulos, Spyros, Liang, Zhouyang, Ou, Carol X. J.,	Competition on e-commerce platforms is becoming increasingly fierce, due to the ease of online searching for comparing products and services. We examine how the sequential browsing behavior of consumers can enable targeted marketing strategies on e-commerce platforms, by using clickstream data from one of the largest e-commerce platforms in Asia. We deploy duration analysis to i) explore how path dependence can better explain consumers' sequential browsing behavior in different product categories, and ii) characterize the sequential browsing behavior of heterogeneous consumer groups. The findings of our work showcase i) the high accuracy of using sequential browsing path dependence to explain consumer behavior, ii) the patterns of their behavioral intentions and iii) the spell of the behavior of heterogeneous consumer groups. Our findings provide nuanced implications for strategically managing branding, marketing, and customer relations on e-commerce platforms. We discuss the implications of our findings for both research	10.1007/s10796-022-10311-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-022-10311-3	SpringerLink
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		and practice, and we delineate an agenda for future research on the topic.			
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Why Organizations Fail in Implementing Enterprise Architecture Initiatives?	Gong, Yiwei, Janssen, Marijn,	Enterprise architecture (EA) initiatives consist of functions, processes, tools, instruments, and principles to guide the design of IT and its alignment with business. EA is often presented as a silver bullet to ensure that IT contributes to business. Yet, many EA initiatives do not work out or even fail, but in the literature this area is undertheorized. This study aims to understand the factors influencing the failure of EA initiatives. We identified 15 factors and invited 8 EA experts to evaluate the factors and their influence based on an approach combining grey systems theory, Decision-Making and Trial Evaluation Laboratory (DEMATEL), and Interpretative Structural Modeling (ISM). The findings indicate that the factors are correlated and interwoven in complex causal chains. This study reveals the root factor and suggests enhancing high-level managers' EA knowledge and ensuring communication and leadership skills of enterprise architects as the starting point to avoid EA failure. Only later, organizing the EA function becomes important.	10.1007/s10796-022-10298-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-022-10298-x	SpringerLink
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Security Algorithm for Intelligent Transport System in Cyber-Physical Systems Perceptive: Attacks, Vulnerabilities, and Countermeasures	Pavithra, R., Kaliappan, Vishnu kumar, Rajendar, Sivaramakrishnan,	Upcoming technological innovations and findings are immense in the field of intelligent transport systems (ITS). Cyber-physical systems (CPSs) are complex systems that integrate communication, control, and computing technology. CPSs are widely used today in intelligent transportation. For every development of a new system, there is a parallel offender who initiates the attack to destroy the root of the system developed. The attack category is infinite in such developing technology. In this paper, we have focused on preserving the security of ITS from cyber-physical systems perceptive, and various vulnerabilities, attacks, and countermeasures against ITS. Reinforcement learning is the latest buzzword in which an agent can understand and explain the environment, perform an action, and learn through trial and error. The paper also explains how reinforcement learning helps ITS in terms of security.	10.1007/s42979-023-01897-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-023-01897-9	SpringerLink
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Continuous user identification in distance learning: a recent technology perspective	Portugal, David, Faria, José N., Belk, Marios, Martins, Pedro, Constantinides, Argyris, Pietron, Anna, Pitsillides, Andreas, Avouris, Nikolaos, Fidas, Christos A.,	The worldwide shift to distance learning at Higher Education Institutions (HEIs) during the COVID-19 global pandemic has raised several concerns about the credibility of online academic activities, especially regarding student identity management. Traditional online frameworks cannot guarantee the authenticity of the enrolled student, which requires instructors to manually verify their identities, a time-consuming task that compromises academic quality. This article presents a comprehensive review of existing efforts around continuous user identification, focusing on intelligent proctoring systems and automatic identification methods, as well as their applicability in this domain. We conclude that there is a clear need for continuous user identification technology by HEIs, but existing systems lack agile system integration models that combine many inputs, such as face, voice and behavioural data in a practical manner, and encounter numerous barriers related to data protection during implementation.	10.1186/s40561-023-00255-9	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40561-023-00255-9	SpringerLink
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Interconnectedness enhances network resilience of multimodal public transportation systems for Safe-to-Fail urban mobility	Xu, Zizhen, Chopra, Shauhrat S.,	<p>The growing interconnectedness of networked infrastructures has a complex impact on resilience in urban environments. Xu and Chopra quantify these effects using network resilience analysis and highlight the benefits of topological interconnectedness within multimodal public transportation systems. The growing interconnectedness of urban infrastructure networks presents challenges to their ability to handle unforeseen disruptions, particularly in the context of extreme weather events resulting from climate change. Understanding the resilience of interconnected infrastructure systems is imperative to effectively manage such disruptions. This study investigates the role of interconnectedness in enhancing the resilience of public transportation systems in Hong Kong, a city heavily reliant on public transit. Our results demonstrate that interconnected transportation systems improve resilience by reducing topological vulnerabilities, increasing attack tolerance, and enhancing post-disruption interoperability. Findings also identify the</p>	10.1038/s41467-023-39999-w	https://www.nature.com/articles/s41467-023-39999-w.pdf	SpringerLink
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		<p>potential to integrate vulnerable systems for greater robustness and highlight the marginal benefits of enhancing intermodal transfer. Strengthening interconnectedness among modes of urban public transit fosters a safe-to-fail system, presenting a distinct resilience-by-design approach. This complements conventional resilience-by-intervention approaches that focus on improving individual systems or introducing entirely new systems.</p>			
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Simulation of music education multimedia mode in network environment based on QNSO algorithm and dynamic optimization	Sha, Xin, Zhang, Ying,	Applying QNSO algorithm to multimedia mode of music education can optimize the transmission and processing of multimedia data and improve the effect and quality of music education. The dynamic optimization technology can dynamically adjust the transmission path and priority of multimedia data according to the real-time state of the network, so as to further improve the effect and quality of the multimedia mode of music education. This paper uses QNSO algorithm and dynamic optimization technology to simulate the multimedia mode of music education, so as to realize the optimization and intelligence of the multimedia mode of music education. This method can improve the effect and quality of music education multimedia mode by simulating and optimizing it precisely. The research shows that the QNSO algorithm and dynamic optimization technology proposed in this paper can effectively realize the simulation and optimization of music education multimedia mode, which has certain guiding significance to improve the intelligence and precision level of music education multimedia mode, and also provides	10.1007/s00500-023-08920-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-023-08920-4	SpringerLink
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		a new idea and method for the application of computer optimization algorithm in the field of music education.			
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Improving hardware/software interface management in systems of systems through documentation as code	Cadavid, Héctor, Andrikopoulos, Vasilios, Avgeriou, Paris,	Context The management of Interface Control Documents (ICDs) has shown to be a major pain point in the architecting processes of Systems of Systems (SoS). Objective This work aims to improve on previously identified ICD management issues using the documentation-as-code philosophy as a potential basis for a treatment, and in collaboration with practitioners. Method We conducted a Technical Action Research (TAR) study with a group of engineers at the Netherlands Radio Astronomy Institute (ASTRON), in the context of the LOFAR radio telescope. An additional research instrument, in the form of an expert panel, was used to evaluate the transferability of the proposed treatment to alternative domains. Results In-depth insights on previously identified interface management issues were gained. Based on these insights a functional proof-of-concept was developed aimed at addressing these issues following the documentation-as-code principles. In addition to receiving overall positive reviews from practitioners and experts, further areas of improvement and transferability considerations for	10.1007/s10664-023-10350-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-023-10350-7	SpringerLink
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		<p>future work were identified.</p> <p>Conclusions The proposed approach, which to our knowledge has not been explored before in this context, is promising to address some of the recurring interfacing-related issues with directed SoS in multiple engineering domains. This could be done mainly by enforcing consistency and completeness on both text-based and formal elements of the ICDs, and turning ICDs into single sources of truth for the architecting processes of large scale SoS.</p>			
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Forest Digital Twin: A Digital Transformation Approach for Monitoring Greenhouse Gas Emissions	Silva, Jose Reinaldo, Artaxo, Paulo, Vital, Elinilson,	<p>Digital Twins has been defined as a virtual representation of a real system, with validation links capable of granting an association and functional equivalence between the “twins,” even simultaneously or with a real-time delay. The virtual counterpart should be a model that must contain all essential issues, operations, and processes to reproduce the behavior of its twin, avoiding unnecessary overhead. Typically, this approach is applied to engineering systems, mainly in Industry 4.0. The idea to apply a similar framework to plant and forest ecology analysis just fit the interests of many research labs, including the Research Center for Greenhouse Gas Innovation (RCGGI), to study formal models for greenhouse gas emissions, sinks and carbon balance along the complex Amazonian ecosystem. A framework was proposed to study the Brazilian Amazon Forest, shared by a multidisciplinary arrangement of Brazilian research groups and connected with other global partners. The proposal connects large data collectecton from several approaches used by distinct research groups, government</p>	10.1007/s41050-023-00041-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41050-023-00041-z	SpringerLink
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		agencies, and international institutions into a data system supporting service science processes. The primary investigation looks for a conceptual framework for Digital Twins to support a research agenda towards a life cycle analysis that allows an incremental and compositional enhanced view of processes affecting the Amazonian ecosystem.			
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Engineering complexity beyond the surface: discerning the viewpoints, the drivers, and the challenges	Garza Morales, Gisela A., Nizamis, Kostas, Bonnema, G. Maarten,	Complexity is often regarded as a "problem" to solve. Instead of attempting to solve complexity, we follow systems engineering practices and switch back to the problem domain, where a major obstacle is the impossibility to universally define complexity. As a workaround, we explored complexity characterization and its existing shortcomings, including: lack of standardization, inconsistent semantics, system-centricity, insufficiently transparent reasoning, and lack of validation. To address these shortcomings, we proposed a compilatory framework to characterize complexity using the Five Ws information-gathering method. The answer to the WHO question proposed four complexity viewpoints; the answer to the WHY question proposed a two-dimensional structure for complexity drivers; and the answer to the WHAT question derived generalized complexity challenges. As a preliminary step to show the potential of the framework to characterize complexity, we used and validated it as a tool to structure general literature related to complexity. In general, our findings suggest that papers with	10.1007/s00163-023-00411-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-023-00411-9	SpringerLink
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		<p>complexity solutions do not frame their research within the complexity problem domain, hindering the contribution evaluation. Through the viewpoints, we identified general research gaps of six solution directions. From the drivers, we noted three observations in the discourse of complexity origins: (1) a system-driven tendency, (2) a preference for concreteness vs. abstraction, and (3) an unclear distinction between origins and effects. Through the challenges' findings we explored two hypotheses: (1) a system-centric preference; and (2) a solution-oriented vision, both of which were supported by the results (most challenges relate to the system viewpoint and challenges are defined based on solution directions).</p>			
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Emerging technologies and design aspects of next generation cyber physical system with a smart city application perspective	Mishra, Ayaskanta, Jha, Amitkumar V., Appasani, Bhargav, Ray, Arun Kumar, Gupta, Deepak Kumar, Ghazali, Abu Nasar,	<p>The Cyber Physical System (CPS) is a disruptive technology that has combined the burgeoning technologies from various domains. The CPS is continuously evolving with the incorporation of next-generation technologies. A CPS capable of supporting next-generation applications is referred to as the Next Generation Cyber Physical System (NG-CPS). This paper comprehensively discusses the different emerging technologies such as Internet of Things, Machine to Machine communication, Machine Learning, Artificial Intelligence, Big-Data, etc. for the NG-CPS. Further, a generic NG-CPS framework is proposed covering all design aspects including physical design aspects, cyber design aspects and communication design aspects. Moreover, the smart city as a NG-CPS is designed using the proposed generic NG-CSP framework. To aid network designer in networking, the state-of-art protocols stack is also presented for smart city NG-CPS. Furthermore, to facilitate researchers in designing a smart city NG-CPS, the key technical specifications are comprehensively summarized, covering all domains of the</p>	10.1007/s13198-021-01523-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-021-01523-y	SpringerLink
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		NG-CPS.			
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<p>Infrastructure seismic risk assessment: an overview and integration to contemporary open tool towards global usage</p>	<p>Poudel, Astha, Pitilakis, Kyriazis, Silva, Vitor, Rao, Anirudh,</p>	<p>Infrastructures are critical for the functioning of society. Due to globalization, damages between different components of infrastructure systems can cross international boundaries, resulting in broad economic and social impacts. Hence, it is fundamental to develop powerful tools for the assessment of infrastructure risk, considering a wide spectrum of uncertainties. Past studies covering infrastructure risk assessment are limited to a few countries, partly because for assessing the infrastructure risk, issues due to the complexity of the systems, like paucity and heterogeneity of the data and methods, the consideration of dependencies between components and systems, modeling of ground shaking in terms of scenario and probabilistic approach, taking into account site effects, spatial variability and cross correlation of ground motion at the urban scale, as well as consideration of risk metrics tailored to infrastructure, still remain partially or not properly answered. Moreover, the presently available infrastructure risk assessment tools are not sufficiently illustrative, user-friendly, and comprehensive to meet actual</p>	<p>10.1007/s10518-023-01693-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10518-023-01693-z</p>	<p>SpringerLink</p>
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		<p>needs. To this end, the paper making an overview of these issues proposes a comprehensive approach that leverages the main strength of existing infrastructure risk methodologies, integrating them into a powerful open-source tool and providing common platform from hazard to risk analysis that will serve for global and easy usage. The methodology and its implementation are illustrated through a test-bed study of the water supply network of the city of Thessaloniki in Greece, considering an M_w 6.5 scenario of the 1978 Thessaloniki earthquake and an event based probabilistic approach and, simultaneously evaluating the sensitivity of cross spatial correlation.</p>			
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<p>An Overview of Interval Analysis Techniques and Their Fuzzy Extensions in Multi-Criteria Decision-Making: What's Going on and What's Next?</p>	<p>Liao, Huchang, Wang, Jiayi, Tang, Ming, Al-Barakati, Abdullah,</p>	<p>Due to the diversity of information, many decision-making problems cannot be solved based on a single criterion. The complexity of assessment objects and the limitations of individual cognition cause the opinions given by experts uncertain, which further aggravates decision-making difficulties. Although fuzzy sets and intuitionistic fuzzy sets are proposed to express vague information, they still have the problem of losing information. As a tool to express uncertain information, interval techniques can effectively prevent the loss of information and improve the accuracy of decision-making. In this regard, many scholars applied interval analysis techniques and their fuzzy extensions to solve multi-criteria decision-making (MCDM) problems. This study reviews 195-related articles published from 2007 to 2022, and analyzes the research progress of interval analysis techniques and their fuzzy extensions in MCDM problems. Through bibliometrics analyses, publication and citation trends as well as productive countries can be intuitively and quantitatively obtained. Then,</p>	<p>10.1007/s40815-022-01448-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40815-022-01448-z</p>	<p>SpringerLink</p>
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		<p>we review theories and methods regarding the combination of interval techniques and MCDM methods, and find that interval-valued fuzzy sets are extensively discussed and combined with TOPSIS. Next, real-world applications of these publications are reviewed, and we obtain that interval techniques are mainly used in supply chain selection. Finally, we propose future directions regarding interval techniques in MCDM problems. It is hoped that this study would be helpful for scholars and practitioners to carry out further research.</p>			
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Has Pakistan learned from disasters over the decades? Dynamic resilience insights based on catastrophe progression and geo-information models	Sajjad, Muhammad, Ali, Zulfiqar, Waleed, Mirza,	<p>Since the last two decades, Pakistan has been often cited among the top ten countries most vulnerable to climate change and disasters, such as intense flooding, extreme heat, and droughts, among others. However, the unavailability of nationwide administrative-scale assessments from a space–time perspective hinders disaster resilience building in Pakistan. In this context, the key purpose of this study is to evaluate the spatial and temporal disparities in community disaster resilience (CDR) in Pakistan during 2004–2014—the period covering two of the most devastating disasters in Pakistan in recent history. Eventually, the dynamic nature of resilience is empirically demonstrated through the catastrophe progression method, and regions, where resilience increased/decreased, are identified using geo-information models, such as the Moran's Index and the local indicators of Spatial Association (LISA). It is evident that CDR in the earlier, middle and final periods during 2004–2014 vary significantly (95% confidence). With inconsistent resilience distribution across Pakistan</p>	10.1007/s11069-023-05976-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-05976-1	SpringerLink
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		<p>during 2004–2014, some noteworthy regional disparities are also found. For instance, while the overall lowest resilience is found for the areas in Balochistan province, the regions that became less resilient during the studied period are spread across Pakistan with notable concentrations in southern districts. Such place-based information is a crucial stepping-stone to initiating and formulating effective plans and resilience enhancement strategies in Pakistan. Furthermore, based on the pioneering analysis presented here, this study acts as a baseline for disaster resilience in Pakistan in terms of spatial–temporal heterogeneities along with pinpointing the significant areas for gradual or immediate attention—facilitating priority intervention areas.</p>			
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Correlation and contrast of multi-user edge computation with single-user edge computation for data offload on terrain electric vehicular applications	Gauni, Sabitha, Bhanupriya, P., Kalimuthu, K., Manimegalai, C. T.,	<p>Vehicles are getting equipped in technology, communication between vehicle and the user is getting better. The vehicular network is an emerging technology to provide mobile users with the flexibility to use various services such as entertainment and navigation on wheels. The users are served with data related to their travel in terms of road map, weather updates, traffic congestions, radio services, social network applications and place of interest. The data communication takes place with the help of Smart On-board Unit (SOBU) present on the vehicle. There is a requirement of compound data computations with firm latency. Vehicle Edge computing (VEC) is the emerging technology that has serves at the edge in the neighbourhood of vehicle that enables data offloading. There will be much of energy consumption and latency resulting from offloading and computations. In this paper smart offloading scheme is proposed that will efficiently harvest the energy and reduce the energy consumption problem. As a performance statistic, the execution cost is used, which accounts for both execution delay and task failure.</p>	10.1007/s11042-023-14848-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-14848-6	SpringerLink
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		<p>And also, the offloading scheme is analyzed for single user and multiuser by simulations and the results are compared graphically for battery energy level, average execution cost and channel mode select parameters respectively. The factors affecting both Single-user and multi-user computation are identified from the results. Experimental results show that offloading schemes proposed for single user and multi user work better than the other state-of-the-art algorithms for vehicular networks. This single-user analysis will be a benchmark for developing auto pilot vehicle for people with special needs and multi-user analysis will help in developing to all kinds of Electric Vehicle communication.</p>			
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<p>Rurbanity: a concept for the interdisciplinary study of rural–urban transformation</p>	<p>Hoffmann, Ellen M., Schareika, Nikolaus, Dittrich, Christoph, Schlecht, Eva, Sauer, Daniela, Buerkert, Andreas,</p>	<p>Along with climate change, population growth, and overexploitation of natural resources, urbanisation is among the major global challenges of our time. It is a nexus where many of the world's grand challenges intersect, and thus key to sustainable development. The widespread understanding of urbanisation as a successive and unidirectional transformation of landscapes and societies from a rural to an urban state is increasingly questioned. Examples from around the globe show that 'the rural' and 'the urban' are not only highly interdependent, but actually coexist and often merge in the same space or livelihood strategy. Our concept of rurbanity provides an integrated theoretical framework which overcomes the rural–urban divide and can be operationalised for empirical research. Rurbanity is the next stringent step following the gradual widening of previous concepts from urban-centred approaches through the emphasis on urban peripheries to attempts of abolishing any distinction of a rural environment and acknowledging the highly dynamic nature of globalising urbanisation.</p>	<p>10.1007/s11625-023-01331-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11625-023-01331-2</p>	<p>SpringerLink</p>
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		<p>Building on complex systems theory and assemblage thinking, our concept explores complementary aspects of the distinct epistemic worldviews dominating the natural and social sciences. Within this theoretical frame, we derive four analytical dimensions as entry points for empirical research: Endowments and Place , Flows and Connectivity , Institutions and Behaviour , and Lifestyles and Livelihoods . Two examples illustrate how these dimensions apply, interact, and together lead to a comprehensive, insightful understanding of rurban phenomena. Such understanding can be an effective starting point for assessing potential contributions of rurbanity to long-term global sustainability.</p>			
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VTGAN: hybrid generative adversarial networks for cloud workload prediction	Maiyza, Aya I., Korany, Noha O., Banawan, Karim, Hassan, Hanan A., Sheta, Walaa M.,	Efficient resource management approaches have become a fundamental challenge for distributed systems, especially dynamic environment systems such as cloud computing data centers. These approaches aim at load-balancing or minimizing power consumption. Due to the highly dynamic nature of cloud workloads, traditional time series and machine learning models fail to achieve accurate predictions. In this paper, we propose novel hybrid VTGAN models. Our proposed models not only aim at predicting future workloads but also predicting the workload trend (i.e., the upward or downward direction of the workload). Trend classification could be less complex during the decision-making process in resource management approaches. Also, we study the effect of changing the sliding window size and the number of prediction steps. In addition, we investigate the impact of enhancing the features used for training using the technical indicators, Fourier transforms, and wavelet transforms. We validate our models using a real cloud workload dataset. Our results show	10.1186/s13677-023-00473-z	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13677-023-00473-z	SpringerLink
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		that VTGAN models outperform traditional deep learning and hybrid models, such as LSTM/GRU and CNN-LSTM/GRU, concerning cloud workload prediction and trend classification. Our proposed model records an upward prediction accuracy ranging from 95.4 % to 96.6 % .			
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A review of monitoring, calculation, and simulation methods for ground subsidence induced by coal mining	Cai, Yinfei, Jin, Yutian, Wang, Zuoyang, Chen, Tao, Wang, Yaru, Kong, Weiyu, Xiao, Wu, Li, Xiaojing, Lian, Xugang, Hu, Haifeng,	Subsidence data acquisition methods are crucial to mining subsidence research and an essential component of achieving the goal of environmentally friendly coal mining. The origin and history of the existing methods of field monitoring, calculation, and simulation were introduced. It summarized and analyzed the main applications, flaws and solutions, and improvements of these methods. Based on this analysis, the future developing directions of subsidence data acquisition methods were prospected and suggested. The subsidence monitoring methods have evolved from conventional ground monitoring to combined methods involving ground-based, space-based, and air-based measurements. While the conventional methods are mature in technology and reliable in accuracy, emerging remote sensing technologies have obvious advantages in terms of reducing field workload and increasing data coverage. However, these remote sensing methods require further technological development to be more suitable for monitoring mining	10.1007/s40789-023-00595-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40789-023-00595-4	SpringerLink
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		<p>subsidence. The existing subsidence calculation methods have been applied to various geological and mining conditions, and many improvements have already been made. In the future, more attention should be paid to unifying the studies of calculation methods and mechanical principles. The simulation methods are quite dependent on the similarity of the model to the site conditions and are generally used as an auxiliary data source for subsidence studies. The cross-disciplinary studies between subsidence data acquisition methods and other technologies should be given serious consideration, as they can be expected to lead to breakthroughs in areas such as theories, devices, software, and other aspects.</p>			
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Properties and Characteristics of Digital Twins: Review of Industrial Definitions	Schweiger, Lukas, Barth, Linard,	<p>As digital twin configurations depend on their use case, there is a need for research on how companies can select the capabilities and appropriate level of sophistication to deploy digital twins in practice successfully. This study investigated the properties and characteristics of digital twins described in academic literature. It summarized them in a taxonomy, which was subsequently used to code and examine 90 definitions of companies. For the analysis, both supervised and unsupervised methods were applied. The results show that researchers focus more on technological requirements when defining digital twins, while companies use more value-based properties that are not included or not precisely delineated in academic reviews. Therefore, an application-oriented definition is proposed to bridge this gap and complement the taxonomy. This study thus contributes to the discussion and forming of an application-oriented and shared understanding of the digital twin concept in research and practice.</p>	10.1007/s42979-023-01937-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-023-01937-4	SpringerLink
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Design of a novel side-mounted leg mechanism with high flexibility for a multi-mission quadruped earth rover BJTUBOT	Wu, Yifan, Guo, Sheng, Li, Luquan, Niu, Lianzheng, Li, Xiao,	<p>Earth rover is a class of emerging wheeled-leg robots for nature exploration. At present, few methods for these robots' leg design utilize a side-mounted spatial parallel mechanism. Thus, this paper presents a complete design process of a novel 5-degree-of-freedom (5-DOF) hybrid leg mechanism for our quadruped earth rover BJTUBOT. First, a general approach is proposed for constructing the novel leg mechanism. Subsequently, by evaluating the basic locomotion task (LT) of the rover based on screw theory, we determine the desired motion characteristic of the side-mounted leg and carry out its two feasible configurations. With regard to the synthesis method of the parallel mechanism, a family of concise hybrid leg mechanisms using the 6-DOF limbs and an L₁F1C limb (which can provide a constraint force and a couple) is designed. In verifying the motion characteristics of this kind of leg, we select a typical (3-U P RU& R RRR)& R mechanism and then analyze its kinematic model, singularities, velocity mapping, workspace, dexterity, statics, and kinetostatic performance. Furthermore, the virtual quadruped rover equipped</p>	10.1007/s11465-022-0740-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11465-022-0740-0	SpringerLink
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		with this innovative leg mechanism is built. Various basic and specific LTs of the rover are demonstrated by simulation, which indicates that the flexibility of the legs can help the rover achieve multitasking.			
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Dependency-based security risk assessment for cyber-physical systems	Akbarzadeh, Aida, Katsikas, Sokratis K.,	<p>A cyber-physical attack is a security breach in cyber space that impacts on the physical environment. The number and diversity of such attacks against Cyber-Physical Systems (CPSs) are increasing at impressive rates. In times of Industry 4.0 and Cyber-Physical Systems, providing security against cyber-physical attacks is a serious challenge which calls for cybersecurity risk assessment methods capable of investigating the tight interactions and interdependencies between the cyber and the physical components in such systems. However, existing risk assessment methods do not consider this specific characteristic of CPSs. In this paper, we propose a dependency-based, domain-agnostic cybersecurity risk assessment method that leverages a model of the CPS under study that captures dependencies among the system components. The proposed method identifies possible attack paths against critical components of a CPS by taking an attacker's viewpoint and prioritizes these paths according to their risk to materialize, thus allowing the defenders to define efficient security controls. We illustrate the</p>	10.1007/s10207-022-00608-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-022-00608-4	SpringerLink
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		workings of the proposed method by applying it to a case study of a CPS in the energy domain, and we highlight the advantages that the proposed method offers when used to assess cybersecurity risks in CPSs.			
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<p>Ergo, SMIRK is safe: a safety case for a machine learning component in a pedestrian automatic emergency brake system</p>	<p>Borg, Markus, Henriksson, Jens, Socha, Kasper, Lennartsson, Olof, Sonnsjö Lönegren, Elias, Bui, Thanh, Tomaszewski, Piotr, Sathyamoorthy, Sankar Raman, Brink, Sebastian, Helali Moghadam, Mahshid,</p>	<p>Integration of machine learning (ML) components in critical applications introduces novel challenges for software certification and verification. New safety standards and technical guidelines are under development to support the safety of ML-based systems, e.g., ISO 21448 SOTIF for the automotive domain and the Assurance of Machine Learning for use in Autonomous Systems (AMLAS) framework. SOTIF and AMLAS provide high-level guidance but the details must be chiseled out for each specific case. We initiated a research project with the goal to demonstrate a complete safety case for an ML component in an open automotive system. This paper reports results from an industry-academia collaboration on safety assurance of SMIRK, an ML-based pedestrian automatic emergency braking demonstrator running in an industry-grade simulator. We demonstrate an application of AMLAS on SMIRK for a minimalistic operational design domain, i.e., we share a complete safety case for its integrated ML-based component. Finally, we report lessons learned</p>	<p>10.1007/s11219-022-09613-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-022-09613-1</p>	<p>SpringerLink</p>
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		and provide both SMIRK and the safety case under an open-source license for the research community to reuse.			
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Tracing security requirements in industrial control systems using graph databases	Tanveer, Awais, Sharma, Chandan, Sinha, Roopak, Kuo, Matthew M. Y.,	<p>We must explicitly capture relationships and hierarchies between the multitude of system and security standards requirements. Current security requirements specification methods do not capture such structure effectively, making requirements management and traceability harder, consequently increasing costs and time to market for developing certified ICS. We propose a novel requirements repository model for ICS that uses labelled property graphs to structure and store system-specific and standards-based requirements using well-defined relationship types. Furthermore, we integrate the proposed requirements repository with design-time ICS tools to establish requirements traceability. A wind turbine case study illustrates the overall workflow in our framework. We demonstrate that a robust requirements traceability matrix is a natural consequence of using labelled property graphs. We also introduce a compatible requirements change management procedure that aids in adapting to changes in development and certification</p>	10.1007/s10270-022-01019-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-022-01019-8	SpringerLink
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AI-big data analytics for building automation and management systems: a survey, actual challenges and future perspectives	Himeur, Yassine, Elnour, Mariam, Fadli, Fodil, Meskin, Nader, Petri, Ioan, Rezgui, Yacine, Bensaali, Faycal, Amira, Abbes,	In theory, building automation and management systems (BAMSs) can provide all the components and functionalities required for analyzing and operating buildings. However, in reality, these systems can only ensure the control of heating ventilation and air conditioning system systems. Therefore, many other tasks are left to the operator, e.g. evaluating buildings' performance, detecting abnormal energy consumption, identifying the changes needed to improve efficiency, ensuring the security and privacy of end-users, etc. To that end, there has been a movement for developing artificial intelligence (AI) big data analytic tools as they offer various new and tailor-made solutions that are incredibly appropriate for practical buildings' management. Typically, they can help the operator in (i) analyzing the tons of connected equipment data; and; (ii) making intelligent, efficient, and on-time decisions to improve the buildings' performance. This paper presents a comprehensive systematic survey on using AI-big data analytics in BAMSs. It covers various AI-based tasks, e.g. load	10.1007/s10462-022-10286-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-022-10286-2	SpringerLink
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		<p>forecasting, water management, indoor environmental quality monitoring, occupancy detection, etc. The first part of this paper adopts a well-designed taxonomy to overview existing frameworks. A comprehensive review is conducted about different aspects, including the learning process, building environment, computing platforms, and application scenario. Moving on, a critical discussion is performed to identify current challenges. The second part aims at providing the reader with insights into the real-world application of AI-big data analytics. Thus, three case studies that demonstrate the use of AI-big data analytics in BAMSs are presented, focusing on energy anomaly detection in residential and office buildings and energy and performance optimization in sports facilities. Lastly, future directions and valuable recommendations are identified to improve the performance and reliability of BAMSs in intelligent buildings.</p>			
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<p>A Survey of Advanced Information Fusion System: from Model-Driven to Knowledge-Enabled</p>	<p>Zhu, Di, Yin, Hailian, Xu, Yidan, Wu, Jiaqi, Zhang, Bowen, Cheng, Yaqi, Yin, Zhanzuo, Yu, Ziqiang, Wen, Hao, Li, Bohan,</p>	<p>Advanced knowledge engineering (KE), represented by knowledge graph (KG), drives the development of various fields and engineering technologies and provides various knowledge fusion and knowledge empowerment interfaces. At the same time, advanced system engineering (SE) takes model-based system engineering (MBSE) as the core to realize formal modeling and process analysis of the whole system. The two complement each other and are the key technologies for the transition from 2.0 to 3.0 in the era of artificial intelligence and the transition from perceptual intelligence to cognitive intelligence. This survey summarizes an advanced information fusion system, from model-driven to knowledge-enabled. Firstly, the concept, representative methods, key technologies and application fields of model-driven system engineering are introduced. Then, it introduces the concept of knowledge-driven knowledge engineering, summarizes the architecture and construction methods of advanced knowledge engineering and summarizes the application fields. Finally, the combination of advanced information fusion systems,</p>	<p>10.1007/s41019-023-00209-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41019-023-00209-8</p>	<p>SpringerLink</p>
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		development opportunities and challenges are discussed.			
Features of Automation of Information Search in the Design of Technical Objects Using Their Digital Twins	Shvedenko, V. N., Shchekochikhin, O. V., Sinkevich, Y. A., Volkov, A. A.,	The development of a new methodology for the search and use of scientific and technical information from a wide class of electronic resources to improve the design efficiency of new models, modifications, and implementations of technical products is proposed. Verification of the possibilities for achieving the tactical and technical characteristics of scientific and technical products is conducted through virtual experiments as recommended in the scientific and technical literature and the documentation of innovations. To implement effective search, it is proposed to create an information system for the continuous monitoring of scientific journals, patents, sites of manufacturers of components, materials, and so on. A schematic diagram of the information system for searching for scientific and technical information is presented. A fragment of an information and search system based on a microservice architecture is shown.	10.3103/S0005105523030081	http://link.springer.com/openurl/pdf?id=doi:10.3103/S0005105523030081	SpringerLink

<p>The Impact of Industry 4.0 Concepts and Technologies on Different Phases of Construction Project Lifecycle: A Literature Review</p>	<p>Menegon, Julia, Silva Filho, Luiz Carlos Pinto,</p>	<p>With the advent of the fourth Industrial Revolution, sensors, machines, tools, and intelligent systems became connected and can interact with each other along the production chain. Such changes tend to increase productivity, as well as to promote changes in the workforce profile, and intensify competitiveness. The construction industry, however, has not kept up with other sectors in terms of adding technologies to its processes. Among other reasons, the lack of understanding about how technologies can be helpful to the industry is one of the main factors hindering the adoption. The aim of this work is, therefore, to analyze how the changes driven by the so-called Industry 4.0 can impact the construction industry. A Systematic Literature Review was conducted to identify the technology trends discussed and analyzed by the academy in the last years. We grouped the technologies according to their similarity and analyzed which phase of the construction lifecycle they could mainly impact. The results provide an essential overview of the vectors that may transform the industry in the coming years. It is possible to see</p>	<p>10.1007/s40996-022-00989-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40996-022-00989-5</p>	<p>SpringerLink</p>
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		<p>that technologies such as BIM, along with other virtual environment concepts, and 3D Printing are subjects with great expressiveness among the selected papers. Also, the planning and management phase tends to be most revolutionized by introducing new technologies, followed by the construction stage. This work can contribute to developing an innovative vision and culture within the construction industry.</p>			
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Reference architectures modelling and compliance checking	Bucaioni, Alessio, Di Salle, Amleto, Iovino, Ludovico, Malavolta, Ivano, Pelliccione, Patrizio,	Reference architectures (RAs) are successfully used to represent families of concrete software architectures in several domains such as automotive, banking, and the Internet of Things. RAs inspire architects when designing concrete architectures, and they help to guarantee compliance with architectural decisions, regulatory requirements, as well as architectural qualities. Despite their importance, reference architectures still suffer from a number of open technical issues, including (i) the lack of a common interpretation, a precise notation for their representation and documentation, and (ii) the lack of conformance mechanisms for checking the compliance of concrete architectures to their related reference architecture, architectural decisions, regulatory requirements, etc. This paper addresses these two issues by introducing a model-driven approach that leverages (i) a domain-independent metamodel for the representation of reference architectures and (ii) the combination of model transformation and weaving techniques for the	10.1007/s10270-022-01022-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-022-01022-z	SpringerLink
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		automatic conformance checking of concrete architectures. We evaluate the applicability, effectiveness, and generalizability of our approach using illustrative examples from the web browsers and automotive domains, including an assessment from an independent practitioner.			
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Macroeconomic determinants and their impact on environmental sustainability: the role of cultural and creative product prices	Cai, Lin,	<p>China has to deal with the twin challenges of economic structural reform and carbon emission reduction against global warming. While investing in and constructing new infrastructure is great for the economy, it has also added to the carbon emissions of major cities. The product design industry has recently become increasingly interested in creating and pricing cultural and creative goods in specific provinces. Thanks to the burgeoning global cultural and creative sector, a new platform has opened up for the evolution and modernization of China's ancient cultural practices. Cultural creativity has broken the rigid design and production pattern of traditional products from a business point of view, increasing their economic advantages and competition. Also, this study examines ICT's main and moderate effect on carbon emissions in the 27 provinces of China's economy from 2003 to 2019 using panel estimators. The estimated outcomes show the positive contribution to environmental damages by physical capital, tourism, cultural product prices, innovative, creative prices, and trade openness, while ICT significantly reduces</p>	10.1007/s11356-023-27425-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-023-27425-z	SpringerLink
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		<p>emissions. Besides the moderate role of the digital economy on physical capital, tourism, CP, ICP, and tourism significantly reduce CO2 emissions. However, the granger causality outcomes also show a robust analysis. Furthermore, this study also proposes some interesting policies to obtain environmental sustainability.</p>			
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RETRACTED ARTICLE: Artificial intelligence enabled fuzzy multimode decision support system for cyber threat security defense automation	Hang, Feilu, Xie, Linjiang, Zhang, Zhenhong, Guo, Wei, Li, Hanruo,	Security defense automation uses technology that reduces human assistance to integrate security applications, processes, and infrastructure. In the process of defense and attack, there will be a period of delay in establishing the decision-making and strategy. Recently, fuzzy-based decision-making has been effectively utilized for uncertainty and vague data in security applications. Fuzzy decision tree blends fuzzy representation and associates approximate reasoning with symbolic decision trees. They provide for handling language-related uncertainty, noise, missing or faulty features, and robust behavior while also providing comprehensible knowledge interpretation. Cyber threat intelligence is information an organization utilizes to understand the dangers that have, might, and is presently attacking the company. The collection of single or multi-criteria techniques using fuzzy logic aiming at selecting the best alternative in case of inaccurate, incomplete, and vague information. Hence, this paper proposes a fuzzy multimode decision support system (FMMDSS) for security defense automation.	10.1007/s11416-022-00443-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11416-022-00443-0	SpringerLink
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		<p>Fuzzy logic is a progression to define the human inclination of accurate thinking that simplifies classical logic. This paper aims at the state explosion problem when network nodes increase and design the attack-defense graph to compress the state space and extract network states and defense policies. A simple example representing the suggested model to support decision-making accompanies the security attack and defense processes. This research will potentially offer new ideas and stimuli for future designs of network security and defense automation architecture. This paper concludes with a policy for implementing the recommended model in an operational setting with better dependability predictions, general comparison of predictive analysis ratio 89.7% and a cognitive ability ratio 92.5%, the security control selection ratio of 82.5%. Scalability ratios of 85.2% with an overall performance of 95.7% are measured using conventional methods and our proposed system.</p>			
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<p>Agile services and analysis framework for autonomous and autonomic critical infrastructure</p>	<p>Maurio, Joe, Wood, Paul, Zanolgo, Sebastian, Silbermann, Josh, Sookoor, Tamim, Lorenzo, Alberto, Sleight, Randy, Rogers, James, Muller, Dan, Armiger, Noah, Rouff, Christopher, Watkins, Lanier,</p>	<p>Many cyber physical systems have little or no cybersecurity mechanisms due to their limited computing capabilities or their history of running on isolated networks. As these systems have become interconnected and connected to corporate networks, they have become more vulnerable to cyberattacks. Providing cyber physical systems with autonomic properties will allow them to become more self-aware and react in near real time to attacks and failures. Testing these systems for their susceptibility to intelligent attacks is also needed to provide assurance of their resilience. This paper describes two approaches to providing assurances to cyber physical systems. The first approach retrofits industrial control systems with autonomic properties that will allow them to automatically detect and recover from cyberattacks and other failures through the use of microservices that reconfigure the systems dynamically during attacks or failures. The second approach uses intelligent agents in a modeling and simulation framework to test the resiliency of autonomous unmanned aerial systems. Agents are orchestrated using a range of algorithms and</p>	<p>10.1007/s11334-021-00411-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-021-00411-9</p>	<p>SpringerLink</p>
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		subjected to stressful environments to measure the efficiency and safety of their operations in a simulate multi-UAS air-traffic control problem.			
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<p>The Polyopticon: a diagram for urban artificial intelligences</p>	<p>Sherman, Stephanie,</p>	<p>Smart city discourses often invoke the Panopticon, a disciplinary architecture designed by Jeremy Bentham and popularly theorized by Michel Foucault, as a model for understanding the social impact of AI technologies. This framing focuses attention almost exclusively on the negative ramifications of Urban AI, correlating ubiquitous surveillance, centralization, and data consolidation with AI development, and positioning technologies themselves as the driving factor shaping privacy, sociality, equity, access, and autonomy in the city. This paper describes an alternative diagram for Urban AI—the Polyopticon: a distributed, polyvalent, multi-modal network of synthetic intelligences. It posits that fourth industrial revolution technologies change the political, social, and psychodynamic relationships of sentience and witness in the city, shifting the effects of watching and watched beyond the exclusive domain of top-down surveillance and discipline. The Polyopticon poses a more expansive and ambivalent spectrum of possibilities for Urban AI scenarios, one</p>	<p>10.1007/s00146-022-01501-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-022-01501-3</p>	<p>SpringerLink</p>
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		that undermines the totalizing, singular, and cerebral notion of intelligence that so often characterizes Urban AI and smart city critiques.			
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<p>Awareness requirement and performance management for adaptive systems: a survey</p>	<p>Rashid, Tarik A., Hassan, Bryar A., Alsadoon, Abeer, Qader, Shko, Vimal, S., Chhabra, Amit, Yaseen, Zaher Mundher,</p>	<p>Self-adaptive software can assess and modify its behavior when the assessment indicates that the program is not performing as intended or when improved functionality or performance is available. Since the mid-1960s, system adaptivity has been extensively researched, and during the last decade, many application areas and technologies involving self-adaptation have gained prominence. All of these efforts have in common the introduction of self-adaptability through software. Thus, it is essential to investigate systematic software engineering methods to create self-adaptive systems that may be used across different domains. The primary objective of this research is to summarize current advances in awareness requirements for adaptive strategies and their performance management based on an examination of state-of-the-art methods described in the literature. This paper reviews self-adaptive systems in the context of requirement awareness and summarizes the most common methodologies applied. At first glance, it examines the previous surveys and works about self-adaptive systems.</p>	<p>10.1007/s11227-022-05021-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-022-05021-1</p>	<p>SpringerLink</p>
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		<p>Afterward, it classifies the current self-adaptive systems based on six criteria. Then, it presents performance management in the current adaptive systems and then evaluates the most common self-adaptive approaches. Lastly, the self-adaptive models are evaluated based on four concepts (requirements description, monitoring, relationship, dependency/impact, and tools).</p>			
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Two-stage stochastic formulation for relief operations with multiple agencies in simultaneous disasters	Rodríguez-Espíndola, Oscar,	The increasing damage caused by disasters is a major challenge for disaster management authorities, especially in instances where simultaneous disasters affect different geographical areas. The uncertainty and chaotic conditions caused by these situations combined with the inherent complexity of collaboration between multiple stakeholders complicates delivering support for disaster victims. Decisions related to facility location, procurement, stock prepositioning and relief distribution are essential to ensure the provision of relief for these victims. There is a need to provide analytical models that can support integrated decision-making in settings with uncertainty caused by simultaneous disasters. However, there are no formulations tackling these decisions combining multiple suppliers, multiple agencies, and simultaneous disasters. This article introduces a novel bi-objective two-stage stochastic formulation for disaster preparedness and immediate response considering the interaction of multiple stakeholders in uncertain	10.1007/s00291-023-00705-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00291-023-00705-3	SpringerLink
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		<p>environments caused by the occurrence of simultaneous disasters. At the first stage, decisions related to the selection of suppliers, critical facilities, agencies involved, and pre-disaster procurement are defined. Resource allocation, relief distribution and procurement of extra resources after the events are decided at the second stage. The model was tested on data from the situation caused by simultaneous hurricanes and storms in Mexico during September of 2013. The case is contrasted with instances planning for disasters independently. The results show how planning for multiple disasters can help understand the real boundaries of the disaster response system, the benefits of integrated decision-making, the impact of deploying only the agencies required, and the criticality of considering human resources in disaster planning.</p>			
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RETRACTED ARTICLE: Real-time network virtualization based on SDN and Docker container	He, Qinlu, Zhang, Fan, Bian, Genqing, Zhang, Weiqi, Li, Zhen, Duan, Dongli,	Cloud computing platform is a data-centric architecture, which utilize virtualization resource scheduling technology to integrate and distribute the processing power of distributed server cluster and other network devices distributed over the network, and uses service- oriented architecture to provide users with highly reliable, highly available, and efficient application data services. Although the cloud platform application based on various requirements has become a research hotspot in cloud computing technology, in some high Real- time requirements application scenarios, the research on how to guarantee the real time performance of cloud platform is few. Compared to traditional resource virtualization such as CPU and memory, Docker only provides a small portion of network resource virtualization. The four network modes provided by Docker officially have a single function, which makes it very difficult to apply to cloud platform scenarios with complex network bandwidth requirements and high real-time requirements. Based on Docker's traditional NAT	10.1007/s10586- 022-03731-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-022-03731-y	SpringerLink
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		communication method, this paper proposes a network virtualization solution based on SDN and Docker containers. Through comparison experiments, it is proved that the scheme can guarantee the Real-time performance of the container cloud platform.			
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RETRACTED ARTICLE: Online task scheduling and English online cooperative learning based on 5G mobile communication network	Guo, Shanshan,	The task density of the data processing platform is increasing, and effective online task scheduling directly determines the business flexibility of the data processing platform. This article starts with the remarkable dynamic characteristics of 5G cellular networks, creates an adaptive environment to optimize online task scheduling, and designs the workload characteristics of data processing and computing tasks. On this basis, based on the 5G mobile communication network programming model and the operating and functional principles of its supporting system, the actual structure and field of online task scheduling work templates have been developed and designed. In addition, this article is developing a technology-based, non-intrusive online task scheduling program that can perform detailed real-time detection of the actual implementation of online task scheduling. In this paper, 5G cellular network is used to further reduce the service cache location of online content, and collaborative English learning and deployment at the edge of the network closer to the end user can further reduce	10.1007/s00500-023-08137-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-023-08137-5	SpringerLink
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		network delay, which is important for improving mobile network communication and improving the efficiency of network content distribution. This article creates a model for online collaborative learning of college English on a 5G cellular network and analyzes the data based on experiments with comparative models to improve their self-confidence and interpersonal skills, and these skills can help improve students' language skills.			
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Real-time detection of wood defects based on SPP-improved YOLO algorithm	Cui, Yuming, Lu, Shuochen, Liu, Songyong,	<p>Wood processing is one of the most widely used in agriculture and industry. Low precision and high time delay of machine learning in wood defect detection are currently the main factors restricting the production efficiency and product quality of the wood processing industry. An SPP-improved deep learning method was proposed to detect wood defects based on the basic framework of the YOLO V3 network to improve accuracy and real-time performance. The extended dataset was firstly established by image data enhancement and preprocessing based on the limited samples of the wood defect dataset. Anchor box scale re-clustering of the wood defect dataset was carried out according to the defect features. The spatial pyramid pooling (SPP) network was applied to improve the feature pyramid (FP) network in YOLO V3. The validity and real-time performance of the proposed algorithm were verified by a randomly selected test set. The results show that the overall detection accuracy rate on the wood defect test dataset reaches 93.23% while the detection time for each image is within 13 ms.</p>	10.1007/s11042-023-14588-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-023-14588-7	SpringerLink
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Systematic review of digital twin technology and applications	Yao, Jun-Feng, Yang, Yong, Wang, Xue-Cheng, Zhang, Xiao-Peng,	<p>As one of the most important applications of digitalization, intelligence, and service, the digital twin (DT) breaks through the constraints of time, space, cost, and security on physical entities, expands and optimizes the relevant functions of physical entities, and enhances their application value. This phenomenon has been widely studied in academia and industry. In this study, the concept and definition of DT, as utilized by scholars and researchers in various fields of industry, are summarized. The internal association between DT and related technologies is explained. The four stages of DT development history are identified. The fundamentals of the technology, evaluation indexes, and model frameworks are reviewed. Subsequently, a conceptual ternary model of DT based on time, space, and logic is proposed. The technology and application status of typical DT systems are described. Finally, the current technical challenges of DT technology are analyzed, and directions for future development are discussed.</p>	10.1186/s42492-023-00137-4	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42492-023-00137-4	SpringerLink
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Embedding responsibility in intelligent systems: from AI ethics to responsible AI ecosystems	Stahl, Bernd Carsten,	Intelligent systems that are capable of making autonomous decisions based on input from their environment have great potential to do good, but they also raise significant social and ethical concerns. The discourse on ethics and artificial intelligence (AI) has covered these concerns in depth and developed an array of possible ways of addressing them. This article argues that a shortcoming of this discourse is that it concentrates on specific issues and their mitigation but neglects the nature of intelligent systems as socio-technical systems of systems that are often described as ecosystems. Building on the discussion of ethics and AI, the article suggests that it would be beneficial to come to an understanding of what would constitute responsible AI ecosystems. By introducing the concept of meta-responsibility or higher-level responsibility, the article proposes characteristics that an ecosystem would have to fulfil, in order to be considered a responsible ecosystem. This perspective is theoretically interesting because it extends the current AI ethics	10.1038/s41598-023-34622-w	https://www.nature.com/articles/s41598-023-34622-w.pdf	SpringerLink
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		discourse. It furthermore offers a novel perspective for researchers and developers of intelligent system and helps them reflect on the way they relate to ethical issues.			
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Application of microservices patterns to big data systems	Ataei, Pouya, Staegemann, Daniel,	<p>The panorama of data is ever evolving, and big data has emerged to become one of the most hyped terms in the industry. Today, users are the perpetual producers of data that if gleaned and crunched, have the potential to reveal game-changing patterns. This has introduced an important shift regarding the role of data in organizations and many strive to harness to power of this new material. Howbeit, institutionalizing data is not an easy task and requires the absorption of a great deal of complexity. According to the literature, it is estimated that only 13% of organizations succeeded in delivering on their data strategy. Among the root challenges, big data system development and data architecture are prominent. To this end, this study aims to facilitate data architecture and big data system development by applying well-established patterns of microservices architecture to big data systems. This objective is achieved by two systematic literature reviews, and infusion of results through thematic synthesis. The result of this work is a series of theories that explicates how microservices patterns could be useful for big data</p>	10.1186/s40537-023-00733-4	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40537-023-00733-4	SpringerLink
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		systems. These theories are then validated through expert opinion gathering with 7 experts from the industry. The findings emerged from this study indicates that big data architectures can benefit from many principles and patterns of microservices architecture.			
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<p>Adaptive Water Management: On the Need for Using the Post-WWII Science in Water Governance</p>	<p>Hjorth, Peder, Madani, Kaveh,</p>	<p>Although the UN concluded, already in 1997, that water would be the most contentious issue of the 21st century, water governance is still confused, nearly everywhere. Even the severe impacts of escalating water bankruptcy and global warming have so far failed to incur a marked improvement in governance systems. The global community has adopted sustainable development as a common vision and guide for the future. Yet, the adoption of the underlying principles of sustainable development has been slow in the water sector and elsewhere. Despite the realization that water governance is a political issue, the near-universal neoliberal agenda tends to only employ technologic and economic solutions to address water problems. This paper presents a historical overview, from the end of the Second World War (WWII) and onwards, of events that could, or should, have had an impact on water management frameworks. It evidences some important consequences of the institutional rigidity exposed during that period. The paper also turns to the fields of science, policy, and management, to pinpoint failures in the translation</p>	<p>10.1007/s11269-022-03373-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11269-022-03373-0</p>	<p>SpringerLink</p>
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		<p>of political rhetoric as well as new scientific findings into change at the operational level. It explores how an updated knowledge base could serve a quest for sustainable water governance strategies. It is argued that a persistent failure to learn is an important reason behind the dire state that we are now in. As a result, water management is still based on century-old, technocratic, and instrumental methodologies that fail to take advantage of important scientific advancements since WWII and remain unable to properly deal with real-world complexities and uncertainties. The paper concludes that when it is linked to a transformation of the institutional superstructure, adaptive water management (AWM), a framework rooted in systems thinking, emerges as a prominent way to embark on a needed, radical transformation of the water governance systems.</p>			
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Multi-objective approach for scheduling time-aware business processes in cloud-fog environment	Fakhfakh, Fairouz, Cheikhrouhou, Saoussen, Dammak, Bouthaina, Hamdi, Monia, Rekik, Mouna,	Currently, constant innovations in service-oriented architectures lead to extending the Cloud services with promising solutions such as Fog computing. As the Cloud-Fog environment still remains in its infancy stage, several issues remain among the considerable challenges to be handled. One of the key issues in a Cloud-Fog environment is the scheduling of business processes tasks, i. e. selecting the suitable Cloud-Fog resources to support the execution of the business processes tasks while considering budget and temporal constraints. Indeed, these constraints are generally contradictory. Indeed, the use of cheaper resources increases the execution time and vice versa. Furthermore, minimizing the energy consumption is among the prominent considerations when dealing with Cloud-Fog environment. Hence, finding out the trade-off set of optimal solutions is required considering minimizing cost, time and energy consumption. To address such an issue, we propose, in this paper, a Multi-Objectives Particle Swarm Optimization (MOPSO) algorithm based on a non-dominance sort to	10.1007/s11227-022-04690-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-022-04690-2	SpringerLink
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		handle the scheduling problem of time-aware business processes with many conflicting objective functions. Our algorithm aims to optimize three conflicting objectives namely, the makespan (total execution time), the monetary cost and the energy consumption while taking into account budget and temporal constraints of the business process. The output of our MOPSO algorithm represents a set of Pareto optimal solutions from which the user can select the best one. The elaborated experimentation illustrates the good performance of the proposed algorithm.			
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<p>Spatial regression identifies socioeconomic inequality in multi-stage power outage recovery after Hurricane Isaac</p>	<p>Best, Kelsea, Kerr, Siobhan, Reilly, Allison, Patwardhan, Anand, Niemeier, Deb, Guikema, Seth,</p>	<p>Power outages are a common outcome of hurricanes in the USA with potentially serious implications for community wellbeing. Understanding how power outage recovery is influenced by factors such as the magnitude of the outage, storm characteristics, and community demographics is key to building community resilience. Outage data are a valuable tool that can help to better understand how hurricanes affect built infrastructure and influence the management of short-term infrastructure recovery process. We conduct a spatial regression analysis on customers experiencing outages and the total power recovery time to investigate the factors influencing power outage recovery in Louisiana after Hurricane Isaac. Our interest was in whether infrastructure damage and recovery times resulting from a hurricane disproportionately affect socioeconomically vulnerable populations and racial minorities. We find that median income is a significant predictor of the time it takes to restore 50%, 80%, and 95% of the total outages within a ZIP Code Tabulation Area, even after controlling for hurricane characteristics</p>	<p>10.1007/s11069-023-05886-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-023-05886-2</p>	<p>SpringerLink</p>
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		<p>and total outages. Higher income geographies and higher income adjacent geographies experience faster recovery times. Our findings point to possible inequities associated with income in power outage recovery prioritization, which cannot be explained by exposure to outages, storm characteristics, or the presence of critical services such as hospitals and emergency response stations. These results should inform more equitable responses to power outages in the future helping to improve overall community resilience.</p>			
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Information system-theoretic view on the architecture of smart manufacturing systems: a case study in the Democratic People's Republic of Korea	Kim, Song-Chol, Jong, Il-Chol, Rim, Gwang-Nam, Kwon, Il-Jin, Ryu, Un-Gyong, Pak, Jong-Chol, Kim, Jong-Chol,	This paper is written to propose a new architecture of the smart manufacturing system from the perspective of information system theory by synthesizing the achievements and experiences gained in the process of researching and developing the smart manufacturing system suitable for the situation of the Democratic People's Republic of Korea. Verifying the structure of a smart manufacturing system suitable for the situation of the Democratic People's Republic of Korea is an essential research task that presents the goals to be achieved in the R&D and introduction of smart manufacturing systems, which are put forward by different R&D groups. Based on a global study, synthesis, and analysis of the architectural features of smart manufacturing systems required by enterprises, the authors have identified a new structure of smart manufacturing system that meets the actual conditions of the Democratic People's Republic of Korea by verifying its rationality through the practical process of studying, developing, and constructing the smart manufacturing system in the digital book editing (virtual	10.1007/s00170-023-11193-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-023-11193-8	SpringerLink
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		<p>production) and printing (physical production) of a book printing factory. The findings are that (a) a smart manufacturing system is an informative and organic combination of management information systems and the internet of things with cyber-physical system as the core; (b) a product lifecycle management system is a comprehensive information integration tool of production and management related information systems to optimize the production and management activities of enterprises and put them on a high scientific and technological basis, and its implementation is essential; and (c) research on the smart manufacturing system should be continuously conducted to meet the demands of enterprise management practice that are constantly faced with new theoretical, practical, and information technology challenges, and such research results should be realized at a high level based on strong research, development, and introduction forces in the future. The finding of the new architecture of smart manufacturing system has been made in the context of the research on the</p>			
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		smart manufacturing system, and it will serve as the theoretical basis for the smart manufacturing system to be built in various types of enterprises in the Democratic People's Republic of Korea.			
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Design of art teaching multimedia system based on genetic algorithms and computer network	Jing, Chen,	<p>The application of multimedia technology and the development of computer networks always affect the lifestyle and behavioral habits of modern people and also affect the education and learning methods of modern people. The genetic algorithm is called the form of calculation of the evolution algorithm, and it has the characteristics of parallelism and overallity and space search. This form is gradually brought into a large-scale cluster system. The article comprehensively considers the time, reliability, algorithm bandwidth, cost, and demand display of each individual from four different aspects, and designs an art teaching multimedia system in the form of adaptive functions to ensure the quality of teaching services. Finally, this article explores the design and development of multimedia networks in art teaching, based on the design of an art teaching courseware system. R&D forms mainly include: preparation and production of online courseware, development of online courseware, the operation and programming of online courseware, and the test and evaluation of online</p>	10.1007/s00500-023-08114-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-023-08114-y	SpringerLink
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		<p>courseware. This design system research shows that the multimedia network system design under the art teaching is very important, which is the basis of the whole network teaching. For the system design and research of the whole art teaching understanding, it is the need to change and innovate technology, and also the only way for art design.</p>			
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Charting AI urbanism: conceptual sources and spatial implications of urban artificial intelligence	Palmini, Otello, Cugurullo, Federico,	<p>The aim of this paper is to tease out some of the key issues concerning the relationship between AI and urbanism. This relationship, which is presented in the academic literature as a new driving force of contemporary urbanism, will be investigated through an interdisciplinary approach that places urban studies and philosophy of technology in dialogue. Thus, the analysis will not focus on the technological development of artificial intelligence systems but on how their application can affect urbanistic thinking and vice versa. The chart that is produced by this method is based on two fundamental axes: time and space. AI urbanism will then be inquired first through key turning points in the history of the relationship between technology and the city (modern urbanism, cybernetics and the smart city paradigm). Secondly, the spatial implications of urban AI will be investigated from the point of view of the concrete applications of this technology to the city (Robots, AVs, Software agents) and their impact on the relationships between different urban actors. Ultimately, this work aims to offer a conceptual tool for understanding</p>	10.1007/s44163-023-00060-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s44163-023-00060-w	SpringerLink
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		<p>some decisive implications of the relationship between AI and urbanism, such as the connection between quantitative and qualitative approaches, the implications related to autonomous technology, the economic-political background of AI urbanism, the material urban impact of AI, and the relationship between AI and other urban intelligences. Understanding these implications will be valuable for future research on AI urbanism oriented toward transforming simple technological development into sustainable urban innovations.</p>			
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<p>Framing a novel holistic energy subsystem structure for water-energy-food nexus based on existing literature (basic concepts)</p>	<p>Vahabzadeh, Masoud, Afshar, Abbas, Molajou, Amir,</p>	<p>It is interesting to note that the country of Iran is essential in terms of energy production and consumption, and the economy of Iran is mainly dependent on energy revenues. Therefore, thermal and hydropower plants consume water to produce various energy carriers. Considering that Iran is suffering from water stress, the nexus of water and energy becomes very important. This paper frames a comprehensive structure for Iran's energy subsystem within the Water, Energy, and Food (WEF) nexus system. The energy subsystem's supply and demand side in the proposed framework are formulated using data and physic-based equations. The presented framework addresses most interactions between WEF subsystems in a dynamic and adaptive setting. It is shown that through analysis of binding interactions between WEF, different management scenarios can boost the flexibility of the supply and demand side of the energy subsystem. In addition, by incorporating this framework, the water subsystem will manage the allocated and consumed water on the supply side and arrive at the most desirable</p>	<p>10.1038/s41598-023-33385-8</p>	<p>https://www.nature.com/articles/s41598-023-33385-8.pdf</p>	<p>SpringerLink</p>
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		outcome for the water sector. Also, the optimal cropping pattern could be evaluated based on energy consumption.			
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Safe and secure system architectures for cyber-physical systems	Furrer, Frank J.,	<p>Cyber-physical systems are at the core of our current civilization. Countless examples dominate our daily life and work, such as driverless cars that will soon master our roads, implanted medical devices that will improve many lives, and industrial control systems that control production and infrastructure. Because cyber-physical systems manipulate the real world, they constitute a danger for many applications. Therefore, their safety and security are essential properties of these indispensable systems. The long history of systems engineering has demonstrated that the system quality properties—such as safety and security—strongly depend on the underlying system architecture . Satisfactory system quality properties can only be ensured if the fundamental system architecture is sound! The development of dependable cyber-physical architectures in recent years suggests that two harmonical architectures are required: a design-time architecture and a run-time architecture . The design-time architecture defines and specifies all parts</p>	10.1007/s00287-023-01533-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00287-023-01533-z	SpringerLink
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		<p>and relationships, assuring the required system quality properties. However, in today's complex systems, ensuring all quality properties in all operating conditions during design time will never be possible. Therefore, an additional line of defense against safety accidents and security incidents is indispensable: This must be provided by the run-time architecture. The run-time architecture primarily consists of a protective shell that monitors the run-time system during operation. It detects anomalies in system behavior, interface functioning, or data—often using artificial intelligence algorithms—and takes autonomous mitigation measures, thus attempting to prevent imminent safety accidents or security incidents before they occur. This paper's core is the protective shell as a run-time protection mechanism for cyber-physical systems. The paper has the form of an introductory tutorial and includes focused references.</p>			
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Security in IoT-enabled smart agriculture: architecture, security solutions and challenges	Vangala, Anusha, Das, Ashok Kumar, Chamola, Vinay, Korotaev, Valery, Rodrigues, Joel J. P. C.,	<p>Agricultural industry is one of the most vital industries that has a major contribution to the economy due to its share in the Gross Domestic Product (GDP) and as a source of employment. The past few decades have seen immense change in the operation of agricultural sector with the introduction of precision farming in conjunction with Internet of Things (IoT). The application of such advancements is highly based on exchange of messages between various devices in the farming. This paper aims to study the security scenarios applicable in husbandry through the analysis of possible attacks and threats. The testbeds available for agriculture based on IoT have been studied. An architecture for smart farming is proposed which is independent of the underlying technologies that may be used and the requirements of security have been laid out based on the proposed architecture. A literature survey of security protocols for various subsectors of security in smart agriculture along with authentication protocols in smart applications provides a detailed direction of the progress in each of farming security sub-</p>	10.1007/s10586-022-03566-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-022-03566-7	SpringerLink
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		areas and identifies the dearth of existing protocols. The current progress in development of IoT-based tools and systems from industry has also been studied.			
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Mathematical programming model of process plant safety layout using the equipment vulnerability index	Guo, Liping, Wang, Zhirong, Guo, Pinkun, Wang, Jinghong, Zhao, Dan,	<p>Safety is the focus of attention in plant layout problems. Previous studies have often expressed safety as a cost of risk, that is, the cost of property losses that may occur in an accident. In this paper, the influence of uncertainty on the equipment vulnerability is quantitatively considered and a more reliable process plant layout is proposed. The equipment vulnerability index is used to evaluate the vulnerability level of the target equipment in case of an accident, which is applied to propose a mixed-integer nonlinear optimized process plant layout to minimize domino risk. In addition, a decision matrix is applied to determine whether the risk level of the optimized layout of the target equipment is acceptable. Damage probability and vulnerability are the basic inputs of this matrix. The proposed method was applied to a coal-water slurry gasification process and the results show that the layout obtained by the proposed model has better practical value than the current layout, reducing the domino risk by 53.2%. Meanwhile, the model can be used to identify critical equipment and select targeted safety measures during</p>	10.1007/s11814-022-1357-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11814-022-1357-z	SpringerLink
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		the production stage.			
Editorial: Smart Societies, Infrastructure, Systems, Technologies, and Applications	Mehmood, Rashid, Sheikh, Aziz, Catlett, Charlie, Chlamtac, Imrich,		10.1007/s11036-022-01990-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11036-022-01990-y	SpringerLink

Challenges resulting from urban density and climate change for the EU energy transition	Perera, A. T. D., Javanroodi, Kavan, Mauree, Dasaraden, Nik, Vahid M., Florio, Pietro, Hong, Tianzhen, Chen, Deliang,	Dense urban morphologies further amplify extreme climate events due to the urban heat island phenomenon, rendering cities more vulnerable to extreme climate events. Here we develop a modelling framework using multi-scale climate and energy system models to assess the compound impact of future climate variations and urban densification on renewable energy integration for 18 European cities. We observe a marked change in wind speed and temperature due to the aforementioned compound impact, resulting in a notable increase in both peak and annual energy demand. Therefore, an additional cost of 2060% will be needed during the energy transition (without technology innovation in building) to guarantee climate resilience. Failure to consider extreme climate events will lower power supply reliability by up to 30%. Energy infrastructure in dense urban areas of southern Europe is more vulnerable to the compound impact, necessitating flexibility improvements at the design phase when improving renewable penetration levels. Understanding the impact of future climate variations and urban densification is	10.1038/s41560-023-01232-9	https://www.nature.com/articles/s41560-023-01232-9.pdf	SpringerLink
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		key to planning renewable energy integration. By developing a multi-scale spatio-temporal modelling framework, Perera et al. reveal changes in wind speed and temperature across European cities.			
Whole-of-Nation Moral Learning by Spiritual Hearts: A Case of Brunei's Transformation to tackle the COVID-19 Pandemic	Tarip, Iznan, Ashari, Zuraihi,	All nations are continuously learning how best to live with the COVID-19 pandemic. Utilizing organizational moral learning and Islamic spirituality perspectives, this paper proposes a learning framework called the whole-of-nation moral learning by spiritual hearts to understand the dynamics of learning and change in a nation tackling the pandemic. It proposes that to overcome the pandemic or any other crises, governance requires the combination of moral leadership and followership by spiritual hearts as agents for moral learning and change, supported by realigned and reconfigured systems for holistic growth. Brunei's journey in tackling the pandemic illustrates the framework.	10.1007/s10943-023-01758-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10943-023-01758-y	SpringerLink

Integration of Distributed Generations and Static VAR Compensator in a Distribution Network Using Genetic Algorithms	Shukla, Vipul, Mukherjee, Vivekananda, Singh, Bindeshwar,	<p>The global power system is overloaded, resulting in a poor voltage profile, voltage instability, and large real and reactive power losses. Electrical power growth and hitching in providing required capacity provide a spur to appoint distributed generation (DGs) and static VAR compensator (SVC) options. This research shows how to use a genetic algorithm to optimize the integration of DGs and SVC in a distribution network for improved system performance by minimizing total real and reactive power losses. The 38-bus distribution test network, where GA is employed to solve the optimization problem, demonstrates the value of the proposed strategy. This paper assists individuals in working on the system performance of viability and building of future power grids, as well as a variety of scheme performance indicators from a higher social environment.</p>	10.1007/s40031-023-00860-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40031-023-00860-9	SpringerLink
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Digital technologies for net-zero energy transition: a preliminary study	Cao, Liwei, Hu, Peiyu, Li, Xiang, Sun, Hui, Zhang, Jinrui, Zhang, Chuan,	<p>This paper reviews current progress and future challenges of digital technology applications for energy system transition in the context of net-zero. A list of case studies for such digitization enabled optimal design and operation of energy systems at various temporal and spatial scales are reviewed in the paper, including model predictive control, enterprise-wide optimization, eco-industrial park data management, and smart city. The key technological innovations across these applications, such as virtual representation of physical entities, ontological knowledge base, data-driven high dimensional surrogate model based parameterization are also inspected in the paper. Future challenges in terms of data privacy and security are also discussed as potential barriers for digitalization enabled net-zero energy system transition.</p>	10.1007/s43979-023-00047-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43979-023-00047-7	SpringerLink
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Errors in IVF laboratories: risks assessments and mitigations	Ifenatuoha, Chibuzor Williams, Mohammed, Chand, Malhotra, Keshav,	<p>Background Assisted reproductive technology (ART) has positively impacted the field of human reproduction. Over the years, ART procedures have evolved to include several complex techniques, associated with various risks of errors and failure opportunities, especially in laboratories. IVF-associated errors, although rare, have significant implications. Patients may be psychologically affected, given the emotional attachment associated with IVF treatments. Most of these errors are associated with humans and/or systemic failure.</p> <p>Methods In this article, we used the Google Scholar database to search for related peer-reviewed original and review articles. Search keywords were “IVF laboratory”, “the embryologist”, “laboratory error”, “IVF laboratory errors”, “IVF error prevalence”, “risks of IVF error”, “consequences/repercussion, IVF errors”, “risk assessment”, and “risk mitigation”. All studies were extensively evaluated.</p> <p>Findings There is a need for an effective approach toward improving existing risk management systems and, possibly, developing better risk management models that can eliminate these</p>	10.1186/s43043-023-00130-0	http://link.springer.com/openurl/pdf?id=doi:10.1186/s43043-023-00130-0	SpringerLink
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		<p>errors. Because laboratory resources (equipment and human expertise) are finite and are dependent on systemic policies, error mitigation must involve a multidimensional approach. This review includes several of these error-mitigating strategies as well as innovative technologies that may provide practical approaches to improve error surveillance, reporting, management, and potentially, eradication. Furthermore, errors in IVF laboratories threaten the integrity of the IVF processes and pose significant implications, which are often negative.</p> <p>Conclusion This review highlights those errors and the stages they occur during the IVF process.</p> <p>Recommendations Understanding the risks of errors in IVF laboratories can help embryologists develop better approaches to identify, evaluate the causes, and prevent errors in the laboratory. Essentially, the practice of effective risks assessment and management can help reinforce patients' trust in the clinics and prevent repercussions such as litigations and many more. More laboratories can also begin reporting even minor errors to curb the scarce data in this subject.</p>			
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Design of capability maturity model integration with cybersecurity risk severity complex prediction using bayesian-based machine learning models	Alshammari, Fahad H.,	<p>Extreme complex events and the corresponding abnormal statistics of cyber security are ubiquitously observed in many real-time systems, and the development of efficient tools to explain and properly anticipate such representative features remains a great issue. Art and science must be carefully balanced in order to determine the risk of cyberattacks. Once the risk variables have been identified, a risk assessor typically begins by gathering relevant information for each. Logs, architecture diagrams, network topology, compliance evaluations, incidents, vulnerability evaluations, threat modelling, and control assessment are all sources of information for the assessor. The assessor uses approved impact and likelihood tables to evaluate risk factors based on evidence gathered and a methodology that has been approved. Assessments that are accurate are those in which draw conclusions from large amounts of acquired data and then apply those conclusions to the calculated risk severity. Contextualizing risk requires the assessor to draw on past experience, knowledge, and observations of the system itself.</p>	10.1007/s11761-022-00354-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11761-022-00354-4	SpringerLink
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		<p>Qualitative assessments of cybersecurity risks are performed. It is difficult, if not impossible, to obtain meaningful quantitative measures of cybersecurity risk variables. Risk assessments in cybersecurity cannot use quantitative estimations because they're time- and labour-intensive. A shortage of competent individuals, the quantity of staff necessary, the assessment time, and business objectives all limit the ability to scale quantitative and qualitative risk assessments. Using machine learning (ML) to forecast the severity of future risks based on previous risk assessments may provide a solution to the scalability problem in risk assessment. The intuition, insight, and skill that risk assessors use to determine the severity of a risk are all included into machine learning algorithms. As an initial step, machine learning can be used to assess risk, and if the level of risk exceeds a predetermined threshold, additional steps can be taken. The algorithm learns from each manual analysis, reducing the need for human interaction dramatically.</p>			
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Strategic drivers to overcome the impacts of the COVID-19 pandemic: implications for ensuring resilience in supply chains	Moktadir, Md. Abdul, Paul, Sanjoy Kumar, Kumar, Anil, Luthra, Sunil, Ali, Syed Mithun, Sultana, Razia,	<p>The recent coronavirus (COVID-19) pandemic has affected the manufacturing industry's entire supply chain system. It is important to investigate the strategic drivers to deal with the impacts of COVID-19 in the manufacturing industry. Accordingly, this study aims to identify the strategic drivers to overcome the impacts of the COVID-19 pandemic and improve the resiliency of the Bangladeshi footwear industry, an emerging economy. The strategic drivers are identified after reviewing research papers, reports, blogs, and discussions on social media platforms. The main drivers and their respective sub-drivers are finalized by discussing with domain experts. To offer strategic plans for building resiliency, it is crucial to know the importance of the main drivers and sub-drivers; therefore, the best–worst method is applied to determine the priority importance of the strategic drivers. The findings indicate that the top five drivers to defeat the impacts of COVID-19 are “high capability of reconfigurability,” “enhance the relationship with suppliers,” “develop health protocols to continue manufacturing,” “government support through</p>	10.1007/s12063-022-00301-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12063-022-00301-8	SpringerLink
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		<p>incentives, subsidy, tax rebate, etc.,” and “set a policy to stable material supply”. Based on the findings, this study also provides practical implications with proposed research themes for policymakers and operations managers towards mitigating the impacts of the COVID-19 pandemic. The study’s contribution is unique and important for the footwear supply chain as the research on COVID-19 in the context of resiliency focusing on the footwear supply chain is non-existent.</p>			
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Towards industry 4.0 in practice: a novel RFID-based intelligent system for monitoring and optimisation of production systems	Jesus Pacheco, Diego Augusto, Jung, Carlos Fernando, Azambuja, Marcelo Cunha,	In line with the emerging Industry 4.0 technologies and their challenges for implementation, this study presents the results of research that developed a novel industrial integrated information system based on open source and low-cost technologies. The proposed Control System via RFID for Online Monitoring and Optimisation of Production Lines uses hardware and software to analyse the production system flow and performance. A longitudinal in-depth case study in a manufacturing plant exposes the empirical challenges to developing and implementing intelligent manufacturing systems towards Industry 4.0 in practice. Findings demonstrated that the proposed system enables industrial information integration through supervision and generation of information from the shop-floor contributing to the managerial decision-making process in real-time. Implications for practitioners and academics address some of the current challenges for implementing Industry 4.0 technologies and industrial information integration. This study extends the knowledge of industrial integration and	10.1007/s10845-021-01840-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-021-01840-w	SpringerLink
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		RFID implementation within Industry 4.0 by presenting a real-life application based on open source and low-cost technologies. The insights and lessons gained in this study can potentially be generalised for future efforts across industry manufacturers with similar shop-floor.			
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Hospital-system functionality quantification based on supply–demand relationship under earthquake	Hou, Zonghao, Zhang, Juan, Zhang, Mingyuan, Li, Gang,	<p>The hospital system is one of the most critical systems in the city and plays an irreplaceable role in the whole process of earthquake disasters. This paper presents a method that considers the medical supply–demand relationship to quantify the functionality and functional loss of a hospital system under earthquake conditions, which is different from the current quantitative method that only considers internal factors of the hospital system. This method provides a “finest granularity” method for the division of quantitative evaluation units of hospital system functionality based on GIS overlay. Secondly, the functionality of the hospital system considering the medical supply–demand relationship and the quantitative metric, substitution capacity of medical resources (SCMR), is constructed. Then, we propose a quantification method of SCMR by combining the spatial and network analysis methods. Finally, a hospital system in eastern China is considered as an illustrative example. The impact of changes in the medical supply and demand at different times of the day on the</p>	10.1007/s11069-022-05670-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-022-05670-8	SpringerLink
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		hospital system functionality is analyzed. The results show that the medical supply and demand can impact hospital system functionality. The loss of medical supply causes a decline of hospital system functionality, while changes in the spatial aggregation of medical demand positively affect the loss of hospital system functionality. This paper can use the proposed method to quantify the hospital system functionality and reflect the balance of the medical supply–demand relationship before and after the earthquake. It can help decision-maker develop scientific post-earthquake emergency plans and enhance hospital system resilience.			
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<p>The Ground Truth program: simulations as test beds for social science research methods</p>	<p>Naugle, Asmeret, Russell, Adam, Lakkaraju, Kiran, Swiler, Laura, Verzi, Stephen, Romero, Vicente,</p>	<p>Social systems are uniquely complex and difficult to study, but understanding them is vital to solving the world's problems. The Ground Truth program developed a new way of testing the research methods that attempt to understand and leverage the Human Domain and its associated complexities. The program developed simulations of social systems as virtual world test beds. Not only were these simulations able to produce data on future states of the system under various circumstances and scenarios, but their causal ground truth was also explicitly known. Research teams studied these virtual worlds, facilitating deep validation of causal inference, prediction, and prescription methods. The Ground Truth program model provides a way to test and validate research methods to an extent previously impossible, and to study the intricacies and interactions of different components of research.</p>	<p>10.1007/s10588-021-09346-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10588-021-09346-9</p>	<p>SpringerLink</p>
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Dual-Use Technologies in the Context of Autonomous Driving: An Empirical Case Study From Germany	Guntrum, Laura Gianna, Schwartz, Sebastian, Reuter, Christian,	<p>The article examines which technical aspects of autonomous driving are potentially transferable to the military sector. Through expert interviews the strong fragmentation of technologies in the field of autonomous driving becomes apparent. This hinders the clear identification of a specific dual-use technology. Environmental perception, artificial intelligence and sensors are considered to have the highest transferability rate from civil research to the military sector. Therefore, sensor development should receive special attention.</p> <p>Der Beitrag untersucht, welche technischen Aspekte des autonomen Fahrens im militärischen Bereich eingesetzt werden können. Auf Grundlage von Experteninterviews wird die starke Fragmentierung der Technologien im Bereich des autonomen Fahrens deutlich, was eine eindeutige Identifizierung einer bestimmten Dual-Use-Technologie erschwert. Von den Entwicklungen aus der zivilen Forschung, die auf den militärischen Sektor übertragen werden können, wurde die Umweltwahrnehmung, neben KI und Sensoren,</p>	10.1007/s12399-022-00935-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12399-022-00935-3	SpringerLink
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Assessing the water–energy–carbon nexus (WECN) in combined cycle power plants in Iran	Ghodrati, S., Kargari, N., Farsad, F., Javid, A. H., Kani, A. H.,	Water and energy are two vital and related resources and the process of generation and distribution of these resources in the electricity industry leads to carbon emissions and climate change. The study aimed to evaluate the water, energy, and carbon nexus (WECN) in the combined cycle power plants. First, carbon and water footprints were estimated by the LCA method. Then, the WEN and flow relations were investigated using the REWSS (Regional Energy & Water Supply Scenarios model) model and the Sankey diagram. Finally, optimal relationships between WEN were defined using Vensim software to increase electricity production along with managing water consumption and reducing greenhouse gas emissions. The result of WECN in this study showed that the average annual amount of water footprint in electricity generated was 980 L of water consumed per MWh of electricity. The highest and lowest water footprint was related to the Damavand (67.14 L/MWh) and Zavareh (18.95 L/MWh) power plants, respectively. Moreover, the average annual amount of carbon footprint in electricity generated was	10.1007/s13762-022-04749-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13762-022-04749-w	SpringerLink
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		<p>0.623 t/mkWh of electricity. The highest and lowest average carbon footprint was related to Fars (1.15 t/mkWh) and Khoy (0.53 t/mkWh) power plants, respectively. Further, the highest (1898 kcal/kWh) and lowest (1704 kcal/kWh) thermal efficiency was determined for Khoy and Gilan power plants, respectively. The comparison of WEN results showed that the amount of electricity generation, water consumption, and carbon emissions in combined cycle power plants are not always directly related to each other. The results can help managers and politicians in planning and integrated managing of these limited resources.</p>			
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Trans-AI/DS: transformative, transdisciplinary and translational artificial intelligence and data science	Cao, Longbing,	<p>After the many ups and downs over the past 70 years of AI and 50 years of data science (DS), AI/DS have migrated into their new age. This new-generation AI/DS build on the consilience and universology of science, technology and engineering. In particular, it synergizes AI and data science, inspiring Trans-AI/DS (i.e., Trans-AI, Trans-DS and their hybridization) thinking, vision, paradigms, approaches and practices. Trans-AI/DS feature their transformative (or transformational), transdisciplinary, and translational AI/DS in terms of thinking, paradigms, methodologies, technologies, engineering, and practices. Here, we discuss these important paradigm shifts and directions. Trans-AI/DS encourage big and outside-the-box thinking beyond the classic AI, data-driven, model-based, statistical, shallow and deep learning hypotheses, methodologies and developments. They pursue foundational and original AI/DS thinking, theories and practices from the essence of intelligences and complexities inherent in humans, nature, society, and their creations.</p>	10.1007/s41060-023-00383-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-023-00383-y	SpringerLink
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Comparison of open-source runtime testing tools for microservices	Sotomayor, Juan P., Allala, Sai Chaithra, Santiago, Dionny, King, Tariq M., Clarke, Peter J.,	<p>In recent years, there has been an increase in the number of software applications developed using the microservices architectural pattern. This trend is due to the benefits derived from the more traditional N-tier architectural patterns that use monolithic designs for each tier. The value of using the microservices architectural pattern, particularly in the cloud, has been pioneered by companies such as Netflix and Google. These companies have created protocols and tools to support the development of cloud-based applications. However, the testing of microservices applications continues to be challenging due to the added complexity of network communication between the collaborating services. In addition, an increasing number of tools are being used to test microservices-based applications, which makes selecting the most appropriate tool(s) a challenging task. In this article, we compare several open-source tools used to support the testing of microservices based on testing levels, the scaffolding required, languages used for test cases, and the type of</p>	10.1007/s11219-022-09583-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-022-09583-4	SpringerLink
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		<p>interface used to interact with the applications under test. We describe a prototype for a microservices-based application called Rideshare that allows users to reserve rides from available drivers. Using the Rideshare application, we performed a study using a subset of selected open-source tools to determine the overhead added by these tools. We present the results of the study and describe our experiences in configuring the tools to test the Rideshare application using different testing approaches.</p>			
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<p>A review of common natural disasters as analogs for asteroid impact effects and cascading hazards</p>	<p>Titus, Timothy, Robertson, D., Sankey, J. B., Mastin, L., Rengers, F.,</p>	<p>Modern civilization has no collective experience with possible wide-ranging effects from a medium-sized asteroid impactor. Currently, modeling efforts that predict initial effects from a meteor impact or airburst provide needed information for initial preparation and evacuation plans, but longer-term cascading hazards are not typically considered. However, more common natural disasters, such as volcanic eruptions, earthquakes, wildfires, dust storms, and hurricanes, are likely analogs that can provide the scope and scale of these potential effects. These events, especially the larger events with cascading effects, are key for understanding the scope and complexity of mitigation, relief, and recovery efforts for a medium-sized asteroid impact event. This paper reviews the initial and cascading effects of these natural hazards, describes the state of the art for modeling these hazards, and discusses the relevance of these hazards to expected long-term effects of an asteroid impact. Emergency managers, resource managers and planners, and research scientists involved in mitigation and recovery efforts would likely</p>	<p>10.1007/s11069-022-05722-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-022-05722-z</p>	<p>SpringerLink</p>
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		derive significant benefit from a framework linking multiple hazard models to provide a seamless sequence of related forecasts.			
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<p>An approach for performance requirements verification and test environments generation</p>	<p>Abdeen, Waleed, Chen, Xingru, Unterkalmsteiner, Michael,</p>	<p>Model-based testing (MBT) is a method that supports the design and execution of test cases by models that specify the intended behaviors of a system under test. While systematic literature reviews on MBT in general exist, the state of the art on modeling and testing performance requirements has seen much less attention. Therefore, we conducted a systematic mapping study on model-based performance testing. Then, we studied natural language software requirements specifications in order to understand which and how performance requirements are typically specified. Since none of the identified MBT techniques supported a major benefit of modeling, namely identifying faults in requirements specifications, we developed the Performance Requirements verification and Test EnvironmentS generation approach (PRO-TEST). Finally, we evaluated PRO-TEST on 149 requirements specifications. We found and analyzed 57 primary studies from the systematic mapping study and extracted 50 performance requirements models. However, those models don't</p>	<p>10.1007/s00766-022-00379-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-022-00379-3</p>	<p>SpringerLink</p>
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		<p>achieve the goals of MBT, which are validating requirements, ensuring their testability, and generating the minimum required test cases. We analyzed 77 Software Requirements Specification (SRS) documents, extracted 149 performance requirements from those SRS, and illustrate that with PRO-TEST we can model performance requirements, find issues in those requirements and detect missing ones. We detected three not-quantifiable requirements, 43 not-quantified requirements, and 180 underspecified parameters in the 149 modeled performance requirements. Furthermore, we generated 96 test environments from those models. By modeling performance requirements with PRO-TEST, we can identify issues in the requirements related to their ambiguity, measurability, and completeness. Additionally, it allows to generate parameters for test environments.</p>			
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5G Rollout Challenges and Opportunities for Frontier and Emerging Markets	Gepko, Igor,	<p>Abstract Cost efficiency is an essential metric in the design of major part of what is expected to be the 5G network. Some of the 5G solutions, mainly those involving mmWave technology and network densification, are extremely expensive. Much of what was said about 5G rollout strategies has been said with regard to the world's major leaders in 5G technology and telecom infrastructure investment. However, a much more numerous group of countries often referred as emerging markets or middle-income economies has never hold a leadership in the development of cellular technologies. To date, few of them have fully leveraged the potential of 4G systems while many still have not ensured a return on investment in 3G. This gave rise to the views that these countries are not ready for 5G challenges. However, all of them are doomed to enter the era of another industrial revolution, where exactly 5G is to become the main driver. Yet, the use cases and the portfolio of services of the future networks will apparently depend on economic realities of the country where it will be deployed. There is a rather vague picture at</p>	10.3103/S0735272723040040	http://link.springer.com/openurl/pdf?id=doi:10.3103/S0735272723040040	SpringerLink
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		<p>the moment of how the 5G rollout may take place in this part of the world and that is the main reason for this study. In this paper, we outline the technical challenges and economic tensions associated with the developing of 5G physical infrastructure and address spectrum allocation issues with a particular focus on the needs of the future enhanced mobile broadband component. Then we discuss the role of government in establishing favorable regulatory framework, providing supportive policies and finding local drivers to facilitate 5G rollout and the challenges, confronting the operators paving their way to 5G.</p>			
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GeoCloud4SDI: a cloud enabled open framework for development of spatial data infrastructure at city level	Tripathi, Ashutosh Kumar, Agrawal, Sonam, Gupta, Rajan Dev,	<p>Spatial Data Infrastructure (SDI) is considered as a holistic framework for effective collection, integration, discovery, sharing and delivery on a common platform for better utilization of multi-source geospatial data by global community, thereby, resulting in increased awareness of the use of geospatial data and the cooperation between decision-makers and stakeholders. Cloud computing technology can provide convenient and on-demand network access to shared computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction, and has been widely used in different applications. However, much research could not be found related to adoption of cloud computing in development of SDI at various levels from local to country. The present research is a step forward to fill this research gap by development of an open, interoperable and efficient framework for implementation of SDI at City level (acronym GeoCloud4SDI) for Prayagraj city (India) and deploying the same on OpenStack</p>	10.1007/s12145-022-00893-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-022-00893-6	SpringerLink
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		<p>private cloud. Accordingly, multi-tier client server web GIS based SDI architecture and cloud enabled SDI services and workflow using load balancing and elastic computing architecture is developed. The novel framework for GeoCloud4SDI is developed using four layers, namely, (i) physical layer, (ii) cloud services layer, (iii) geospatial services layer and (iv) client layer. The physical layer and the cloud services layer combined together enables the access of virtualized computing resources from the cloud to enhance the performance of City level SDI. Geospatial services layer provides two different functionalities, namely, (a) management, retrieval and access of spatial data and metadata, and (b) retrieval of cloud services from cloud service layer. The performance of GeoCloud4SDI is examined by cloud enabled load balancing and elastic computing framework and the results show the response time reduced up to 50.43% along with 1.95 s performance gain for 1000 concurrent requests. The developed and implemented cloud enabled framework of</p>			
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		GeoCloud4SDI is built via Open Geospatial Consortium (OGC) compliant interoperable service standards using Open Source Software (OSS), thereby ensuring standardisation and interoperability, and can also be adopted for other cities in India and the world.			
OR in digital production and logistics management	Cancela, Héctor, Tohmé, Fernando, Piñeyro, Pedro, Rossit, Daniel Alejandro,		10.1007/s10479-023-05211-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-023-05211-x	SpringerLink
Preface CWD & DSEC 2023	Jacobs, Georg,		10.1007/s10010-023-00618-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10010-023-00618-1	SpringerLink
A SafeML extension for a unified risk assessment to diverse service robots	Miyoshi, Takao, Nakabo, Yoshihiro, Fukui, Hidetoshi, Yashiro, Makoto, Miyazawa, Iko, Sakamoto, Takeshi, Ando, Noriaki, Kuga, Toru, Kitamura, Atsushi, Ohara, Kenichi, Kimura, Tetsuya,	Risk assessment is one of the important processes in the social implementation of robots. In risk assessment and safety design of systems with various stakeholders, modeling and visualization of related elements are important not only for designers but also for users. We examined the use of SafeML in the process and proposed its extension for the purpose for missing elements.	10.1186/s40648-023-00245-z	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40648-023-00245-z	SpringerLink

Analysis of quantitative metrics for assessing resilience of human-centered CPPS workstations	Aruväli, Tanel, Marchi, Matteo, Rauch, Erwin,	<p>Manufacturing companies' preparedness level against external and internal disruptions is complex to assess due to a lack of widely recognized or standardized models. Resilience as the measure to characterize preparedness against disruptions is a concept with various numerical approaches, but still lacking in the industry standard. Therefore, the main contribution of the research is the comparison of existing resilience metrics and the selection of the practically usable quantitative metric that allows manufacturers to start assessing the resilience in digitally supported human-centered workstations more easily. An additional contribution is the detection and highlighting of disruptions that potentially influence manufacturing workstations the most. Using five weighted comparison criteria, the resilience metrics were pairwise compared based on multi-criteria decision-making Analytic Hierarchy Process analysis on a linear scale. The general probabilistic resilience assessment method Penalty of Change that received the highest score considers the probability of disruptions and related cost of</p>	10.1038/s41598-023-29735-1	https://www.nature.com/articles/s41598-023-29735-1.pdf	SpringerLink
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		<p>potential changes as inputs for resilience calculation. Additionally, manufacturing-related disruptions were extracted from the literature and categorized for a better overview. The Frequency Effect Sizes of the extracted disruptions were calculated to point out the most influencing disruptions. Overall, resilience quantification in manufacturing requires further research to improve its accuracy while maintaining practical usability.</p>			
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Integrated twitter analysis to distinguish systems thinkers at various levels: a case study of COVID-19	Pirim, Harun, Nagahi, Morteza, Larif, Oumaima, Nagahisarchoghaei, Mohammad, Jaradat, Raed,	<p>Systems Thinking (ST) has become essential for practitioners and experts when dealing with turbulent and complex environments. Twitter medium harbors social capital including systems thinkers, however there are limited studies available in the extant literature that investigate how experts' systems thinking skills, if possible at all, can be revealed within Twitter analysis. This study aims to reveal systems thinking levels of experts from their Twitter accounts represented as a network. Unraveling of latent Twitter network clusters ensues the centrality analysis of their follower networks inferred in terms of systems thinking dimensions. COVID-19 emerges as a relevant case study to investigate the relationship between COVID-19 experts' Twitter network and their systems thinking capabilities. A sample of 55 trusted expert Twitter accounts related to COVID-19 has been selected for the current study based on the lists from Forbes, Fortune, and Bustle. The Twitter network has been constructed based on the features extracted from their Twitter accounts. Community detection reveals three distinct</p>	10.1007/s41109-022-00520-9	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1007/s41109-022-00520-9	SpringerLink
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		<p>groups of experts. In order to relate system thinking qualities to each group, systems thinking dimensions are matched with the follower network characteristics such as node-level metrics and centrality measures including degree, betweenness, closeness and Eigen centrality. Comparison of the 55 expert follower network characteristics elucidates three clusters with significant differences in centrality scores and node-level metrics. The clusters with a higher, medium, lower scores can be classified as Twitter accounts of Holistic thinkers, Middle thinkers, and Reductionist thinkers, respectfully. In conclusion, systems thinking capabilities are traced through unique network patterns in relation to the follower network characteristics associated with systems thinking dimensions.</p>			
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Vulnerability management in Linux distributions	Lin, Jiahuei, Zhang, Haoxiang, Adams, Bram, Hassan, Ahmed E.,	<p>Vulnerabilities in software systems not only lead to loss of revenue, but also to loss of reputation and trust. To avoid this, software providers strive to remedy vulnerabilities rapidly for their customers. However, in open-source development, the providers do not always control the distribution of their software themselves, but instead typically rely on Linux distributions to integrate and distribute upstream projects to millions of end users, which increases the difficulty of vulnerability management. In addition, an upstream project is usually packaged into several Linux distributions so that a vulnerability can propagate across multiple distributions via the upstream project. In this work, we empirically investigate a large number of vulnerabilities registered with the Common Vulnerabilities and Exposures (CVE) program in two popular Linux distributions, i.e., Debian (21,752 CVE-IDs) and Fedora (17,434 CVE-IDs), to study the practices of vulnerability management in such ecosystems. We investigate the lifecycle of fixing vulnerabilities, analyze how fast it takes for a vulnerability to go through each phase of its</p>	10.1007/s10664-022-10267-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-022-10267-7	SpringerLink
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		<p>lifecycle, characterize the commonly occurring vulnerabilities that affect both distributions, and identify the practices that developers use to fix vulnerabilities. Our results suggest that the vulnerability testing period (i.e., the period from when the vulnerability fix is committed for testing to when the vulnerability fix is released) accounts for the largest number of days (median of 15 days) in Fedora. 74% (i.e., 16,070) and 92% (i.e., 16,070) of the vulnerabilities in Debian and Fedora, respectively, occur in both Linux distributions, which we refer to as common security vulnerabilities (CSVs). This result is impacted by the package selection and customization of the distributions. Finally, on a representative sample of 345 fixed CSVs, we find that upstream projects were responsible for fixing 303 (85%) and 267 (76%) out of the 345 CSVs in Debian and Fedora, respectively, with distribution maintainers integrating those fixes. Our work aims to gain a deeper understanding of the current practices in the vulnerability management of Linux distributions, and propose suggestions to distribution</p>			
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		maintainers for better mitigation of the risks of vulnerabilities.			
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<p>Intimate coupling of a hydrologic model with an economic input–output model using system dynamics</p>	<p>Abdolabadi, Hamid, Amaya, Maria, Little, John C.,</p>	<p>This paper illustrates the intimate coupling of a hydrologic model with an economic input–output model. A realistic watershed and a simple hypothetical economy are used to illustrate the trade-off between water use and water availability. This approach provides two key benefits for water management. First, it directly links the supply side (the hydrologic model is used to estimate water availability) to the demand side (the economic model is used to estimate water use by sector) using a common framework that accounts for the interdependence of the two models. This link allows us to analyze water allocation and calculate the intensity of water scarcity. Second, it enables us to consider the effect of spatial distribution of economic activity on the hydrologic model and prevents either under or over estimating water scarcity. Without this spatial disaggregation, a shortfall in one sub-watershed may be offset by an abundance in another sub-watershed. The framework is sufficiently flexible to assess more complex situations, including varied spatial disaggregation and feedbacks. The coupled model is much faster and can be</p>	<p>10.1007/s13201-023-01872-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13201-023-01872-y</p>	<p>SpringerLink</p>
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		<p>applied to watersheds with different characteristics. We use system dynamics to develop the integrated hydrologic-economic modelling framework and analyze three scenarios: a baseline situation, a spatially-resolved coupled model, and a temporally-resolved coupled model. The paper concludes with recommendations for implementation and future research.</p>			
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Cyber risk management for autonomous passenger ships using threat-informed defense-in-depth	Amro, Ahmed, Gkioulos, Vasileios,	Recent innovations in the smart city domain have led to the proposition of a new mode of transportation utilizing Autonomous Passenger Ships (APS) or ferries in inland waterways. The novelty of the APS concept influenced the cyber risk paradigm and led to different considerations regarding attack objectives, techniques as well as risk management approaches. The main factor that has led to this is the autoremove operational mode, which refers to autonomous operations and remote supervision and control in case of emergency. The autoremove operational mode influences the risk of cyber attacks due to the increased connectivity and reliance on technology for automating navigational functions. On the other hand, the presence of passengers without crew members imposes a safety risk factor in cyber attacks. In this paper, we propose a new cyber risk management approach for managing the cyber risks against cyber physical systems in general and Autonomous Passenger Ships in particular. Our proposed approach aims to improve the Defense-in-Depth risk management strategy with	10.1007/s10207-022-00638-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-022-00638-y	SpringerLink
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		<p>additional components from the Threat-Informed Defense strategy allowing for more evolved cyber risk management capabilities. Moreover, we have utilized the proposed cyber risk management approach for the proposition of a cybersecurity architecture for managing the cyber risks against an APS use case named milliAmpere2. Additionally, we present our results after conducting a Systematic Literature Review (SLR) in cybersecurity evaluation in the maritime domain. Then, the findings of the SLR were utilized for a suitable evaluation of the proposed risk management approach. Our findings suggest that our proposed risk management approach named Threat-Informed Defense-in-Depth is capable of enriching several risk management activities across different stages in the system development life cycle. Additionally, a comprehensive evaluation of the cybersecurity posture of milliAmpere2 has been conducted using several approaches including risk evaluation, simulation, checklist, and adversary emulation. Our evaluation has uncovered several limitations in the current cybersecurity posture and proposed actions</p>			
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		for improvement.			
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<p>A survey on COVID-19 impact in the healthcare domain: worldwide market implementation, applications, security and privacy issues, challenges and future prospects</p>	<p>Shakeel, Tanzeela, Habib, Shaista, Boulila, Wadii, Koubaa, Anis, Javed, Abdul Rehman, Rizwan, Muhammad, Gadekallu, Thippa Reddy, Sufiyan, Mahmood,</p>	<p>Extensive research has been conducted on healthcare technology and service advancements during the last decade. The Internet of Medical Things (IoMT) has demonstrated the ability to connect various medical apparatus, sensors, and healthcare specialists to ensure the best medical treatment in a distant location. Patient safety has improved, healthcare prices have decreased dramatically, healthcare services have become more approachable, and the operational efficiency of the healthcare industry has increased. This research paper offers a recent review of current and future healthcare applications, security, market trends, and IoMT-based technology implementation. This research paper analyses the advancement of IoMT implementation in addressing various healthcare concerns from the perspectives of enabling technologies, healthcare applications, and services. The potential obstacles and issues of the IoMT system are also discussed. Finally, the survey includes a comprehensive overview of different disciplines of IoMT to empower future</p>	<p>10.1007/s40747-022-00767-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40747-022-00767-w</p>	<p>SpringerLink</p>
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		researchers who are eager to work on and make advances in the field to obtain a better understanding of the domain.			
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<p>A modelling framework to support integrated design of production systems at early design stages</p>	<p>Abdoli, Shiva,</p>	<p>Multidisciplinary, large scale, and dynamic essence of production-logistic systems make their design knowledge complex. As a result, designers from different disciplines mostly design these systems with sequential approaches. This does not address the impact of single design decisions on overall system performance, which may lead to inconsistencies between different disciplines or failures. This paper aims to realise the integrated design of such systems by introducing a framework that incorporates Systems Engineering and Object-Oriented methods to develop a model that holistically embodies design knowledge of such systems. This model is constructed in Finite-State-Machine formalism to achieve an executable architecture and integrated with optimization models to allow simulation of alternatives and to observe the impact of design decisions on system behaviour. Supportive algorithms are introduced for refinements of design alternatives according to the simulation results. A fuzzy assessment approach is introduced to also assess the alternatives against qualitative</p>	<p>10.1007/s12008-022-00987-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12008-022-00987-x</p>	<p>SpringerLink</p>
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		<p>criteria. The framework integrates simulation and fuzzy assessment results and performs a multi-criteria assessment to select an alternative for the detailed design. Therefore, the framework can stand as a decision support framework at early design stages, giving insights to designers about the impact of single design decisions on system overall performance and satisfaction of various objectives.</p>			
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Towards an Interdisciplinary Development of IoT-Enhanced Business Processes	Valderas, Pedro, Torres, Victoria, Serral, Estefanía,	IoT-enhanced Business Processes make use of sensors and actuators to carry out the process tasks and achieve a specific goal. One of the most important difficulties in the development of IoT-enhanced BPs is the interdisciplinarity that is demanded by this type of project. Defining an interdisciplinary tool-supported development approach that facilitates the collaboration of different professionals, with a special focus on three main facets: business process requirements, interoperability between IoT devices and BPs, and low-level data processing. The study followed a Design Science Research methodology for information systems that consists of a 6-step process: (1) problem identification and motivation; (2) define the objectives for a solution; (3) design and development; (4) demonstration; (5) evaluation; and (6) communication. The paper presents an interdisciplinary development process to support the creation of IoT-enhanced BPs by applying the Separation of Concerns principle. A collaborative development environment is built to provide each professional	10.1007/s12599-022-00770-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-022-00770-y	SpringerLink
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		<p>with the tools required to accomplish her/his development responsibilities. The approach is successfully validated through a case-study evaluation. The evaluation allows to conclude that the proposed development process and the supporting development environment are effective to face the interdisciplinary nature of IoT-enhanced BPs.</p>			
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Exploring the use of IoT Data for Heightened Situational Awareness in Centralised Monitoring Control Rooms	Horita, Flávio, Baptista, João, Albuquerque, João Porto,	<p>This paper traces the expansion of a network of IoT sensors to improve the effectiveness of a centralised control room in Brazil in anticipating natural hazards. This centralised model relies on using IoT data by highly qualified experts replacing previous smaller local structures. We draw on the notion of Situational Awareness to carry out the study. Results show that although the operators were not always familiar with the characteristics of locations, the use of IoT data heightened their situational awareness in the centralised control room by improving perception and comprehension. However, they still relied on local knowledge and learned experiences to support projection and anticipation of risks. The study highlights that although data analytics systems are capable of expanding operators' perception of local elements, they must be complemented by local richer forms of information, needed to anticipate risks and make critical decisions with major impact on local population.</p>	10.1007/s10796-020-10075-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-020-10075-8	SpringerLink
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<p>A Novel Approach to Enhance Safety on Drowsy Driving in Self-Driving Car</p>	<p>Islam, Md. Motaharul, Kowsar, Ibna, Zaman, Mashfiq Shahriar, Sakib, Md. Fahmidur Rahman, Saquib, Nazmus, Alam, Syed Md. Shamsul,</p>	<p>Drowsy driving centric accidents are increasing at a frightening rate. Needless to say that the state-of-the-art technologies only have competencies in detecting drowsiness and alerting the drowsy driver. Existing methods have some remarkable hindrances in the domain of handling the distressed situation. Therefore these methodologies are ineffective to take additional safety measures if the driver is not proficient enough to operate the vehicle even though an alarm is given. Consequently, after evaluating the existing methodologies and the growth of autonomous vehicles, we have proposed an innovative approach that detects driver drowsiness in real-time. Our suggested model can locate a nearest available safe parking space and reach the parking location after initiating the autonomous driving mode to ensure safety. The proposed methodology has achieved an accuracy of 98 % .</p>	<p>10.1007/s11036-022-01932-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11036-022-01932-8</p>	<p>SpringerLink</p>
<p>Editorial Introduction</p>	<p>Ricca, Mario, Berteà, Stefano, Heritier, Paolo,</p>		<p>10.1007/s11196-022-09965-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11196-022-09965-8</p>	<p>SpringerLink</p>

A Comparative Analysis of Machine and Deep Learning Techniques for EEG Evoked Emotion Classification	Kumari, Nandini, Anwar, Shamama, Bhattacharjee, Vandana,	<p>In the field of Brain Computer Interface (BCI), applications in real life like emotion recognition from recorded electrical activity from brain have become famous topic of research nowadays. Learning successful representations of consistent performances from electroencephalogram (EEG) signals is one of the difficulties in recognition tasks. This research is intended to propose a discriminative and efficacious classification approach for categorizing brain signals patterns depending on the level of activity or frequency for recognizing emotion states. The paper classifies three possible emotion states such as neutral, negative and positive emotional states by operating the Muse EEG headset with four electrode channels (AF7, AF8, TP9, TP10) captured while a subject was watching an emotional video clip on screen. In this experiment various statistical, linear and non linear features are extracted and then Machine and Deep learning based models are implemented to classify the EEG evoked emotions. In this work, a brief comparison study is carried out between the various implemented models with respect to train and test</p>	10.1007/s11277-022-10076-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-022-10076-7	SpringerLink
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		<p>accuracy, recall, precision and F1 score. The highest average accuracy achieved are 98.13% for the proposed Convolutional Neural Network (CNN) model among all implemented Deep learning models and 98.12% for Random forest among the various machine learning techniques implemented. The proposed Long Short Term Memory (LSTM) and Gated Recurrent Unit (GRU) model with 97.42 and 97.19% and Decision tree and Support Vector Machine with 96.25 and 96.42% have also provided comparable results for emotion classification respectively.</p>			
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Fuzzy logic indicators for the assessment of farming sustainability strategies in a tropical agricultural frontier	dos Reis, Júlio César, Rodrigues, Geraldo Stachetti, de Barros, Inácio, de Aragão Ribeiro Rodrigues, Renato, Garrett, Rachael D., Valentim, Judson Ferreira, Kamoi, Mariana Y. T., Michetti, Miqueias, Wruck, Flávio Jesus, Rodrigues-Filho, Saulo,	Assessing the sustainability of agricultural systems encompasses complex and interchanging economic, environmental and social issues, and requires multi-criteria decision-analysis approaches. Various models have been proposed to assess agricultural sustainability considering these issues, based for example on programs for multi-attribute decision making or Fuzzy Interference Systems. However, we identify a lack of comprehensive models applicable to broad agricultural conditions in different environments and socioeconomic contexts. To fill this gap, we propose a novel, indicator-based fuzzy logic model for assessing the sustainability of agricultural systems. To test the model's suitability, we conducted twenty-two case studies over the 2018/19 cropping season in the Brazilian agricultural-forest frontier region; the farms chosen represent the three most common farming systems there: (i) pure crop farming (crop rotation only: soybean - corn), (ii) pure livestock, and (iii) integrated farming (crop - livestock and livestock - forest). Partial indicators were built to assess the economic,	10.1007/s13593-022-00858-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13593-022-00858-5	SpringerLink
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		<p>environmental, and social performances of those farming systems, then were further integrated in a sustainability index. The results show higher and better-balanced performance for integrated farms, which displayed the highest sustainability index values. In contrast, livestock farms performed poorly in all dimensions and showed the lowest sustainability index. Crop farms showed higher economic, but lower social and environmental performances. These results are in contrast to the oft-perceived trade-offs among different pillars of sustainability and show that integrated systems have the potential to balance multiple sustainability objectives, by leveraging multiple subsystem synergies. The innovative fuzzy inference model proposed is suitable to deal with information at the farm level, handling different types of farming systems, and applicable to different environmental or socioeconomic contexts. Moreover, the proposed indicators and associated indices offer relevant information to policy-makers to foster the sustainable intensification of farming systems, while promoting environmental protection and</p>			
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		the coexistence of biodiversity and the agricultural sector.			
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Patterns in the Public Square: Reference Models for Regulatory Science	Schindel, William D.,	Science and engineering involve discovery, representation, explanation, and exploitation of recurrent patterns, observed as phenomena. Model-based representations describe not only natural phenomena and engineered products, but also the socio-technical systems of systems that carry out scientific study, product engineering, medical practice, public health, commerce, and regulation. The term "Regulatory Science" invites us to represent and understand innovation, regulation and their intended and actual consequences as observable system phenomena in their own right, using scientific and engineering principles, tools, and insights. This article summarizes three classes of model-based reference patterns central to representing, understanding, communicating, and enhancing systems of innovation, regulation, and improvement over life cycles. In order of increasing scale, these pattern classes are (1) the domain-independent pattern of model-based representation of system phenomena (the S*Metamodel) in the sciences and engineering disciplines, underlying all modeling and	10.1007/s10439-022-03083-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10439-022-03083-z	SpringerLink
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		simulation; (2) domain-specific patterns representing families of natural systems and engineered products in their life cycle contexts; and (3) the large-scale Innovation Ecosystem Pattern, in which science, engineering, commerce, medicine, and regulation are performed, planned, and advanced—including sharing of managed models and data across ecosystems. All three are applied by the Model-Based Patterns Working Group of the International Council on Systems Engineering (INCOSE).			
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<p>Drought patterns: their spatiotemporal variability and impacts on maize production in Limpopo province, South Africa</p>	<p>Ferreira, Nicole Costa Resende, Rötter, Reimund Paul, Bracho-Mujica, Gennady, Nelson, William C. D., Lam, Quang Dung, Recktenwald, Claus, Abdulai, Isaaka, Odhiambo, Jude, Foord, Stefan,</p>	<p>Due to global climate change, droughts are likely to become more frequent and more severe in many regions such as in South Africa. In Limpopo, observed high climate variability and projected future climate change will likely increase future maize production risks. This paper evaluates drought patterns in Limpopo at two representative sites. We studied how drought patterns are projected to change under future climatic conditions as an important step in identifying adaptation measures (e.g., breeding maize ideotypes resilient to future conditions). Thirty-year time horizons were analyzed, considering three emission scenarios and five global climate models. We applied the WOFOST crop model to simulate maize crop growth and yield formation over South Africa's summer season. We considered three different crop emergence dates. Drought indices indicated that mainly in the scenario SSP5-8.5 (2051–2080), Univen and Syferkuil will experience worsened drought conditions (DC) in the future. Maize yield tends to decline and future changes in the emergence date seem to impact yield significantly. A possible alternative is to</p>	<p>10.1007/s00484-022-02392-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00484-022-02392-1</p>	<p>SpringerLink</p>
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		<p>delay sowing date to November or December to reduce the potential yield losses. The grain filling period tends to decrease in the future, and a decrease in the duration of the growth cycle is very likely. Combinations of changed sowing time with more drought tolerant maize cultivars having a longer post-anthesis phase will likely reduce the potential negative impact of climate change on maize.</p>			
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UML and NFR-framework based method for the analysis of the requirements of an information system	Arif, Mohd., Mohammad, Chaudhary Wali, Sadiq, Mohd.,	Software requirements are the expectation of stakeholders which are identified and modeled by various requirements elicitation and modeling techniques like traditional methods, goal oriented methods, and unified modeling language (UML), etc. The identified software requirements are broadly classified into functional requirements (FRs) and non-functional requirements (NFRs). Based on our literature review, we found that most of the focus in the area of software engineering is on the analysis of FRs as compared to NFRs. For the successful development of any information system both FRs and NFRs should be considered equally during the elicitation and modeling process; and ignoring NFRs may lead to failure of software. Therefore, to address this issue, we developed a method for the analysis of both FRs and NFRs so that a successful software product can be developed by a software company. In the proposed method, FRs are modeled by UML use-case diagram, class-diagram, and activity diagram. The NFRs are analyzed using NFR-framework; and NFR propagation rules have been	10.1007/s41870-022-01112-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41870-022-01112-7	SpringerLink
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		derived from the requirements of an information system. In this framework, fuzzy based approach has been used to analyze the contribution links of softgoal interdependency graph. The applicability of the proposed method is discussed by using FRs and NFRs of library information system.			
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Imbalanced data preprocessing techniques for machine learning: a systematic mapping study	Werner de Vargas, Vitor, Schneider Aranda, Jorge Arthur, Santos Costa, Ricardo, Silva Pereira, Paulo Ricardo, Victória Barbosa, Jorge Luis,	Machine Learning (ML) algorithms have been increasingly replacing people in several application domains—in which the majority suffer from data imbalance. In order to solve this problem, published studies implement data preprocessing techniques, cost-sensitive and ensemble learning. These solutions reduce the naturally occurring bias towards the majority sample through ML. This study uses a systematic mapping methodology to assess 9927 papers related to sampling techniques for ML in imbalanced data applications from 7 digital libraries. A filtering process selected 35 representative papers from various domains, such as health, finance, and engineering. As a result of a thorough quantitative analysis of these papers, this study proposes two taxonomies—illustrating sampling techniques and ML models. The results indicate that oversampling and classical ML are the most common preprocessing techniques and models, respectively. However, solutions with neural networks and ensemble ML models have the best performance—with potentially better results through hybrid	10.1007/s10115-022-01772-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10115-022-01772-8	SpringerLink
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		sampling techniques. Finally, none of the 35 works apply simulation-based synthetic oversampling, indicating a path for future preprocessing solutions.			
Difficulties of FAIR Principles Implementation in Cross-Domain Research Infrastructures	Kalinin, N. A., Skvortsov, N. A.,	Abstract Continuously increasing complexity of scientific research lead to the growing need for close integration of heterogeneous scientific communities. Such integration can be provided by the development of cross-domain research data infrastructures. In this paper, problems of the effective organization of scientific data in research infrastructures, based on FAIR principles, are considered. Analysis of the representation of various subjects in the existing infrastructures used for highlighting the main difficulties facing researchers, the ways of its overcoming are considered.	10.1134/S199508022301016X	http://link.springer.com/openurl/pdf?id=doi:10.1134/S199508022301016X	SpringerLink

Throughput capacity importance measure (a case study)	Hazrati, Ali, Qarahasanlou, Ali Nouri, Barabady, Javad, Khodayari, Ali Asghar,	<p>A predefined production level should be achieved to meet the market demand and customer satisfaction. Therefore, in cases that the system cannot reach the desired production level, throughput capacity should be improved. Improving system throughput capacity can be obtained by improvement in component performance. Since various components have different effects on system throughput capacity, thus, a component that has the greatest effect on system throughput capacity should be identified. This paper aims to investigate the application of analytical methods for throughput capacity analysis of a system and suggest the throughput capacity importance measure, adapted from the Birnbaum importance measure. The throughput capacity importance measure quantifies the components' effect on system throughput capacity. The analysis result will be useful to identify the critical component/s from a system throughput capacity point of view. A case study demonstrates how it can be applied in a real case.</p>	10.1007/s12517-022-11084-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12517-022-11084-4	SpringerLink
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<p>The impact of sugar-sweetened beverages tax on oral health-related outcomes: a systematic review of the current evidence</p>	<p>Shakiba, Maryam, Iranparvar, Pouria, Jadidfard, Mohammad-Pooyan,</p>	<p>Objective To provide a systematic overview of the impact of taxing sugar-sweetened beverages (SSBs) on oral health-related outcomes. Data sources For this PRISMA-compliant review, we searched PubMed, Scopus, Embase, Web of Science and Cochrane Central for relevant studies published from database inception to 27 August 2020. Data selection and extraction Two reviewers assessed the abstracts and then the full text of the studies. Primary studies that evaluated the impact of any kind of SSB tax on oral health-related outcomes (that is, decayed, missing and filled teeth, caries increment and dental treatment costs) were included. Data synthesis Of 503 search results, five studies met the inclusion criteria. All five were modelling studies, from which four studies predicted an SSB tax to have a positive impact on oral health-related outcomes, whereas one study in a developing country did not find an SSB tax to be solely successful. According to three studies, the younger population and men are likely to benefit the most from such a tax. One study demonstrated the benefits of an SSB tax to be potentially more</p>	<p>10.1038/s41432-022-0830-1</p>	<p>https://www.nature.com/articles/s41432-022-0830-1.pdf</p>	<p>SpringerLink</p>
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		significant among low-income individuals. Conclusion While no empirical studies are available to support the benefits of an SSB tax, the studies covered in this review altogether anticipate a positive impact. Furthermore, this review discusses some of the obstacles and limitations of implementing such a tax predicted by the included studies.			
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Trust in artificial intelligence: From a Foundational Trust Framework to emerging research opportunities	Lukyanenko, Roman, Maass, Wolfgang, Storey, Veda C.,	With the rise of artificial intelligence (AI), the issue of trust in AI emerges as a paramount societal concern. Despite increased attention of researchers, the topic remains fragmented without a common conceptual and theoretical foundation. To facilitate systematic research on this topic, we develop a Foundational Trust Framework to provide a conceptual, theoretical, and methodological foundation for trust research in general. The framework positions trust in general and trust in AI specifically as a problem of interaction among systems and applies systems thinking and general systems theory to trust and trust in AI. The Foundational Trust Framework is then used to gain a deeper understanding of the nature of trust in AI. From doing so, a research agenda emerges that proposes significant questions to facilitate further advances in empirical, theoretical, and design research on trust in AI.	10.1007/s12525-022-00605-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-022-00605-4	SpringerLink
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Quality management in humanitarian operations and disaster relief management: a review and future research directions	Modgil, Sachin, Singh, Rohit Kumar, Foropon, Cyril,	Quality management has been widely discussed in the literature, and recent special issues on humanitarian supply chains and relief operations have emphasized the increasing importance of quality management in this key emerging area. In this paper, we provide an extensive literature review in the field of quality management in humanitarian operations and disaster relief management. Our comprehensive review, comprising 61 articles published from 2009 to 2018, leads to the identification of enablers (e.g., transparency, policy framework), challenges (e.g., financial services, identity protection), and theory development approaches, as well as numerous research gaps that must be addressed.	10.1007/s10479-020-03695-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-020-03695-5	SpringerLink
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<p> Viable IT Risk Management System by Viable System Model (VSM): Action Research for Managing IT-related Risk in the Banking Service </p>	<p> Arghand, Ali Akbar, </p>	<p> In recent years, some standards and frameworks proposed the risk management structures for managing and controlling IT risk that is the main component of enterprise governance of IT. Unfortunately, these frameworks have a retrospective view of threat analysis and less pay attention to future threats in the business environment, and do not propose adaptable solutions. At the same time, the current risk framework is not based on a strong scientific system modeling. In this research, the researcher proposed the Viable System Model (VSM) as an adaptable and comprehensive framework that is based on scientific modeling with the systematic approach for managing and controlling IT risk in today's complex business environment. This research did in a systematic action research methodology in the banking context in Iran. The results showed that by applying the VSM as a framework for managing IT risk, adaptability of IT risk criteria according to the future threats can be achieved by this framework. A comprehensive risk management framework (retrospective and prospective view) with a systematic approach could be achieved by this system </p>	<p> 10.1007/s11213-021-09587-4 </p>	<p> http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-021-09587-4 </p>	<p> SpringerLink </p>
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		modeling.			
Novel Technology Methods of Enterprise Unmanned Traffic Management (E-UTM) Solutions for Mining	Woolsey, Aimee A.,	Enterprise Unmanned Traffic Management is a holistic system concept evolving from technological developments in radio frequency where dynamic tracking can be added into current and emerging platforms. This is done through inexpensive RF sensors capable of real-time and cooperative, non-GPS tracking enabling digital visualization of assets, including unmanned aerial systems (UAS). The RF sensors are low size, weight, and power (SWaP), creating efficiencies in energy and material consumption while transmitting positions in real-time and at long ranges. Multiple UAS and other unmanned vehicles can be visualized for risk mitigation in operations, thus allowing mine management better decision-making capabilities in the current and future mosaic of mine operations.	10.1007/s42461-022-00687-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42461-022-00687-w	SpringerLink

Requirements document relations	Großer, Katharina, Riediger, Volker, Jürjens, Jan,	<p>Relations between requirements are part of nearly every requirements engineering approach. Yet, relations of views, such as requirements documents, are scarcely considered. This is remarkable as requirements documents and their structure are a key factor in requirements reuse, which is still challenging. Explicit formalized relations between documents can help to ensure consistency, improve completeness, and facilitate review activities in general. For example, this is relevant in space engineering, where many challenges related to complex document dependencies occur:</p> <ol style="list-style-type: none"> 1. Several contractors contribute to a project. 2. Requirements from standards have to be applied in several projects. 3. Requirements from previous phases have to be reused. We exploit the concept of "layered traceability", explicitly considering documents as views on sets of individual requirements and specific traceability relations on and between all of these representation layers. Different types of relations and their dependencies are investigated with 	10.1007/s10270-021-00958-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-021-00958-y	SpringerLink
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		<p>a special focus on requirement reuse through standards and formalized in an Object-Role Modelling (ORM) conceptual model.</p> <p>Automated analyses of requirement graphs based on this model are able to reveal document inconsistencies.</p> <p>We show examples of such queries in Neo4J/Cypher for the EagleEye case study. This work aims to be a step toward a better support to handle highly complex requirement document dependencies in large projects with a special focus on requirements reuse and to enable automated quality checks on dependent documents to facilitate requirements reviews.</p>			
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Model-based assurance evidence management for safety-critical systems	Vara, Jose Luis, García, Arturo S., Valero, Jorge, Ayora, Clara,	<p>Most safety-critical systems are subject to rigorous assurance processes to justify that the systems satisfy given requirements and are dependable. These processes are typically conducted in compliance with standards and require the provision of assurance evidence in the form of system artifacts, such as system specifications and testing results. The management of assurance evidence is usually a complex process because of the large number of artifacts to deal with, the amount of information to gather about the artifacts, and the need to guarantee evidence quality, among other issues. Our aim is to facilitate assurance evidence management by means of a model-based approach. The approach is based on a metamodel that defines the information to be collected about evidence artifacts during their lifecycle. A process for assurance evidence management and usage guidance are also presented. The approach has been developed in the scope of several industry-academia projects, implemented in the OpenCert tool, and validated by</p>	10.1007/s10270-021-00957-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-021-00957-z	SpringerLink
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		practitioners in 10 industrial case studies. Based on the results of the validation, we argue that the approach is an effective means for assurance evidence management and that it could improve the state of the practice.			
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RETRACTED ARTICLE: Evaluate the challenges of sustainable supply chain 4.0 implementation under the circular economy concept using new decision making approach	Xin, Lulu, Lang, Shuai, Mishra, Arunodaya Raj,	Industry 4.0 has the potential of growing industrialization and, on the other hand, disrupting the sustainability of prevailing manufacturing supply chains through inducing great challenges such as higher resource consumption that, in turn, results in global warming and climate change. As a result, researchers working in the area of sustainable supply chain 4.0 need to make deep evaluations on the challenges arising for manufacturing supply chains contemplating the improvement of their sustainability levels and having a digital transformation toward Industry 4.0. To fill this gap, the current paper designs an innovative framework on the basis of the Stepwise Weight Assessment Ratio Analysis (SWARA) technique and the Complex Proportional Assessment (COPRAS) approach to evaluate the challenges that may arise for supply chain 4.0 in the q-Rung Orthopair Fuzzy Sets (q-ROFSs) setting. The proposed method uses an extended SWARA process to determine the criteria importance degrees considering the experts' preferences. The performance of the proposed method was assessed by	10.1007/s12063-021-00243-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12063-021-00243-7	SpringerLink
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		conducting an empirical case study under the q-ROFSs condition. Further, a sensitivity analysis was executed to check whether the proposed method is stable enough to be relied on parameter values. Finally, the results obtained were compared to those of currently used methods to verify the obtained results' reliability. As revealed by the comparative results, the framework proposed in this article was of higher consistency and strength compared to other prevailing approaches.			
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Multicriteria decision-making method under the complex Pythagorean fuzzy environment	Khan, Madad, Haq, Inam Ul, Zeeshan, Muhammad, Anis, Saima, Bilal, Muhammad,	<p>The concept of complex fuzzy set (CFS) and complex intuitionistic fuzzy set (CIFS) is two recent developments in the field of fuzzy set theory. The significance of these concepts lies in the fact that these concepts assigned membership grades from the unit circle in the plane, i.e., in the form of a complex number instead of $[0,1]$ interval. CFS cannot deal with information of yes and no type, while CIFS works only for a limited range of values. To deal with these kinds of problems, in this article, the further development of the theory of complex Pythagorean fuzzy sets (CPFSSs) has been discussed. Some new operations on CPFSSs, such as bounded difference, disjoint sum, disjunctive sum, probabilistic sum, bold sum, bold intersection, s-norm and t-norm have been proposed. The distance of two CPFSSs has been proposed. This distance measure is then used to define η-equalities of CPFSSs. Moreover, we define some new notions for the multicriteria decision-making (MCDM) problems such as the CPF decision-making matrix, \max CPF \max and \min CPF \min decision-making matrix, and the distance</p>	10.1007/s40622-023-00332-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40622-023-00332-5	SpringerLink
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		<p>measure between CPF \max and \min decision-making matrices. An MCDM method has been developed on the proposed novel notions. A real-life example demonstrates that the MCDM method developed in the paper can be utilized to deal with problems of uncertainty. Further, the comparative study of CPFs with complex intuitionistic fuzzy sets, Pythagorean fuzzy sets, intuitionistic fuzzy sets, complex fuzzy sets, and fuzzy sets is established.</p>			
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Software Testing in the DevOps Context: A Systematic Mapping Study	Pando, B., Dávila, A.,	<p>Abstract DevOps is a philosophy and framework that allows software development and operations teams to work in a coordinated manner, with the purpose of developing and releasing software quickly and cheaply. However, the effectiveness and benefits of DevOps depend on several factors, as reported in the literature. In particular, several studies have been published on software test automation, which is a cornerstone for the continuous integration phase in DevOps, which needs to be identified and classified. This study consolidates and classifies the existing literature on automated tests in the DevOps context. For the study, a systematic mapping study was performed to identify and classify papers on automated testing in DevOps based on 8 research questions. In the query of 6 relevant databases, 3,312 were obtained; and then, after the selection process, 299 papers were selected as primary studies. Researchers maintain a continuing and growing interest in software testing in the DevOps context. Most of the research (71.2%) is carried out in the industry and</p>	10.1134/S0361768822080175	http://link.springer.com/openurl/pdf?id=doi:10.1134/S0361768822080175	SpringerLink
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		is done on web applications and SOA. The most reported types of tests are unit and integration tests.			
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<p>The cultural impact on social cohesion: an agent-based modeling approach</p>	<p>Plikynas, Darius, Miliauskas, Arnas, Laužikas, Rimvydas, Dulskis, Vytautas, Sakalauskas, Leonidas,</p>	<p>Social processes in modern multicultural societies require a better conceptual understanding of the mechanisms of cultural events' impact on social welfare. Due to a number of objective reasons, one of the critical challenges in this complex research area is the lack of empirically based predictive models. The current paper provides an alternative approach—a bottom-up (from agents to social systems) modeling how cultural events can shape social cohesion measured by social capital and cultural features probabilistic clustering in the population. In this paper, based on prior empirical observations, proposed agent-based modeling can help (i) understand and interpret some empirical findings, and (ii) foresee outcomes of otherwise very costly real-life social experiments. To this end, this paper presents an agent-based simulation model to demonstrate the simple mechanism of how cultural events can impact the empirically observed complex dynamics of social capital. Presented model is implemented in the NetLogo simulation environment, where simple agents' behavioral</p>	<p>10.1007/s11135-021-01293-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11135-021-01293-6</p>	<p>SpringerLink</p>
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		<p>properties are simulated following basic empirical observations. Implemented simulation approach upgrades Axelrod's classical model of cultural dissemination in three main ways. First, it models agents' neighborhood interactions not only in the simulated agents' physical space but in the cultural features space as well. Second, the model simulates the dissemination of cultural events' impact (not only) through pair-based neighborhood interaction but also through wide-range social media and networks broadcasting. Third, it implements some agents' inherent propensity toward differentiation (uniqueness) that generates divergence in the virtual space of characteristic behavioral cultural features. Simulation results provide not only proof of concept but also reveal underlying cultural conditions for the emergence of different behavioral patterns of social capital cohesion or fragmentation.</p>			
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Big data and machine learning: A roadmap towards smart plants	Dorneanu, Bogdan, Zhang, Sushen, Ruan, Hang, Heshmat, Mohamed, Chen, Ruijuan, Vassiliadis, Vassilios S., Arellano-Garcia, Harvey,	Industry 4.0 aims to transform chemical and biochemical processes into intelligent systems via the integration of digital components with the actual physical units involved. This process can be thought of as addition of a central nervous system with a sensing and control monitoring of components and regulating the performance of the individual physical assets (processes, units, etc.) involved. Established technologies central to the digital integrating components are smart sensing, mobile communication, Internet of Things, modelling and simulation, advanced data processing, storage and analysis, advanced process control, artificial intelligence and machine learning, cloud computing, and virtual and augmented reality. An essential element to this transformation is the exploitation of large amounts of historical process data and large volumes of data generated in real-time by smart sensors widely used in industry. Exploitation of the information contained in these data requires the use of advanced machine learning and artificial intelligence technologies integrated with more traditional modelling	10.1007/s42524-022-0218-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42524-022-0218-0	SpringerLink
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		<p>techniques. The purpose of this paper is twofold: a) to present the state-of-the-art of the aforementioned technologies, and b) to present a strategic plan for their integration toward the goal of an autonomous smart plant capable of self-adaption and self-regulation for short- and long-term production management.</p>			
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Modeling and specifying formally compound MAPE pattern for self-adaptive IoT systems	Hachicha, Marwa, Ben Halima, Riadh, Hadj Kacem, Ahmed,	IoT systems are required to manage themselves to changes regarding their internal and external contexts. So, adaptability is a very important aspect in IoT software systems. The MAPE (Monitoring, Analysis, Planning, Execution) control loop model, inspired from the autonomic nervous system, has been identified as a crucial element for realizing self-adaptation in software systems. In fact, software design patterns provide architects and developers with reusable software elements helping them to master building complex software systems including several interconnected components. Complex self-adaptive systems require several architectural patterns in their design which leads to the need of architectural pattern composition. In this paper, we focus in modeling adaptability in IoT systems through a set of MAPE design patterns for decentralized control in self-adaptive systems and we propose an approach for composing them using a UML profile. Then, we propose formalizing the composition process using the Event-B method. In addition, we propose verifying adaptation properties based on the resulting	10.1007/s11334-021-00409-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-021-00409-3	SpringerLink
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		formal specification. We illustrate our approach by modeling structural and behavioral features of the hybrid pattern resulting from the composition of two MAPE patterns and applied to the fall-detection ambient assisting living system for elderly people.			
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Creating a national crime fiction through allegory translation: from Sherlock Holmes, the western detective to Relentless Avni, the turkish Sherlock Holmes	Altnta, Özge, Karada, Aye Banu,	We aim to examine Ebussüreyya Sami's Relentless Avni, the Turkish Sherlock Holmes , the first Turkish crime fiction series in the Turkish literary system published in the late Ottoman Era, with a focus on allegory translation in crime fiction. Despite being considered as original in the Turkish literary system, the series under investigation raises the issue of whether it is "original" due to its similarities to western crime novels. Studies on crime fiction translation show that the genre is an important tool for creating national allegories which can be transformed into other allegories through translation. We argue that the series, albeit having been considered "original" in the Turkish literary system, constitutes an example of allegory translation produced through creative mediation due to the absence of an established crime fiction tradition in the Turkish literature at the time. The comparative analysis of the series and their western counterparts reveals that Ebussüreyya Sami, the author-translator, transformed a Western-oriented allegory into a new national allegory for the	10.1007/s11059-022-00644-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11059-022-00644-y	SpringerLink
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		<p>readers to create a culture repertoire with a specific emphasis on Turkishness in line with the National Literature Movement and nationalist modernization in the Turkish target culture and the protagonist Relentless Avni, the Turkish Sherlock Holmes functioned as a contributor to “culture planning” by providing a role model of a nationalist modern Turkish citizen. • Allegory in crime fiction is not static but can be transformed into an allegory of another culture through translation, which can be called allegory translation. • The first Turkish crime fiction series is in fact an allegory translation produced through “creative mediation.” • “Creative mediation” can be considered as a translation technique used to create a new national allegory for a target society.</p>			
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<p>A comprehensive review of digital twin — part 1: modeling and twinning enabling technologies</p>	<p>Thelen, Adam, Zhang, Xiaoge, Fink, Olga, Lu, Yan, Ghosh, Sayan, Youn, Byeng D., Todd, Michael D., Mahadevan, Sankaran, Hu, Chao, Hu, Zhen,</p>	<p>As an emerging technology in the era of Industry 4.0, digital twin is gaining unprecedented attention because of its promise to further optimize process design, quality control, health monitoring, decision and policy making, and more, by comprehensively modeling the physical world as a group of interconnected digital models. In a two-part series of papers, we examine the fundamental role of different modeling techniques, twinning enabling technologies, and uncertainty quantification and optimization methods commonly used in digital twins. This first paper presents a thorough literature review of digital twin trends across many disciplines currently pursuing this area of research. Then, digital twin modeling and twinning enabling technologies are further analyzed by classifying them into two main categories: physical-to-virtual, and virtual-to-physical, based on the direction in which data flows. Finally, this paper provides perspectives on the trajectory of digital twin technology over the next decade, and introduces a few emerging areas of research which will likely be of great use in future digital twin research. In part two of this review, the role of</p>	<p>10.1007/s00158-022-03425-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00158-022-03425-4</p>	<p>SpringerLink</p>
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		uncertainty quantification and optimization are discussed, a battery digital twin is demonstrated, and more perspectives on the future of digital twin are shared. Code and preprocessed data for generating all the results and figures presented in the battery digital twin case study in part 2 of this review are available on Github .			
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<p>The African Development Corridors Database: a new tool to assess the impacts of infrastructure investments</p>	<p>Thorn, Jessica P. R., Bignoli, Diego Juffe, Mwangi, Ben, Marchant, Robert A.,</p>	<p>The large-scale expansion of built infrastructure is profoundly reshaping the geographies of Africa, generating lock-in patterns of development for future generations. Understanding the impact of these massive investments can allow development opportunities to be maximised and therefore be critical for attaining the United Nations' Sustainable Development Goals and African Union's Agenda 2063 aims. However, until now information on the types, scope, and timing of investments, their evolution and spatial-temporal impact was dispersed amongst various agencies. We developed a database of 79 development corridors across Africa, synthesizing data from multiple sources covering 184 projects on railways, wet and dry ports, pipelines, airports, technocities, and industrial parks. The georeferenced interlinked tabular and spatial database includes 22 attributes. We expect this database will improve coordination, efficiency, monitoring, oversight, strategic planning, transparency, and risk assessments, among other uses for investment</p>	<p>10.1038/s41597-022-01771-y</p>	<p>https://www.nature.com/articles/s41597-022-01771-y.pdf</p>	<p>SpringerLink</p>
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		banks, governments, impact assessment practitioners, communities, conservationists, economists, and regional economic bodies. Measurement(s) infrastructure projects Technology Type(s) Geographic information systems Factor Type(s) Project code • Project name • Corridor name • Infrastructure/dev elopment type • Status • Country • Region or province • Description • Launch year • USD amount (million) min • USD amount (million) max • Amount description • Distance (km) min • Distance (km) max • GIS distance • Area • Supplier or recipient of goods or services • Key beneficiaries • Commodities traded or transported • Name of donors or financiers • Amount funded (USD million) per donor type • Type of major donor/financiers Sample Characteristic - Environment Anthropogenic Sample Characteristic - Location Africa			
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Investigation of meteorological drought characteristics of the great man-made river region: a case study of drought in Libya	Elhaj, Mustafa Ibrahim Mohamed, Ekemen Keskin, Tülay, Jamali, Ali,	<p>Drought is a hidden natural hazard that involves complex climatic systems and has significant environmental and social consequences. Due to the current state of catastrophic climatic occurrences, there has been an increased interest in monitoring droughts in recent years. This study conducted meteorological drought analysis for five monitoring stations in the Great Man-Made River region located in Libya. The Standardized Precipitation Index (SPI) and Reconnaissance Drought Index (RDI) methods were used to determine meteorological droughts utilizing monthly total precipitation data, and mean monthly temperatures and monthly total precipitation data, respectively. The drought analysis of the Great Man-Made River region using DrinC software for 1-, 3-, 6-, and 12-month SPI values were researched. According to the SPI-12-month index values, the driest period was determined by 86% in the Tripoli Airport and Nalut station, and the least dry period was determined in the Sirt station by 39%. It was found that the year 2000–2001 was one of the driest years in all studied stations, and the other years with high drought rates</p>	10.1007/s12665-022-10633-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12665-022-10633-0	SpringerLink
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		were 1981–1982, 1984–1985, and 1992–1993.			
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Cognitive control, intentions, and problem solving in skill learning	Christensen, Wayne, Bicknell, Kath,	<p>We investigate flexibility and problem solving in skilled action. We conducted a field study of mountain bike riding that required a learner rider to cope with major changes in technique and equipment. Our results indicate that relatively inexperienced individuals can be capable of fairly complex 'on-the-fly' problem solving which allows them to cope with new conditions. This problem solving is hard to explain for classical theories of skill because the adjustments are too large to be achieved by automatic mechanisms and too complex and rapid to be achieved by cognitive processes as they are usually understood. A recent theory, Mesh, can explain these results because it posits that skill-specific cognitive abilities develop during skill learning and that control typically involves an interplay between cognitive and automatic mechanisms. Here we develop Mesh further, providing a detailed explanation for these problem solving abilities. We argue that causal representation, metacognitive awareness and other forms of performance awareness combine in the formulation and control of action strategies. We also argue that</p>	10.1007/s11229-022-03920-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11229-022-03920-7	SpringerLink
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		<p>the structure of control present in this case is inconsistent with Bratman's model of intentions, and that, in the face of high uncertainty and risk, intentions can be much more labile than Bratman recognises. In addition, we found limitations and flaws in problem solving which illuminate the representations involved. Finally, we highlight the crucial role of social and cultural learning in the development of complex skills.</p>			
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Understanding the Cyber-Physical System in International Stadiums for Security in the Network from Cyber-Attacks and Adversaries using AI	Wan, Bingjun, Xu, Chengwei, Mahapatra, Rajendra Prasad, Selvaraj, P.,	<p>Sports stadiums have a substantial influence on the environmental, urban, and social context. Information and communication technology applications in the international sports stadium increasingly use modern venues and facilities, containing the command and control system, intelligent application of sports facilities, television systems, ticket access control systems, communication systems for event management, contest information systems, etc. There is a high demand for advanced stadium security systems because of the large number of sporting events organized. Hence, in this study, an Artificial intelligence assisted Cyber-Physical System (AI-CPS) has been proposed for security in the network to predict cyber attacks and adversaries. The data has been collected and analyzed, and the proposed AI-CPS model predicts anomaly behaviour in the network. This study deals with the subject of how surveillance and security practices at sports events are organized. Advances in Artificial Intelligence (AI) techniques show potential in enabling cybersecurity authorities to counter the ever-</p>	10.1007/s11277-021-08573-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-021-08573-2	SpringerLink
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		evolving attack posed by an adversary. Here, this paper explores AI's potential in enhancing cybersecurity resolutions by determining both its strengths and weaknesses. The numerical results show that the suggested AI-CPS model improves an accuracy ratio of 95.6%, a prediction ratio of 97.6%, packet loss of 12.3%, delay ratio of 15.1%, and latency ratio of 11.2% to other existing methods.			
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Towards a domain-specific information architecture enabling the investigation and optimization of flexible production systems by utilizing artificial intelligence	Binder, Christoph, Neureiter, Christian, Lüder, Arndt,	The industrial domain is undergoing a major transformation, pushed forward by emerging technologies originating from research or industry. The resulting trend, better known by the term Industry 4.0, advances automation within these manufacturing companies by providing ubiquitous interconnection. This enables the integration of technologies mainly used in the Industrial Internet of Things (IIoT), Cyber-physical Systems (CPS) or Big Data with the goal to optimize production processes or facilitate intelligent decision-making. While those processes are progressively supported by methodologies coming from the area of artificial intelligence (AI) like machine learning algorithms, sustainable and consistent storing of production data becomes increasingly important. Concluding, production systems engineering and information engineering are correlating with each other, as the respective results could be used to the advantage of the respective other discipline. In order to address these issues while developing such flexible production systems, the Reference	10.1007/s00170-022-10141-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-022-10141-2	SpringerLink
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		<p>Architecture Model Industrie 4.0 (RAMI 4.0) has been introduced. However, practical applications are lacking as this standard is mainly described in theory, which makes it difficult to actually apply this framework. Thus, the main goal of this paper is to specify a detailed architecture description of the Information Layer to ensure the practical application of RAMI 4.0, which allows stakeholders to utilize model-based Systems Engineering (MBSE) for developing data aspects of industrial systems on the one hand and enable Information Engineering on the other hand. Supported by the concept of the Zachman Framework, the resulting architecture is applied and validated with the help of a real-world case study.</p>			
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Assessment of Flooding Impact on Water Supply Systems: A Comprehensive Approach Based on DSS	Barbetta, Silvia, Bonaccorsi, Bianca, Tsitsifli, Stavroula, Boljat, Ivana, Argiris, Papakonstantinou, Reberski, Jasmina Luka, Massari, Christian, Romano, Emanuele,	<p>The assessment of flood impact on a Water Supply System (WSS) requires a comprehensive approach including several scales of analysis and models and should be managed in the Water Safety Plans (WSP), as recommended in the EU Water Directive 2020/2184. Flooding can affect the quality of groundwater and surface water resources and can cause supply service interruption due to damaged infrastructures. A complete approach to address flood impact on WSS is required but not yet available, while only specific aspects were investigated in details. This work introduces a comprehensive tool named WAter Safety Planning Procedures Decision Support System (WASPP–DSS) developed in the context of MUHA (Multihazard framework for Water Related risks management) project. The tool is mainly addressed to small water utilities (WU) for supporting WSP development and is based on two main premises: 1) a correct approach for WSS risk analysis requires a multi-hazard perspective encompassing all the system components and different hazards; 2) other institutions in addition to WUs</p>	10.1007/s11269-022-03306-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11269-022-03306-x	SpringerLink
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		<p>have to be involved in WSS risk analyses to harmonize monitoring and response procedures. The tool is here applied on risks associated to flooding and demonstrated for three case studies. The WASPP–DSS, tested by eight WUs, was found a potentially valid support for small WUs that must start drafting the WSP in a comprehensive way and can provide a common shared scheme. Improvements are desirable, as including a specific section to consider the issue of loss of water resources from reservoirs due to overflow.</p>			
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Incorporating human behaviour into Earth system modelling	Beckage, Brian, Moore, Frances C., Lacasse, Katherine,	<p>For a long time, climate models did not account for human behaviour. This Review by Beckage et al. surveys existing social climate models, an emerging class of models that embed human behaviour in climate models, and makes recommendations for how to best represent and integrate human behaviour in climate models. Climate change and other challenges to the stability and functioning of natural and managed environmental systems are driven by increasing anthropogenic domination of the Earth. Models to forecast the trajectory of climate change and to identify pathways to sustainability require representation of human behaviour and its feedbacks with the climate system. Social climate models (SCMs) are an emerging class of models that embed human behaviour in climate models. We survey existing SCMs and make recommendations for how to integrate models of human behaviour and climate. We suggest a framework for representing human behaviour that consists of cognition, contagion and a behavioural response. Cognition represents the human</p>	10.1038/s41562-022-01478-5	https://www.nature.com/articles/s41562-022-01478-5.pdf	SpringerLink
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		<p>processing of information around climate change; contagion represents the spread of information, beliefs and behaviour through social networks; and response is the resultant behaviour or action. This framework allows for biases, habituation and other cognitive processes that shape human perception of climate change as well as the influence of social norms, social learning and other social processes on the spread of information and factors that shape decision-making and behaviour. SCMs move beyond the inclusion of human activities in climate models to the representation of human behaviour that determines the magnitude, sign and character of these activities. The development of SCMs is a challenging but important next step in the evolution of Earth system models.</p>			
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Exploiting vulnerability of convolutional neural network-based gait recognition system	Bukhari, Maryam, Durrani, Mehr Yahya, Gillani, Saira, Yasmin, Sadaf, Rho, Seungmin, Yeo, Sang-Soo,	In today's era of advanced technologies, the concerns related to global security have led to video surveillance gadgets. Human gait recognition as a biometric is considered an evolving technology for intelligent surveillance monitoring. This research study exploits vulnerabilities associated with a convolutional neural network (CNN)-based gait recognition system under various walking conditions involving clothing, carrying items, and speed. In the first stage, we design a CNN model capable of identifying individuals based on their gait characteristics. Subsequently, in the next stage, we design a five-pixel adversarial attack in which we perturb the gait features of individuals computed using the fast gradient sign method. The resulting perturbation is added to only five random pixels to create naturalistic adversarial samples similar to the original samples. Further, the main aim of this study is to determine and analyze the performance of the CNN-based gait recognition system under an adversarial attack. The research concludes that gait recognition systems based on CNN models are highly susceptible to adversarial attacks,	10.1007/s11227-022-04611-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-022-04611-3	SpringerLink
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		motivating researchers to design defense mechanisms to mitigate the effect of these attacks.			
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Certain Investigation of Fake News Detection from Facebook and Twitter Using Artificial Intelligence Approach	Setiawan, Roy, Ponnamm, Vidya Sagar, Sengan, Sudhakar, Anam, Mamoon, Subbiah, Chidambaram, Phasinam, Khongdet, Vairaven, Manikandan, Ponnusamy, Selvakumar,	The news platform has moved from traditional newspapers to online communities in the technologically advanced area of Artificial Intelligence. Because Twitter and Facebook allow us to consume news much faster and with less restricted editing, false information continues to spread at an impressive rate and volume. Online Fake News Detection is a promising field in research and captivates the attention of researchers. The sprawl of huge chunks of misinformation in social network platforms is vulnerable to global risk. This article recommends using a Machine Learning optimization technique for automated news article classification on Facebook and Twitter. The emergence of the research is facilitated by the strategic implementation of Natural Language Processing for social forum fake news findings in order to distort news reports from non-recurrent outlets. The result from the study is outstanding with text document frequency words, which act as extraction technique's attribute, and the classifier is acted upon by Hybrid Support Vector Machine by achieving 91.23%	10.1007/s11277-021-08720-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-021-08720-9	SpringerLink
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		accuracy.			
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Empowering engineering with data, machine learning and artificial intelligence: a short introductive review	Chinesta, Francisco, Cueto, Elias,	Simulation-based engineering has been a major protagonist of the technology of the last century. However, models based on well established physics fail sometimes to describe the observed reality. They often exhibit noticeable differences between physics-based model predictions and measurements. This difference is due to several reasons: practical (uncertainty and variability of the parameters involved in the models) and epistemic (the models themselves are in many cases a crude approximation of a rich reality). On the other side, approaching the reality from experimental data represents a valuable approach because of its generality. However, this approach embraces many difficulties: model and experimental variability; the need of a large number of measurements to accurately represent rich solutions (extremely nonlinear or fluctuating), the associate cost and technical difficulties to perform them; and finally, the difficulty to explain and certify, both constituting key aspects in most engineering applications. This work overviews some of the most remarkable progress in the field in recent	10.1186/s40323-022-00234-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40323-022-00234-8	SpringerLink
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		years.			
Artificial intelligence and machine learning in cancer imaging	Koh, Dow-Mu, Papanikolaou, Nickolas, Bick, Ulrich, Illing, Rowland, Kahn, Charles E., Jr., Kalpathi-Cramer, Jayshree, Matos, Celso, Martí-Bonmatí, Luis, Miles, Anne, Mun, Seong Ki, Napel, Sandy, Rockall, Andrea, Sala, Evis, Strickland, Nicola, Prior, Fred,	Koh, Papanikolaou et al. discuss the application of artificial intelligence in cancer imaging. The authors highlight opportunities for exploiting machine learning algorithms in this field, and outline barriers in their implementation and how these might be addressed. An increasing array of tools is being developed using artificial intelligence (AI) and machine learning (ML) for cancer imaging. The development of an optimal tool requires multidisciplinary engagement to ensure that the appropriate use case is met, as well as to undertake robust development and testing prior to its adoption into healthcare systems. This multidisciplinary review highlights key developments in the field. We discuss the challenges and opportunities of AI and ML in cancer imaging; considerations for the development of algorithms into tools that can be widely used and disseminated; and the development of the ecosystem needed to promote growth of AI and ML in cancer imaging.	10.1038/s43856-022-00199-0	https://www.nature.com/articles/s43856-022-00199-0.pdf	SpringerLink

Design and Control of a Crawler-Type Wall-Climbing Robot System for Measuring Paint Film Thickness of Offshore Wind Turbine Tower	Yang, Pei, Zhang, Minglu, Sun, Lingyu, Li, Xinbao,	<p>In the process of detecting the paint film thickness of offshore wind turbine towers, there are problems such as the risk of high-altitude and the changeable working environments, which pose a great threat to the safety of operators. In response to the above problems, a crawler-type climbing-robot system for measuring paint film thickness of offshore wind turbine towers is developed. Firstly, the robot structure is designed by adopting modular design idea. Secondly, the kinematics analysis of the robot's facade steering is carried out, and the kinematics model of the robot's instantaneous steering is established. On this basis, considering the influence of hydrodynamic force and track deformation, a dynamic model of multi-track coordinated motion is established. Then, the kinematics and dynamics of the robot are simulated and calculated by Matlab. The robot control system is designed according to the requirements of multi-module cooperative operation. Finally, a robot prototype is developed based on the theory and simulation, and the robot is verified through the experimental</p>	10.1007/s10846-022-01750-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-022-01750-w	SpringerLink
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		platform and the offshore wind power field experiment.			
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<p>Risk Perception and Risk Communication from a Systems Perspective: a Study on Safety Behavioural Intervention Frameworks and Functions</p>	<p>Chionis, Dimitrios, Karanikas, Nektarios,</p>	<p>The constant developments in the industry influence organisational practices. The latter often require personnel to adapt their behaviours and comply with policies and rules to realise business objectives while ensuring safety. Although risk perception and risk communication are significant contributors to safe behaviours, there is a lack of a comprehensive approach to behavioural safety which encompasses those two essential aspects while accounting for interactions within systems. This research identified and assessed eleven behavioural intervention frameworks and eight intervention functions for inclusivity of risk perception and communication factors through a scoping review. The results, which were discussed against studies and practice in the aviation industry as a representative safety-critical and high-reliability sector, showed notable fluctuations of inclusivity parameters across intervention frameworks and functions. The combination of “enablement”, “education”, and “environmental restructuring” emerged as the most promising functions, and the “Recognition Primed Decision</p>	<p>10.1007/s11213-022-09590-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-022-09590-3</p>	<p>SpringerLink</p>
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		<p>Making” framework was found as the most inclusive relatively to the rest intervention frameworks reviewed. Nonetheless, as even the functions and framework assessed as relatively more inclusive still miss several aspects of system agent interactions and risk perception and communication factors, considering all those parameters in future research is warranted.</p>			
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Capability development in hybrid organizations: enhancing military logistics with additive manufacturing	Valtonen, Ilari, Rautio, Samu, Salmi, Mika,	Additive Manufacturing (AM) has the potential to revolutionize key aspects of Military Logistics and partnerships between governmental and industrial organizations. Extreme outsourcing of key capabilities has created complex and deep hybrid organizations between armed forces and the private sector. In this study, the internal and external effects and requirements of Additive Manufacturing in the context of the hybrid organization of The Finnish Defence Forces (FDF) and its strategic partner in Maintenance, Repair, Overhaul (MRO), and Millog Oy were studied. First, with a literature review, we sought to link the capability development processes and the change drivers within them in both military and commercial contexts. Then, we utilized an existing, structured capability model used by the FDF (DOTMLPFI) and its individual change drivers to form an initial concept of AM as a part of the hybrid organization in question. The initial concept shows that AM can increase the performance of the commercially backed Military Logistic System by mitigating the risks of spare parts shortage in	10.1007/s40964-022-00280-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40964-022-00280-z	SpringerLink
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		<p>case of supply line disturbances and by facilitating localized spare parts production. However, the different primary goals of the military and commercial organizations and the contractual base of the hybrid organization impose constraints on the capability development process. Administrative decision-making across the organizations and the conflict between maximizing military and commercial potential are the key challenges in maintaining joint-capability systems of hybrid organizations.</p>			
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Knowledge Discovery of Edge Computation for Offload Vehicular Applications in IoT	Bhanupriya, P., Gauni, Sabitha, Kalimuthu, K., Manimegalai, C. T.,	<p>One of the biggest challenges in autonomous vehicles is processing massive data in real-time and task reliable decisions on time. In order to process data in real-time, the onboard unit is allocated with additional resources, which makes it more complex and consumes much power. To overcome this, an energy harvesting scheme (EH) along with offloading of tasks is proposed. The main motivation of autonomous vehicle is to avoid unnecessary accidents caused by negligence and human error. In this paper, allocation of the tasks between onboard unit and server unit utilizes the resources efficiently, and a novel task allocation scheme for allocating tasks between onboard unit and server unit is proposed. The decision of offloading, the processing unit frequencies and the corresponding power transmitted is computed using the proposed Harvest Energy Residue algorithm. This is a critical feature that enables reliable communication and produces a greater efficiency in IoT than the existing one. These decisions depend on direct data obtained, not on the distributed values of the channel, task details, and</p>	10.1007/s11277-021-09191-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-021-09191-8	SpringerLink
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		<p>the EH process. The model is analyzed for EH and different allocation modes over the entire duration of the task. The results are simulated and shows that there is an improvement in the ratio of offloading computation tasks.</p>			
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<p>Toward integrated smart city: a new model for implementation and design challenges</p>	<p>Attaran, Houbakht, Kheibari, Nahid, Bahrepour, Davoud,</p>	<p>In smart city architecture, information and communication technologies are used to improve living standards and its management by citizens and government. Most researchers have divided this structure into six main components: smart people, the smart government, smart environment, smart transportation, smart economy, and smart life. Due to the connection between smart cities and the challenges resulting from their implementation and especially its integration, there exists no perfect solution for the concept of an integrated smart city so far according to our studies. Some more general concepts such as security, ICT infrastructure, and knowledge are not seen integrative in these structures. Therefore, it seems that new sub-components and general extra-components should be added to the existing models to form an integrated structure in such a way that the executive projects are located in their proper place in this structure and create and guarantee the integration of the smart city. Therefore, the requirements engineering of the smart city can also be explained</p>	<p>10.1007/s10708-021-10560-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10708-021-10560-w</p>	<p>SpringerLink</p>
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		<p>more precisely. This study presents a model of an integrated graph in such a way that besides maintaining and improving the model of the smart city and existing models, it will fully cover the integration and requirements engineering and methodologies of the smart city in the future. The present paper offers an upgraded model of a six-component smart city structure as a flexible integrated dynamic graph so that beside maintaining the features of existing smart city models, it ensures its integrity, dynamism, flexibility and performance and prevents the failure of smart operations. Due to its flexibility, adaptability and localization, the proposed model presented in this paper can create an integrated solution and facilitating the life cycle of executive systems and enable governments and communities to predict and prevent sudden events such as natural disasters, pandemics like Covid-19 and the like as well as managing and leading their target community in the best way.</p>			
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<p>C2M: a maturity model for the evaluation of communication in distributed software development</p>	<p>Junior, Ivaldir de Farias, Marczak, Sabrina, Santos, Rodrigo, Rodrigues, Cleyton, Moura, Hermano,</p>	<p>Communication is essential in any software development project, particularly those globally distributed where geographical, temporal, and cultural distance may hinder the effectiveness of communication. The challenges imposed by distance often characterize communication as still one of the main drawbacks of globally distributed projects. Therefore, establishing communication processes and practices is relevant to support a team's work. These processes and practices need to be updated and aligned with the team's needs. Thus, assessing and evaluating the maturity of such communication processes and practices is paramount. This article presents a Communication Maturity Model called C2M which aims to help organizations identify the maturity of communication-related aspects by providing an approach for revealing what practices need to be improved. The model is composed of 4 levels of maturity (causal, partially managed, managed and reflective) and 4 areas of maturity (people, project, organizational and engineering) which are organized into 15 maturity factors, each factor comprising a set</p>	<p>10.1007/s10664-022-10211-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-022-10211-9</p>	<p>SpringerLink</p>
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		<p>of practices. The model has 58 practices and each has its specific objectives. The model was empirically developed and evaluated in three well-defined phases. In the conception phase, methodological procedures (Tertiary Study, Systematic Literature Review, and Interviews) were carried out in order to gather relevant information for designing the first version of the C2M model (alpha version). Then, in the refinement phase, two focus group meetings were held in two organizations in order to identify how effectively the model attends its purpose. The results led to a second version of the C2M model (beta version), analyzed by a survey with experts who assessed the representation of the third version of the C2M model—omega version (evaluation phase). All results achieved so far suggest that the model can assist in discovering the maturity level of the communication processes and practices in globally distributed projects. Future works will focus on developing a software tool to help with self-assessment.</p>			
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<p>VEC model of water infrastructure in Los Angeles: implications for community resilience and recovery</p>	<p>Pastor, Daniel J., Ewing, Bradley T.,</p>	<p>Los Angeles is a community that is susceptible to earthquakes, wildfires and other disasters that may cause water utility disruption. This study estimates water production in Los Angeles using a vector autoregressive error correction model (VECM). The model captures the short- and long-run dynamics among water production and elements of the economic system related to the labor market, built environment, energy and transportation networks in the Los Angeles area. We find evidence of a single cointegrating relationship between water production as measured by total monthly potable in gallons, employment, the S&P/Case-Shiller CA-Los Angeles Home Price index, and retail unleaded gasoline prices. VECM results suggest that after a shock that disrupts the equilibrium, such as an earthquake, system moves about 24% toward eliminating the disequilibrium in the first month, with a return to equilibrium in about 4–5 months. The results have implications both domestically and internationally for understanding a community's resilience and recovery to shocks and, thus, may shed light on how natural</p>	<p>10.1007/s11069-022-05404-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-022-05404-w</p>	<p>SpringerLink</p>
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		disasters affect a local economy.			
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Community-scale big data reveals disparate impacts of the Texas winter storm of 2021 and its managed power outage	Lee, Cheng-Chun, Maron, Mikel, Mostafavi, Ali,	Aggregated community-scale data could be harnessed to provide insights into the disparate impacts of managed power outages, burst pipes, and food inaccessibility during extreme weather events. During the winter storm that brought historically low temperatures, snow, and ice to the entire state of Texas in February 2021, Texas power-generating plant operators resorted to rolling blackouts to prevent collapse of the power grid when power demand overwhelmed supply. To reveal the disparate impact of managed power outages on vulnerable subpopulations in Harris County, Texas, which encompasses the city of Houston, we collected and analyzed community-scale big data using statistical and trend classification analyses. The results highlight the spatial and temporal patterns of impacts on vulnerable subpopulations in Harris County. The findings show a significant disparity in the extent and duration of power outages experienced by low-income and minority groups, suggesting the existence of inequality in the management and implementation of the power outage. Also, the extent of burst pipes and	10.1057/s41599-022-01353-8	https://www.nature.com/articles/s41599-022-01353-8.pdf	SpringerLink
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		<p>disrupted food access, as a proxy for storm impact, were more severe for low-income and minority groups. Insights provided by the results could form a basis from which infrastructure operators might enhance social equality during managed service disruptions in such events. The results and findings demonstrate the value of community-scale big data sources for rapid impact assessment in the aftermath of extreme weather events.</p>			
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<p>Future of industry 5.0 in society: human-centric solutions, challenges and prospective research areas</p>	<p>Adel, Amr,</p>	<p>Industry 4.0 has been provided for the last 10 years to benefit the industry and the shortcomings; finally, the time for industry 5.0 has arrived. Smart factories are increasing the business productivity; therefore, industry 4.0 has limitations. In this paper, there is a discussion of the industry 5.0 opportunities as well as limitations and the future research prospects. Industry 5.0 is changing paradigm and brings the resolution since it will decrease emphasis on the technology and assume that the potential for progress is based on collaboration among the humans and machines. The industrial revolution is improving customer satisfaction by utilizing personalized products. In modern business with the paid technological developments, industry 5.0 is required for gaining competitive advantages as well as economic growth for the factory. The paper is aimed to analyze the potential applications of industry 5.0. At first, there is a discussion of the definitions of industry 5.0 and advanced technologies required in this industry revolution. There is also discussion of the applications</p>	<p>10.1186/s13677-022-00314-5</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13677-022-00314-5</p>	<p>SpringerLink</p>
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		enabled in industry 5.0 like healthcare, supply chain, production in manufacturing, cloud manufacturing, etc. The technologies discussed in this paper are big data analytics, Internet of Things, collaborative robots, Blockchain, digital twins and future 6G systems. The study also included difficulties and issues examined in this paper head to comprehend the issues caused by organizations among the robots and people in the assembly line.			
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<p>A systemic risk framework to improve the resilience of port and supply-chain networks to natural hazards</p>	<p>Verschuur, Jasper, Pant, Raghav, Koks, Elco, Hall, Jim,</p>	<p>Ports are embedded in different networks, including the local critical infrastructure network, the regional hinterland transport network and the global maritime transport network. These networks are exposed to a variety of natural hazards, which cause disruptions that can propagate to other network components, resulting in wider supply chain losses. However, the risks of such indirect network disruptions, or systemic risks, are often not considered in risk analyses of ports. We propose a systemic risk framework for different networks interconnected through ports, and describe the state-of-the-art risk modelling approaches to quantify systemic risks. In addition, we present a port risk layering framework that can help identify how resilience against systemic risks can be improved. As climate change will likely increase the occurrence of natural hazards to ports and transport networks, efforts to enhance system-wide resilience should be considered, alongside port adaptation, to prevent exacerbation of supply chain losses in the future.</p>	<p>10.1057/s41278-021-00204-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1057/s41278-021-00204-8</p>	<p>SpringerLink</p>
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<p>Risk science offers an integrated approach to resilience</p>	<p>Logan, Tom McLeod, Aven, Terje, Guikema, Seth David, Flage, Roger,</p>	<p>In the face of growing calls to restrict risk analysis to narrow and specific events, this Perspectives argues instead for fully integrated frameworks that bring risk analysis into all aspects of resilience studies. Why do we hear calls to separate and independently manage aspects of risk and resilience that are inherently related? These arguments are inconsistent with more holistic and integrated responses to wicked challenges—such as climate change—that are necessary if we are to find balances and synergies. The justification of such views is based on misconceptions of risk science that are no longer accurate. Rather than being irrelevant, the risk concept and related literature provide a wealth of resilience analysis resources that are potentially being overlooked. In this Perspective, we discuss how the modern view of risk can provide an integrated framework for the key aspects of resilience.</p>	<p>10.1038/s41893-022-00893-w</p>	<p>https://www.nature.com/articles/s41893-022-00893-w.pdf</p>	<p>SpringerLink</p>
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<p>The transparency challenge of blockchain in organizations</p>	<p>Sedlmeir, Johannes, Lautenschlager, Jonathan, Fridgen, Gilbert, Urbach, Nils,</p>	<p>This position paper discusses the challenges of blockchain applications in businesses and the public sector related to an excessive degree of transparency. We first point out the types of sensitive data involved in different patterns of blockchain use cases. We then argue that the implications of blockchains' information exposure caused by replicated transaction storage and execution go well beyond the often-mentioned conflicts with the GDPR's "right to be forgotten" and may be more problematic than anticipated. In particular, we illustrate the trade-off between protecting sensitive information and increasing process efficiency through smart contracts. We also explore to which extent permissioned blockchains and novel applications of cryptographic technologies such as self-sovereign identities and zero-knowledge proofs can help overcome the transparency challenge and thus act as catalysts for blockchain adoption and diffusion in organizations.</p>	<p>10.1007/s12525-022-00536-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-022-00536-0</p>	<p>SpringerLink</p>
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<p>A Review of the Legal, Regulatory and Practical Aspects Needed to Unlock Autonomous Beyond Visual Line of Sight Unmanned Aircraft Systems Operations</p>	<p>Matalonga, Santiago, White, Samuel, Hartmann, Jacques, Riordan, James,</p>	<p>Services that exploit Unmanned Aircraft Systems (UAS) are poised to revolutionise the service industry with a projected value of 71 BUSD by the end of the decade. A key enabler of this technology is the unlocking of autonomous Beyond Visual Line of Sight (BVLOS) operations. BVLOS operations will depend on a robust Detect and Avoid (D&A) capability. Yet, currently in the UK and EU, BVLOS operations are only allowed in specific cases and scenarios. As a result, the technological landscape for the development of robust D&A faces limitations, and there is little market incentive for development. Furthermore, while automated BVLOS is a future technology, a strong D&A capability is of importance now for all types of UAS operations. As the remote pilot has to deal with information overload from the controller device and the environment. These high-risk UAS operations are becoming more common. In this paper, we discuss the current legal framework in the UK making comparisons to EU countries. We make the case that even when an operation abides by the current framework the remote pilot is</p>	<p>10.1007/s10846-022-01682-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-022-01682-5</p>	<p>SpringerLink</p>
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		<p>exposed to several legal liabilities. We review the roadmaps for UAS adoption (including certification processes for UAS-based products) and highlight that for software-intensive systems, key steps are missing to assure the quality of the product. Finally, we build on these findings to set forwards a path to complement future certification processes to enable autonomous based UAS operations to share the airspace with remotely piloted operations.</p>			
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<p>A review of smartphone applications designed to improve occupational health, safety, and well-being at workplaces</p>	<p>Karlsen, Iben Louise, Svendsen, Peter Aske, Abildgaard, Johan Simonsen,</p>	<p>Background As smartphones become more widespread, software applications for occupational health, safety and well-being (OHS&W) at work are increasing. There is sparse knowledge about the available apps and the research evidence of their effects. This study aims to identify available smartphone applications designed to improve OHS&W at workplaces, and examine to what extent the apps are scientifically validated. Methods We searched the Danish App Store and Google Play for free OHS&W apps. Apps were included if they targeted OHS&W and were designed for workplace use. After categorizing the apps, we searched bibliographic databases to identify scientific studies on the 'intervention apps'. Results Altogether, 57 apps were included in the study; 19 apps were categorized as digital sources of information, 37 apps contained an intervention designed for workplace changes, and one app had too sparse information to be classified. Based on the publicly available information about the 37 intervention apps, only 13 had references to research. The bibliographic database search</p>	<p>10.1186/s12889-022-13821-6</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12889-022-13821-6</p>	<p>SpringerLink</p>
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		<p>returned 531 publications, resulting in four relevant studies referring to four apps aimed at ergonomic measures, noise exposure, and well-being, which showed either limited effect or methodological limitations.</p> <p>Conclusion There is no conceptual clarity about what can be categorized as an OHS&W app. Although some of the apps were developed based on scientific research, there is a need to evaluate the apps' effects in promoting OHS&W. The sparse documentation of evidence should be kept in mind when applying apps to improve OHS&W.</p>			
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<p>A systematic mapping of semi-formal and formal methods in requirements engineering of industrial Cyber-Physical systems</p>	<p>Zahid, Farzana, Tanveer, Awais, Kuo, Matthew M. Y., Sinha, Roopak,</p>	<p>The requirements engineering of Industrial Cyber-Physical Systems is extremely challenging due to large system sizes, component heterogeneity, involvement of multi-discipline stakeholders and machines, and continuous evolution. Formal and semi-formal languages, techniques, tools and frameworks can assist by providing repeatable and rigorous structures for eliciting, specifying, analysing, verifying and maintaining requirements. Various approaches have been proposed, but a contemporary and comprehensive study providing a landscape of the state-of-the-art is currently missing. This article reports a systematic mapping study covering 93 primary studies published between 2009 and October 2020. We categorise surveyed studies by current research directions in the use of semi-formal and formal methods for Requirements Engineering phases for Industrial Cyber-Physical Systems. We also identify gaps in current research and develop a novel conceptual model capturing the relationship between available formalisms and Requirements</p>	<p>10.1007/s10845-021-01753-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-021-01753-8</p>	<p>SpringerLink</p>
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		<p>Engineering activities. We find that extensive work has been carried out on the formal analysis and verification of safety and timings requirements. However, the use of semi-formal notations, works on key phases like requirements elicitation and management, and the adoption of industrial standards are largely missing. Moreover, we find no literature providing methods to handle privacy and trust requirements, which have become critical concerns in this area.</p>			
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<p>The Prevalence of Systems Thinking in Supply Chain Management: a Systematic Literature Review</p>	<p>Wilden, Daniell, Hopkins, John, Sadler, Ian,</p>	<p>In light of the maelstrom that global Supply Chains must struggle with, we contend that Systems Thinking in Supply Chain Management can be an enabling factor. Systems Thinking can support problem-solving in the reactive crisis mode that practitioners find themselves in, let alone when seeking ways to improve the end-to-end Supply Chain. This paper determines the prevalence of Systems Thinking methodologies within the literature and confirms if these contributions provide benefits to Supply Chain Management beyond the dyad through empirical research? Given the challenges of realising supply chain-wide progression, are these contributions supporting the discipline in pursuing industry advancement strategies? A systematic literature review methodology was employed, evaluating ninety-seven peer-reviewed papers regarding the breadth; from suppliers' supplier to customers customer, and depth; from literature review to empirical research. Five research outcomes are identified, resulting in an established hypothesis. We argue that a positive correlation between Systems Thinking Maturity</p>	<p>10.1007/s11213-021-09578-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-021-09578-5</p>	<p>SpringerLink</p>
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		and Supply Chain Performance leads to a more significant opportunity to go beyond the dyad. The hypothesis led to a research construct that advocates the need to determine empirically whether a correlation exists between Systems Thinking Maturity and Supply Chain Performance.			
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Exploring the concept of Cognitive Digital Twin from model-based systems engineering perspective	Jinzhi, Lu, Zhaorui, Yang, Xiaochen, Zheng, Jian, Wang, Dimitris, Kiritsis,	Digital Twin technology has been widely applied in various industry domains. Modern industrial systems are highly complex consisting of multiple interrelated systems, subsystems and components. During the lifecycle of an industrial system, multiple digital twin models might be created related to different domains and lifecycle phases. The integration of these relevant models is crucial for creating higher-level intelligent systems. The Cognitive Digital Twin (CDT) concept has been proposed to address this challenge by empowering digital twins with augmented semantic capabilities. It aims at identifying the dynamics and interrelationships of virtual models, thus to enhance complexity management capability and to support decision-making during the entire system lifecycle. This paper aims to explore the CDT concept and its core elements following a systems engineering approach. A conceptual architecture is designed according to the ISO 42010 standard to support CDT development; and an application framework enabled by knowledge graph is provided to	10.1007/s00170-022-09610-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-022-09610-5	SpringerLink
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		guide the CDT applications. In addition, an enabling tool-chain is proposed corresponding to the framework to facilitate the implementation of CDT. Finally, a case study is conducted, based on simulation experiments as a proof-of-concept.			
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<p>A novel application architecture of digital twin in smart grid</p>	<p>Jiang, Zongmin, Lv, Honghong, Li, Yuanchao, Guo, Yangming,</p>	<p>Digital twin (DT) is a hot topic in information engineering, which has been introduced into the intelligent solution of the power grid system to deal with the reliability assurance issues of complex systems. Due to the lack of an operational application architecture model, it is impossible to map the complex system comprehensively. Based on the review of the concept model of DT and the current research situation in the smart grid (SG), an OKDD [i.e., ontology-body (OB), knowledge-body (KB), data-body (DB), and digital-portal (DP)] model of digital twin body (DTB) is proposed and specified in detail. Taking a vacuum circuit breaker and a 35 kV substation of the power grid as examples, the OKDD is applied in the DTB construction, and the developed prognostic and health management (PHM) system demo is practiced in a 110 kV substation simply. The approach is proved to be feasible preliminarily. This model provides a novel method for the unified description and standardization of DTB, which is conducive to the hierarchical creation (unit-system-system of systems) for complex systems. Meanwhile, it can represent</p>	<p>10.1007/s12652-021-03329-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-021-03329-z</p>	<p>SpringerLink</p>
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		<p>complex physical entities more comprehensively, and enable the reuse of knowledge and the duplication of similar unit-level DTB rapidly. Thus, this research provides a new reference for the practical application of DT.</p>			
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The uncertainty interaction problem in self-adaptive systems	Cámara, Javier, Troya, Javier, Vallecillo, Antonio, Bencomo, Nelly, Calinescu, Radu, Cheng, Betty H. C., Garlan, David, Schmerl, Bradley,	<p>The problem of mitigating uncertainty in self-adaptation has driven much of the research proposed in the area of software engineering for self-adaptive systems in the last decade. Although many solutions have already been proposed, most of them tend to tackle specific types, sources, and dimensions of uncertainty (e.g., in goals, resources, adaptation functions) in isolation. A special concern are the aspects associated with uncertainty modeling in an integrated fashion. Different uncertainties are rarely independent and often compound, affecting the satisfaction of goals and other system properties in subtle and often unpredictable ways. Hence, there is still limited understanding about the specific ways in which uncertainties from various sources interact and ultimately affect the properties of self-adaptive, software-intensive systems. In this SoSym expert voice, we introduce the Uncertainty Interaction Problem as a way to better qualify the scope of the challenges with respect to representing different types of uncertainty while capturing their interaction in models employed to reason about</p>	10.1007/s10270-022-01037-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-022-01037-6	SpringerLink
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		<p>self-adaptation. We contribute a characterization of the problem and discuss its relevance in the context of case studies taken from two representative application domains. We posit that the Uncertainty Interaction Problem should drive future research in software engineering for autonomous and self-adaptive systems, and therefore, contribute to evolving uncertainty modeling towards holistic approaches that would enable the construction of more resilient self-adaptive systems.</p>			
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Review paper on technology adoption and sustainability in India towards smart cities	Murthy Nimmagadda, Satyanarayana, Harish, K Sai,	<p>This paper mainly aims to identify the key factors that should be included in building of smart cities in a proper efficient way. Due to rapid increase in urban population, it should be responsible to provide a better way in building of a smart city. Smart city is an idea of providing urban development that includes social, financial, ecological parts of a society. A smart and sustainable city has goals to be achieved in an adaptable, reliable, scalable, accessible, and in resilient way which will be discussed in the methodology section. This paper mainly focuses on some important factors in improving sustainability of smart cities such as climate and environmental issues and governance authorities for improving quality of life of citizens. Also, this paper explains 3E's which are environment, economy and equity are plays a crucial role in rapid development of smart cities. This research is focused on discussing various smart technologies recently used in India and the challenges involved in them. Recent literature on smart city development is reviewed, and the challenges that prevailed in recent technologies are</p>	10.1007/s11042-022-12885-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-022-12885-1	SpringerLink
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		<p>analysed. This paper includes how Internet of Things (IoT), Connectivity, Cloud computing and AI etc., should be effectively used for developing a smart city. This paper deals with the requirements to build smart cities in India – regarding various aspects like available resources, lifestyle, transport management system, smart healthcare system, smart waste management, smart Sanitation, smart railways, smart agriculture, home automation, smart energy consumption etc. This paper also discusses ‘smart living,’ ‘smart infrastructure,’ ‘smart governance,’ ‘smart economy,’ and other various systems which are need for Smart India in particular. When adopted with proper planning, all the above catalysing with smart services and solutions, build a sustainable city.</p>			
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Online adaptation for autonomous unmanned systems driven by requirements satisfaction model	Luo, Yixing, Zhou, Yuan, Zhao, Haiyan, Jin, Zhi, Zhang, Tianwei, Liu, Yang, Barthaud, Danny, Yu, Yijun,	Autonomous unmanned systems (AUSs) emerge to replace human operators for achieving better safety, efficiency, and effectiveness in harsh and difficult missions. They usually run in a highly open and dynamic operating environment, in which some unexpected situations may occur, leading to violations of predefined requirements. In order to maintain stable performance, the AUS control software needs to predict in advance whether the requirements will be violated and then make adaptations to maximize requirements satisfaction. We propose $\mathit{Captain}$, a model-driven and control-based online adaptation approach, for the AUS control software. At the modeling phase, apart from the system behavior model and the operating environment model, we construct a requirements satisfaction model. At runtime, based on the requirements satisfaction model, $\mathit{Captain}$ first predicts whether the requirements will be violated in the upcoming situation; then identifies the unsatisfiable requirements that need to be accommodated; and finally, finds	10.1007/s10270-022-00981-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-022-00981-7	SpringerLink
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		<p>an optimal adaptation for the upcoming situation. We evaluate \mathcal{C} in both simulated scenarios and the real world. For the former, we use two cases of UAV Delivery and UUV Ocean Surveillance, whose results demonstrate the \mathcal{C}'s robustness, scalability, and real-time performance. For the latter, we have successfully implemented \mathcal{C} in the DJI Matrice 100 UAV with real-world workloads.</p>			
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EDCCS: effective deterministic clustering scheme based compressive sensing to enhance IoT based WSNs	Aziz, Ahmed, Osamy, Walid, Alfawaz, Oruba, Khedr, Ahmed M.,	<p>The problem of Data acquisition in large distributed Wireless Sensor Networks (WSNs) scale is a hindrance in the growth of the Internet of Things (IoT). Recently, the combination of compressive sensing (CS) and routing techniques has attracted great interest from researchers. An open question of this approach is how to effectively integrate these technologies for specific tasks. The objective of this paper is two parts. First, we propose an effective deterministic clustering scheme based CS technique (EDCCS) for data collection in IoT based homogeneous and heterogeneous WSN to deal with the data acquisition problem, reduce the consumption of energy and increase the lifetime of network. Second, we propose random matching pursuit (RMP) as an effective CS reconstruction algorithm to improve the recovery process by reducing the error average at the base station (BS). The simulation results show that our proposed novel EDCCS scheme reduces at least 60% of the average power consumption and increases the network lifetime at least 1.3 times of the other schemes in homogeneous network while, it</p>	10.1007/s11276-022-02973-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-022-02973-3	SpringerLink
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		increases the network lifetime and residual energy by 1.9 times and 1.3 times respectively, compared to the other schemes in heterogeneous network. Also, our proposed RMP algorithm reduces the error average of reconstruction at least 35% compared to other reconstruction algorithms.			
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Exploring the raison d'être behind metric selection in network analysis: a systematic review	Morrison, D., Bedinger, M., Beevers, L., McClymont, K.,	<p>Network analysis is a useful tool to analyse the interactions and structure of graphs that represent the relationships among entities, such as sectors within an urban system. Connecting entities in this way is vital in understanding the complexity of the modern world, and how to navigate these complexities during an event. However, the field of network analysis has grown rapidly since the 1970s to produce a vast array of available metrics that describe different graph properties. This diversity allows network analysis to be applied across myriad research domains and contexts, however widespread applications have produced polysemic metrics. Challenges arise in identifying which method of network analysis to adopt, which metrics to choose, and how many are suitable. This paper undertakes a structured review of literature to provide clarity on raison d'être behind metric selection and suggests a way forward for applied network analysis. It is essential that future studies explicitly report the rationale behind metric choice and describe how the mathematics relates to target concepts and</p>	10.1007/s41109-022-00476-w	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1007/s41109-022-00476-w	SpringerLink
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		themes. An exploratory metric analysis is an important step in identifying the most important metrics and understanding redundant ones. Finally, where applicable, one should select an optimal number of metrics that describe the network both locally and globally, so as to understand the interactions and structure as holistically as possible.			
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Organizing the fragmented landscape of multidisciplinary product development: a mapping of approaches, processes, methods and tools from the scientific literature	Guérineau, Julia, Bricogne, Matthieu, Rivest, Louis, Durupt, Alexandre,	The fourth industrial revolution is shaping a new industrial landscape. A variety of technologies related to software, information and communication technologies embody a ubiquitous digital and connectivity era. These technologies enable the creation of new products with the integration of connectivity, data collection and processing capacities which require combining engineering disciplines. Increasing product multidisciplinary compels companies to adapt their product development practices. The scientific literature offers a variety of concepts and techniques to support multidisciplinary product development. This paper seeks to organize the landscape of concepts and techniques available for multidisciplinary product development. An extensive literature review was conducted, and 236 concepts and techniques were identified. Multidisciplinary products of interest deal with both software and hardware development and can be encountered through the denominations of cyber-physical systems, mechatronics and smart products	10.1007/s00163-022-00389-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-022-00389-w	SpringerLink
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		<p>and systems. An in-depth analysis led to the classification and mapping, for each product denomination, of the concepts and techniques available to support their development. The classification relies on a four-level model paired with a decision tree to thoroughly sort the variety of concepts and techniques into the approach, process, method, and tool levels. The mapping between the sorted concepts and techniques enabled the generation of graphical representations called cartographies. These cartographies serve to support companies' transformation towards the fourth industrial revolution from the product development perspective by giving a general overview of the related literature, and guiding them in the identification of the most suitable approaches, processes, methods and tools.</p>			
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<p>Sourcing decision under interconnected risks: an application of mean–variance preferences approach</p>	<p>Mukherjee, Soumyatanu, Padhi, Sidhartha S.,</p>	<p>Supply chains are customarily associated with multiple interconnected risks originated from supply side, demand side, or from the unanticipated background uncertainties faced by a firm. Also, effective functioning of supply chain hinges on sourcing decisions of inputs (raw materials). Therefore, there is a striking need to analyse the risk preference of the decision maker while going for optimal sourcing decision under varying degree of interconnected supply chain risks. This study addresses this issue by analysing the comparative static effects under interconnected supply chain risks for a risk averse decision-maker, manufacturing and selling products in a regulated market under perfect competition. The decision-maker faces not only supply-side risk (due to random input material prices) but also interconnected risks arising out of background risk (setup costs risk) and demand-side risk (output prices risk). With preferences defined over the mean and standard deviation of the uncertain final profit, this study illustrates the effects of the changes in the pairwise correlations</p>	<p>10.1007/s10479-021-04485-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-04485-3</p>	<p>SpringerLink</p>
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		<p>between the three above mentioned risks on the optimum input choice of the manufacturer. To contextualise this study, an India-based generic drug manufacturer cum seller has been considered as a case in the parametric example of our model. Adaptation of the mean–variance framework helps obtaining all the results in terms of the relative trade-off between risk and return, with simple yet intuitive interpretations.</p>			
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Levels of automation in maritime autonomous surface ships (MASS): a fuzzy logic approach	Poornikoo, Mehdi, Øvergård, Kjell Ivar,	<p>The development of maritime autonomous surface ships (MASS) is on the verge of opening a new era in the shipping industry that can result in a new paradigm shift with regard to efficiency, safety, security, and environmental impact. This development is likely to have significant implications for cargo transportation, navigation, and ship operations. Until now, the primary research focus has been on the technical aspects of autonomous ships, with a strong focus on operational risks. There has been less attention paid to the level of automation (LOA) in which autonomous ships are expected to operate. Despite the pervasive use of LOAs, there is no agreement as to what constitutes level of automation and how LOAs in different taxonomies (as defined below) can be compared, leaving the concept prone to interpretation. This study presents the current status of levels of automation in MASS and proposes a new approach to address the shortcomings in existing LOAs (e.g., imprecision and ambiguity). A fuzzy rule-based inference system and operational criteria for automation are used to quantify</p>	10.1057/s41278-022-00215-z	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41278-022-00215-z	SpringerLink
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		and express the logical sequence in the levels of automation. More specifically, LOAs in MASS are defined based on LOAs in operational tasks and functions. Our approach offers a universal language to express the LOAs in MASS, thus meaningfully operationalizing an abstract concept.			
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Transdisciplinary Cyber-systemic Design of Instruments to Measure Academic Performance in Middle and Higher Education Systems	Reséndiz-Castro, Matilde, Zepeda-Bautista, Rosalba, Peón-Escalante, Ignacio Enrique,	<p>This study reports a systemic cyber application with a transdisciplinary approach of a case study, through the creation of measuring instruments to improve academic performance in middle and higher education. The objective is to amend an absence of comprehensive measurement mechanisms to promote school stay in technical and vocational training, and its impact on the productive sector. Educational models themselves are not a guarantee of educational efficiency or a link between education and society. Educational lag information in many Latin American countries is evident, only 18% complete higher-level studies. To improve academic performance, it is necessary to use measurement tools related to educational contexts and their actors. To fulfil this purpose, we use a hybrid methodology of soft systems with an emphasis on cybernetics and a transdisciplinary approach. The most important findings were found a set of variables related to students (demographic, sociocultural, economic and health, academic information, learning-teaching processes, equity and academic supports, and business-</p>	10.1007/s11213-021-09574-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-021-09574-9	SpringerLink
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		<p>university collaboration; with teachers (work and teaching experience, learning-teaching process, equity and academic supports and university-business collaboration); with employers (general information, human capital, fellows and support for fellows and collaboration university company). The instruments comprise a total of 193 contextual variables of students-teachers-employers, for which an application model was proposed (diagnosis-application-feedback) to a case study. A notion of academic performance is integrated, based on literature review and consultation with experts. It is concluded that the geocultural integration of the actors supports the management of culturally viable and organizationally sustainable solutions for the innovation of academic programs and their coevolution in the educational system.</p>			
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<p>Iterative uncertainty reduction in multi-actor smart service innovation</p>	<p>Poeppelbuss, Jens, Ebel, Martin, Anke, Jürgen,</p>	<p>Smart service innovation is the process of reconfiguring resources, structures, and value co-creation processes in service systems that result in novel data-driven service offerings. The nature of such offerings requires the involvement of multiple actors, which has been investigated by a few studies only. In particular, little is known about the multiple actors' efforts to manage uncertainty in the process of establishing smart service systems. Empirically grounded in data from 25 interviews with industry experts, we explore how organizations act and interact in smart service innovation processes. For our data analysis, we adopt a microfoundational view to derive a theoretical model that conceptualizes actor engagement as a microfoundation for iterative uncertainty reduction in the actor-to-actor network of the smart service system. Our study contributes to information systems research on service systems engineering and digital transformation by explaining smart service innovation from both a multi-actor and a multi-level perspective, drawing on service-dominant (S-D) logic and microfoundations</p>	<p>10.1007/s12525-021-00500-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-021-00500-4</p>	<p>SpringerLink</p>
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		as well-established theoretical lenses.			
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RETRACTED ARTICLE: Computer vision for facial analysis using human-computer interaction models	Liao, Zitian, Samuel, R. Dinesh Jackson, Krishnamoorthy, Sujatha,	Currently, a facial analysis system for human-computer interfaces is presented and employed extensively. The increasing computer and digital speed, accuracy, and low-cost webcams that users can use bring computer vision systems more and more popular. These systems can assist people with alternative, hand-free communication to computers with human-computer interfaces. Hence, in this paper, computer vision-based face analysis model (CVFAM) has been suggested for human-computer interaction. This paper can determine the mouth and eyes position and use the facial centre to estimate the head's pose. In the suggested model, the face location is extracted from the central image by a cascade and skin detector and then is sent to the recognition phase. In the recognition phase, the threshold condition is examined, and the extracted face and gaze will be predictable. To learn about computer systems that automatically analyzes images, this paper CVFAM mode has suggested recognizing the user's face sitting in front of the system and recognizing user hand gestures and facial	10.1007/s10772-021-09953-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10772-021-09953-6	SpringerLink
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		expressions, therefore providing interfaces for users HCI. The simulation results show that the suggested CVFAM model enhances the accuracy ratio of 93.5%, the detection rate of 94.2, the location analysis ratio of 94.5%, the recognition rate of 83.2, and the average delay ratio of 22.1% to other existing models.			
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<p>A transformative mission for prioritising nature in Australian cities</p>	<p>Frantzeskaki, Niki, Oke, Cathy, Barnett, Guy, Bekessy, Sarah, Bush, Judy, Fitzsimons, James, Ignatieva, Maria, Kendal, Dave, Kingsley, Jonathan, Mumaw, Laura, Ossola, Alessandro,</p>	<p>Australia is experiencing mounting pressures related to processes of urbanisation, biodiversity loss and climate change felt at large in cities. At the same time, it is cities that can take the leading role in pioneering approaches and solutions to respond to those coupling emergencies. In this perspective piece we respond to the following question: What are the required transformations for prioritising, valuing, maintaining and embracing nature in cities in Australia? We adopt the mission framework as an organising framework to present proposed pathways to transform Australian cities as nature-positive places of the future. We propose three interconnected pathways as starting actions to steer urban planning, policy and governance in Australian cities: First, cities need to establish evidence-based planning for nature in cities and mainstream new planning tools that safeguard and foreground urban nature. Second, collaborative planning needs to become a standard practice in cities and inclusive governance for nature in cities needs to prioritise Aboriginal knowledge systems and practices as well as look beyond what local</p>	<p>10.1007/s13280-022-01725-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13280-022-01725-z</p>	<p>SpringerLink</p>
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		<p>governments can do. Third, for progressing to nature-positive cities, it is paramount to empower communities to innovate with nature across Australian cities. Whilst we focus on Australian cities, the lessons and pathways are broadly applicably globally and can inspire science-policy debates for the post COP15 biodiversity and COP26 climate change implementation processes.</p>			
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<p>Toward a collaborative governance model for distributed ledger technology adoption in organizations</p>	<p>Anthony Jnr., Bokolo,</p>	<p>Distributed ledger technology (DLT) is one of the emerging technologies adopted in organizations. Unlike traditional databases, the integrity of the DLT is maintained automatically by an algorithmic consensus mechanism and not by any dominant authority. Thus, the consensus mechanism controls the decision-making and governance process. But the adoption of DLT is faced with issues regarding how to ensure that governance decisions in distributed ledger systems in the interest of all actors and stakeholders involved in the operations of organizational operations. Therefore, it is imperative to provides a better understanding of the governance of DLT adoption in organizations. Accordingly, this study conducts an extensive literature review to investigate the governance issues and control of DLT adoption in intra-organizational domain. Findings from this study presents state-of-the-art governance practices to offer a comprehensive understanding on key governance issues in organizations. Additionally, the findings present factors associated with governance of DLT adoption solutions. More importantly, a</p>	<p>10.1007/s10669-022-09852-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-022-09852-4</p>	<p>SpringerLink</p>
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		governance model is developed to enhance the adoption of DLT adoption to accelerate the digitalization of organizational operations.			
Using log analytics and process mining to enable self-healing in the Internet of Things	Singh, Prasannjeet, Saman Azari, Mehdi, Vitale, Francesco, Flammini, Francesco, Mazzocca, Nicola, Caporuscio, Mauro, Thornadtsson, Johan,	The Internet of Things (IoT) is rapidly developing in diverse and critical applications such as environmental sensing and industrial control systems. IoT devices can be very heterogeneous in terms of hardware and software architectures, communication protocols, and/or manufacturers. Therefore, when those devices are connected together to build a complex system, detecting and fixing any anomalies can be very challenging. In this paper, we explore a relatively novel technique known as Process Mining, which—in combination with log-file analytics and machine learning—can support early diagnosis, prognosis, and subsequent automated repair to improve the resilience of IoT devices within possibly complex cyber-physical systems. Issues addressed in this paper include generation of consistent Event Logs and definition of a roadmap toward effective Process Discovery and Conformance Checking to support Self-Healing in IoT.	10.1007/s10669-022-09859-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-022-09859-x	SpringerLink

<p>Deep Transfer Learning in Mechanical Intelligent Fault Diagnosis: Application and Challenge</p>	<p>Qian, Chenhui, Zhu, Junjun, Shen, Yehu, Jiang, Quansheng, Zhang, Qingkui,</p>	<p>Mechanical intelligent fault diagnosis is an important method to accurately identify the health status of mechanical equipment and ensure its safe operation. With the advent of the "big data" era, it has become an inevitable tendency to choose different deep network models to improve the ability of data processing and classify faults. Meanwhile, in order to improve the generalization performances of fault diagnosis methods in different diagnosis scenarios, some fault diagnosis algorithms based on deep transfer learning have been developed. This paper introduces the concepts of deep transfer learning and explains the investigation motive. The advent in intelligent fault diagnosis of instances-based deep transfer learning, network-based deep transfer learning, mapping based deep transfer learning and adversarial-based deep transfer learning in recent years are summarized. Finally, we discuss the existing problems and development trend of deep transfer learning for intelligent fault diagnosis. This research has a positive significance for utilising deep transfer learning method in mechanical fault diagnosis.</p>	<p>10.1007/s11063-021-10719-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11063-021-10719-z</p>	<p>SpringerLink</p>
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Assessing the Social Impacts of Additive Manufacturing Using Hierarchical Evidential Reasoning Approach	Bappy, Mahathir Mohammad, Key, John, Hossain, Niamat Ullah Ibne, Jaradat, Raed,	In recent times, the wider adoption and development of additive manufacturing is prominent in society, but the information regarding the social impacts of this technology is very limited. Due to this, assessing the social impacts of additive manufacturing technology is crucial. The assessment process to determine the social impacts of additive manufacturing information from factors, which are qualitative, incomplete, and uncertain in nature, is observed. The evidential reasoning (ER) approach is a method that can handle subjective, uncertain, and incomplete data. In this paper, the ER approach along with the analytical hierarchy process (AHP) is incorporated for the first time to build up a model for assessing the social impacts of additive manufacturing technology. Based on the experts' opinion, AHP is applied to the relevant attributes of social impacts to rate and structure the attributes. In this research, the model will be tested using subjective judgmental belief structure data. The data will be aggregated using the ER approach and the attributes will be illustrated in a distributed manner. In the proposed model,	10.1007/s40171-021-00295-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-021-00295-5	SpringerLink
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		<p>Yager's combination method is applied to compare the output of the D–S approach. The model output is comprised of the average state of social impact from additive manufacturing along with a level of uncertainty for each attribute. The proposed model is now available for utilization by the decision maker to assess the social impacts of additive manufacturing technology. Furthermore, the model could be used as a baseline for planning mitigation of impacts to or improvement to a current state of social impacts.</p>			
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<p>An intelligent manufacturing cell based on human–robot collaboration of frequent task learning for flexible manufacturing</p>	<p>Zhang, Shuai, Li, Shiqi, Wang, Haipeng, Li, Xiao,</p>	<p>The trend of short-run production and personalized customization is more and more popular in the manufacturing industry. And the robots in these production lines must conduct task adjustment efficiently when learning new tasks. Thus, this paper developed the intelligent manufacturing cell based on the human–robot collaboration (HRC-IMC) which can enhance the learning ability of cobots by introducing the intelligence of human. The HRC-IMC was composed with four modules: the imitating learning module, the human–robot safety planning module, the task planning module and the visual inferring module. All of the four modules were designed to provide a set of systematic and effective methods. That was conducive to the efficiency improvement of the task adjustment for cobots' new task learning. The experimental results indicated that the efficiency of task adjustment can be increased by 42.8 % when the HRC-IMC was employed than that of Moveit. All in all, this study is of great significance for improving the efficiency of new task adjustment of cobots by imitating the manipulation experience of human via combining four</p>	<p>10.1007/s00170-022-09005-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-022-09005-6</p>	<p>SpringerLink</p>
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		algorithm modules.			
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<p>An ICT architecture for enabling ancillary services in Distributed Renewable Energy Sources based on the SGAM framework</p>	<p>Stocker, Armin, Alshawish, Ali, Bor, Martin, Vidler, John, Gouglidis, Antonios, Scott, Andrew, Marnerides, Angelos, Meer, Hermann, Hutchison, David,</p>	<p>Smart Grids are electrical grids that require a decentralised way of controlling electric power conditioning and thereby control the production and distribution of energy. Yet, the integration of Distributed Renewable Energy Sources (DRESSs) in the Smart Grid introduces new challenges with regards to electrical grid balancing and storing of electrical energy, as well as additional monetary costs. Furthermore, the future smart grid also has to take over the provision of Ancillary Services (ASs). In this paper, a distributed ICT infrastructure to solve such challenges, specifically related to ASs in future Smart Grids, is described. The proposed infrastructure is developed on the basis of the Smart Grid Architecture Model (SGAM) framework, which is defined by the European Commission in Smart Grid Mandate M/490. A testbed that provides a flexible, secure, and low-cost version of this architecture, illustrating the separation of systems and responsibilities, and supporting both emulated DRESSs and real hardware has been developed. The resulting system supports the integration of a variety of DRESSs with a</p>	<p>10.1186/s42162-022-00189-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-022-00189-5</p>	<p>SpringerLink</p>
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		<p>secure two-way communication channel between the monitoring and controlling components. It assists in the analysis of various inter-operabilities and in the verification of eventual system designs. To validate the system design, the mapping of the proposed architecture to the testbed is presented. Further work will help improve the architecture in two directions; first, by investigating specific-purpose use cases, instantiated using this more generic framework; and second, by investigating the effects a realistic number and variety of connected devices within different grid configurations has on the testbed infrastructure.</p>			
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Prospective assessment of energy technologies: a comprehensive approach for sustainability assessment	Haase, M., Wulf, C., Baumann, M., Rösch, C., Weil, M., Zapp, P., Naegler, T.,	<p>Background A further increase in renewable energy supply is needed to substitute fossil fuels and combat climate change. Each energy source and respective technologies have specific techno-economic and environmental characteristics as well as social implications. This paper presents a comprehensive approach for prospective sustainability assessment of energy technologies developed within the Helmholtz Initiative "Energy System 2050" (ES2050).</p> <p>Methods The "ES2050 approach" comprises environmental, economic, and social assessment. It includes established life cycle based economic and environmental indicators, and social indicators derived from a normative concept of sustainable development. The elaborated social indicators, i.e. patent growth rate, acceptance, and domestic value added, address three different socio-technical areas, i.e. innovation (patents), public perception (acceptance), and public welfare (value added). Results The implementation of the "ES2050 approach" is presented exemplarily and different sustainability</p>	10.1186/s13705-022-00344-6	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13705-022-00344-6	SpringerLink
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		<p>indicators and respective results are discussed based on three emerging technologies and corresponding case studies: (1) synthetic biofuels for mobility; (2) hydrogen from wind power for mobility; and (3) batteries for stationary energy storage. For synthetic biofuel, the environmental advantages over fossil gasoline are most apparent for the impact categories Climate Change and Ionizing Radiation—human health. Domestic value added accounts for 66% for synthetic biofuel compared to 13% for fossil gasoline. All hydrogen supply options can be considered to become near to economic competitiveness with fossil fuels in the long term. Survey participants regard Explosion Hazard as the most pressing concern about hydrogen fuel stations. For Li-ion batteries, the results for patent growth rate indicate that they enter their maturity phase. Conclusions The “ES2050 approach” enables a consistent prospective sustainability assessment of (emerging) energy technologies, supporting technology developers, decision-makers in politics, industry, and society with knowledge for further</p>			
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		evaluation, steering, and governance. The approach presented is considered rather a starting point than a blueprint for the comprehensive assessment of renewable energy technologies though, especially for the suggested social indicators, their significance and their embedding in context scenarios for prospective assessments.			
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<p>A Sociotechnical Systems Framework for Performance-Based Design for Fire Safety</p>	<p>Meacham, Brian J.,</p>	<p>The fundamental construct for performance-based design for fire safety in use today has not significantly changed since the early 1990s. While the current construct has seen some success, performance-based design for fire safety is not as broadly accepted as performance-based design approaches in other building-related engineering disciplines. To advance performance-based design for fire safety, it is proposed to move towards a sociotechnical systems approach. This means changing the starting point from a focus on fire safety objectives as a unique property of buildings, infrastructure, or operations, and considering fire safety as one of several sociotechnical objectives. It also means focusing fire safety analysis and design on system attributes which can be controlled through design, and less on variables for which control is unlikely or not possible. As part of this, consideration of fire safety systems performance should be considered in terms of a 'fail-safe' perspective, in which there is less focus on all possible events that could occur, and more on preventing those which could result</p>	<p>10.1007/s10694-022-01219-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10694-022-01219-0</p>	<p>SpringerLink</p>
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		<p>in unacceptable performance. Evaluation of building fire safety as a sociotechnical systems problem would also need to consider the interactions of all components that contribute to safety over the lifetime of the system, including in-use safety system management and system performance over time.</p>			
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Genotoxicity induced by medicinal plants	Bardoloi, Arpita, Soren, Amar Deep,	<p>Background The use of medicinal plants in curing diseases is an ancient culture still in use in many parts of the world. Many plants have been proven to have precise ethno-pharmacological relevance. On the contrary, many folkloric plants have also been found to possess DNA damaging effects. Hence, assessing the safety profile of medicinal herbs before being approved for use must be undertaken. Main text This review focuses on medicinal plants exerting genotoxicity effect within through in vivo studies on the bone marrow, erythrocyte or other organs on animal models and in vitro studies on bacterial cells or mammalian cell lines such as mammalian lymphocytes, human hepatoma cell line or HepG2, mouse lung fibroblast cell lines or human adenocarcinoma cell lines. This review has found that several medicinal plants possess genotoxic potentials and are not safe to use. The common methodologies several authors have used include the comet assay, micronucleus assay, bacterial reverse mutation assay, Ames test or Salmonella/micro some assay. Conclusion Plants that have been proven to</p>	10.1186/s42269-022-00803-2	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42269-022-00803-2	SpringerLink
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		be genotoxic are not reduced to a particular family, while groups including Fabaceae, Asteraceae, Euphorbiaceae, Rosaceae, Lamiaceae and Apocynaceae appear to be frequent. To avoid any mutation in its users, genotoxicity assessment of therapeutic plants appears to be required.			
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Optical crosslinks and satellite synchronization for GNSS, communications, and beyond	Warren, Zachary, Fields, Renny,	Traditional intersatellite communications for shared timing information rely on microwave transceivers such as those in Milstar, AEHF, and Iridium constellations. With extensive space heritage and well-established engineering and performance specifications, these methods have typified the field of high-performance satellite synchronization for decades, recently introduced into active GNSS satellite constellations such as BeiDou. Optical crosslinks, currently investigated as an augmentation or alternative to traditional microwave-based methods, can provide enhanced precision to intersatellite ranging and time transfer, performing beyond one-way or uplink/downlink microwave-based communications. The challenges of time transfer through optical links and crosslinks can significantly impact the systems architecture, optical terminal complexity, and agreements on international standards. Orders-of-magnitude precision enhancement can enable novel timing and ranging technologies allowing for advanced navigation capabilities.	10.1007/s10291-022-01233-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10291-022-01233-3	SpringerLink
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		<p>Additionally, basic scientific studies with a fleet of synchronized satellites could inform fundamental physics studies on a truly global scale. We evaluate the benefits, drawbacks, and potential applications of satellite synchronization through microwave and optical crosslinks for shared timing and ephemeris data in support of enhanced constellation state estimation and reduced range error. The risks and value associated with these technologies are also discussed with an emphasis on challenges for aerospace.</p>			
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What distinguishes a model of systems engineering from other models of designing? An ontological, data-driven analysis	Kannengiesser, Udo, Gero, John S.,	This paper investigates how the core technical processes of the INCOSE model of systems engineering differ from other models of designing used in the domains of mechanical engineering, software engineering and service design. The study is based on fine-grained datasets produced using mappings of the different models onto the function-behaviour-structure (FBS) ontology. By representing every model uniformly, the same statistical analyses can be carried out independently of the domain of the model. Results of correspondence analysis, cumulative occurrence analysis and Markov model analysis show that the INCOSE model differs from the other models in its increased emphasis on requirements and on behaviours derived from structure, in the uniqueness of its verification and validation phases, and in some patterns related to the temporal development and frequency distributions of FBS design issues.	10.1007/s00163-021-00382-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-021-00382-9	SpringerLink
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<p>The analysis of the operational process of a complex fire alarm system used in transport facilities</p>	<p>Pa, Jacek, Klimczak, Tomasz, Rosiski, Adam, Stawowy, Marek,</p>	<p>A fire alarm system (FAS) is a system comprising signalling-alarm devices, which automatically detect and transmit information about fire, but also receivers of fire alarms and receivers for damage signals. Fire alarm systems function in different environmental conditions. During operation they should be in state of fitness. This is determined by the reliability of the assembled units and rational management of the operation process. Therefore a reliability and operational analysis of fire alarm systems as a whole is essential. This article presents an authorial model and an operational and reliability analysis of FAS, which is exploited in a transport building. It also demonstrates relationships occurring in the analysed system, where to an addressable fire alarm central unit with detection loops and control-monitoring loops alarm device lines (with monitored relay outputs for actuation of alarm-signalling devices) were connected. Research and analysis of results for representative FAS, which were exploited in similar environmental conditions, were conducted in order to determine</p>	<p>10.1007/s12273-021-0790-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12273-021-0790-y</p>	<p>SpringerLink</p>
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		operational and reliability parameters of the investigated system. FAS computer simulation was run during the time $t = 1$ year of safety system operation. This led to the calculation of the probability value of the analysed FAS staying in the examined operational states.			
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Two-phase multi-expert knowledge approach by using fuzzy clustering and rule-based system for technology evaluation of unmanned aerial vehicles	Çolak, Murat, Kaya, Hsian, Karaan, Ali, Erdoan, Melike,	Unmanned aerial vehicles (UAVs) are utilized in many different areas for different aims such as the benefit of humanity, safety control, traffic control, crop monitoring, scientific research, and commercial applications. Moreover, the UAVs are also successfully utilized for military operations, such as surveillance of an area and counter-terrorism actions. Evaluating them through the technological perspective is quite significant and should be considered from multiple perspectives. In this context, it will be more beneficial to construct a methodology for an efficient evaluation process. The fuzzy set theory (FST) can also be integrated into this methodology to improve its sensitiveness and flexibility. In this paper, a novel methodology integrating fuzzy c-means (FCM) clustering and fuzzy inference system (FIS) has been suggested for the technical evaluation of UAVs. While the FCM clustering algorithm has been utilized to determine the clusters, rules have been created for the FIS through expert assessments, and alternative UAV technologies have been prioritized. For the evaluation	10.1007/s00521-021-06694-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-021-06694-0	SpringerLink
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		<p>procedure, the hierarchical structure of the technology evaluation features has been determined by fusing expert knowledge, literature review, and related ISO standards. Through the FCM clustering algorithm, alternative vehicles have been clustered based on the sub-features of each main feature. Then, FIS has been conducted by using experts' knowledge from the fields of military technologies in UAVs and armed UAVs to obtain the technology indices of the eight UAVs locally produced and used in Turkey. The results demonstrate that the proposed methodology can be successfully applied by the managers or research and development (R&D) engineers for evaluation of the UAV technologies to consider cardinal and linguistic data. Additionally, a comparative analysis based on self-organizing map (SOM) and fuzzy \$\$\$\$ k - means algorithms has also been applied for the proposed method, and their performances have been compared.</p>			
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Understanding ICT's impacts on urban spaces: a qualitative content analysis of literature	Afradi, Kazem, Nourian, Farshad,	<p>Since the 1980s, a considerable amount of research has dealt with the spatial impacts of services and devices related to Information and Communication Technology (ICT). In answering the question of "what are the ICT's spatial impacts?", a literature review reveals that a major part of the research is trapped in dualities such as the "centralization-decentralization" and "substitutionary-complementary" effects of ICT. Other studies have investigated the ICT's spatial impacts regarding the discourses of the industrial age rather than the post-information age. Moving beyond the technology-centered and deterministic presumptions, this paper deals with a more fundamental question on defining the variables which play a role in the process through which ICT impacts urban spaces. We have conducted a qualitative content analysis in order to gain an understanding of these variables. Based on the review of 242 texts in the literature, 175 codes were extracted and organized into 18 subcategories, four generic categories, two main categories and one theme. The extracted theme points to a quadripartite dynamic co-</p>	10.1007/s10708-020-10277-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10708-020-10277-2	SpringerLink
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		evolution between the ICT, agents, societies and cities. This co-evolution—and considering the long history of technological changes in cities—mean that cohesive policies toward predetermined visions are needed for effective use of ICT in creating desired spatial impacts. In absence of such policies, the spatial impacts of ICT remain unpredictable.			
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Dynamic and scalable multi-level trust management model for Social Internet of Things	Abdelghani, Wafa, Amous, Ikram, Zayani, Corinne Amel, Sèdes, Florence, Roman-Jimenez, Geoffrey,	<p>The Internet of Things (IoT) is a paradigm that has made everyday objects intelligent by offering them the ability to connect to the Internet and communicate. Integrating the social component into IoT gave rise to the Social Internet of Things (SIoT), which has helped overcome various issues such as heterogeneity and navigability. In this kind of environment, participants compete to offer a variety of attractive services. Nevertheless, some of them resort to malicious behaviour to spread poor-quality services. They perform so-called Trust-Attacks and break the basic functionality of the system. Trust management mechanisms aim to counter these attacks and provide the user with an estimate of the trust degree they can place in other users, thus ensuring reliable and qualified exchanges and interactions. Several works in literature have interfered with this problem and have proposed different Trust-Models. The majority tried to adapt and reapply Trust-Models designed for common social networks or peer-to-peer ones. That is, despite the similarities between these types of networks, SIoT</p>	10.1007/s11227-021-04205-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-021-04205-5	SpringerLink
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		<p>ones present specific peculiarities. In SloT, users, devices and services are collaborating. Devices entities can present constrained computing and storage capabilities, and their number can reach some millions. The resulting network is complex, constrained and highly dynamic, and the attacks-implications can be more significant. In this paper, we propose DSL-STM a new dynamic and scalable multi-level Trust-Model, specifically designed for SloT environments. We propose multidimensional metrics to describe and SloT entities behaviours. The latter are aggregated via a Machine Learning-based method, allowing classifying users, detecting attack types and countering them. Finally, a hybrid propagation method is suggested to spread trust values in the network, while minimizing resource consumption and preserving scalability and dynamism. Experimentation made on various simulated scenarios allows us to prove the resilience and performance of DSL-STM.</p>			
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Digital twin integrated power-hardware-in-the-loop for the assessment of distributed renewable energy resources	Nguyen, Van Hoa, Tran, Quoc Tuan, Besanger, Yvon, Jung, Marc, Nguyen, Tung Lam,	In this paper, the method of digital twin integrated power-hardware-in-the-loop for the assessment of distributed renewable energy resources is presented. The digital twin of the electrical grid is created via synchronization between the real-time simulator and the supervision, control and data acquisition system. The digital twin can be integrated to larger system with the addition of simulated devices, with or without reconfiguration of topology. The setup is then completed with power-hardware-in-the-loop interface where the real distributed energy resource can be physically integrated. The impact can then be analysed locally and globally as it propagates through the desired deployment environment.	10.1007/s00202-021-01246-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00202-021-01246-0	SpringerLink
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Assessment of Uncertainties in Modelling Land Use Change with an Integrated Cellular Automata–Markov Chain Model	Palmate, Santosh S., Wagner, Paul D., Fohrer, Nicola, Pandey, Ashish,	<p>Uncertainty in future land use change modelling is crucial to study as it may result in varying spatial characteristics and features of the model. An integrated land use change model combines different modelling techniques and strengths. However, combined model uncertainties may significantly affect the accuracy of the model results. In this study, uncertainties resulting from spatial resolution and proportional errors of the input maps, as well as from iteration number of the cellular automata (CA) employing an integrated CA–Markov chain (CA-MC) model have been explored. The model uncertainty was quantified by comparing simulated maps to a classified land use map with the help of kappa statistics and confusion matrix. Further, correlation analysis was performed between kappa coefficients and land use simulations. The results show that the input data uncertainty (spatial resolution and proportional error) has a higher influence on land use simulation as compared to the CA-model parameter uncertainty (iteration number). The confusion matrix and the percent deviation from simulated land use map showed that variation in</p>	10.1007/s10666-021-09804-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10666-021-09804-3	SpringerLink
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		<p>the major land use classes, namely agriculture (69.2 to 66.1%), dense forest (14.8 to 12%), degraded forest (12.6 to 14.5%), and barren land (1.31 to 5.96%), is required to be taken into account to reduce the model simulation error and hence the uncertainties. This study reveals that input datasets of fine spatial resolution and a low proportional error as well as to a lesser extent a high number of iterations can be recommended to minimize uncertainty in the CA-MC modelling.</p>			
Values and Ethics in Information Systems	<p>Spiekermann, Sarah, Krasnova, Hanna, Hinz, Oliver, Baumann, Annika, Benlian, Alexander, Gimpel, Henner, Heimbach, Irina, Köster, Antonia, Maedche, Alexander, Niehaves, Björn, Risius, Marten, Trenz, Manuel,</p>		10.1007/s12599-021-00734-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-021-00734-8	SpringerLink

Artificial intelligence in the field of economics	Bickley, Steve J., Chan, Ho Fai, Torgler, Benno,	The history of AI in economics is long and winding, much the same as the evolving field of AI itself. Economists have engaged with AI since its beginnings, albeit in varying degrees and with changing focus across time and places. In this study, we have explored the diffusion of AI and different AI methods (e.g., machine learning, deep learning, neural networks, expert systems, knowledge-based systems) through and within economic subfields, taking a scientometrics approach. In particular, we centre our accompanying discussion of AI in economics around the problems of economic calculation and social planning as proposed by Hayek. To map the history of AI within and between economic sub-fields, we construct two datasets containing bibliometrics information of economics papers based on search query results from the Scopus database and the EconPapers (and IDEAs/RePEc) repository. We present descriptive results that map the use and discussion of AI in economics over time, place, and subfield. In doing so, we also characterise the authors and affiliations of those engaging with AI in	10.1007/s11192-022-04294-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11192-022-04294-w	SpringerLink
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		economics. Additionally, we find positive correlations between quality of institutional affiliation and engagement with or focus on AI in economics and negative correlations between the Human Development Index and share of learning-based AI papers.			
Modeling in advanced systems engineering	Gray, Jeff, Rumpe, Bernhard,		10.1007/s10270-022-00999-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-022-00999-x	SpringerLink

<p>A comprehensive review on comparison among effluent treatment methods and modern methods of treatment of industrial wastewater effluent from different sources</p>	<p>Sathya, K., Nagarajan, K., Carlin Geor Malar, G., Rajalakshmi, S., Raja Lakshmi, P.,</p>	<p>In recent years, rapid development in the industrial sector has offered console to the people but at the same time, generates numerous amounts of effluent composed of toxic elements like nitrogen, phosphorus, hydrocarbons, and heavy metals that influences the environment and mankind hazardously. While the technological advancements are made in industrial effluent treatment, there arising stretch in the techniques directing on hybrid system that are effective in resource recovery from effluent in an economical, less time consuming and viable manner. The key objective of this article is to study, propose and deliberate the process and products obtained from different industries and the quantity of effluents produced, and the most advanced and ultra-modern theoretical and scientific improvements in treatment methods to remove those dissolved matter and toxic substances and also the challenges and perspectives in these developments. The findings of this review appraise new eco-friendly technologies, provide intuition into the efficiency in contaminants</p>	<p>10.1007/s13201-022-01594-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13201-022-01594-7</p>	<p>SpringerLink</p>
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		removal and aids in interpreting degradation mechanism of toxic elements by various treatment assemblages.			
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Energy management system for a small-scale microgrid	Iqbal, Muhammad Mubashir, Kumar, Shubash, Lal, Chaman, Kumar, Chandar,	<p>In recent years, the power system has been evolved into microgrids, which are little pockets of self-contained entities. Different distributed, interconnected generation units, loads, and energy storage units make up a typical microgrid system. The increased energy efficiency of these units on microgrids is gaining popularity day by day. Because of their stochastic behavior, renewable generation causes an imbalance in the power system, which needs microgrid energy management. To solve these issues, a variety of novel approaches have been explored in the literature. For the stand-alone microgrid in this research, efficient energy management and control mechanism is adopted. A photovoltaic system, a wind turbine, and a battery energy storage device make up this stand-alone microgrid. The power stability of the hybrid system is ensured by a sophisticated controller. The main purpose of this study is to regulate the DC/DC bidirectional converter (DBC), which connects the Li-ion battery to the DC bus of the stand-alone microgrid. This paper describes the development of a wind/photovoltaic power generation system to the</p>	10.1186/s43067-022-00046-1	http://link.springer.com/openurl/pdf?id=doi:10.1186/s43067-022-00046-1	SpringerLink
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		<p>load, as well as MPPT techniques like perturb and observe (P&O). The system is simulated and the results are presented using MPPT techniques. There is no requirement for a specific power model in the suggested method. Only power and voltage system data are used by DBC. A stand-alone microgrid system was simulated using MATLAB.</p>			
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Formal requirements modeling for cyber-physical systems engineering: an integrated solution based on FORM-L and Modelica	Bouskela, Daniel, Falcone, Alberto, Garro, Alfredo, Jardin, Audrey, Otter, Martin, Thuy, Nguyen, Tundis, Andrea,	The increasing complexity of cyber-physical systems (CPSs) makes their design, development and operation extremely challenging. Due to the nature of CPS that involves many heterogeneous components, which are often designed and developed by organizations belonging to different engineering domains, it is difficult to manage, trace and verify their properties, requirements and constraints throughout their lifecycle by using classical techniques. In this context, the paper presents an integrated solution to formally define system requirements and automate their verification through simulation. The solution is based on the FOrmal Requirements Modeling Language and the Modelica language. The solution is exemplified through two case studies concerning a Trailing-Edge High-Lift system and a Heating, Ventilation and Air Conditioning system.	10.1007/s00766-021-00359-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-021-00359-z	SpringerLink
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Dedicated to Lamont C. (Monty) Hempel	Blockstein, David E,	Lamont C. (Monty) Hempel (1950–2019) was one of the founders and the first interim president of the Association of Environmental Studies and Sciences (AESS). Thw AESS Board approved this Festschrift to celebrate Monty's life, scholarship, activism, and optimism. Monty was the Hedco Chair in Environmental Studies and Director of the Center for Environmental Studies at the University of Redlands. Monty helped to form and lead the key US organizations in our field, including the Association for the Advancement of Sustainability in Higher Education (AASHE) and the Council of Environmental Deans and Directors (CEDD) of the National Council for Science and the Environment (NCSE). He was active in global environmental education and governance, including in the Republic of Palau where he led field courses for Redlands students for more than a decade.	10.1007/s13412-021-00729-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13412-021-00729-7	SpringerLink
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Contactless person recognition using 2D and 3D finger knuckle patterns	Chaa, Mourad, Akhtar, Zahid, Lati, Abdehai,	<p>In this paper, a contactless person verification system based on score level fusion of 2D and 3D finger knuckle patterns. In particular, four types of scores extracted from 3D forefinger FKP (Finger Knuckle Print), 3D middle FKP, 2D forefinger FKP and 2D middle FKP are merged to attain higher accuracy for personal recognition systems. The Tan and Triggs normalization technique (TT) is applied on the depth of 3D FKP image (fore and middle finger) to acquire TT 3D FKP image. Then, a novel and efficient scheme to extract features from TT 3D FKP image, namely Monogenic Local Phase Quantization (MLPQ) is utilized. Also, the MLPQ descriptor is applied on 2D FKP image (fore and middle finger) to extract features. The main idea of MLPQ descriptor is, first, the monogenic filters are applied to decompose TT 3D FKP image or 2D FKP image into three complementary parts: Bandpass, vertical and horizontal Bandpass components. Later, Local Phase Quantization (LPQ) is utilized to encode these complementary components. The encoded components are divided into $M \times M$ non-overlapped</p>	10.1007/s11042-022-12111-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-022-12111-y	SpringerLink
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		<p>rectangular sub-regions to calculate their histograms. These histograms sequences are concatenated to build a large feature vector. The kernel fisher analysis (KFA) is used as a dimensionality reduction technique to build the monogenic Local Phase Quantization (MLPQ) feature vector for 3D or 2D FKP recognition. Finally, the cosine distance is used to ascertain the identity of the person. Experimental results using publicly available PolyU FKP dataset show that the presented framework notably attained lower error rates and outperformed the state-of-the-art technique.</p>			
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Political machines: a framework for studying politics in social machines	Papakyriakopoulos, Orestis,	In the age of ubiquitous computing and artificially intelligent applications, social machines serves as a powerful framework for understanding and interpreting interactions in socio-algorithmic ecosystems. Although researchers have largely used it to analyze the interactions of individuals and algorithms, limited attempts have been made to investigate the politics in social machines. In this study, I claim that social machines are per se political machines, and introduce a five-point framework for classifying influence processes in socio-algorithmic ecosystems. By drawing from scholars from political theory, I use a notion of influence that functions as a meta-concept for connecting and comparing different conceptions of politics. In this way, I can associate multiple political aspects of social machines from a cybernetic perspective. I show that the framework efficiently categorizes dimensions of influence that shape interactions between individuals and algorithms. These categories are symbolic influence, political conduct, algorithmic influence, design, and regulatory	10.1007/s00146-021-01180-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-021-01180-6	SpringerLink
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		influence. Using case studies, I describe how they interact with each other on online social networks and in algorithmic decision-making systems and illustrate how the framework is able to guide scientists in further research.			
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<p>A Systematic Survey on CAPTCHA Recognition: Types, Creation and Breaking Techniques</p>	<p>Kumar, Mohinder, Jindal, M. K., Kumar, Munish,</p>	<p>CAPTCHA stands for Completely Automated Public Turing Test to Tell Computers and Human Apart. CAPTCHA is used for internet security. A few CAPTCHA schemes are available today like, text-based, audio-based, video/animation-based, puzzle based etc. In this paper, all these types are collaborating at single place to analyze. The main aim of this article is to present a literature to identify and recognize CAPTCHA, its types, the creation and breaking techniques. It is a systematic and complete analysis of all available CAPTCHA types. In this paper, 16 text-based CAPTCHA's generation methods are discussed with usability and security ranges from 3 to 100 and 65 to 100%, respectively. The security and usability measures are not calculated/sustained using some known English schemes. Out of 16 reviewed CAPTCHAs, 12 are based on English language, 1 on Arabic language, 1 on Chinese language, 1 on Devanagari language and 1 on Gurumukhi script. The designs are made segment proof with overlapping random shapes, overlapping characters, claspings, different colors and</p>	<p>10.1007/s11831-021-09608-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-021-09608-4</p>	<p>SpringerLink</p>
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		<p>different shades. For making recognition proof many techniques are used like image masking, local and global warping; broken characters, random rotation, arcs, jaws, etc. Approximately 50 schemes, especially based on the English language, are successfully broken with a success rate that ranges from 2 to 100%. The techniques that are used to break these schemes include shape context matching, distortion estimation, Log Gabor 2D filter, horizontal and vertical projection (for a segment the letters) are used. For recognition CNN, KNN, DNN and MCDNN are used. Almost 15 images-based CAPTCHAs are discussed that are designed with usability and security range 90–100 and 17–100%, respectively. Out of these 5 schemes are successfully broken with a success rate ranging between 7 and 100%. The K-NN and SVM are mostly used algorithms to recognize the images. Audio based CAPTCHAs (5 designs) are discussed with usability and security range from 68.5 to 100 and 100%, respectively. The broken rate of these audio schemes is also 45–75%. These schemes are broken with SVM and K-NN algorithms. The</p>			
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		<p>paper also discusses 4 popular video-based designs that provide usability and security that ranges from 75 to 100 and 98 to 100, respectively. These schemes are also compromised with broken rate 16–10% using SIFT, NN and simple OCR techniques. The paper can be a benchmark to precede any specific research to dive into any one of these types.</p>			
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<p>A new extension of FDOSM based on Pythagorean fuzzy environment for evaluating and benchmarking sign language recognition systems</p>	<p>Al-Samarraay, Mohammed S., Salih, Mahmood M., Ahmed, Mohamed A., Zaidan, A. A., Albahri, O. S., Pamucar, Dragan, AlSattar, H. A., Alamoodi, A. H., Zaidan, B. B., Dawood, Kareem, Albahri, A. S.,</p>	<p>Many studies have recently developed real-time sign language recognition system (SLRS)-based DataGlove wearable electronic devices for deaf and dumb to assort hand gestures as having an identical meaning in spoken language. An evaluation and benchmarking of these systems are important towards understanding the most suitable for fulfilling all essential requirements. This process falls under the multi-criteria decision-making (MCDM) problem because of different issues, namely, multi-evaluation criteria, criteria importance and data variation. Therefore, the MCDM solution is necessary to solve complex problems. The latest MCDM method called the fuzzy decision by the opinion score method (FDOSM) and its extension are considered the most powerful and suitable methods. However, these methods still suffer from vagueness issues. According to the advantage of Pythagorean fuzzy numbers in solving such issues, this study extended FDOSM into Pythagorean fuzzy set based on the Interactive hybrid arithmetic mean (IHAM) operator (called PFDOSM-IHAM) to evaluate and benchmark effectively the real-time SLRS.</p>	<p>10.1007/s00521-021-06683-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-021-06683-3</p>	<p>SpringerLink</p>
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		<p>The methodology is presented on the basis of the two phases. Firstly, a decision matrix is proposed on the basis of 'performance evaluation criteria' and 'SLRS set'. Secondly, the development of the PFDOSM-IHAM method is provided considering the following two stages: data transformation and processing. The following results are presented. (1) Variations are observed in the individual benchmarking results of real-time SLRS depending on each decision maker. (2) The group benchmarking results indicate that the 29th real-time SLRS was the best, whereas the worst real-time SLRS was attributed to SLRS (6th). (3) In evaluation, the statistical test indicates that the benchmarked systems from PFDOSM-IHAM are undergoing a systematic ranking. (4) Comparative analysis confirmed the efficacy of the proposed PFDOSM-IHAM against of the other well-known MCDM methods running on Pythagorean fuzzy numbers.</p>			
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Multi-objective optimization of task assignment in distributed mobile edge computing	Almasri, Sanaa, Jarrah, Moath, Al-Duwairi, Basheer,	<p>Traditional computing models and centralized cloud computing are not capable of meeting today's application requirements, especially when deploying technologies, such as the Internet of things (IoT), 5G, and wearable devices, on a large scale. Mobile edge computing (MEC) introduces the feasibility of using edge and smart devices, such as gateways and smart phones, to perform task execution of different applications. Moreover, an efficient task scheduling approach should consider the deadlines requirements and the power consumption of the edge devices. This paper proposes a multi-objective optimization solution to assign different application tasks to different edge devices while minimizing the energy consumption of edge devices and the computation time of tasks. Task dependencies and data distribution are considered within a new and more general MEC model. Multi-objective evolutionary algorithm (MOEA) framework is used to solve the optimization problem subject to deadline and power consumption constraints. Results show that</p>	10.1007/s40860-021-00162-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-021-00162-1	SpringerLink
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		the proposed multi-objective approach achieves better performance in terms of energy and computation time when compared to a single objective approach.			
Overview of the Hunga Tonga-Hunga Ha'apai Volcanic Eruption and Tsunami	Manneela, Sunanda, Kumar, Srinivasa,		10.1007/s12594-022-1980-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12594-022-1980-7	SpringerLink

<p>A collaboration context ontology to enhance human-related collaboration into Industry 4.0</p>	<p>Li, Siying, Abel, Marie-Hélène, Negre, Elsa,</p>	<p>The advent of Industry 4.0 where humans and intelligent machines coexist, allows machines to assist humans on production lines. During such processes, humans work with other humans and/or machines to produce the required products, forming human-related collaborations. Therefore, Industry 4.0 goes beyond a digital ecosystem by being considered as a System of Information Systems which matches heterogeneous systems. This heterogeneity causes poor information interoperability, weakening the effectiveness of collaboration. This poses an issue: how to facilitate human-related collaborations on production lines into Industry 4.0? Addressing it requires better information interoperability and the definition of indicators that can be used to generate recommendations during collaborations. In this article, we focus on indicators of collaboration context and integrate them into a collaboration context ontology to enhance human-related collaborations into Industry 4.0. We then show how to use it in generating context-aware collaborator recommendations.</p>	<p>10.1007/s10111-021-00677-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-021-00677-w</p>	<p>SpringerLink</p>
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Simulation of transportation infrastructures resilience: a comprehensive review	Dong, Bei-Xuan, Shan, Ming, Hwang, Bon-Gang,	Despite the increasing simulation methods used by the research of transportation infrastructure resilience in the past decade, a comprehensive review of these simulation methods is lacking. Thus, this paper conducted an in-depth review of the major simulation methods adopted by the existing transportation infrastructure resilience literature, which are Monte Carlo simulation, network-based simulation, numerical simulation, and agent-based modeling and simulation. The four simulation methods were reviewed from three perspectives, namely purposes of simulation, data demands, and modeling approaches. Finally, based on the review results, this paper proposed three directions for that the research may go towards in the future. This paper contributes to the current body of knowledge by reviewing the simulation methods adopted by the research of transportation infrastructure resilience. This paper is useful to the practice as well, as it provides practitioners with a holistic view of the practical application of transportation infrastructure resilience simulation, which can enhance their knowledge and	10.1007/s11356-021-18033-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-021-18033-w	SpringerLink
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		skills in this regard.			
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<p>Kubernetes in IT administration and serverless computing: An empirical study and research challenges</p>	<p>Mondal, Subrota Kumar, Pan, Rui, Kabir, H M Dipu, Tian, Tan, Dai, Hong-Ning,</p>	<p>Today's industry has gradually realized the importance of lifting efficiency and saving costs during the life-cycle of an application. In particular, we see that most of the cloud-based applications and services often consist of hundreds of micro-services; however, the traditional monolithic pattern is no longer suitable for today's development life-cycle. This is due to the difficulties of maintenance, scale, load balance, and many other factors associated with it. Consequently, people switch their focus on containerization—a lightweight virtualization technology. The saving grace is that it can use machine resources more efficiently than the virtual machine (VM). In VM, a guest OS is required to simulate on the host machine, whereas containerization enables applications to share a common OS. Furthermore, containerization facilitates users to create, delete, or deploy containers effortlessly. In order to manipulate and manage the multiple containers, the leading Cloud providers introduced the container orchestration platforms, such as Kubernetes, Docker Swarm, Nomad, and</p>	<p>10.1007/s11227-021-03982-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-021-03982-3</p>	<p>SpringerLink</p>
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		<p>many others. In this paper, a rigorous study on Kubernetes from an administrator's perspective is conducted. In a later stage, serverless computing paradigm was redefined and integrated with Kubernetes to accelerate the development of software applications. Theoretical knowledge and experimental evaluation show that this novel approach can be accommodated by the developers to design software architecture and development more efficiently and effectively by minimizing the cost charged by public cloud providers (such as AWS, GCP, Azure). However, serverless functions are attached with several issues, such as security threats, cold start problem, inadequacy of function debugging, and many other. Consequently, the challenge is to find ways to address these issues. However, there are difficulties and hardships in addressing all the issues altogether. Respectively, in this paper, we simply narrow down our analysis toward the security aspects of serverless. In particular, we quantitatively measure the success probability of attack in serverless (using Attack Tree and Attack–Defense</p>			
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		<p>Tree) with the possible attack scenarios and the related countermeasures . Thereafter, we show how the quantification can reflect toward the end-to-end security enhancement. In fine, this study concludes with research challenges such as the burdensome and error-prone steps of setting the platform, and investigating the existing security vulnerabilities of serverless computing, and possible future directions.</p>			
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Using Flow Tools to Enact Control in Software Development Projects: A Cross-case Analysis	Estevam, Alex, Dennehy, Denis, Conboy, Kieran,	Flow development tools and metrics are the latest in a long line of approaches designed to control and improve software development productivity and the overall quality of software produced. While there are many claims regarding the value of flow to control development activity, there is a lack of rigorous research on this topic. In this study, we use control theory as a lens to explore how flow tools and metrics are used to enact both formal and informal control modes. This qualitative study draws on a cross-case analysis of two multinationals located in Ireland that involved interviews with five software development teams distributed across Ireland, India, and the US. The findings reveal that both managers and project teams try to conduct business as usual in order to maintain their control status. This study contributes four key challenges on the use of flow tools, evidence-based recommendations on how to effectively implement flow, and a research agenda for future researchers. While the findings are within the context of flow-based software development projects, the lessons learned can be generalised to other software	10.1007/s10796-020-10081-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-020-10081-w	SpringerLink
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		development contexts.			
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A Real Case Application of Game Theoretical Concepts in a Complex Decision-Making Process: Case Study ERTMS	Bekius, Femke, Meijer, Sebastiaan, Thomassen, Hugo,	<p>Engineering systems are complex, amongst others due to the interdependencies between actor and technical aspects. This complexity has consequences for the way of designing such systems and, in particular, for the decision-making process. Recognizing the impossibility of having an optimal system design in such complex systems, this article explores how a game theoretical characterization of a decision-making process assists in the organization and design of the process itself. In contrast to a game theoretical analysis, which results in optimal outcomes, the characterization is fed back to the designers of the decision-making process during the course of the process. The study analyses how the game concept characterization was used, i.e., which strategies were defined during the game theory interventions, and what the consequences of these strategies were for the design of the decision-making process. The design of a new safety system ERTMS for the Dutch railway sector is the context in which the study was performed. The contribution is a successful approach to complex decision-making in multi-actor</p>	10.1007/s10726-021-09762-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-021-09762-x	SpringerLink
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		<p>systems by identification of multiple game concepts over time, with periodic feedback into the designing system, and not the actual decision-making itself. In short, it supported adapting to an actor focus on the process, it affected the role and responsibilities of the program management, it contributed to (de)coupling of issues, and it influenced the capability of creating awareness amongst actors of the urgency of the decision window. The paper ends with reflections on the experience of intervening in a decision-making process with game theoretical concepts.</p>			
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Engineering ethical behaviors in autonomous industrial cyber-physical human systems	Trentesaux, Damien, Karnouskos, Stamatis,	<p>This paper addresses the engineering of the ethical behaviors of autonomous industrial cyber-physical human systems in the context of Industry 4.0. An ethical controller is proposed to be embedded into these autonomous systems, to enable their successful integration in the society and its norms. This proposed controller that integrates machine ethics is realized through three main strategies that utilize two ethical paradigms, namely deontology, and consequentialism . These strategies are triggered according to the type of event sensed and the state of the autonomous industrial cyber-physical human systems, their combination being potentially unknown or posing ethical dilemmas. Two case studies are investigated, that deal with a fire emergency, and two different contexts i.e. one with an autonomous train, and one with an autonomous industrial plant, are discussed to illustrate the controller utilization. The case studies demonstrate the potential benefits and exemplify the need to integrate ethical behaviors in autonomous industrial cyber-physical human systems already at the design</p>	10.1007/s10111-020-00657-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-020-00657-6	SpringerLink
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		phase. The proposed approach, use cases, and discussions make evident the need to address ethical aspects in new efforts to engineer industrial systems in the context of Industry 4.0.			
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Energy efficiency in cloud computing data center: a survey on hardware technologies	Katal, Avita, Dahiya, Susheela, Choudhury, Tanupriya,	<p>The internet is expanding its viewpoint into each conceivable part of the cutting-edge economy. Unshackled from our web programs today, the internet is characterizing our way of life, regardless of whether it's sitting in front of the TV or driving an independent auto. The enchantment of the internet appears to be relatively unbounded. In any case, with each new spell there comes an ever-increasing amount of data, and interest for computational power. Cloud computing which is an on-request conveyance of computing power, applications, database storage, and other IT assets by means of the Internet has violently expanded our computerized lives. Though, there have been critical improvements as far as accessibility, fluctuation, time and quality in administrations are concerned; the unbounded development of our computerized way of life requires monstrous measures of power, especially for the data centers that fill in as the mind of the advanced economy. Data organizations foresee a decrease in the quantity of data centers, as more businesses close their little data centers and move</p>	10.1007/s10586-021-03431-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-021-03431-z	SpringerLink
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		<p>towards cloud computing. All things considered, the move by clients towards cloud, will increase the general energy utilization significantly, exceeding any energy productivity increase; which has recorded for over 70% of data center development in 2018. Many research advancements are already made in this domain for minimizing the energy utilization of the computing types of gear included; for efficient power energy consumption, decrease of carbon impression and e-squander. These procedures are supporters of green cloud computing, which are focused on planning and advancing energy-proficient activities to contain inordinate energy utilization in data centers. This paper discusses different mechanisms for lowering the power utilization in data centers. It provides in depth detail about the various mechanisms that can be employed at the hardware component level so that the utilization of energy by component can be reduced. Techniques that can be applied at network, cluster of servers' level along with the various dynamic power management measures that can be employed</p>			
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		at the hardware or firmware level and can lead to energy efficient or green data centers are also studied in detail. The paper concludes with the research challenges for building the green data centers.			
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Enhanced head-skull shape learning using statistical modeling and topological features	Nguyen, Tan-Nhu, Tran, Vi-Do, Nguyen, Ho-Quang, Nguyen, Duc-Phong, Dao, Tien-Tuan,	Skull prediction from the head is a challenging issue toward a cost-effective therapeutic solution for facial disorders. This issue was initially studied in our previous work using full head-to-skull relationship learning. However, the head-skull thickness topology is locally shaped, especially in the face region. Thus, the objective of the present study was to enhance our head-to-skull prediction problem by using local topological features for training and predicting. Head and skull feature points were sampled on 329 head and skull models from computed tomography (CT) images. These feature points were classified into the back and facial topologies. Head-to-skull relations were trained using the partial least square regression (PLSR) models separately in the two topologies. A hyperparameter tuning process was also conducted for selecting optimal parameters for each training model. Thus, a new skull could be generated so that its shape was statistically fitted with the target head. Mean errors of the predicted skulls using the topology-based learning method were better than those using the non-topology-based learning	10.1007/s11517-021-02483-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11517-021-02483-y	SpringerLink
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		<p>method. After tenfold cross-validation, the mean error was enhanced 36.96% for the skull shapes and 14.17% for the skull models. Mean error in the facial skull region was especially improved with 4.98%. The mean errors were also improved 11.71% and 25.74% in the muscle attachment regions and the back skull regions respectively. Moreover, using the enhanced learning strategy, the errors (mean \pmSD) for the best and worst prediction cases are from 1.1994\pm1.1225 mm (median: 0.9036, coefficient of multiple determination (R^2): 0.997274) to 3.6972\pm2.4118 mm (median: 3.9089, R^2: 0.999614) and from 2.0172\pm2.0454 mm (median: 1.2999, R^2: 0.995959) to 4.0227\pm2.6098 mm (median: 3.9998, R^2: 0.998577) for the predicted skull shapes and the predicted skull models respectively. This present study showed that more detailed information on the head-skull shape leads to a better accuracy level for the skull prediction from the head. In particular, local topological features on the back and face regions of interest should be considered toward a better learning strategy for the head-to-skull prediction problem. In perspective, this</p>			
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		<p>enhanced learning strategy was used to update our developed clinical decision support system for facial disorders. Furthermore, a new class of learning methods, called geometric deep learning will be studied.</p> <p>Graphical abstract</p>			
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Review of the Forel–Ule Index based on in situ and remote sensing methods and application in water quality assessment	Ye, Miao, Sun, Yonghua,	<p>Water pollution is considered an acute worldwide environmental issue. At present, the commonly adopted method of water quality characterisation involves the retrieval of optically active water quality parameters based on remote sensing reflectance (R_{rs}), but this method is subject to the limitation that understanding local scatter and absorption characteristics of light is essential to precisely derive these parameters. Water colour primarily depends on water constituents and is traditionally gauged with the Forel–Ule (FU) scale. In recent years, R_{rs} within the visible region has been considered to determine the Forel–Ule Index (FUI) for water colour measurement. The FUI exhibits the advantages of remote sensing and does not rely on local retrieval algorithms. Therefore, this index can characterise natural waters in a simple and globally effective manner. As there exists a lack of review articles on the FUI, we present a comprehensive review of this index that may help researchers progress. First, we introduce the most recent techniques for FUI measurement, especially remote sensing–deriving methods. Then,</p>	10.1007/s11356-021-18083-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-021-18083-0	SpringerLink
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		we summarise FUI applications in water quality assessment of oceans and inland waters. Finally, FUI development trends, challenges and application perspectives are examined.			
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<p>A Model-Driven Framework for the Development of MVC-Based (Web) Application</p>	<p>Ahmad, Sheikh Israr, Rana, Tauseef, Maqbool, Ayesha,</p>	<p>Model-driven engineering is a renowned software engineering methodology for design and development of software systems with the help of various types of models. Model–View–Controller (MVC) is a popular and extensively used architectural pattern for Web application development process in different platforms. Literature review reveals that there are implementation-level deficiencies in the form of complicated structure, time taken for development and maintenance of MVC-based Web application in different MVC-based frameworks. In this article, we introduce a unique model-driven framework approach to simplify the use of MVC-based frameworks for Web application development. In our approach, we introduce a unique mechanism with the help of a UML Profile model and a model to text transformation engine to automatically generate the implementation of any (Web) application in three defined MVC-based frameworks; our approach is extensible to support more MVC frameworks. For ease, we have created an application with GUI to generate the required MVC-based</p>	<p>10.1007/s13369-021-06087-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13369-021-06087-4</p>	<p>SpringerLink</p>
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		framework code. The application/implementation of our unique approach is verified with two benchmark case studies; results show that we closely generate the MVC-based Web application source code which is flexible to add critical application business logic.			
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Research trends in cybercrime victimization during 2010–2020: a bibliometric analysis	Ho, Huong Thi Ngoc, Luong, Hai Thanh,	<p>Research on cybercrime victimization is relatively diversified; however, no bibliometric study has been found to introduce the panorama of this subject. The current study aims to address this research gap by performing a bibliometric analysis of 387 Social Science Citation Index articles relevant to cybercrime victimization from Web of Science database during the period of 2010–2020. The purpose of the article is to examine the research trend and distribution of publications by five main fields, including time, productive authors, prominent sources, active institutions, and leading countries/regions. Furthermore, this study aims to determine the global collaborations and current gaps in research of cybercrime victimization. Findings indicated the decidedly upward trend of publications in the given period. The USA and its authors and institutions were likely to connect widely and took a crucial position in research of cybercrime victimization. Cyberbullying was identified as the most concerned issue over the years and cyber interpersonal crimes had the large number of research comparing to</p>	10.1007/s43545-021-00305-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43545-021-00305-4	SpringerLink
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		cyber-dependent crimes. Future research is suggested to concern more about sample of the elder and collect data in different countries which are not only European countries or the USA. Cross-nation research in less popular continents in research map was recommended to be conducted more. This paper contributed an overview of scholarly status of cybercrime victimization through statistical evidence and visual findings; assisted researchers to optimize their own research direction; and supported authors and institutions to build strategies for research collaboration.			
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<p>Smart City Healthcare Cyber Physical System: Characteristics, Technologies and Challenges</p>	<p>Verma, Rupali,</p>	<p>The recent pandemic has demanded a strong and smart healthcare system which can monitor the patients efficiently and handle the situation that arises from the outbreak of the disease. Smart healthcare cyber physical systems are the future systems as they integrate the physical and cyber world for efficient functioning of medical processes and treatment through external monitoring and control of patients, medical devices and equipment for continuous communication and information exchange of physiological data. Technologies like Internet of Things, Machine learning and Artificial Intelligence have given birth to smart cyber physical systems like Smart Healthcare Systems, Smart Homes, Smart Vehicular Systems and Smart Grid. Such systems are interdisciplinary in nature with multitude of technologies contributing to its effective working. This paper presents a case study on healthcare cyber physical systems presenting its characteristics, role of various technologies in its growth and major challenges in successful implementation of cyber physical medication systems.</p>	<p>10.1007/s11277-021-08955-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-021-08955-6</p>	<p>SpringerLink</p>
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Optimization framework and applications of training multi-state influence nets	Sun, Jianbin, You, Yaqian, Ge, Bingfeng, Tan, Yuejin, Yang, Kewei,	Influence nets (INs) are proposed on the basis of causal logic for the purpose of depicting causal relationship strengths in complex systems. However, it is difficult to accurately determine the causal strength (CAST) parameters on the basis of expert knowledge only, particularly for practical problems with multiple attributes and multiple states. In this paper, the original IN with binary states is first extended into a multi-state IN, endowing the IN with the ability to model and infer under multiple states. Based on this method, an optimization framework is proposed to optimize the CAST parameters of multi-state INs. Finally, two practical cases are studied to verify the feasibility and efficiency of the proposed multi-state IN with an optimization framework in regression and classification.	10.1007/s10489-021-02514-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10489-021-02514-z	SpringerLink
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Addressing our planetary crisis	Falk, Jim, Attig-Bahar, Faten, Colwell, Rita R., Behera, Swadhin K., El-Beltagy, Adel S., Braun, Joachim, Dasgupta, Partha, Gleick, Peter H., Kaneko, Ryuichi, Kennel, Charles F., Koundouri, Phoebe, Lee, Yuan Tseh, Lovejoy, Thomas E., Luers, Amy, Murray, Cherry A., Lal, Rattan, Serageldin, Ismail, Sokona, Youba, Takeuchi, Kazuhiko, Taniguchi, Makoto, Watanabe, Chiho, Yasunari, Tetsuzo,		10.1007/s11625-021-01059-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11625-021-01059-x	SpringerLink
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Cloud Control System Architectures, Technologies and Applications on Intelligent and Connected Vehicles: a Review	Chu, Wenbo, Wuniri, Qigige, Du, Xiaoping, Xiong, Qiuchi, Huang, Tai, Li, Keqiang,	The electrification of vehicle helps to improve its operation efficiency and safety. Due to fast development of network, sensors, as well as computing technology, it becomes realizable to have vehicles driving autonomously. To achieve autonomous driving, several steps, including environment perception, path-planning, and dynamic control, need to be done. However, vehicles equipped with on-board sensors still have limitations in acquiring necessary environmental data for optimal driving decisions. Intelligent and connected vehicles (ICV) cloud control system (CCS) has been introduced as a new concept as it is a potentially synthetic solution for high level automated driving to improve safety and optimize traffic flow in intelligent transportation. This paper systematically investigated the concept of cloud control system from cloud related applications on ICVs, and cloud control system architecture design, as well as its core technologies development. Based on the analysis, the challenges and suggestions on cloud control system development have been addressed.	10.1186/s10033-021-00638-4	http://link.springer.com/openurl/pdf?id=doi:10.1186/s10033-021-00638-4	SpringerLink
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Beyond private 5G networks: applications, architectures, operator models and technological enablers	Maman, Mickael, Calvanese-Strinati, Emilio, Dinh, Lam Ngoc, Haustein, Thomas, Keusgen, Wilhelm, Wittig, Sven, Schmieder, Mathis, Barbarossa, Sergio, Merluzzi, Mattia, Costanzo, Francesca, Sardellitti, Stefania, Klessig, Henrik, Kendre, Savita Vitthalrao, Munaretto, Daniele, Centenaro, Marco, di Pietro, Nicola, Liang, Shuo-Peng, Chih, Kuan-Yi, Luo, Jack Shi-Jie, Kao, Ling-Chih, Huang, Jiun-Cheng, Huang, Jen-Sheng, Wang, Tzu-Ya,	Private networks will play a key role in 5G and beyond to enable smart factories with the required better deployment, operation and flexible usage of available resource and infrastructure. 5G private networks will offer a lean and agile solution to effectively deploy and operate services with stringent and heterogeneous constraints in terms of reliability, latency, re-configurability and re-deployment of resources as well as issues related to governance and ownership of 5G components, and elements. In this paper, we present a novel approach to operator models, specifically targeting 5G and beyond private networks. We apply the proposed operator models to different network architecture options and to a selection of relevant use cases offering mixed private–public network operator governance and ownership. Moreover, several key enabling technologies have been identified for 5G private networks. Before the deployment, stakeholders should consider spectrum allocation and on-site channel measurements in order to fully understand the propagation characteristic of a given	10.1186/s13638-021-02067-2	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13638-021-02067-2	SpringerLink
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		<p>environment and to set up end-to-end system parameters. During the deployment, a monitoring tools will support to validate the deployment and to make sure that the end-to-end system meet the target KPI. Finally, some optimization can be made individually for service placement, network slicing and orchestration or jointly at radio access, multi-access edge computing or core network level.</p>			
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<p>IQCPSoS: A Model-Based Approach for Modeling and Analyzing Information Quality Requirements for Cyber-Physical System-of-Systems</p>	<p>Gharib, Mohamad, Lollini, Paolo, Bondavalli, Andrea,</p>	<p>A Cyber-Physical System-of-Systems (CPSoS) can be defined as a System-of-Systems (SoS), where its component systems are Cyber-Physical Systems (CPSs) that have been networked together for achieving a certain higher goal. Therefore, a key viability of any CPSoS is the integration of its CPSs to function as a single integrated system to support a common mission. Although such integration can be achieved relying on the exchange of information among CPSs, only few works have highlighted the importance of considering the quality of such information. Without considering Information Quality (IQ) requirements during the design of CPSoS, CPSs will be vulnerable to faults arising from depending on inaccurate, incomplete, inconsistent, and/or outdated information, which may influence the overall dependability, reliability, and performance of the CPSoS. This paper proposes a model-based approach that offers a novel UML profile, named IQCPSoS (Information Quality for Cyber-Physical System-of-Systems), which contains various stereotypes and tagged values for modeling and analyzing IQ</p>	<p>10.1007/s13740-021-00129-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13740-021-00129-8</p>	<p>SpringerLink</p>
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		requirements for CPSoS. The profile also proposes a set of constraints expressed in the Object Constraint Language (OCL) to be used for the verification of such models. We evaluate our approach by developing a prototype implementation and test its applicability, usability, and validity for modeling and analyzing IQ requirements for a realistic scenario concerning a Tram system.			
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Evaluation of Flexible Strategies to Manage the COVID-19 Pandemic in the Education Sector	Ahmed, Sayem, Taqi, Hasin Md. Muhtasim, Farabi, Yeasir Iqbal, Sarker, Mohiuddin, Ali, Syed Mithun, Sankaranarayana n, Bathrinath,	COVID-19 has had a substantial impact on almost every field including the education sector. Due to the requirements for social distancing, the pandemic has provided an impetus for change in the education sector; technology-based sustainable education platforms not experienced previously have become essential. This research aims to propose flexible strategies to mitigate challenges of COVID-19 pandemic in the education sector of an emerging economy: Bangladesh. A total of 16 challenges and 19 flexible strategies were identified based on stakeholders' inputs and literature review. To evaluate the flexible strategies, a methodology based on Pareto analysis and a revised rough-decision making trial and evaluation laboratory (rough-DEMATEL) method is proposed. Findings reveal that in the context of the COVID-19 pandemic, 'Maintain social distancing and health protocol,' 'Enhance the communication and collaboration among students and teachers,' 'Financial incentives from government,' 'Utilize modern technologies for digitizing the entire education system,' and 'Know how to	10.1007/s40171-021-00267-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-021-00267-9	SpringerLink
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		<p>engage students in an online environment' are the vital strategies that must be implemented if education continues through E-learning. Because the current pandemic situation is a new experience for many individuals around the world, this study helps to recognize the challenges and to propose effective strategies to solve these challenges so that education does not become stagnant.</p>			
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Integration of energy systems	Arent, Douglas J., Barrows, Clayton, Davis, Steven, Grim, Gary, Schaidle, Joshua, Kroposki, Ben, Ruth, Mark, Zandt, Brooke,	Abstract This article in MRS Bulletin and the framework set out in the introductory article articulate a scenario of renewable electrons and electrification of end use appliances and industrial processes as a plausible paradigm to realize a carbon-free energy economy. The subsequent articles cover specific sectoral or chemical applications of those renewable electrons (e.g., for hydrogen, transportation, building use, electrochemical storage, and within the chemical industry). This article addresses the intersections among and across those sectors. We describe the importance of considering integrated systems and systems of systems as we consider pathways to a decarbonized energy economy. Further, we review and summarize key insights into the innovation challenges that reside at the particular integration interfaces among sectors, and highlight the opportunity for advances in materials and processes that will be critical to successful achievement of economy-wide, low-carbon energy systems. Graphical abstract	10.1557/s43577-021-00244-8	http://link.springer.com/openurl/pdf?id=doi:10.1557/s43577-021-00244-8	SpringerLink
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Reducing Kidney Discard With Artificial Intelligence Decision Support: the Need for a Transdisciplinary Systems Approach	Threlkeld, Richard, Ashiku, Lirim, Canfield, Casey, Shank, Daniel B., Schnitzler, Mark A., Lentine, Krista L., Axelrod, David A., Battineni, Anil Choudary Reddy, Randall, Henry, Dagli, Cihan,	<p>Purpose of Review A transdisciplinary systems approach to the design of an artificial intelligence (AI) decision support system can more effectively address the limitations of AI systems. By incorporating stakeholder input early in the process, the final product is more likely to improve decision-making and effectively reduce kidney discard. Recent Findings Kidney discard is a complex problem that will require increased coordination between transplant stakeholders. An AI decision support system has significant potential, but there are challenges associated with overfitting, poor explainability, and inadequate trust. A transdisciplinary approach provides a holistic perspective that incorporates expertise from engineering, social science, and transplant healthcare. A systems approach leverages techniques for visualizing the system architecture to support solution design from multiple perspectives. Summary Developing a systems-based approach to AI decision support involves engaging in a cycle of documenting the system architecture,</p>	10.1007/s40472-021-00351-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40472-021-00351-0	SpringerLink
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		identifying pain points, developing prototypes, and validating the system. Early efforts have focused on describing process issues to prioritize tasks that would benefit from AI support.			
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Guided architecture trade space exploration: fusing model-based engineering and design by shopping	Procter, Sam, Wrage, Lutz,	<p>Advances in model-based system engineering have greatly increased the predictive power of models and the analyses that can be run on them. At the same time, designs have become more modular and component-based. It can be difficult to manually explore all possible system designs due to the sheer number of possible architectures and configurations; trade space exploration has arisen as a solution to this challenge. In this work, we present a new software tool: the Guided Architecture Trade Space Explorer (GATSE), which connects an existing model-based engineering language (AADL) and modeling environment (OSATE) to an existing trade space exploration tool (ATSV). GATSE, AADL, and OSATE are all designed to be easily extended by users, which enables relatively straightforward domain-customizations. ATSV, combined with these customizations, lets system designers “shop” for candidate architectures and interactively explore the architectural trade space according to any quantifiable quality attribute or system characteristic. We evaluate GATSE according to an established</p>	10.1007/s10270-021-00889-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-021-00889-8	SpringerLink
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		framework for variable system architectures, and demonstrate its use on an avionics subsystem.			
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Electricity Markets and Power Supply Resilience: an Incisive Review	Shittu, Ekundayo, Santos, Joost Reyes,	<p>Purpose of Review This paper focuses on the advances in the resilience of electricity systems and energy markets. The objective is to identify how the progress on system resilience may influence market rules while uncovering the gaps in the literature. Recent Findings This review distills three findings. First, significant advances have been achieved both in the design and configuration of power systems for resilience. Second, topological and architectural advances appear isolated from market operations. Third, there is room to integrate self-healing resilience into power systems and bridge the bifurcation between increasing network resilience and having the market adequately value resilience. Summary Evidently, the incidences of disruptions to electricity networks are on the rise, making a change from having a merely reliable electricity network to one that is resilient and adaptive a necessity. This review showcases the qualitative value inherent in processes to enhance adaptive resilience while promoting the requisite signals for power market integration.</p>	10.1007/s40518-021-00194-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40518-021-00194-4	SpringerLink
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Self-Driving Vehicles—an Ethical Overview	Hansson, Sven Ove, Belin, Matts-Åke, Lundgren, Björn,	<p>The introduction of self-driving vehicles gives rise to a large number of ethical issues that go beyond the common, extremely narrow, focus on improbable dilemma-like scenarios. This article provides a broad overview of realistic ethical issues related to self-driving vehicles. Some of the major topics covered are as follows: Strong opinions for and against driverless cars may give rise to severe social and political conflicts. A low tolerance for accidents caused by driverless vehicles may delay the introduction of driverless systems that would substantially reduce the risks. Trade-offs will arise between safety and other requirement on the road traffic system. Over-reliance on the swift collision-avoiding reactions of self-driving vehicles can induce people to take dangerous actions, such as stepping out in front of a car, relying on its fast braking. Children travelling alone can violate safety instructions such as the use of seatbelts. Digital information about routes and destinations can be used to convey commercial and political messages to car users. If fast passage can be bought, then socio-economic</p>	10.1007/s13347-021-00464-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13347-021-00464-5	SpringerLink
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		segregation of road traffic may result. Terrorists and other criminals can hack into a vehicle and make it crash. They can also use self-driving vehicles for instance to carry bombs to their designed places of detonation or to wreak havoc on a country's road system.			
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<p>A Review of the Progress, Challenges and Future Trends in Tsunami Early Warning Systems</p>	<p>Srinivasa Kumar, T., Manneela, Sunanda,</p>	<p>One of the consequences of the devastating 2004 Indian Ocean tsunami was tremendous advancements in global tsunami science and coastal emergency management systems. The event, which killed over 235,000 people, brought to light the vital gaps in global tsunami science and observation systems. The subsequent global and national initiatives to develop Tsunami Early Warning System (TEWS) conceded positive results in reducing harm to people and damage to infrastructure. Especially, after the 2011 Japan tsunami, more significant improvements are accomplished in the last decade in tsunami science and its applications to disaster risk reduction. Although early warning systems have been a great promise for tsunami mitigation, there are still considerable uncertainties in monitoring and detection. Most of the current Tsunami Early Warning Systems are based on seismic origin earthquakes occurring at subduction zones. However, the other 'atypical' sources such as events related to submarine landslides and volcano eruptions are yet to be addressed</p>	<p>10.1007/s12594-021-1910-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12594-021-1910-0</p>	<p>SpringerLink</p>
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		<p>globally. Here in this paper, we review the current state of the Indian Tsunami Early Warning System, recent advances to reduce the forecast uncertainties, and future developments to deal with 'atypical' sources. Also, we review the significant developments in community preparedness and awareness activities of India to reduce tsunami impact on the public and property. Advanced technology combined with enhanced response capabilities of the public at risk is important for a successful and sustainable Tsunami Early Warning System.</p>			
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<p>An integrated quality and resilience engineering framework in healthcare with Z-number data envelopment analysis</p>	<p>Tavana, Madjid, Nazari-Shirkouhi, Salman, Farzaneh Kholghabad, Hamidreza,</p>	<p>Supplier selection for medical equipment is a major challenge for hospitals in healthcare supply chains. The primary reason for measuring medical equipment supplier efficiency is to achieve the highest level of overall performance and productivity in healthcare supply chains. This study presents an integrated quality and resilience engineering (QRE) framework for evaluating medical equipment suppliers' performance using structural equation modeling and Z - number data envelopment analysis (Z-DEA). Noise analysis is used to select the best -cut for the Z-DEA model, and fuzzy data are used to handle uncertainties. We show that flexibility, conformance to standards, redundancy, cost, quality certifications, and delivery time significantly affect the medical equipment suppliers' performance. In addition, we demonstrate that the proposed integrated QRE framework is more efficient and informative than stand-alone quality engineering or resiliency engineering. We present a case study in a cardiovascular hospital to illustrate the applicability of the proposed framework for</p>	<p>10.1007/s10729-021-09550-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10729-021-09550-8</p>	<p>SpringerLink</p>
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		medical equipment supplier evaluation and selection. To the best of our knowledge, this is the first study to integrate QRE and Z-DEA for supplier performance evaluation in healthcare.			
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Automating integration under emergent constraints for embedded systems	Schlatow, Johannes, Schmidt, Edgard, Ernst, Rolf,	<p>As embedded applications are subject to non-functional requirements (latency, safety, reliability, etc.) they require special care when it comes to providing assurances. Traditionally, these systems are quite static in their software and hardware composition. However, there is an increasing interest in enabling adaptivity and autonomy in embedded systems that cannot be satisfied with preprogrammed adaptations any more. Instead, it requires automated software composition in conjunction with model-based analyses that must adhere to requirements and constraints from various viewpoints. A major challenge in this matter is that embedded systems are subject to emergent constraints which are affected by inter-dependent properties resulting from the software composition and platform configuration. As these properties typically require an in-depth evaluation by complex analyses, a holistic formulation of parameters and their constraints is not applicable. We present a compositional framework for model-based integration of component-based embedded</p>	10.1007/s00450-021-00428-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00450-021-00428-2	SpringerLink
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		<p>systems. The framework provides a structured approach to perform operations on a cross-layer model for model enrichment, synthesis and analysis. It thereby provides the overarching mechanisms to combine existing models, analyses and reasoning. Furthermore, it automates integration decisions and enables an iterative exploration of feasible system compositions. We demonstrate the applicability of this framework on a case study of a stereo-vision robot that uses a component-based operating system.</p>			
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Model-based resource analysis and synthesis of service-oriented automotive software architectures	Kugele, Stefan, Obergfell, Philipp, Sax, Eric,	Context Automotive software architectures describe distributed functionality by an interaction of software components. One drawback of today's architectures is their strong integration into the onboard communication network based on predefined dependencies at design time. The idea is to reduce this rigid integration and technological dependencies. To this end, service-oriented architecture offers a suitable methodology since network communication is dynamically established at run-time. Aim We target to provide a methodology for analysing hardware resources and synthesising automotive service-oriented architectures based on platform-independent service models. Subsequently, we focus on transforming these models into a platform-specific architecture realisation process following AUTOSAR Adaptive. Approach For the platform-independent part, we apply the concepts of design space exploration and simulation to analyse and synthesise deployment configurations, i. e., mapping services to hardware resources at an	10.1007/s10270-021-00896-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-021-00896-9	SpringerLink
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		<p>early development stage. We refine these configurations to AUTOSAR Adaptive software architecture models representing the necessary input for a subsequent implementation process for the platform-specific part. Result We present deployment configurations that are optimal for the usage of a given set of computing resources currently under consideration for our next generation of E/E architecture. We also provide simulation results that demonstrate the ability of these configurations to meet the run time requirements. Both results helped us to decide whether a particular configuration can be implemented. As a possible software toolchain for this purpose, we finally provide a prototype.</p> <p>Conclusion The use of models and their analysis are proper means to get there, but the quality and speed of development must also be considered.</p>			
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Vehicle Design in Aerial Robotics	Butler, Cason, Costello, Mark,	<p>Purpose of Review Robotic technology has given rise to many advances in aviation as well as shaped the design of air vehicles. The goal of this work is to synthesize the recent advances in vehicle design as it pertains to aerial robotics. A secondary use of this work is for guidance on the different vehicle design options one has in the space of aerial robotics. Recent Findings Within aerial robotics, vehicle design and morphology are diversifying to meet the needs of expanding mission profiles. Robotics technology, such as robotic legs and arms, are integrating on to aerial systems with improved results. Summary Aerial robotic missions have grown in diversity, and choice of vehicle to accomplish a mission is important. There are many different aerial robotic platforms: rotorcraft, fixed-wing, rocketry, flapping-wing, canopy, lighter-than-air, and hybrid designs. There are also many robotic features that can be integrated into an aerial system: robotic landing gear, aerial manipulators, and interfacing.</p>	10.1007/s43154-021-00069-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43154-021-00069-y	SpringerLink
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Reducing maritime accidents in ships by tackling human error: a bibliometric review and research agenda	Dominguez-Péry, Carine, Vuddaraju, Lakshmi Narasimha Raju, Corbett-Etchevers, Isabelle, Tassabehji, Rana,	Over the past decade the number of maritime transportation accidents has fallen. However, as shipping vessels continue to increase in size, one single incident, such as the oil spills from 'super' tankers, can have catastrophic and long-term consequences for marine ecosystems, the environment and local economies. Maritime transport accidents are complex and caused by a combination of events or processes that might ultimately result in the loss of human and marine life, and irreversible ecological, environmental and economic damage. Many studies point to direct or indirect human error as a major cause of maritime accidents, which raises many unanswered questions about the best way to prevent catastrophic human error in maritime contexts. This paper takes a first step towards addressing some of these questions by improving our understanding of upstream maritime accidents from an organisation science perspective—an area of research that is currently underdeveloped. This will provide new and relevant insights by both clarifying how ships can be described in	10.1186/s41072-021-00098-y	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41072-021-00098-y	SpringerLink
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		<p>terms of organisations and by considering them in a whole ecosystem and industry. A bibliometric review of extant literature of the causes of maritime accidents related to human error was conducted, and the findings revealed three main root causes of human and organisational error, namely, human resources and management, socio-technical Information Systems and Information Technologies, and individual/cognition-related errors. As a result of the bibliometric review, this paper identifies the gaps and limitations in the literature and proposes a research agenda to enhance our current understanding of the role of human error in maritime accidents. This research agenda proposes new organisational theory perspectives—including considering ships as organisations; types of organisations (highly reliable organisations or self-organised); complex systems and socio-technical systems theories for digitalised ships; the role of power; and developing dynamic safety capabilities for learning ships. By adopting different theoretical perspectives and adapting research methods from social and human</p>			
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		sciences, scholars can advance human error in maritime transportation, which can ultimately contribute to addressing human errors and improving maritime transport safety for the wider benefit of the environment and societies ecologies and economies.			
Link knowledge and action networks to tackle disasters	Falk, Jim, Colwell, Rita R., Kennel, Charles F., Murray, Cherry A.,	Letter to the Editor	10.1038/d41586-021-03419-0	https://www.nature.com/articles/d41586-021-03419-0.pdf	SpringerLink

WARA-PS: a research arena for public safety demonstrations and autonomous collaborative rescue robotics experimentation	Andersson, Olov, Doherty, Patrick, Lager, Mårten, Lindh, Jens-Olof, Persson, Linnea, Topp, Elin A., Tordenlid, Jesper, Wahlberg, Bo,	A research arena (WARA-PS) for sensing, data fusion, user interaction, planning and control of collaborative autonomous aerial and surface vehicles in public safety applications is presented. The objective is to demonstrate scientific discoveries and to generate new directions for future research on autonomous systems for societal challenges. The enabler is a computational infrastructure with a core system architecture for industrial and academic collaboration. This includes a control and command system together with a framework for planning and executing tasks for unmanned surface vehicles and aerial vehicles. The motivating application for the demonstration is marine search and rescue operations. A state-of-art delegation framework for the mission planning together with three specific applications is also presented. The first one concerns model predictive control for cooperative rendezvous of autonomous unmanned aerial and surface vehicles. The second project is about learning to make safe real-time decisions under uncertainty for autonomous vehicles, and the third one is on robust terrain-	10.1007/s43684-021-00009-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43684-021-00009-9	SpringerLink
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		<p>aided navigation through sensor fusion and virtual reality tele-operation to support a GPS-free positioning system in marine environments. The research results have been experimentally evaluated and demonstrated to industry and public sector audiences at a marine test facility. It would be most difficult to do experiments on this large scale without the WARA-PS research arena. Furthermore, these demonstrator activities have resulted in effective research dissemination with high public visibility, business impact and new research collaborations between academia and industry.</p>			
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<p>The Swiss data cube, analysis ready data archive using earth observations of Switzerland</p>	<p>Chatenoux, Bruno, Richard, Jean-Philippe, Small, David, Roeoesli, Claudia, Wingate, Vladimir, Poussin, Charlotte, Rodila, Denisa, Peduzzi, Pascal, Steinmeier, Charlotte, Ginzler, Christian, Psomas, Achileas, Schaepman, Michael E., Giuliani, Gregory,</p>	<p>Since the opening of Earth Observation (EO) archives (USGS/NASA Landsat and EC/ESA Sentinels), large collections of EO data are freely available, offering scientists new possibilities to better understand and quantify environmental changes. Fully exploiting these satellite EO data will require new approaches for their acquisition, management, distribution, and analysis. Given rapid environmental changes and the emergence of big data, innovative solutions are needed to support policy frameworks and related actions toward sustainable development. Here we present the Swiss Data Cube (SDC), unleashing the information power of Big Earth Data for monitoring the environment, providing Analysis Ready Data over the geographic extent of Switzerland since 1984, which is updated on a daily basis. Based on a cloud-computing platform allowing to access, visualize and analyse optical (Sentinel-2; Landsat 5, 7, 8) and radar (Sentinel-1) imagery, the SDC minimizes the time and knowledge required for environmental analyses, by offering consistent calibrated and spatially co-registered</p>	<p>10.1038/s41597-021-01076-6</p>	<p>https://www.nature.com/articles/s41597-021-01076-6.pdf</p>	<p>SpringerLink</p>
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		<p>satellite observations. SDC derived analysis ready data supports generation of environmental information, allowing to inform a variety of environmental policies with unprecedented timeliness and quality.</p> <p>Measurement(s) surface reflectance • backscatter</p> <p>Technology Type(s) satellite imaging</p> <p>Sample Characteristic - Location Switzerland</p> <p>Machine-accessible metadata file describing the reported data: https://doi.org/10.6084/m9.figshare.14635485</p>			
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Vulnerability assessment of agricultural production systems to drought stresses using robustness measures	Cruz, Marangely Gonzalez, Hernandez, E. Annette, Uddameri, Venkatesh,	Intensification of droughts in agricultural areas threaten global food security. The impacts of drought stresses vary widely across a region, not only due to climate variability but also due to heterogeneous soil and groundwater buffering capacities which protect against droughts. An innovative drought vulnerability index was developed by reconciling the negative effects of drought stresses against the robustness offered by hydrologic buffers. Indicators for climate stresses, soil and groundwater buffering capacities were defined using physical principles and integrated using a multi-criteria decision making (MCDM) framework. The framework was applied to delineate drought vulnerability of agricultural production systems and evaluate current cropping choices across the High Plains region of the US that is underlain by the Ogallala Aquifer. Current crop growth choices appeared to be compatible with the intrinsic drought vulnerabilities with cotton and sorghum grown in higher vulnerability areas and corn and soybean produced in areas with lower vulnerability. Nearly 50% of the aquifer region fell	10.1038/s41598-021-98829-5	https://www.nature.com/articles/s41598-021-98829-5.pdf	SpringerLink
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		in the transition zone exhibiting medium to high vulnerabilities warranting the need for better water management to adapt to a changing climate.			
Cybersecurity management for distributed control system: systematic approach	Ali, Saqib,	Distributed control systems are the backbone of modern industrial revolution. Its utilization ranges from industries like agriculture, automobiles, petrochemical and refineries to nuclear power plants. Inclusion of cyber capabilities to distributed control systems exposed it to security risk especially once used for critical infrastructure of a country. It is critical for distributed control systems to effectively manage its cybersecurity risks and attacks. In this research, a consolidated cybersecurity management approach is developed which is based on cyclic phases that addresses the risk, security, testing and trust factors of distributed control systems within cyber physical systems domain. This research also identified trust and reputation as two additional components to be included in managing distributed control systems' cybersecurity. This method enhances the level of security required to safeguard distributed control systems.	10.1007/s12652-020-02775-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-020-02775-5	SpringerLink

Support for Managing the Survivability of Energy Systems Based on a Combinatorial Approach	Bychkov, I. V., Gorsky, S. A., Edelev, A. V., Kostromin, R. O., Sidorov, I. A., Feoktistov, A. G., Fereferov, E. S., Fedorov, R. K.,	Abstract A new approach to creating a domain-specific heterogeneous distributed computing environment is considered. It is used to support decision-making on urgent problems of increasing the survivability of energy systems. The approach is based on the use of high-performance computing, multiagent scheduling of computations and resource assignment, tools for processing semistructured information, and visualization of subject data using electronic maps. Decision-making alternatives are evaluated using combinatorial modeling and multicriteria optimization. Orlando Tools is used as the base for the environment's integrated software. It implements flexible modular construction of scalable scientific applications (distributed application packages). The advantages of using the environment are demonstrated by the example of solving practical problems.	10.1134/S1064230721060071	http://link.springer.com/openurl/pdf?id=doi:10.1134/S1064230721060071	SpringerLink
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Safety and security co-engineering for highly automated vehicles	Schwarzl, Christian, Marko, Nadja, Martin, Helmut, Expósito Jiménez, Víctor, Castella Triginer, Joaquim, Winkler, Bernhard, Bramberger, Robert,	Hochautomatisiertes Fahren wird einen großen Einfluss auf das gesellschaftliche Leben des Menschen haben und die Art und Weise verändern, wie wir Mobilität und ihre tatsächliche Bedeutung wahrnehmen und wie sich die Fahrzeuginsassen während der Fahrt zu den gewünschten Zielen verhalten werden. Zukünftige hochautomatisierte Fahrzeuge (HAVs) müssen regelmäßig aktualisiert werden, um sie kontinuierlich zu verbessern und um mit der enormen Entwicklungsgeschwindigkeit des gesamten Automated Driving (AD)-Ökosystems Schritt zu halten. Der Aktualisierungsprozess sowie die hohe Konnektivität von HAVs führen zu einem hohen Risiko an Angriffen auf die Cybersicherheit über alle Arten von internen und externen elektrischen Schnittstellen. Durch solche Angriffe könnten Informationen gestohlen oder, noch schlimmer, die Kontrolle über Fahrzeuge übernommen werden. Die Cybersicherheit wirkt sich daher direkt auf die funktionale Sicherheit von Fahrzeugen aus. Angriffe müssen in allen Phasen des Fahrzeuglebenszyklus, einschließlich Entwicklung,	10.1007/s00502-021-00934-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-021-00934-w	SpringerLink
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		<p>Betrieb, Wartung und Entsorgung, abgeschwächt werden, um die Cybersicherheits- und damit die funktionalen Sicherheitsrisiken zu reduzieren. Derzeit fehlt ein klar definierter und offiziell akzeptierter Ansatz zur Kombination von funktionalen Sicherheits- und Cybersicherheitsaktivitäten. Sowohl die Standards für funktionale Sicherheit als auch für Cybersicherheit müssen erfüllt und entsprechend in den (Entwicklungs-) Prozessen berücksichtigt werden. In diesem Beitrag werden die im Automobilbereich bekannten Sicherheitsmethoden zusammengefasst. Co-Analyse- und Co-Design-Methoden für funktionale Sicherheit und Cybersicherheit werden für den Automobilbereich mit einem Schwerpunkt auf HAVs erläutert. Des Weiteren werden diese Methoden und implementierte Sicherheitsmaßnahmen praxisnah an einem realen Fahrzeug evaluiert und erste experimentelle Ergebnisse gezeigt. Das untersuchte Fahrzeug ist die mobile Testplattform SPIDER. Diese Plattform ermöglicht es, Komponenten und Fahrzeugfunktionen in realen Situationen und</p>			
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		<p>unter rauen Umgebungsbedingungen zu testen, was eine Voraussetzung ist, um Sicherheit zu gewährleisten. Highly automated driving will have a great impact on people's social life, changing the way we perceive mobility and its actual meaning and how vehicle occupants act while traveling to their desired destinations. Future highly automated vehicles (HAVs) will have to be updated periodically to continuously improve them and to keep up with the enormous development speed of the entire automated driving (AD) ecosystem. The updating process as well as the high connectivity of HAVs lead to a high risk of cybersecurity attacks through all kinds of internal and external electrical interfaces. Through such attacks, information could be stolen or, even worse, the control over vehicles could be assumed. Hence, security directly influences safety of vehicles. Attacks must be mitigated during all stages of the vehicle's life cycle, including development, operation, maintenance, and disposal, to reduce security risks and, consequently, safety risks. Currently, there is no well-defined and officially accepted approach to</p>			
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		<p>combine safety and cybersecurity activities. Both the standards for functional safety and cybersecurity have to be met and taken into account accordingly during the (development) processes. In this paper, well-known safety and security methods in the automotive sector are summarized. Safety and cybersecurity co-analysis and co-design methods are outlined for the automotive sector with a focus on HAVs. Furthermore, these safety, cybersecurity, and co-engineering methods are evaluated in practice using a real vehicle and the first results are shown. The examined vehicle is the mobile test platform SPIDER. This platform enables the testing of components and vehicle functions in real-world situations and under harsh environmental conditions, which is a prerequisite to ensure safety.</p>			
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<p>Agile ethics: an iterative and flexible approach to assessing ethical, legal and social issues in the agile development of crisis management information systems</p>	<p>Kroener, Inga, Barnard-Wills, David, Muraszkiewicz, Julia,</p>	<p>This paper reassess the evaluation of ethical, legal and social issues (ELSI) in relation to the agile development of information systems in the domain of crisis management. The authors analyse the differing assessment needs of a move from a traditional approach to the development of information systems to an agile approach, which offers flexibility, adaptability and responds to the needs of users as the system develops. In turn, the authors argue that this development requires greater flexibility and an iterative approach to assessing ELSI. The authors provide an example from the Horizon 2020 EU-funded project iTRACK (Integrated system for real-time TRACKing and collective intelligence in civilian humanitarian missions) to exemplify this move to an iterative approach in practice, drawing on the process of undertaking an ethical and privacy impact assessment for the purpose of this project.</p>	<p>10.1007/s10676-019-09501-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10676-019-09501-6</p>	<p>SpringerLink</p>
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Towards big services: a synergy between service computing and parallel programming	Mezni, Haithem, Sellami, Mokhtar, Aridhi, Sabeur, Charrada, Faouzi Ben,	Over the last years, cloud computing has emerged as a natural choice to host, manage, and provide various kinds of virtualized resources (e.g., software, business processes, databases, platforms, mobile and social applications, etc.) as on-demand services. This "servicelization" across various domains has produced a huge volume of data, leading to the emergence of a new service model, called big service . This latter consists of the encapsulation, abstraction and the processing of big data, allowing then to hide their complexity. However, this promising approach still lacks management facilities and tools. Indeed, due to the highly dynamic and uncertain nature of their hosting cloud environments, big services together with their accessed data need continuous management operations, so that to maintain a moderate state and high quality of their execution. In this context, frameworks for designing, composing, executing and managing big services become a major need. The purpose of this paper is to provide an understanding of the new emerging big service model from the lifecycle management	10.1007/s00607-021-00999-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-021-00999-7	SpringerLink
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		phases' point of view. We also study the role of big data frameworks and multi-cloud strategies in the provisioning of big services. A research road map on this topic will be summarized at the end of this paper.			
Ethics in the COVID-19 pandemic: myths, false dilemmas, and moral overload	Ishmaev, Georgy, Dennis, Matthew, Hoven, M. Jeroen,		10.1007/s10676-020-09568-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10676-020-09568-6	SpringerLink

CNN-based single object detection and tracking in videos and its application to drone detection	Lee, Dong-Hyun,	<p>This paper presents convolutional neural network (CNN)-based single object detection and tracking algorithms. CNN-based object detection methods are directly applicable to static images, but not to videos. On the other hand, model-free visual object tracking methods cannot detect an object until a ground truth bounding box of the target is provided. Moreover, many annotated video datasets of the target object are required to train both the object detectors and visual trackers. In this work, three simple yet effective object detection and tracking algorithms for videos are proposed to efficiently combine a state-of-the-art object detector and visual tracker for circumstances in which only a few static images of the target are available for training. The proposed algorithms are tested using a drone detection task and the experimental results demonstrated their effectiveness.</p>	10.1007/s11042-020-09924-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-020-09924-0	SpringerLink
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<p>The role of utilitarianism, self-safety, and technology in the acceptance of self-driving cars</p>	<p>Karnouskos, Stamatis,</p>	<p>Self-driving vehicles are currently being developed in major industries for mass public deployment. Their benefits are attractive, and there is interest in having them on the streets as quickly as possible. Delegating responsibility to the cars has far-reaching impacts. As accidents will be unavoidable, the self-driving car will be asked to make life and death decisions that will impact human lives. However, the impact of machine decision making on the overall acceptance of self-driving cars in society is far from sufficiently addressed. The research presented here investigates three factors, i.e., technology, self-safety, and utilitarianism, and hypothesizes their link to self-driving car acceptance. Survey-collected data is statistically analyzed to assess the proposed hypotheses. The empirical outcome of this work shows that the three investigated factors contribute to the societal acceptance of self-driving cars, with technology being the major contributor while the ethical aspects (self-safety and utilitarianism) follow.</p>	<p>10.1007/s10111-020-00649-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-020-00649-6</p>	<p>SpringerLink</p>
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Automation platform independent multi-agent system for robust networks of production resources in industry 4.0	Seitz, Matthias, Gehlhoff, Felix, Cruz Salazar, Luis Alberto, Fay, Alexander, Vogel-Heuser, Birgit,	<p>The Cyber-Physical Production System (CPPS) is a concept derived from software (cyber) and hardware (physical) applications and is based on global information exchange between such systems. The CPPS is known as a trend of Industry 4.0 (I4.0) focusing on flexibility regarding new products and adaptability to new requirements. This paper focuses on two I4.0 scenarios described by the Platform Industrie 4.0 that describe challenges for the industry towards its digital future. First, it looks at the Order Controlled Production (OCP) scenario that deals with flexible and self-configuring production networks. It describes the dynamic organization of production resources required to execute a production order. Second, the Adaptable Factory (AF) application scenario is discussed, which focuses on the configuration of production resources and describes the adaptability of an individual facility through (physical) modification. This paper first provides a detailed analysis of the requirements from these scenarios. Furthermore, it analyses the</p>	10.1007/s10845-021-01759-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-021-01759-2	SpringerLink
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		<p>current Multi-Agent System (MAS) architectures and agent-based planning and decision support systems requirements. MAS can be used to create application-independent I4.0 systems with arbitrary hardware automation platforms. To create a scalable communication network that also supports application independence and enables the semantically machine-readable description of the exchanged data, the OPC UA standard was adopted. As a result of the study, the concept shows how different and independent automation platforms can be seamlessly connected via OPC UA. The proposed MAS concept has been evaluated in different use cases, namely OCP and AF.</p>			
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Survey paper: achievements and perspectives of community resilience approaches to societal systems	Toyoda, Yusuke,	<p>The term resilience has become a buzzword with a multitude of definitions, and several studies have exerted efforts in conceptualizing it. For further academic progress, discussions on community resilience need to shift from conceptualization to operationalization . In this context, I aim to synthesize academic contributions and provide future perspectives of studies on community resilience approaches, focusing on societal systems. First, I demonstrate the general trend of community resilience research, which leads to a general analytical framework for these studies. Next, I present the results of a survey of influential studies based on this framework and discuss recent achievements in community resilience in relation to the following six elements: social, information, competence, economic, spatial, and natural. From the survey results, I suggest two perspectives: (1) the harmonization of gears for resilience and community resilience sub-elements, including equitable resilience, and (2) inactive resident pursuits of roles in community resilience. Finally,</p>	10.1007/s41685-021-00202-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41685-021-00202-x	SpringerLink
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		I show the potential contributions of regional science to this topic highlighting its strengths in interdisciplinary approaches based on spatial and temporal scales.			
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Risk-Layering for Indirect Effects	Hochrainer-Stigler, Stefan, Reiter, Karina,	<p>Environmental risks are one of the greatest threats in the twenty-first century. Especially in the last years, the cascading impacts and risks associated with such events have received great attention as economic losses and consequences have mounted in their wake. As concerns about these ripple effects are rising, strategies to prevent and manage indirect risks are in urgent demand. However, such effects are currently barely considered in most countries and can seriously threaten global agendas such as achieving the Sustainable Development Goals by 2030 or the targets set out in the Sendai Framework for Disaster Risk Reduction 20152030. We discuss how the concept of risk-layering, which, though already applied in disaster risk management, could be expanded to include indirect effects. We point out some of the benefits, limitations, and ways forward for using this approach. To do so, we first delineate the transition of the risk-layering concept, which originated from the insurance industry, from its original use to its application in a wider context. We bring special focus to the application of</p>	10.1007/s13753-021-00366-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-021-00366-2	SpringerLink
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		<p>risk-layering in disaster risk management and identify strategies that allow for the inclusion of indirect risks. Our main suggestion is that, while a probabilistic approach is appropriate for evaluating direct risks, a focus on connectedness is appropriate for indirect risks, which still allows for an easy link to direct risk-layering. This, so we argue, facilitates more comprehensive risk management systems apt to deal with the multi-dimensional challenges ahead.</p>			
A Refinement of the Farkas Lemma	Morozov, V. V.,	<p>Abstract A refinement is presented of the Farkas lemma on inequality corollaries of a system of linear inequalities where the strict fulfillment of one system inequality implies the same of the inequality corollary. Examples are given of the lemma's use in financial market and linear production models.</p>	10.3103/S0278641921040051	http://link.springer.com/openurl/pdf?id=doi:10.3103/S0278641921040051	SpringerLink

<p>Distributed Simulation Platforms and Data Passing Tools for Natural Hazards Engineering: Reviews, Limitations, and Recommendations</p>	<p>Xu, Lichao, Lin, Szu-Yun, Hlynka, Andrew W., Lu, Hao, Kamat, Vineet R., Menassa, Carol C., El-Tawil, Sherif, Prakash, Atul, Spence, Seymour M. J., McCormick, Jason,</p>	<p>There has been a strong need for simulation environments that are capable of modeling deep interdependencies between complex systems encountered during natural hazards, such as the interactions and coupled effects between civil infrastructure systems response, human behavior, and social policies, for improved community resilience. Coupling such complex components with an integrated simulation requires continuous data exchange between different simulators simulating separate models during the entire simulation process. This can be implemented by means of distributed simulation platforms or data passing tools. In order to provide a systematic reference for simulation tool choice and facilitating the development of compatible distributed simulators for deep interdependent study in the context of natural hazards, this article focuses on generic tools suitable for integration of simulators from different fields but not the platforms that are mainly used in some specific fields. With this aim, the article provides a comprehensive review of the most commonly used generic distributed</p>	<p>10.1007/s13753-021-00361-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-021-00361-7</p>	<p>SpringerLink</p>
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		<p>simulation platforms (Distributed Interactive Simulation (DIS), High Level Architecture (HLA), Test and Training Enabling Architecture (TENA), and Distributed Data Services (DDS)) and data passing tools (Robot Operation System (ROS) and Lightweight Communication and Marshalling (LCM)) and compares their advantages and disadvantages. Three specific limitations in existing platforms are identified from the perspective of natural hazard simulation. For mitigating the identified limitations, two platform design recommendations are provided, namely message exchange wrappers and hybrid communication, to help improve data passing capabilities in existing solutions and provide some guidance for the design of a new domain-specific distributed simulation framework.</p>			
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Systematic reviews in sentiment analysis: a tertiary study	Ligthart, Alexander, Catal, Cagatay, Tekinerdogan, Bedir,	With advanced digitalisation, we can observe a massive increase of user-generated content on the web that provides opinions of people on different subjects. Sentiment analysis is the computational study of analysing people's feelings and opinions for an entity. The field of sentiment analysis has been the topic of extensive research in the past decades. In this paper, we present the results of a tertiary study, which aims to investigate the current state of the research in this field by synthesizing the results of published secondary studies (i.e., systematic literature review and systematic mapping study) on sentiment analysis. This tertiary study follows the guidelines of systematic literature reviews (SLR) and covers only secondary studies. The outcome of this tertiary study provides a comprehensive overview of the key topics and the different approaches for a variety of tasks in sentiment analysis. Different features, algorithms, and datasets used in sentiment analysis models are mapped. Challenges and open problems are identified that can help to identify points that require research efforts	10.1007/s10462-021-09973-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-021-09973-3	SpringerLink
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		in sentiment analysis. In addition to the tertiary study, we also identified recent 112 deep learning-based sentiment analysis papers and categorized them based on the applied deep learning algorithms. According to this analysis, LSTM and CNN algorithms are the most used deep learning algorithms for sentiment analysis.			
Digital Identities and Verifiable Credentials	Sedlmeir, Johannes, Smethurst, Reilly, Rieger, Alexander, Fridgen, Gilbert,		10.1007/s12599-021-00722-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-021-00722-y	SpringerLink

Terrestrial carbon cycle model-data fusion: Progress and challenges	Li, Xin, Ma, Hanqing, Ran, Youhua, Wang, Xufeng, Zhu, Gaofeng, Liu, Feng, He, Honglin, Zhang, Zhen, Huang, Chunlin,	<p>The terrestrial carbon cycle is an important component of global biogeochemical cycling and is closely related to human well-being and sustainable development. However, large uncertainties exist in carbon cycle simulations and observations. Model-data fusion is a powerful technique that combines models and observational data to minimize the uncertainties in terrestrial carbon cycle estimation. In this paper, we comprehensively overview the sources and characteristics of the uncertainties in terrestrial carbon cycle models and observations. We present the mathematical principles of two model-data fusion methods, i.e., data assimilation and parameter estimation, both of which essentially achieve the optimal fusion of a model with observational data while considering the respective errors in the model and in the observations. Based upon reviewing the progress in carbon cycle models and observation techniques in recent years, we have highlighted the major challenges in terrestrial carbon cycle model-data fusion research, such as the “equifinality” of models, the identifiability of model parameters, the</p>	10.1007/s11430-020-9800-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11430-020-9800-3	SpringerLink
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		<p>estimation of representativeness errors in surface fluxes and remote sensing observations, the potential role of the posterior probability distribution of parameters obtained from sensitivity analysis in determining the error covariance matrixes of the models, and opportunities that emerge by assimilating new remote sensing observations, such as solar-induced chlorophyll fluorescence. It is also noted that the synthesis of multisource observations into a coherent carbon data assimilation system is by no means an easy task, yet a breakthrough in this bottleneck is a prerequisite for the development of a new generation of global carbon data assimilation systems. This article also highlights the importance of carbon cycle data assimilation systems to generate reliable and physically consistent terrestrial carbon cycle reanalysis data products with high spatial resolution and long-term time series. These products are critical to the accurate estimation of carbon cycles at the global and regional scales and will help future carbon management strategies meet the goals of carbon neutrality.</p>			
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Greenhouse industry 4.0 – digital twin technology for commercial greenhouses	Howard, Daniel Anthony, Ma, Zheng, Veje, Christian, Clausen, Anders, Aaslyng, Jesper Mazanti, Jørgensen, Bo Nørregaard,	The project aims to create a Greenhouse Industry 4.0 Digital Twin software platform for combining the Industry 4.0 technologies (IoT, AI, Big Data, cloud computing, and Digital Twins) as integrated parts of the greenhouse production systems. The integration provides a new disruptive approach for vertical integration and optimization of the greenhouse production processes to improve energy efficiency, production throughput, and productivity without compromising product quality or sustainability. Applying the Industry 4.0 Digital Twin concept to the Danish horticulture greenhouse industry provides digital models for simulating and evaluating the physical greenhouse facility's performance. A Digital Twin combines modeling, AI, and Big Data analytics with IoT and traditional sensor data from the production and cloud-based enterprise data to predict how the physical twin will perform under varying operational conditions. The Digital Twins support the co-optimization of the production schedule, energy consumption, and labor cost by considering influential factors,	10.1186/s42162-021-00161-9	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-021-00161-9	SpringerLink
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		<p>including production deadlines, quality grading, heating, artificial lighting, energy prices (gas and electricity), and weather forecasts. The ecosystem of digital twins extends the state-of-the-art by adopting a scalable distributed approach of “system of systems” that interconnects Digital Twins in a production facility. A collection of specialized Digital Twins are linked together to describe and simulate all aspects of the production chain, such as overall production capacity, energy consumption, delivery dates, and supply processes. The contribution of this project is to develop an ecosystem of digital twins that collectively capture the behavior of an industrial greenhouse facility. The ecosystem will enable the industrial greenhouse facilities to become increasingly active participants in the electricity grid.</p>			
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A GRL-compliant iStar extension for collaborative cyber-physical systems	Daun, Marian, Brings, Jennifer, Krajinski, Lisa, Stenkova, Viktoria, Bandyszak, Torsten,	Collaborative cyber-physical systems are capable of forming networks at runtime to achieve goals that are unachievable for individual systems. They do so by connecting to each other and exchanging information that helps them coordinate their behaviors to achieve shared goals. Their highly complex dependencies, however, are difficult to document using traditional goal modeling approaches. To help developers of collaborative cyber-physical systems leverage the advantages of goal modeling approaches, we developed a GRL-compliant extension to the popular iStar goal modeling language that takes the particularities of collaborative cyber-physical systems and their developers' needs into account. In particular, our extension provides support for explicitly distinguishing between the goals of the individual collaborative cyber-physical systems and the network and for documenting various dependencies not only among the individual collaborative cyber-physical systems but also between the individual systems and the network. We provide abstract syntax, concrete syntax, and well-	10.1007/s00766-021-00347-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-021-00347-3	SpringerLink
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		formedness rules for the extension. To illustrate the benefits of our extension for goal modeling of collaborative cyber-physical systems, we report on two case studies conducted in different industry domains.			
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Reviewing qualitative research approaches in the context of critical infrastructure resilience	Cantelmi, R., Di Gravio, G., Patriarca, R.,	Modern societies are increasingly dependent on the proper functioning of critical infrastructures (CIs). CIs produce and distribute essential goods or services, as for power transmission systems, water treatment and distribution infrastructures, transportation systems, communication networks, nuclear power plants, and information technologies. Being resilient becomes a key property for CIs, which are constantly exposed to threats that can undermine safety, security, and business continuity. Nowadays, a variety of approaches exist in the context of CIs' resilience research. This paper provides a state-of-the-art review on the approaches that have a complete qualitative dimension, or that can be used as entry points for semi-quantitative analyses. The study aims to uncover the usage of qualitative research methods through a systematic review based on PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The paper identifies four principal dimensions of resilience referred to CIs (i.e., techno-centric, organisational,	10.1007/s10669-020-09795-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-020-09795-8	SpringerLink
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		community, and urban) and discusses the related qualitative methods. Besides many studies being focused on energy and transportation systems, the literature review allows to observe that interviews and questionnaires are most frequently used to gather qualitative data, besides a high percentage of mixed-method research. The article aims to provide a synthesis of literature on qualitative methods used for resilience research in the domain of CIs, detailing lessons learned from such approaches to shed lights on best practices and identify possible future research directions.			
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<p>An Event-B formal model for a system reconfiguration pattern and its instantiation: application to Web services compensation</p>	<p>Ait-Ameur, Yamine, Babin, Guillaume, Pantel, Marc,</p>	<p>System substitution can be defined as the capability to replace a system by another one that preserves the specification of the original one. It may be used for reconfiguration in various situations like failure management, maintenance or Web services compensation. When substituting a system at runtime, a key requirement is to correctly restore the state of the substituted one. This paper proposes a correct-by-construction generic model for system reconfiguration defined using formal methods, based on a system substitution operator we define. This model provides a formal semantics for Web services compensation seen as a particular case of system substitution. The originality of the proposed approach relies on the fact that it is defined on a family of systems and it provides instantiation mechanisms for particular systems using witnesses. Systems are seen as state transition systems, and the system substitution operation is formalized as a state recovery operation. This proposal is supported by a formal model relying on stepwise refinements and proofs. A generic</p>	<p>10.1007/s11761-021-00314-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11761-021-00314-4</p>	<p>SpringerLink</p>
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		<p>formal model is developed using Event-B. Specific systems instantiate this generic model using a particular use of refinement based on the definition of witnesses for existential proof obligations. A specific case study, borrowed from an electronic commerce application, is used as a particular instance of the defined generic model.</p>			
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Artificial intelligence in cyber physical systems	Radanliev, Petar, Roure, David, Kleek, Max, Santos, Omar, Ani, Uchenna,	<p>This article conducts a literature review of current and future challenges in the use of artificial intelligence (AI) in cyber physical systems. The literature review is focused on identifying a conceptual framework for increasing resilience with AI through automation supporting both, a technical and human level. The methodology applied resembled a literature review and taxonomic analysis of complex internet of things (IoT) interconnected and coupled cyber physical systems. There is an increased attention on propositions on models, infrastructures and frameworks of IoT in both academic and technical papers. These reports and publications frequently represent a juxtaposition of other related systems and technologies (e.g. Industrial Internet of Things, Cyber Physical Systems, Industry 4.0 etc.). We review academic and industry papers published between 2010 and 2020. The results determine a new hierarchical cascading conceptual framework for analysing the evolution of AI decision-making in cyber physical systems. We argue that such evolution is inevitable and autonomous</p>	10.1007/s00146-020-01049-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-020-01049-0	SpringerLink
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		because of the increased integration of connected devices (IoT) in cyber physical systems. To support this argument, taxonomic methodology is adapted and applied for transparency and justifications of concepts selection decisions through building summary maps that are applied for designing the hierarchical cascading conceptual framework.			
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<p>The application of cascading consequences for emergency management operations</p>	<p>Cuartas, J. B., Frazier, Tim, Wood, Erik,</p>	<p>How societies organize themselves to respond to cascading impacts exacerbated by climate change will help define the future of disaster planning, mitigation, response, and recovery. Current emergency management risk analyses focus on identifying a broad array of threats and hazards that may affect an area. However, there is limited attention and understanding of the totality of hazard impacts, the relationship of consequences across disasters, and the dangers of not addressing critical capabilities necessary to rapidly managing consequences—including the potential to create new incidents within incidents. Through a focused review of the related literature and guiding policy documents, this study aims to provide a cascading consequence-based framework that can support emergency managers in the analysis of their jurisdictional risks, development of emergency operations plans, and decision-making. Results include the identification of an alternative framework to identify cascading networks, the creation of a supplementary model for downstream risk assessment, and refined Threat</p>	<p>10.1007/s11069-021-04807-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-021-04807-5</p>	<p>SpringerLink</p>
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		and Hazard Identification and Risk Analysis (THIRA) outputs for improved grant allocation. The proposed framework has the potential to help organizations factor both conspicuous and downstream consequences into their Emergency Operations Plans in the planning and mitigations phases. This proposed refinement, which looks deeper into the progression of a disaster, has both national and international implications.			
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Ranking the Factors Influencing e-Trading Usage in Agricultural Marketing	Chaudhary, Sanjay, Suri, P. K.,	<p>This research article attempts to rank the factors influencing continued e-Trading usage in Indian agriculture marketing. The ranking process is the first of its kind application in agricultural e-trading. A review of published literature has helped in identifying key factors influencing e-trading usage in agricultural marketing. The factors are ranked using the efficient Interpretive Ranking Process (IRP) methodology adopted in the context of agricultural marketing. Sixteen expert members, grouped into three different expert panels, have helped generate ranks and validation besides giving suggestions for improving e-trading usage in the context of the National Agriculture Market project (eNAM) in India. It has been found that the top factors influencing e-trading usage are 'Trust', 'Cost', 'Perceived Ease of Use', and 'Facilitating Conditions', respectively. These factors need to be supported with adequate resources to strengthen eNAM in terms of improved usage among the beneficiaries. It is further revealed that immediate attention is needed on aspects such as</p>	10.1007/s40171-021-00276-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-021-00276-8	SpringerLink
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		transparency, quick information dissemination, adequate quality assurance, uniformity in taxes and market fee, improvement in marketing infrastructure, inter-market trade logistics, conflict resolution, mobility and training. Further, the e-trading system's flexibility needs to be enhanced by incorporating modular design options, configurable new features, open-source innovation, cloud computing, and progressive artificial intelligence application.			
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Opportunities and challenges of the industry 4.0 in industrial companies: a survey on Moroccan firms	Gallab, Maryam, Bouloiz, Hafida, Kebe, Sekoun Abdoudrahamane, Tkiouat, Mohamed,	<p>Industry 4.0 is a concept that represents a whole new vision of the factory where components and machines are becoming intelligent and are part of a network based on a heterogeneous integration of data and knowledge. This is what we tend to designate today as the factory of the future or the intelligent factory. Nowadays, industries in developed countries are experiencing this revolution and are achieving a very high level of performance. On the other hand, for emerging countries, they are beginning to enter this industrial era. Morocco is one of the countries that adopt an industrial acceleration plan to create an efficient industry, and to increase the industrial share in the national GDP (gross domestic product). The aim of this paper is to study the opportunities and challenges of the industry 4.0 in Moroccan firms. Based on the use of data from a large-scale survey of 11 industrial sectors representing 1200 companies of the industry in Morocco, we studied what technologies 4.0 are most used by these companies and according to which sectors, and what are the benefits that 4.0 technologies can bring to these industries. We</p>	10.1007/s40812-021-00190-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40812-021-00190-1	SpringerLink
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		show also the internal and external obstacles that hinder these industries in achieving and implementing these digital technologies. This work contributes by in providing a background to advance research on real benefits of the industry 4.0.			
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Network data security sharing system based on blockchain	Lu, Xinghua, Liu, Peihao, Ke, Yiran, Zhang, Hao,	<p>Traditional network data security sharing system ignores that many people share data simultaneously, which leads to poor real-time performance. Therefore, the authors designed a network data security sharing system based on blockchain technology. In the hardware design, the PCI encryption card is used to encode the data. The microprocessor is used to access the system's external equipment, and DDR-SDRAM dynamic storage area and NAND flash static memory are used as network data. In the software section of the system, a secure transmission mechanism is established. The cp-abe method is used to encrypt the network shared data, and the multi-person digital envelope technology is used to share the data. These two methods contribute to the design of the network data security sharing system. In the experiment, eight users share the data. The system login response time, key distribution time, data encryption time, and key update time are taken as the experimental objects. Experimental results show that the system response time, key distribution time, data encryption time, and key update time of the system are</p>	10.1007/s11042-021-11183-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-021-11183-6	SpringerLink
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		shorter than those of the comparison method.			
Elastic AI: system support for adaptive machine learning in pervasive computing systems	Cichiwskyj, Christopher, Schmeißer, Stephan, Qian, Chao, Einhaus, Lukas, Ringhofer, Christopher, Schiele, Gregor,	Artificial intelligence (AI) is an important part of today's pervasive computing systems. Still, there is no end-to-end system platform that allows to deploy, update, manage and execute AI models in pervasive systems. We propose such a system platform in this paper. Most importantly, we reuse concepts and techniques from twenty years of pervasive computing research on how to enable runtime adaptation and apply it to AI. This allows to specify adaptive AI models that are able to react to a multitude of dynamic changes, e.g. with respect to available devices, networking conditions, but also application requirements and sensor data sources. Developers can optimise their applications iteratively, starting with a generic setup and refining it step by step towards their specific pervasive computing scenario. To show the applicability of our platform, we apply it to two pervasive use cases and evaluate them, achieving up to four times faster inference and three times lower energy consumption compared to a classical AI deployment.	10.1007/s42486-021-00070-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42486-021-00070-6	SpringerLink

CONSOLE: intruder detection using a UAV swarm and security rings	Stolfi, Daniel H., Brust, Matthias R., Danoy, Grégoire, Bouvry, Pascal,	<p>This article introduces CONcentric Swarm mObiLity modEl (CONSOLE), a novel mobility model for unmanned aerial vehicles (UAVs) to efficiently achieve surveillance and intruder detection missions. It permits to protect a restricted area from intruders using a concentric circles model where simulated UAVs evolve in these so-called security rings. Having UAVs arranged in rings fosters an early detection (outer ring) while increases the reliability of the surveillance system featuring a last detection barrier (inner ring). Using the first return map from a chaotic attractor (an unpredictable sequence of real numbers) and a dynamic pheromone map, the UAV swarm members make a collective decision about their trajectories evaluating the options of a best-of- n problem. As a result, routes are unpredictable and detection rates are optimised. The parameters of each UAV, i.e. amount of pheromones and ring assignation, has been tuned using a specifically designed evolutionary algorithm. The performance of CONSOLE has been compared to five state-of-the-art mobility models on 20 case studies comprising 30</p>	10.1007/s11721-021-00193-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11721-021-00193-7	SpringerLink
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		different scenarios each. Empirical results obtained via simulations demonstrate the better performance of CONSOLE in terms of amount of intruder detected and detection time.			
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Artificial Intelligence and the Internet of Things in Industry 4.0	Radanliev, Petar, Roure, David, Nicolescu, Razvan, Huth, Michael, Santos, Omar,	This paper presents a new design for artificial intelligence in cyber-physical systems. We present a survey of principles, policies, design actions and key technologies for CPS, and discusses the state of art of the technology in a qualitative perspective. First, literature published between 2010 and 2021 is reviewed, and compared with the results of a qualitative empirical study that correlates world leading Industry 4.0 frameworks. Second, the study establishes the present and future techniques for increased automation in cyber-physical systems. We present the cybersecurity requirements as they are changing with the integration of artificial intelligence and internet of things in cyber-physical systems. The grounded theory methodology is applied for analysis and modelling the connections and interdependencie s between edge components and automation in cyber-physical systems. In addition, the hierarchical cascading methodology is used in combination with the taxonomic classifications, to design a new integrated framework for future cyber-physical systems. The study looks	10.1007/s42486-021-00057-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42486-021-00057-3	SpringerLink
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		at increased automation in cyber-physical systems from a technical and social level.			
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<p>Maturity Levels of Public Safety Applications using Unmanned Aerial Systems: a Review</p>	<p>Stampa, Merlin, Sutorma, Andreas, Jahn, Uwe, Thiem, Jörg, Wolff, Carsten, Röhrig, Christof,</p>	<p>Unmanned Aerial Systems (UAS) are becoming increasingly popular in the public safety sector. While some applications have so far only been envisioned, others are regularly performed in real-life scenarios. Many more fall in between and are actively investigated by research and commercial communities alike. This study reviews the maturity levels, or “market-readiness”, of public safety applications for UAS. As individual assessments of all applications suggested in the literature are infeasible due to their sheer number, we propose a novel set of application categories: Remote Sensing, Mapping, Monitoring, Human-drone Interaction, Flying Ad-hoc Networks, Transportation, and Counter UAV Systems. Each category’s maturity is assessed through a literature review of contained applications, using the metric of Application Readiness Levels (ARLs). Relevant aspects such as the environmental complexity and available mission time of addressed scenarios are taken into account. Following the analysis, we infer that improvements in autonomy and software reliability are the most promising</p>	<p>10.1007/s10846-021-01462-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-021-01462-7</p>	<p>SpringerLink</p>
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		research areas for increasing the usefulness and acceptance of UAS in the public safety domain.			
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Using systems thinking and causal loop diagrams to identify cascading climate change impacts on bioenergy supply systems	Groundstroem, Fanny, Juhola, Sirkku,	Increased use of bioenergy, driven by ambitious climate and energy policies, has led to an upsurge in international bioenergy trade. Simultaneously, it is evident that every node of the bioenergy supply chain, from cultivation of energy crops to production of electricity and heat, is vulnerable to climate change impacts. However, climate change assessments of bioenergy supply chains neither account for the global nature of the bioenergy market, nor the complexity and dynamic interconnectivity between and within different sub-systems in which the bioenergy supply chain is embedded, thereby neglecting potential compounding and cascading impacts of climate change. In this paper, systems thinking is utilised to develop an analytical framework to address this gap, and aided by causal loop diagrams, cascading impacts of climate change are identified for a case study concerning imports of wood pellets from the United States to the European Union. The findings illustrate how the complexity and interconnectivity of the wood pellet supply system predispose the	10.1007/s11027-021-09967-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11027-021-09967-0	SpringerLink
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		supply chain to various cascading climate change impacts stemming from environmental, social, political and economic domains, and highlight the value of using system-based analysis tools for studying such complex and dynamic systems.			
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<p>Critical evaluation of the customisation process of the UNDRR disaster resilience scorecard for cities to earthquake-induced soil liquefaction disaster events</p>	<p>Jones, Keith, Pascale, Federica, Wanigarathna, Nadeeshani, Morga, Mariantonietta, Sargin, Sinan,</p>	<p>As cities become larger and more densely populated the impacts of major earthquake events on city communities become more severe. Improving community resilience to earthquake events relies on the complex relationships that exist between different community stakeholder groups (citizens, businesses, community groups, emergency services, critical infrastructure providers, politicians etc.). This paper reports results from a major EU funded study (LIQUEFACT) that developed a tool for assessing community resilience to Earthquake Induced Liquefaction Disaster (EILD) events. The tool is based on a customised version of the UNDRR Disaster Resilience Scorecard for Cities. The paper reviews alternative approaches to measuring community resilience and describes the process used in the LIQUEFACT project to develop and validate the customised scorecard. The paper presents the results of a questionnaire survey to identify the best generic approach to measure community resilience and a series of semi-structured group interviews to define a range of</p>	<p>10.1007/s10518-020-00993-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10518-020-00993-y</p>	<p>SpringerLink</p>
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		<p>specific metrics for assessing community resilience to EILD events; and the results of a validation workshop to assess the effectiveness and usability of the customised scorecard. The paper concludes that it is possible to develop a customised version of the UNDRR Scorecard at an appropriate level of granularity to support improved community resilience to earthquake induced soil liquefaction disaster events. The paper also presents key lessons that could assist those developing similar customised versions of the UNDRR scorecard for use in different geographical settings or against different disaster scenarios.</p>			
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Geographic modeling and simulation systems for geographic research in the new era: Some thoughts on their development and construction	Chen, Min, Lv, Guonian, Zhou, Chenghu, Lin, Hui, Ma, Zaiyang, Yue, Songshan, Wen, Yongning, Zhang, Fengyuan, Wang, Jin, Zhu, Zhiyi, Xu, Kai, He, Yuanqing,	Regionality, comprehensiveness, and complexity are regarded as the basic characteristics of geography. The exploration of their core connotations is an essential way to achieve breakthroughs in geography in the new era. This paper focuses on the important method in geographic research: Geographic modeling and simulation. First, we clarify the research requirements of the said three characteristics of geography and its potential to address geo-problems in the new era. Then, the supporting capabilities of the existing geographic modeling and simulation systems for geographic research are summarized from three perspectives: Model resources, modeling processes, and operational architecture. Finally, we discern avenues for future research of geographic modeling and simulation systems for the study of regional, comprehensive and complex characteristics of geography. Based on these analyses, we propose implementation architecture of geographic modeling and simulation systems and discuss the module composition and	10.1007/s11430-020-9759-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11430-020-9759-0	SpringerLink
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		functional realization, which could provide theoretical and technical support for geographic modeling and simulation systems to better serve the development of geography in the new era.			
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Improving the resilience of existing built assets to earthquake induced liquefaction disaster events	Jones, Keith G., Morgia, Marianonietta, Wanigarathna, Nadeeshani, Pascale, Federica, Meslem, Abdelghani,	LIQUEFACT was a EU H2020 funded project to investigate earthquake induced liquefaction potential across Europe and develop a series of tools to understand better the impacts that earthquake induced liquefaction disaster events have on the resilience of built assets and communities. A resilience assessment and improvement framework was developed to provide the theoretical underpinning for the LIQUEFACT project and to provide practical guidance on the assessment of built assets to Earthquake Induced Liquefaction Disaster events through the LIQUEFACT software tool and built asset management planning framework. This paper outlines the theoretical basis to the resilience assessment and improvement framework and built asset management planning framework and presents the results from a validation exercise through their application to a hypothetical healthcare scenario. The paper also describes the different stages of the research that led to the definition of the resilience assessment and improvement framework and built asset management	10.1007/s10518-020-00979-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10518-020-00979-w	SpringerLink
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		<p>planning framework. To this end the paper concludes that the resilience assessment and improvement framework and built asset management framework provide a longitudinal, holistic view of disaster vulnerability and resilience that can inform the selection of ground improvement mitigation actions to improve business continuity and resilience planning.</p>			
<p>Uncertainty representation in software models: a survey</p>	<p>Troya, Javier, Moreno, Nathalie, Bertoa, Manuel F., Vallecillo, Antonio,</p>	<p>This paper provides a comprehensive overview and analysis of research work on how uncertainty is currently represented in software models. The survey presents the definitions and current research status of different proposals for addressing uncertainty modeling and introduces a classification framework that allows to compare and classify existing proposals, analyze their current status and identify new trends. In addition, we discuss possible future research directions, opportunities and challenges.</p>	<p>10.1007/s10270-020-00842-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-020-00842-1</p>	<p>SpringerLink</p>

Analyzing and Evaluating Industrial Ecology Development Model in Iran Using FAHP-DPSIR	Padash, Amin, Vahidi, Hossein, Fattahi, Reza, Nematollahi, Hossein,	<p>The application of industrial ecology and its frameworks can minimize environmental pollution. DPSIR technique is effective in identifying areas related to the framework of industrial ecology development in Iran. Combination of DPSIR and modified Fuzzy Analytic Hierarchy Process (FAHP) is of great help in recognizing the components of industrial ecology's framework in Iran. Knowledge of industrial ecology for managers is one of the most important issues that can be effective in its development in Iran. 43 factors were extracted based on the DPSIR model. 18 criteria and four alternatives for developing of IE model in Iran has identified.</p> <p>Improve IE law, Establish IE national database are the effective and priority factors in the development of Iran's IE model. Today, attention to the issue of industrial ecology in the world has become very high and significant, but in Iran this attention does not exist and is only a slogan and preliminary studies. The purpose of this study is to investigate these conditions and provide a structure and model for the implementation of industrial ecology in Iran. Industrial estates are one of the major</p>	10.1007/s41742-021-00335-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41742-021-00335-z	SpringerLink
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		<p>centers of producing energy and industrial waste in the country. Developing Industrial Ecology (IE) faces significant obstacles. This study evaluates the barriers due to a combination model, including the DPSIR and Fuzzy Analytic Hierarchy Process (FAHP). It prioritizes the responses and alternatives regarding the driving forces, pressures, states, and impacts (criteria). In this study, different responses for IE development in Iran were evaluated and prioritized based on different indicators classified based on DPSIR and FAHP techniques and models. The results suggest prioritizing future IE development in Iran based on current infrastructure and conditions. To compare the analysis of two fuzzy numbers, a new division method based on a comparative example is used; to confirm the proposed method, a comparative example is described and presented. According to the field studies and research background of the research, the number of "18 criteria" and "four responses" were suggested. Finally, improving IE legal is the first step of modifying the industries clustering system, establishing IE national database</p>			
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		and industries training. According to the identified priorities, practical suggestions for the development of Iran's industrial environmental model within the framework of legal requirements, infrastructure and regulations that should be developed or updated, were presented and the duties of relevant legal agencies were identified and proposed.			
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Engineering Swarms of Cyber-Physical Systems with the CPSwarm Workbench	Sende, Micha, Schranz, Melanie, Prato, Gianluca, Brosse, Etienne, Morando, Omar, Umlauft, Martina,	Engineering swarms of cyber-physical systems (CPSs) is a complex process. We present the CPSwarm workbench that creates an automated design workflow to ease this process. This formalized workflow guides the user from modeling, to code generation, to deployment, both in simulation and on CPS hardware platforms. The workbench combines existing and emerging tools to solve real-world CPS swarm problems. As a proof-of-concept, we use the workbench to design a swarm of unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs) for a search and rescue (SAR) use case. We evaluate the resulting swarm behaviors on three levels. First, abstract simulations for rapid prototyping. Second, detailed simulation to test the correctness of the results. Third, deployment on hardware to demonstrate the applicability. We measure the swarm performance in terms of area covered and victims rescued. The results show that the performance of the swarm is proportional to its size. Despite some manual steps, the proposed workbench shows to be well suited to ease the complicated task of deploying a swarm of CPSs.	10.1007/s10846-021-01430-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-021-01430-1	SpringerLink
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Anticipatory governance for newcomers: lessons learned from the UK, the Netherlands, Finland, and Korea	Heo, Kyungmoo, Seo, Yongseok,	Anticipatory governance (AG) is defined as a "system of systems" that employs foresight to create future plans and execute relevant actions. Recently, various frameworks of AG have been introduced, but there is little practical information available for newcomers on how to do this. This research conducted a framework-based comparative country analysis to provide lessons learned for newcomers in the sphere of foresight-linked AG. By evaluating the AG levels of Finland, the UK, the Netherlands, and Korea, we found that the consequences of foresight-linked AGs were different in each country. At the same time, we also identified a common denominator, namely, future receptivity, a "human or people" capacity to accept and understand the value of foresight. Instead of temporary system changes or organizational modifications, future receptivity is an underlying element for newcomers to overcome lingering short-termism and facilitate the coordination of stakeholders concerning foresight. In conclusion, we suggest ways to promote future receptivity for newcomers. First, the government	10.1186/s40309-021-00179-y	http://link.springer.com/openurl/pdf?id=doi:10.1186/s40309-021-00179-y	SpringerLink
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		<p>should educate and train the public and government officials to promote future literacy and future proficiency . Second, the government should provide a process for public participation such as nationwide networking that enables the public to influence their diverse future images over foresight outcomes.</p>			
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Can we detect trends in natural disaster management with artificial intelligence? A review of modeling practices	Tan, Ling, Guo, Ji, Mohanarajah, Selvarajah, Zhou, Kun,	<p>There has been an unsettling rise in the intensity and frequency of natural disasters due to climate change and anthropogenic activities. Artificial intelligence (AI) models have shown remarkable success and superiority to handle huge and nonlinear data owing to their higher accuracy and efficiency, making them perfect tools for disaster monitoring and management. Accordingly, natural disaster management (NDM) with the usage of AI models has received increasing attention in recent years, but there has been no systematic review so far. This paper presents a systematic review on how AI models are applied in different NDM stages based on 278 studies retrieved from Elsevier Science, Springer LINK and Web of Science. The review: (1) enables increased visibility into various disaster types in different NDM stages from the methodological and content perspective, (2) obtains many general results including the practicality and gaps of extant studies and (3) provides several recommendations to develop innovative AI models and improve the quality of modeling. Overall, a</p>	10.1007/s11069-020-04429-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-020-04429-3	SpringerLink
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		comprehensive assessment and evaluation for the reviewed studies are performed, which tracked all stages of NDM research with the applications of AI models.			
Solving Environmental Problems According to the Concept of Sustainable Development of the Earth	Kalenchuk-Porkhanova, A., Tulchinsky, V.,	The scientific foundation for the development and implementation of automated control systems (ACS) in the USSR are discussed and the results obtained at the V. M. Glushkov Institute of Cybernetics of the National Academy of Sciences of Ukraine in the development and implementation of ecology monitoring ACS according to the principles of sustainable development of the society are presented.	10.1007/s10559-021-00389-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10559-021-00389-z	SpringerLink

Systematic manufacturability evaluation using dimensionless metrics and singular value decomposition: a case study for additive manufacturing	Coatanéa, Eric, Nagarajan, Hari P. N., Panicker, Suraj, Prod'hon, Romaric, Mokhtarian, Hossein, Chakraborti, Ananda, Paris, Henri, Ituarte, Iñigo Flores, Haapala, Karl R.,	Additive manufacturing has been presented as a novel and competitive method to achieve unprecedented part shapes and material complexities. Though this holds true in niche markets, the economic viability of additive manufacturing for large-scale industrial production is still in question. Companies often struggle to justify their investment in additive manufacturing due to challenges in the integration of such technologies into mainstream production. First, most additive technologies exhibit a relatively low production rate when compared with traditional production processes. Second, there is a lack of robust design for additive manufacturing methods and tools that enable the leveraging of the attendant unique capabilities, including the ability to form organic part geometries and automated part consolidations. Third, there is a dearth of systematic part screening methods to evaluate manufacturability in additive manufacturing. To tackle the challenge of manufacturability evaluation, the present work proposes a novel approach derived from latent	10.1007/s00170-020-06158-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-020-06158-0	SpringerLink
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		<p>semantic analysis and dimensional analysis to evaluate parts and their production for a variety of selected metrics. The selected metrics serve as descriptors of design features and manufacturing functions, which are developed using functional modeling and dimensional analysis theory. Singular-value decomposition and Euclidean distance measurement techniques are used to determine the relative manufacturability for a set of parts for a specified manufacturing process technology. The utility of the method is demonstrated for laser powder bed fusion technology. While demonstrated for additive manufacturing here, the developed approach can be expanded for any given set of manufacturing processes. Expansion of this systemic manufacturability analysis method can support part design decision-making, process selection, and design and manufacturing optimization.</p>			
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<p>Digital twin–based cyber-physical system for automotive body production lines</p>	<p>Son, Yoo Ho, Park, Kyu Tae, Lee, Donggun, Jeon, Seung Woo, Noh, Sang,</p>	<p>At automotive manufacturing sites, meeting the delivery schedule is difficult owing to the occurrence of unpredictable abnormal scenarios such as product defects and equipment failures. To overcome this, manufacturing technologies developed as part of the Fourth Industrial Revolution are employed to meet the delivery schedule set by the customer. We propose a digital twin (DT)–based cyber-physical system (CPS) that can predict whether a product can be manufactured as per the schedule requested by a customer at an automotive body production line where abnormal scenarios occur. We designed a product, process, plan, plant, and resource information model for automotive body production lines; the proposed DT employs this model. Unlike in previous research on DTs focusing on independent engineering application development, we designed and implemented a CPS combined with a DT and other components for a Web-based integrated manufacturing platform. To the best of our knowledge, this is the first time a DT-based CPS is implemented for abnormal scenarios involving automotive body production lines;</p>	<p>10.1007/s00170-021-07183-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-021-07183-3</p>	<p>SpringerLink</p>
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		<p>the capability of the proposed system was verified via experiments. The experimental results indicate that the proposed system achieved an average prediction performance of 96.83% for the actual production plan. We confirmed that the DT-based CPS can be applied to automotive body production lines, and it provides an advanced solution to predict whether production is possible according to the production plan.</p>			
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Priority list of biodiversity metrics to observe from space	<p>Skidmore, Andrew K., Coops, Nicholas C., Neinavaz, Elnaz, Ali, Abebe, Schaeppman, Michael E., Paganini, Marc, Kissling, W. Daniel, Vihervaara, Petteri, Darvishzadeh, Roshanak, Feilhauer, Hannes, Fernandez, Miguel, Fernández, Néstor, Gorelick, Noel, Geijzenborffer, Ilse, Heiden, Uta, Heurich, Marco, Hobern, Donald, Holzwarth, Stefanie, Muller-Karger, Frank E., Kerchove, Ruben, Lausch, Angela, Leitão, Pedro J., Lock, Marcelle C., Muecher, Caspar A., O'Connor, Brian, Rocchini, Duccio, Roeoesli, Claudia, Turner, Woody, Vis, Jan Kees, Wang, Tiejun, Wegmann, Martin, Wingate, Vladimir,</p>	<p>Monitoring global biodiversity from space through remotely sensing geospatial patterns has high potential to add to our knowledge acquired by field observation. Although a framework of essential biodiversity variables (EBVs) is emerging for monitoring biodiversity, its poor alignment with remote sensing products hinders interpolation between field observations. This study compiles a comprehensive, prioritized list of remote sensing biodiversity products that can further improve the monitoring of geospatial biodiversity patterns, enhancing the EBV framework and its applicability. The ecosystem structure and ecosystem function EBV classes, which capture the biological effects of disturbance as well as habitat structure, are shown by an expert review process to be the most relevant, feasible, accurate and mature for direct monitoring of biodiversity from satellites. Biodiversity products that require satellite remote sensing of a finer resolution that is still under development are given lower priority (for example, for the EBV class species traits). Some EBVs are not directly measurable by remote sensing</p>	10.1038/s41559-021-01451-x	https://www.nature.com/articles/s41559-021-01451-x.pdf	SpringerLink
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		<p>from space, specifically the EBV class genetic composition. Linking remote sensing products to EBVs will accelerate product generation, improving reporting on the state of biodiversity from local to global scales. Remote sensing of geospatial biodiversity patterns is an important complement to field observations. This priority list suggests how remote sensing observations can be better integrated into the essential biodiversity variables.</p>			
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<p>A cloud-based service-oriented architecture to unlock smart energy services</p>	<p>Haghgoo, Maliheh, Dognini, Alberto, Storek, Thomas, Plamanescu, Radu, Rahe, Ulrike, Gheorghe, Stefan, Albu, Mihaela, Monti, Antonello, Müller, Dirk,</p>	<p>In a modern smart energy system with increased penetration of renewable energy resources, the amount of data from various sources is growing significantly. Such systems require complex algorithms and controlling on-demand. These requirements can be addressed with on-demand scalability and a stable system. Nowadays, on-demand scalability is achieved by considering cloud computing and Internet of Things (IoT) technologies. This paper presents a cloud-based platform based on service-oriented architecture to perform analyzes on smart energy system services. It is the result of the European FISMEP (FIWARE for Smart Energy Platform) project to demonstrate an information and communication technology (ICT) architecture for the smart energy sector. The presented architecture is powered by FIWARE, open-source and customizable building blocks for future internet applications and services. Furthermore, the feasibility of the architecture is evaluated using various test cases.</p>	<p>10.1186/s42162-021-00143-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-021-00143-x</p>	<p>SpringerLink</p>
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Nexus Services in Smart City Ecosystems	Tsoutsas, Paraskevi, Fitsilis, Panos, Anthopoulos, Leonidas, Ragos, Omiros,	<p>According to market research, the number of smart cities is increasing rapidly. Information and communication technologies (ICT) provide the smart infrastructure that is the foundation for all the key themes related to a smart city, such as smart economy, smart governance, smart mobility, smart health, smart buildings, and smart water. As such, a smart city is constituted of various infrastructure components that form a complex system of systems, which is essential to collaborate effectively. Services play a central role in this vision of smart cities, as they are used as building blocks for effective collaboration, i.e., to achieve interoperability between heterogeneous parties and independence from the underlying infrastructure. In order to cope with the problem of complexity and the scalability in smart cities' systems, a solution is to provide autonomous, collaborating services that have situation awareness and are able to adapt dynamically to the changing needs of the environment forming a nexus of services. In this research, we propose a nexus model for smart cities' services collaboration by</p>	10.1007/s13132-020-00635-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-020-00635-3	SpringerLink
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		<p>using the role modeling approach enhanced by the introduction of service teamwork roles. The teamwork roles definition is inspired both by human and agent team working models. We determine the dominant teamwork roles that prevail during service group cooperation, where the main goal of each role is to intervene and “act as a connector” during collaboration to keep the team of component services consistent with the goal of the group–team. The teamwork functionality is applied through the introduction of a new layer in the architecture of smart cities and is exploited to overcome some of the aforementioned problems. A case study that presents how teamwork roles could affect and benefit the service collaboration in a smart city environment is also provided.</p>			
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An Architecture Framework Approach for Complex Transport Projects	Shirvani, Farid, Beydoun, Ghassan, Perez, Pascal, Scott, William, Campbell, Peter,	<p>Transport infrastructure systems are very complex and expensive. Projects to procure such systems are costly, long and complex to manage. The procurement context usually includes many collaborating organizations but often with different concerns and priorities, and many interactions to other parties. This makes the procurement very complex and entangled. DoDAF, MoDAF and TRAK are three architecture frameworks (AF) that model the whole enterprise/system life cycle that includes system procurement. They are expressed as metamodels. In this paper, we analyse various procurements strategies and identify the concerns that AFs should address. The TRAK AF is then applied to a Rail procurement case study in collaboration with Transport for New South Wales (NSW) in Australia to assess its effectiveness in meeting the procurement needs. In all stages of the study, TRAK is mapped and compared to DoDAF and MoDAF to examine whether DoDAF or MoDAF can cover the inadequacies of TRAK. This paper shows that there is a considerable number of procurement</p>	10.1007/s10796-019-09978-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-019-09978-y	SpringerLink
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		needs which are overlooked by these architecture frameworks. It proposes a metamodel driven expansion to these frameworks to improve their completeness and expressiveness.			
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<p>An Agent-Based Digital Twin for Exploring Localized Non-pharmaceutical Interventions to Control COVID-19 Pandemic</p>	<p>Barat, Souvik, Parchure, Ritu, Darak, Shrinivas, Kulkarni, Vinay, Paranjape, Aditya, Gajrani, Monika, Yadav, Abhishek, Kulkarni, Vinay,</p>	<p>The COVID-19 epidemic created, at the time of writing the paper, highly unusual and uncertain socio-economic conditions. The world economy was severely impacted and business-as-usual activities severely disrupted. The situation presented the necessity to make a trade-off between individual health and safety on one hand and socio-economic progress on the other. Based on the current understanding of the epidemiological characteristics of COVID-19, a broad set of control measures has emerged along dimensions such as restricting people's movements, high-volume testing, contract tracing, use of face masks, and enforcement of social-distancing. However, these interventions have their own limitations and varying level of efficacy depending on factors such as the population density and the socio-economic characteristics of the area. To help tailor the intervention, we develop a configurable, fine-grained agent-based simulation model that serves as a virtual representation, i.e., a digital twin of a diverse and heterogeneous area such as a city. In this paper, to illustrate our techniques, we focus our</p>	<p>10.1007/s41403-020-00197-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41403-020-00197-5</p>	<p>SpringerLink</p>
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		<p>attention on the Indian city of Pune in the western state of Maharashtra. We use the digital twin to simulate various what-if scenarios of interest to (1) predict the spread of the virus; (2) understand the effectiveness of candidate interventions; and (3) predict the consequences of introduction of interventions possibly leading to trade-offs between public health, citizen comfort, and economy. Our model is configured for the specific city of interest and used as an in-silico experimentation aid to predict the trajectory of active infections, mortality rate, load on hospital, and quarantine facility centers for the candidate interventions. The key contributions of this paper are: (1) a novel agent-based model that seamlessly captures people, place, and movement characteristics of the city, COVID-19 virus characteristics, and primitive set of candidate interventions, and (2) a simulation-driven approach to determine the exact intervention that needs to be applied under a given set of circumstances. Although the analysis presented in the paper is highly specific to COVID-19, our tools are generic enough to serve as a template for modeling the impact of future</p>			
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		pandemics and formulating bespoke intervention strategies.			
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A survey on runtime testing of dynamically adaptable and distributed systems	Lahami, Mariam, Krichen, Moez,	<p>This article addresses the need of applying testing activities with the purpose of checking the consistency and the correctness of distributed and dynamically adaptable systems whose structure and behavior evolve dynamically at runtime. We identified in the literature a number of studies that used some traditional testing techniques (e.g., regression testing) applied at development time and runtime verification techniques (e.g., runtime monitoring) to ensure the trustworthiness of software systems. Since traditional testing techniques are no longer adequate for dynamically adaptable systems because some behavioral/structural evolutions are unknown at development time, the runtime testing was introduced (Brenner et al., 2007). It is defined as any testing method that has to be carried out on the final execution environment by performing tests during deployment or in-service time. However, there is a lack of recent comprehensive survey on this emerging verification and validation technique. To fill this gap, we conduct a survey to investigate research done in this area. A list of 43 research studies are deeply discussed</p>	10.1007/s11219-021-09558-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-021-09558-x	SpringerLink
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		to address answers of eight research questions. In particular, this work gives the runtime testing taxonomy, challenges and introduces several approaches dealing with such technique and discusses challenges as well as recent advances in this area. Moreover, it also points out some future directions.			
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Overcoming Systemic Barriers Preventing Healthy Urban Development in the UK: Main Findings from Interviewing Senior Decision-Makers During a 3-Year Planetary Health Pilot	Black, Daniel, Pilkington, Paul, Williams, Ben, Ige, Janet, Prestwood, Emily, Hunt, Alistair, Eaton, Eleanor, Scally, Gabriel,	<p>This paper sets out the main findings from two rounds of interviews with senior representatives from the UK's urban development industry: the third and final phase of a 3-year pilot, Moving Health Upstream in Urban Development' (UPSTREAM). The project had two primary aims: firstly, to attempt to value economically the health cost-benefits associated with the quality of urban environments and, secondly, to interview those in control of urban development in the UK in order to reveal the potential barriers to, and opportunities for, the creation of healthy urban environments, including their views on the use of economic valuation of (planetary) health outcomes. Much is known about the 'downstream' impact of urban environments on human and planetary health and about how to design and plan healthy towns and cities ('midstream'), but we understand relatively little about how health can be factored in at key governance tipping points further 'upstream', particularly within dominant private sector areas of control (e.g. land, finance, delivery) at sub-national level. Our findings suggest that both public</p>	10.1007/s11524-021-00537-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11524-021-00537-y	SpringerLink
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		<p>and private sector appeared well aware of the major health challenges posed by poor-quality urban environments. Yet they also recognized that health is not factored adequately into the urban planning process, and there was considerable support for greater use of non-market economic valuation to help improve decision-making. There was no silver bullet however: 110 barriers and 76 opportunities were identified across a highly complex range of systems, actors and processes, including many possible points of targeted intervention for economic valuation. Eight main themes were identified as key areas for discussion and future focus. This findings paper is the second of two on this phase of the project: the first sets out the rationale, approach and methodological lessons learned.</p>			
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Systems analysis for deployment of internet of things (IoT) in the maritime industry	Hiekata, Kazuo, Wanaka, Shinnosuke, Mitsuyuki, Taiga, Ueno, Ryuji, Wada, Ryota, Moser, Bryan,	Various industries are undergoing transformation given recently available pervasive sensors, low-cost and low-latency digital communication, and distributed control technologies. The objective of this paper is to support the introduction of Internet of things (IoT) technologies in the maritime industry. The maritime industry is analyzed as a system of systems to define performance criteria and functions to be modeled and analyzed through simulation. In this case, the simulation of a shipping system includes models of operation, cargo loading, fuel loading, and docking for maintenance. In the simulation, various kinds of IoT technologies are defined by several input parameters. By changing the parameters, the simulator evaluates the impact of those technologies quantitatively. As a case study, 11 IoT technologies are evaluated and compared. The result reveals several insights that weight of the ship is the most impactful for the profit, controlling damage of the ship's hull by operation is the most important for safety, and improvement in efficiency at ports is the key to reducing delay time in operation. Moreover, this paper shows that	10.1007/s00773-020-00750-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00773-020-00750-5	SpringerLink
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		the sensitivity analysis by changing the input parameters can support the decision making of how much investment will be effective in considering the technologies' levels.			
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<p>The Wireless Access for Future Smart Cities as a Large Scale Complex Cyber Physical System</p>	<p>Poulkov, Vladimir,</p>	<p>In future smart cities (SCs) highly developed and smart wireless communication access infrastructures will be needed for the connection of a huge number of different types of objects, sensors and user terminals. Such access networks must have the necessary autonomic and intelligent mechanisms to respond to the needs of an increasing variety of users (human and non-human), to cope with the high user density in SCs, their mobility, new and increasing service requirements, traffic dynamics, SC complex wireless channel conditions, etc. The wireless AN of a future SC must be a type of network which is able to offer revolutionary services, capabilities, and facilities that are hard to be provided via the heterogeneous network (HetNet) infrastructures that are implemented today. This paper introduces the concept of the unified wireless access (UWA) for SCs and considers some of the challenges related to its functional requirements and design. The structure of a sample UWA network illustrating the functional relations between its components is given. It is envisaged that such UWA architecture will</p>	<p>10.1007/s11277-019-06343-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-019-06343-9</p>	<p>SpringerLink</p>
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		perform and could be considered from the aspect of a large scale complex and intelligent cyber physical system (CPS) with control feedbacks and different types of users introducing stochasticity in the loop of the system. For the goal of analyzing the performance and functional relationships between the elements of such UWA a general modeling approach is introduced taking into consideration some of the basic approaches applied for CPS analysis.			
Virtual Sensors	Martin, Dominik, Kühl, Niklas, Satzger, Gerhard,		10.1007/s12599-021-00689-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-021-00689-w	SpringerLink

A Methodological Proposal for the Complementarity of the SSM and the VSM for the Analysis of Viability in Organizations	Ramírez-Gutiérrez, Ana Gabriela, Cardoso-Castro, Pedro Pablo, Tejeida-Padilla, Ricardo,	This paper presents a protocol that establishes the complementarity between Soft Systems Methodology (SSM) and the Viable System Model (VSM) for the analysis of viability in organizations. Various studies demonstrate the advantages of both hard and soft multimethodologies, especially in the field of operational research (OR). Relying on a literature review of multimethodology, the present research specifically focuses on papers that examine the resolution of problem situations in organizations using SSM and VSM. It subsequently addresses approaches to both methodologies and, as a result, presents the characteristics that favor complementarity. Thus, this research primarily contributes with a methodological proposal that integrates both SSM and VSM. In terms of its technical-methodological approach, this study proposes a comprehensive protocol for the integration of SSM and VSM. While some studies do extol the benefits of combining the two methodologies, a systematic protocol for their integration is still lacking. As such,	10.1007/s11213-020-09536-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-020-09536-7	SpringerLink
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		the protocol presented herein consists of six steps used to diagnose or design a viable organization that includes a questionnaire for detecting organizational pathologies.			
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Topological Data Analysis for Network Resilience Quantification	Pereira, Luiz Manella, Torres, Luis Caicedo, Amini, M. Hadi,	<p>Developing accurate metrics to evaluate the resilience of large-scale networks, e.g., critical infrastructures, plays a pivotal role in secure operation of these networks. In this paper, we propose a novel framework to study the resilience of a network. To this end, we leverage the tools from Topological Data Analysis (TDA) and Persistent Homology (PH). The combined deployment of TDA and PH tools provides us with a solid understanding of network topology only based on the underlying weighted graph and comparing it with the base network, e.g., fully connected network as the most resilient structure. By utilizing an abstract network to build our arguments and results, we present a step-by-step method to leverage the fundamental theories of TDA to study and improve a network's resilience. By creating a weighted graph, where weights represent a meaningful attribute to the underlying network, we utilize Vietori–Rips complex and filtration to create persistent diagrams. This allows us to extract topological information to study network resilience. Further, we show</p>	10.1007/s43069-021-00070-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43069-021-00070-3	SpringerLink
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		how the use of Wasserstein distances can provide detailed information about the critical edges (e.g., roads in transportation networks, or power distribution lines in power networks) in the network, and how adding or removing certain edges affect the level of resilience of the network by presenting a novel metric to quantify the resilience of a network. We evaluate the effectiveness of the proposed method using a case study that compares a base network with networks that include different edges using our resilience metric.			
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Data and Temporality in the Spectral City	Olmstead, Nathan A.,	<p>Rapid urbanization has meant that cities around the world must deal with problems like traffic congestion, aging infrastructure, affordable housing, and climate change. Increasingly, policymakers are turning to investments in technology and digital infrastructure to address these problems. Yet the move towards so-called smart cities is not simply responsive, and policymakers increasingly advocate for smart city initiatives as a necessary step towards objective, efficient, and rational governance. This understanding of technological interventions as inherently progressive, however, causes many to overlook the erasures, biases, and limitations that emerge from trying to leave the past behind. As the problems associated with this enthusiasm become more apparent, the smart city movement must therefore recalibrate its relationship to not just technology but time itself. Building on deconstructive temporalities emerging out of quantum physics, I argue that cities must begin drawing from alternative temporalities more open to the intersections between past, present, and future. As such, I</p>	10.1007/s13347-019-00381-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13347-019-00381-8	SpringerLink
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		suggest that the time has come to replace the ideal of the smart city with that of the spectral city – an incomplete city haunted by the ghosts (and composts) of the past.			
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Automated organization of interaction between modules of information systems based on neural network data channels	Obukhov, Artem D., Krasnyanskiy, Mikhail N.,	<p>The automation of the process of information systems construction is an important and urgent problem, as it allows reducing the negative influence of a person during decision making and developing software, releasing additional time and material resources to solve more complex and creative problems. Most modern information systems are developed on a modular base; therefore, a significant design stage is the implementation of links between system components. The purpose of the study is to automate the organization of intermodular interaction in information systems, which will reduce the complexity, time and cost of this implementing process. In order to achieve the result, a method is proposed for the organization of interaction between modules of information systems based on neural network data channels, realized within the general concept of a neural network architecture. The structure of neural network channels, the principles of their functioning, theoretical substantiation, mathematical and algorithmic support and area of application are considered in detail. A</p>	10.1007/s00521-020-05491-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-020-05491-5	SpringerLink
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		<p>classification of neural network channels is presented, based on two of their characteristics: categories and degrees. As a result of the conducted research, the practical implementation of two neural network data channels is realized (transmission and adaptation), the structure of the program code, the used tools and libraries are analyzed. Based on a set of metrics for the complexity of the program code (Halstead, Jilb), the estimation of the computational complexity of algorithms, time and material costs for implementation, a comparative analysis of neural network data transmission channels and adaptation with classical approaches in the form of a set of network data transmission protocol and the required algorithmic support for data processing is carried out. The obtained experimental results confirm the lower complexity of neural network channels (reduction by at least 20% according to Halstead metrics and cyclometric complexity), reduction in time (by 12–32%) and cost (by 36–63%) of implementation and increase in the accuracy of the problem solving (by 11.8–15.5%). This</p>			
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		demonstrates the effectiveness of using neural network data channels to automate the organization of intermodular interaction in information systems.			
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Precision agriculture and geospatial techniques for sustainable disease control	Roberts, Daniel P., Short, Nicholas M., Jr, Sill, James, Lakshman, Dilip K., Hu, Xiaojia, Buser, Michael,	<p>The agricultural community is confronted with dual challenges; increasing production of nutritionally dense food and decreasing the impacts of these crop production systems on the land, water, and climate. Control of plant pathogens will figure prominently in meeting these challenges as plant diseases cause significant yield and economic losses to crops responsible for feeding a large portion of the world population. New approaches and technologies to enhance sustainability of crop production systems and, importantly, plant disease control need to be developed and adopted. By leveraging advanced geoinformatic techniques, advances in computing and sensing infrastructure (e.g., cloud-based, big data-driven applications) will aid in the monitoring and management of pesticides and biologicals, such as cover crops and beneficial microbes, to reduce the impact of plant disease control and cropping systems on the environment. This includes geospatial tools being developed to aid the farmer in managing cropping system and disease management strategies that are more sustainable but</p>	10.1007/s42360-021-00334-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42360-021-00334-2	SpringerLink
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		<p>increasingly complex. Geoinformatics and cloud-based, big data-driven applications are also being enlisted to speed up crop germplasm improvement; crop germplasm that has enhanced tolerance to pathogens and abiotic stress and is in tune with different cropping systems and environmental conditions is needed. Finally, advanced geoinformatic techniques and advances in computing infrastructure allow a more collaborative framework amongst scientists, policymakers, and the agricultural community to speed the development, transfer, and adoption of these sustainable technologies.</p>			
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Towards a Verification-Driven Iterative Development of Software for Safety-Critical Cyber-Physical Systems	Sirjani, Marjan, Provenzano, Luciana, Asadollah, Sara Abbaspour, Moghadam, Mahshid Helali, Saadatmand, Mehrdad,	Software systems are complicated, and the scientific and engineering methodologies for software development are relatively young. Cyber-physical systems are now in every corner of our lives, and we need robust methods for handling the ever-increasing complexity of their software systems. Model-Driven Development is a promising approach to tackle the complexity of systems through the concept of abstraction, enabling analysis at earlier phases of development. In this paper, we propose a model-driven approach with a focus on guaranteeing safety using formal verification. Cyber-physical systems are distributed, concurrent, asynchronous and event-based reactive systems with timing constraints. The actor-based textual modeling language, Rebeca, with model checking support is used for formal verification. Starting from structured requirements and system architecture design the behavioral models, including Rebeca models, are built. Properties of interest are also derived from the structured requirements, and then model checking is used to formally verify the properties. This process can	10.1186/s13174-021-00132-z	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-021-00132-z	SpringerLink
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		<p>be performed in iterations until satisfaction of desired properties are ensured, and possible ambiguities and inconsistencies in requirements are resolved. The formally verified models can then be used to develop the executable code. The Rebeca models include the details of the signals and messages that are passed at the network level including the timing, and this facilitates the generation of executable code. The natural mappings among the models for requirements, the formal models, and the executable code improve the effectiveness and efficiency of the approach.</p>			
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<p>A systems thinking approach to understanding the challenges of achieving the circular economy</p>	<p>Iacovidou, Eleni, Hahladakis, John N., Purnell, Phil,</p>	<p>Circular economy (CE) is extensively discussed around the globe. Presently, discussions are mostly concerned with the importance of achieving CE and the benefits associated therewith, with the various barriers surrounding its implementation being less debated. Understanding the context in which circularity can flourish is a prerequisite in building the capabilities to deal with the multi-faceted challenges that currently hamper progress in closing the material, component and product loops. In this study, we discuss the importance of systems thinking in understanding the way resource recovery systems operate, and in promoting deep transformational change. We suggest that transformational change needs to go beyond closing materials, components and products (MCPs) loops, and promote sustainability in the way resources are exploited, used and managed throughout the system. By adopting a system of systems approach, we postulate that there are five interconnected sub-systems that need to be considered for supporting transitions to CE, namely, resource</p>	<p>10.1007/s11356-020-11725-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-020-11725-9</p>	<p>SpringerLink</p>
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		<p>flows and provisioning service; governance, regulatory framework and political landscape; business activities and the market; infrastructure and innovation; and user practices. This holistic approach provides a useful means to cutting through systemic complexity, and focuses on the dynamics between processes, values and actors in the value chain, and their dependence on cultural, spatial and temporal characteristics. We conclude that a systems-based approach can build up the capabilities required to identify and understand persistent linear trends and, in turn, support forward-thinking and time investment in enabling sustainable transitions. This, in turn, can help to align priorities and transform our current practices, speeding up the process of closing the MCP loops in a sustainable manner. Graphical abstract</p>			
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Quantitative Estimate of Infrastructure Interdependence	Tweneboah-Koduah, Samuel, Tsetse, Anthony, Prasad, Ramjee,	<p>The advancement in information and communication technologies and the integration with electric power grids, has made the later more pervasive, extensive, and in some cases complex in terms of design, structure, operations, and management. This complexity-induced convergence means the disruptions in one part of the system cascade to other areas, causing secondary, tertiary, and even higher-order destructive effects. Increasing complexity also means an increase in both systems' vulnerabilities and threats exposure. In most countries, various control measures are being implemented by both security engineers and regulatory bodies; aiming to intensify security requirements as well as compliance. This security objective is to ensure that critical infrastructure systems are not only protected but are also effective and resilient at all times. From the perspective of network theory, the paper proposes an infrastructure interdependence reliability metric; as a technique to assess the functional and structural impact of a systematic cyberattack on system (critical infrastructure) and its interdependent</p>	10.1007/s11277-020-08012-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-08012-8	SpringerLink
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		<p>systems. The metric computes the infrastructure interdependence effectiveness index and resilience ratio among interdependent infrastructure systems. The reliability approach provides a perspective in understanding how systems convergence impact systems' overall functionality, performance, and resilience. For researchers, the study presents a new approach that advances existing discussion on systems convergence in a heterogeneous environment such as IoT.</p>			
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Agent-based modeling for migration and modern slavery research: a systematic review	McAlpine, Alys, Kiss, Ligia, Zimmerman, Cathy, Chalabi, Zaid,	<p>This systematic review aims to synthesize how agent-based modeling (ABM) has been used in migration and modern slavery research and provide the basis to model development for social science researchers exploring the use of ABM. We searched five bibliographic databases using two terminology categories: (1) migration or modern slavery terminology; (2) complex system methods terminology. Two reviewers conducted independent article screening. Peer-reviewed articles presenting original migration or modern slavery ABMs were included. Data extraction included model development steps and model characteristics. The dataset was synthesized and compared across studies. We identified 28 articles for inclusion. Many of the ABMs tested theories and about half were based on empirical data. Model development varied considerably and reported methods were extremely opaque. Only five studies used a structured development framework. The most common model involved agents deciding whether and where to migrate and attempting migration. Climate change was a common exogenous</p>	10.1007/s42001-020-00076-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42001-020-00076-7	SpringerLink
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		<p>scenario modeled. Most of the ABMs did not undergo any sensitivity analysis or validation. ABM has a greater capacity to account for heterogeneous and dynamic decision-making than more frequently applied methods in research on migration and modern slavery. However, there is still a paucity of studies adopting ABM methods. These reviewed ABMs highlight gaps in the reporting and implementing of model development. ABM is a promising technique to address many urgent and complex questions in research on migration and modern slavery to better support decision-makers, but addressing current methodological gaps is a critical first step.</p>			
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<p>A method to characterize the social cascading damage processes of disasters using media information</p>	<p>Noguchi, Hiroki, Nishizawa, Takuma, Fuse, Masaaki,</p>	<p>Constantly advancing media information is a key data source to characterize the social cascading damage processes following natural hazards. However, media information tends to include a large sample size but low information density. In consideration of these properties, the aim of this study is to develop a new method for media-based information characterizing social cascading damage processes. In developing the method, a network theory framework was constructed to systematically integrate media information and its characterization. The method has two analytical components: a disaster damage network systematically inputting media information and network analysis using the concept of degree centrality. The developed method was applied to the record-breaking 2018 heavy rain disaster in western Japan, employing newspaper articles as media information sources. The study identified the critical disaster events and their relationships. This case study demonstrates that our method will benefit policymakers by providing them with potential fundamental</p>	<p>10.1007/s11069-021-04581-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-021-04581-4</p>	<p>SpringerLink</p>
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		information to support disaster management.			
Data science: a game changer for science and innovation	Grossi, Valerio, Giannotti, Fosca, Pedreschi, Dino, Manghi, Paolo, Pagano, Pasquale, Assante, Massimiliano,	This paper shows data science's potential for disruptive innovation in science, industry, policy, and people's lives. We present how data science impacts science and society at large in the coming years, including ethical problems in managing human behavior data and considering the quantitative expectations of data science economic impact. We introduce concepts such as open science and e-infrastructure as useful tools for supporting ethical data science and training new generations of data scientists. Finally, this work outlines SoBigData Research Infrastructure as an easy-to-access platform for executing complex data science processes. The services proposed by SoBigData are aimed at using data science to understand the complexity of our contemporary, globally interconnected society.	10.1007/s41060-020-00240-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-020-00240-2	SpringerLink

(So) Big Data and the transformation of the city	<p>Andrienko, Gennady, Andrienko, Natalia, Boldrini, Chiara, Caldarelli, Guido, Cintia, Paolo, Cresci, Stefano, Facchini, Angelo, Giannotti, Fosca, Gionis, Aristides, Guidotti, Riccardo, Mathioudakis, Michael, Muntean, Cristina Ioana, Pappalardo, Luca, Pedreschi, Dino, Pournaras, Evangelos, Pratesi, Francesca, Tesconi, Maurizio, Trasarti, Roberto,</p>	<p>The exponential increase in the availability of large-scale mobility data has fueled the vision of smart cities that will transform our lives. The truth is that we have just scratched the surface of the research challenges that should be tackled in order to make this vision a reality. Consequently, there is an increasing interest among different research communities (ranging from civil engineering to computer science) and industrial stakeholders in building knowledge discovery pipelines over such data sources. At the same time, this widespread data availability also raises privacy issues that must be considered by both industrial and academic stakeholders. In this paper, we provide a wide perspective on the role that big data have in reshaping cities. The paper covers the main aspects of urban data analytics, focusing on privacy issues, algorithms, applications and services, and georeferenced data from social media. In discussing these aspects, we leverage, as concrete examples and case studies of urban data science tools, the results obtained in the “City of Citizens” thematic area of the</p>	10.1007/s41060-020-00207-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-020-00207-3	SpringerLink
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		<p>Horizon 2020 SoBigData initiative, which includes a virtual research environment with mobility datasets and urban analytics methods developed by several institutions around Europe. We conclude the paper outlining the main research challenges that urban data science has yet to address in order to help make the smart city vision a reality.</p>			
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A workflow language for research e-infrastructures	Candela, Leonardo, Grossi, Valerio, Manghi, Paolo, Trasarti, Roberto,	Research e-infrastructures are “systems of systems,” patchworks of resources such as tools and services, which change over time to address the evolving needs of the scientific process. In such environments, researchers carry out their scientific process in terms of sequences of actions that mainly include invocation of web services, user interaction with web applications, user download and use of shared software libraries/tools. The resulting workflows are intended to generate new research products (articles, datasets, methods, etc.) out of existing ones. Sharing a digital and executable representation of such workflows with other scientists would enforce Open Science publishing principles of “reproducibility of science” and “transparent assessment of science.” This work presents HyWare, a language and execution platform capable of representing scientific processes in highly heterogeneous research e-infrastructures in terms of so-called hybrid workflows. Hybrid workflows can express sequences of “manually executable actions,” i.e., formal descriptions guiding users to	10.1007/s41060-020-00237-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-020-00237-x	SpringerLink
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		repeat a reasoning, protocol or manual procedure, and “machine-executable actions,” i.e., encoding of the automated execution of one (or more) web services. An HyWare execution platform enables scientists to (i) create and share workflows out of a given action set (as defined by the users to match e-infrastructure needs) and (ii) execute hybrid workflows making sure input/output of the actions flow properly across manual and automated actions. The HyWare language and platform can be implemented as an extension of well-known workflow languages and platforms.			
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New finite-time synchronization of memristive Cohen–Grossberg neural network with reaction–diffusion term based on time-varying delay	Ren, Fangmin, Jiang, Minghui, Xu, Hao, Fang, Xue,	<p>This paper focuses on the finite-time synchronization of memristive Cohen–Grossberg neural networks with time delays based on the reaction–diffusion term. Two new finite-time synchronous lemmas, Lemmas 2.3 and 2.4 , have been obtained through some integration techniques. Since the proposal of Lemma 2.5 solves the</p> $\ X^{\varphi}\ _{\left(\left\{\left\ u\left(t\right)\right\ \right\}_{t\in\left[0,+\infty\right)}\right)}\leq\frac{1}{\inf_{t\in\left[0,+\infty\right)}\left\ u\left(t\right)\right\ }\ X\ $ <p>problem in the denominator, and by designing two different controllers and inequality techniques, two finite-time synchronization theorems are finally obtained. Simulations are performed according to two examples to verify the validity of the results in this paper.</p>	10.1007/s00521-020-05259-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-020-05259-x	SpringerLink
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UAV Communication Networks Issues: A Review	Nawaz, Haque, Ali, Husnain Mansoor, Laghari, Asif Ali,	<p>The unmanned aerial vehicle communication networks (UAVCN) comprises of a collection of unmanned aerial vehicles (UAVs) to build a network that can be used for many applications. These nodes autonomously fly in free space in ad-hoc mode to carry out the mission. However, the UAVs face some challenging issues during collaboration and communication. These nodes have high speed, hence the communication links fail to route the traffic that affects the routing mechanism. Therefore, UAVCN communication affecting the quality of service and facing the performance issue. Power is another major problem to limit and optimize the use of power, the energy-efficient mechanism is needed. In this paper, an attempt is made to explore the issues of unmanned aerial vehicle communication networks: UAVCN characteristics, UAVCN design issues, UAVCN applications, routing protocols, quality of service, power issue and identify the future open research areas which could be considered for further research to explore the UAVCN technology.</p>	10.1007/s11831-020-09418-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-020-09418-0	SpringerLink
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Robot Speed Adaption in Multiple Trajectory Planning and Integration in a Simulation Tool for Human-Robot Interaction	Glogowski, Paul, Böhmer, Alexander, Hypki, Alfred, Kuhlenkötter, Bernd,	Speed and separation monitoring (SSM) is one of the four permissible collaborative operations in human-robot interaction (HRI). At all times, it must be ensured that the speed-dependent separation distance is maintained. To guarantee this, the robot speed or the robot path can be adapted. In this paper, the robot speed adaption for multiple trajectories is implemented in an HRI simulation tool and tested in an application example. Thereby, numerous complex process situations, such as a temporary robot stop or obstacles in the collaborative workspace, can be simulated. The simulation tool enables a comprehensive simulation, analysis and optimisation of human and robot motions within the HRI, already in the planning phase.	10.1007/s10846-020-01309-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-020-01309-7	SpringerLink
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A survey on artificial intelligence assurance	Batarseh, Feras A., Freeman, Laura, Huang, Chih-Hao,	Artificial Intelligence (AI) algorithms are increasingly providing decision making and operational support across multiple domains. AI includes a wide (and growing) library of algorithms that could be applied for different problems. One important notion for the adoption of AI algorithms into operational decision processes is the concept of assurance. The literature on assurance, unfortunately, conceals its outcomes within a tangled landscape of conflicting approaches, driven by contradicting motivations, assumptions, and intuitions. Accordingly, albeit a rising and novel area, this manuscript provides a systematic review of research works that are relevant to AI assurance, between years 1985 and 2021, and aims to provide a structured alternative to the landscape. A new AI assurance definition is adopted and presented, and assurance methods are contrasted and tabulated. Additionally, a ten-metric scoring system is developed and introduced to evaluate and compare existing methods. Lastly, in this manuscript, we provide foundational insights,	10.1186/s40537-021-00445-7	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40537-021-00445-7	SpringerLink
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		discussions, future directions, a roadmap, and applicable recommendations for the development and deployment of AI assurance.			
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<p>Organizing Self-Organizing Systems: A Terminology, Taxonomy, and Reference Model for Entities in Cyber-Physical Production Systems</p>	<p>Berger, Stephan, Häckel, Björn, Häfner, Lukas,</p>	<p>Ongoing digitalization accelerates the transformation and integration of physical production and traditional computing systems into smart objects and their interconnectivity, forming the Internet of Things. In manufacturing, the cross-linking of embedded systems creates adaptive and self-organizing Cyber-Physical Production Systems (CPPSs). Owing to ever-increasing cross-linking, rapid technological advances, and multifunctionality, the complexity and structural opacity of CPPSs are rapidly increasing. The development of urgently needed modeling approaches for managing such complexity and structural opacity, however, is impeded by a lack of common understanding of CPPSs. Therefore, in this paper, we contribute to a common understanding of CPPSs by defining and classifying CPPS entities and illustrating their relations. More precisely, we present a terminology, a taxonomy, and a reference model for CPPS entities, created and evaluated using an iterative development process. Thereby, we lay the foundation for future CPPS modeling approaches that</p>	<p>10.1007/s10796-019-09952-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-019-09952-8</p>	<p>SpringerLink</p>
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		make CPPS complexity and structural opacity more manageable.			
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Requirement Engineering Challenges: A Systematic Mapping Study on the Academic and the Industrial Perspective	Tukur, Muhammad, Umar, Sani, Hassine, Jameleddine,	<p>Requirement engineering (RE) is the process of discovering stakeholders' requirements and needs and documenting them in such a way that they can serve as the basis for all other system development activities. Despite recent advances in RE practices and tools, requirements engineers are still experiencing fundamental problems. Therefore, the identification and characterization of such challenges would help RE practitioners manage and overcome such difficulties allowing them to meet expected quality objectives. The main objective of this paper is to identify and compare RE challenges reported in the literature and in practice. To this aim, we have conducted a systematic mapping study to collect and analyze RE challenges in the literature. Furthermore, we have also conducted a questionnaire-based empirical investigation to collect and analyze RE challenges faced by IT practitioners working for 15 companies located in four different countries. Results show that the top challenges are the same in the literature and in practice. However, overall, our comparative study revealed a</p>	10.1007/s13369-020-05159-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13369-020-05159-1	SpringerLink
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		<p>weak positive correlation between RE challenges in the literature and in practice (Spearman coefficient = 0.3061). This weak positive relationship indicates that some of the challenges found in the literature are not perceived by the participant to have a great impact on the practice. This may be due to the fact that solutions to (or guidelines to avoid) some of the identified challenges have been provided by the surveyed corporations.</p>			
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<p>A framework for Model-Driven Engineering of resilient software-controlled systems</p>	<p>Parri, Jacopo, Patara, Fulvio, Sampietro, Samuele, Vicario, Enrico,</p>	<p>Emergent paradigms of Industry 4.0 and Industrial Internet of Things expect cyber-physical systems to reliably provide services overcoming disruptions in operative conditions and adapting to changes in architectural and functional requirements. In this paper, we describe a hardware/software framework supporting operation and maintenance of software-controlled systems enhancing resilience by promoting a Model-Driven Engineering (MDE) process to automatically derive structural configurations and failure models from reliability artifacts. Specifically, a reflective architecture developed around digital twins enables representation and control of system Configuration Items properly derived from SysML Block Definition Diagrams, providing support for variation. Besides, a plurality of distributed analytic agents for qualitative evaluation over executable failure models empowers the system with runtime self-assessment and dynamic adaptation capabilities. We describe the framework architecture outlining roles</p>	<p>10.1007/s00607-020-00841-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-020-00841-6</p>	<p>SpringerLink</p>
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		and responsibilities in a System of Systems perspective, providing salient design traits about digital twins and data analytic agents for failure propagation modeling and analysis. We discuss a prototype implementation following the MDE approach, highlighting self-recovery and self-adaptation properties on a real cyber-physical system for vehicle access control to Limited Traffic Zones.			
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<p>Natura Non Facit Saltus: Challenges and Opportunities for Digital Industrialisation Across Developing Countries</p>	<p>Andreoni, Antonio, Chang, Ha-Joon, Labrunie, Mateus,</p>	<p>In this paper, we discuss the challenges and the opportunities faced by developing countries that want to join the so-called Fourth Industrial Revolution (4IR). We first point out that the current discourse on 4IR is often based on poor understanding of the true nature of the phenomenon. Emphasising that many of the so-called 4IR technologies have been there and evolving rapidly in the last half a century, we argue that what defines 4IR is the fusion of these technologies. Given this, we argue, rather than trying to master particular 4IR technologies, developing countries should first focus on acquiring what we call the foundational capabilities, i.e. the capabilities to learn new technical and organisational solutions and apply them in creative and flexible ways. Using this perspective, we then discuss in great detail how different 4IR technologies are re-shaping each industry and creating new industries through technological fusion, while discussing how these changes are affecting the opportunities and challenges faced by developing countries for industrial development. We conclude the paper by discussing the implications of</p>	<p>10.1057/s41287-020-00355-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1057/s41287-020-00355-z</p>	<p>SpringerLink</p>
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		<p>our findings for industrial policy in developing countries. Dans cet article, nous discutons des défis et des opportunités auxquels sont confrontés les pays en développement qui souhaitent rejoindre la soi-disant quatrième révolution industrielle (4RI). Nous commençons par souligner que, bien souvent, le discours actuel sur la 4RI est fondé sur une mauvaise compréhension de la vraie nature du phénomène. Tout en mettant l'accent sur le fait que de nombreuses technologies soi-disant issues de la 4RI existent depuis la seconde moitié du siècle dernier et ont évolué rapidement, nous soutenons que ce qui définit la 4RI est la fusion de ces technologies. Compte tenu de cela, nous soutenons que, plutôt que d'essayer de maîtriser des technologies particulières de la 4RI, les pays en développement devraient d'abord se concentrer sur l'acquisition de ce que nous appelons les capacités fondamentales, c'est-à-dire les capacités d'apprendre de nouvelles solutions techniques et organisationnelles et de les appliquer de manière créative et flexible. Nous adoptons cette perspective et discutons ensuite en détail de la</p>			
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		<p>manière dont les différentes technologies de la 4RI remodelent chaque industrie et créent de nouvelles industries grâce à la fusion technologique, tout en discutant de la façon dont ces changements affectent les opportunités et les défis auxquels sont confrontés les pays en développement en matière de développement industriel. Pour conclure l'article, nous discutons de l'implication de nos résultats pour la politique industrielle des pays en développement.</p>			
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Developing a Multi-methodology for Conflict Resolution: Case of Yemen's Humanitarian Crisis	Nassereddine, M., Ellakkis, M. A., Azar, A., Nayeri, M. D.,	<p>Conflict analysis as one of the most challenging and demanding issues within different fields of nowadays world, is generally characterized by two types of complexities: structural and behavioral. Therefore, scholars worldwide to tackle the mentioned complexities welcome a multi-methodology intervention. Consequently, this study focuses on the development and application of multi-methodological intervention benefiting from the advantages of Soft OR and Game theory to deal more effectively with the complex nature of a real-world problem. Accordingly, the paper contributes to JOURNEY making methodology through developing new concepts, making it richer information-wise, and thus more reliable. Moreover, it applied the proposed model for the Saudi-led war on Yemen, where the latter faces one of the world's worst humanitarian crisis. In addition, a stability analysis considered investigating stable scenarios (equilibrium) for all parties. Ultimately, findings indicate that only one stable scenario can stop the war and resolve one of the world's worst</p>	10.1007/s10726-020-09695-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-020-09695-x	SpringerLink
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Deep learning application in smart cities: recent development, taxonomy, challenges and research prospects	Muhammad, Amina N., Aseere, Ali M., Chiroma, Haruna, Shah, Habib, Gital, Abdulsalam Y., Hashem, Ibrahim Abaker Targio,	<p>The purpose of smart city is to enhance the optimal utilization of scarce resources and improve the resident's quality of live. The smart cities employed Internet of Things (IoT) to create a sustainable urban life. The IoT devices such as sensors, actuators, and smartphones in the smart cities generate data. The data generated from the smart cities are subjected to analytics to gain insight and discover new knowledge for improving the efficiency and effectiveness of the smart cities. Recently, the application of deep learning in smart cities has gained a tremendous attention from the research community. However, despite raise in popularity and achievements made by deep learning in solving problems in smart cities, no survey has been dedicated mainly on the application of deep learning in smart cities to show recent progress and direction for future development. To bridge this gap, this paper proposes to conduct a dedicated survey on the applications of deep learning in smart cities. In this paper, recent progress, new taxonomies, challenges and opportunities for future research opportunities on the application of</p>	10.1007/s00521-020-05151-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-020-05151-8	SpringerLink
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		<p>deep learning in smart cities have been unveiled. The paper can provide opportunities for experts in the research community to propose a novel approach for developing the research area. On the other hand, new researchers interested in the research area can use the paper as an entry point.</p>			
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<p>A concept map to support the planning and evaluation of artifacts in the initial phases of PSS design</p>	<p>Rosa, Maiara, Wang, Wei Min, Stark, Rainer, Rozenfeld, Henrique,</p>	<p>Designing Product-Service Systems (PSS) is associated with multiple problems and challenges, usually derived from its multidisciplinary and partially intangible nature. One particular issue is the high likelihood of ignoring the creation of relevant information regarding one or more PSS elements during the early design phases. Proceeding to later stages (e.g., detailed design) without generating the required information regarding all PSS elements and their relationships may lead to rework and lack of integration. Dealing with this problem requires adequate planning and evaluation of the artifacts (such as documents and models) created in the initial design phases. As a fundamental theoretical basis to support the creation of solutions that may help project managers dealing with this challenge, this paper presents a concept map to structure the concepts that compose artifacts resulting from the initial stages of PSS design and how those concepts interrelate. This concept map aims to structure which classes of information should be defined in the early phases of the design process before proceeding to a</p>	<p>10.1007/s00163-021-00358-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-021-00358-9</p>	<p>SpringerLink</p>
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		<p>detailed design. The concept map was created by extracting concepts and relationships proposed in classifications, taxonomies, ontologies, meta-models, and concept maps in the PSS and servitization fields. Those documents were identified through a comprehensive systematic literature review. The resulting concept map was verified for completeness against formal documentation of two retrospective PSS design projects. The final proposed concept map is composed of 143 concepts interconnected through 278 relationships. In its current format, the concept map may be used as a checklist to support project managers in planning and evaluating early phases of PSS design based on information completeness. Researchers may also employ it to deploy ontologies, approach further knowledge and information-related challenges in PSS design, or structure PSS-related model-based systems engineering approaches. In future research, this concept map shall be deployed in a meta-model based on artifacts commonly used in PSS design, structuring a computational tool to allow and support practical application on planning and evaluating PSS</p>			
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		design projects.			
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A Multilayer Proposal to a Smart Home Applied to Healthcare	Silva, Jose Reinaldo, Macedo, Euler Cassio Tavares, Correa, Yaney Gomez, Medeiros, Rafael Pereira,	Smart home technology is an up-and-coming field of automation that integrates different areas, including sensing and electrical automation subsystems, devices, mechanical and hydraulic systems associated with sophisticated control and supervising. Recently these systems also received an extra mission to assist particular users, as older adults or patients who need intensive care. Such a challenge brings enormous pressure in developing engineering requirements that match automation goals with those raised by telemedicine and healthcare. Treating these smart healthcare homes as a system-of-systems, we have to consider a social goal that matches comfort, security, and flexibility with intensive care, protection, and telemedicine. The proposal presented in this paper is based on a multilayer approach: one layer is responsible for the physical home automation and the other with healthcare and the coupling with the final user, reinforcing a service design approach. Both are intelligent systems, which justifies using AI (Artificial Intelligence) planning, where automated processes achieve each	10.1007/s41050-021-00029-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41050-021-00029-7	SpringerLink
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		<p>system's goals. That change substantially home-automation projects, which should be designed to be reused, and creates a link to healthcare and telemedicine. An illustrative case study is used to present the proposal based on a process that monitors old adults' night sleep using home automation features associated with a planned healthcare process. Shortly we expect that the formal method presented here could be fully inserted in software tools (or in a commercially available system) to become an option for practical work.</p>			
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Design and evaluation of a mobile smart home interactive system with elderly users in Brazil	Tsuchiya, Letícia Diniz, Braga, Lucas Fiorini, Faria Oliveira, Otávio, Bettio, Raphael Winckler, Gregghi, Juliana Galvani, Freire, André Pimenta,	<p>This article presents a study concerning the evaluation of a smart home control system for elderly people with a sample of 10 users in a city in the interior of Brazil. The control system consisted of a prototype using a Web-based mobile application, developed considering requirements obtained from a previous study and recommendations from the literature. The test participants were over 60 years old and had basic experience in the use of smartphones and computers. Success rates in the execution of activities, difficulty levels in carrying out activities, satisfaction, motivation, and control feelings were analyzed. We noted that the application had a satisfactory acceptance level by the participants, showing good results with the tests applied. As main implications for the design, the study showed the importance of clearly identifying the users' whereabouts in the house in the application, not hiding information under scrolling, using images and videos appropriately in help systems to avoid confusion, limiting the number of windows open to keep context, avoiding unclear interactive elements to favor direct</p>	10.1007/s00779-020-01408-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00779-020-01408-0	SpringerLink
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		affordances, and proximity on the screen to group rooms and appliances visually. The results from the study can contribute to improving interaction with smart home systems for elderly people, especially in countryside parts of developing countries.			
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Automated compliance checking in the context of Industry 4.0: from a systematic review to an empirical fuzzy multi-criteria approach	Cunha, Vitor Heitor Cardoso, Caiado, Rodrigo Goyannes Gusmão, Corseuil, Eduardo Thadeu, Neves, Hugo Fernandes, Bacoccoli, Letícia,	Nowadays, the industry is undergoing the Fourth Industrial Revolution, and techniques and algorithms for automated compliance checking (ACC) are continually being improved, generalized and flexible with the use of semantic and logic-based representations. However, there is still a lack of research that addresses advances in ACC tools headed for the Industry 4.0 (I4.0) perspective and that point out practitioners' perceptions concerning the current application of these technologies. In this sense, this paper aims to conduct a systematic review to identify the main automated code-checking tools to regulatory compliance in the I4.0 era, indicating new trends and possible gaps, and then ranking the selected technologies with the support of two soft hybrid multi-criteria decision-making techniques. By content analysis, we identified and categorized seven main technologies used to ACC in several industrial areas. As a practical example of group decision-making and modeling of uncertainty, we implemented fuzzy analytical hierarchical process to aggregate different perspectives and obtain the criteria weights and	10.1007/s00500-021-05599-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-021-05599-3	SpringerLink
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		<p>combined it with TOPSIS and VIKOR methods. To do this, by means of expert panel, we evaluated practitioner's perception about the surveyed technologies concerning the ISO/IEC 9126 standard. The results indicate that both methods have shown similar rankings, and although portability was considered the most relevant criterion, open-source tools are key issues when choosing ACC technologies. Several further research trends were also pointed out through this theoretical–empirical approach, such as the use of natural language processing, declarative rule processing and flow-based processing.</p>			
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Software Engineering und Software-Engineering-Forschung im Zeitalter der Digitalisierung	Felderer, Michael, Reussner, Ralf, Rumpe, Bernhard,	Die Digitalisierung und der damit verbundene digitale Wandel durchdringen alle Lebensbereiche. Qualitativ hochwertige Software ist der zentrale Baustein und Treiber der Digitalisierung. Damit nimmt auch das ingenieurmäßige Erstellen von Software, das Software Engineering, eine zentrale Rolle im digitalen Wandel ein und ist dabei selbst großen Veränderungen unterworfen. Dieser Artikel versucht deshalb eine Standortbestimmung des Software Engineering und seiner Forschung im Zeitalter der Digitalisierung vorzunehmen.	10.1007/s00287-020-01322-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00287-020-01322-y	SpringerLink
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Understanding large-scale software systems – structure and flows	Levy, Omer, Feitelson, Dror G.,	<p>Program comprehension accounts for a large portion of software development costs and effort. The academic literature contains mainly research on program comprehension of short code snippets, but comprehension at the system level is no less important. We claim that comprehending a software system is a distinct activity that differs from code comprehension. We interviewed experienced developers, architects, and managers in the software industry and open-source community, to uncover the meaning of program comprehension at the system level; later we conducted a survey to verify the findings. The interviews demonstrate, among other things, that system comprehension is largely detached from code and programming language, and includes scope that is not captured in the code. It focuses on one hand on the structure of the system, and on the other hand on the flows in the system, but less on the code itself. System comprehension is a continuous, unending, iterative process, which utilizes white-box and black-box approaches at different layers of the system depending on needs, and</p>	10.1007/s10664-021-09938-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-021-09938-8	SpringerLink
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		combines both bottom-up and top-down comprehension strategies. In summary, comprehending a system is not just comprehending the code at a larger scale, and it is not possible to comprehend large systems at the same level as comprehending code.			
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<p>Fighting against COVID-19: what operations research can help and the sense-and-respond framework</p>	<p>Choi, Tsan-Ming,</p>	<p>COVID-19 is affecting all walks of life. To deal with it, we need to make use of scientifically sound tools and models. Operations research (OR), as a well-established field which focuses on deploying analytical tools to solving decision making problems, comes to the rescue. In this paper, by examining the OR literature and practices related to pandemics (including COVID-19), we discuss what OR can help to tackle challenges under COVID-19. We classify the literature into three stages, namely “before pandemic”, “during pandemic” and “after pandemic”. We examine the related literature and reveal the respective research areas and OR methods employed. Then, we propose a future research agenda. Finally, we establish the sense-and-respond OR framework regarding what specific actions should be taken to cope with COVID-19 from the perspectives of governments, healthcare and non-profit-making organizations, and businesses. We believe that the findings of this paper lay the solid foundation to stimulate further OR studies to combat COVID-19.</p>	<p>10.1007/s10479-021-03973-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-021-03973-w</p>	<p>SpringerLink</p>
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<p>Development and validation of a safe communication protocol compliant to railway standards</p>	<p>Bertieri, Duccio, Ceccarelli, Andrea, Zoppi, Tommaso, Mungiello, Innocenzo, Barbareschi, Mario, Bondavalli, Andrea,</p>	<p>Railway systems are composed of a multitude of subsystems, sensors, and actuators that exchange datagrams through safety-critical communication protocols. However, the vast majority of these protocols rely on ad hoc interlacing mechanisms and safety codes which raise the heterogeneity and complexity of the overarching railway system. Therefore, Rete Ferroviaria Italiana, the company who is in charge of managing the Italian railway network, coordinated the definition of the Protocollo Vitale Standard (Standard Vital Protocol). This protocol is inspired to, and compliant with, the communication protocols adopted for the European Train Control System (ETCS) (SUBSET, UNISIG, 037, Euroradio FIS, version 2.3. 0; SUBSET, UNISIG, 098, RBC-RBC safe communication interface, 2007), and it is meant to become the standard layer to enable safe communication between components of the Italian railway system. This paper reports our experience in the design, implementation, verification, and validation of the Protocollo Vitale Standard in compliance with the European safety standards</p>	<p>10.1186/s13173-021-00106-w</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13173-021-00106-w</p>	<p>SpringerLink</p>
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		<p>for railway systems. We first defined a safety plan and a verification and validation plan, which guide the design, development, verification, and validation activities as required by safety standards. Guidelines of such plans have been followed strictly until completion of the work, which concludes with the provision of a safety case where all safety evidences are summarized. Noticeably, we (i) selected appropriate safety mechanisms, (ii) verified the software design, (iii) implemented the software in compliance with code metrics and coding rules, (iv) conducted tests to validate the protocol against its functional and performance requirements, and ultimately (v) devised all relevant documentation and a safety case which summarizes the evidences needed for certification.</p>			
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Method for process-based modeling of combat scenarios using interaction analysis weapon systems	Jeong, Dongsu, Kim, Dohyun, Seo, Yoonho,	<p>, . (M&S) . . , M&S, . M&S, (), . , (PBM) . 3: (1) ; (2) , ; (3) , . , PBM . . , . . With technological advancements, weapon system development has become increasingly complex and costly. Using modeling and simulation (M&S) technology in the conceptual design stage is effective in reducing the development time and cost of weapons. One way to reduce the complexity and trial-and-error associated with weapon development using M&S technology is to develop combat scenarios to review the functions assigned to new weapons. Although the M&S technology is applicable, it is difficult to analyze how effectively the weapons are functioning, because of the dynamic features inherent in combat scenario modeling, which considers interrelations among different weapon entities. To support review of weapon functions including these characteristics, this study develops a process-based modeling (PBM) method to model the interactions between weapons in the combat scenario. This method includes the following three steps: (1) construct virtual models by converting the weapons and the weapon functions</p>	10.1631/FITEE.1900649	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.1900649	SpringerLink
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		<p>into their corresponding components; (2) generate the combat process from the combat scenario, which is derived from the interrelations among weapons under consideration using reasoning rules; (3) develop a process-based model that describes weapon functions by combining the combat process with virtual models. Then, a PBM system based on this method is implemented. The case study executed on this system shows that it is useful in deriving process-based models from various combat scenarios, analyzing weapon functions using the derived models, and reducing weapon development issues in the conceptual design stage.</p>			
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Systemic criticality—a new assessment concept improving the evidence basis for CI protection	Kruse, Philip M., Schmitt, Hanna C., Greiving, Stefan,	With high certainty, extreme weather events will intensify in their impact within the next 10 years due to climate change-induced increases in hazard probability of occurrence and simultaneous increases in socio-economic vulnerability. Data from previous mega-disasters show that losses from disruptions of critical services surpass the value of direct damages in the exposed areas because critical infrastructures [CI] are increasingly (inter-) dependent. Local events may have global impacts. Systemic criticality, which describes the relevance of a critical infrastructure due to its positioning within the system, needs to be addressed to reduce the likelihood of cascading effects. This paper presents novel approaches to operationalise and assess systemic criticality. Firstly, the paper introduces systemic cascade potential as a measurement of systemic criticality. It takes the relevance of a sector and the relevance of its interdependencies into account to generate a relative value of systemic importance for a CI sector. Secondly, an exemplary sectoral assessment of the road network allows reflecting	10.1007/s10584-021-03019-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10584-021-03019-x	SpringerLink
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		<p>the spatial manifestation of the first level of cascading effects. It analyses the impact of traffic interruptions on the accessibility of critical facilities to point out the systemically most critical segments of the municipal road network. To further operationalise the spatial dimension of criticality, a normative assertion determining the worthiness of protection of system components is required. A nationwide spatial flood protection plan incorporates this aspect in Germany for the first time. Its formal approval process was initiated in February 2020.</p>			
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<p>A spatiotemporal analysis of urban resilience to the COVID-19 pandemic in the Yangtze River Delta</p>	<p>Chen, Xiansheng, Quan, Ruisong,</p>	<p>The COVID-19 pandemic has severely affected the normal socioeconomic operation of countries worldwide, causing major economic losses and deaths and posing great challenges to the sustainable development of cities that play a leading role in national socioeconomic development. The strength of urban resilience determines the speed of urban social and economic recovery. This paper constructed a comprehensive evaluation index system for urban resilience under the COVID-19 pandemic scenario considering four dimensions—economy, ecology, infrastructure, and social systems—conducted a quantitative evaluation of urban resilience in the Yangtze River Delta of China, revealed its spatiotemporal differences and change trends, and proposed targeted strategies for improving urban resilience. The results show that (1) the Yangtze River Delta urban resilience system is growing stronger every year, but there are significant differences in the level of urban resilience, its spatial distribution and regional urban resilience. (2) In the Yangtze River Delta urban agglomeration, there is less distribution of</p>	<p>10.1007/s11069-020-04493-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-020-04493-9</p>	<p>SpringerLink</p>
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		<p>areas with a higher resilience index, while those with high and medium resilience levels are more distributed. However, the resilience of most cities is low. (3) The resilience index of eastern coastal cities is significantly higher, and the resilience of cities under the COVID-19 scenario presents obvious east-west differentiation. (4) When constructing urban resilience, the individual situation of cities should be taken into account, measures adjusted according to local conditions, reasonable lessons drawn from effective international urban resilience construction, and reasonable planning policies formulated; it is important to give play to the relationship between the whole and the parts of resilience to achieve unified and coordinated development.</p>			
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Exploring Recovery Strategies for Optimal Interdependent Infrastructure Network Resilience	Almoghatawi, Yasser, González, Andrés D., Barker, Kash,	<p>Infrastructure networks such as power, communication, gas, water, and transportation rely on one another for their proper functioning. Such infrastructure networks are subject to diverse disruptive events, including random failures, malevolent attacks, and natural disasters, which could significantly affect their performance and adversely impact economic productivity. Moreover, the proliferation of interdependencies among infrastructure networks has increased the complexity associated with recovery planning after a disruptive event. Consequently, providing solution approaches to restore interdependent networks following the occurrence of a disruptive event has attracted many researchers in the last decade. The goal of this paper is to help decision makers plan for recovery following the occurrence of a disruptive event, to procure strategies that center not only on recovering the system promptly, but also such that the weighted average performance of the system is maximized during the recovery process (i.e., enhancing its resilience). Accordingly, this paper studies the interdependent network</p>	10.1007/s11067-020-09515-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11067-020-09515-4	SpringerLink
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		<p>restoration problem (INRP) and proposes a resilience-driven multi-objective optimization model to solve it. The proposed model aims to: (i) prioritize the restoration of the disrupted components for each infrastructure network, and (ii) assign and schedule the prioritized networks components to the available work crews, such that the resilience of the system of interdependent infrastructure networks is enhanced considering the physical interdependency among them. The proposed model is formulated using mixed-integer programming (MIP) with the objectives of: (i) enhancing the resilience of the system of interdependent infrastructure networks, and (ii) minimizing the total costs associated with the restoration process (i.e., flow, restoration, and disruption costs). Moreover, the proposed model considers partial disruptions and recovery of the disrupted network components, and partial dependence between nodes in different networks. The proposed model is illustrated through a system of interdependent infrastructure networks after multiple hypothetical earthquakes in Shelby County,</p>			
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<p>Safety requirements for symbiotic human–robot collaboration systems in smart factories: a pairwise comparison approach to explore requirements dependencies</p>	<p>Dede, Georgia, Mitropoulou, Persefoni, Nikolaidou, Mara, Kamalakis, Thomas, Michalakelis, Christos,</p>	<p>Industry 4.0 is expected to deliver significant productivity gain taking advantage of Internet of things (IoT). Smart solutions, enhanced by IoT, are constantly driving revolutionary approaches in multiple domains. Smart factories are one domain where intelligent integrated robotic systems will revolutionize manufacturing, resulting in a complex ecosystem, where humans, robots and machinery are combined. In this setting, human safety requirements are of paramount importance. This paper focuses on symbiotic human–robot collaboration systems (HRC), where human safety requirements are essential. Hence, it aims to explore and prioritize human safety requirement dependencies, as well as their dependencies with other critical requirements of smart factory operation, as effectiveness and performance. Toward this end, the proposed approach is based on SysML to represent the requirements dependencies and pairwise comparisons, a fundamental decision-making method, to quantify the importance of these dependencies. This model-driven approach is used as the primary medium for conveying</p>	<p>10.1007/s00766-020-00337-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-020-00337-x</p>	<p>SpringerLink</p>
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		<p>traceability among human safety requirements as well as traceability from safety requirements to effectiveness and performance requirements in the system model. The analysis is based on the operational requirements identified in the European project HORSE, which aims to develop a methodological/technical framework for easy adaptation of robotic solutions from small-/medium-sized enterprises. Validation of the results is also performed to further elaborate on human safety requirement dependency exploration. The outcomes of this paper may be beneficial for symbiotic HRC systems in the early design stage. As the system is being developed with an emphasis on human safety, all these requirements that have been assessed with highly prioritized dependencies should be taken into account, whereas those with negligible ones have to be ignored since they do not significantly affect the rest of the process. Since operational requirements may be conflicted and incompatible, this approach may be very useful for other systems as well during the system design phase to find the appropriate</p>			
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		<p>solution satisfying the majority of the requirements, giving a priority to the ones with highly ranked dependencies and hence facilitating the implementation phase and afterward the production line. The outcomes may be used as a step in developing a model-driven approach which should be able to support the manufacturing process, facilitating the integration of systems and software modeling, which is increasingly important for robotic systems in smart factories incorporating HRC.</p>			
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Building adaptive context-aware service-based smart systems	Faieq, Soufiane, Saidi, Rajaa, El Ghazi, Hamid, Front, Agnès, Rahmani, Moulay Driss,	Existing smart systems tend to be domain specific and developed end-to-end in an ad hoc manner and thus tend to be time and resource consuming, error prone and hard to interoperate and integrate. The objective of this paper is to provide a method through which the method users can follow a general process model and a uniform set of concepts to define the main elements involved in their targeted smart solution while also thinking about how their system could or should improve, adapt and eventually integrate with other systems. We propose an approach to design smart systems based on the principles of service-oriented computing, context-awareness and adaptability to tackle the previously mentioned issues. The proposed approach, called AS3 (adaptive service-based smart systems), consists of two main contributions. To deal with the interoperability, integration and adaptability issues, we first propose a smart system loop to showcase the capabilities of smart systems, the main concepts in play and their interactions. Then, we propose a method to design	10.1007/s11761-020-00310-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11761-020-00310-0	SpringerLink
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		smart systems that is supported by a product metamodel and a process model. The application of AS3 on a road security-focused intelligent transport system design and simulation shows its relevance and efficiency in designing adaptive smart systems.			
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<p>Fuzzy logic based clustering algorithm for management in critical infrastructure</p>	<p>Kasmi, Ouafae, Baina, Amine, Bellafkih, Mostafa,</p>	<p>Infrastructure interdependency is a bidirectional interconnection between entities of two infrastructures. These Critical Infrastructures (CIs) suffer from several attacks, vulnerabilities, and failures. Indeed a failure in one CI could lead to serious consequences on physical security, economic security, or public health. However, the protection of these infrastructures is essential. The clustering algorithm is considered as one of the best interesting solutions to reduce its impacts. This paper presents a new approach of the Fuzzy Logic-based clustering algorithm to better identify and understand the overall interconnections between entities in CI. The Fuzzy Logic based on the clustering algorithm is split into Cluster heads (CHs) election and Cluster Members formation (CMs) election. The CH is elected by quantifying the degree of dependency of each component and CM is elected by determining their criticality levels using Failure Mode and Effect Analysis method to determine their Number Priority of Risk. The simulation results demonstrate that by adopting our proposed approach, improved management in CIs is gained not</p>	<p>10.1007/s10586-020-03113-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-020-03113-2</p>	<p>SpringerLink</p>
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		only in enhancing the degree of inter/dependency but also in identifying the criticality of interdependencie s, minimizing Round Time Trip of failures nodes detection and reduce uncertainty risks.			
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Exploring the emerging evolution trends of disaster risk reduction research: a global scenario	Orimoloye, I. R., Belle, J. A., Ololade, O. O.,	<p>This study aimed at appraising the scientific research on disaster risk reduction (DRR) and to identify their evolutionary trajectory between 1990 and 2019. This study used published research articles on DRR retrieved from the database of Web of Science on December 9, 2019, which hosted reliable and efficient high-impact scientific research. To assess the previous studies on DRR, we used "Disaster Risk Reduction" as the key term for the studies published during the period using bibliometric innovative techniques. The results reveal that the published studies on DRR from 1990 to 2019 had an annual growth rate of about 3%, which connotes that the studies on DRR have been increasing over time especially during the period of study. The number of articles witnessed a drastic increment with about 110, 123 and 129 articles in the years 2015, 2016 and 2018, respectively, and there was a decline in 2017 (99 articles) during the same period. This study highlights five of the various innovations that can be highly useful in DRR practice; these include geographic information system and remote sensing, disaster risk</p>	10.1007/s13762-020-02847-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13762-020-02847-1	SpringerLink
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		insurance, social networking systems and materials that are resilient to disasters. Such technologies are considered very successful, but they are not always easy to utilise. This study concludes that the DRR-related research hotspots are focused primarily on disaster management and science, environmental science, climate change and ecosystem services.			
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Digital twin-based sustainable intelligent manufacturing: a review	He, Bin, Bai, Kai-Jian,	As the next-generation manufacturing system, intelligent manufacturing enables better quality, higher productivity, lower cost, and increased manufacturing flexibility. The concept of sustainability is receiving increasing attention, and sustainable manufacturing is evolving. The digital twin is an emerging technology used in intelligent manufacturing that can grasp the state of intelligent manufacturing systems in real-time and predict system failures. Sustainable intelligent manufacturing based on a digital twin has advantages in practical applications. To fully understand the intelligent manufacturing that provides the digital twin, this study reviews both technologies and discusses the sustainability of intelligent manufacturing. Firstly, the relevant content of intelligent manufacturing, including intelligent manufacturing equipment, systems, and services, is analyzed. In addition, the sustainability of intelligent manufacturing is discussed. Subsequently, a digital twin and its application are introduced along with the development of intelligent manufacturing based on the	10.1007/s40436-020-00302-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40436-020-00302-5	SpringerLink
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		digital twin technology. Finally, combined with the current status, the future development direction of intelligent manufacturing is presented.			
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Hybrid collective intelligence in a human–AI society	Peeters, Marieke M. M., Diggelen, Jurriaan, Bosch, Karel, Bronkhorst, Adelbert, Neerincx, Mark A., Schraagen, Jan Maarten, Raaijmakers, Stephan,	<p>Within current debates about the future impact of Artificial Intelligence (AI) on human society, roughly three different perspectives can be recognised: (1) the technology - centric perspective , claiming that AI will soon outperform humankind in all areas, and that the primary threat for humankind is superintelligence; (2) the human - centric perspective , claiming that humans will always remain superior to AI when it comes to social and societal aspects, and that the main threat of AI is that humankind's social nature is overlooked in technological designs; and (3) the collective intelligence - centric perspective , claiming that true intelligence lies in the collective of intelligent agents, both human and artificial, and that the main threat for humankind is that technological designs create problems at the collective, systemic level that are hard to oversee and control. The current paper offers the following contributions: (a) a clear description for each of the three perspectives, along with their history and background; (b) an analysis and interpretation of current applications of AI in human society according to each</p>	10.1007/s00146-020-01005-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-020-01005-y	SpringerLink
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		of the three perspectives, thereby disentangling miscommunication in the debate concerning threats of AI; and (c) a new integrated and comprehensive research design framework that addresses all aspects of the above three perspectives, and includes principles that support developers to reflect and anticipate upon potential effects of AI in society.			
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<p>Food Supply Chains as Cyber-Physical Systems: a Path for More Sustainable Personalized Nutrition</p>	<p>Smetana, Sergiy, Aganovic, Kemal, Heinz, Volker,</p>	<p>Current food system evolved in a great degree because of the development of processing and food engineering technologies: people learned to bake bread long before the advent of agriculture; salting and smoking supported nomad lifestyles; canning allowed for longer military marches; etc. Food processing technologies went through evolution and significant optimization and currently rely on minor fraction of energy comparing with initial prototypes. Emerging processing technologies (high-pressure, pulsed electric fields, ohmic heating, ultrasound) and novel food systems (cultured biomass, 3-D bioprinting, cyber-physical chains) try to challenge the existing chains by developing potentially more nutritious and sustainable food solutions. However, new food systems rely on low technology readiness levels and estimation of their potential future benefits or drawbacks is a complex task mostly due to the lack of integrated data. The research is aimed for the development of conceptual guidelines of food production system structuring as cyber-physical systems. The study indicates that cyber-</p>	<p>10.1007/s12393-020-09243-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12393-020-09243-y</p>	<p>SpringerLink</p>
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		<p>physical nature of modern food is a key for the engineering of more nutritious and sustainable paths for novel food systems. Implementation of machine learning methods for the collection, integration, and analysis of data associated with biomass production and processing on different levels from molecular to global, leads to the precise analysis of food systems and estimation of upscaling benefits, as well as possible negative rebound effects associated with societal attitude. Moreover, such data-integrated assessment systems allow transparency of chains, integration of nutritional and environmental properties, and construction of personalized nutrition technologies.</p>			
Dependable Autonomous Commercial Vehicles	Adler, Rasmus, Reich, Jan, Kaypmaz, Cem,		10.1007/s41321-020-0405-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41321-020-0405-z	SpringerLink

Damage detection of wind turbine system based on signal processing approach: a critical review	Kumar, Roshan, Ismail, Mohamed, Zhao, Wei, Noori, Mohammad, Yadav, Arvind R., Chen, Shengbo, Singh, Vikash, Altabey, Wael A., Silik, Ahmad I. H., Kumar, Gaurav, Kumar, Jayendra, Balodi, Arun,	Abstract Numerous damage detection methods have been discovered to provide an early warning at the earliest possible stage against structural damage or any type of abnormality in the wind turbine system. In this paper, a comprehensive literature review is carried out in the field of damage detection for wind turbine systems. Several modern signal processing techniques including time-domain and frequency-domain analysis, joint time–frequency methods, entropy-based damage detection, supervisory control and data acquisition (SCADA), and machine learning approaches are all emphasized, and how to estimate the damage in wind turbine system by utilizing these various approaches is discussed. It is concluded that each of these methods offers its own unique merits and shortcomings in detecting certain types of damage with various levels of complexity. This research paper is aimed to inform the readers and experts about the damage detection techniques of the wind turbine system and fault diagnosis with various advanced signal processing methods. Graphical abstract	10.1007/s10098-020-02003-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10098-020-02003-w	SpringerLink
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Robust requirements gathering for ontologies in smart water systems	Howell, Shaun, Beach, Thomas, Rezgui, Yacine,	Urban environments are urgently required to become smarter to overcome sustainability and resilience challenges whilst remaining economically viable. This involves a vast increase in the penetration of ICT resources, both physical and virtual, with the requirement to factor in built environment, socio-economic and human artefacts. This paper, therefore, proposes a methodology for eliciting, testing, and deploying, requirements in the field of urban cybernetics. This extends best practice requirements engineering principles to meet the demands of this growing niche. The paper follows a case study approach of applying the methodology in the smart water domain, where it achieves positive results. The approach not only heavily utilises iteration alongside domain experts, but also mandates the integration of technical domain experts to ensure software requirements are met. A key novelty of the approach is prioritising a balance between (a) knowledge engineers' tenacity for logical accuracy, (b) software engineers' need for speed, simplicity, and integration with other components, and (c) the domain	10.1007/s00766-020-00335-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-020-00335-z	SpringerLink
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		experts' needs to invoke ownership and hence nurture adoption of the resulting ontology.			
Systemic Methods and Large-Scale Models in Ekistics	Theodosis, Lefteris,	<p>In recent years planning discourse and ideology have been dominated by the smart city movement and yet the past is full theories that address the challenges of the increasingly urban world drawing on scientific concepts and technological advances, in most cases unsuccessfully. This paper describes ekistics, a concept coined by architect-planner C.A. Doxiadis to describe the science of human settlements. It offered a comprehensive, interdisciplinary, and systemic approach that explored worldwide urbanization drawing on mathematics, forecasting models, but also on social sciences. In parallel, the paper reviews Doxiadis Associates' Urban Detroit Area project to denote the clash of systemic methods and large-scale models with urban complexity. The aim is to provide a historical background for assessing the theoretical underpinnings and scope of the smart city model.</p>	10.1007/s00004-020-00531-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00004-020-00531-y	SpringerLink

An Integrated Piezoelectric Sensor Based Energy Efficient Transmission Using Base-Station Controlled Dynamic Clustering Protocol	Subramanian, Arunkumar, Bojan, Vinoth Kumar,	<p>A piezoelectric sensor based energy efficient transmission using base station controlled dynamic clustering protocol (BSCDCP) is proposed in this work. The piezoelectric sensor design and simulation is analyzed with the help of COMSOL finite element modeling and location based energy efficient routing is estimated by BSCDCP hierarchical routing techniques. The sensor voltage $5.2 \text{ V}^{-1} \text{ g}$ acceleration and electrical load impedance $12 \text{ } \Omega$ is distributed uniform voltage to all the nodes and analyze piezoelectric sensor performance based on BSCDCP protocol. The number of iterations the life time of sensor node is increasing with the help of piezoelectric sensor. The numerical results show that 95% accuracy when increase the distance and number of nodes also it suggest to improve the life time of piezoelectric sensor. By using BSCDCP protocol, the optimize piezoelectric sensor frequency and generated voltage is enhance and time duration $0.5 \text{ } \mu\text{s}$ is achieved and simulation done with number of nodes, which is very fast compared to</p>	10.1007/s11277-020-07910-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-07910-1	SpringerLink
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		existing protocol techniques. The overall protocol is best suitable for energy efficient routing for large volume with less latency and accuracy.			
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Embedding autonomy in large-scale IoT ecosystems using CAO and L4G-CAO	Michailidis, Iakovos T., Kapoutsis, Athanasios Ch., Korkas, Christos D., Michailidis, Panagiotis T., Alexandridou, Kyriaki A., Ravanis, Christos, Kosmatopoulos, Elias B.,	<p>Recently, special attention has been paid in developing methodologies and systems for embedding autonomy within smart devices (Things). Moreover, as Things typically operate in an interconnected IoT ecosystem, autonomous operation must be performed in a cooperative fashion so the different Things coordinate their autonomous actions towards meeting high-level objectives and policies. Embedding Things with cooperative autonomy typically requires a tedious and costly effort not only during the original ecosystem deployment but throughout its lifetime. The current study describes CAO (Cognitive Adaptive Optimization)—and its distributed counterpart L4G-CAO (Local for Global Cognitive Adaptive Optimization)—which can overcome this shortcoming. CAO and L4G-CAO—which have recently been introduced and tested in a variety of IoT applications—can embed Things with cooperative autonomy in a plug-n-play fashion, i.e., without requiring the aforementioned tedious and costly effort. Results of the application of the aforementioned approaches in three different</p>	10.1007/s43926-021-00003-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43926-021-00003-w	SpringerLink
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		<p>application domains (smart homes and districts, intelligent traffic systems and coordinated swarms of robots) are also presented. The presented results demonstrate the potential, of both approaches, to exploit the IoT automation functionalities in order to significantly improve the overall IoT performance without tedious effort.</p>			
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QoE in IoT: a vision, survey and future directions	Fizza, Kaneez, Banerjee, Abhik, Mitra, Karan, Jayaraman, Prem Prakash, Ranjan, Rajiv, Patel, Pankesh, Georgakopoulos, Dimitrios,	<p>The rapid evolution of the Internet of Things (IoT) is making way for the development of several IoT applications that require minimal or no human involvement in the data collection, transformation, knowledge extraction, and decision-making (actuation) process. To ensure that such IoT applications (we term them autonomic) function as expected, it is necessary to measure and evaluate their quality, which is challenging in the absence of any human involvement or feedback.</p> <p>Existing Quality of Experience (QoE) literature and most QoE definitions focuses on evaluating application quality from the lens of human receiving application services. However, in autonomic IoT applications, poor quality of decisions and resulting actions can degrade the application quality leading to economic and social losses. In this paper, we present a vision, survey and future directions for QoE research in IoT. We review existing QoE definitions followed by a survey of techniques and approaches in the literature used to evaluate QoE in IoT. We identify and review the role of data from the perspective of IoT architectures,</p>	10.1007/s43926-021-00006-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43926-021-00006-7	SpringerLink
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		which is a critical factor when evaluating the QoE of IoT applications. We conclude the paper by identifying and presenting our vision for future research in evaluating the QoE of autonomic IoT applications.			
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Competing socio-technical narratives in times of grid capacity challenges: the representative case of Sweden	Libertson, Frans,	<p>Background</p> <p>Around the globe the electricity sector is strikingly similar, as regardless of nation it is structured around centralized large-scale power production. However, these centralized systems are currently experiencing operational problems related to climate change, energy security and aging grid infrastructures. In Sweden, the lack of investment and maintenance of the grid have created bottlenecks in certain regions, which are now facing an electricity shortage. This capacity crisis has received the attention of the media and generated a debate around the future trajectory of the electricity system.</p> <p>Results</p> <p>The purpose of this study is to analyze the ongoing media discourse in Sweden to determine whether there is a dominant narrative in the debate and its potential implications. The findings indicate that the government is unanimously held accountable for the electricity shortage and that there is a strong inclination toward a centralized electricity system as a solution.</p> <p>Conclusion</p> <p>The results indicate that the dominating centralized narrative, should it receive too much</p>	10.1186/s13705-021-00279-4	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13705-021-00279-4	SpringerLink
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		traction, might create a technological lock-in and result in overlooking the many advantages of a decentralized electricity system. Ultimately, this might give rise to an outdated electricity system that stalls its transformation toward a more sustainable path.			
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Machine learning classifies predictive kinematic features in a mouse model of neurodegeneration	Huang, Ruyi, Nikooyan, Ali A., Xu, Bo, Joseph, M. Selvan, Damavandi, Hamidreza Ghasemi, Trotha, Nathan, Li, Lilian, Bhattarai, Ashok, Zadeh, Deebea, Seo, Yeji, Liu, Xingquan, Truong, Patrick A., Koo, Edward H., Leiter, J. C., Lu, Daniel C.,	Motor deficits are observed in Alzheimer's disease (AD) prior to the appearance of cognitive symptoms. To investigate the role of amyloid proteins in gait disturbances, we characterized locomotion in APP-overexpressing transgenic J20 mice. We used three-dimensional motion capture to characterize quadrupedal locomotion on a treadmill in J20 and wild-type mice. Sixteen J20 mice and fifteen wild-type mice were studied at two ages (4- and 13-month). A random forest (RF) classification algorithm discriminated between the genotypes within each age group using a leave-one-out cross-validation. The balanced accuracy of the RF classification was $92.3 \pm 5.2\%$ and $93.3 \pm 4.5\%$ as well as False Negative Rate (FNR) of $0.0 \pm 0.0\%$ and $0.0 \pm 0.0\%$ for the 4-month and 13-month groups, respectively. Feature ranking algorithms identified kinematic features that when considered simultaneously, achieved high genotype classification accuracy. The identified features demonstrated an age-specific kinematic profile of the impact of APP-overexpression. Trunk tilt and unstable hip movement	10.1038/s41598-021-82694-3	https://www.nature.com/articles/s41598-021-82694-3.pdf	SpringerLink
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		<p>patterns were important in classifying the 4-month J20 mice, whereas patterns of shoulder and iliac crest movement were critical for classifying 13-month J20 mice. Examining multiple kinematic features of gait simultaneously could also be developed to classify motor disorders in humans.</p>			
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Design and Development of a Cyber Security Framework for National Time Dissemination	Arunachalam, Amutha, Seetharaman, K., Agarwal, Ashish,	Coordinated Universal Time (UTC) is based on the biggest possible number of atomic clocks of various categories, to be found in various regions of the world and connected through a network which allows precise time comparisons amid remote sites. In India, UTC system is followed and cyber security issues are a concern. This research explains the security problems faced with UTC (k) system and describes how enhancement rectifies such problem. There is necessity for single time scale for whole nation. This research adopted qualitative approach and experimental design for carrying out investigation. Data are collected from National Physical Laboratory and National measurement institute of India. Proposed Software to be used in this particular research for implementing the framework is archimate open source. The aim of intention of this research is to design and develop cyber physical security framework for national time dissemination. Security problems are rectified with developed cyber physical security framework. The developed cyber security framework	10.1007/s42979-021-00471-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-021-00471-5	SpringerLink
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		achieves traceability and synchronization in cyber security environment. This research would be helpful for practitioners, academicians, policy-makers, capitalists to understand the need for developing a framework for national time dissemination in cyber-secure environment.			
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Security of internet of things based on cryptographic algorithms: a survey	Mousavi, Seyyed Keyvan, Ghaffari, Ali, Besharat, Sina, Afshari, Hamed,	<p>Internet of Things (IoT) is a new concept in Information and Communications Technology and its structure is based on smart objects communications. It contributes to controlling, managing, and administrating devices through the Internet. IoT is emerging as a key component of the Internet and a vital infrastructure for millions of interconnected objects. Thus, the security of IoT is highly important. Scalable applications and services are vulnerable to various attacks and information leakage, demanding greater levels of security and privacy. For instance, hacking personal information is a challenge in this regard. The present study is an investigation of symmetric, asymmetric and hybrid encryption algorithms for IoT security. Asymmetric key encryption to ensure secure communication between multiple users and thereby avoiding distributing key on an insecure channel. All algorithms are compared based on security factors. Results indicate that Elliptic Curve Cryptography (ECC) has a better performance than other algorithms in the study. ECC to generate smaller, faster and reliable cryptography keys. Also, ECC decreases the</p>	10.1007/s11276-020-02535-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-020-02535-5	SpringerLink
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		memory requirements and the execution encryption/decryption time. This study helps to understand the importance of several security factors in IoT and advancements in cryptography algorithms.			
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<p>An analysis of capability meta-models for expressing dynamic business transformation</p>	<p>Koutsopoulos, Georgios, Henkel, Martin, Stirna, Janis,</p>	<p>Environmental dynamism is gaining ground as a driving force for enterprise transformation. To address the changes, the capabilities of digital enterprises need to adapt. Capability modeling can facilitate this process of transformation. However, a plethora of approaches for capability modeling exist. This study explores how concepts relevant to change have been implemented in the meta-models of these approaches, aiming to visualize relationships among change-related concepts, and identify ways to improve capability modeling toward a more efficient depiction of capability change. The concepts are visualized in concept maps, and a framework is developed to assist the classification of concepts relevant to change functions. Similarities and differences among the existing models are discussed, leading to suggestions toward improvements of capability modeling for capability adaptation.</p>	<p>10.1007/s10270-020-00843-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-020-00843-0</p>	<p>SpringerLink</p>
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<p>A framework for automated multi-stage and multi-step product configuration of cyber-physical systems</p>	<p>Safdar, Safdar Aqeel, Lu, Hong, Yue, Tao, Ali, Shaukat, Nie, Kunming,</p>	<p>Product line engineering (PLE) has been employed to large-scale cyber-physical systems (CPSs) to provide customization based on users' needs. A PLE methodology can be characterized by its support for capturing and managing the abstractions as commonalities and variabilities and the automation of the configuration process for effective selection and customization of reusable artifacts. The automation of a configuration process heavily relies on the captured abstractions and formally specified constraints using a well-defined modeling methodology. Based on the results of our previous work and a thorough literature review, in this paper, we propose a conceptual framework to support multi-stage and multi-step automated product configuration of CPSs, including a comprehensive classification of constraints and a list of automated functionalities of a CPS configuration solution. Such a framework can serve as a guide for researchers and practitioners to evaluate an existing CPS PLE solution or devise a novel CPS PLE solution. To validate the framework, we conducted three real-world case studies. Results show that the framework fulfills</p>	<p>10.1007/s10270-020-00803-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-020-00803-8</p>	<p>SpringerLink</p>
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		<p>all the requirements of the case studies in terms of capturing and managing variabilities and constraints. Results of the literature review indicate that the framework covers all the functionalities concerned by the literature, suggesting that the framework is complete for enabling the maximum automation of configuration in CPS PLE.</p>			
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Empirical assessment of generating adversarial configurations for software product lines	Temple, Paul, Perrouin, Gilles, Acher, Mathieu, Biggio, Battista, Jézéquel, Jean-Marc, Roli, Fabio,	<p>Software product line (SPL) engineering allows the derivation of products tailored to stakeholders' needs through the setting of a large number of configuration options. Unfortunately, options and their interactions create a huge configuration space which is either intractable or too costly to explore exhaustively. Instead of covering all products, machine learning (ML) approximates the set of acceptable products (e.g., successful builds, passing tests) out of a training set (a sample of configurations). However, ML techniques can make prediction errors yielding non-acceptable products wasting time, energy and other resources. We apply adversarial machine learning techniques to the world of SPLs and craft new configurations faking to be acceptable configurations but that are not and vice-versa. It allows to diagnose prediction errors and take appropriate actions. We develop two adversarial configuration generators on top of state-of-the-art attack algorithms and capable of synthesizing configurations that are both adversarial and conform to logical constraints. We empirically assess our</p>	10.1007/s10664-020-09915-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-020-09915-7	SpringerLink
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		generators within two case studies: an industrial video synthesizer (MOTIV) and an industry-strength, open-source Web-app configurator (JHipster). For the two cases, our attacks yield (up to) a 100% misclassification rate without sacrificing the logical validity of adversarial configurations. This work lays the foundations of a quality assurance framework for ML-based SPLs.			
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Autoregressive model extrapolation using cubic splines for damage progression analysis	Yano, Marcus Omori, Villani, Luis G. G., Silva, Samuel, Figueiredo, Eloi,	<p>The application of Structural Health Monitoring (SHM) methods focuses mainly on its initial levels of the hierarchy of damage identification. The contribution of this paper is to propose a new strategy that allows going further, predicting the progression of the damage indices through the extrapolation of Autoregressive (AR) models with one-step-ahead prediction estimated at early-stage damage conditions using piecewise cubic splines. A trending curve capable of predicting the damage progression can be determined, and it allows the extrapolation to future structural conditions based on some assumptions. The data sets of a benchmark involving a three-story building structure are investigated to illustrate the proposed methodology. The extrapolated coefficients in the most severe condition are implemented to identify an extrapolated AR model, and the results are encouraging by adequately reproducing the structure's future behavior if the damage is initially detected and not repaired immediately.</p>	10.1007/s40430-020-02734-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40430-020-02734-3	SpringerLink
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Multi-Level Message Sequence Charts to Validate the Collaborative Automotive Cyber-Physical Systems	Daun, Marian, Tenbergen, Bastian, Brings, Jennifer, Obe, Patricia Aluko,	Autonomous driving and e-mobility are swiftly becoming not only the work of science fiction or popular science, but a reality. A key focus of manufacturers and suppliers in the automotive domain is of course to specify systems that implement this reality. Often, scenarios at type-level are used throughout the development process to specify system behavior and interaction within the car, as scenario models are comparatively easy to understand and can easily be subjected to manual validation. However, autonomous driving and e-mobility require interaction not just of systems within the same car, but collaboration between multiple cars as well as between cars and miscellaneous road infrastructure (e.g., smart road signs). The car becomes a Cyber-Physical System that dynamically forms collaborating networks at runtime with other Cyber-Physical System to create functionality that goes beyond the scope of the individual vehicle (e.g., resolve a traffic jam). Consequently, a plethora of possible compositions of such a network exist and must be specified and validated	10.2991/jase.d.210710.001	http://link.springer.com/openurl/pdf?id=doi:10.2991/jase.d.210710.001	SpringerLink
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		<p>completely to assure their adequate and safe execution at runtime. Doing this at type-level with scenario models becomes prohibitively tedious, error prone, and likely results in unrealistic development cost. To combat this issue, we investigate the use of multi-level Message Sequence Charts to allow for specifying interaction scenarios between collaborative Cyber-Physical System in a network of collaborating automotive Cyber-Physical System. To assist the developer in systematically defining multi-level Message Sequence Charts, we propose two processes. The resulting diagrams use a mixture of type and instance-level abstractions within one conceptual diagram. This allows reducing the required effort to manually validate the adequacy of scenarios to a manageable amount because information within the scenarios can be validated in batches. At the same time, instance-level defects become more obvious. Evaluation results from a controlled experiment show that multi-level Message Sequence Charts contribute to effectiveness and efficiency of manual validation for collaborative</p>			
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		automotive Cyber-Physical System.			
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Research on the system function-structure analysis based on its implicit relation	Li, Shasha, Cui, Tiejun,	<p>To understand the system function-structure under different background relations, two analysis methods are proposed based on space fault tree and factor space theory. They are the system function-structure minimal disjunctive formula and the system function-structure simplest formula. The former establishes the axiom system of system function-structure analysis based on factor logic, and proves that the system function-structure obtained by function-structure analysis method is a minimal disjunction formula. The latter gives a more detailed analysis steps based on the former idea, which is mainly used to determine the implicit relation between system function and component function. The background sets consisting of the 16 and 32 background relations are studied with these two methods. The results show that the complete background relations can obtain a certain system function-structure uniquely; the incomplete background relations can obtain a family of certain system function-structures. If the incomplete background relations are a subset of the complete</p>	10.1007/s12652-020-02058-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-020-02058-z	SpringerLink
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		<p>background relations, then the incomplete background relations must has a linear relation between functions to complement the incomplete background relations. At the same time, the system function equivalent and replacement relation are obtained. It is also proved that the system function-structure obtained from several subsets of the background sets is the simplest and the condition required for the simplest structure of the background set is strict. At present, the above methods are mainly used for system reliability analysis in safety system engineering.</p>			
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<p>A Decision-centric approach for secure and energy-efficient cyber-physical systems</p>	<p>Jithish, J., Sankaran, Sriram, Achuthan, Krishnashree,</p>	<p>Cyber-Physical Systems (CPSs) integrate the interdisciplinary fields of computing, networking and control to perform tasks in the real world. CPSs have recently found applications in many battery-powered devices with stringent energy consumption requirements. To ensure secure operation, CPS necessitates sufficient security mechanisms to be incorporated against cyber attacks. However, maximizing energy efficiency and improving security are desirable but contrasting requirements. Towards reducing energy consumption, the optimal strategy for CPS is to initialize the security mechanism dynamically, at the onset of cyberattacks. In the absence of attacks, CPS can deactivate the security mechanism to minimize energy consumption. In the case of CPS, this approach is novel and contrary to the traditional approach of long-term, continual operation of the security mechanism. Towards this goal, we use a decision-centric approach based on Markov Decision Process (MDP) to estimate a threshold upon which the system initiates its security mechanism. We evaluate our proposed</p>	<p>10.1007/s12652-020-01995-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-020-01995-z</p>	<p>SpringerLink</p>
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		<p>mechanism using MATLAB based TrueTime simulator. Evaluation shows that our proposed MDP-based approach achieves maximum energy-savings of 8.26 and 11.05 % in defending against Denial-of-Service and Deception attacks, respectively. Further, our approach can be used to develop sustainable CPS designs that balance the trade-off between energy-efficiency and security.</p>			
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Enhanced petri nets for traceability of food management using internet of things	Balamurugan, S., Ayyasamy, A., Joseph, K. Suresh,	In this paper, we propose efficient food traceability management techniques using the Internet of things and derive a solution for data transmission. The enhanced Petri net model is utilized for food traceability using the improved period data. The application of the food traceability is used to maintain the automation, minimized cost and reduced system complexity. The primary parameter for this system is the food transportation from the producer to the customer. The Internet of Things is utilized to connect the producer to the customer with a smart transportation system. A low-cost solution is obtained using the IoT based food traceability. The application of the food traceability is used to maintain the automation, minimized cost and reduced system complexity. The Enhanced Petri Net model is simulated and the experimental results proved that the proposed Enhanced Petri Net algorithm is more efficient for food traceability management Techniques compared to the K-means and SOM methods.	10.1007/s12083-020-00943-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12083-020-00943-0	SpringerLink
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Systems modelling to support the complex nature of healthcare services	Engelseth, Per, White, B. E., Mundal, Ingunn, Eines, Trude Fløystad, Kritchanchai, Duangpun,	Healthcare is a service commonly associated with lacking performance in relation to output and the economy of production. Contingency theory and complex systems thinking are approaches here combined to study the logistics of healthcare service flows. Contingency theory directs attention to networked interdependencies while complex systems thinking concerns process emergence and flexible resource use in supporting logistics. This hybrid form of analysis gives conceptual direction to information technology development and use to support the logistics of healthcare services. Three small examples of healthcare service as logistics processes in their as-is state are provided and analysed based on the developed analytical framework. These illustrate in detail what exemplifies complexity in this industry. Given the inherently complex nature of many types of healthcare services, this discussion concerns how to conceptually model information systems in healthcare services as a complex system. This chosen complexity-sensitive approach of service logistics constitutes a	10.1007/s12553-020-00504-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12553-020-00504-8	SpringerLink
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		<p>basis for information technology enabled healthcare service development sensitive to this type of service provision directing focus to the emergent features of healthcare service needs. It is also a basis for further investigation into this topic of information technology use to support the inherent logistical complexity of healthcare services.</p>			
Foreword	Kasturirangan, K., Jayaraman, V.,		10.1007/s12524-021-01315-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12524-021-01315-8	SpringerLink

Cybersecurity hazards and financial system vulnerability: a synthesis of literature	Uddin, Md. Hamid, Ali, Md. Hakim, Hassan, Mohammad Kabir,	<p>In this paper, we provide a systematic review of the growing body of literature exploring the issues related to pervasive effects of cybersecurity risk on the financial system. As the cybersecurity risk has appeared as a significant threat to the financial sector, researchers and analysts are trying to understand this problem from different perspectives. There are plenty of documents providing conceptual discussions, technical analysis, and survey results, but empirical studies based on real data are yet limited. Besides, the international and national regulatory bodies suggest guidelines to help banks and financial institutions managing cyber risk exposure. In this paper, we synthesize relevant articles and policy documents on cybersecurity risk, focusing on the dimensions detrimental to the banking system's vulnerability. Finally, we propose five new research avenues for consideration that may enhance our knowledge of cybersecurity risk and help practitioners develop a better cyber risk management framework.</p>	10.1057/s41283-020-00063-2	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41283-020-00063-2	SpringerLink
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Toward indicators of the performance of US infrastructures under climate change risks	Wilbanks, Thomas J., Zimmerman, Rae, Julius, Susan, Kirshen, Paul, Smith, Joel B., Moss, Richard, Solecki, William, Ruth, Matthias, Conrad, Stephen, Fernandez, Steven J., Matthews, Michael S., Savonis, Michael J., Scarlett, Lynn, Schwartz, Henry G., Jr, Toole, G. Loren,	Built infrastructures are increasingly disrupted by climate-related extreme events. Being able to monitor what climate change implies for US infrastructures is of considerable importance to all levels of decision-makers. A capacity to develop cross-cutting, widely applicable indicators for more than a dozen different kinds of infrastructure, however, is severely limited at present. The development of such indicators must be considered an ongoing activity that will require expansion and refinement. A number of recent consensus reports suggest four priorities for indicators that portray the impacts of climate change, climate-related extreme events, and other driving forces on infrastructure. These are changes in the reliability of infrastructure services and the implications for costs; changes in the resilience of infrastructures to climate and other stresses; impacts due to the interdependencies of infrastructures; and ongoing adaptation in infrastructures.	10.1007/s10584-020-02942-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10584-020-02942-9	SpringerLink
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High-end weapon equipment portfolio selection based on a heterogeneous network model	Li, Jichao, Ge, Bingfeng, Jiang, Yang, Kewei, Chen, Yingwu,	<p>The selection and development of high-end weapon equipment is a strategic issue for nations. High-end weapon equipment portfolio selection (HWEPS) has attracted much attention because it is closely related to the production, deployment, and operation of weapons, which is a crucial factor determining the outcome of a war. This paper presents a united framework called capability-oriented weapon system portfolio selection (CWSPS) to solve the HWEPS problem based on a heterogeneous combat network. Specifically, the concept of an operation loop is introduced and a heterogeneous combat network model is proposed, with consideration of the different types of functional entities and information flows of high-end weapon equipment systems. Based on this, a new measure called the operational capability evaluation index (OCEI) is first proposed to assess the operational execution capability of a portfolio of high-end equipment systems. Then, a portfolio selection model is established by maximizing the cost-OCEI efficiency of high-end weapon equipment, with capability demand and the budget restriction</p>	10.1007/s10898-018-0687-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10898-018-0687-1	SpringerLink
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		as constraints. Finally, both an empirical case of missile defense system and numerical experiments are taken to demonstrate the reliability and effectiveness of CWSPS, and results show that our method can achieve very good performance in solving the HWEPS problem.			
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<p>Appraisal of a Ship's Cybersecurity efficiency: the case of piracy</p>	<p>Karahalios, Hristos,</p>	<p>New information technologies are beneficial for ship operations in terms of safety and utilisation of company resources. However, new cybercrime threats have emerged affecting , both ship safety and security that need to be assessed and evaluated. At the moment, actions of the maritime industry to keep pace dealing with such threats are slow when compared with other business sectors. As a high concern, maritime pirates could take advantage of cybersecurity breaches to monitor ship activity and gain information for potential protective failures. In 2021 companies and seafarers should be able to demonstrate knowledge and safeguard policies of their companies. Nevertheless, there is limited discussion on how companies will educate seafarers for existing threats. Therefore, in this study, a risk-based methodology is proposed for evaluation of cybersecurity threats in the context of a piracy attack. STPA-SafeSec's analysis is used to identify security threats, and FAHP is utilised for evaluating the severity of each security constraint. Audits on 15 ships with 315 seafarers indicated that there are</p>	<p>10.1007/s12198-020-00223-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-020-00223-1</p>	<p>SpringerLink</p>
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		significant security gaps mainly due to lack of awareness from operators and seafarers. However, physical security and network protection that already apply to ships are significant security strengths.			
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<p>Aided design of market mechanisms for electricity clusters</p>	<p>Kaletka, Mariusz,</p>	<p>There are two pillars of sustainable development in the electricity sector: renewable energy and energy efficiency. Both can be addressed by a concept of electrical energy cluster, which is a local area power system that works towards self-balancing. In this paper, we consider the problem of designing the market mechanism for an electrical energy cluster. This task is complex and extensive with ill-defined constraints and criteria. Therefore, we propose the ARchitecture for Market Systems, a well-defined reference architecture that captures the entire design process and helps the designer to navigate through it. The contribution of the paper lies in structuring the cluster mechanism design problem through problem decomposition into several areas called views. Within this architecture, a mechanism is being designed by choosing parameters from the space of solutions, visualising the concept on different schemas, and applying simulation models for evaluation purposes. Based on our reference architecture, we also propose a decision support system (DSS) for</p>	<p>10.1007/s10100-019-00640-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10100-019-00640-1</p>	<p>SpringerLink</p>
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		the market designer. We prove the usefulness of the approach by implementing a part of the DSS concept and by presenting its application for exemplary cluster design processes.			
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Marine Robots for Underwater Surveillance	Terracciano, D.S., Bazzarello, L., Caiti, A., Costanzi, R., Manzari, V.,	<p>Purpose of Review The paper reviews the role of marine robots, in particular unmanned vehicles, in underwater surveillance, i.e. the control and monitoring of an area of competence aimed at identifying potential threats in support of homeland defence, antiterrorism, force protection and Explosive Ordnance Disposal (EOD). Recent Findings The paper explores separately robotic missions for identification and classification of threats lying on the seabed (e.g. EOD) and anti-intrusion robotic systems. The current main scientific challenge is identified in terms of enhancing autonomy and team/swarm mission capabilities by improving interoperability among robotic vehicles and providing communication networking capabilities, a non-trivial task, giving the severe limitations in bandwidth and latency of acoustic underwater messaging.</p> <p>Summary The work is intended to be a critical guide to the recent prolific bibliography on the topic, providing pointers to the main recent advancements in the field, and to give also a set of references in</p>	10.1007/s43154-020-00028-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s43154-020-00028-z	SpringerLink
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		terms of mission and stakeholders' requirements (port authorities, coastal guards, navies).			
The Geodesist's Handbook 2020	Poutanen, Markku, Rózsa, Szabolcs,		10.1007/s00190-020-01434-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00190-020-01434-z	SpringerLink

Emergence in cyber-physical systems: potential and risk	Tyszberowicz, Shmuel, Faitelson, David,	<p>Cyber-physical systems (CPSs) are distributed assemblages of computing, communicating, and physical components that sense their environment, algorithmically assess the incoming information, and affect their physical environment. Thus, they share a common structure with other complex adaptive systems, and therefore share both the possible benefits and the probable harmful effects of emergent phenomena. Emergence is an often unexpected pattern that arises from the interactions among the individual system components and the environment. In this paper we focus on three major problems concerning emergence in the context of CPSs: how to successfully exploit emergence, how to avoid its detrimental effects in a single CPS, and how to avoid harmful emergence that arises due to unexpected interaction among several independently developed CPSs that are operating in the same environment. We review the state of the research with regard to these problems and outline several approaches that could be used to address them.</p>	10.1631/FITEE.2000279	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.2000279	SpringerLink
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Space-Based Earth Observations for Disaster Risk Management	Le Cozannet, G., Kervyn, M., Russo, S., Ifejika Speranza, C., Ferrier, P., Foumelis, M., Lopez, T., Modaresi, H.,	As space-based Earth observations are delivering a growing amount and variety of data, the potential of this information to better support disaster risk management is coming into increased scrutiny. Disaster risk management actions are commonly divided into the different steps of the disaster management cycle, which include: prevention, to minimize future losses; preparedness and crisis management, often focused on saving lives; and post-crisis management aiming at re-establishing services supporting human activities. Based on a literature review and examples of studies in the area of coastal, hydro-meteorological and geohazards, this review examines how space-based Earth observations have addressed the needs for information in the area of disaster risk management so far. We show that efforts have essentially focused on hazard assessments or supporting crisis management, whereas a number of needs still remain partly fulfilled for vulnerability and exposure mapping, as well as adaptation planning. A promising way forward to maximize the	10.1007/s10712-020-09586-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10712-020-09586-5	SpringerLink
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		<p>impact of Earth observations includes multi-risk approaches, which mutualize the collection of time-evolving vulnerability and exposure data across different hazards. Opportunities exist as programmes such as the Copernicus Sentinels are now delivering Earth observations of an unprecedented quality, quantity and repetitiveness, as well as initiatives from the disaster risk science communities such as the development of observatories. We argue that, as a complement to this, more systematic efforts to (1) build capacity and (2) evaluate where space-based Earth observations can support disaster risk management would be useful to maximize its societal benefits.</p>			
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Human-cyber-physical systems: concepts, challenges, and research opportunities	Liu, Zhiming, Wang, Ji,	<p>In this perspective article, we first recall the historic background of human-cyber-physical systems (HCPSs), and then introduce and clarify important concepts. We discuss the key challenges in establishing the scientific foundation from a system engineering point of view, including (1) complex heterogeneity, (2) lack of appropriate abstractions, (3) dynamic black-box integration of heterogeneous systems, (4) complex requirements for functionalities, performance, and quality of services, and (5) design, implementation, and maintenance of HCPS to meet requirements. Then we propose four research directions to tackle the challenges, including (1) abstractions and computational theory of HCPS, (2) theories and methods of HCPS architecture modelling, (3) specification and verification of model properties, and (4) software-defined HCPS. The article also serves as the editorial of this special section on cyber-physical systems and summarises the four articles included in this special section.</p>	10.1631/FITEE.2000537	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.2000537	SpringerLink
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A survey of model-driven techniques and tools for cyber-physical systems	Liu, Bo, Zhang, Yuan-rui, Cao, Xue-lian, Liu, Yu, Gu, Bin, Wang, Tie-xin,	Cyber-physical systems (CPSs) have emerged as a potential enabling technology to handle the challenges in social and economic sustainable development. Since it was proposed in 2006, intensive research has been conducted, showing that the construction of a CPS is a hard and complex engineering process due to the nature of integrating a large number of heterogeneous subsystems. Among other approaches to dealing with the complex design issues, model-driven design of CPSs has shown its advantages. In this review paper, we present a survey of research on model-driven development of CPSs. We are concerned mainly with the widely used methods, techniques, and tools, and discuss how these are applied to CPSs. We also present comparative analyses on the surveyed techniques and tools from various perspectives, including their modeling languages, functionalities, and the challenges which they address in CPS design. With our understanding of the surveyed methods, we believe that model-driven approaches are an inevitable choice in building CPSs and further research effort is	10.1631/FITEE.2000311	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.2000311	SpringerLink
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		needed in the development of model-driven theories, techniques, and tools. We also argue that a unified modeling platform is needed. Such a platform would benefit research in the academic community and practical development in industry, and improve the collaboration between these two communities.			
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Concept and engineering development of cyber physical production systems: a systematic literature review	Wu, Xuan, Goepp, Virginie, Siadat, Ali,	Cyber Physical Systems (CPSs) play a crucial role in the Industry 4.0 paradigm. The application of CPSs in production and manufacturing environments gave rise to the term Cyber Physical Production Systems (CPPSs). There is a growing interest in CPPSs, yet research in this area is scattered and needs to be reviewed for understanding their development status and maturity. The aim of this study is to carry out a systematic literature review (SLR) to analyze the current research activities on CPPSs according to their contributions to the engineering life cycle of such production system. Firstly, a method for SLR is presented. Then, literature analysis of CPPSs is conducted to present research activities in the light of the concept development and engineering development stages. Finally, based on the results of the literature analysis, a concept map of CPPSs research is proposed, which depicts the existing research topics in the engineering life cycle of CPPSs. And we exploit it to propose a research agenda of the CPPSs integration process required to ensure their efficient industrial	10.1007/s00170-020-06110-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-020-06110-2	SpringerLink
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		use. Findings of this review can help researchers to examine the maturity of the development status of CPPSs, to discover which phases require improvement, and to know the future research directions for their industrial practices.			
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A contingency lens on cloud provider management processes	Oesterle, Severin, Jöhnk, Jan, Keller, Robert, Urbach, Nils, Yu, Xin,	<p>Traditional ways of managing information technology (IT) service providers are no longer applicable as companies use more and more services provisioned in the cloud. Therefore, organizations are looking for new ways to manage their relationship with cloud providers. The shift from IT-as-a-product to IT-as-a-service puts clients in a continued dependency on cloud service providers (CSPs), making provider management a critical factor for companies' success. In this paper, we (1) identify cloud-specific challenges in managing CSPs, (2) develop a corresponding process framework for CSP management, and (3) discuss and extend this framework. Our final cloud management framework comprises ten processes for effective CSP management based on a literature study and twelve expert interviews. Furthermore, we unpack three major contingency factors, i.e., client-provider ratio, specificity, and service delivery model, which influence the reasonability and configuration of the cloud management processes. Drawing on two specific cases from our interview study, we explicate the</p>	10.1007/s40685-020-00128-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40685-020-00128-8	SpringerLink
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		contingency factors' influence. Thus, our paper contributes to cloud sourcing research by deepening the understanding of client-provider relationships and by introducing a viable CSP management instrument contingent on three salient factors of cloud service provisioning.			
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<p>Discrete game-theoretic analysis of defense in correlated cyber-physical systems</p>	<p>He, Fei, Zhuang, Jun, Rao, Nageswara S. V.,</p>	<p>A cyber-physical system (CPS) is composed of a discrete number of cyber and physical components and subject to internal failures and external disruptions. The functionality of CPS therefore is determined not only by cyber and physical components but the adversary's attacker strategy. We characterize the effect of cyber-physical interdependency on the CPS survival probability using a product-form function with cyber and physical exponential correlation coefficients. We model simultaneous and sequential discrete games between the provider and attacker on a CPS infrastructure to analyze its survivability and reinforcement strategy at Nash equilibrium. Our results show that the cyber and physical correlation coefficients can significantly affect CPS survival probability. In general, the provider's cyber- (or physical-) reinforcement level increases as the cyber- (or physical-) attack level increases. In each of cyber and physical domains, the reinforcement level first increases then decreases in its own correlation coefficient, probability of successful component attacks, and</p>	<p>10.1007/s10479-019-03381-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-019-03381-1</p>	<p>SpringerLink</p>
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		<p>maximum level of available resources, but decreases in the correlation coefficient of the other domain. We apply this game-theoretic analysis to a cloud computing infrastructure, and show that its residual capacity is relatively high when the attacker has no information about the distribution of servers. Also, a high level of survival probability does not necessarily lead to high utility.</p>			
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Earth Observations for Coastal Hazards Monitoring and International Services: A European Perspective	Benveniste, Jérôme, Manda, Mioara, Melet, Angélique, Ferrier, Pierrick,	<p>This article aims to provide a tour of satellite missions for Coastal Hazards Monitoring, of relevant applications, as well as the downstream International Services such as the Copernicus Ocean and Land Monitoring Services. Earth observation (EO) satellite remote sensing provides global, repetitive and long-term observations with increasing resolution with every new generation of sensors. They permit the monitoring of small-scale signals like the ones impacting the coastal zone. EO missions are showcased in this article.</p> <p>Transforming the data products based on the satellite mission ground segment (usually called geophysical products, geophysical data records or so-called Level 2 products) into information useable by managers and decision-makers is done by downstream international services. This is an essential step to increase the uptake of satellite data for the benefit of society. Here, the type of services provided by, e.g., the European Copernicus Programme, is described along with examples of applications, such as monitoring storm surges.</p>	10.1007/s10712-020-09612-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10712-020-09612-6	SpringerLink
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<p>MDWA: a model-driven Web augmentation approach—coping with client- and server-side support</p>	<p>Urbiet, Matias, Firmenich, Sergio, Bosetti, Gabriela, Maglione, Pedro, Rossi, Gustavo, Olivero, Miguel Angel,</p>	<p>Web augmentation is a set of techniques allowing users to define and execute software which is dependent on the presentation layer of a concrete Web page. Through the use of specialized Web augmentation artifacts, the end users may satisfy several kinds of requirements that were not considered by the analysts, developers and stakeholders that built the application. Although some augmentation approaches are contemplating a server-side counterpart (to support aspects such as collaboration or cross-browser session management), the augmentation artifacts are usually purely client-side. The server-side support increases the capabilities of the augmentations, since it may allow sharing information among users and devices. So far, this support is often defined and developed in an ad hoc way. Although it is clear that server-side support brings new possibilities, it is also true that developing and deploying server-side Web applications is a challenging task that end users hardly may handle. This work presents a novel approach for designing Web augmentation applications based on client-</p>	<p>10.1007/s10270-020-00779-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-020-00779-5</p>	<p>SpringerLink</p>
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		<p>side and server-side components. We propose a model-driven approach that raises the abstraction level of both, client- and server-side developments. We provide a set of tools for designing the composition of the core application with new features on the back-end and the augmentation of pages in the front-end. The usability and the value of the produced augmentations have been evaluated through two experiments involving 30 people in total.</p>			
Abstracts from the 9th DACH+ Conference on Energy Informatics			10.1186/s42162-020-00113-9	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-020-00113-9	SpringerLink

<p>A Systematic Review on Software Architectures for IoT Systems and Future Direction to the Adoption of Microservices Architecture</p>	<p>Razzaq, Abdul,</p>	<p>The Internet of Things-based systems and software allow computations anywhere at any time by interconnecting individuals, networks, services, computers and artefacts that allow autonomous systems to form digitized communities. As the blueprint for software-intensive applications, and software architecture that precise the complexity of a network's planning, development, and changing phases to effectively and efficiently build complex IoT-driven applications. In any case, there exists no comprehensive analysis in the state of the research on the adoption of MSA for IoT systems. This study effort is needed to explore architectural concepts and practices for designing and developing IoT software to excel state-of-the-art for IoTs along with suggestions and recommendations for IoT software to the adoption of MSA to fulfil the identified gaps. A systematic analysis was coordinated, covering up the literature on existing IoT solutions by studying 140 qualitatively selected articles performed between 2005 and Jan 2020. One hundred forty articles were</p>	<p>10.1007/s42979-020-00359-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-020-00359-w</p>	<p>SpringerLink</p>
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		<p>comprised in this SLR. The findings of this study demonstrated different research topics including software architectural styles, patterns, and models to build IoT software. This research presents cloud-based computing environments, autonomous, software-defined networking, and responsive applications, and IoT-driven agent-based systems, (1) thirteen MSA architectural and design patterns for IoTs and classification of patterns, (2) classification of software architectures for IoTs into nine main categories and their sub-categories, (3) twenty-three most investigated IoT challenges, and (4) mapping of IoT challenges with software architectural solutions. The study revealed the innovative work on IoT software architecture and trends that help in the creation and dynamic adaptation of IoT software for reusability, automation and human decision-making. The outputs of this SLR are useful in revealing many recommendations to the software industry, software engineering community, and computer sciences community with over the past 15 years of research into the adoption of MSA. This study reflects a distilled awareness of</p>			
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		architectural practices and principles to assist researchers and practitioners in promoting information sharing software architectural roles and responsibilities for the Internet of Things software.			
A survey on data analysis on large-Scale wireless networks: online stream processing, trends, and challenges	Medeiros, Dianne S. V., Cunha Neto, Helio N., Lopez, Martin Andreoni, S. Magalhães, Luiz Claudio, Fernandes, Natalia C., Vieira, Alex B., Silva, Edelberto F., F. Mattos, Diogo M.,	In this paper we focus on knowledge extraction from large-scale wireless networks through stream processing. We present the primary methods for sampling, data collection, and monitoring of wireless networks and we characterize knowledge extraction as a machine learning problem on big data stream processing. We show the main trends in big data stream processing frameworks. Additionally, we explore the data preprocessing, feature engineering, and the machine learning algorithms applied to the scenario of wireless network analytics. We address challenges and present research projects in wireless network monitoring and stream processing. Finally, future perspectives, such as deep learning and reinforcement learning in stream processing, are anticipated.	10.1186/s13174-020-00127-2	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-020-00127-2	SpringerLink

Automating threat modeling using an ontology framework	Välja, Margus, Heiding, Fredrik, Franke, Ulrik, Lagerström, Robert,	Threat modeling is of increasing importance to IT security, and it is a complex and resource demanding task. The aim of automating threat modeling is to simplify model creation by using data that are already available. However, the collected data often lack context; this can make the automated models less precise in terms of domain knowledge than those created by an expert human modeler. The lack of domain knowledge in modeling automation can be addressed with ontologies. In this paper, we introduce an ontology framework to improve automatic threat modeling. The framework is developed with conceptual modeling and validated using three different datasets: a small scale utility lab, water utility control network, and university IT environment. The framework produced successful results such as standardizing input sources, removing duplicate name entries, and grouping application software more logically.	10.1186/s42400-020-00060-8	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42400-020-00060-8	SpringerLink
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Service Selection Using Multi-criteria Decision Making: A Comprehensive Overview	Hosseinzadeh, Mehdi, Hama, Hawkar Kamaran, Ghafour, Marwan Yassin, Masdari, Mohammad, Ahmed, Omed Hassan, Khezri, Hemn,	The growing number of services that can meet the users' functional requirements, inspired many researchers to provide some approaches to rank and select the best possible services regarding their quality of service (QoS) and users' preferences. Considering various criteria which should be considered in the service selection process, multi-criteria decision making (MCDM) techniques have been vastly applied to help a decision-maker in determining the weight of each QoS factor and ranking the services provided by different service providers. This paper provides an extensive investigation of the state of the art MCDM-based service selection schemes proposed in the literature. It provides the required background knowledge and puts forward a taxonomy of the investigated service selection schemes regarding their applied MCDM methods. Also, it describes how the MCDM methods are adapted by the studied schemes, which datasets and QoS criteria are employed by each system, and which factors and environments are utilized to evaluate the service selection schemes. Finally, the concluding remarks are provided, and	10.1007/s10922-020-09553-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10922-020-09553-w	SpringerLink
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		directions for future studies are highlighted.			
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Mitigating heat-related mortality risk in Shanghai, China: system dynamics modeling simulations	Liu, Xiaochen, Tian, Zhan, Sun, Laixiang, Liu, Junguo, Wu, Wei, Xu, Hanqing, Sun, Landong, Wang, Chunfang,	<p>Numerous studies in epidemiology, meteorology, and climate change research have demonstrated a significant association between abnormal ambient temperature and mortality. However, there is a shortage of research attention to a systematic assessment of potential mitigation measures which could effectively reduce the heat-related morbidity and mortality risks. This study first illustrates a conceptualization of a systems analysis version of urban framework for climate service (UFCS). It then constructs a system dynamics (SD) model for the UFCS and employs this model to quantify the impacts of heat waves on public health system in Shanghai and to evaluate the performances of two mitigation measures in the context of a real heat wave event in July 2013 in the city. Simulation results show that in comparison with the baseline without mitigation measures, if the hospital system could prepare 20% of beds available for emergency response to heat waves once receiving the warning in advance, the number of daily deaths could be reduced by 40–60 (15.8–19.5%) on</p>	10.1007/s10653-020-00556-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10653-020-00556-9	SpringerLink
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		<p>the 2 days of day 7 and day 8; if increasing the minimum living allowance of 790 RMB/month in 2013 by 20%, the number of daily deaths could be reduced by 50–70 (17.7–21.9%) on the 2 days of day 8 and day 12. This tool can help policy makers systematically evaluate adaptation and mitigation options based on performance assessment, thus strengthening urban resilience to changing climate.</p>			
Extreme science and engineering	Kusiak, Andrew,		10.1007/s10845-020-01643-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-020-01643-5	SpringerLink

<p>A statistical shape modeling approach for predicting subject-specific human skull from head surface</p>	<p>Nguyen, Tan-Nhu, Tran, Vi-Do, Nguyen, Ho-Quang, Dao, Tien-Tuan,</p>	<p>Human skull is an important body structure for jaw movement and facial mimic simulations. Surface head can be reconstructed using 3D scanners in a straightforward way. However, internal skull is challenging to be generated when only external information is available. Very few studies in the literature focused on the skull generation from outside head information, especially in a subject-specific manner with a complete skull. Consequently, this present study proposes a novel process for predicting a subject-specific skull with full details from a given head surface using a statistical shape modeling approach. Partial least squared regression (PLSR)-based method was used. A CT image database of 209 subjects (genders—160 males and 49 females; ages—34–88 years) was used for learning head-to-skull relationship. Heads and skulls were reconstructed from CT images to extract head/skull feature points, head/skull feature distances, head–skull thickness, and head/skull volume descriptors for the learning process. A hyperparameter turning process was performed to determine the optimal numbers of head/skull</p>	<p>10.1007/s11517-020-02219-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11517-020-02219-4</p>	<p>SpringerLink</p>
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		<p>feature points, PLSR components, deformation control points, and appropriate learning strategies for our learning problem. Two learning strategies (point-to-thickness with/without volume descriptor and distance-to-thickness with/without volume descriptor) were proposed. Moreover, a 10-fold cross-validation procedure was conducted to evaluate the accuracy of the proposed learning strategies. Finally, the best and worst reconstructed skulls were analyzed based on the best learning strategy with its optimal parameters. The optimal number of head/skull feature points and deformation control points are 2300 and 1300 points, respectively. The optimal number of PLSR components ranges from 4 to 8 for all learning configurations. Cross-validation showed that grand means and standard deviations of the point-to-thickness, point-to-thickness with volumes, distance-to-thickness, and distance-to-thickness with volumes learning configurations are 2.48 ± 0.27 mm, 2.46 ± 0.19 mm, 2.46 ± 0.15 mm, and 2.48 ± 0.22 mm, respectively. Thus, the distance-to-</p>			
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		<p>thickness is the best learning configuration for our head-to-skull prediction problem. Moreover, the mean Hausdorff distances are 2.09 ± 0.15 mm and 2.64 ± 0.26 mm for the best and worst predicted skull, respectively. A novel head-to-skull prediction process based on the PLSR method was developed and evaluated. This process allows, for the first time, predicting 3D subject-specific human skulls from head surface information with a very good accuracy level. As perspective, the proposed head-to-skull prediction process will be integrated into our real-time computer-aided vision system for facial animation and rehabilitation. Graphical abstract</p>			
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Fog Computing for Big Data Analytics in IoT Aided Smart Grid Networks	Hussain, Md. Muzakkir, Beg, M. M. Sufyan, Alam, Mohammad Saad,	<p>The recent integration of Internet of Things and Cloud Computing (CC) technologies into a Smart Grid (SG) revolutionizes its operation. The scalable and unlimited Store Compute and Networking (SCN) resources offered by CC enables efficient Big Data Analytics of SG data. However, due to remote location of Cloud Data Centers and congested network traffic, the cloud often gives poor performance for latency and energy critical SG applications. Fog Computing (FC) is thus proposed as a model that distributes the SCN resources at the intermediary devices, termed as Fog Computing Nodes (FCN), viz. network gateways, battery powered servers, access points, etc. By executing application specific logic at those nodes, the FC astonishingly reduces the response time as well as energy consumption of network elements. In this paper, we propose a mathematical framework that explains the Planning and Placement of Fog computing in smart Grid (PPFG). Basically, the PPFG model is formulated as an Integer Linear Programming problem that determines the optimal location, the capacity and the number of</p>	10.1007/s11277-020-07538-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-07538-1	SpringerLink
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		<p>FCNs, towards minimizing the average response delay and energy consumption of network elements. Since this optimization problem is trivially NP-Hard, we solve it using an evolutionary Non-dominated Sorting Genetic Algorithm. By running the model on an exemplary SG network, we demonstrate the operation of proposed PPFG model. In fact, we perform a complete analysis of the obtained Pareto Fronts (PF), in order to better understand the working of design constraints in the PPFG model. The PFs will enable the SG utilities and architectural designers to evaluate the pros and cons of each of the trade-off solutions, leading to intelligent planning, designing and deployment of FC based SG applications.</p>			
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Decomposition Based Cloud Resource Demand Prediction Using Extreme Learning Machines	Kumar, Jitendra, Singh, Ashutosh Kumar,	Cloud computing has drastically transformed the means of computing in past few years. Apart from numerous advantages, it suffers with a number of issues including resource under-utilization, load balancing and power consumption. The workload prediction is being widely explored to solve these issues using time series analysis regression and neural networks based models. The time series analysis based models are unable to capture the dynamics in the workload behavior whereas neural network based models offer better accuracy on the cost of high training time. This paper presents a workload prediction model based on extreme learning machines (ELM) whose learning time is very low and forecasts the workload more accurately. The performance of the model is evaluated over two real world cloud server workloads i.e. CPU and Memory demand traces of Google cluster and compared with predictive models based on state-of-art techniques including Auto Regressive Integrated Moving Average (ARIMA), Support Vector Regression (SVR), Linear Regression (LR), Differential Evolution (DE), Blackhole	10.1007/s10922-020-09557-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10922-020-09557-6	SpringerLink
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		Algorithm (BhA), and Propagation (BP). It is observed that the proposed model outperforms the state-of-art techniques by reducing the mean prediction error up to 100% and 99% on CPU and memory request traces respectively.			
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<p>Credible practice of modeling and simulation in healthcare: ten rules from a multidisciplinary perspective</p>	<p>Erdemir, Ahmet, Mulugeta, Lealem, Ku, Joy P., Drach, Andrew, Horner, Marc, Morrison, Tina M., Peng, Grace C. Y., Vadigepalli, Rajanikanth, Lytton, William W., Myers, Jerry G., Jr.,</p>	<p>The complexities of modern biomedicine are rapidly increasing. Thus, modeling and simulation have become increasingly important as a strategy to understand and predict the trajectory of pathophysiology, disease genesis, and disease spread in support of clinical and policy decisions. In such cases, inappropriate or ill-placed trust in the model and simulation outcomes may result in negative outcomes, and hence illustrate the need to formalize the execution and communication of modeling and simulation practices. Although verification and validation have been generally accepted as significant components of a model's credibility, they cannot be assumed to equate to a holistic credible practice, which includes activities that can impact comprehension and in-depth examination inherent in the development and reuse of the models. For the past several years, the Committee on Credible Practice of Modeling and Simulation in Healthcare, an interdisciplinary group seeded from a U.S. interagency initiative, has worked to codify best practices. Here, we provide Ten Rules for credible practice</p>	<p>10.1186/s12967-020-02540-4</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12967-020-02540-4</p>	<p>SpringerLink</p>
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		<p>of modeling and simulation in healthcare developed from a comparative analysis by the Committee's multidisciplinary membership, followed by a large stakeholder community survey. These rules establish a unified conceptual framework for modeling and simulation design, implementation, evaluation, dissemination and usage across the modeling and simulation life-cycle. While biomedical science and clinical care domains have somewhat different requirements and expectations for credible practice, our study converged on rules that would be useful across a broad swath of model types. In brief, the rules are: (1) Define context clearly. (2) Use contextually appropriate data. (3) Evaluate within context. (4) List limitations explicitly. (5) Use version control. (6) Document appropriately. (7) Disseminate broadly. (8) Get independent reviews. (9) Test competing implementations. (10) Conform to standards. Although some of these are common sense guidelines, we have found that many are often missed or misconstrued, even by seasoned practitioners. Computational models are</p>			
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		already widely used in basic science to generate new biomedical knowledge. As they penetrate clinical care and healthcare policy, contributing to personalized and precision medicine, clinical safety will require established guidelines for the credible practice of modeling and simulation in healthcare.			
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<p>Internet of Things in Animal Healthcare (IoTAH): Review of Recent Advancements in Architecture, Sensing Technologies and Real-Time Monitoring</p>	<p>Karthick, G. S., Sridhar, M., Pankajavalli, P. B.,</p>	<p>In recent days, the Internet of Things (IoT) used to connect many devices and communicate with each other, which created a greater impact on animal healthcare systems. IoT devices are in the form of wearable's that have been used to track the activities of humans. Now, the wearable devices are used in monitoring the activities of the animals. Internet of Things in Animal Healthcare (IoTAH) uses the biosensors and software for monitoring and maintaining the animal health records. These kinds of technologies make a precise health status and sickness projection which are most effective in humans but it can be applied to animals with few changes. Some of those recent technologies acquired the importance of their use in animal healthcare and development. The integration of available medical sensors creates a connected digital platform that empowers the connectivity with pets and livestock with improved efficiency. This article describes the scope of biosensors, computing, communicating, and wearable technologies available for animals. The main intention of this article is to review the recent advancements in the field of animal healthcare which</p>	<p>10.1007/s42979-020-00310-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-020-00310-z</p>	<p>SpringerLink</p>
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		<p>includes domestic, farm, and wild animals. This article reviews the smart technologies available for various categories of animals. The outcomes of this survey are expected to improve the future research and development of animal welfare systems.</p>			
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Systematic mapping study on domain-specific language development tools	Iung, Aníbal, Carbonell, João, Marchezan, Luciano, Rodrigues, Elder, Bernardino, Maicon, Basso, Fabio Paulo, Medeiros, Bruno,	<p>Domain-specific languages (DSL) are programming or modeling languages devoted to a given application domain. There are many tools used to support the implementation of a DSL, making hard the decision-making process for one or another. In this sense, identifying and mapping their features is relevant for decision-making by academic and industrial initiative on DSL development.</p> <p>Objective: The goal of this work is to identify and map the tools, Language Workbenches (LW), or frameworks that were proposed to develop DSLs discussed and referenced in publications between 2012 and 2019.</p> <p>Method: A Systematic Mapping Study (SMS) of the literature scoping tools for DSL development.</p> <p>Results: We identified 59 tools, including 9 under a commercial license and 41 with non-commercial licenses, and analyzed their features from 230 papers.</p> <p>Conclusion: There is a substantial amount of tools that cover a large number of features. Furthermore, we observed that usually, the developer adopts one type of notation to implement the DSL: textual or graphical. We</p>	10.1007/s10664-020-09872-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-020-09872-1	SpringerLink
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		also discuss research gaps, such as a lack of tools that allow meta-meta model transformations and that support modeling tools interoperability.			
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Software requirements testing approaches: a systematic literature review	Santos, Jemison, Martins, Luiz Eduardo G., Santiago Júnior, Valdivino A., Povia, Lucas Venezian, Santos, Luciana Brasil R.,	Testing a software system is an important step approach to ensuring quality, safety, and reliability in safety-critical systems (SCS). Several authors have published new approaches to improve the processes of testing safety requirements taking into consideration existing processes that seek to improve techniques and contribute positively with software developers. This article aims to investigate the main approaches to requirements testing, particularly focusing on safety requirements in the context of SCS. We investigated how these approaches have been developed and what contributions they provide to academia and industry. We evaluated the pros and cons of the approaches and how they related to the joint work of requirements engineers and testers. We performed a systematic literature review (SLR), selecting 53 papers published between 1990 and 2018. Our research was conducted according to the guidelines proposed by Kitchenham and Biolchini. The results of this SLR point out to the new research related to the software and safety-critical	10.1007/s00766-019-00325-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-019-00325-w	SpringerLink
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		<p>systems testing. The results show issues in the integration of requirements engineers with the application test team and gaps in the approaches found, particularly in the applications of the techniques in the industry setting. Moreover, several approaches are presented to solve problems and help to prevent future problems. The results of this research point to the main approaches to requirements testing and their use in academia and industry, as well as the advantages and disadvantages. The shortcomings allow us to suggest new research in safety-critical systems in the scope of validation, verification, specification, and testing of safety requirements, as well as to integrate test teams with requirements engineers in order to get better results. Based on the results, we suggest future studies for improvements in the requirements testing techniques to improve the integration of safety requirements and test cases.</p>			
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A socio-technical-based process for questionnaire development in requirements elicitation via interviews	Wahbeh, Abdullah, Sarnikar, Surendra, El-Gayar, Omar,	<p>Software development is the process of building systems that solve users' need and satisfy stakeholders' objectives. Such needs are determined through requirements elicitation, which is considered an intensive, complex, and multi-disciplinary process. Traditional methods of elicitation often fail to uncover requirements that are critical for successful and wide-scale user adoption because these methods primarily focus on the technical aspects and constraints of the systems rather than considering a socio-technical perspective. The success of information system development involves the identification of the social, organizational and technical features of the systems, which in turn can result in a more acceptable system by users. In this paper, we propose a requirements elicitation process based on socio-technical (ST) systems theory. The process leverages ST system components to help identify a set of ST imbalances, which in turn help in requirements elicitation. The applicability of the process is demonstrated using empirical investigation with a randomized two-group experimental</p>	10.1007/s00766-019-00324-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-019-00324-x	SpringerLink
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		design, where the objective is to see the potential of the proposed process to enhance analysts' understanding of socio-technical aspects of a domain, interview readiness, and questionnaire quality.			
Towards a Quality-of-Thing based approach for assigning things to federations	Maamar, Zakaria, Asim, Muhammad, Boukadi, Khouloud, Baker, Thar, Saeed, Saad, Guidara, Ikbel, Yahya, Fadwa, Ugljanin, Emir, Benslimane, Djamal,	In the context of an Internet-of-Things (IoT) ecosystem, this paper discusses two necessary stages for managing federations of things. The first stage defines things in terms of duties and non-functional properties that define the quality of these duties. And, the second stage uses these properties to assign appropriate things to future federations. Specialized into ad hoc and planned, federations are expected to satisfy needs and requirements of real-life situations like traffic control that arise at run-time. A set of experiments using a mix of real and simulated datasets, demonstrate the technical doability of thing assignment to federations and are presented in the paper, as well.	10.1007/s10586-020-03047-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-020-03047-9	SpringerLink

<p>A digital twin-driven production management system for production workshop</p>	<p>Ma, Jun, Chen, Huimin, Zhang, Yu, Guo, Hongfei, Ren, Yaping, Mo, Rong, Liu, Luyang,</p>	<p>With the rapid development of smart manufacturing, some challenges are emerging in the production management, including the utilization of information technology and the elimination of dynamic disturbance. A digital twin-driven production management system (DTPMS) can dynamically simulate and optimize production processes in manufacturing and achieve real-time synchronization, high fidelity, and real-virtual fusion in cyber-physical production. This paper focuses on establishing DTPMS for production life-cycle management. First, we illustrate how to integrate digital twin technology and simulation platforms. Second, a framework of DTPMS is proposed to support a cyber-physical system of production workshop, including product design, product manufacturing, and intelligent service management. Finally, the proposed DTPMS is applied to the production process of a heavy-duty vehicle gearbox. The experimental results indicate that the defective rate of products and the in-process inventory are reduced by 34% and 89%, respectively, while the one-time pass rate of</p>	<p>10.1007/s00170-020-05977-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-020-05977-5</p>	<p>SpringerLink</p>
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		product inspection is increased by 14.2%, which demonstrates the feasibility and effectiveness of the DTPMS.			
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<p>A Survey of Deep Learning and Its Applications: A New Paradigm to Machine Learning</p>	<p>Dargan, Shaveta, Kumar, Munish, Ayyagari, Maruthi Rohit, Kumar, Gulshan,</p>	<p>Nowadays, deep learning is a current and a stimulating field of machine learning. Deep learning is the most effective, supervised, time and cost efficient machine learning approach. Deep learning is not a restricted learning approach, but it abides various procedures and topographies which can be applied to an immense speculum of complicated problems. The technique learns the illustrative and differential features in a very stratified way. Deep learning methods have made a significant breakthrough with appreciable performance in a wide variety of applications with useful security tools. It is considered to be the best choice for discovering complex architecture in high-dimensional data by employing back propagation algorithm. As deep learning has made significant advancements and tremendous performance in numerous applications, the widely used domains of deep learning are business, science and government which further includes adaptive testing, biological image classification, computer vision, cancer detection, natural language processing, object detection, face recognition, handwriting recognition, speech</p>	<p>10.1007/s11831-019-09344-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11831-019-09344-w</p>	<p>SpringerLink</p>
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		<p>recognition, stock market analysis, smart city and many more. This paper focuses on the concepts of deep learning, its basic and advanced architectures, techniques, motivational aspects, characteristics and the limitations. The paper also presents the major differences between the deep learning, classical machine learning and conventional learning approaches and the major challenges ahead. The main intention of this paper is to explore and present chronologically, a comprehensive survey of the major applications of deep learning covering variety of areas, study of the techniques and architectures used and further the contribution of that respective application in the real world. Finally, the paper ends with the conclusion and future aspects.</p>			
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Software architectures for big data: a systematic literature review	Avci, Cigdem, Tekinerdogan, Bedir, Athanasiadis, Ioannis N.,	Big Data systems are often composed of information extraction, preprocessing, processing, ingestion and integration, data analysis, interface and visualization components. Different big data systems will have different requirements and as such apply different architecture design configurations. Hence a proper architecture for the big data system is important to achieve the provided requirements. Yet, although many different concerns in big data systems are addressed the notion of architecture seems to be more implicit. In this paper we aim to discuss the software architectures for big data systems considering architectural concerns of the stakeholders aligned with the quality attributes. A systematic literature review method is followed implementing a multiple-phased study selection process screening the literature in significant journals and conference proceedings.	10.1186/s41044-020-00045-1	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41044-020-00045-1	SpringerLink
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<p>The Dynamic Computational Model and the New Era of Cloud Computation Using Microsoft Azure</p>	<p>Gundu, Srinivasa Rao, Panem, Charan Arur, Thimmapuram, Anuradha,</p>	<p>The new era of computation has given new directions for advancement and sophistication. The meaning of computation has made a paradigm shift from device and location orientation to the distributed level. Storage has become cheaper. Multiple technologies and their interconnections and their wide range of services have made this planet to be more sophisticated and more flexible in computing. Service orientation based computing of cloud has achieved a huge success. Data centers has already existing even before the emergence of cloud technology, but cloud makes these data centers to communicate, between these data centers and allocate the resources properly and functioning appropriately using a network and to used these resources and maintain them properly. Most of the cloud services providers have their own Data center. 'Azure' online cloud platform provided Microsoft provides cloud services and resources to the end-user. Its pricing mechanism is economical and flexible. One can learn Azure very easily and Micro soft company provides Azure certifications for the one who qualifies with</p>	<p>10.1007/s42979-020-00276-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-020-00276-y</p>	<p>SpringerLink</p>
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Maintaining critical infrastructure resilience to natural hazards during the COVID-19 pandemic: hurricane preparations by US energy companies	Clark-Ginsberg, Aaron, Rueda, Ismael Arciniegas, Monken, Jonathon, Liu, Jay, Chen, Hong,	<p>The COVID-19 pandemic has the potential to compromise the ability of critical infrastructure utilities to respond to or mitigate natural hazards like wildfires and hurricanes. This article describes the ways that an energy organization, the regional transmission operator PJM, is preparing for hurricanes during the COVID-19 pandemic. PJM is using a combination of technological and organizational processes to prepare for hurricanes during the pandemic. Activities include the development of a third control room to increase redundancy and maintaining social distance at control center, investment in more resilient communications technology to maintain connectivity, and taking a holistic approach to identifying issues related to supply chain and fuel security. With this mix of organizational and technological processes, we argue that critical infrastructure resilience should be understood as a sociotechnical construct and identify several recommendations for improving resilience. The article has implications for policymakers working to maintain infrastructure resilience to natural hazards during the COVID-19 pandemic.</p>	10.1186/s43065-020-00010-1	http://link.springer.com/openurl/pdf?id=doi:10.1186/s43065-020-00010-1	SpringerLink
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Status, perspectives and trends of satellite navigation	Hein, Guenter W.,	This paper reviews the status of satellite navigation (as per 11 May 2020)—without claim for completeness—and discusses the various global navigation satellite systems, regional satellite navigation systems and satellite-based augmentation systems. Problems and challenges for delivering nowadays a safe and reliable navigation are discussed. New opportunities, perspectives and megatrends of satellite navigation are outlined. Some remarks are closing this paper emphasizing the great value of satellite navigation at present and in future.	10.1186/s43020-020-00023-x	http://link.springer.com/openurl/pdf?id=doi:10.1186/s43020-020-00023-x	SpringerLink
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Modelling intra-dependencies to assess road network resilience to natural hazards	Der Sarkissian, Rita, Abdallah, Chadi, Zaninetti, Jean-Marc, Najem, Sara,	<p>Estimating the resilience of a road network (one of the essential critical infrastructures in times of crisis) to natural hazards is crucial in achieving the goals of disaster risk reduction (DRR). This study proposes a new predictive method to implement, in an operational way, the concept of resilience by exploring the robustness of the road network in Baalbek-Hermel Governorate (Lebanon) in order to predict its future behavior in response to natural hazards occurrence. The proposed methodology consists of a predictive-spatial-analytic approach based on geospatial numerical models combined with an R-NetSwan function for modeling and simulating critical infrastructures. The results show that Baalbek-Hermel's road network is moderately resilient since it reaches a total loss of connectivity when nearly 60% of its critical nodes are blocked or damaged. Earthquakes proved to be the most disruptive hazards of this network, threatening the connectivity, starting its first damaged nodes, and causing the highest percentages of connectivity loss (70%). The novelty of this method lies in utilizing network analysis to reveal roads resilience</p>	10.1007/s11069-020-03962-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-020-03962-5	SpringerLink
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		<p>to different natural hazards and serve several operational targets: revealing the defects of the road network for improvement or the construction of new detours, as well as allowing the first aid services to better visualize these weaknesses and to better prepare themselves. This study facilitates the implementation of a proactive approach to DRR and the protection of CI networks for better crisis response and much more effective evacuation plans.</p>			
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Research on the urban resilience evaluation with hybrid multiple attribute TOPSIS method: an example in China	Xun, Xiaolin, Yuan, Yongbo,	Cities are important barriers to protect people's lives and property in the face of natural disasters, economic fluctuations and epidemic diseases. The evaluation of urban resilience is a hybrid multiple attribute group decision-making problem involving both crisp and fuzzy indicators. In order to evaluate the urban resilience reasonably and quantitatively, an urban resilience evaluation index system is established, including four primary indicators of ecological environment, municipal facilities, economic development and social development, and 28 secondary indicators. An evaluation model based on the theory of intuitionistic fuzzy set and TOPSIS method is proposed. The intuitionistic trapezoidal fuzzy number is used to quantify the fuzzy index and determine the weights of experts. The weight of each index is determined based on the maximizing deviation method. The relevant data of Dalian City from 2013 to 2017 are collected to evaluate the city resilience, and a sensitivity analysis is carried out based on the proposed model. The results may provide insights for the further	10.1007/s11069-020-04000-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-020-04000-0	SpringerLink
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		urban resilience promotion.			
A Philosophy of Security Architecture Design	Køien, Geir M.,	Digital systems are almost always vulnerable, yet we increasingly depend on these systems. There will be many threats towards these system. In a fully networked system, the vulnerabilities will literally be exposed to the whole world. The exposed vulnerabilities may be transformed into attacks. To counter this state of "vulnerability", the standard remedy is to conduct security requirements analysis and security threat modeling. Threats are assessed, and various countermeasures are devised. The totality of these measures may be described as a security architecture. The goal of a security architecture will largely be to make the system robust and resilient in the face of an adversary. However, we shall argue that this is not enough. Security architecture designs should go one step further, and actually improve the defenses when faced with hostile actions. That is, the security architectures must become antifragile.	10.1007/s11277-020-07310-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-07310-5	SpringerLink

Semi-Quantitative Environmental Impact Assessment of Khewra Salt Mine of Pakistan: an Application of Mathematical Approach of Environmental Sustainability	Naseem, Sobia, Fu, Gao Lei, Mohsin, Muhammad, Rehman, Muhammad Zia-ur, Baig, Sajjad Ahmad,	The environmental sustainability is linked back to human sustainability; the sustainability development comprises the environment, society, and economics. This study mainly focused on mining sustainability and its impact on the environment of Pakistan. For measuring the level and environmental mining sustainability nature to Environmental Impact Assessment (EIA) of the world's second largest salt mine "Khewra," Folchi and Phillips environmental sustainability mathematics (PESM) models are applied. The results indicated that Khewra was deemed to be potentially sustainable for the environment and quality of salt. The results suggest the delicate balance of maintaining sustainability successfully, regarding the mining process in Pakistan which has been affecting the local environment and community so badly. The paper lays emphasis on the potential significance of the model's application for the attainment of sustainable mining goal. This study is essential for researchers, Mining Environmental Impact Assessors, and Government of Pakistan in environmental	10.1007/s42461-020-00214-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42461-020-00214-9	SpringerLink
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		and socioeconomic perspective.			
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Concoction Node Fault Discovery (CNFD) on Wireless Sensor Network Using the Neighborhood Density Estimation in SHM	Surya, S., Ravi, R.,	<p>Structural Health Monitoring (SHM) has been considered to afford up-to-date information about the state of structures by assessing structural vibration responses and further physical phenomena and disorders. Determining the structure conditions is not an easy task which is associated with complex civil structures. The main objective of SHM is earlier damage detection, inspection cost reduction and lifetime estimation. The modern improvements of wireless sensor networks paid attention in the field of structural health monitoring. The deployment of sensors are expected to provide the rich information about civil structures in an effective manner. The main limitations of sensors (small memory size, small communication throughput, limited speed of the CPU) reduce the effectiveness of SHM. We propose concoction node fault discovery approach in order to provide reliable communication in the wireless environment specifically having lot of obstacles. The HRPD algorithm select the Line of sight (LOS) nodes based on extracted RSS features which is higher than non LOS. The selected</p>	10.1007/s11277-020-07623-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-07623-5	SpringerLink
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		<p>intermediate LOS nodes transmit the collected sensing information to the base station with reduced energy consumption. The Statistical link parameter estimation supports to detect the optimal path through continuous analysis of link metrics such like link bandwidth, response time and queue size. The LOS fault tolerant approach determines the faulty LOS nodes, and direct the system towards survivability. The simulation results shows that our proposed approach minimize the energy depletion and enhances the sensor node's life time. The application of the proposed work helps to monitor the structural health of buildings, bridges and towers with high quality monitoring mechanism.</p>			
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From the Internet of Things to the Social Innovation and the Economy of Data	Sánchez, Luis, Lanza, Jorge, Muñoz, Luis,	<p>Historically, cities and their citizens have led the largest changes that have been taking place continuously, especially since the transition from an agricultural economy to an industrial one. This phenomenon is especially significant from the mid-eighteenth century and it will become more intense if the predictions that establish that, around the year 2050, approximately 70% of the world population will concentrate in some type of city finally come true. With these boundary conditions, it is evident that the achievement of more efficient and sustainable cities is an unavoidable objective for which politicians, managers and technicians must work in order to guarantee the quality of life of their citizens. Although this paradigm of sustainability and efficiency has always been present in the managers of cities, it has not been until very recently that technology has made available to the responsible parties a plethora of possibilities that, when properly employed, translate into significant savings. At the same time, the day-to-day improvement of the citizens is consolidating a new urban concept in which</p>	10.1007/s11277-020-07321-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-020-07321-2	SpringerLink
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		<p>the different processes and systems that occur in it are continuously monitored in both time and space. This paper reviews the evolution of one of the pioneering examples of such cities, Santander, where an Internet of the Things infrastructure was deployed a decade ago. In this time, multiple technologies and services have been developed and deployed in smart city pilots. The paper discusses the key lessons learnt from the digitalization of the city and the new challenges that have arisen as we were paving the way for a smarter and more liveable city.</p>			
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<p>A flexible ICT architecture to support ancillary services in future electricity distribution networks: an accounting use case for DSOs</p>	<p>Jindal, Anish, Kronawitter, Jakob, Kühn, Ramona, Bor, Martin, Meer, Hermann, Gouglidis, Antonios, Hutchison, David, Marnerides, Angelos K., Scott, Andrew, Mauthe, Andreas,</p>	<p>With the increased penetration of distributed renewable energy sources (DRES) in the grid, new pathways are required to keep the electricity distribution system stable. The provision of ancillary services (AS) by the DRES can contribute in this regard. However, it is necessary to communicate the need for AS from the third party providers such as distribution system operator (DSO) to the DRES in an efficient and scalable manner. To this end, a flexible information and communication technology (ICT) architecture is presented in this paper, and the requirements for the architecture are elaborated. We argue that this architecture is capable of supporting the present and future needs of electricity distribution networks. To illustrate its utility and effectiveness, an accounting use case for DSOs has been presented; it describes a remuneration scheme for the AS provision. A dashboard has been developed to enable communication via this architecture and to allow control of the grid. In addition, a distributed ledger technology for the realization of accounting has been analysed with respect to its scalability and</p>	<p>10.1186/s42162-020-00111-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-020-00111-x</p>	<p>SpringerLink</p>
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		performance capabilities.			
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Understanding and managing connected extreme events	Raymond, Colin, Horton, Radley M., Zscheischler, Jakob, Martius, Olivia, AghaKouchak, Amir, Balch, Jennifer, Bowen, Steven G., Camargo, Suzana J., Hess, Jeremy, Kornhuber, Kai, Oppenheimer, Michael, Ruane, Alex C., Wahl, Thomas, White, Kathleen,	Extreme weather and climate events and their impacts can occur in complex combinations, an interaction shaped by physical drivers and societal forces. In these situations, governance, markets and other decision-making structures—together with population exposure and vulnerability—create nonphysical interconnections among events by linking their impacts, to positive or negative effect. Various anthropogenic actions can also directly affect the severity of events, further complicating these feedback loops. Such relationships are rarely characterized or considered in physical-sciences-based research contexts. Here, we present a multidisciplinary argument for the concept of connected extreme events, and we suggest vantage points and approaches for producing climate information useful in guiding decisions about them. The impacts of extreme weather and climate can be amplified by physical interactions among events and across a complex set of societal factors. This Perspective discusses the concept and challenge of connected extreme events,	10.1038/s41558-020-0790-4	https://www.nature.com/articles/s41558-020-0790-4.pdf	SpringerLink
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		exploring research approaches and decision-making strategies.			
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<p>Frontiers of business intelligence and analytics 3.0: a taxonomy-based literature review and research agenda</p>	<p>Eggert, Mathias, Alberts, Jens,</p>	<p>Researching the field of business intelligence and analytics (BI & A) has a long tradition within information systems research. Thereby, in each decade the rapid development of technologies opened new room for investigation. Since the early 1950s, the collection and analysis of structured data were the focus of interest, followed by unstructured data since the early 1990s. The third wave of BI & A comprises unstructured and sensor data of mobile devices. The article at hand aims at drawing a comprehensive overview of the status quo in relevant BI & A research of the current decade, focusing on the third wave of BI & A. By this means, the paper's contribution is fourfold. First, a systematically developed taxonomy for BI & A 3.0 research, containing seven dimensions and 40 characteristics, is presented. Second, the results of a structured literature review containing 75 full research papers are analyzed by applying the developed taxonomy. The analysis provides an overview on the status quo of BI & A 3.0. Third, the results foster discussions on the predicted and observed developments in BI & A research of the past</p>	<p>10.1007/s40685-020-00108-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40685-020-00108-y</p>	<p>SpringerLink</p>
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		decade. Fourth, research gaps of the third wave of BI & A research are disclosed and concluded in a research agenda.			
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Grey Wolf based compressive sensing scheme for data gathering in IoT based heterogeneous WSNs	Aziz, Ahmed, Osamy, Walid, Khedr, Ahmed M., El-Sawy, Ahmed A., Singh, Karan,	Sensor node energy constraint is considered as an impediment in the further development of the Internet of Things (IoT) technology. One of the most efficient solution is to combine between compressive sensing (CS) and routing techniques. However, this combination faces many challenges that makes it an attractive point for research. This paper proposes an Efficient Multi-hop Cluster-based Aggregation scheme using Hybrid CS (EMCA-CS) for IoT based heterogeneous wireless sensor networks (WSNs). EMCA-CS efficiently combines between CS and routing protocols to extend the network lifetime and reduces the reconstruction error. EMCA-CS includes the following: a new algorithm to partition the field into various hexagonal cells (clusters) and based on multiple criteria, selects a node from each cluster as cluster head (CH). Each CH will then compress its cluster data using hybrid CS method. Also, a new Grey Wolf based algorithm to create optimal path for CHs to deliver the compressed data to base station (BS) and a CSMO-GWO algorithm to optimize the CS matrix construction	10.1007/s11276-020-02265-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11276-020-02265-8	SpringerLink
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		<p>process is introduced. Moreover, a new Grey Wolf and reversible Greedy based Reconstruction Algorithm is proposed to recover the actual data. The simulation results indicate that the performance of the proposed work exceeds the existing baseline techniques in terms of prolonging WSN lifetime, reducing the power consumption and reducing normalized mean square error.</p>			
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Towards a more complete object-orientation in graph-based design languages	Vogel, Samuel, Arnold, Peter,	In this paper an extension of the design method graph-based design languages is proposed. This is realized by adding object-oriented class methods and interface mechanisms to the design method. Additionally, graphical mechanisms for modeling and calling the methods are proposed. This allows object-oriented design patterns to be transferred to the product design, where they improve the handling of complexity in the product engineering. As result, the proposed extension enables modularization and reuse of engineering knowledge, the integration of engineering domains is enhanced and multi-stakeholder collaboration with security access control (information security) becomes feasible.	10.1007/s42452-020-2959-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-020-2959-x	SpringerLink
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Intelligence Using Automata-Based Nature's Digital Philosophy	Gundu, Srinivasa Rao, Panem, Charan Arur, Thimmapuram, Anuradha,	<p>Science and technology are developing with much faster way to support the needs of the common people around the world. Safe and security is assured by science and technology today. It is to recall the scientists who has struggled and provided improved life style of our lives today. It is expressed in this paper as the intelligence is acquired by all livelihoods from the nature. Today, the intelligence may be common for the human beings, but it is a greatest achievement among all the livelihoods of this planet. It is an achievement from fire to satellite. This paper is an extension to the ideas of 'Konrad Zuse' and his concept of Digital Universe. The manifestations of the acquired intelligence have dictated the terms for all the livelihoods for the diversified development and the proper maintenance of equilibrium position in the nature. The manifestations of the nature determine the existences of all the livelihoods in the living environments.</p>	10.1007/s42979-020-00200-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42979-020-00200-4	SpringerLink
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<p>Cyber risk at the edge: current and future trends on cyber risk analytics and artificial intelligence in the industrial internet of things and industry 4.0 supply chains</p>	<p>Radanliev, Petar, De Roure, David, Page, Kevin, Nurse, Jason R. C., Mantilla Montalvo, Rafael, Santos, Omar, Maddox, La'Treall, Burnap, Pete,</p>	<p>Digital technologies have changed the way supply chain operations are structured. In this article, we conduct systematic syntheses of literature on the impact of new technologies on supply chains and the related cyber risks. A taxonomic/cladistic approach is used for the evaluations of progress in the area of supply chain integration in the Industrial Internet of Things and Industry 4.0, with a specific focus on the mitigation of cyber risks. An analytical framework is presented, based on a critical assessment with respect to issues related to new types of cyber risk and the integration of supply chains with new technologies. This paper identifies a dynamic and self-adapting supply chain system supported with Artificial Intelligence and Machine Learning (AI/ML) and real-time intelligence for predictive cyber risk analytics. The system is integrated into a cognition engine that enables predictive cyber risk analytics with real-time intelligence from IoT networks at the edge. This enhances capacities and assist in the creation of a comprehensive understanding of the opportunities and threats that arise when edge</p>	<p>10.1186/s42400-020-00052-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42400-020-00052-8</p>	<p>SpringerLink</p>
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		computing nodes are deployed, and when AI/ML technologies are migrated to the periphery of IoT networks.			
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A Two-Level Hierarchical Graph Model for Conflict Resolution with Application to International Climate Change Negotiations	He, Shawei, Hipel, Keith W., Xu, Haiyan, Chen, Ye,	<p>A novel two-level hierarchical graph model is developed to analyze international climate change negotiations with hierarchical structures: the negotiations take place between two nations and between each nation and its provincial governments. The two national government are two decision makers at the top level. Within each nation, the two provincial governments negotiate with the national government at the lower level. The theoretical structure of this novel model, including decision makers, options, moves, and preference relations, are developed. The interrelationship between the stabilities in the two-level hierarchical graph model and the stabilities in local models are investigated by theorems. These theorems can be utilized to calculate complete stabilities in the two-level hierarchical graph model when the stabilities in local graph models are known. The international climate change negotiations as the illustrative example is then investigated in detail. The extra equilibrium, uniquely obtained by this novel methodology, suggests that opposition may still be from one provincial government when the national</p>	10.1007/s11518-019-5448-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-019-5448-2	SpringerLink
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		government does not sign the international climate agreement and implements existing environmental laws. Compared with other approaches, this novel methodology is an effective and flexible tool in analyzing hierarchical conflicts at two levels by providing decision makers with strategic resolutions with broader vision.			
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<p>Bouncing forward: a resilience approach to dealing with COVID-19 and future systemic shocks</p>	<p>Hynes, William, Trump, Benjamin, Love, Patrick, Linkov, Igor,</p>	<p>Policy questions are often framed in popular discussion as situations where pulling the right levers will get the economy and society back on track after shocks and crises. This approach ignores how systems interact and how their systemic properties shape socioeconomic outcomes, leading to an over-emphasis on a limited set of characteristics, notably efficiency. We argue that this emphasis on efficiency in the operation, management and outcomes of various economic and social systems is not a conscious collective choice, but rather the response of the whole system to the incentives that individual components face. This has brought much of the world to rely upon complex, nested, and interconnected systems to deliver goods and services around the globe. While this approach has many benefits, the Covid-19 crisis shows how it has also reduced the resilience of key systems to shocks, and allowed failures to cascade from one system to others. This paper reviews the impact of COVID-19 on socioeconomic systems, discusses the notion of resilience, and provides specific recommendations on both integrating resilience</p>	<p>10.1007/s10669-020-09776-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-020-09776-x</p>	<p>SpringerLink</p>
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		analytics for recovery from the current crisis as well as on building resilient infrastructure to address future systemic challenges.			
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Digital Economy as a Factor in the Technological Development of the Mineral Sector	Litvinenko, V. S.,	<p>This article describes the impact of the global digital economy on the technological development of the mineral sector in the world. Due to the different specifics of the legislative bases of the investigated regions, such as the USA, China, EU, and Africa, the development of digital transformation is presented on the example of the Russian Federation in the context of world trends. The article presents an analysis of the possibilities of using straight-through digital technology in prospecting, design, development, and use of mineral resources. It describes a structure promoting the development of applied digital technology through research—education centers and international competence centers. This structure would allow forming the new competencies for personnel working in the digital economy. The underfunding of the information and computing infrastructure could be a significant challenge to the digital transformation of the economy. Creating the conditions for a reliable and secure process of generating, storing, and using data is the basis for protection from the cybersecurity</p>	10.1007/s11053-019-09568-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11053-019-09568-4	SpringerLink
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		<p>hazard that could act as a brake on technology advancement. This article discusses the organizational and technological priorities of the development of the mineral resource sector on the example of the Russian Federation. The challenges for the mineral resource complex resulting from global changes can be taken on through technological changes of the industry. The article gives a thorough description of issues related to technological developments in the raw materials sector, oil refining industry, development of integrated and advanced mineral processing systems, and the use of household and industrial wastes. The research presents basic technology contributing to sustainable development, starting from exploration and production forecasting and up to sustainable planning and distribution of material and energy resources based on real-time data. It also pays special attention to the possibilities of creating digital platforms for the mineral sector. Digital integration, combining research areas, personnel, processes, users, and data will create conditions for scientific and technological achievements and</p>			
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		breakthroughs, providing scientific and economic developments in related industries and, above all, in the global mineral and raw materials market.			
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Cloud enabled SDI architecture: a review	Tripathi, Ashutosh Kumar, Agrawal, Sonam, Gupta, R. D.,	<p>With the advancement of GIS technology since its inception in 1960's, many educational institutions, government departments, public/ private sectors and individuals have started its use for the production and management of spatial data. Spatial Data Infrastructure (SDI) concept was introduced in the early1990's and provides a set of technologies, standards, protocols, policies and guidelines on the whole cycle of geospatial data production and distributions, i.e., from data capture to storage and to sharing. SDI initiative at national level, termed as National Spatial Data Infrastructure (NSDI), has been taken by different countries including India. Geospatial community is facing various challenges like handling of large volumes of geospatial data, requirement of high computing resources to process geospatial data, scalability and interoperability. Therefore, need of advanced technologies in the form of SDI and cloud computing is realized to resolve the above challenges. Cloud computing has several characteristics like scalability, elasticity and self-provisioning that offers high-performance computing</p>	10.1007/s12145-020-00446-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-020-00446-9	SpringerLink
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		<p>resources to perform geoprocessing efficiently. The main aim of the present paper is to study SDI and its components along with analysis and comparison of NSDI of various countries as well as to conceptualize and discuss service oriented architecture of cloud enabled SDI. Several challenges of the spatial data handling and processing that occurred due to the high intensity of data and lack of processing capability can be solved by adopting proposed cloud enabled SDI architecture. This research will help geospatial community and SDI developers in various perspectives including data sharing and management, interoperability, security and reliability, fault tolerance, mass market solution, upfront cost and global collaboration.</p>			
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Important trends and junctures in warship design	Atkinson, Simon Reay, Skinner, Christopher J., Joiner, Keith F., Caldwell, Nicholas H. M., Swidan, Ahmed,	Concerns about risks associated with new conceptual designs of surface warships have led many decision-makers to rely on the parent-design approach. For example, the design of the Oliver Hazard Perry Class (FFG-7) became the standard of surface warship design for 71 subsequent vessels in three Navies, e.g. Australia, Spain and Taiwan, even though the FFG-7 was initially considered under-armed and vulnerable. This paper finds that following warship designs remain derivations primarily of limited parent designs and that generally warship design is now increasingly costly, yet mostly stagnant, and with fleet numbers in steady decline. By contrast, submarine-build programmes generally show regularly refreshed conceptual designs, new modularised build and construction, usually improving affordability and proliferation. Approaching a modern Synthetical Age, this paper submits that a reconceptualisation of the surface warship design space, shipyards and build techniques are arguably at a critical design juncture. As such a revolution in warship design, like the FFG-7 design was, is overdue. This	10.1007/s40868-020-00076-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40868-020-00076-2	SpringerLink
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		<p>paper provides insights into the ship designs that are necessary and possible from today's emerging technologies. Such revolutionary design could inject greater usability and affordability to naval surface fleets and build more political, economic and military affordability of ships and potential warfare losses. This new approach is called 'Versatile modularisation'.</p>			
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Trends and applications of resilience analytics in supply chain modeling: systematic literature review in the context of the COVID-19 pandemic	Golan, Maureen S., Jernegan, Laura H., Linkov, Igor,	<p>The increasingly global context in which businesses operate supports innovation, but also increases uncertainty around supply chain disruptions. The COVID-19 pandemic clearly shows the lack of resilience in supply chains and the impact that disruptions may have on a global network scale as individual supply chain connections and nodes fail. This cascading failure underscores the need for the network analysis and advanced resilience analytics we find lacking in the existing supply chain literature. This paper reviews supply chain resilience literature that focuses on resilience modeling and quantification and connects the supply chain to other networks, including transportation and command and control. We observe a fast increase in the number of relevant papers (only 47 relevant papers were published in 2007–2016, while 94 were found in 2017–2019). We observe that specific disruption scenarios are used to develop and test supply chain resilience models, while uncertainty associated with threats including consideration of “unknown unknowns” remains rare. Publications that utilize more advanced models often focus just</p>	10.1007/s10669-020-09777-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-020-09777-w	SpringerLink
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		<p>on supply chain networks and exclude associated system components such as transportation and command and control (C2) networks, which creates a gap in the research that needs to be bridged. The common goal of supply chain modeling is to optimize efficiency and reduce costs, but trade-offs of efficiency and leanness with flexibility and resilience may not be fully addressed. We conclude that a comprehensive approach to network resilience quantification encompassing the supply chain in the context of other social and physical networks is needed to address the emerging challenges in the field. The connection to systemic threats, such as disease pandemics, is specifically discussed.</p>			
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<p>'Zero-error' versus 'good-enough': towards a 'frugality' narrative for defence procurement policy</p>	<p>Patil, Kapil, Bhaduri, Saradindu,</p>	<p>The procurement decision-making process for complex military product systems (CoPS) has significant implications for military end-users, suppliers, and exchequers. This study examines the usefulness of adopting a fast and frugal decision-making approach for the acquisition of military CoPS. Defence procurement environment is complex. On the one hand, there are uncertainties and severe resource constraints due to regularly changing threat perceptions, limited flow of information about new technologies, and the growing demand to reduce defence related expenses. On the other hand, several stakeholders remain pre-occupied with the demand for 'zero-error' technologies. In such a setting, recurrent cost overruns and delays in supply are common in defence procurement programmes, across countries. Taking the illustrative examples of the missile system, fighter jet, and radar system acquisitions in India, we elucidate on 'optimising' versus 'satisficing' dynamics in the procurement decisions. The paper argues that a fast and frugal decision-making process by</p>	<p>10.1007/s11299-020-00223-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11299-020-00223-7</p>	<p>SpringerLink</p>
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		relying on judgement, experiential knowledge, and intuitive learning might make procurement processes, adaptively, more efficient. Such an approach would enable a 'good enough' technology to be inducted, and improved upon, through regular feedback from the actual environment. The study has implications for policy scholarships on innovation policy instruments under uncertainty.			
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Modeling flexible generator operating regions via chance-constrained stochastic unit commitment	Singh, Bismark, Knueven, Bernard, Watson, Jean-Paul,	<p>We introduce a novel chance-constrained stochastic unit commitment model to address uncertainty in renewables' production in operations of power systems. For most thermal generators, underlying technical constraints that are universally treated as "hard" by deterministic unit commitment models are in fact based on engineering judgments, such that system operators can periodically request operation outside these limits in non-nominal situations, e.g., to ensure reliability. We incorporate this practical consideration into a chance-constrained stochastic unit commitment model, specifically by infrequently allowing minor deviations from the minimum and maximum thermal generator power output levels. We demonstrate that an extensive form of our model is computationally tractable for medium-sized power systems given modest numbers of scenarios for renewables' production. We show that the model is able to potentially save significant annual production costs by allowing infrequent and controlled violation of the traditionally hard bounds imposed on thermal generator production limits. Finally, we</p>	10.1007/s10287-020-00368-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10287-020-00368-3	SpringerLink
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		conduct a sensitivity analysis of optimal solutions to our model under two restricted regimes and observe similar qualitative results.			
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Ark: a constraint-based method for architectural synthesis of smart systems	Guessi, Milena, Oquendo, Flavio, Nakagawa, Elisa Yumi,	As smart systems leverage capabilities of heterogeneous systems for accomplishing complex combined behaviors, they pose new challenges to traditional software engineering practices that considered software architectures to be mostly static and stable. The software architecture of a smart system is inherently dynamic due to uncertainty surrounding its operational environment. While the abstract architecture offers a way to implicitly describe different forms taken by the software architecture at run time, it is still not sufficient to guarantee that all concrete architectures will automatically adhere to it. To address this issue, this work presents a formal method named Ark supporting the architectural synthesis of smart systems. This is achieved by expressing abstract architectures as a set of constraints that must be valid for any concrete architecture of the smart system. This way, we can benefit from existing model-checking techniques to guarantee that all concrete architectures realized from such an abstract model will comply with well-formed rules. We also describe how this	10.1007/s10270-019-00764-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-019-00764-7	SpringerLink
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		<p>method can be incorporated to a model-driven approach for bridging the gap between abstract and concrete architectural models. We demonstrate our method in an illustrative case study, showing how Ark can be used to support the synthesis of concrete architectures as well check the correctness and completeness of abstract architecture descriptions. Finally, we elaborate on future directions to consolidating a process for the synthesis of run-time architectures that are correct-by-construction.</p>			
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Challenges in Regulatory, Experimental, and Theoretical Computational Maintenance of Safety in Hydrogen Power Engineering	Kirillov, I. A., Simonenko, V. A., Kharitonova, N. L.,	Abstract The formation and development of hydrogen power engineering (HPE) as a technologically efficient and competitive part of the future with a carbon-free or low-carbon economic paradigm makes it necessary to overcome many obstacles related not only to the maturity, availability, and economic efficiency of technologies but also to a sufficient, socially acceptable level of safety in HPE. Even if most technological and economic issues are resolved, the pace of adopting scientific and engineering developments in HPE on an industrial and commercial scale may be inhibited by the level of comprehensive (analytical, theoretical and computational, experimental) scientific and engineering support for safety in HPE facilities, networks, and systems throughout their entire life cycle (from design to decommissioning) and the completeness and sufficiency of the regulatory framework for both, new reactor centers with related new technologies and infrastructural HPE safety systems. Three classes of correlated challenges in the theoretical computational, experimental, and regulatory support safety in HPE are	10.1134/S1995078020030064	http://link.springer.com/openurl/pdf?id=doi:10.1134/S1995078020030064	SpringerLink
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		formulated and described in brief. Their timely resolution is critical to the successful transition to the carbon-free technological paradigm.			
Design of resilient socio-technical systems by human-system co-creation	Sawaragi, Tetsuo,	The concept of resilience is commonly used to represent “an ability to adapt to a changing environment and to survive flexibly despite facing difficulties.” This definition of resilience emphasized its aspects of unpredictable responsiveness to external disturbances as well as self-organized phenomena, which seemed to be close to the definition of complex adaptive systems. This article summarizes the technical challenges to consider the implementation of a concept of resilience into systems from a variety of perspectives. Then, challenges to tackle with the resilience to variabilities in production plans, in work quality, in empirical knowledge, in human-automation systems, and in organizations are presented.	10.1007/s10015-020-00598-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10015-020-00598-3	SpringerLink

<p>Digital twins: development and implementation challenges within Moroccan context</p>	<p>Ghita, Mezzour, Siham, Benhadou, Hicham, Medromi, Abdelhafid, Aitelmahjoub, Laurent, Deshayes,</p>	<p>Industrial world today is experiencing its fourth industrial revolution. Predecessor of the automation industry, Industry-4.0 adds a layer of autonomy, intelligence and advanced connectivity to complex industrial systems. This layer creates an interactive and dynamic bridge between virtual systems and physical systems with their upward constraints and requirements in a constantly changing physical environment. Digital twins fall into the category of advanced concepts and technologies that enhance this connectivity. Several projects have been launched in Morocco by the government, industrialists and research communities, initiating the digital transformation of Moroccan industrial manufactories and companies. This paper comes within this framework, firstly to highlight the great potential that digital twins can offer for Moroccan industrial context enhancement, secondly to identify the challenges that can hinder the integration and development of digital twins in Moroccan industrial environment.</p>	<p>10.1007/s42452-020-2691-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-020-2691-6</p>	<p>SpringerLink</p>
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Flexible automatic detection for security management of dispatching data network	Yang, Xianrui, Liu, Yuming, Wang, Jiehong, Yao, Zhao, Zhou, Yanping, Fu, Shucun,	Power grid dispatching is among the forefront issues in the power industry for it can highly influence the efficiency of electricity-related industries. At present, power grid dispatching is usually managed manually, which is quite time-consuming with the continuous growth of scale and complexity of electric power systems. To mitigate the time cost of power grid dispatching, an automatic power grid dispatching system is proposed. The system contains devices configuration detection, flexible and automatic device detection and vertical encryption to ensure the efficiency, adaptability and security of power grid dispatching. In this paper, modeling and algorithm details of the automatic power grid dispatching system are presented, and the effectiveness and efficiency of the proposed system was evaluated with power grid data in Kunming, China.	10.1186/s13677-020-00163-0	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13677-020-00163-0	SpringerLink
Digital Twin: Empowering Enterprises Towards a System-of-Systems Approach	Dietz, Marietheres, Pernul, Günther,		10.1007/s12599-019-00624-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-019-00624-0	SpringerLink

<p>Auction-Based Algorithms for Routing and Task Scheduling in Federated Networks</p>	<p>Ehsanfar, Abbas, Grogan, Paul T.,</p>	<p>This paper studies and develops multiple auction-based algorithms for resource exchange among decentralized systems in federated networks with distributed computational resources. Decentralized resource owners and users use processing, storage, and communication units to perform the available computational tasks at each time step while an auctioneer facilitates allocating resources. The auctioneer communicates with federates and receives bids for buying and selling resources, solves combinatorial problems, and proposes prices to federates. Multiple auction-based mechanisms are formulated and assessed using collective performance metrics in a networked federation. The auction-based algorithms include four reverse-bid and double-sided auctions: (1) first-price auction, (2) sequential non-linear pricing auction, (3) min-max closed-form pricing auction, and (4) balanced and maximizing closed-form pricing auction. For results, we assess algorithms for economic and computational efficiency using extensive simulation runs in hundreds of</p>	<p>10.1007/s10922-019-09506-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10922-019-09506-y</p>	<p>SpringerLink</p>
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		network topologies and initial conditions. The metrics introduced for our numerical validation include normalized bids and prices, collective values, and convergence rates.			
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Emergency preparedness for management of main propulsion engine failure on a bulker during harsh weather at sea	Anantharaman, Mohan, Islam, Rabiul, Khan, Faisal, Garaniya, Vikram, Lewarn, Barrie,	<p>Bulkers are vessels that carry various types of cargo, which includes coal, iron ore or grain ranging from 3000 deadweight tonne (dwt) to 400,000 dwt. These bulkers are propelled by large marine diesel engines the capacity of which ranges from 4000 kW to 80,000 kW. The owners of the bulkers generally charter the vessels to reputed charter parties for mutually agreed terms and condition, the main specifications being the vessel speed in knots and the fuel consumption in tonnes per day respectively. Safe transportation of the bulk cargo from one port to another at the specs of the charter party is a great challenge for the vessel's chief engineer. Moreover, there is a likelihood of the vessel coming to a halt in a harsh weather condition, because of the main engine failure. Thus, the seafarer's on-board ship needs to be well prepared to handle such an emergency in a harsh working environment. This study looks at the likelihood of main engine failure during harsh weather at sea and effective ways of managing the emergency. The findings of this study will work as a guide for the seafarers and helps to manage</p>	10.1007/s42797-019-00014-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42797-019-00014-5	SpringerLink
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		the risk on-board ship.			
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Smart design engineering: a literature review of the impact of the 4th industrial revolution on product design and development	Pereira Pessôa, Marcus Vinicius, Jauregui Becker, Juan Manuel,	<p>Industrial revolutions (IRs) are mostly associated with how transformations regarding the operations of an enterprise affect said enterprise's manufacturing systems. However, the impact of these transformations exceeds the production systems themselves; rather, they affect the entire value chain, from the product design and development process (PDDP) through manufacturing and supply-chain management to marketing and disposal. As the new PDDP to a large extent defines the value chain for a company, the challenge lies in ensuring that the designed product will help the company fully benefit from the IRs. By analysing the 4th IR, the authors reveal that few publications shed light on this aspect. Consequently, the purpose of this study is to establish features and properties that will shape the PDDP throughout the 4th IR and into a smart design engineering. To accomplish this, the authors conduct a systematic review of the literature, which provides ten findings. These findings are then analysed by 11 specialists both from academia and the industry, and the findings' relations to the 4th IR and their impact on</p>	10.1007/s00163-020-00330-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-020-00330-z	SpringerLink
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		the product development process is discussed. By establishing these findings, this paper provides a platform for the understanding of what could potentially shape smart design engineering and its design-related activities.			
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Dynamic resilience assessment for process units operating in Arctic environments	Zinetullina, Altyngul, Yang, Ming, Khakzad, Nima, Golman, Boris,	<p>The Arctic is known for its abundant reserve of natural resources. Last decade has seen some exploration and production activities in this region. The assurance of safe operations in this region is a critical and challenging task because of the harsh environment, the remoteness of operation sites, the limited infrastructure, and resources available in response to emergent situations, the application of costly equipment and facilities, and the sensitive marine environment. For complex process systems operating in a harsh environment, the scope of conventional risk assessment is not enough because of the highly uncertain environment, and its impacts on equipment performance. Risk assessment needs to be extended to include both the pre-failure and the post-failure phases. Additionally, risk assessment approaches under normal operating, and environmental conditions may not be applicable in the Arctic regions with unique and uncertain characteristics of the harsh environment. Therefore, this study aims to develop a quantitative resilience assessment method for</p>	10.1007/s42797-019-00008-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42797-019-00008-3	SpringerLink
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		<p>process units operating under Arctic extreme conditions. Dynamic Bayesian network (DBN) is applied to model the probabilistic relationships between causes and effects in a dynamic manner. The proposed method is applied to the resilience assessment of a separator (as part of an oil production system). The proposed approach will help reveal the critical operating parameters under extreme conditions for process units. It also helps identify potential design improvement to enhance process safety.</p>			
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Using Hierarchical Timed Coloured Petri Nets in the formal study of TRBAC security policies	Ben Attia, Hasiba, Kahloul, Laid, Benhazrallah, Saber, Bourekkache, Samir,	<p>Role-Based Access Control (RBAC) is one of the most used models in designing and implementation of security policies, in large networking systems. Basic RBAC model does not consider temporal aspects which are so important in such policies. Temporal RBAC (TRBAC) is proposed to deal with these temporal aspects. Despite the elegance of these models, designing a security policy remains a challenge. Designers must ensure the consistency and the correctness of the policy. The use of formal methods provides techniques for proving that the designed policy is consistent. In this paper, we present a formal modelling/analysis approach of TRBAC policies. This approach uses Hierarchical Timed Coloured Petri Nets (HTCPN) formalism to model the TRBAC policy, and the CPN-tool to analyse the generated models. The timed aspect, in HTCPN, facilitates the consideration of temporal constraints introduced in TRBAC. The hierarchical aspect of HTCPN makes the model "manageable", in spite of the complexity of TRBAC policy specification. The analysis phase allows the verification of</p>	10.1007/s10207-019-00448-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10207-019-00448-9	SpringerLink
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		many important properties about the TRBAC security policy.			
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Towards the profiling of the atmospheric boundary layer at European scale—introducing the COST Action PROBE	Cimini, Domenico, Haeffelin, Martial, Kotthaus, Simone, Löhnert, Ulrich, Martinet, Pauline, O'Connor, Ewan, Walden, Christopher, Coen, Martine Collaud, Preissler, Jana,	The atmospheric boundary layer (ABL) is the layer closest to the Earth's surface within which most human activities take place. The vertical profile of atmospheric thermodynamic parameters in the ABL impact weather, air quality and climate. However, surface sensor networks and satellite observations do not provide sufficient information on the high temporal variability and strong vertical gradients that occur in the ABL. Thus, the ABL represents an important but rather under-sampled part of the atmosphere. This observational gap currently hampers progress in numerical weather prediction, air quality forecasting and climate assessment. Due to recent technological and methodological advances, ground-based remote sensing instruments are now able to provide high-quality profiles of ABL parameters such as temperature, humidity, wind, aerosol and cloud properties. However, even though state-of-the-art ABL profilers are deployed at numerous sites in Europe, efficient science and technology networking and coordination is still required to exploit this rich dataset	10.1007/s42865-020-00003-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42865-020-00003-8	SpringerLink
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		<p>effectively. The current lack of data and procedure harmonization often diminishes the potential societal benefits of the existing ABL profiling data. This paper introduces PROBE, a new initiative funded by the European Cooperation in Science and Technology (COST), that aims to broaden the bridge between a wide range of user needs and the science and technology expertise residing in industry and academia, while strengthening and harmonizing methods and procedures to yield higher quality ABL observational data. Here, the challenges, objectives and implementation plan for PROBE are described, highlighting some preliminary results that will be further developed into operational applications during the 4-year duration (2019–2023) of this collaborative project.</p>			
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Challenges of server consolidation in virtualized data centers and open research issues: a systematic literature review	Abadi, Reza Mohamadi Bahram, Rahmani, Amir Masoud, Alizadeh, Sasan Hossein,	With the increasing demands for cloud computing services, the development of technologies based on virtualization in data centers was noticed. In the virtualized data center, the efficient mapping of virtual machines to physical machines is done using the consolidation technique. Due to the advantages of the server consolidation technique, a large body of research has been done in this field. A comprehensive study on the different server consolidation solutions has not been done yet, though. In this study, a systematic review has been done on a set of researches related to server consolidation. After investigating the considered researches, their proposed solutions were categorized into three groups based on the type of decision making for running the consolidation process. Groups involve static method, dynamic method (including threshold-based and periodic-based adaptation) and prediction-based dynamic method. Thereafter, we discussed handling the challenges presented in each research by investigating the proposed approach for developing consolidation technique. Then,	10.1007/s11227-019-03068-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-019-03068-1	SpringerLink
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		the open issues in each study were expressed. Finally, the objectives, evaluation parameters, optimization methods and the affecting parameters of server consolidation in all studies were investigated and analyzed.			
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Impact of sugar-sweetened beverage tax on dental caries: a simulation analysis	Urwannachotima, Nipaporn, Hanvoravongchai, Piya, Ansah, John Pastor, Prasertsom, Piyada, Koh, Victoria Rui Ying,	<p>Background The tiered sugar-sweetened beverage (SSB) tax was implemented in Thailand to encourage industries to reduce sugar content in beverages, and consequently reduce sugar consumption in the population. The aim of the study is to explore the expected impact of the new SSB tax policy in Thailand, a middle-income country in Asia, and other alternative policies on oral health outcomes as measured by the prevalence and severity of dental caries among the Thai population.</p> <p>Methods A qualitative system dynamics model that captures the complex interrelationships among SSB tax, sugar consumption and dental caries, was elicited through participatory stakeholder engagement. Based on the qualitative model, a quantitative system dynamics model was developed to simulate the SSB tax policy and other alternative scenarios in order to evaluate their impact on dental caries among Thai adults from 2010 to 2040.</p> <p>Results Under the base-case scenario, the dental caries prevalence among the Thai population 15 years and older, is projected to increase from 61.3% in 2010 to</p>	10.1186/s12903-020-1061-5	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12903-020-1061-5	SpringerLink
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		<p>74.9% by 2040. Implementation of SSB tax policy is expected to decrease the prevalence of dental caries by only 1% by 2040, whereas the aggressive policy is projected to decrease prevalence of dental caries by 21% by 2040.</p> <p>Conclusions In countries where a majority of the sugar consumed is from non-tax sugary food and beverages, especially Asian countries where street food culture is ubiquitous and contributes disproportionately to sugar intake, SSB tax alone is unlikely to have meaningful impact on oral health unless it is accompanied with a comprehensive public health policy that aims to reduce total sugar intake from non-SSB sources.</p>			
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Global stability for a nonautonomous reaction-diffusion predator-prey model with modified Leslie–Gower Holling-II schemes and a prey refuge	Luo, Yantao, Zhang, Long, Teng, Zhidong, Zheng, Tingting,	In this paper, a nonautonomous reaction-diffusion predator-prey model with modified Leslie–Gower Holling-II schemes and a prey refuge is proposed. Applying the comparison theory of differential equation, sufficient average criteria on the permanence of solutions and the existence of the positive periodic solutions are established. Moreover, the existence region of the positive periodic solutions is an invariant region dependent on t . Then, constructing a suitable Lyapunov function, we obtain sufficient conditions to guarantee the global asymptotic stability of the positive periodic solutions. Finally, we do some numerical simulations to verify our main results and investigate the effect of prey refuge on the dynamics of the system.	10.1186/s13662-020-02563-7	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13662-020-02563-7	SpringerLink
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Sensemaking as an approach for resilience assessment in an Essential Service Organization	Merwe, Susara E., Biggs, Reinette, Preiser, Rika,	<p>Essential service organizations are interested in approaches to assess and build infrastructure resilience to ensure an uninterrupted supply of services, such as electricity or water. This study applied a sensemaking approach to assess the nature of social resilience in a national essential service organization in South Africa. It used the SenseMaker tool to collect and surface patterns from a set of micro-narratives collected in response to a national emergency simulation exercise. Findings show that participants utilized specified resilience resources, such as procedures and protocols, while general social resilience resources, such as social network integration and agency, which would have contributed to the response, did not feature significantly. Participants' sense of coherence—how they comprehend, manage, and find meaning amidst life's challenges—had a positive bearing on preparedness, involvement, and expectation of outcome in the context of the emergency simulation exercise and appear to be the organization's strongest social resilience resource. This</p>	10.1007/s10669-019-09743-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-019-09743-1	SpringerLink
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		study suggests that a sense of coherence can inform resilience-building interventions, and be used as a measure of effective sensemaking towards more resilient outcomes.			
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Dynamic Optimization Model for Improving Urban Water Supply System Fragility with Uncertain Streamflow	Moudi, Mahdi, Xu, Zhongwen, Yao, Liming, Yuan, He,	<p>With uncertainties in available water resources, the performance of water supply systems must be assessed and optimized to meet future sectoral demands. This study develops a dynamic model by evaluating fragility, which comprises three indexes: reliability, resiliency and vulnerability. With the aim of mitigating the negative stressors that lead to system collapse, dynamic multisectoral water supply optimization is conducted. To mitigate the negative impacts of water scarcities on system fragility over the long term, the performance of dynamic systems must be assessed. Optimization can shift the water supply system fragility (WSSF) to a robust or even an antifragile state. A real-world case study in Northeast China is conducted over ten-year intervals. Based on the optimized model, several managerial insights are given to the policy makers of the Tianjin Binhai New Area (TBHN) to cope with streamflow uncertainties. Finally, scenario analysis and sensitivity analysis are conducted, and the results indicate that as water availability decreases, both reliability and vulnerability decrease, which</p>	10.1007/s11269-020-02513-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11269-020-02513-8	SpringerLink
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		further increases system fragility. In addition, the reliability of the system greatly contributed to system antifragility compared with the contributions of resilience and vulnerability.			
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<p>CARE: Cooperative Autonomy for Resilience and Efficiency of robot teams for complete coverage of unknown environments under robot failures</p>	<p>Song, Junnan, Gupta, Shalabh,</p>	<p>This paper addresses the problem of Multi-robot Coverage Path Planning for unknown environments in the presence of robot failures. Unexpected robot failures can seriously degrade the performance of a robot team and in extreme cases jeopardize the overall operation. Therefore, this paper presents a distributed algorithm, called Cooperative Autonomy for Resilience and Efficiency , which not only provides resilience to the robot team against failures of individual robots, but also improves the overall efficiency of operation via event-driven replanning. The algorithm uses distributed Discrete Event Supervisors , which trigger games between a set of feasible players in the event of a robot failure or idling, to make collaborative decisions for task reallocations. The game-theoretic structure is built using Potential Games , where the utility of each player is aligned with a shared objective function for all players. The algorithm has been validated in various complex scenarios on a high-fidelity robotic simulator, and the results demonstrate that the team achieves complete coverage under failures, reduced coverage time, and faster target</p>	<p>10.1007/s10514-019-09870-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10514-019-09870-3</p>	<p>SpringerLink</p>
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		discovery as compared to three alternative methods.			
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<p>An adaption scheduling based on dynamic weighted random forests for load demand forecasting</p>	<p>Chen, Mincheng, Yuan, Jingling, Liu, Dongling, Li, Tao,</p>	<p>With the development of cloud computing, energy consumption has become a major and costly problem in data centers. To improve the energy efficiency of data centers, we analyze the influence factors of energy consumption and discover that reducing the idle servers can effectively cut down the energy consumption of data centers. Then the load demand forecasting algorithm using weighted random forests is proposed. And time factor matching coefficient obtained by considering the day type and the time span is employed to calculate the weights. To enhance the forecasting performance, an error correction strategy is also introduced into the forecasting model. The experimental results show that these strategies further improve the prediction accuracy, and the root-mean-square error is 2.6–4.1% lower than other forecasting algorithms. We finally design an adaptive scheduling technology that utilizes short-term prediction of load demand. This technology adaptively adjusts the scale of the data center cluster based on the forecast results. The simulation results indicate that the technology can</p>	<p>10.1007/s11227-017-2223-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-017-2223-3</p>	<p>SpringerLink</p>
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		reduce 12.5% energy consumption while ensuring the service quality.			
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<p>90.000 Tonnen Diplomatie 2.0: Die Integration von unbemannten Systemen in den operativen Flugzeugträgerbetrieb am Beispiel der X-47B</p>	<p>Schwartz, Sebastian, Reuter, Christian,</p>	<p>Die Debatte um die Integration von autonomen Systemen in Streitkräfte wird oftmals auf einer (militär-)strategischen Ebene geführt. Die technisch-operativen Aspekte werden außerhalb des Fachpublikums häufig nur am Rande erwähnt. Der Beitrag analysiert die Integration von U(C)AVs in den operativen Flugzeugträgerbetrieb am Beispiel der X47B. Die Studie zeigt, dass es keine fundamentalen Probleme bei der Integration gibt, U(C)AVs in einem Fünf-Jahres-Horizont zur neuen maritimen Realität gehören und die Gefahr eines Rüstungswettlaufs in Bezug auf autonome Waffensysteme steigen wird. The debate on the integration of autonomous systems into armed forces is often conducted on a (military) strategic level. The technical-operational aspects are often only mentioned marginally outside a specialist audience. This paper analyses the integration of U(C)AVs into operational aircraft carrier operations using the example of the X47B. Our study concludes that there are no fundamental problems with the integration. U(C)AVs will belong to the new maritime reality within a five-year horizon and the</p>	<p>10.1007/s12399-020-00803-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12399-020-00803-y</p>	<p>SpringerLink</p>
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		danger of an arms race for autonomous weapon systems will increase.			
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<p>A Historical Perspective on Development of Systems Engineering Discipline: A Review and Analysis</p>	<p>Hossain, Niamat Ullah Ibne, Jaradat, Raed M., Hamilton, Michael A., Keating, Charles B., Goerger, Simon R.,</p>	<p>Since its inception, Systems Engineering (SE) has developed as a distinctive discipline, and there has been significant progress in this field in the past two decades. Compared to other engineering disciplines, SE is not affirmed by a set of underlying fundamental propositions, instead it has emerged as a set of best practices to deal with intricacies stemming from the stochastic nature of engineering complex systems and addressing their problems. Since the existing methodologies and paradigms (dominant patterns of thought and concepts) of SE are very diverse and somewhat fragmented. This appears to create some confusion regarding the design, deployment, operation, and application of SE. The purpose of this paper is 1) to delineate the development of SE from 1926–2017 based on insights derived from a histogram analysis, 2) to discuss the different paradigms and school of thoughts related to SE, 3) to derive a set of fundamental attributes of SE using advanced coding techniques and analysis, and 4) to present a newly developed instrument that could assess the performance of</p>	<p>10.1007/s11518-019-5440-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-019-5440-x</p>	<p>SpringerLink</p>
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		systems engineers. More than Two hundred and fifty different sources have been reviewed in this research in order to demonstrate the development trajectory of the SE discipline based on the frequency of publication.			
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<p>Evaluating the reduced flight deck crew concept using cognitive work analysis and social network analysis: comparing normal and data-link outage scenarios</p>	<p>Schmid, Daniela, Korn, Bernd, Stanton, Neville A.,</p>	<p>The aim of the present paper is to demonstrate how a subset of methods from Cognitive Work Analysis (CWA) in combination with Social Network Analysis (SNA) can be used to analyse the effects of a reduced crew in a legacy system of a commercial airliner's two-pilot-crew operations. Whereas existing research approaches have used different methodological approaches such as classical workload evaluations, we focus on social organisation and cooperation at early conceptual design stages. A case study of Reduced-Crew Operations (RCO) in commercial aviation highlights how Work Domain Analysis, Control Task Analysis and Social Organization and Cooperation Analysis were applied to allocate functions and identify future automation requirements. Furthermore, the SNA shows the possible interactions in future RCO. The effect of technological failure on the network architecture's resilience is also explored. A proposal on how to react to a data-link outage and break-up in RCO is made with respect to limitations in technology. In this way, the work can foster identifying automation</p>	<p>10.1007/s10111-019-00548-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-019-00548-5</p>	<p>SpringerLink</p>
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		requirements and related possible failures at early stages in the design process.			
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<p>The Graph Model for Conflict Resolution: Reflections on Three Decades of Development</p>	<p>Hipel, Keith W., Fang, Liping, Kilgour, D. Marc,</p>	<p>The fundamental design and inherent capabilities of the Graph Model for Conflict Resolution (GMCR) to address a rich range of complex real world conflict situations are put into perspective by tracing its historical development over a period spanning more than 30 years, and highlighting great opportunities for meaningful future expansions within an era of artificial intelligence (AI) and intensifying conflict in an over-crowded world. By constructing a sound theoretical foundation for GMCR based upon assumptions reflecting what actually occurs in reality, a fascinating story is narrated on how GMCR was able to expand in bold new directions as well as take advantage of many important legacy decision technologies built within the earlier Metagame Analysis and later Conflict Analysis paradigms. From its predecessors, for instance, GMCR could benefit by the employment of option form put forward within Metagame Analysis for effectively recording a conflict, as well as preference elicitation techniques and solution concepts for defining chess-like behavior when calculating stability of states from the realm of</p>	<p>10.1007/s10726-019-09648-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-019-09648-z</p>	<p>SpringerLink</p>
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		<p>Conflict Analysis. The key ideas outlined in the paper underlying the current and projected capabilities of GMCR include the development of four different ways to handle preference uncertainty in the presence of either transitive or intransitive preferences; a wide range of solution concepts for describing many kinds of human behavior under conflict; unique coalition analysis algorithms for determining if a given decision maker can fare better in a dispute via cooperation; tracing the evolution of a conflict over time; and the matrix formulation of GMCR for computational efficiency when calculating stability and also theoretically expanding GMCR in bold new directions. Inverse engineering is mentioned as an AI extension of GMCR for computationally determining the preferences required by decision makers in order to reach a desirable state, such as a climate change agreement in which all nations significantly cut back on their greenhouse gas emissions. The basic design of a decision support system for permitting researchers and practitioners to readily apply the foregoing and other advancements in GMCR to tough</p>			
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		real world controversies is discussed. Although GMCR has been successfully applied to challenging disputes arising in many different fields, a simple climate change negotiation conflict between the US and China is utilized to explain clearly key concepts mentioned throughout the fascinating historical journey surrounding GMCR.			
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Risk management in water supply networks: Aveiro case study	Rodrigues, Fernanda, Borges, Manuela, Rodrigues, Hugo,	<p>Water supply networks are critical infrastructures essentials to health, safety, economic and social well-being which have to be maintained and preserved to ensure their proper functioning. Considering the importance of these critical infrastructures, the risks to which they are exposed and the consequences of such risks must be analysed. Thus, it is important that companies responsible for the management of these assets incorporate risk management in their activities. In the scope of risk management, this paper intends to identify the vulnerabilities of water supply infrastructures, by analysing the risks they are exposed and identifying the measures that need to be implemented or reinforced. Risk assessment methodologies were analysed to identify the advantages and disadvantages of each one. As a case study, the water supply network of the Aveiro municipality in mainland Portugal was used. This network was analysed resourcing ArcMap, ArcGIS desktop software, which allows a better understanding of the water supply network. Risk management was applied and the probability and</p>	10.1007/s11356-019-05797-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11356-019-05797-5	SpringerLink
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		possible consequences of six distinct categories of threats were determined in eight scenarios, allowing the development of risk maps concluding that all these scenarios are in a low or medium level of risk. To decrease the vulnerability of the water network, a set of plans and specific measures have to be developed.			
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Enhancing privacy in smart energy systems	Engel, Dominik,	<p>Die Energiewende weg von fossilen und hin zu erneuerbaren Energieträgern wird von der Digitalisierung unserer Energiesysteme begleitet und ermöglicht. Durch den Einsatz von Informations- und Kommunikationstechnologien wird die umfassende Einspeisung durch erneuerbare und dezentrale Energiequellen auch im Verteilnetz ermöglicht. Neue Anwendungsfälle wie das schnelle Laden von Elektroautos, gemeinschaftliche Erzeugungsanlagen und dynamische Energietarife werden dadurch realisierbar. Neben allen Vorteilen macht die Digitalisierung Energiesysteme aber auch verwundbarer gegen Cyber-Kriminalität und es bestehen Bedenken, was den Schutz persönlicher Daten betrifft. In diesem Artikel werden die Themen Privatsphäre und Schutz persönlicher Daten näher beleuchtet und aktuelle Methoden zum Schutz der Privatsphäre diskutiert. The mission to move from fossil to renewable energy sources is accompanied and enabled by the digitalization of our energy systems. With the introduction of information and communication technologies, the</p>	10.1007/s00502-019-00779-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-019-00779-4	SpringerLink
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		<p>widespread integration of distributed, renewable sources, even in the distribution grid, are enabled. New use cases such as fast EV charging, local energy communities and dynamic energy tariffs are also enabled. However, this move toward digitalization also increases the exposure of the energy systems for cybercrime and raises concerns regarding the privacy of personal data. In this article, we address the issue of privacy in smart energy systems and give an overview of current methods to enhance privacy.</p>			
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Barriers and Facilitators in Interorganizational Disaster Response: Identifying Examples Across Europe	Berchtold, Claudia, Vollmer, Maike, Sendrowski, Philip, Neisser, Florian, Müller, Larissa, Grigoleit, Sonja,	<p>Disaster response actors are facing new challenges, which encompass not only new and ever more complex threats but also the need to collaborate across organizational boundaries and even state borders. Depending on scale, these interactions have to work across governance setups, political and legal conditions, organizational cultures, as well as personal preferences and experiences that vary among actors, organizations, and countries. But which concrete measures are taken by crisis management actors at different scales to bridge these challenges and which of these could serve others as example to address comparable challenges in their contexts? This study made attempts to analyze whether certain solutions across organizations and states exist that facilitate effective interorganizational crisis management in the member states of the European Union (EU). It is based on selected expert interviews with representatives of different types of disaster response organizations (health services, police services, fire services, and other crisis management organizations)</p>	10.1007/s13753-020-00249-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-020-00249-y	SpringerLink
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		from seven EU member states (Germany, Netherlands, United Kingdom, Ireland, Italy, Austria, and Greece).			
Artificial Intelligence Crime: An Interdisciplinary Analysis of Foreseeable Threats and Solutions	King, Thomas C., Aggarwal, Nikita, Taddeo, Mariarosaria, Floridi, Luciano,	Artificial intelligence (AI) research and regulation seek to balance the benefits of innovation against any potential harms and disruption. However, one unintended consequence of the recent surge in AI research is the potential re-orientation of AI technologies to facilitate criminal acts, term in this article AI-Crime (AIC). AIC is theoretically feasible thanks to published experiments in automating fraud targeted at social media users, as well as demonstrations of AI-driven manipulation of simulated markets. However, because AIC is still a relatively young and inherently interdisciplinary area—spanning socio-legal studies to formal science—there is little certainty of what an AIC future might look like. This article offers the first systematic, interdisciplinary literature analysis of the foreseeable threats of AIC, providing ethicists, policy-makers, and law enforcement organisations with a synthesis of the current problems, and a possible solution space.	10.1007/s11948-018-00081-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11948-018-00081-0	SpringerLink

Human performance modeling and its uncertainty factors affecting decision making: a survey	Li, Ning, Huang, Jincai, Feng, Yanghe,	<p>This paper introduces the background and connotation of human performance modeling (HPM), HPM models, and the application of artificial intelligence algorithms in HPM. It deeply analyzes the connotation and uncertainty of each model and finally puts forward its military application. The aim is to provide relevant researchers in the field with an in-depth understanding of domain knowledge and related uncertainties and to indicate future research directions. The first part is a general overview of human factors engineering, where the definition, origin, research field, importance, and general problems of HPM are elaborated. The composition of the man-machine system and its corresponding relationship with the observe-orient-decide-act loop are described. The second part reviews the models of perception, cognition, understanding, and decision making. Among them, models of cognition consist of visual search, visual sampling, mental workload, and goals, operators, methods, and selection rules; models of action consist of Hick-Hyman law, Fitts's law, and manual control</p>	10.1007/s00500-019-04659-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-019-04659-z	SpringerLink
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		<p>theory. The third part is a review of the source and importance of the integrated models and focuses on the principles, composition, and successful application cases of the three models, namely SAINT, IMPRINT, and ACT-R. The fourth part is a review of the application of the algorithms and models in the fields of artificial intelligence, deep learning, and data mining in analyzing multivariate datasets in HPM. In addition, future HPM military applications are presented.</p>			
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Quality attributes use in architecture design decision methods: research and practice	Lytra, Ioanna, Carrillo, Carlos, Capilla, Rafael, Zdun, Uwe,	Over the past 10 years software architecture has been perceived as the result of a set of architecture design decisions rather than the elements that form part of the software design. As quality attributes are considered major drivers of the design process to achieve high quality systems, the design decisions that drive the selection and use of specific quality properties and vice versa are closely related. Consequently, quality attributes must play a role for decision making processes and be documented alongside the decisions captured. Consequently, we conduct a systematic literature review to study the importance and impact of the relationships between quality attributes and architecture design decisions and to what extent existing architecture knowledge management methods and tools deal with the decisions that affect the quality of a system. We also report on the challenges and future research paths for architectural knowledge management methods and tools. Our results reveal important explicit relationships between both software artifacts, the role of uncertainty in decision making and empirical	10.1007/s00607-019-00758-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-019-00758-9	SpringerLink
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		studies reporting the use of quality attributes in architecture knowledge management activities.			
Future developments in standardisation of cyber risk in the Internet of Things (IoT)	Radanliev, Petar, Roure, David C., Nurse, Jason R. C., Mantilla Montalvo, Rafael, Cannady, Stacy, Santos, Omar, Maddox, La'Treall, Burnap, Peter, Maple, Carsten,	In this research article, we explore the use of a design process for adapting existing cyber risk assessment standards to allow the calculation of economic impact from IoT cyber risk. The paper presents a new model that includes a design process with new risk assessment vectors, specific for IoT cyber risk. To design new risk assessment vectors for IoT, the study applied a range of methodologies, including literature review, empirical study and comparative study, followed by theoretical analysis and grounded theory. An epistemological framework emerges from applying the constructivist grounded theory methodology to draw on knowledge from existing cyber risk frameworks, models and methodologies. This framework presents the current gaps in cyber risk standards and policies, and defines the design principles of future cyber risk impact assessment. The core contribution of the article therefore, being the presentation of a new model for impact assessment of IoT cyber risk.	10.1007/s42452-019-1931-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42452-019-1931-0	SpringerLink

Thirteen years of SysML: a systematic mapping study	Wolny, Sabine, Mazak, Alexandra, Carpella, Christine, Geist, Verena, Wimmer, Manuel,	<p>The OMG standard Systems Modeling Language (SysML) has been on the market for about thirteen years. This standard is an extended subset of UML providing a graphical modeling language for designing complex systems by considering software as well as hardware parts. Over the period of thirteen years, many publications have covered various aspects of SysML in different research fields. The aim of this paper is to conduct a systematic mapping study about SysML to identify the different categories of papers, (i) to get an overview of existing research topics and groups, (ii) to identify whether there are any publication trends, and (iii) to uncover possible missing links. We followed the guidelines for conducting a systematic mapping study by Petersen et al. (Inf Softw Technol 64:1–18, 2015) to analyze SysML publications from 2005 to 2017. Our analysis revealed the following main findings: (i) there is a growing scientific interest in SysML in the last years particularly in the research field of Software Engineering, (ii) SysML is mostly used in the design or</p>	10.1007/s10270-019-00735-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-019-00735-y	SpringerLink
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		<p>validation phase, rather than in the implementation phase, (iii) the most commonly used diagram types are the SysML-specific requirement diagram, parametric diagram, and block diagram, together with the activity diagram and state machine diagram known from UML, (iv) SysML is a specific UML profile mostly used in systems engineering; however, the language has to be customized to accommodate domain-specific aspects, (v) related to collaborations for SysML research over the world, there are more individual research groups than large international networks. This study provides a solid basis for classifying existing approaches for SysML. Researchers can use our results (i) for identifying open research issues, (ii) for a better understanding of the state of the art, and (iii) as a reference for finding specific approaches about SysML.</p>			
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Search. Review. Repeat? An empirical study of threats to replicating SLR searches	Krüger, Jacob, Lausberger, Christian, Nostitz- Wallwitz, Ivonne, Saake, Gunter, Leich, Thomas,	A systematic literature review (SLR) is an empirical method used to provide an overview of existing knowledge and to aggregate evidence within a domain. For computer science, several threats to the completeness of such reviews have been identified, leading to recommendations and guidelines on how to improve their quality. However, few studies address to what extent researchers can replicate an SLR. To conduct a replication, researchers have to first understand how the set of primary studies has been identified in the original study, and can ideally retrieve the same set when following the reported protocol. In this article, we focus on this initial step of a replication and report a two-fold empirical study: Initially, we performed a tertiary study using a sample of SLRs in computer science and identified what information that is needed to replicate the searches is reported. Based on the results, we conducted a descriptive, multi- case study on digital libraries to investigate to what extent these allow replications. The results reveal two threats to replications of SLRs: First, while researchers have improved the quality of their reports, relevant	10.1007/s10664- 019-09763-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-019-09763-0	SpringerLink
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		<p>details are still missing—we refer to a reporting threat . Second, we found that some digital libraries are inconsistent in their query results—we refer to a searching threat . While researchers conducting a review can only overcome the first threat and the second may not be an issue for all kinds of replications, researchers should be aware of both threats when conducting, reviewing, and building on SLRs.</p>			
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A Standard Driven Software Architecture for Fully Autonomous Vehicles	Serban, Alex, Poll, Erik, Visser, Joost,	<p>The development of self-driving vehicles is often regarded as adding a layer of intelligence on top of classic vehicle platforms. However, the amount of software needed to reach autonomy will exceed the software deployed for operation of normal vehicles. As complexity increases, the demand for proper structure also increases. Moreover, the shift from open, deterministic components to more opaque, probabilistic software components raises new challenges for system designers. In this paper we introduce a functional software architecture for fully autonomous vehicles aimed to standardise and ease the development process. Existing literature presents past experiments with autonomous driving or implementations specific to limited domains (e.g. winning a competition). The architectural solutions are often an after-math of building or evolving an autonomous vehicle and not the result of a clear software development life-cycle. A major issue of this approach is that requirements cannot be traced with respect to functional components and several components</p>	10.2991/jase.d.200212.001	http://link.springer.com/openurl/pdf?id=doi:10.2991/jase.d.200212.001	SpringerLink
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		<p>group most functionality. Therefore, it is often difficult to adopt the proposals. In this paper we take a prescriptive approach starting with requirements from a widely adopted automotive standard. We follow a clear software engineering process, specific to the automotive industry. During the design process, we make extensive use of robotic architectures – which seem to be often ignored by automotive software engineers – to support standard driven requirements.</p>			
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Modeling languages in Industry 4.0: an extended systematic mapping study	Wortmann, Andreas, Barais, Olivier, Combemale, Benoit, Wimmer, Manuel,	<p>Industry 4.0 integrates cyber-physical systems with the Internet of Things to optimize the complete value-added chain. Successfully applying Industry 4.0 requires the cooperation of various stakeholders from different domains. Domain-specific modeling languages promise to facilitate their involvement through leveraging (domain-specific) models to primary development artifacts. We aim to assess the use of modeling in Industry 4.0 through the lens of modeling languages in a broad sense. Based on an extensive literature review, we updated our systematic mapping study on modeling languages and modeling techniques used in Industry 4.0 (Wortmann et al., Conference on model-driven engineering languages and systems (MODELS'17), IEEE, pp 281–291, 2017) to include publications until February 2018. Overall, the updated study considers 3344 candidate publications that were systematically investigated until 408 relevant publications were identified. Based on these, we developed an updated map of the research landscape on modeling languages and techniques for</p>	10.1007/s10270-019-00757-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-019-00757-6	SpringerLink
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		<p>Industry 4.0. Research on modeling languages in Industry 4.0 focuses on contributing methods to solve the challenges of digital representation and integration. To this end, languages from systems engineering and knowledge representation are applied most often but rarely combined. There also is a gap between the communities researching and applying modeling languages for Industry 4.0 that originates from different perspectives on modeling and related standards. From the vantage point of modeling, Industry 4.0 is the combination of systems engineering, with cyber-physical systems, and knowledge engineering. Research currently is splintered along topics and communities and accelerating progress demands for multi-disciplinary, integrated research efforts.</p>			
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Efficient task and workflow scheduling in inter-cloud environments: challenges and opportunities	Masdari, Mohammad, Zangakani, Mehran,	Efficient task and workflow scheduling are very crucial for increasing performance, resource utilization, customer satisfaction, and return of investment for cloud service providers. Based on the number of clouds that the scheduling schemes can support, they can be classified as single-cloud and inter-cloud scheduling schemes. This paper presents a comprehensive survey and an overview of the inter-cloud scheduling schemes aimed to allocate user-submitted tasks and workflows to the appropriate virtual machines on multiple clouds regarding various objectives and factors. It classifies the scheduling schemes designed for a variety of inter-cloud environments and describes their architecture, key features, and advantages. Also, the inter-cloud scheduling approaches are compared and their various features are highlighted. Finally, the concluding remarks and open research challenges in the multi-cloud scheduling context are illuminated.	10.1007/s11227-019-03038-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-019-03038-7	SpringerLink
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A Dynamic Inertial Weight Strategy in Micro PSO for Swarm Robots	Bakhale, Mugdha, Hemalatha, V., Dhanalakshmi, Samiappan, Kumar, R., Siddharth Jain, M.,	<p>A relatively new area of research and development is Swarm Robotics. It is a part of the swarm intelligence field. In the proposed paper, we shall use swarm robotics in the field of defense and security, particularly for the problem of counter-improvised explosive device (IED) operations. The biggest problem in this regard is to physically detect the IEDs. We propose the use of a swarm of autonomous robots which shall be moving through the search space to collectively detect IEDs in a relatively lesser span of time with greater reliability. Since the robots are autonomous, there will not be any human contact involved, thus distancing humans from any potential IEDs or hazardous environments. The robot hardware shall be robust and able to traverse different kinds of terrains or even water bodies. A major problem of decision making for autonomous robots is localization of the robots towards the origin. Localization deals with finding its Cartesian coordinates and direction in the given coordinate system. For effective autonomous navigation of a robot, finding the position of the robot is essential at every point of time. Particle swarm</p>	10.1007/s11277-019-06743-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-019-06743-x	SpringerLink
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		optimization (PSO) is a useful method for population based global search. The proposed algorithm is an extension of micro-particle swarm optimization (μ PSO) for Simultaneous Localization and Mapping. The effectiveness of this method is estimated by comparing its results with the traditional PSO and μ PSO.			
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Assessing IT availability risks in smart factory networks	Häckel, Björn, Hänsch, Florian, Hertel, Michael, Übelhör, Jochen,	Emerging smart manufacturing technologies combine physical production networks with digital IT systems, resulting in complex smart factory networks, which are especially vulnerable to IT security risks, such as IT component non-availabilities. Companies must employ extensive IT security measures to secure their production facilities. However, complex network structures and inherent dependencies of smart factory networks complicate corresponding investment decisions and increase the need for appropriate decision support. We develop a risk assessment model that supports companies in the investment decision-making process regarding IT security measures by identifying and evaluating the most critical areas of the information network while considering the underlying production network. For this purpose, IT availability risks are quantified by means of graph theory, matrix notation, and value-at-risk. Our model provides a structured approach and considers network structures and interdependencies. The insights gained by our	10.1007/s40685-018-0071-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40685-018-0071-5	SpringerLink
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		model present a profound economic basis for investment decisions on IT security measures. By applying our model in an exemplary real-world setting, we analyze various IT security measures and their risk reduction effect.			
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Design innovation of mesoscale robotic swarms: applications to cooperative urban sensing and mapping	Dharmawan, Audelia G., Soh, Gim Song, Foong, Shaohui, Bouffanais, Roland, Wood, Kristin L.,	Development of mesoscale robots is gaining interest in security and surveillance domains due to their stealth and portable nature in achieving tasks. Their design and development require a host of hardware, controls, and behavioral innovations to yield fast, energy-efficient, distributed, adaptive, robust, and scalable systems. We extensively describe one such design and development process by: (1) the genealogy of our embedded platforms; (2) the key system architecture and functional layout; (3) the developed and implemented design principles for mesoscale robotic systems; (4) the various key algorithms developed for effective collective operations of mesoscale robotic swarms, with applications to urban sensing and mapping. This study includes our perception of the embedded hardware requirements for reliable operations of mesoscale robotic swarms and our description of the key innovations made in magnetic sensing, indoor localization, central pattern generator control, and distributed autonomy. Although some elements of the design process of such a complex robotic system are inevitably ad-hoc, we focus on	10.1631/FITEE.1900384	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.1900384	SpringerLink
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		the system-of-systems design process and the component design integration. This system-of-systems process provides a basis for developing future systems in the field, and the designs represent the state-of-the-art development that may be benchmarked against and adapted to other applications.			
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Understanding Business Disruption and Economic Losses Due to Electricity Failures and Flooding	Koks, Elco, Pant, Raghav, Thacker, Scott, Hall, Jim W.,	Failure of critical national infrastructures can cause disruptions with widespread economic impacts. To analyze these economic impacts, we present an integrated modeling framework that combines: (1) geospatial information on infrastructure assets/networks and the natural hazards to which they are exposed; (2) geospatial modeling of the reliance of businesses upon infrastructure services, in order to quantify disruption to businesses locations and economic activities in the event of infrastructure failures; and (3) multiregional supply-use economic modeling to analyze wider economic impacts of disruptions to businesses. The methodology is exemplified through a case study for the United Kingdom. The study uses geospatial information on the location of electricity infrastructure assets and local industrial areas, and employs a multiregional supply-use model of the UK economy that traces the impacts of floods of different return intervals across 37 subnational regions of the UK. The results show up to a 300% increase in total economic losses when	10.1007/s13753-019-00236-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-019-00236-y	SpringerLink
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		power outages are included in the risk assessment, compared to analysis that just includes the economic impacts of business interruption due to flooded business premises. This increase indicates that risk studies that do not include failure of critical infrastructures may be underestimating the total losses.			
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Simulation methods and tools for collaborative embedded systems: with focus on the automotive smart ecosystems	Cioroica, Emilia, Pudlitz, Florian, Gerostathopoulos, Ilias, Kuhn, Thomas,	<p>Embedded Systems are increasingly equipped with open interfaces that enable communication and collaboration with other embedded systems. Collaborative embedded systems (CES) can be seen as an emerging new class of systems which, although individually designed and developed, can form collaborations at runtime. When embedded systems collaborate with each other, functions developed independently need to be integrated for performing evaluation of the resulting system in order to discover unwanted side-effects. Traditionally, early-stage validation and verification (V&V) of systems composed of collaborative subsystems is performed by function integration at design time. Simulation is used at this stage to verify system's behaviour in a predefined set of test scenarios. In this paper we provide a survey of simulation methods and tools for the V&V of CES. In the context of one use case from the automotive domain (vehicle platooning) we present solutions (methods and tools) and challenges brought by evaluating vehicle collaboration</p>	10.1007/s00450-019-00426-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00450-019-00426-5	SpringerLink
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		using simulation.			
Ethics and the UN Sustainable Development Goals: The Case for Comprehensive Engineering	Hoven, Jeroen,	In the twenty-first century, the urgent problems the world is facing (the UN Sustainable Development Goals) are increasingly related to vast and intricate 'systems of systems', which comprise both socio-technical and eco-systems. In order for engineers to adequately and responsibly respond to these problems, they cannot focus on only one technical or any other aspect in isolation, but must adopt a wider and multidisciplinary perspective of these systems, including an ethical and social perspective. Engineering curricula should therefore focus on what we call 'comprehensive engineering'. Comprehensive engineering implies ethical coherence, consilience of scientific disciplines, and cooperation between parties.	10.1007/s11948-016-9862-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11948-016-9862-2	SpringerLink

Modeling for Concise Space Mission Utility Simulation with Apollo as Exemplar	Watson, Ja'Mar A.,	Presented is a stochastic modeling method enabling rapid yet comprehensive space mission utility simulation. The method facilitates multivariate analysis with concurrent tradespace exploration, risk assessment, and holistic design while simultaneously exploring, assessing, and developing statistically validated concepts of prospective space missions. Modeling is achieved through the synergistic integration of statistical mechanics, blackbox, Bayesian, ansatz, and analytics techniques. The method is verified for its ability to accurately depict a human spaceflight mission and validated for its ability to perform mission utility analysis by backtesting the Apollo 11–17 missions to the Moon through Monte Carlo simulation.	10.1007/s40295-019-00174-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40295-019-00174-3	SpringerLink
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<p>Cross-Cultural Adaptation and Validation of the 10-Item Conjoint Community Resiliency Assessment Measurement in a Community-Based Sample in Southwest China</p>	<p>Cui, Ke, Han, Ziqiang,</p>	<p>Community resilience has received growing attention in disaster risk management policies and practices, especially in China. However, few applicable instruments are available as a baseline for profiling and estimating a community's resiliency in the face of disasters. The purpose of this study is to cross-culturally adapt and validate the original version of the 10-Item Conjoint Community Resiliency Assessment Measurement (CCRAM-10) in China. Our study further investigates if and to what extent community members translate their participation in disaster risk reduction (DRR) activities into perceived community resilience. A Chinese version of CCRAM-10 was generated and applied to 369 participants from a rural and an urban community in southwest China affected by the 2008 Wenchuan Earthquake. Internal consistency reliability and confirmatory factor analyses were performed to test the assessment instrument's applicability. The Communities Advancing Resilience Toolkit Assessment Survey was used to establish the convergent validity for the</p>	<p>10.1007/s13753-019-00240-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-019-00240-2</p>	<p>SpringerLink</p>
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		<p>Chinese version of CCRAM-10. Multiple linear regression models were used to explore the correlations between respondents' participation in activities and their perception of community resilience, while controlling for basic socio-demographic variables. Analysis results demonstrated good internal consistency reliability (Cronbach's alpha=0.85) and satisfactory convergent validity for the Chinese version of the CCRAM-10. Construct validity was also confirmed ($\chi^2/df=2.161$; CFI=0.977; GFI=0.971; NFI=0.958; RMSEA=0.056; SRMR=0.030). The regression analysis results indicated that respondents' participation in DRR activities was positively correlated with their perception of community resilience. This study contributes to the wider collection of disaster studies by providing a tested tool for assessing community resilience in the context of China. Community workers and practice researchers may be interested in applying CCRAM-10 to evaluate the effect of specific DRR programmatic activities for improving community resilience.</p>			
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<p>Military Blast-Related Traumatic Brain Injury</p>	<p>Weppner, Justin, Linsenmeyer, Mark, Ide, William,</p>	<p>Purpose of Review This paper aims to review and discuss the epidemiological, neuropathologic, and mechanistic characteristics of blast traumatic brain injury (bTBI) specific to the military population. Recent Findings Military service members have sustained over 383,000 reported incidents of TBI since 2000. In combat, mild bTBI due to explosive attacks comprise the most common type. Identification, treatment, and reporting of bTBI are compounded by the operational demands of combat as well as frequent co-presentation with PTSD and associated injuries. Following primary injury, a secondary metabolic and inflammatory cascade in bTBI leads to an array of symptoms and impairments. Development of screening batteries, sensors, and laboratory assays has sought to advance evaluation and management. Summary bTBI is a widespread, though underreported, injury in service members with significant neurological and cognitive impacts. The highly prevalent traumatic and psychiatric comorbidities incurred in combat must be considered in the approach to management. Further research</p>	<p>10.1007/s40141-019-00241-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40141-019-00241-8</p>	<p>SpringerLink</p>
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		is needed to improve bTBI detection and facilitate prognosis.			
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Methodology for Autonomous Crossing Narrow Passages Applied on Assistive Mobile Robots	Maciel, Guilherme M., Pinto, Milena F., Júnior, Ivo. C. da S., Marcato, André L. M.,	<p>The assistive robotics field works with technologies aimed at assisting people with physical impairments. Simple tasks like passing through doorways can be a significant challenge for motored wheelchairs users. Besides, depending on the disability degree, the task may be impossible to complete without help. Therefore, mobile robotics technologies have been implemented in wheelchairs to give them intelligence, and a supervisory interface inserts the user in the control loop to complete the objectives. Thus, this research proposes an innovative method to assist the user to cross narrow passages automatically. The methodology works in known and unknown environments. Besides, it does not require mapping and global localization algorithms. In this technique, a depth camera recognizes the edges between a narrow path. A Kalman filter method is used to improve the precision of these points even when the passage leaves the camera field of view. Finally, a nonlinear controller performs the narrow passage crossing. This methodology was analyzed using a MATLAB model, Gazebo simulation platform, and a</p>	10.1007/s40313-019-00499-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40313-019-00499-2	SpringerLink
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		real mobile robot Pioneer-P3DX. The results demonstrated promising applicability.			
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<p>Tackling Critical Challenges towards Efficient CyberPhysical Components & Services Interconnection: The ATLAS CPS Platform Approach</p>	<p>Antonopoulos, Christos P., Antonopoulos, Konstantinos, Panagiotou, Christos, Voros, Nikolaos S.,</p>	<p>Cyber-Physical Systems (CPS) comprise a rapidly expanding research domain incorporating various diverse ICT aspects. Consequently, such systems are characterized by high degree of heterogeneity regarding communication, hardware and software technologies. Additionally, a high number of challenges must be tackled before such horizontal architectures can yield useful services, that can be exploited by todays and future consumer electronics and respective vertical domains. Aiming to address such objectives, this paper proposes a holistic end-to-end CPS architecture based on message passing communication technologies able to support the inherent complexity of respective deployments spanning several areas of applied industrial research and development. In this context, this paper aims to serve as a roadmap on how existing, prominent technologies from different domains can be effectively integrated and address all changes while be applied in diverse application demands. This is achieved by analytically presenting the proposed ATLAS infrastructure emphasizing on integration of prominent</p>	<p>10.1007/s11265-018-1436-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11265-018-1436-x</p>	<p>SpringerLink</p>
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		consumer electronics technologies. Finally, the deployment of the proposed solution in different verticals is presented, highlighting i) the applicability of the system and ii) a resource conservative behavior advocating the integration with nowadays COTS embedded systems.			
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Business ecosystem modeling- the hybrid of system modeling and ecological modeling: an application of the smart grid	Ma, Zheng,	<p>Business ecosystem is popularly used to investigate a complex social system with the business perspective, and particularly contributes to the understanding of actors and their relations in the innovation research. However, the aspect of business ecosystem modeling is limited discussed in the literature, although the importance has emerged significantly in recent years due to the emphasis on cross-disciplinary research and digitalization with artificial intelligence. Therefore, this paper proposes a framework for business ecosystem modeling with the discussion of system engineering and ecological modeling. The domain of smart grid is selected to demonstrate how system engineering, especially standards and ontologies contribute to the business ecosystem modeling. The proposed framework of the business ecosystem modeling includes three parts and nine stages that combines theories from system engineering, ecology, and business ecosystem. Part I-Business ecosystem architecture development</p>	10.1186/s42162-019-0100-4	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-019-0100-4	SpringerLink
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		<p>includes four stages which aims to identify a target business ecosystem and its elements (actors, roles, and interactions). Part II-Factor analysis includes two stages to identify potential changes (and the dimensions of the changes) in the ecosystem. Part III- Ecosystem simulation and reconfiguration aims to use simulations to investigate the transition of an ecosystem and the re-configured ecosystem. The framework not only provides a systematic approach for modeling a business ecosystem but also provides a methodological foundation for research on the aspect of complex systems in the business ecosystem field.</p>			
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<p>A survey of challenges for runtime verification from advanced application domains (beyond software)</p>	<p>Sánchez, César, Schneider, Gerardo, Ahrendt, Wolfgang, Bartocci, Ezio, Bianculli, Domenico, Colombo, Christian, Falcone, Yliès, Francalanza, Adrian, Krsti, Sran, Lourenço, Joao M., Nickovic, Dejan, Pace, Gordon J., Rufino, Jose, Signoles, Julien, Traytel, Dmitriy, Weiss, Alexander,</p>	<p>Runtime verification is an area of formal methods that studies the dynamic analysis of execution traces against formal specifications. Typically, the two main activities in runtime verification efforts are the process of creating monitors from specifications, and the algorithms for the evaluation of traces against the generated monitors. Other activities involve the instrumentation of the system to generate the trace and the communication between the system under analysis and the monitor. Most of the applications in runtime verification have been focused on the dynamic analysis of software, even though there are many more potential applications to other computational devices and target systems. In this paper we present a collection of challenges for runtime verification extracted from concrete application domains, focusing on the difficulties that must be overcome to tackle these specific challenges. The computational models that characterize these domains require to devise new techniques beyond the current state of the art in runtime</p>	<p>10.1007/s10703-019-00337-w</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10703-019-00337-w</p>	<p>SpringerLink</p>
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		verification.			
Conceptual model of real-time IoT systems	Yuan, Bo, Chen, De-ji, Xu, Dong-mei, Chen, Ming,	We address a special kind of Internet of Things (IoT) systems that are also real-time. We call them real-time IoT (RT-IoT) systems. An RT-IoT system needs to meet timing constraints of system delay, clock synchronization, deadline, and so on. The timing constraints turn to be more stringent as we get closer to the physical things. Based on the reference architecture of IoT (ISO/IEC 30141), the RT-IoT conceptual model is established. The idea of edge subsystem is introduced. The sensing & controlling domain is the basis of the edge subsystem, and the edge subsystem usually must meet the hard real-time constraints. The model includes four perspectives, the time view, computation view, communication view, and control view. Each view looks, from a different angle, at how the time parameters impact an RT-IoT system.	10.1631/FITEE.1900115	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.1900115	SpringerLink

Models@run.time: a guided tour of the state of the art and research challenges	Bencomo, Nelly, Götz, Sebastian, Song, Hui,	<p>More than a decade ago, the research topic models@run.time was coined. Since then, the research area has received increasing attention. Given the prolific results during these years, the current outcomes need to be sorted and classified.</p> <p>Furthermore, many gaps need to be categorized in order to further develop the research topic by experts of the research area but also newcomers. Accordingly, the paper discusses the principles and requirements of models@run.time and the state of the art of the research line. To make the discussion more concrete, a taxonomy is defined and used to compare the main approaches and research outcomes in the area during the last decade and including ancestor research initiatives. We identified and classified 275 papers on models@run.time , which allowed us to identify the underlying research gaps and to elaborate on the corresponding research challenges. Finally, we also facilitate sustainability of the survey over time by offering tool support to add, correct and visualize data.</p>	10.1007/s10270-018-00712-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-018-00712-x	SpringerLink
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Enabling architecture based Co-Simulation of complex Smart Grid applications	Binder, Christoph, Fischinger, Michael, Altenhuber, Lukas, Draxler, Dieter, Lastro, Goran, Neureiter, Christian,	<p>The integration of decentralized prosumers into current energy systems leads to continuously increasing complexity in today's popular term of the Smart Grid. Since conventional engineering methods reach their limits when dealing with the challenges in developing such systems, model-driven approaches like Domain Specific Systems Engineering (DSSE) gain significant importance. Contributing to the agile development of such a System of Systems (SoS), the application of the DSSE approach is furthermore supported by the introduction of the Smart Grid Architecture Model (SGAM) and Mosaik. However, with both concepts being individual methodologies, their interconnection is missing specifications. Therefore, this paper proposes the development of an interface between architecting and simulating a complex Smart Grid. To achieve this, the concepts of SGAM and Mosaik are analyzed in the first place in order to set up a suitable architectural model of an energy system and the corresponding simulation scenario. Subsequently, the applicability of the present</p>	10.1186/s42162-019-0084-0	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-019-0084-0	SpringerLink
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		approach is demonstrated by utilizing an excerpt of a real-world case study, the charging behavior of an Electric Vehicle (EV).			
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Towards automated engineering and validation of cyber-physical energy systems	Andrén, Filip Pröbstl, Strasser, Thomas I., Resch, Jürgen, Schuiki, Bernhard, Schöndorfer, Sebastian, Panholzer, Georg, Brandauer, Christof,	The massive deployment of distributed generators from renewable sources in recent years has led to a fundamental paradigm change in terms of planning and operation of the electric power system. The usage of advanced automation and information and communication technology is a key element to handle these new challenges and to turn the traditional power system into a smart grid. The implementation of such complex systems solutions is associated with increasing development complexity resulting in increased engineering costs. The traditional engineering methods used for power system automation were not intended to be used for applications of this scale and complexity. However, the usage of proper methods, automation architectures, and corresponding tools holds huge optimization potential for the engineering process. Therefore, this work presents a model-based engineering and validation support system, covering the overall engineering process for smart grid applications.	10.1186/s42162-019-0095-x	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-019-0095-x	SpringerLink
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Work Disability in Australia: An Overview of Prevalence, Expenditure, Support Systems and Services	Collie, Alex, Donato, Michael, Iles, Ross,	<p>Purpose This study sought to describe Australian systems of income support for people with work disability. Specific aims were to summarise and compare the features of the income support systems, including the rehabilitation and employment services funded or provided by those systems, and factors affecting transition between systems. Further objectives were to estimate the prevalence of work disability in Australia and the national expenditure on work disability income support.</p> <p>Methods A mixed methods project involving collation and analysis of existing publicly available documentation and data, and interviews with 25 experts across ten major systems of income support. The prevalence of work disability and expenditure in each system, and in total, was estimated using publicly accessible data sources. System features and service models were synthesised from data sources, tabulated and compared qualitatively.</p> <p>Results In Australia during the 2015/2016 financial year an estimated 786,000 people with work disability received income support from a Commonwealth,</p>	10.1007/s10926-018-9816-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10926-018-9816-4	SpringerLink
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		<p>state, territory or private source. An additional 6.5 million people accessed employer provided leave entitlements for short periods of work incapacity. A total of \$37.2 billion Australian dollars was spent on income support for these people during the year. This support was provided through a complex array of government authorities, private sector insurers and employers. Service models vary substantially between systems, with case management the only service provided across all systems. Healthcare and return to work services were provided in some systems, although models differed markedly between systems. Income support ranged from 19 to 100% of earnings for a person earning the average weekly Australian wage pre-disability. There is a paucity of information relating to movement between systems of support, however it is likely that many thousands of people with long periods of work disability transition between systems annually.</p> <p>Conclusions This study demonstrates the substantial financial and human impact of work disability on Australian society. Findings indicate multiple</p>			
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		opportunities for reducing the burden of work disability, including aligning case management and healthcare service models, and engaging employers in prevention and rehabilitation. The findings suggest a need for greater interrogation and evaluation of Australian work disability support systems.			
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Stability Analysis of Following Vehicles on a Highway for Safety of Automated Transportation Systems	Yahiaoui, Azzedine,	The development and integration of advanced control technologies in vehicles and infrastructure can make intelligent (or automated) transportation systems much more safe and efficient. This paper focuses on a proper approach to stability and control of two adjacent vehicles following each other on the same traffic lane of a highway to ensure the functional safety of their automated driving systems. These vehicles are as entirely automated as they have the ability to follow a line path at a high speed and reduce the distance that separates them while adjusting their dynamic responses automatically without intervention from humans (i.e. drivers). To meet requirements for driving safety and stability, this paper explores a new approach to string stability of (any) two adjacent vehicles traveling in the same direction based on using optimal control and Lyapunov stability theories. Therefore, sufficient conditions for string stability of a vehicle traffic using continuous-time Lyapunov function and matrix Riccati equation are presented. The search for a quadratic Lyapunov function is formulated as a convex	10.1007/s13177-019-00177-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13177-019-00177-2	SpringerLink
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		optimization problem in terms of a linear invariant system towards a quadratic optimal criterion. The analysis of these methods for minimizing the desired performance criteria is also given. Finally, the paper ends with a conclusion and perspective for future work.			
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From a literature review to a conceptual framework of enablers for smart manufacturing control	Rojas, Rafael A., Rauch, Erwin,	When cyber-physical systems (CPS) are connected to perform smart manufacturing, we have a cyber-physical production system (CPPS). In such systems, CPS collaborate in an intelligent way to obtain and maintain the optimum of the manufacturing process, handle disturbances and adapt to changing conditions. This work, based on a systematic literature review, shows current trends in cyber-physical production systems with a special focus on the role of connectivity and control systems in production. We are looking for the enablers of CPPS focusing on the current evolution of control systems in the smart factory of the future. As a result, a conceptual framework as well as a CPPS control system architecture for the introduction and organisation of enablers for CPPS is presented to support practitioners in the realisation of smart manufacturing control concepts.	10.1007/s00170-019-03854-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00170-019-03854-4	SpringerLink
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Discovery method for distributed denial-of-service attack behavior in SDNs using a feature-pattern graph model	Xiao, Ya, Fan, Zhi-jie, Nayak, Amiya, Tan, Cheng-xiang,	<p>The security threats to software-defined networks (SDNs) have become a significant problem, generally because of the open framework of SDNs. Among all the threats, distributed denial-of-service (DDoS) attacks can have a devastating impact on the network. We propose a method to discover DDoS attack behaviors in SDNs using a feature-pattern graph model. The feature-pattern graph model presented employs network patterns as nodes and similarity as weighted links; it can demonstrate not only the traffic header information but also the relationships among all the network patterns. The similarity between nodes is modeled by metric learning and the Mahalanobis distance. The proposed method can discover DDoS attacks using a graph-based neighborhood classification method; it is capable of automatically finding unknown attacks and is scalable by inserting new nodes to the graph model via local or global updates. Experiments on two datasets prove the feasibility of the proposed method for attack behavior discovery and graph update tasks, and demonstrate that</p>	10.1631/FITEE.1800436	http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.1800436	SpringerLink
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		the graph-based method to discover DDoS attack behaviors substantially outperforms the methods compared herein.			
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<p>A model for the evaluation of environmental impact indicators for a sustainable maritime transportation systems</p>	<p>Pérez Lespier, Lizzette, Long, Suzanna, Shoberg, Tom, Corns, Steven,</p>	<p>Maritime shipping is considered the most efficient, low-cost means for transporting large quantities of freight over significant distances. However, this process also causes negative environmental and societal impacts. Therefore, environmental sustainability is a pressing issue for maritime shipping management, given the interest in addressing important issues that affect the safety, security, and air and water quality as part of the efficient movement of freight throughout the coasts and waterways and associated port facilities worldwide. In-depth studies of maritime transportation systems (MTS) can be used to identify key environmental impact indicators within the transportation system. This paper develops a tool for decision making in complex environments; this tool will quantify and rank preferred environmental impact indicators within a MTS. Such a model will help decision-makers to achieve the goals of improved environmental sustainability. The model will also provide environmental policy-makers in the shipping industry with an analytical tool that can evaluate tradeoffs within the system and identify possible</p>	<p>10.1007/s42524-019-0004-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42524-019-0004-9</p>	<p>SpringerLink</p>
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		alternatives to mitigate detrimental effects on the environment.			
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Sound black-box checking in the LearnLib	Meijer, Jeroen, Pol, Jaco,	<p>In black-box checking (BBC) incremental hypotheses on the behavior of a system are learned in the form of finite automata, using information from a given set of requirements, specified in Linear-time Temporal Logic (LTL). The LTL formulae are checked on intermediate automata and potential counterexamples are validated on the actual system. Spurious counterexamples are used by the learner to refine these automata. We improve BBC in two directions. First, we improve checking lasso-like counterexamples by assuming a check for state equivalence. This provides a sound method without knowing an upper-bound on the number of states in the system. Second, we propose to check the safety portion of an LTL property first, by deriving simple counterexamples using monitors. We extended LearnLib's system under learning API to make our methods accessible, using LTSmin as model checker under the hood. We illustrate how LearnLib's most recent active learning algorithms can be used for BBC in practice. Using the RERS 2017 challenge, we provide experimental results on the performance of all LearnLib's</p>	10.1007/s11334-019-00342-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-019-00342-6	SpringerLink
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		active learning algorithms when applied in a BBC setting. We will show that the novel incremental algorithms TTT and ADT perform the best. We also provide experiments on the efficiency of various BBC strategies.			
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<p>A protection strategy for inverter-interfaced islanded microgrids with looped configuration</p>	<p>Karimi, Hamed, Shahgholian, Ghazanfar, Fani, Bahador, Sadeghkhani, Iman, Moazzami, Majid,</p>	<p>Development of an efficient protection strategy is one of the main barriers in paving the way for the implementation of inverter-based microgrids. The limited fault current of voltage-sourced converter (VSC) units as the sole fault feeding sources in the islanded mode of operation makes the fault detection difficult for conventional overcurrent-based protection system. On the other hand, bidirectional power flow due to the presence of distributed energy resource units and looped configuration of microgrids results in miscoordination of the overcurrent relays. To address these problems, this paper proposes a protection strategy for islanded inverter-interfaced looped microgrids. By monitoring the fault-imposed component of VSC current, the proposed scheme quantifies the severity of fault condition as the fault detection criterion. To preserve the protection coordination among available overcurrent relays, the proposed protection scheme adaptively changes the limiting level of hybrid reference frame limiter of the VSC control system proportional to their distances to the fault point. The proposed</p>	<p>10.1007/s00202-019-00841-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00202-019-00841-6</p>	<p>SpringerLink</p>
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		protection scheme is local, and there is no need for any change in the commercially available overcurrent protection relays. The reliable performance of the proposed protection strategy is assessed on the simulation model of a looped microgrid network.			
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<p>E-Mobility Systems Architecture: a model-based framework for managing complexity and interoperability</p>	<p>Kirpes, Benedikt, Danner, Philipp, Basmadjian, Robert, Meer, Hermann de, Becker, Christian,</p>	<p>The future of e-mobility will consist of a large number of connected electric vehicles, smart charging stations and information systems at the intersection of electricity and mobility sector. When engineering and integrating the multitude of systems into even more complex systems-of-systems for e-mobility, interoperability and complexity handling are vital. Model-based system architectures support the engineering process of information systems with the concepts of abstraction, reduction and separation of concerns. In this paper, we contribute to the research body, by extracting requirements for managing complexity and interoperability of these systems. Further, a comparative analysis of the state-of-the-art in existing architecture models and frameworks for e-mobility is conducted. Based on the identified gaps in existing research, we propose the E-Mobility Systems Architecture (EMSA) Model, a three-dimensional systems architecture model for the e-mobility sector. Its structure originates from the well-established Smart Grid</p>	<p>10.1186/s42162-019-0072-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-019-0072-4</p>	<p>SpringerLink</p>
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		<p>Architecture Model. We further allocate all relevant entities from the e-mobility sector to the EMSA dimensions, including a harmonized role model, functional reference architecture, component and systems allocation, as well as a mapping of data standards and communication protocols. The model then is validated qualitatively and quantitatively against the requirements with a case study approach. Our evaluation shows that the EMSA Model fulfills all requirements regarding the management of complexity and ensuring interoperability. From the case study, we further identify gaps in current data model standardization for e-mobility.</p>			
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Software mediators as first-class entities of systems-of-systems software architectures	Garcés, Lina, Oquendo, Flavio, Nakagawa, Elisa Yumi,	Context In contrast to traditional software systems that are mostly created from scratch, current software systems are engineered as a junction of systems already in operation. Examples can be found in domains, such as smart cities, crisis and emergency, IoT, big data, industry 4.0, and connected health systems. Most of them can be considered systems-of-systems (SoS), since they refer to alliances of operational and managerial independent software-intensive systems, which are sometimes distributed over different environments. Therefore, SoS software architectures must be dynamic, evolve over time, and support the execution of emergent behaviors to accomplish SoS missions. They must be also designed to enable the connection of heterogeneous systems, making possible their interoperation, communication, coordination, cooperation, and collaboration, most of the times, in a seamless way. Similar challenges have been addressed by using software mediators as architectural entities. However, the application of mediators in SoS has not been properly explored. Goal This article introduces	10.1186/s13173-019-0089-3	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13173-019-0089-3	SpringerLink
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		<p>MediArch , a layered architecture that considers mediators as first-class software entities to be used in the construction of SoS architectures. Our objective is to present evidence about how MediArch 's can support the construction of SoS architectures.</p> <p>Methods The following four steps were conducted to define MediArch :</p> <p>(1) identification of mediation requirements to allow SoS properties; (2) establishment and categorization of twelve types of mediators, for enabling capabilities of communication and control of constituent systems interactions and conversion of heterogeneous messages exchanged through a mediation infrastructure; (3) specification of duties, behaviors, assumptions, and guarantees of mediators; and (4) organization of MediArch in three layers, namely, the constituents & consumer systems layer; the communication, conversion, & coordination layer; and the control layer. This architecture was used as the backbone for the software architectures of two SoS in different domains, namely, flood monitoring system-of-</p>			
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		<p>systems (FMSoS), and health-care supportive home system-of-systems (HSH-SoS), for providing evidence on how MediArch supports the architecting process of SoS. Results MediArch (1) supports the integration of independent constituent systems, (2) provides strategies to manage emergent behaviors, (3) defines different schemes of control authorities, (4) offers elements to support SoS evolution, and (5) promotes the resilience and adaptability of SoS architectures.</p> <p>Conclusions</p> <p>Although MediArch contributes to the establishment of SoS architectures, some challenges related to performance, resource consumption, security, safety, and non-disruptive reconfigurations must still be overcome.</p>			
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On the search for industry-relevant regression testing research	Ali, Nauman bin, Engström, Emelie, Taromirad, Masoumeh, Mousavi, Mohammad Reza, Minhas, Nasir Mehmood, Helgesson, Daniel, Kunze, Sebastian, Varshosaz, Mahsa,	Regression testing is a means to assure that a change in the software, or its execution environment, does not introduce new defects. It involves the expensive undertaking of rerunning test cases. Several techniques have been proposed to reduce the number of test cases to execute in regression testing, however, there is no research on how to assess industrial relevance and applicability of such techniques. We conducted a systematic literature review with the following two goals: firstly, to enable researchers to design and present regression testing research with a focus on industrial relevance and applicability and secondly, to facilitate the industrial adoption of such research by addressing the attributes of concern from the practitioners' perspective. Using a reference-based search approach, we identified 1068 papers on regression testing. We then reduced the scope to only include papers with explicit discussions about relevance and applicability (i.e. mainly studies involving industrial stakeholders). Uniquely in this literature review, practitioners were consulted at	10.1007/s10664-018-9670-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-018-9670-1	SpringerLink
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		<p>several steps to increase the likelihood of achieving our aim of identifying factors important for relevance and applicability. We have summarised the results of these consultations and an analysis of the literature in three taxonomies, which capture aspects of industrial-relevance regarding the regression testing techniques. Based on these taxonomies, we mapped 38 papers reporting the evaluation of 26 regression testing techniques in industrial settings.</p>			
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<p>How to succeed in implementing (smart) sustainable urban Agendas: “keep cities smart, make communities intelligent”</p>	<p>Marsal-Llacuna, Maria-Lluïsa,</p>	<p>United Nations-Habitat New Urban Agenda and European Union's Urban Agenda are today's international Agendas safeguarding sustainability of our cities and communities. Although in different ways, these Agendas also incorporate “smart” concepts and therefore acknowledge the important role that technology plays, especially in both delivery and implementation. However, although the incorporation of the technological element, Agenda's sustainable policies have poor adoption and this is due to the lack of executive instruments to help their implementation. In this research, the Author proposes a novel technologically enabled executive function to better succeed in the implementation of Agendas, the so-called Policies - Actuated - Planning (PAP), and an executive instrument, the Actuators . Differently from existing Actuators that leverage on the Internet-of-Things to trigger a function on a given urban device, the proposed Actuators put a policy at work through the technological execution of urban planning interventions. Hence, the name Policies - Actuated -</p>	<p>10.1007/s10668-018-0115-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10668-018-0115-1</p>	<p>SpringerLink</p>
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		<p>Planning (PAP) is given. Moreover, Actuators constitute a novel accountability system to measure the performance in the implementation of policies since they offer pioneering qualitative monitoring functionalities. Finally, to mention that the PAP relies on Author's several times published Intelligenter Method , which is based on a bottom-up, collaborative and holistic-systemic approach to complex systems. The use of Intelligenter Method principles results in Actuator's technologically enabled execution of city policies implemented at the lowest possible level, the community.</p>			
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A Cumulative Prospect Theory Based Counterterrorism Resource Allocation Method under Interval Values	Ge, Bingfeng, Zhang, Xiaoxiong, Zhou, Xiaolei, Tan, Yuejin,	Strategic resource allocation into decision-making model plays a valuable role for the defender in mitigating damage and improving efficiency in military environments. In this paper, we develop a defensive resource allocation model based on cumulative prospect theory (CPT), which considers terrorists' psychological factors of decision-making in reality. More specifically, we extend existing models in the presence of multiple attributes and terrorists' deviations from rationality using a multi-attribute cumulative prospect theory. In addition, interval values are used to cope with uncertainties regarding gain and loss. Comparative studies are also carried out to demonstrate the differences among minmax, Nash equilibrium (NE), and traditional probability risk analysis (PRA) strategies. Results show that the defender's optimal defensive resource allocation will change along with terrorists' behaviors and the proposed model makes more sense compared with other traditional resource allocation strategies.	10.1007/s11518-019-5423-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-019-5423-y	SpringerLink
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The Myth of Responsibility: on Changing the Purpose Paradigm	Glauner, Friedrich,	<p>As part of our exploration of a new conceptual framework for an economy that works for 100% of humanity, this conceptual paper asks why all talk about the purpose of organizations seems to suffer from a certain bias, namely the bias of scarcity, and how this myth of scarcity influences our understanding of corporate responsibility. The mainstream understanding of corporate purpose always contains partly normative and partly functional aspects designed to cope with the purported problem of scarcity. According to economic and CSR reasoning, this bias concerning the purpose of business organizations triggers two quite distinct understandings of the essence of corporate responsibility. The economic view interprets it as responsibility towards the company, while CSR and business ethics argue that it reflects, or at least ought to reflect, a broader responsibility towards society. To overcome this responsibility gap, we need to affect a paradigm shift in economic reasoning, a shift which reconciles economic responsibility on the micro-level logic of raising profit with the greater demands of the meso, macro, and supra</p>	10.1007/s41463-018-0048-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41463-018-0048-8	SpringerLink
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		<p>levels. Only then do we obtain a truly meaningful lever for changing real-world business practice from within the micro-logics of running a corporation. This paradigm shift requires a different mental model - a model of resource growth and natural abundance, rather than of scarcity - on the part of both economists and business ethicists. It can be labeled the economic model of future viability. This paper develops a conceptual argument for a future viable model of business practice which, first and foremost, takes seriously the need for the kind of micro-level decision-making which keeps individual organizations afloat, but which also, and crucially, delivers a solution for future viable business models and business behavior which breaks the apparent downward spiral of modern wealth creation, i.e. the spiral of continuous acceleration, disruption, concentration and resource exploitation, and which, thirdly, delivers a proper definition of purpose which can be applied in measurement systems which are free of biased assumptions of scarcity.</p>			
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Thematic series on Social Network Analysis and Mining	Santos, Rodrigo Pereira, Lopes, Giseli Rabello,	<p>Social networks were first investigated in social, educational and business areas. Academic interest in this field though has been growing since the mid twentieth century, given the increasing interaction among people, data dissemination and exchange of information. As such, the development and evaluation of new techniques for social network analysis and mining (SNAM) is a current key research area for Internet services and applications. Key topics include contextualized analysis of social and information networks, crowdsourcing and crowdfunding, economics in networks, extraction and treatment of social data, mining techniques, modeling of user behavior and social networks, and software ecosystems. These topics have important areas of application in a wide range of fields, such as academia, politics, security, business, marketing, and science.</p>	10.1186/s13174-019-0113-z	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-019-0113-z	SpringerLink
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Multi-peril risk assessment for business downtime of industrial facilities	Prabhu, Saurabh, Javanbarg, Mohammad, Lehmann, Marc, Atamturktur, Sez,	The losses incurred by industrial facilities following catastrophic events can be broadly broken down into property damage and business interruption due to the ensuing downtime. This article describes a generalized probabilistic methodology for estimating facility downtime under multi-hazard scenarios. Since the vulnerability of each components of an industrial facility varies with the types of hazard, it is beneficial to adopt a system-of-systems approach for analyzing such complex facilities under multiple interdependent hazards. In this approach, the complex layout of the facility is first broken down into its constituent components. The component vulnerabilities to different hazards are combined using Boolean logic, assuming their repair time as a common basis for defining damage states of the component. This combination results in multi-hazard fragility functions for each component of the system, which give the probability of damage under combined occurrence of multiple perils. The time to repair a component is expressed probabilistically using restoration functions. Using fault tree analysis, the components' fragility functions and restoration	10.1007/s11069-019-03711-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-019-03711-3	SpringerLink
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		functions are propagated to calculate system-level downtime. We demonstrate the methodology on a case-study power plant to estimate downtime risk under combined earthquake and tsunami hazard.			
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Internet of things: new classification model of intelligence	Boulaalam, Abdelhak,	<p>With the hug development of information and communication technologies, the internet of things (IoT) becomes one of the concepts that transform our surroundings more and more intelligent. Actually, it's heavily affecting people's daily lives in many domains. Consequently, we are in front of a variety of vertical silos IoT applications. Each vertical system has its own hidden features, targets different ecosystems and his vision of intelligence. In addition, there is no horizontal silos standardization. This paper presents an overview of the intelligence aspect on the IoT topic. As intelligence on IoT have many facets, this paper is mainly focused on the elements behind intelligence facet. For this, current study proposes a first and a new classification model of intelligence on IoT, which distinguishes between four orthogonal dimensions. Furthermore, the survey and projection of some studies and applications on the proposed model will be discussed in this research.</p>	10.1007/s12652-018-0965-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-018-0965-2	SpringerLink
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Optimal Sizing of Distributed Energy Resources in a Microgrid System with Highly Penetrated Renewables	Dey, Bishwajit, Bhattacharyya, Biplab, Sharma, Sharmistha,	Economic dispatch (ED) of a grid connected and renewable integrated microgrid system is considered in this paper. Two wind farms take the renewable energy sources (RES) into consideration. A parameter worst-case-transaction-cost which arises due to the stochastic availability and uncontrollable nature of wind farms is also emphasised and efforts have been taken to minimize it too. Hence the paper's focus into split objective functions and the generation costs and the worst case transaction costs are optimised separately and also the net microgrid cost is optimized as a whole. Two different cases with highly varying transaction prices are studied. Two meta-heuristic soft computing algorithms are applied for optimization and a comparative analysis among them is studied. Numerical results are tabulated to justify the effectiveness of the novel approach.	10.1007/s40998-018-0141-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40998-018-0141-x	SpringerLink
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<p>The Freshwater Information Platform: a global online network providing data, tools and resources for science and policy support</p>	<p>Schmidt-Kloiber, Astrid, Bremerich, Vanessa, Wever, Aaike, Jähnig, Sonja C., Martens, Koen, Strackbein, Jörg, Tockner, Klement, Hering, Daniel,</p>	<p>Freshwaters are among the most complex, dynamic, and diverse ecosystems globally. Despite their small share of the earth's surface (less than 1%) they are home to over 10% of all known animal species. Biodiversity decrease in general and freshwater biodiversity decline in particular have recently received increasing attention, and various policy instruments are now targeting the conservation, protection and enhancement of biodiversity and associated ecosystem services. Surveillance programs as well as a variety of research projects have been producing a tremendous amount of freshwater-related information. Though there have been various attempts to build infrastructures for online collection of such data, tools and reports, they often provide only limited access to resources that can readily be extracted for conducting large scale analyses. Here, we present the Freshwater Information Platform, an open system of relevant freshwater biodiversity-related information. We provide a comprehensive overview of the platform's core components,</p>	<p>10.1007/s10750-019-03985-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10750-019-03985-5</p>	<p>SpringerLink</p>
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		highlight their values, present options for their use, and discuss future developments. This is complemented by information on the platform's current management structure, options for contributing data and research results and an outlook for the future.			
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Empowering Engineering Students in Ethical Risk Management: An Experimental Study	Guntzburger, Yoann, Pauchant, Thierry C., Tanguy, Philippe A.,	<p>The complexity of industrial reality, the plurality of legitimate perspectives on risks and the role of emotions in decision-making raise important ethical issues in risk management that are usually overlooked in engineering. Using a questionnaire answered by 200 engineering students from a major engineering school in Canada, the purpose of this study was to assess how their training has influenced their perceptions toward these issues. While our results challenge the stereotypical portrait of the engineer, they also suggest that the current engineering education might fail to empower engineers to engage in ethical risk management. We therefore propose an active-learning method to help in this matter. Carried out through workshops with 34 students in chemical engineering, the effectiveness of this method has been evaluated using group interviews and questionnaires. Our results suggest that such an approach is effective, at least in the short run, to motivate students to engage in ethical risk management and to trigger reflectivity on what it means to be an engineer today.</p>	10.1007/s11948-018-0044-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11948-018-0044-2	SpringerLink
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Learning and statistical model checking of system response times	Aichernig, Bernhard K., Bauerstätter, Priska, Jöbstl, Elisabeth, Kann, Severin, Korošec, Robert, Krenn, Willibald, Mateis, Cristinel, Schlick, Rupert, Schumi, Richard,	<p>Since computers have become increasingly more powerful, users are less willing to accept slow responses of systems. Hence, performance testing is important for interactive systems. However, it is still challenging to test if a system provides acceptable performance or can satisfy certain response-time limits, especially for different usage scenarios. On the one hand, there are performance-testing techniques that require numerous costly tests of the system. On the other hand, model-based performance analysis methods have a doubtful model quality. Hence, we propose a combined method to mitigate these issues. We learn response-time distributions from test data in order to augment existing behavioral models with timing aspects. Then, we perform statistical model checking with the resulting model for a performance prediction. Finally, we test the accuracy of our prediction with hypotheses testing of the real system. Our method is implemented with a property-based testing tool with integrated statistical model checking algorithms. We demonstrate the feasibility of our techniques in an industrial case study with a web-</p>	10.1007/s11219-018-9432-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-018-9432-8	SpringerLink
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		service application.			
Systems engineering in context	Beling, Peter A., Fleming, Cody H., Scherer, William T.,		10.1007/s10669-019-09733-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-019-09733-3	SpringerLink
Major incidents that shaped aviation security	Klenka, Michal,	This article is giving an overview about major incidents in civil aviation, that have shaped the aviation security policies over the course of time. It begins with industry threats and security breaches (hijackings and terrorism), the counter measures and policy decisions are giving an example of changing the aviation security. The article continues with analysing the impact of 9/11, but also the current threats to civil aviation and the international efforts in combating them. The objective is to analyse the impact of the incidents on the evolution of aviation security and find out whether industry has been reactive or proactive to aviation threat mitigation. This article concludes that the security methods are reactively implemented, and a proactive attitude of the stakeholders has to maintain it course towards the aviation security, as we believe the aviation will have an increasingly part in the future of transportation.	10.1007/s12198-019-00201-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-019-00201-2	SpringerLink

Model-driven allocation engineering: specifying and solving constraints based on the example of automotive systems	Pohlmann, Uwe, Hüwe, Marcus,	Automotive systems provide sophisticated functionality and are controlled by networked electronic control units (ECUs). Nowadays, software engineers use component-based development approaches to develop their software. Moreover, software components have to be allocated to ECUs to be executed. Engineers have to cope with topology-, software-, and timing dependencies and memory-, scheduling-, and routing constraints. Currently, engineers use linear programming to specify allocation constraints manually and to compute a feasible allocation specification automatically. However, encoding the allocation problem as a linear program is a complex and error-prone task. This paper contributes a model-driven, object constraint language based, and graph pattern based allocation engineering approach for reducing the engineering effort and to avoid failures. We validate our approach with an automotive case study. We specify the software component model, the hardware platform model, and the allocation constraint specification with	10.1007/s10515-018-0248-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10515-018-0248-3	SpringerLink
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		our engineering approach MechatronicUML . Our validation shows that we can specify allocation constraints with less engineering effort and are able to compute feasible allocation specifications automatically.			
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Interoperability in Internet of Things: Taxonomies and Open Challenges	Noura, Mahda, Atiquzzaman, Mohammed, Gaedke, Martin,	<p>In the last few years, many smart objects found in the physical world are interconnected and communicate through the existing internet infrastructure which creates a global network infrastructure called the Internet of Things (IoT). Research has shown a substantial development of solutions for a wide range of devices and IoT platforms over the past 6-7 years. However, each solution provides its own IoT infrastructure, devices, APIs, and data formats leading to interoperability issues. Such interoperability issues are the consequence of many critical issues such as vendor lock-in, impossibility to develop IoT application exposing cross-platform, and/or cross-domain, difficulty in plugging non-interoperable IoT devices into different IoT platforms, and ultimately prevents the emergence of IoT technology at a large-scale. To enable seamless resource sharing between different IoT vendors, efforts by several academia, industry, and standardization bodies have emerged to help IoT interoperability, i.e., the ability for multiple IoT platforms from different vendors to work together. This paper performs a</p>	10.1007/s11036-018-1089-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11036-018-1089-9	SpringerLink
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		comprehensive survey on the state-of-the-art solutions for facilitating interoperability between different IoT platforms. Also, the key challenges in this topic is presented.			
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Fault-based refinement-testing for CSP	Cavalcanti, Ana, Simao, Adenilso,	<p>The process algebra CSP has been studied as a notation for model-based testing. Theoretical and practical work has been developed using its trace and failure semantics, and their refinement notions as conformance relations. Two sets of tests have been defined and proved to be exhaustive, in the sense that they can identify any SUT that is non-conforming with respect to the relevant refinement relation. However, these sets are usually infinite, and in this case, it is obviously not possible to apply them to verify the conformity of an SUT. Some classical selection criteria based on models have been studied. In this paper, we propose a procedure for online test generation for selection of finite test sets for traces refinement from CSP models. It is based on the notion of fault domains, focusing on the set of faulty implementations of interest. We investigate scenarios where the verdict of a test campaign can be reached after a finite number of test executions. We illustrate the usage of the procedure with some case studies.</p>	10.1007/s11219-018-9431-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-018-9431-9	SpringerLink
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Test descriptions with ETSI TDL	Makedonski, Philip, Adamis, Gusztáv, Käärik, Martti, Kristoffersen, Finn, Carignani, Michele, Ulrich, Andreas, Grabowski, Jens,	To address the need for abstract, high-level test descriptions that can be shared among different stakeholders, the European Telecommunications Standards Institute (ETSI) commissioned the design of the Test Description Language (TDL). TDL is designed as a domain-specific language for testing, consisting of a standardised abstract syntax (meta-model) and concrete syntaxes for textual specification, graphical design, and model exchange between tools. Its main purpose is to support a test methodology that is followed in the standardisation work for software-intensive systems at ETSI and is applicable in industrial projects as well. TDL enables the formal specification of both test objectives derived from system requirements and test descriptions refining the test objectives. The latter serve as blueprint for the implementation of executable tests. A standardised mapping of TDL specifications to test scripts in the standardised test execution language TTCN-3 widens the reach of TDL to ensure compatibility and consistency of generated executable tests. An open-source toolset has been developed as a common platform to accelerate the adoption of TDL	10.1007/s11219-018-9423-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-018-9423-9	SpringerLink
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		and lower the barrier to entry for users and tool vendors. Reports from pilot applications within three ETSI standardisation groups demonstrate the practicality of the chosen approach.			
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Coherent quality management for big data systems: a dynamic approach for stochastic time consistency	Chen, Yi-Ting, Sun, Edward W., Lin, Yi-Bing,	Big data systems for reinforcement learning have often exhibited problems (e.g., failures or errors) when their components involve stochastic nature with the continuous control actions of reliability and quality. The complexity of big data systems and their stochastic features raise the challenge of uncertainty. This article proposes a dynamic coherent quality measure focusing on an axiomatic framework by characterizing the probability of critical errors that can be used to evaluate if the conveyed information of big data interacts efficiently with the integrated system (i.e., system of systems) to achieve desired performance. Herein, we consider two new measures that compute the higher-than-expected error,—that is, the tail error and its conditional expectation of the excessive error (conditional tail error)—as a quality measure of a big data system. We illustrate several properties (that suffice stochastic time-invariance) of the proposed dynamic coherent quality measure for a big data system. We apply the proposed measures in an empirical study with three wavelet-based big data systems in monitoring and forecasting electricity demand to conduct the	10.1007/s10479-018-2795-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10479-018-2795-1	SpringerLink
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		reliability and quality management in terms of minimizing decision-making errors. Performance of using our approach in the assessment illustrates its superiority and confirms the efficiency and robustness of the proposed method.			
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Using Flexibility in Designing CRM Solution	Dutt, Himanshu, Chauhan, Kavita,	<p>The role of flexibility is eminent in designing a CRM solution. But the challenge is how to embed it. We must know where exactly to apply it. The purpose of this research therefore exactly is to identify the linkages between flexibility and CRM solution design and suggest how and where the flexibility can be embedded in this design. It explores the concept of flexible systems management and the CRM system as 'independent' and 'interrelated' set of activities based on systems-thinking concept. The research identifies two sets of flexibility affecting the CRM design—one, the flexibility of CRM process (and modules within) and two, the flexibility of CRM design and its users. The research also outlines what CRM features are critical for applying flexibility. We used Delphi method to prepare a ranking of such critical features for a successful CRM design. Based on this, we created a hypothetical used case for building and mapping flexibility to each CRM feature (from the six identified) plotted between flexibility and rigidity quadrant. Features 'high on flexibility' are recommended to 'stretch further', and those skewed towards</p>	10.1007/s40171-018-0203-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-018-0203-y	SpringerLink
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		<p>rigidity are advised to 'control or divest'. This study will be beneficial to practitioners looking forward to implementing CRM or those already underway. It should help these practising professionals in thinking ways to build flexibility, do scoping for their CRM project like which variables (read functionalities) to focus and assess how to leverage flexibility to meet productivity goals and business requirements of the present and the future.</p>			
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Execution of UML models: a systematic review of research and practice	Ciccozzi, Federico, Malavolta, Ivano, Selic, Bran,	<p>Several research efforts from different areas have focused on the execution of UML models, resulting in a diverse and complex scientific body of knowledge. With this work, we aim at identifying, classifying, and evaluating existing solutions for the execution of UML models. We conducted a systematic review in which we selected 63 research studies and 19 tools among over 5400 entries by applying a systematic search and selection process. We defined a classification framework for characterizing solutions for UML model execution, and we applied it to the 82 selected entries. Finally, we analyzed and discussed the obtained data. From the analyzed data, we drew the following conclusions: (i) There is a growing scientific interest on UML model execution; (ii) solutions providing translational execution clearly outnumber interpretive solutions; (iii) model-level debugging is supported in very few cases; (iv) only a few research studies provide evidence of industrial use, with very limited empirical evaluations; (v) the most common limitation deals with coverage of the UML language. Based on these</p>	10.1007/s10270-018-0675-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-018-0675-4	SpringerLink
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		observations, we discuss potential research challenges and implications for the future of UML model execution. Our results provide a concise overview of states of the art and practice for UML model execution intended for use by both researchers and practitioners.			
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Enabling automated requirements reuse and configuration	Li, Yan, Yue, Tao, Ali, Shaukat, Zhang, Li,	<p>A system product line (PL) often has a large number of reusable and configurable requirements, which in practice are organized hierarchically based on the architecture of the PL. However, the current literature lacks approaches that can help practitioners to systematically and automatically develop structured and configuration-ready PL requirements repositories. In the context of product line engineering and model-based engineering, automatic requirements structuring can benefit from models. Such a structured PL requirements repository can greatly facilitate the development of product-specific requirements repository, the product configuration at the requirements level, and the smooth transition to downstream product configuration phases (e.g., at the architecture design phase). In this paper, we propose a methodology with tool support, named as Zen-ReqConfig, to tackle the above challenge. Zen-ReqConfig is built on existing model-based technologies, natural language processing, and similarity measure techniques. It automatically devises a hierarchical</p>	10.1007/s10270-017-0641-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-017-0641-6	SpringerLink
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		<p>structure for a PL requirements repository, automatically identifies variabilities in textual requirements, and facilitates the configuration of products at the requirements level, based on two types of variability modeling techniques [i.e., cardinality-based feature modeling (CBFM) and a UML-based variability modeling methodology (named as SimPL)]. We evaluated Zen-ReqConfig with five case studies. Results show that Zen-ReqConfig can achieve a better performance based on the character-based similarity measure Jaro than the term-based similarity measure Jaccard. With Jaro, Zen-ReqConfig can allocate textual requirements with high precision and recall, both over 95% on average and identify variabilities in textual requirements with high precision (over 97% on average) and recall (over 94% on average). Zen-ReqConfig achieved very good time performance: with less than a second for generating a hierarchical structure and less than 2 s on average for allocating a requirement. When comparing SimPL and CBFM, no practically significant</p>			
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		difference was observed, and they both performed well when integrated with Zen-ReqConfig.			
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A feature-based survey of model view approaches	Bruneliere, Hugo, Burger, Erik, Cabot, Jordi, Wimmer, Manuel,	<p>When dealing with complex systems, information is very often fragmented across many different models expressed within a variety of (modeling) languages. To provide the relevant information in an appropriate way to different kinds of stakeholders, (parts of) such models have to be combined and potentially revamped by focusing on concerns of particular interest for them. Thus, mechanisms to define and compute views over models are highly needed. Several approaches have already been proposed to provide (semi)automated support for dealing with such model views . This paper provides a detailed overview of the current state of the art in this area. To achieve this, we relied on our own experiences of designing and applying such solutions in order to conduct a literature review on this topic. As a result, we discuss the main capabilities of existing approaches and propose a corresponding research agenda. We notably contribute a feature model describing what we believe to be the most important characteristics of the support for views on models. We expect this work to be helpful</p>	10.1007/s10270-017-0622-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-017-0622-9	SpringerLink
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		to both current and potential future users and developers of model view techniques, as well as to any person generally interested in model-based software and systems engineering.			
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Simulation-supported aviation cyber-security risk analysis: a case study	Schmitt, A. R., Edinger, C., Mayer, T., Niederl, J., Kiesling, T.,	<p>The air transport infrastructure is important and prominent. The current aviation system is already vulnerable and the advent of more automation and pervasion of standard IT in the future leads to ever more complex and interconnected systems with an increasing attack surface. To cope with this situation, we need suitable methods and tools to achieve understanding of the consequences in potential cyber threat situations. In this paper, we present results of a case study on the use of simulation methodologies to support aviation cyber-security risk assessment. We use different variants of a flight plan data manipulation scenario as well as a scenario, where the availability of flight plan data is compromised. The one day scenarios were implemented in the air traffic simulator TrafficSim. The aim is to investigate the potential of the methodology and to achieve an estimation of cyber-threat potentials in connection with flight plan data processing. One scenario capped the flight level of 473 flights on the same airway, resulting in 1073 t additional fuel, and 147 flights would spent their minimum final reserve fuel before landing. A second scenario showed that four</p>	10.1007/s13272-018-0331-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-018-0331-2	SpringerLink
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		<p>or five flights, missing their flight plan at startup, could impact a well utilized runway for about 2–4 h. During a risk assessment, the effects of an attack can be more accurately assessed using simulation results. We recommend to (1) develop, maintain, and apply simulation models and cyber attack simulation scenarios, (2) connect and develop simulation models from “gate-to-gate”, and (3) integrate human interactions with cyber attack simulation scenarios.</p>			
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TOSCA-based Intent modelling: goal-modelling for infrastructure-as-code	Tamburri, Damian A., Heuvel, Willem-Jan, Lauwers, Chris, Lipton, Paul, Palma, Derek, Rutkowski, Matt,	DevOps entails a set of practices that speed up the time needed to rollout software product changes. One such practice is automating deployment and delivery with infrastructure-as-code, i.e., automated scripts that ideally carry out 1-click deployment. Providing effective infrastructure-as-code poses the tricky issue in determining the modelling and information representation paradigm (e.g., Imperative, Declarative, etc.) most compatible with specifying infrastructural code. The OASIS TOSCA standard ("Topology and Orchestration Specification for Cloud Applications") is the de-facto and de-iure standard language for infrastructure-as-code, and adopts an innovative take called "intent modelling". This paper articulates the foundations of this modelling approach incorporating the most related modelling paradigm, that is, goal-modelling. We elaborate on it with a real but simple industrial sample featuring the TOSCA language.	10.1007/s00450-019-00404-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00450-019-00404-x	SpringerLink
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Are you emotional or depressed? Learning about your emotional state from your music using machine learning	Panwar, Sharaj, Rad, Paul, Choo, Kim-Kwang Raymond, Roopaei, Mehdi,	Music plays an important role in our society and has applications broader than just entertainment and pleasure due to its social and physiological effects. There has been recent interest in music, and two active research topics are music information retrieval and music emotion recognition, where data mining and machine learning techniques are integrated with music features and annotations to extract music information such as genres, instrument and its emotional content. In this paper, a machine learning music perception model is proposed to identify emotional content of a given audio stream and study the emotional effects of music. In fact, our developed model has the capability to determine the emotional state of a region (e.g., city) that could be utilized in applications such as marketing, and many other facets of the society such as cognitive development, education, therapy and security. This emotion recognition task is performed by mapping musical acoustic features to corresponding arousal and valence emotion indexes using a linear regression model. A radio-induced emotion dataset (RIED) is compiled from the songs broadcasted on radio in four US	10.1007/s11227-018-2499-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-018-2499-y	SpringerLink
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		major cities (i.e., Houston, New York, Los Angeles and Miami) between October 21, 2017, and November 21, 2017. The RIED is then used as input to the proposed perception model to observe the regional music emotion propensity.			
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Autonomie in Waffensystemen: Chancen und Risiken für die US-Sicherheitspolitik	Hansen, Aaron, Sauer, Frank,	<p>The article analyses the security implications resulting from the current increase of autonomy in weapon systems. Drawing on the example of the US, the article weighs gains and risks, particularly with regard to proliferation and new vulnerabilities as well as dynamics of escalation and instability. The article concludes that the US's strategy regarding autonomy in weapon systems will not yield a net gain in security over the medium and long run. In closing, the article considers the hurdles that multilateral arms control within a United Nations framework is currently facing.</p> <p>Der Artikel analysiert die sich aus Autonomie in Waffensystemen ergebenden sicherheitspolitischen Implikationen. Er fragt am Beispiel der USA nach Chancen und Risiken, insbesondere mit Blick auf Proliferation und neue Verwundbarkeiten sowie Eskalations- und Instabilitätsdynamiken. Der Artikel schlussfolgert, dass die Strategie der USA mit Blick auf Autonomie in Waffensystemen mittel- und langfristig keinen Sicherheitsgewinn erzeugt. Abschließend werden die Hürden beleuchtet, denen sich multilaterale Rüstungskontrolle im Rahmen der</p>	10.1007/s12399-019-00770-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12399-019-00770-z	SpringerLink
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		UN aktuell gegenübersteht.			
RETRACTED ARTICLE: Deep learning model for home automation and energy reduction in a smart home environment platform	Popa, Dan, Pop, Florin, Serbanescu, Cristina, Castiglione, Aniello,	The target of smart houses and enhanced living environments is to increase the quality of life further. In this context, more supporting platforms for smart houses were developed, some of them using cloud systems for remote supervision, control and data storage. An important aspect, which is an open issue for both industry and academia, is represented by how to reduce and estimate energy consumption for a smart house. In this paper, we propose a modular platform that uses the power of cloud services to collect, aggregate and store all the data gathered from the smart environment. Then, we use the data to generate advanced neural network models to create energy awareness by advising the smart environment occupants on how they can improve daily habits while reducing the energy consumption and thus also the costs.	10.1007/s00521-018-3724-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00521-018-3724-6	SpringerLink

Pervasive computing middleware: current trends and emerging challenges	Becker, Christian, Julien, Christine, Lalande, Philippe, Zambonelli, Franco,	Driven by the increasing diffusion of embedded sensors and actuators, and more in general by "Internet of Things" (IoT) devices, pervasive computing is becoming a reality. Yet, most actual implementations of pervasive computing environments rely on rather centralized architectures and on middleware solutions that integrate only the minimal set of services to enable interoperability and data integration. In this article, after having overviewed the state of the art in the area of pervasive computing middleware, we discuss the many challenges that still have to be faced for pervasive computing middleware to be able to support elastic, easy to configure, easy to develop, safe, and ethically acceptable, pervasive computing services and applications.	10.1007/s42486-019-00005-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42486-019-00005-2	SpringerLink
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A “pay-how-you-drive” car insurance approach through cluster analysis	Carfora, Maria Francesca, Martinelli, Fabio, Mercaldo, Francesco, Nardone, Vittoria, Orlando, Albina, Santone, Antonella, Vaglini, Gigliola,	As discussed in the recent literature, several innovative car insurance concepts are proposed in order to gain advantages both for insurance companies and for drivers. In this context, the “pay-how-you-drive” paradigm is emerging, but it is not thoroughly discussed and much less implemented. In this paper, we propose an approach in order to identify the driver behavior exploring the usage of unsupervised machine learning techniques. A real-world case study is performed to evaluate the effectiveness of the proposed solution. Furthermore, we discuss how the proposed model can be adopted as risk indicator for car insurance companies.	10.1007/s00500-018-3274-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-018-3274-y	SpringerLink
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<p>Heuristic methods for synthesizing realistic social networks based on personality compatibility</p>	<p>O'Neil, Daniel A., Petty, Mikel D.,</p>	<p>Social structures and interpersonal relationships may be represented as social networks consisting of nodes corresponding to people and links between pairs of nodes corresponding to relationships between those people. Social networks can be constructed by examining actual groups of people and identifying the relationships of interest between them. However, there are circumstances where such empirical social networks are unavailable or their use would be undesirable. Consequently, methods to generate synthetic social networks that are not identical to real-world networks but have desired structural similarities to them have been developed. A process for generating synthetic social networks based on assigning human personality types to the nodes and then adding links between nodes based on the compatibility of the nodes' personalities was developed. Two new algorithms, Probability Search and Compatibility-Degree Matching, for finding an effective assignment of personality types to the nodes were developed, implemented, and tested. The two algorithms were evaluated in</p>	<p>10.1007/s41109-019-0117-4</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1007/s41109-019-0117-4</p>	<p>SpringerLink</p>
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		terms of realism, i.e., the similarity of the generated synthetic social to exemplar real-world social networks, for 14 different real-world social networks using 20 standard quantitative network metrics. Both search algorithms produced networks that were, on average, more realistic than a standard network generation algorithm that does not use personality, the Configuration Model. The algorithms were also evaluated in terms of computational complexity.			
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<p>The Role of Renewable Energy to Achieve Energy Sustainability in Iran. An Economic and Technical Analysis of the Hybrid Power System</p>	<p>Razmjoo, A. Armin, Davarpanah, Afshin, zargarian, Amirhossein,</p>	<p>The aim of this study is an economic and technical analysis of a hybrid system in the Semirom city of Iran that is performed by a technical-economic analysis on combined utilization of solar-wind and diesel system. In this study HOMER software is utilized for economic assessment and optimization. At first, the related meteorological data gathered and then using Homer software the calculation was carried out. This city has good potential for solar and wind energy. The solar radiation ranges of Semirom city is from 2.88 to 7.78 kWh/m²/d, and the wind speed ranges are from 2.9 to 5.3 m/s. Solar and wind analyses on Semirom show that this city have great potential in solar and wind energy generation because this city has a proper position to receive sun solar and has high potential in wind speed for wind power generation. Regarding this study and due to high potential in solar and wind energy in Semirom, investments on renewable energy sector of this city will be economically justified.</p>	<p>10.1007/s40866-019-0063-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40866-019-0063-3</p>	<p>SpringerLink</p>
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Knowledge Acquisition Using Group Support Systems	Pyrko, Igor, Eden, Colin, Howick, Susan,	<p>This paper reports on a project in which a group support system (GSS) equipped with a causal mapping facility was used to acquire knowledge from experts in seven European cities in order to understand the systemicity of risks which cities may face. The practical constraints demanded that participants' experience and wisdom about the city risk environment was collected in a short period of time: three 1-day workshops. The acquisition of knowledge posed a number of important epistemological challenges which are explored in our discussion. The GSS was faced with the need to (1) facilitate sharing of knowledge with others, (2) manage the complexity of expert knowledge, (3) acknowledge the time demands on experts, (4) manage and merge multiple perspectives, and (5) acknowledge the subjectivity of knowledge in this domain. By discussing how the GSS process attended directly to these epistemological issues and to methodological considerations that linked to these issues, the paper contributes to a better understanding of the application of GSS for knowledge acquisition, particularly in comparison with</p>	10.1007/s10726-019-09614-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-019-09614-9	SpringerLink
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		other possible methods.			
Possibilistic Moment Models for Multi-period Portfolio Selection with Fuzzy Returns	Liu, Yong-Jun, Zhang, Wei-Guo,	<p>The aim of this paper is to investigate the effects of higher moments on multi-period portfolio selection with fuzzy returns. This paper gives the definitions of possibilistic mean and variance about the product of multiple fuzzy numbers. Based on these definitions, three multi-period fuzzy portfolio optimization models are proposed. The proposed models aim to maximize terminal wealth and minimize terminal risk by taking into account some realistic constraints including higher moments, budget constraint, round-lot constraint, cardinality constraint and bound constraint. To ensure the selection of the best solutions, a novel fuzzy programming approach-based self-adaptive differential evolution algorithm is designed to solve the proposed models. A numerical example is given to demonstrate the application of the proposed models. Computational results show that the designed algorithm is effective for solving complex portfolio selection model with realistic constraints.</p>	10.1007/s10614-018-9833-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10614-018-9833-6	SpringerLink

Resource identification in fog-to-cloud systems: toward an identity management strategy	Gómez-Cárdenas, Alejandro, Masip-Bruin, Xavi, Marín-Tordera, Eva, Kahvazadeh, Sarang,	Fog-to-Cloud (F2C) is a novel paradigm aiming at extending the cloud computing capabilities to the edge of the network through the hierarchical and coordinated management of both, centralized cloud datacenters and distributed fog resources. It will allow all kinds of devices that are capable to connect to the F2C network to share its idle resources and access both, service provider and third parties' resources to expand its own capabilities. However, despite the numerous advantages offered by the F2C model, such as the possibility of offloading delay-sensitive tasks to a nearby device and using the cloud infrastructure in the execution of resource-intensive tasks, the list of open challenges that needs to be addressed to have a deployable F2C system is pretty long. In this paper we focus on the resource identification challenge, proposing an identity management system (IDMS) solution that starts assigning identifiers (IDs) to the devices in the F2C network in a decentralized fashion using hashes and afterwards, manages the usage of those IDs applying a fragmentation technique. The obtained results during the validation phase	10.1007/s40860-019-00074-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-019-00074-1	SpringerLink
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		show that our proposal not only meets the desired IDMS characteristics, but also that the fragmentation strategy is aligned with the constrained nature of the devices in the lowest tier of the network hierarchy.			
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<p>The next evolution of MDE: a seamless integration of machine learning into domain modeling</p>	<p>Hartmann, Thomas, Moawad, Assaad, Fouquet, Francois, Le Traon, Yves,</p>	<p>Machine learning algorithms are designed to resolve unknown behaviors by extracting commonalities over massive datasets. Unfortunately, learning such global behaviors can be inaccurate and slow for systems composed of heterogeneous elements, which behave very differently, for instance as it is the case for cyber-physical systems and Internet of Things applications. Instead, to make smart decisions, such systems have to continuously refine the behavior on a per-element basis and compose these small learning units together. However, combining and composing learned behaviors from different elements is challenging and requires domain knowledge. Therefore, there is a need to structure and combine the learned behaviors and domain knowledge together in a flexible way. In this paper we propose to weave machine learning into domain modeling. More specifically, we suggest to decompose machine learning into reusable, chainable, and independently computable small learning units, which we refer to as microlearning units. These microlearning units are modeled together with and</p>	<p>10.1007/s10270-017-0600-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-017-0600-2</p>	<p>SpringerLink</p>
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		at the same level as the domain data. We show, based on a smart grid case study, that our approach can be significantly more accurate than learning a global behavior, while the performance is fast enough to be used for live learning.			
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Cybersecurity for eMaintenance in railway infrastructure: risks and consequences	Thaduri, Adithya, Aljumaili, Mustafa, Kour, Ravdeep, Karim, Ramin,	<p>Recently, due to the advancements in the Information and Communication Technology, there has been lot of emphasis on digitization of the existing and newly developed infrastructure. In transportation infrastructure, in general, 80% of the assets are already in place and there has been tremendous push to move to the digital era. For efficient and effective design, construction, operation and maintenance of the infrastructure, due to this digitization, there is increasing research trend in data-driven decision-making algorithms that are proved to be effective because of several advantages. Since railway is the backbone of the society, the data-driven approaches will ensure the continuous operation, efficient maintenance, planning and potential future investments. The breach and leak of this potential data to the wrong hands might result in havoc, risk, trust, hazards and serious consequences. Hence, the main purpose of this paper is to stress the potential challenges, consequences, threats, vulnerabilities and risk management of data security in the railway infrastructure in context of eMaintenance. In</p>	10.1007/s13198-019-00778-w	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13198-019-00778-w	SpringerLink
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		addition, this paper also identifies the research methods to obtain and secure this data for potential possible research.			
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Testing in the incremental design and development of complex products	Tahera, Khadija, Wynn, David C., Earl, Chris, Eckert, Claudia M.,	<p>Testing is an important aspect of design and development which consumes significant time and resource in many companies. However, it has received less research attention than many other activities in product development, and especially, very few publications report empirical studies of engineering testing. Such studies are needed to establish the importance of testing and inform the development of pragmatic support methods. This paper combines insights from literature study with findings from three empirical studies of testing. The case studies concern incrementally developed complex products in the automotive domain. A description of testing practice as observed in these studies is provided, confirming that testing activities are used for multiple purposes depending on the context, and are intertwined with design from start to finish of the development process, not done after it as many models depict. Descriptive process models are developed to indicate some of the key insights, and opportunities for further research are suggested.</p>	10.1007/s00163-018-0295-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-018-0295-6	SpringerLink
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Infrastructure for sustainable development	Thacker, Scott, Adshead, Daniel, Fay, Marianne, Hallegatte, Stéphane, Harvey, Mark, Meller, Hendrik, O'Regan, Nicholas, Rozenberg, Julie, Watkins, Graham, Hall, Jim W.,	Investing in infrastructure systems will lock-in patterns of development for future generations. This study finds that infrastructure either directly or indirectly influences the attainment of all of the Sustainable Development Goals, including 72% of the targets. Infrastructure systems form the backbone of every society, providing essential services that include energy, water, waste management, transport and telecommunications. Infrastructure can also create harmful social and environmental impacts, increase vulnerability to natural disasters and leave an unsustainable burden of debt. Investment in infrastructure is at an all-time high globally, thus an ever-increasing number of decisions are being made now that will lock-in patterns of development for future generations. Although for the most part these investments are motivated by the desire to increase economic productivity and employment, we find that infrastructure either directly or indirectly influences the attainment of all of the Sustainable Development Goals (SDGs), including 72% of the targets. We categorize the	10.1038/s41893-019-0256-8	https://www.nature.com/articles/s41893-019-0256-8.pdf	SpringerLink
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		positive and negative effects of infrastructure and the interdependencies between infrastructure sectors. To ensure that the right infrastructure is built, policymakers need to establish long-term visions for sustainable national infrastructure systems, informed by the SDGs, and develop adaptable plans that can demonstrably deliver their vision.			
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Volcano observatory best practices (VOBP) workshops - a summary of findings and best-practice recommendations	Pallister, John, Papale, Paolo, Eichelberger, John, Newhall, Chris, Mandeville, Charles, Nakada, Setsuya, Marzocchi, Warner, Loughlin, Susan, Jolly, Gill, Ewert, John, Selva, Jacopo,	We summarize major findings and best-practice recommendations from three Volcano Observatory Best Practices (VOBP) workshops, which were held in 2011, 2013 and 2016. The workshops brought together representatives from the majority of the world's volcano observatories for the purpose of sharing information on the operation and practice of these institutions and making best practice recommendations . The first workshop focused on eruption forecasting, the second on hazard communication, and the third on long-term hazard assessment. Subsequent VOBP workshops will address additional issues of broad interest to the international volcano observatory community. The objective of VOBP is to develop synergy among volcano hazards programs and their observatories internationally, so as to more rapidly and broadly advance the field of applied volcanology. Each of the workshop summaries presented here include best practice recommendations for consideration by the world's volcano observatories.	10.1186/s13617-019-0082-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13617-019-0082-8	SpringerLink
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MaCRA: a model-based framework for maritime cyber-risk assessment	Tam, Kimberly, Jones, Kevin,	<p>In the current economy, roughly 90% of all world trade is transported by the shipping industry, which is now accelerating its technological growth. While the demand on mariners, ship owners, and the encompassing maritime community for digital advances (particularly towards digitization and automation) has led to efficient shipping operations, maritime cyber-security is a pertinent issue of equal importance. As hackers are becoming increasingly aware of cyber-vulnerabilities within the maritime sector, and as existing risk assessment tools do not adequately represent the unique nature of maritime cyber-threats, this article introduces a model-based risk assessment framework which considers a combination of cyber and maritime factors. Confronted with a range of ship functionalities, configurations, users, and environmental factors, this framework aims to comprehensively present maritime cyber-risks and better inform those in the maritime community when making cyber-security decisions. By providing the needed maritime cyber-risk profiles, it becomes possible to</p>	10.1007/s13437-019-00162-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13437-019-00162-2	SpringerLink
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		support a range of parties, such as operators, regulators, insurers, and mariners, in increasing overall global maritime cyber-security.			
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<p>A game-theoretic learning approach to QoE-driven resource allocation scheme in 5G-enabled IoT</p>	<p>Dai, Haibo, Zhang, Haiyang, Wu, Wei, Wang, Baoyun,</p>	<p>To significantly promote Internet of Things (IoT) development, 5G network is enabled for supporting IoT communications without the limitation of distance and location. This paper investigates the channel allocation problem for IoT uplink communications in the 5G network, with the aim of improving the quality of experience (QoE) of smart objects (SOs). To begin with, we define a mean opinion score (MOS) function of transmission delay to measure QoE of each SO. For the sum-MOS maximization problem, we leverage a game-theoretic learning approach to solve it. Specifically, the original optimization problem is equivalently transformed into a tractable form. Then, we formulate the converted problem as a game-theoretical framework and define a potential function which has a near-optimum as the optimization objective. To optimize the potential function, a distributed channel allocation algorithm is proposed to converge to the best Nash equilibrium solution which is the global optimum of maximizing the potential function. Finally, numerical results verify the effectiveness of</p>	<p>10.1186/s13638-019-1359-7</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13638-019-1359-7</p>	<p>SpringerLink</p>
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		the proposed scheme.			
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<p>A future airliner's reduced-crew: modelling pilot incapacitation and homicide-suicide with systems theory</p>	<p>Schmid, Daniela, Stanton, Neville A.,</p>	<p>One main hurdle towards commercial airliners' Reduced-Crew Operations (RCO) is how to encounter pilot incapacitation. The aim of this modelling study is to evaluate the potential effects of a single-pilot's incapacitation on a future design approach to RCO. Most solutions propose a ground support of the pilot by a remote operator whom control should be handed over in case of an emergency. Both incapacitation and homicide-suicide have been discussed in the literature but neither of these events have been modelled nor evaluated empirically. We introduce a future operational design concept for RCO which includes a remote-copilot as ground support and automation tools monitoring pilot's health and entries into aircraft systems. The hazard analysis technique System-Theoretic Process Analysis (STPA) was used to model and analyse scenarios of incapacitation/homicide-suicide. A hierarchical control structure showed how RCO can be embedded into commercial aviation. The STPA of pilot incapacitation and two scenarios of pilot homicide-suicide showed how unsafe control actions leading to</p>	<p>10.1007/s42454-019-00001-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42454-019-00001-y</p>	<p>SpringerLink</p>
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		<p>an incident or accident after incapacitation/homicide-suicide could be prevented. The possible detection and take-over of control by the ground support in the case of incapacitation raised the question for detailed procedures on how to react to its detection. Either an autoland by the remote-copilot or by an affiliated system is possible. An additional breakup of data-link may only be solved by an automatic landing system on-board.</p>			
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Defining transformative climate science to address high-end climate change	David Tàbara, J., Jäger, Jill, Mangalagiu, Diana, Grasso, Marco,	High-end climate change requires transformative solutions, as conventional strategies and solutions will not be enough if major disruptions in social-ecological systems are to be avoided. However, conventional climate assessment approaches and methods show many limitations if they are to provide robust knowledge and support to the implementation of such solutions in practice. To this end, we define transformative climate science as the open-ended process of producing, structuring, and applying solutions-oriented knowledge to fast-link integrated adaptation and mitigation strategies to sustainable development. In particular, based on our experiences within regional cases in Central Asia, Europe, Iberia, Scotland, and Hungary, we have selected 12 dimensions that scientists and practitioners can use as a checklist to design transformative-oriented climate assessments. While it is possible to talk both about transformative adaptation and transformative mitigation, in this paper, we make the case that societal transformation does not depend on mitigation or adaptation policies and	10.1007/s10113-018-1288-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10113-018-1288-8	SpringerLink
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		actions, mostly because they are related to sustainability innovations, which are endogenous developments derived from deliberate social learning			
Ecopracticology: the study of socio-ecological practice	Xiang, Wei-Ning,	In this communication, the author defines ecopracticology as a legitimate field of scholarly inquiry, discusses its theoretical independence and interdependence, introduces Socio - Ecological Practice Research (SEPR) as its home journal, and pays tribute to those who contributed to the field's development. In compliance with journal's requirements for the article type Communication , presentations are concise; footnotes are used as needed to compensate brevity.	10.1007/s42532-019-00006-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s42532-019-00006-6	SpringerLink

<p>The Selection of Vertiport Location for On-Demand Mobility and Its Application to Seoul Metro Area</p>	<p>Lim, Eunha, Hwang, Hoyon,</p>	<p>This paper addresses the application of the concept of on-demand mobility (ODM) to Seoul, the capital city of South Korea. First, commuting data of high population density areas (Seoul, Incheon, and Gyunggi) were collected and presented on longitude and latitude coordinates. Based on the data, ODM was applied to three different traveling paths. To show the variations of traveling time depending on the number of vertiports, the K - mean algorithm was used to cluster the data, assuming that each centroid of clusters would be reasonable locations of vertiports for personal air vehicles (PAV). The Silhouette technique verified the quality of clusters. Eighteen different cases by the number of vertiports from 2 to 36 increased by 2 were analyzed for the three most demanding routes. The case study benchmarked the traveling time between the existing ground transport systems and ODM. Each section was divided into three parts that were traveling on the ground and those using PAV. The cases of using automobile and public transportation to travel to the vertiport were calculated separately. This travel time was compared with</p>	<p>10.1007/s42405-018-0117-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s42405-018-0117-0</p>	<p>SpringerLink</p>
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		the time of the existing transport method to find out the validity of the application of ODM in the Seoul metropolitan area, and the location and number of vertiport impacts on the ODM.			
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Exploiting Repositories in Mobile Software Ecosystems from a Governance Perspective	Lima Fontão, Awdren, Santos, Rodrigo Pereira, Dias-Neto, Arilo Claudio,	Software organizations that maintain mobile platforms (e.g. Apple, Google, and Microsoft) open their infrastructure to attract and engage external developers to meet the demands of users. This scenario has been investigated as Mobile Software Ecosystem (MSECO). In MSECO, an organization provides content reuse repositories where users can search, download and evaluate apps, or where developers can get support materials. Such repositories are commonly inspired by reuse mechanisms and help an organization to control and evolve the whole ecosystem to keep it vibrant. In this scenario, it is important to understand how to govern MSECO as well as how reuse mechanisms can support this goal. As such, we investigated governance strategies that emerge from content reuse repositories based on four steps: (1) designing a governance process; (2) performing an initial evaluation of this process with managers who are experts in the main existing MSECO (Apple, Google, Nokia, Microsoft, and Samsung); (3) interviewing 18 MSECO managers to collect opinion about the	10.1007/s10796-018-9861-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-018-9861-8	SpringerLink
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		<p>process; and (4) conducting an exploratory analysis of the MSECO reuse repositories' structure based on the proposed governance process. Three types of content reuse repositories (Apps' Store, Developer's Central, and Apps' Management) were analyzed. As a result, this research allowed us to define a governance process from a repository perspective containing 11 activities.</p>			
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<p>A Value-Focused Multiple Participant-Multiple Criteria (MPMC) Decision Support Approach for Public Policy Formulation</p>	<p>Williams, Colin, Fang, Liping,</p>	<p>A decision support framework for policy formulation that incorporates a value-focused, multiple participant-multiple criteria (MPMC) approach is presented to address the systemic over-reliance of financial assessments as the primary decision support model. The proposed approach provides a robust decision support framework for aiding complex public decision-making processes involving conflicting multiple decision-makers (as participants) and values. Participant values are used to determine viable options which in turn determine feasible policy recommendations . Values also determine participant preferences. Through the application of the Graph Model of Conflict Resolution, policy-makers can generate viable and stable policy recommendations . In contrast to focusing solely on alternatives, this framework ensures that policy-makers review scenarios that align with organizational values and objectives, thereby producing informed policy decisions. Further, the framework is applied within a case study involving the City</p>	<p>10.1007/s10726-018-9597-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-018-9597-3</p>	<p>SpringerLink</p>
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		<p>of Toronto, Canada, where policy recommendations to privatize curbside waste collection services were being considered. The framework incorporates multiple participant perspectives and their associated criteria, in lieu of traditional financial assessments (e.g., cost–benefit analysis). This study further demonstrates the usefulness and practicality of incorporating a value-focused, MPMC approach for the derivation of good public policy.</p>			
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Value of information analysis for assessing risks and benefits of nanotechnology innovation	Zabeo, Alex, Keisler, Jeffrey M., Hristozov, Danail, Marcomini, Antonio, Linkov, Igor,	<p>Background</p> <p>Decisions on adoption of technological innovation are difficult for manufacturers, especially for small and medium enterprises (SMEs) who have limited resources but often drive product development. Decision analytic methods have been applied to regulatory issues in the nanotechnology sector but such applications to market innovation are not found in the literature.</p> <p>Value of information (Vol) is a decision analytic method for quantifying the benefit of acquiring additional information to support such analyses that can be used to help in a wide range of manufacturing decisions.</p> <p>Results This paper develops a Vol methodology for comparative evaluation of technological alternatives and applies it to a real case study aimed at the selection between a coating system containing nano-TiO₂ and alternative conventional paints. The aim of this approach is to aid SMEs and larger industries in deciding whether to further develop the nano-enabled product and in evaluating to which extent investing in more research about risks and/or benefits would be worthwhile.</p> <p>Conclusions</p> <p>Results</p>	10.1186/s12302-019-0194-0	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12302-019-0194-0	SpringerLink
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		demonstrated how prioritization in information gaining can improve risk–benefit analyses and impact on both risk management and innovation decision making. By applying the proposed methodology, SMEs and larger industries might easily identify optimal data gathering and/or research strategies to formulate solid development and risk management plans.			
First international Competition on Runtime Verification: rules, benchmarks, tools, and final results of CRV 2014	Bartocci, Ezio, Falcone, Yliès, Bonakdarpour, Borzoo, Colombo, Christian, Decker, Normann, Havelund, Klaus, Joshi, Yogi, Klaedtke, Felix, Milewicz, Reed, Reger, Giles, Rosu, Grigore, Signoles, Julien, Thoma, Daniel, Zalinescu, Eugen, Zhang, Yi,	The first international Competition on Runtime Verification (CRV) was held in September 2014, in Toronto, Canada, as a satellite event of the 14th international conference on Runtime Verification (RV'14). The event was organized in three tracks: (1) offline monitoring, (2) online monitoring of C programs, and (3) online monitoring of Java programs. In this paper, we report on the phases and rules, a description of the participating teams and their submitted benchmark, the (full) results, as well as the lessons learned from the competition.	10.1007/s10009-017-0454-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10009-017-0454-5	SpringerLink

Health and climate impacts of future United States land freight modelled with global-to-urban models	Liu, Liang, Hwang, Taesung, Lee, Sungwon, Ouyang, Yanfeng, Lee, Bumsoo, Smith, Steven J., Tessum, Christopher W., Marshall, Julian D., Yan, Fang, Daenzer, Kathryn, Bond, Tami C.,	Driven by economic growth, globalization and e-commerce, freight per capita in the United States has been consistently increasing in recent decades. Projecting to 2050, we explore the emissions, and health and climate impacts of US freight truck and rail transport under various policy scenarios. We predict that, overall, air pollutant emissions and health impacts from the freight-truck-rail system will be greatly reduced from 2010 to 2030, while long-term climate forcing will continue to increase if petroleum is the fuel source. A carbon tax could shift freight shipments from trucking to energy-efficient rail, providing the greatest reduction in long-term forcing among all policies (24%), whereas a policy enforcing truck fleet maintenance would cause the largest reduction in air pollutant emissions, offering the largest reduction in mortalities (36%). Increasing urban compactness could reduce freight activity but increase population exposure per unit emission, offering slight health benefits over the current urban sprawl trend (13%). Per-capita freight in the United States has been increasing in recent decades. This	10.1038/s41893-019-0224-3	https://www.nature.com/articles/s41893-019-0224-3.pdf	SpringerLink
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		study presents projections to 2050 to examine the emissions, and health and climate impacts of US freight truck and rail transportation under various policy scenarios.			
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<p>Future smart energy software houses</p>	<p>Kettunen, Petri, Mäkitalo, Niko,</p>	<p>Software is the key enabling technology (KET) as digitalization is cross-cutting future energy systems spanning the production sites, distribution networks, and consumers particularly in electricity smart grids. In this paper, we identify systematically what particular software competencies are required in the future energy systems focusing on electricity system smart grids. The realizations of that can then be roadmapped to specific software capabilities of the different future 'software houses' across the networks. Our instrumental method is software competence development scenario path construction with environmental scanning of the related systems elements. The vision of future software-enabled smart energy systems with software houses is mapped with the already progressing scenarios of energy systems transitions on the one hand coupled with the technology foresight of software on the other hand. Grounding on the Smart Grid Reference Architecture Model (SGAM), it tabulates the distinguished software competencies and attributes them to the different parties—including</p>	<p>10.1186/s40309-018-0153-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1186/s40309-018-0153-9</p>	<p>SpringerLink</p>
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		<p>customers/consumers (Internet of People, IoP)—involved in future smart energy systems. The resulting designations can then be used to recognize and measure the necessary software competencies (e.g., fog computing) in order to be able to develop them in-house, or for instance to partner with software companies, depending on the future desirability. Software-intensive systems development competence becomes one of the key success factors for such cyber-physical-social systems (CPSS). Further futures research work is chartered with the Futures Map frame. This paper contributes preliminarily toward that by identifying pictures of the software-enabled futures and the connecting software competence-based scenario paths.</p>			
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Proof of violation for response time auditing in cloud systems	Hwang, Gwan-Hwan, Yuan, Yi-Ling,	In this paper we propose to employ the concept of proof of violation (POV) for the response time auditing in the cloud. A POV scheme enables a user or a service provider to produce a precise proof of either the occurrence of the violation of properties or the innocence of the service provider. POV schemes are solutions for obtaining mutual nonrepudiation between users and the service provider in the cloud. To the best of our knowledge, it is the first scheme that can perform response time auditing according to cryptographic evidences without the need of a delivery agent. Experimental results are presented that demonstrate the feasibility of the proposed scheme. Service providers can use the proposed scheme to provide a mutual nonrepudiation guarantee for response time in their service-level agreements.	10.1007/s11227-015-1555-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-015-1555-0	SpringerLink
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Earth observation applications for coastal sustainability: potential and challenges for implementation	Politi, Eirini, Paterson, Shona K., Scarrott, Rory, Tuohy, Eimear, O'Mahony, Cathal, Cámara-García, Walther C. A.,	<p>The coast is home to unique ecosystems, where complex ecological processes take place through the interaction of terrestrial, aquatic, atmospheric, and human landscapes. However, there are considerable knowledge and data gaps in achieving effective and future change-proof sustainable management of coastal zones around the world due to both technical and social barriers, as well as governance challenges. Currently, the role of Earth observation (EO) in addressing many of the recognised information gaps is small and under-utilised. While EO can provide much of the spatiotemporal information required for historical analysis and current status mapping, and offers the advantage of global coverage; its uptake can be limited by technical and methodological challenges associated mostly with lack of capacity and infrastructure, product accuracy and accessibility, costs, and institutional acceptance. While new initiatives and recent technological progress in the EO and information technology arena aim to tackle some of these issues so that EO</p>	10.1139/anc-2018-0015	http://link.springer.com/openurl/pdf?id=doi:10.1139/anc-2018-0015	SpringerLink
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		<p>products can be more easily used by non-EO experts, uptake is still limited. This paper discusses how EO can potentially inform transformative practices of planning in the coastal water zone, by using examples to demonstrate the EO potential in providing information relevant to decisionmaking framed by international agreements, such as the United Nations Agenda 2030, the Convention on Biological Diversity, and the Sendai Framework for Risk Reduction. By presenting evidence for how EO can contribute to innovative opportunities and data synergies at scale, the paper discusses opportunities and challenges for a more solution-led approach to sustainable coastal management.</p>			
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Anwendungsszenarien für die Blockchain-Technologie in der Industrie 4.0	Bartsch, Florian, Neidhardt, Nils, Nüttgens, Markus, Holland, Martin, Kompf, Martin,	<p>Neue Entwicklungen in der Fertigung durch Industrie 4.0 gehen mit vielfältigen sicherheitstechnischen Herausforderungen einher. Einen möglichen Lösungsansatz zu deren Behebung stellt die Verwendung der Blockchain-Technologie dar. Gegenstand dieses Beitrages ist somit die Charakterisierung sicherheitstechnischer Herausforderungen in der Industrie 4.0 sowie nachfolgend die Darstellung Blockchain-basierter Lösungsansätze. Letztere werden beispielhaft anhand des Projektes „Secure Additive Manufacturing Platform“ (SAMPL) beschrieben, dessen Ziel es ist, die vollständige Wertschöpfungskette additiv gefertigter Bauteile in der Luftfahrtindustrie abzusichern. Die Eignung der Blockchain-Technologie für diesen Anwendungsfall konnte hierbei anhand einer prototypischen Implementierung nachgewiesen werden. New developments in manufacturing under the umbrella of Industry 4.0 introduce a variety of security challenges. A possible solution thereof could be the use of the Blockchain technology. The</p>	10.1365/s40702-018-00456-8	http://link.springer.com/openurl/pdf?id=doi:10.1365/s40702-018-00456-8	SpringerLink
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		<p>aim of this paper is hence the characterisation of security issues in Industry 4.0, as well as the presentation of Blockchain-based solution approaches. The latter are described by using the SAMPL project as an example, which intends to secure the value chain of 3D-printed parts in the aviation industry. The suitability of the Blockchain technology for this use case could be demonstrated via a prototype implementation.</p>			
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A review on synchrophasor communication system: communication technologies, standards and applications	Appasani, Bhargav, Mohanta, Dusmanta Kumar,	<p>The present-day power system is a complex network that caters to the demands of several applications with diverse energy requirements. Such a complex network is susceptible to faults caused due to several reasons such as the failure of the equipment, hostile weather conditions, etc. These faults if not detected in the real-time may lead to cascading failures resulting in a blackout. These blackouts have catastrophic consequences which result in a huge loss of resources. For example, a blackout in 2004 caused an economic loss of 10 billion U.S dollars as per the report of the Electricity Consumers Resource Council. Subsequent investigation of the blackout revealed that the catastrophe could have been prevented if there was an early warning system. Similar other blackouts across the globe forced the power system engineers to devise an effective solution for real-time monitoring and control of the power system. The consequence of these efforts is the wide area measurement system (WAMS). The WAMS consists of several sensors known as the phasor measurement units (PMUs) that collect the real</p>	10.1186/s41601-018-0110-4	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s41601-018-0110-4	SpringerLink
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		<p>information pertaining to the health of the power grid. This information in the form time synchronized voltage and current phasors is communicated to the central control center or the phasor data concentrator (PDC) where the data is analyzed for detection of power system anomalies. The communication of the synchrophasor data from each PMU to the PDC constitutes the synchrophasor communication system (SPCS). Thus, the SPCS can be considered as the edifice of the WAMS and its reliable operation is essential for the effective monitoring and control of the power system. This paper presents a comprehensive review of the various synchrophasor communication technologies, communication standards and applications. It also identifies the existing knowledge gaps and the scope for future research work.</p>			
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<p>A review and future directions of SOA-based software architecture modeling approaches for System of Systems</p>	<p>Mohsin, Ahmad, Janjua, Naeem Khalid,</p>	<p>Software architecture is a software system's earliest set of design decisions that are critical for the quality of the system desired by the stakeholders. The architecture makes it easier to reason about and manage change during different phases of complex software life cycle. The modeling of software architecture for System of Systems (SoS) is a challenging task because of a system's complexity arising from an integration of heterogeneous, distributed, managerially and operationally independent systems collaborating to achieve global missions. SoS is essentially dynamic and evolutionary by design requiring suitable architectural patterns to deal with runtime volatility. Service-oriented architecture offers several architectural features to these complex systems; these include, interoperability, loose coupling, abstraction and the provision of dynamic services based on standard interfaces and protocols. There is some research work available that provides critical analysis of current software architecture modeling approaches for SoS. However, none of them outlines the important characteristics of</p>	<p>10.1007/s11761-018-0245-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11761-018-0245-1</p>	<p>SpringerLink</p>
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		<p>SoS or provides detailed analysis of current service-oriented architecture modeling approaches to model those characteristics. This article addresses this research gap and provides a taxonomy of software architecture modeling approaches, comparing and contrasting them using criteria critical for realization of SoS. Additionally, research gaps are identified, and future directions are outlined for building software architecture for SoS to model and reason about architecture quality in a more efficient way in service-oriented paradigm.</p>			
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Developing and evolving a DSL-based approach for runtime monitoring of systems of systems	Rabiser, Rick, Thanhofer-Pilisch, Jürgen, Vierhauser, Michael, Grünbacher, Paul, Egyed, Alexander,	Complex software-intensive systems are often described as systems of systems (SoS) due to their heterogeneous architectural elements. As SoS behavior is often only understandable during operation, runtime monitoring is needed to detect deviations from requirements. Today, while diverse monitoring approaches exist, most do not provide what is needed to monitor SoS, e.g., support for dynamically defining and deploying diverse checks across multiple systems. In this paper we report on our experiences of developing, applying, and evolving an approach for monitoring an SoS in the domain of industrial automation software, that is based on a domain-specific language (DSL). We first describe our initial approach to dynamically define and check constraints in SoS at runtime and then motivate and describe its evolution based on requirements elicited in an industry collaboration project. We furthermore describe solutions we have developed to support the evolution of our approach, i.e., a code generation approach and a framework to automate testing	10.1007/s10515-018-0241-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10515-018-0241-x	SpringerLink
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		<p>the DSL after changes. We evaluate the expressiveness and scalability of our new DSL-based approach using an industrial SoS. We also discuss lessons we learned. Our results show that while developing a DSL-based approach is a good solution to support industrial users, one must prepare the approach for evolution, by making it extensible and adaptable to future scenarios. Particularly, support for automated (re-)generation of tools and code after changes and automated testing are essential.</p>			
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Mapping the values of IoT	Nicolescu, Razvan, Huth, Michael, Radanliev, Petar, Roure, David,	<p>We investigate the emerging meanings of “value” associated with the Internet of Things. Given the current political economy, we argue that the multiple meanings of “value” cannot be reduced to a single domain or discipline, but rather they are invariably articulated at the juxtaposition of three domains: social, economic, and technical. We analyse each of these domains and present domain challenges and cross-domain implications – drawing from an interdisciplinary literature review and gap analysis across sources from academia, business, and governments. We propose a functional model that aggregates these findings into a value-driven logic of the emerging global political economy enabled by digital technology in general and IoT in particular. These conceptual contributions highlight the critical need for an interdisciplinary understanding of the meaning of “value”, so that IoT services and products will create and sustain such concurrent meanings during their entire lifecycle, from design to consumption and retirement or recycling.</p>	10.1057/s41265-018-0054-1	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41265-018-0054-1	SpringerLink
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<p>A brokered Virtual Hub approach for the generation of web applications based on historical maps</p>	<p>Previtali, Mattia, Latre, Miguel Angel,</p>	<p>Integration between historical maps and current cartography is nowadays recognized of primary importance in many applications (e.g. urban planning, landscape valorisation and preservation, land changes identification). However, due to large variety in Geographical Information (GI) standards and interfaces for data publishing, some technical issues arise for developers when integrating different data for the generation of new web-based applications. In addition, information overload makes difficult their discovery and management: without knowing the specific repository where the data are stored, it is difficult to find the information required. To partially cope with those problems, this paper describes a new brokering-based approach for the generation of web applications based on multi-temporal GI data gathered from different providers. In particular, this new approach is exemplified by a couple of new web applications built on top of the developed solution. Even if the two applications deal both with historical maps, they present significant differences in technical (e.g. libraries,</p>	<p>10.1007/s12518-018-0235-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12518-018-0235-1</p>	<p>SpringerLink</p>
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		development environment, data formats) and non-technical (e.g. user addressed, user requirements) aspects showing the flexibility of the solution.			
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Cooperation in earth observation missions in Africa: a role for afrigeoss	Agbaje, Ganiy I., John, Olusoji N.,	<p>This paper is aimed at examining the role of African Global Earth Observation System of Systems (AfriGEOSS) in Earth Observation (EO) mission cooperation on the continent of Africa. It discusses the importance of earth observation programs for developing countries as well as the benefits of international cooperative efforts. The paper further examined some collaborative projects on Earth Observation in Africa and their associated problems. It specifically looked at the EO data coordination initiatives such as the Spatial Data Infrastructure (SDI), GEOSS, Africa Discovery Broker, etc. It then situates AfriGEOSS in the context of African Space Agenda (ASA) with recommendations especially to the Africa Union Commission for the realization of ASA set goals. The paper reiterated that regardless of whether developed or developing, Earth observation information provides substantial benefit supporting economic development, decision making and policy implementation of all countries of the world. This is as a result of its multifarious benefits to humans in areas like agriculture,</p>	10.1007/s10708-017-9840-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10708-017-9840-5	SpringerLink
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		<p>forestry, risk management, disaster monitoring, maritime, defence and security and natural resources management. Consequently, the paper argued that the numerous benefits from space assets have driven countries within the continent of Africa to either acquire or develop capabilities in space systems which is devoted to improving quality of life in general. The paper concluded that while space systems are expensive, there is need for continuity and sustainability as a result of its numerous advantages to the human's society.</p>			
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New Dimensions for a Challenging Security Environment: Growing Exposure to Critical Space Infrastructure Disruption Risk	Gheorghe, Adrian V., Georgescu, Alexandru, Bucovechi, Olga, Lazr, Marilena, Scarlat, Cezar,	Space systems have become a key enabler for a wide variety of applications that are vital to the functioning of advanced societies. The trend is one of quantitative and qualitative increase of this dependence, so much so that space systems have been described as a new example of critical infrastructure. This article argues that the existence of critical space infrastructures implies the emergence of a new category of disasters related to disruption risks. We inventory those risks and make policy recommendations for what is, ultimately, a resilience governance issue.	10.1007/s13753-018-0197-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-018-0197-2	SpringerLink
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<p>A systematic approach for performance assessment using process mining</p>	<p>Bernardi, Simona, Domínguez, Juan L., Gómez, Abel, Joubert, Christophe, Merseguer, José, Perez-Palacin, Diego, Requeno, José I., Romeu, Alberto,</p>	<p>Software performance engineering is a mature field that offers methods to assess system performance. Process mining is a promising research field applied to gain insight on system processes. The interplay of these two fields opens promising applications in the industry. In this work, we report our experience applying a methodology, based on process mining techniques, for the performance assessment of a commercial data-intensive software application. The methodology has successfully assessed the scalability of future versions of this system. Moreover, it has identified bottlenecks components and replication needs for fulfilling business rules. The system, an integrated port operations management system, has been developed by Prodevelop , a medium-sized software enterprise with high expertise in geospatial technologies. The performance assessment has been carried out by a team composed by practitioners and researchers. Finally, the paper offers a deep discussion on the lessons learned during the experience, that will be useful for practitioners to adopt the methodology and for researcher to</p>	<p>10.1007/s10664-018-9606-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-018-9606-9</p>	<p>SpringerLink</p>
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		find new routes.			
Resource nexus perspectives towards the United Nations Sustainable Development Goals	Bleischwitz, Raimund, Spataru, Catalina, VanDeveer, Stacy D., Obersteiner, Michael, Voet, Ester, Johnson, Corey, Andrews-Speed, Philip, Boersma, Tim, Hoff, Holger, Vuuren, Detlef P.,	<p>Debate around increasing demand for natural resources is often framed in terms of a 'nexus', which is perhaps at risk of becoming a buzz word. A nexus between what? Over what scales? And what are the consequences of such a nexus? This article analyses why readers should care about the nexus concept in relation to the United Nations Sustainable Development Goals (SDGs). We discuss a five-nodes definition and propose perspectives that may lead to a reload of climate policy with buy-in from supply-chain managers and resource-rich developing countries. Our research perspectives address modelling approaches and scenarios at the interface of bio-physical inputs and the human dimensions of security and governance. Issues around the use of natural resources are often framed in terms of the nexus concept. This Perspective discusses why the nexus concept matters in understanding the link between bio-physical and human dimensions, particularly with regard to the SDGs.</p>	10.1038/s41893-018-0173-2	https://www.nature.com/articles/s41893-018-0173-2.pdf	SpringerLink

<p>The Fine Line between Trusting and Cheating: Exploring Relationships between Actors in Ugandan Pineapple Value Chains</p>	<p>Tröger, Katharine, Lelea, Margareta Amy, Kaufmann, Brigitte,</p>	<p>Le développement d'une chaîne de valeur alimentaire inclusive est particulièrement difficile lorsque de nombreux petits exploitants s'engagent dans la production et le commerce de produits alimentaires non standardisés dans des systèmes spatialement dispersés. En nous appuyant sur le concept de système d'activité humaine avec l'accent sur son utilité, nous fournissons un compte rendu des activités et des relations qui façonnent la chaîne de valeur de l'ananas en Ouganda. Sur la base d'entretiens semi-structurés avec des agriculteurs, des courtiers et des commerçants, nous avons examiné la création et le maintien de relations d'affaires ainsi que les défis rencontrés. Les résultats montrent comment la confiance se développe pour faire l'intermédiaire dans les relations d'échange qui structurent l'organisation de la chaîne. Reflétant l'environnement commercial incertain et la vulnérabilité des acteurs, les relations de confiance sont simultanément menacées par des opportunités de gain à court terme, appelées «tricheries». Le fait d'accepter l'importance des</p>	<p>10.1057/s41287-018-0134-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1057/s41287-018-0134-7</p>	<p>SpringerLink</p>
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		<p>échanges fondés sur la confiance pour l'appui aux systèmes économiques locaux peut fournir un levier essentiel pour le développement qui place au centre les petits exploitants et d'autres acteurs de la chaîne de valeur à petite échelle. Inclusive food value chain development is particularly challenging when numerous smallholders engage in production and trade of non-standardised food products within spatially dispersed systems. Drawing on the concept of human activity systems with an emphasis on purposefulness, we provide a situated account of the activities and relations that shape the pineapple value chain in Uganda. Based on semi-structured interviews with farmers, brokers and traders, we examined the creation and maintenance of business relationships as well as challenges faced. Findings show how trust unfolds to mediate exchange relations that structure chain organisation. Reflecting the uncertain business environment and vulnerability of actors, trustful relationships are simultaneously threatened by opportunities for short-term gain, referred to as "cheating". Embracing the importance of</p>			
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		trust-based relational exchanges for sustaining local economic systems can provide critical leverage for development that puts smallholder farmers and other small-scale value chain actors at the centre.			
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Virtual prototyping for maritime crane design and operations	Chu, Yingguang, Hatledal, Lars Ivar, Zhang, Houxiang, Æsøy, Vilmar, Ehlers, Sören,	<p>This paper presents the implementation of the virtual prototyping system for maritime crane design and operations. The study is designed to bridge the following gaps in maritime crane system simulations. First, the virtual prototyping system introduces an open and flexible platform oriented to overall product and system design, modeling, simulation and visualization. Second, the virtual simulator for operations based on the proposed framework is reinforced by high fidelity models of physics and dynamics. The paper discusses the challenges in virtual prototyping of complex multi-domain systems from the perspectives of modern complex engineering system design, modeling and simulation of multi-domain dynamic systems, large set of data exchange for communication and visualization. The software architecture of the system is based on the application of the functional mock-up interface standard. This utilizes the current available modeling and simulation tools, and allows for the exchange and reuse of models. Simulations in a virtual environment permit the evaluation of multiple trade-offs and alternative</p>	10.1007/s00773-017-0509-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00773-017-0509-z	SpringerLink
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		<p>solutions from early design stages. As a case study and verification, the knuckle boom crane systems were implemented. The virtual crane simulator proved the effectiveness of the proposed virtual prototyping system in solving the long-existing challenges in simulations of complex multi-domain systems.</p>			
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<p>An efficient transmission method based on HEVC multi-view adaptive video streaming over P2P network in NFV</p>	<p>Ma, Linh, Yu, Gwanghyun, Kim, Jin-Young, Won, Yongggwan, Kim, Jinsul,</p>	<p>Researchers and entertainment companies have given lots of attention to virtual reality over the past decade. 3D multi-view is a technology that provides interactions that are similar to those in the real world. However, 3D video streaming has a high data transfer rate because we must transmit multimedia data at a rate several times higher than that used for regular streaming. Besides, network throughput is unstable due to the inherent limitations of network infrastructure, which degrades video streaming quality. Additionally, network failure can occur frequently, causing stalling in multimedia playback. Hence, a network system is required to have more than one backup route in order to successfully guarantee the reliability of a network at all times. Furthermore, in the field of multi-view transmission, not much research has been published that has been conducted in a network virtualization environment. Therefore, we present a study on adaptive-based, high-efficiency video coding with three-dimensional, multi-view streaming over a peer-to-peer network. First, we study adaptive</p>	<p>10.1007/s11227-018-2594-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-018-2594-0</p>	<p>SpringerLink</p>
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		<p>bitrate streaming methods based on high-efficiency video coding. Then we research transmitting multi-view data over a multi-path system. In the experiment, we first record a video from different views using five cameras. Next we merge recorded videos from the five cameras into a file and encode it before transmitting it over the peer-to-peer network. Moreover, we build a virtualized system using Docker virtualization technology and network function virtualization. The results of the experiment show that transmitting high-volume data over a multi-path network channel increases the streaming buffer level, which is about 20% higher than an adaptive streaming 3D method. It also makes the video quality 4% higher than in an HEVC-based adaptive streaming method.</p>			
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<p>Detecting requirements defects with NLP patterns: an industrial experience in the railway domain</p>	<p>Ferrari, Alessio, Gori, Gloria, Rosadini, Benedetta, Trotta, Iacopo, Bacherini, Stefano, Fantechi, Alessandro, Gnesi, Stefania,</p>	<p>In the railway safety-critical domain requirements documents have to abide to strict quality criteria. Rule-based natural language processing (NLP) techniques have been developed to automatically identify quality defects in natural language requirements. However, the literature is lacking empirical studies on the application of these techniques in industrial settings. Our goal is to investigate to which extent NLP can be practically applied to detect defects in the requirements documents of a railway signalling manufacturer. To address this goal, we first identified a set of typical defects classes, and, for each class, an engineer of the company implemented a set of defect-detection patterns by means of the GATE tool for text processing. After a preliminary analysis, we applied the patterns to a large set of 1866 requirements previously annotated for defects. The output of the patterns was further inspected by two domain experts to check the false positive cases. Additional discard-patterns were defined to automatically remove these cases. Finally, SREE, a tool that searches for typically ambiguous terms, was applied to the requirements.</p>	<p>10.1007/s10664-018-9596-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-018-9596-7</p>	<p>SpringerLink</p>
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		<p>The experiments show that SREE and our patterns may play complementary roles in the detection of requirements defects. This is one of the first works in which defect detection NLP techniques are applied on a very large set of industrial requirements annotated by domain experts. We contribute with a comparison between traditional manual techniques used in industry for requirements analysis, and analysis performed with NLP. Our experience shows that several discrepancies can be observed between the two approaches. The analysis of the discrepancies offers hints to improve the capabilities of NLP techniques with company specific solutions, and suggests that also company practices need to be modified to effectively exploit NLP tools.</p>			
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Explanatory analysis of the key factors in an energy sustainability index	Agovino, Massimiliano, Garofalo, Antonio, Romano, Antonio Angelo, Scandurra, Giuseppe,	<p>The need to reduce the emissions of greenhouse gases in energy generation has led to international and national bodies recommending and encouraging a series of policies and measures to boost so-called green energy generation and achieve sustainability in the energy sector. In order to assess the energy sustainability path of countries worldwide, we first propose a dynamic analysis of an energy sustainability index (ESI) based on the methodology of composite indicators built on a large dataset of 136 heterogeneous countries and 38 variables observed in 3 years (2000, 2005 and 2011). Second, to isolate the influence of socio-demographic and economic characteristics on the energy sustainability of countries, we perform quantile regression with clustered data. Our findings demonstrate that major changes are required in developing countries, where development is pursued mainly through the use of energy sources based on fossil fuels. To ensure access to sustainable energy, policy makers need to consider and improve the key factors according to the ESI's quantiles. In</p>	10.1007/s11135-017-0679-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11135-017-0679-0	SpringerLink
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		<p>particular, human development variables (i.e., life expectancy and the percentage of completed secondary schooling attained in the population) and the variables related to civil rights and institutions (e.g., percentage of women in national parliaments) are crucial in promoting energy sustainability. By contrast, high unemployment rates, high congestion costs and the continued use of highly polluting energy sources have the effect of reducing energy sustainability.</p>			
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Goal model analysis of autonomy requirements for Unmanned Aircraft Systems	Neace, Kerry, Roncace, Robert, Fomin, Pavel,	<p>Designing Unmanned Aircraft Systems (UASs) for optimal autonomy while meeting user requirements is quite challenging. Researchers have focused on improving autonomy algorithms and verification methods to ensure safe and reliable autonomous behavior in UASs, but little research has been conducted on requirements engineering for UASs to answer design questions and explore the trade space for using autonomy to satisfy user requirements. This paper introduces a method to determine an optimal set of autonomous capabilities that satisfies UAS user requirements in the early stages of conceptual design. The method uses a modified Autonomy Requirements Engineering (ARE) process that applies quantitative measures and statistical analysis to Goal-Oriented Requirements Engineering (GORE). We demonstrate this method in a case study of a "disaster robot," i.e., a hazard response UAS for which the autonomy requirements were optimized using a goal model developed in the Goal-oriented Requirement Language (GRL),</p>	10.1007/s00766-017-0278-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-017-0278-6	SpringerLink
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		<p>as implemented in the modeling tool jUCMNav. The high-level goals of the hazard response UAS—system performance, cost, and safety—were evaluated using the formula-based GRL strategy evaluation algorithm resident in jUCMNav version 6.0. An autonomy trade space study was conducted through a Design and Analysis of Simulation Experiments (DASE). Our designed simulation experiment inserted the number of trials (evaluation strategies) and inputs into the goal model, and evaluation data were analyzed to optimize design factors based on user weightings of the response variables. This paper presents a structured method of ARE for UASs, which could be adopted more broadly across other domains, demonstrating how to optimize autonomous capabilities for different design conditions.</p>			
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Data science at SoBigData: the European research infrastructure for social mining and big data analytics	Grossi, Valerio, Rapisarda, Beatrice, Giannotti, Fosca, Pedreschi, Dino,	<p>Most people have become “big data” producers in their daily life. Our desires, opinions, sentiments, social links as well as our mobile phone calls and GPS track leave traces of our behaviours. To transform these data into knowledge, value is a complex task of data science. This paper shows how the SoBigData Research Infrastructure supports data science towards the new frontiers of big data exploitation. Our research infrastructure serves a large community of social sensing and social mining researchers and it reduces the gap between existing research centres present at European level. SoBigData integrates resources and creates an infrastructure where sharing data and methods among text miners, visual analytics researchers, socio-economic scientists, network scientists, political scientists, humanities researchers can indeed occur. The main concepts related to SoBigData Research Infrastructure are presented. These concepts support virtual and transnational (on-site) access to the resources. Creating and supporting research communities are considered to be</p>	10.1007/s41060-018-0126-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41060-018-0126-x	SpringerLink
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		<p>of vital importance for the success of our research infrastructure, as well as contributing to train the new generation of data scientists. Furthermore, this paper introduces the concept of exploratory and shows their role in the promotion of the use of our research infrastructure. The exploratories presented in this paper represent also a set of real applications in the context of social mining. Finally, a special attention is given to the legal and ethical aspects. Everything in SoBigData is supervised by an ethical and legal framework.</p>			
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<p>A load prediction model for cloud computing using PSO-based weighted wavelet support vector machine</p>	<p>Zhong, Wei, Zhuang, Yi, Sun, Jian, Gu, Jingjing,</p>	<p>In order to reduce the energy consumption in the cloud data center, it is necessary to make reasonable scheduling of resources in the cloud. The accurate prediction for cloud computing load can be very helpful for resource scheduling to minimize the energy consumption. In this paper, a cloud load prediction model based on weighted wavelet support vector machine(WWSVM) is proposed to predict the host load sequence in the cloud data center. The model combines the wavelet transform and support vector machine to combine the advantages of them, and assigns weight to the sample, which reflects the importance of different sample points and improves the accuracy of load prediction. In order to find the optimal combination of the parameters, we proposed a parameter optimization algorithm based on particle swarm optimization(PSO). Finally, based on the WWSVM model, a load prediction algorithm is proposed for cloud computing using PSO-based weighted support vector machine. The Google cloud computing data set is used to verify the algorithm proposed in this paper by</p>	<p>10.1007/s10489-018-1194-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10489-018-1194-2</p>	<p>SpringerLink</p>
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		experiments. The experiment results indicate that comparing with the wavelet support vector machine, autoregressive integrated moving average, adaptive network-based fuzzy inference system and tuned support vector regression, the proposed algorithm is superior to the other four prediction algorithms in prediction accuracy and efficiency.			
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Wireless 5G ultra reliable low latency communications	Zemen, Thomas,	<p>Die 5G-Standardisierung und Forschung schreiten weltweit auf Hochtouren voran. In diesem Artikel beschreiben die Autoren die Architektur zukünftiger 5G-Systeme, ihre Anwendungsfälle und wichtige physikalische Funktechnologien. Der Zeitplan und der aktuelle Stand der 5G-Forschung in Europa in "Horizon 2020" werden vorgestellt. Weiters wird ein Überblick der Forschungsaktivitäten in Österreich präsentiert. Der 5G-Forschungsschwerpunkt am AIT Austrian Institute of Technology mit seinen Projekten im Bereich der hochzuverlässigen 5G-Funkkommunikation mit niedriger Latenzzeit (ultra reliable low latency communications, URLLC) wird abschließend vorgestellt. 5G standardization and research progresses at full speed on a worldwide scale. In this article we describe the architecture of future 5G systems, their use cases and key physical layer technologies. The time-plan and current state of 5G research in Europe in Horizon 2020 is presented. An overview about the research activities in Austria is given. Finally, the 5G research focus at AIT Austrian Institute of Technology with its projects in the</p>	10.1007/s00502-018-0645-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-018-0645-0	SpringerLink
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		domain of ultra reliable low latency communications (URLLC) is introduced.			
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Systems biology of seeds: decoding the secret of biochemical seed factories for nutritional security	Kumar, Anil, Pathak, Rajesh Kumar, Gayen, Aranyadip, Gupta, Supriya, Singh, Manoj, Lata, Charu, Sharma, Himanshu, Roy, Joy Kumar, Gupta, Sanjay Mohan,	Seeds serve as biochemical factories of nutrition, processing, bio-energy and storage related important bio-molecules and act as a delivery system to transmit the genetic information to the next generation. The research pertaining towards delineating the complex system of regulation of genes and pathways related to seed biology and nutrient partitioning is still under infancy. To understand these, it is important to know the genes and pathway(s) involved in the homeostasis of bio-molecules. In recent past with the advent and advancement of modern tools of genomics and genetic engineering, multi-layered 'omics' approaches and high-throughput platforms are being used to discern the genes and proteins involved in various metabolic, and signaling pathways and their regulations for understanding the molecular genetics of biosynthesis and homeostasis of bio-molecules. This can be possible by exploring systems biology approaches via the integration of omics data for understanding the intricacy of seed development and nutrient partitioning. These	10.1007/s13205-018-1483-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13205-018-1483-9	SpringerLink
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		<p>information can be exploited for the improvement of biologically important chemicals for large-scale production of nutrients and nutraceuticals through pathway engineering and biotechnology. This review article thus describes different omics tools and other branches that are merged to build the most attractive area of research towards establishing the seeds as biochemical factories for human health and nutrition.</p>			
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Structured workflow achieving interoperable smart energy systems	Gottschalk, Marion, Franzl, Gerald, Frohner, Matthias, Pasteka, Richard, Uslar, Mathias,	Interoperability is the key to Smart Grids and thereby to enable the energy transmission towards 100% renewable energy sources. The project Integrating the Energy System (IES) Austria adopted the holistic methodology to achieve interoperable systems, established in the medical IT and standardized in ISO DTR 28380-1, for the energy domain. The poster will outline the adopted process and the lessons learned when first trial Integration Profiles were specified and tested at the Connectathon Europe 2018, in The Hague, Netherlands. The methodology is found applicable to Smart Energy systems. Interoperability testing and profile integration validation were successfully implemented. The specification of new Integration Profiles, to be presented and tested at the Connectathon Energy 2019, is in progress.	10.1186/s42162-018-0039-x	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-018-0039-x	SpringerLink
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<p>The Application of Cobb-Douglas Function in Forecasting the Duration of Internet Public Opinions Caused by the Failure of Public Policies</p>	<p>Dong, Xuefan, Lian, Ying, Li, Ding, Liu, Yijun,</p>	<p>Gushes of Internet public opinions may trigger unexpected incidents that significantly affect social security and stability, especially for ones caused by the failure of public policies. Therefore, forecasting this kind of Internet public opinions is of great significance. The duration could be cited as one of the most direct indicators that can reflect the severity of a specific Internet public opinion case. Based on this background, this paper aims to find the factors that may affect the duration of Internet public opinions, and accordingly proposes a model that can accurately predict the duration before the release of public policies. Specifically, an index system including 8 factors by considering four dimensions, namely, object, environment, reality (offline), and the network (online), is established. In addition, based on the dataset containing 23 typical Internet public opinion cases caused by the failure of public policies, 9 prediction models are gained by applying the multivariate linear regression model, multivariate nonlinear regression model, and the Cobb-Douglas function.</p>	<p>10.1007/s11518-018-5384-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-018-5384-6</p>	<p>SpringerLink</p>
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Perspectives on Manufacturing Automation Under the Digital and Cyber Convergence	Nof, Shimon Y., Silva, Jose Reinaldo,	<p>The evolution of industrial automation has been divided into four or five main cycles of “industrial revolutions,” also called “disruptive innovations” and “automation revolutions.” The most recent one, started around the 1990s and still on-going, points to the current perspectives envisioned for the twenty-first century and perhaps even beyond. In practice, however, it is difficult to comprehend the real value and impacts by the so called Digital Manufacturing, Smart Factory, Automation 5.0, or Industry 4.0. Furthermore, with frequent and rapid innovations, it is unclear how the emerging digital, smart, and cyber-augmented factories of the future can benefit from the digital and cyber convergence. Which are the dominant factors that motivate and justify the evolution of manufacturing through this current cycle? In this article, we review the relationships between digital, virtual, and cyber convergence, and recent manufacturing engineering challenges ranging from virtual enterprises to collaborative e-Manufacturing, and service orientation. We then point out new perspectives and opportunities for design and re-arrangement in</p>	10.1007/s41050-018-0006-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41050-018-0006-0	SpringerLink
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		<p>production, highlighting the trend of fusion between knowledge, product, process, and service. The impact on methods of analysis, informatics, collaborative intelligence, and design of industrial systems is also analyzed under the new trends and achievements so far in digital and cyber convergence. With several case studies, we also illustrate the emerging challenges.</p>			
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Review of Secure Communication Approaches for In-Vehicle Network	Hu, Qiang, Luo, Feng,	<p>In the connected vehicles, connecting interfaces bring threats to the vehicles and they can be hacked to impact the vehicles and drivers. Compared with traditional vehicles, connected vehicles require more information transfer. Sensor signals and critical data must be protected to ensure the cyber security of connected vehicles. The communications among ECUs, sensors, and gateways are connected by in-vehicle networks. This paper discussed the state-of-art techniques about secure communication for in-vehicle networks. First, the related concepts in automotive secure communication have been provided. Then we have compared and contrasted existing approaches for secure communication. We have analyzed the advantages/disadvantages of MAC and digital signatures for message authentication and compared the performance and limitations of different cryptographic algorithms. Firewall and intrusion detection system are introduced to protect the networks. The constraints and features of different intrusion detection</p>	10.1007/s12239-018-0085-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12239-018-0085-1	SpringerLink
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		<p>approaches are presented. After that, the technical requirements for cryptographic mechanism and intrusion detection policy are concluded. Based on the review of current researches, the future development directions of the automotive network security have been discussed. The purpose of this paper is to review current techniques on automotive secure communication and suggest suitable secure approaches to implement on the in-vehicle networks.</p>			
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<p>Incorporating quantitative reliability engineering measures into tradespace exploration</p>	<p>Bhattacharya, Saikath, Nagaraju, Vidhyashree, Spero, Eric, Ghoshal, Anindya, Fiondella, Lance,</p>	<p>Recently, tradespace analysis and exploration has emerged as an important focus area within the Department of Defense Engineered Resilient System initiative, which draws upon engineering concepts, science, and design tools to produce trusted and effective solutions for a wide range of operational contexts. Most of the previous research on tradespace analysis, including those developed for rotorcraft, emphasize performance. However, non-functional requirements such as reliability, availability, and maintainability have received minimal consideration, despite their direct influence on program level concerns such as operation and support as well as affordability. This paper proposes a strategy to incorporate reliability engineering into tradespace analysis. We also develop a subsystem-level reliability investment model that is illustrated through a simplified example. Our results suggest that reliability investment could achieve significant savings over a systems lifecycle, thereby enabling improved fleet availability and a larger fleet size.</p>	<p>10.1007/s00163-018-0293-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-018-0293-8</p>	<p>SpringerLink</p>
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Efficient parallel reasoning on fuzzy goal models for run time requirements verification	Chatzikonstantinou, George, Kontogiannis, Kostas,	<p>As software applications become highly interconnected in dynamically provisioned platforms, they form the so-called systems-of-systems. Therefore, a key issue that arises in such environments is whether specific requirements are violated, when these applications interact in new unforeseen ways as new resources or system components are dynamically provisioned. Such environments require the continuous use of frameworks for assessing compliance against specific mission critical system requirements. Such frameworks should be able to (a) handle large requirements models, (b) assess system compliance repeatedly and frequently using events from possibly high velocity and high frequency data streams, and (c) use models that can reflect the vagueness that inherently exists in big data event collection and in modeling dependencies between components of complex and dynamically re-configured systems. In this paper, we introduce a framework for run time reasoning over medium and large-scale fuzzy goal models, and we propose a process which allows for the parallel evaluation of</p>	10.1007/s10270-016-0562-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-016-0562-9	SpringerLink
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		such models. The approach has been evaluated for time and space performance on large goal models, exhibiting that in a simulation environment, the parallel reasoning process offers significant performance improvement over a sequential one.			
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<p>An adaptive model with joint chance constraints for a hybrid wind-conventional generator system</p>	<p>Singh, Bismark, Morton, David P., Santoso, Surya,</p>	<p>We analyze scheduling a hybrid wind-conventional generator system to make it dispatchable, with the aim of profit maximization. Our models ensure that with high probability we satisfy the day-ahead power promised by the model, using combined output of the conventional and wind generators. We consider two scenarios, which differ in whether the conventional generator must commit to its schedule prior to observing the wind-power realizations or has the flexibility to adapt in near real-time to these realizations. We investigate the synergy between the conventional generator and wind farm in these two scenarios. Computationally, the non-adaptive model is relatively tractable, benefiting from a strong extended-variable formulation as an integer program. The adaptive model is a two-stage stochastic integer program with joint chance constraints. Such models have seen limited attention in the literature because of the computational challenges they pose. However, we develop an iterative regularization scheme in which we solve a sequence of sample average approximations under a growing sample size. This reduces computational</p>	<p>10.1007/s10287-018-0309-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10287-018-0309-x</p>	<p>SpringerLink</p>
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		effort dramatically, and our empirical results suggest that it heuristically achieves high-quality solutions. Using data from a wind farm in Texas, we demonstrate that the adaptive model significantly outperforms the non-adaptive model in terms of synergy between the conventional generator and the wind farm, with expected profit more than doubled.			
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Using Ranked Weights and Acceptability Analysis to Construct Composite Indicators: A Case Study of Regional Sustainable Society Index	Ding, Yang, Fu, Yelin, Lai, Kin Keung, John Leung, W. K.,	<p>A variety of published composite indicators, i.e., Energy Trilemma Index and Sustainable Society Index, are commonly aggregated with equal weights. However, this plausible scheme is criticized as eclecticism and ignores the discriminating power of the different indicators. Differing from the traditional methods that assign weights to each indicator for the purpose of aggregation, this paper proposes a new mechanism to construct composite indicators using ranked weights and stochastic multicriteria acceptability analysis. More specifically, this study comprehensively consider all possible preferences among the indicators. Under each preference, we develop a sophisticated mathematical transformation to calculate the least and most favorable scores of each entity, which formulates the lower and upper bounds of the intervals. Then an interval decision matrix, alternatively described as a stochastic decision problem, is formulated to construct the composite indicators. Holistic acceptability indices are generated and regarded as a new composite indicator, which is capable of</p>	10.1007/s11205-017-1765-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11205-017-1765-3	SpringerLink
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		providing a comprehensive and robust composite indicator with more discriminating power. We apply the proposed method to modify the regional sustainable society index and present the obtained results and comparisons.			
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Building simulation: Ten challenges	Hong, Tianzhen, Langevin, Jared, Sun, Kaiyu,	Buildings consume more than one-third of the world's primary energy. Reducing energy use and greenhouse-gas emissions in the buildings sector through energy conservation and efficiency improvements constitutes a key strategy for achieving global energy and environmental goals. Building performance simulation has been increasingly used as a tool for designing, operating and retrofitting buildings to save energy and utility costs. However, opportunities remain for researchers, software developers, practitioners and policymakers to maximize the value of building performance simulation in the design and operation of low energy buildings and communities that leverage interdisciplinary approaches to integrate humans, buildings, and the power grid at a large scale. This paper presents ten challenges that highlight some of the most important issues in building performance simulation, covering the full building life cycle and a wide range of modeling scales. The formulation and discussion of each challenge aims to provide insights into the state-of-the-art and future research opportunities for each topic, and to	10.1007/s12273-018-0444-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12273-018-0444-x	SpringerLink
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		inspire new questions from young researchers in this field.			
How do natural hazards cascade to cause disasters?	AghaKouchak, Amir, Huning, Laurie S., Chiang, Felicia, Sadegh, Mojtaba, Vahedifard, Farshid, Mazdiasni, Omid, Moftakhari, Hamed, Mallakpour, Iman,	Track connections between hurricanes, wildfires, climate change and other risks, urge Amir AghaKouchak and colleagues. Track connections between hurricanes, wildfires, climate change and other risks, urge Amir AghaKouchak and colleagues.	10.1038/d41586-018-06783-6	https://www.nature.com/articles/d41586-018-06783-6.pdf	SpringerLink

Surveillance and security: protecting electricity utilities and other critical infrastructures	Gouglidis, Antonios, Green, Benjamin, Hutchison, David, Alshawish, Ali, de Meer, Hermann,	<p>Critical infrastructures – such as electricity networks, power stations and Smart Grids – are increasingly monitored and controlled by computing and communication technologies. The need to address security and protection of electricity infrastructures with a high priority has broadly been recognized. This is driven by many factors, including the rapid evolution of threats and consistent technological advancements of malicious actors as well as potentially catastrophic consequences of disruptions of such systems. Surveillance and security technologies are traditionally used in these contexts as a protection mechanism that maintains situational awareness and provides appropriate alerts. Surveillance is a cumbersome process because of the need to monitor a diverse set of objects, but it is absolutely essential to detect promptly the occurrence of adverse events or conditions. The aims of this paper are twofold: First, we describe two surveillance architectures in which different technologies can be used jointly for boosting the safety and security of electricity utilities and other key resources and critical</p>	10.1186/s42162-018-0019-1	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-018-0019-1	SpringerLink
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		<p>infrastructures. Second, we review the typical surveillance and security technologies and evaluate them in the context of critical infrastructures, which may help in making recommendations and improvements for the future. To accomplish these aims, we extracted and consolidated information from major survey papers. This led to identifying the surveillance and security technologies, their application areas, and challenges that they face. We also investigate the perceived performance of the identified technologies in critical infrastructures. The latter comes from interviewing experts who operate in critical infrastructures, and thus provide indications for protecting critical infrastructures, not least because of their increasing use of cyber-physical elements.</p>			
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<p>Flood resilience: consolidating knowledge between and within critical infrastructure sectors</p>	<p>Pearson, Jonathan, Punzo, G., Mayfield, M., Brighty, G., Parsons, A., Collins, P., Jeavons, S., Tagg, A.,</p>	<p>Flood resilience has been rising up the political, economic and social agendas. Taking an integrated systems approach, using the right design guidance and tools and ensuring that education is in place for all stakeholders are three themes which are intrinsically linked to delivering flood resilience. This paper reviews these themes across the academic research, policy landscape and practitioner approaches, drawing conclusions on the way forward to increase our societies resilience to floods. The term 'flood resilience' is being increasingly used, however, it remains to be clearly defined and implemented. The UK, USA and Australia are leading the way in considering what flood resilience really means, but our review has found few examples of action underpinned by an understanding of systems and complexity. This review investigates how performance objectives & indicators are currently interpreted in guidance documents. It provides an in-depth exploration of the methods, that although developed through European and US expertise, can be used for worldwide</p>	<p>10.1007/s10669-018-9709-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-018-9709-2</p>	<p>SpringerLink</p>
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		<p>application. Our analysis highlights that resilience is often embedded in engineering education and frequently linked to risk. This may however, mask the importance of resilience and where it differs from risk. With £2.6 billion to be spent in the UK over the next 6 years on strengthening the country's flood and coastal defences, this is the opportunity to rethink resilience from a systems approach, and embed that learning into education and professional development of engineers. Our conclusions indicate how consolidating flood resilience knowledge between and within critical infrastructure sectors is the way forward to deliver flood resilience engineering.</p>			
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Resilience engineering: theory and practice in interdependent infrastructure systems	Hickford, Adrian J., Blainey, Simon P., Ortega Hortelano, Alejandro, Pant, Raghav,	<p>The economy and well-being of modern societies relies on complex and interdependent infrastructure systems to enable delivery of utilities and movement of goods, people and services. This complexity has resulted in an increased potential for cascading failures, whereby small scale initial failures in one system can result in events of catastrophic proportions across the wider network. Resilience and the emerging concept of resilience engineering within infrastructure are among the main concerns of those managing such complex systems. However, the disparate nature of resilience engineering development in various academic and industrial regimes has resulted in a diversity of definitions and characterisations. These are discussed in this paper, as are the commonalities between sectors and between different engineering disciplines. The paper also highlights the various methodologies used as part of resilience engineering implementation and monitoring, current practices including existing approaches and metrics, and an insight into the opportunities and potential barriers associated with</p>	10.1007/s10669-018-9707-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-018-9707-4	SpringerLink
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		<p>these methodologies and practices. This research was undertaken for the Resilience Shift initiative to shift the approach to resilience in practice for critical infrastructure sectors. The programme aims to help practitioners involved in critical infrastructure to make decisions differently, contributing to a safer and better world.</p>			
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Past, present, and future of the satellite-based automatic identification system: areas of applications (2004–2016)	Fournier, Mélanie, Casey Hilliard, R., Rezaee, Sara, Pelot, Ronald,	<p>In 2016, the world shipping fleet grew by 3.5%. Even if the annual growth rate remains at its lowest since 2013, the global situation is still in overcapacity (UNCTAD 2016).</p> <p>Ninety percent of global trade, by volume, is done by sea.</p> <p>Monitoring this fleet helps with vessel navigation, informing to help avoid critical situations such as collisions, accidents leading to oil pollution, grounding, or ships in distress, but also because traffic management in congested areas is essential. For system wide management, in regions such as MPAs (marine protected areas), conservation is the key factor, and movements can be monitored and analyzed in order to determine illegal or suspicious activities, or in order to limit and/or divert traffic, to mitigate the risks to species subject to protection. It is among these efforts that the automatic identification system (AIS) can play a key role.</p> <p>Since 2004, this VHF transceiver-based reporting system, imposed by the International Maritime Organization (IMO), has shifted from a traditional vessel identification device to a tool used in a wide variety of applications. The most common uses are safety and security;</p>	10.1007/s13437-018-0151-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13437-018-0151-6	SpringerLink
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		<p>these issues are quite visible in the media and may touch more people on a global scale (e.g., piracy, oil spills). Over the years, AIS has become, especially with the emergence of the satellite-based capture of the signal in 2011, a widely used tool for developing applications such as fisheries monitoring, marine conservation, air pollution forecasting and modeling, ballast water monitoring, invasive species transport, and many more. In this paper, we propose to review the peer-reviewed publications related to the uses and applications of the AIS.</p>			
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<p>Critical Systems Thinking Towards Enhancing Community Engagement in Micro-insurance</p>	<p>Chowdhury, Rajneesh, Jangle, Nihar,</p>	<p>This paper attempts to build a conceptual framework for community engagement in micro-insurance scheme design and deployment. The framework is founded on critical systems thinking literature that introduces the characteristics of openness, flexibility, and agility. The authors have focused on a community-led micro-insurance model, where the nature of the engagement itself underpins the success or failure of a scheme, due to their very nature of operations. Select systems thinking tools are introduced to better understand issues that arise in enhancing community engagement and flexibility, both of which are regarded as a critical aspect in the development of micro-insurance schemes. Reference and learning are drawn from an on-ground scheme in India implemented by the Micro Insurance Academy. The second author of this paper was the lead for this scheme. This is a proposed framework and is yet to be tested on ground.</p>	<p>10.1007/s40171-018-0188-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-018-0188-6</p>	<p>SpringerLink</p>
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<p>Risk assessment of the areas along the highway due to hazardous material transportation accidents</p>	<p>Huang, Xifei, Wang, Xinhao, Pei, Jingjing, Xu, Ming, Huang, Xiaowu, Luo, Yun,</p>	<p>As the industrialization process accelerates in developing countries, road accidents involving hazardous materials are increasing, and the threat associated with these accidents to areas along the highway cannot be ignored. The main objective of this paper is to contribute information regarding risk quantification, risk prevention, and control by government managers in areas along the highways. Thus, the risk assessment of the area along the highway (RAAH) method was established and applied as a regional risk prevention policy. Considering that the damage caused by accidents can vary substantially between different surroundings, the RAAH method was used as an integrated function comprising of accident frequency, intensity and vulnerability along the route, and the vulnerability system reflected the characteristics of the social and environmental factors in the study area. Then, in this study, we implemented this assessment model in geographic information system and applied it to a typical section of the Beijing–Tibet Hig</p>	<p>10.1007/s11069-018-3346-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-018-3346-4</p>	<p>SpringerLink</p>
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		hway in Beijing, China, to demonstrate its functionality and utility. A risk map was successfully obtained, and it showed that this method not only effectively reveals the neglected high-risk units but also can be used to provide technical support to the regional government to identify the blind spots and strengthen their risk management.			
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<p>A formal approach for detection of security flaws in the android permission system</p>	<p>Bagheri, Hamid, Kang, Eunsuk, Malek, Sam, Jackson, Daniel,</p>	<p>The ever increasing expansion of mobile applications into nearly every aspect of modern life, from banking to healthcare systems, is making their security more important than ever. Modern smartphone operating systems (OS) rely substantially on the permission-based security model to enforce restrictions on the operations that each application can perform. In this paper, we perform an analysis of the permission protocol implemented in Android, a popular OS for smartphones. We propose a formal model of the Android permission protocol in Alloy, and describe a fully automatic analysis that identifies potential flaws in the protocol. A study of real-world Android applications corroborates our finding that the flaws in the Android permission protocol can have severe security implications, in some cases allowing the attacker to bypass the permission checks entirely.</p>	<p>10.1007/s00165-017-0445-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00165-017-0445-z</p>	<p>SpringerLink</p>
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A value-based approach to infrastructure resilience	Field, Caroline, Look, Richard,	<p>This paper includes the findings of MMI Thornton Tomasetti's investigation into the measurement of resilience within infrastructure using systems thinking and focussed on value delivery. This paper provides a review of current practise across critical infrastructure sectors, based on a series of interviews undertaken with stakeholders from various UK infrastructure organisations. Gaps and opportunities were identified and an outline for a value-based approach to diagnosing, measuring and building resilience suggested. The performance of critical infrastructure sectors was also comparatively assessed using the suggested approach value metrics.</p>	10.1007/s10669-018-9701-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-018-9701-x	SpringerLink
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<p>Nexus approaches to global sustainable development</p>	<p>Liu, Jianguo, Hull, Vanessa, Godfray, H. Charles J., Tilman, David, Gleick, Peter, Hoff, Holger, Pahl-Wostl, Claudia, Xu, Zhenci, Chung, Min Gon, Sun, Jing, Li, Shuxin,</p>	<p>Sustainability challenges, such as feeding people with fewer resources, involve challenges at the nexus of multiple issues, such as food, water and energy. This Review explores such nexus approaches, surveying their use towards sustainable development challenges, discussing examples, and proposing a systematic procedure and future directions. Many global challenges, though interconnected, have been addressed singly, at times reducing one problem while exacerbating others. Nexus approaches simultaneously examine interactions among multiple sectors. Recent quantitative studies have revealed that nexus approaches can uncover synergies and detect trade-offs among sectors. If well implemented, nexus approaches have the potential to reduce negative surprises and promote integrated planning, management and governance. However, application and implementation of nexus approaches are in their infancy. No studies have explicitly quantified the contributions of nexus approaches to progress toward</p>	<p>10.1038/s41893-018-0135-8</p>	<p>https://www.nature.com/articles/s41893-018-0135-8.pdf</p>	<p>SpringerLink</p>
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		meeting the Sustainable Development Goals. To further implement nexus approaches and realize their potential, we propose a systematic procedure and provide perspectives on future directions. These include expanding nexus frameworks that consider interactions among more sectors, across scales, between adjacent and distant places, and linkages with Sustainable Development Goals; incorporating overlooked drivers and regions; diversifying nexus toolboxes; and making these strategies central in policy-making and governance for integrated Sustainable Development Goal implementation.			
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Graph-theoretic algorithms for cyber-physical vulnerability analysis of power grid with incomplete information	SRIVASTAVA, Anurag K., ERNSTER, Timothy A., LIU, Ren, KRISHNAN, Vignesh G.,	<p>A key focus recently has been in assessing the risk of a coordinated cyber-physical attack and minimizing the impact of a successful attack. Most of the cyber-attackers will have limited system information and conventional power grid N 1 security analysis cannot be extended to assess the risk. Centrality measures are widely used in the network science and an attacker with incomplete information can use it to identify power system vulnerabilities by defining the system as a complex network but without real-time system measurements. This paper presents a graph theory based centrality indices for vulnerability assessment of the power system due to various bus and branch contingencies using limited system information and provides a preliminary defense mechanism to prevent such an attack. Proposed work answers the fundamental question of possible attack scenarios by balancing risk (limited information with low risk to get caught or high risk attack to access more system information) and impact (identifying contingencies with maximal impact on system operation).</p>	10.1007/s40565-018-0448-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40565-018-0448-7	SpringerLink
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		<p>Statistical comparisons are made between the graph theory measures compared to the corresponding DC power flow based $N \times N$ linear sensitivity measures. A unified $N \times N$ centrality based performance index is proposed and validated against the AC power flow based performance index by doing the real-time simulations of an N^3 attack scenario. Defensive mechanisms using topology-based performance indices are also presented.</p>			
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B-space: dynamic management and assurance of open systems of systems	Schneider, Daniel, Trapp, Mario,	<p>Connected cars, freely configurable operating rooms, or autonomous harvesting fleets: dynamically emerging open systems of systems will shape a new generation of systems opening up a vast potential for new kinds of applications. In light of the hard-to-predict structure and behavior of such systems, assuring their safety will require some disruptive changes of established safety paradigms. Combining current research results from different disciplines with industrial experience, this paper dares to think out of the box and look beyond the limits of traditional safety assurance. It structures upcoming challenges posed by the emergence of open systems of systems, tries to shift existing paradigms to meet those new challenges, and proposes an abstract conceptual framework building on comprehensive interlinked multi-concern runtime models for dynamically assuring the safety as well as other properties of open systems of systems. As there currently is no comprehensive realization of the framework, we discuss what kind of approaches could fit into which parts of the</p>	10.1186/s13174-018-0084-5	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-018-0084-5	SpringerLink
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		framework and exemplify this for the case of conditional safety certificates.			
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Assessment of the impact of interdependencies on the resilience of networked critical infrastructure systems	Mao, Quan, Li, Nan,	<p>Critical infrastructure systems (CISs) have a fundamental role in delivering commodities that are essential to various functions in urban systems. The resilience of CISs concerns the robustness of system performance against extreme events, the ineffectiveness of disturbance propagation, and the efficiency of post-disaster system performance restoration. The resilience of CISs is significantly impacted by the interconnectivity among CISs and the interactions among different systems. Although this impact has been recognized by numerous studies, it has rarely been comparatively assessed using different metrics that reflect the different perspectives of various stakeholders. Moreover, the existing literature on the impact of interdependencies in the context of CIS disaster risk reduction has primarily focused on the resistance stage rather than the entire life cycle of disaster events. To address these gaps, this study assesses this impact at different stages of the life cycle of disturbance events, analyzes the effect of interdependencies on determining the total resilience of CISs, and discusses the implications of</p>	10.1007/s11069-018-3302-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-018-3302-3	SpringerLink
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		<p>the results in the context of resilience enhancement of CISOs in practice. To achieve this objective, this study models interconnected CISOs using four different network-based approaches, simulates the disturbance propagation process and system restoration process of CISOs in three different scenarios, and measures the resilience of disturbed CISOs with three different resilience metrics. A case study of three CISOs in a middle-sized city in Eastern China was conducted. The CISOs included an electric power system, a telecommunication system, and a water supply system. The results revealed that the vulnerability of CISOs to extreme events would be significantly underestimated if interdependencies of the CISOs were not considered, which would cause a misleading estimation of the total resilience of the CISOs. The findings also suggested the importance of considering the interdependencies of CISOs in the sequencing of restoration tasks to optimize the efficiency of post-disaster restoration tasks.</p>			
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Agent-Based Knowledge Analysis Framework in Disaster Management	Inan, Dedi Iskandar, Beydoun, Ghassan, Oppen, Simon,	<p>Disaster Management (DM) is a complex set of interrelated activities. The activities are often knowledge-intensive and time sensitive. Timely sharing of the required knowledge is critical for DM. For recurring disasters (e.g. floods), developed countries tend to have dedicated document repositories of Disaster Management Plans (DISPLANS) that can be accessed as needs arise. However, accessing the appropriate plan in a timely manner, and sharing activities between plans, often requires significant domain knowledge and intimate understanding of the plans in the first place. This paper introduces an Agent-Based (AB) knowledge analysis method to convert DISPLANS into a collection of knowledge units that can be stored into a unified repository. The repository of DM actions then enables the mixing and matching of knowledge between different plans. The repository is structured as a layered abstraction according to Meta Object Facility (MOF). We use the flood DISPLANS plans used by SES (State Emergency Service), an authoritative DM</p>	10.1007/s10796-017-9792-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-017-9792-9	SpringerLink
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		agency in New South Wales (NSW) State of Australia (hereinafter referred to as SES NSW) to illustrate and give a preliminary validation of the approach. It is illustrated by using displans along the flood-prone Murrumbidgee river in central NSW.			
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<p>An experience report on applying software testing academic results in industry: we need usable automated test generation</p>	<p>Arcuri, Andrea,</p>	<p>What is the impact of software engineering research on current practices in industry? In this paper, I report on my direct experience as a PhD/post-doc working in software engineering research projects, and then spending the following five years as an engineer in two different companies (the first one being the same I worked in collaboration with during my post-doc). Given a background in software engineering research, what cutting-edge techniques and tools from academia did I use in my daily work when developing and testing the systems of these companies? Regarding validation and verification (my main area of research), the answer is rather short: as far as I can tell, only FindBugs. In this paper, I report on why this was the case, and discuss all the challenging, complex open problems we face in industry and which somehow are “neglected” in the academic circles. In particular, I will first discuss what actual tools I could use in my daily work, such as JaCoCo and Selenium. Then, I will discuss the main open problems I faced, particularly related to environment simulators, unit</p>	<p>10.1007/s10664-017-9570-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-017-9570-9</p>	<p>SpringerLink</p>
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		<p>and web testing. After that, popular topics in academia are presented, such as UML, regression and mutation testing. Their lack of impact on the type of projects I worked on in industry is then discussed. Finally, from this industrial experience, I provide my opinions about how this situation can be improved, in particular related to how academics are evaluated, and advocate for a greater involvement into open-source projects.</p>			
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Load balancing of renewable energy: a cyber security analysis	Vernotte, Alexandre, Välja, Margus, Korman, Matus, Björkman, Gunnar, Ekstedt, Mathias, Lagerström, Robert,	Background In the coming years, the increase of automation in electricity distribution grids, controlled by ICT, will bring major consequences to the cyber security posture of the grids. Automation plays an especially important role in load balancing of renewable energy where distributed generation is balanced to load in a way that the grid stability is ensured. Threats to the load balancing and the smart grid in general arise from the activities of misbehaving or rouge actors in combination with poor design, implementation, or configuration of the system that makes it vulnerable. It is urgent to conduct an in-depth analysis about the feasibility and imminency of these potential threats ahead of a cyber catastrophe. This paper presents a cyber security evaluation of the ICT part of the smart grid with a focus on load balancing of renewable energy. Method The work builds on a load balancing centered smart grid reference architecture model that is designed as part of the evaluation with the help of SCADA system and smart grid experts. The smart grid load balancing architecture represented by the model is then analyzed using a threat modelling approach that is	10.1186/s42162-018-0010-x	http://link.springer.com/openurl/pdf?id=doi:10.1186/s42162-018-0010-x	SpringerLink
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		<p>encapsulated in a tool called securiCAD. Countermeasures are introduced in the model to measure how much each improve the cyber security of the smart grid. Results The analysis shows that the main threat comes from the internet and is directly dependant on the level of internet access office users have coupled with their level of access on the OT zone. Supply chain attacks are also of great concern, i.e. the compromising of the software/hardware vendor with the objective of feeding rogue updates to assets, typically to install a backdoor. The general takeaway defense-wise is that it is of the utmost importance to increase efforts in securing the smart Grid in all the ways possible as they appear to be generally complementary. Discussion The obtained results raise concerns whether the architecture of the smart grid still remains satisfactory in today's state of the cyberspace and the increased presence and sophistication of cyber threats. There are also concerns whether the proposed security measures, regardless of their evaluated effectiveness, are realistically implementable from both financial and</p>			
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		<p>practical point of view.</p> <p>Conclusions</p> <p>There is no silver bullet available to achieve full protection against cyber attacks.</p> <p>The smart grid remains a network of IT/OT machines with dataflows going between them.</p> <p>State-sponsored hackers given enough time and regardless of the defences in place will eventually make their way into a critical infrastructure such as the smart grid. While mitigations will not eliminate the threats, they will increase the cyber resilience of the infrastructure by increasing both its time frame and effectiveness. As such, in a time where usability, efficiency and practicality are at the front of every domain, innovations regarding these aspects should really be carried out with strong security in mind.</p>			
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Resilient Design and Operation of Cyber Physical Systems with Emphasis on Unmanned Autonomous Systems	Vachtsevanos, George, Lee, Benjamin, Oh, Sehwan, Balchanos, Michael,	Autonomy and autonomous systems are occupying central stage in the research community, as autonomous vehicles are proliferating and their utility in all aspects of the military and civilian domains are increasing exponentially from one year to the next. The development and application of resiliency and safety technologies to autonomous systems is, unfortunately, not keeping pace with their growth rate. Several factors impede the deployment and adoption of autonomous systems. Among them is the absence of an adequately high level of autonomy that can be relied upon, significant challenges in the area of human-machine interface requiring significant human intervention to operate and interpret sensor data, the need for emerging machine learning technologies and, most importantly, the resilient design and operation of complex systems to assure their safety, reliability and availability when executing missions in unstructured and cluttered environments. Recent advances in resiliency and safety of complex engineered systems have focused on methods/tools to tradeoff system performance for increased time to failure aiming at	10.1007/s10846-018-0881-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10846-018-0881-x	SpringerLink
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		<p>mission completion or trial and error methods to arrive at a suboptimal policy for system self-organization in the presence of a failure mode. This paper introduces a novel framework for the resilient design and operation of such complex systems via self-organization and control reconfiguration strategies that avoid empirical trial and error techniques and may be implemented and perform in real time on-platform. The main theme is summarized as: “a healthy and resilient system is a safe system”. To accomplish this objective, we introduce an integrated and rigorous approach to resilient design while safety considerations ascertain that the targeted system is contained within a safe envelope. A resilient system is robustly and flexibly monitoring its internal and external environment, it can detect and anticipate disturbances that may affect its operational integrity and take appropriate action to compensate for the disturbance. Resilience enhances safety while improving risk factors and assures that vehicles subjected to extreme disturbances remain within their safe envelope. The</p>			
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		<p>enabling technologies begin with graph spectral and epidemic spreading modeling tools to represent the system behaviors under normal and faulty conditions; a Markov Decision Process is the basic self-organization module. We are introducing a novel approach to fault-tolerance by considering the impacts of severe fault modes on system performance as inputs to a Reinforcement Learning (RL) strategy that trades off system performance with control activity in order to extend the Remaining Useful Life (RUL) of the unmanned system. Performance metrics are defined and assist in the algorithmic developments and their validation. We pursue an integrated and verifiable methodology to safety assurance that enables the evaluation of the effectiveness of risk management strategies. Several unmanned autonomous systems are used for demonstration purposes.</p>			
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MEMS based energy harvesting for the Internet of Things: a survey	Sun, Hongwen, Yin, Minqi, Wei, Wangtong, Li, Jiacheng, Wang, Haibin, Jin, Xin,	<p>The Internet of Things (IoT) can manage a large number of smart wireless devices and form a networking infrastructure connected to the Internet. Traditional batteries in IoT produce environmental concerns and have limited operational life. Harvesting and converting ambient environmental energy is an effective and important approach for sustainable green power used in wireless and portable devices in IoT. This contribution reviews the state-of-the-art development of different energy harvesting sources including mechanical, light/solar, wind, sound, RF, biomechanical and pyroelectric energy. Power density generated from ambient source ranges widely from 0.001 W/cm^2 (RF WiFi) to 100 mW/cm^2 (outdoor solar). Depends on application areas and working principles, typical power consumptions of IoT sensor nodes are in the order of mW (1–750 mW) in active mode and W (0–60 W) in sleep mode (Mathna et al. in Talanta 75:613–623, 2008 ; Magno et al. in IEEE Trans Ind Electron 61:1871–1881, 2014 ; Baranov et al. in Sens Actuators A 233:279–289, 2015 ; Somov et al. in Procedia</p>	10.1007/s00542-018-3763-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00542-018-3763-z	SpringerLink
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		<p>Eng 87:520–523, 2014 ; Spirjakin et al. in Sens Actuators A 247:247–253, 2016 ; Samson et al. in Sens Actuators A 172:240–244, 2011).</p> <p>Therefore, efficient energy storage and management strategies are important for IoT development. These parts are discussed in order to provide the sustainable power. MEMS based energy harvesting devices may be widely employed in various areas, such as military monitoring, remote weather station, bluetooth headsets, and environment detection. This review focuses on the low power and self powered IoT applications: sensors, wearables, and RF-MEMS. With the advance of nanofabrication techniques, IoT devices will become smaller and enter into the era of Internet of Nano-Things.</p>			
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Survey on Wireless Sensor Network Applications and Energy Efficient Routing Protocols	Mohamed, Reem E., Saleh, Ahmed I., Abdelrazzak, Maher, Samra, Ahmed S.,	Wireless sensor network (WSN) is a group of small power-constrained nodes that sense data and communicate it to the base station (BS). These nodes cover a vast region of interest (ROI) for several purposes according to the application need. The first challenge encountered in WSNs is how to cover the ROI perfectly and send the monitored data to the BS. Although the energy introduced during setup phase and the violation of energy fairness constraint of dynamic routing topologies, they achieve high network performance in terms of coverage and connectivity. In this paper, we categorize the applications of WSN based on different aspects to show the major protocol design issues. Thus, the energy efficiency of the recent proactive routing protocols is studied from different angles. The energy overhead and energy fairness of each protocol were carefully analyzed. The most energy efficient routing protocols for homogeneous proactive networks were studied and compared to highlight the research challenges and existing problems in this area. The results proved that energy overhead and route selection	10.1007/s11277-018-5747-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-018-5747-9	SpringerLink
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		are the most effective aspects of network lifetime and network efficiency.			
Proactive dynamic virtual-machine consolidation for energy conservation in cloud data centres	Ismaeel, Salam, Karim, Raed, Miri, Ali,	Data center power consumption is among the largest commodity expenditures for many organizations. Reduction of power used in cloud data centres with heterogeneous physical resources can be achieved through Virtual-Machine (VM) consolidation which reduces the number of Physical Machines (PMs) used, subject to Quality of Service (QoS) constraints. This paper provides an in-depth survey of the most recent techniques and algorithms used in proactive dynamic VM consolidation focused on energy consumption. We present a general framework that can be used on multiple phases of a complete consolidation process.	10.1186/s13677-018-0111-x	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13677-018-0111-x	SpringerLink

<p>Hazard Relation Diagrams: a diagrammatic representation to increase validation objectivity of requirements-based hazard mitigations</p>	<p>Tenbergen, Bastian, Weyer, Thorsten, Pohl, Klaus,</p>	<p>When developing safety-critical embedded systems, it is necessary to ensure that the system under development poses no harm to human users or external systems during operation. To achieve this, potential hazards are identified and potential mitigations for those hazards are documented in requirements. During requirements validation, the stakeholders assess if the documented hazard-mitigating requirements can avoid the identified hazards. Requirements validation is highly subjective. Among others, validation depends on the stakeholders' understanding of the involved processes, their familiarity with the system under development, and the information available. In consequence, there is the risk that stakeholders judge the adequacy of hazard-mitigating requirements based on their individual opinions about the hazards, rather than on the documented information about the system's hazards. To improve the validation of hazard-mitigating requirements, we recently proposed a diagrammatic representation called Hazard Relation Diagrams (Tenbergen B, Weyer T, Pohl K, Supporting the validation of</p>	<p>10.1007/s00766-017-0267-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-017-0267-9</p>	<p>SpringerLink</p>
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		<p>adequacy in requirements-based hazard mitigations. In: Requirements engineering: foundation for software quality. LNCS, vol 9013. Springer, pp 17–32, 2015). In this paper, we extend the ontology of Hazard Relation Diagrams, present their notations, and define well-formedness rules. We elaborate on the application of Hazard Relation Diagrams to visualize complex relationships between hazards and mitigations and present an automated approach to generate Hazard Relation Diagrams. Finally, we report on our empirical evaluations about the impact of Hazard Relation Diagrams on review objectivity, effectiveness, efficiency, and reviewer's subjective confidence.</p>			
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<p>Auxiliary Flexibility in Healthcare Delivery System: An Integrative Framework and Implications</p>	<p>Kumar, Pradeep, Bera, Sasadhar, Dutta, Tanusree, Chakraborty, Shibashish,</p>	<p>The purpose of the study is to conceptualize auxiliary flexibility and identify its sources to provide varied services to the patients. The study aims to explore inter-organizational relationship from a flexibility perspective in the healthcare delivery system. This paper uses case studies based on the semi-structured interview, observation method, and informal discussions with healthcare professionals. In the present study, auxiliary flexibility is conceptualized as a new dimension of flexibility in the healthcare delivery system which provides internal strength to the healthcare organizations to reduce their service variability. Different sources for achieving auxiliary flexibility include outsourcing arrangements, networking, strategic alliances, and collaboration. An integrative framework is developed to establish the relationship of auxiliary flexibility with market-focused flexibility and patient satisfaction. The study is restricted to the findings derived from two hospitals in the Indian healthcare setting. The sample size for the semi-structured interview is limited to senior healthcare professionals. This paper is</p>	<p>10.1007/s40171-018-0183-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-018-0183-y</p>	<p>SpringerLink</p>
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		<p>unique in proposing auxiliary flexibility in the healthcare delivery system and offers new insights to address the gap in the literature regarding how external resources and inter-organizational relationship help in achieving auxiliary flexibility. The framework and propositions presented in the study will guide for appropriate marketing planning and future research. This study provides an overview to shape and redesign inter-organizational relationship to find the different sources of auxiliary flexibility for improved service delivery.</p>			
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<p>A fully distributed asynchronous approach for multi-area coordinated network-constrained unit commitment</p>	<p>Wang, Yamin, Wu, Lei, Li, Jie,</p>	<p>This paper discusses a consensus-based alternating direction method of multipliers (ADMM) approach to solve the multi-area coordinated network-constrained unit commitment (NCUC) problem in a distributed manner. Due to political and technical difficulties, it is neither practical nor feasible to solve the multi-area coordination problem in a centralized fashion, which requires full access to all the data of individual areas. In comparison, in the proposed fully distributed approach, local NCUC problems of individual areas can be solved independently, and only limited information is exchanged among adjacent areas to facilitate the multi-area coordination. Furthermore, since traditional ADMM can guarantee convergence only for convex problems, this paper discusses several strategies to mitigate oscillations, enhance convergence performance, and derive good-enough feasible solutions, including: (1) a tie-line power-flow-based area coordination strategy is designed to reduce the number of global consensus variables; (2) different penalty parameters are assigned to</p>	<p>10.1007/s11081-018-9375-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11081-018-9375-8</p>	<p>SpringerLink</p>
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		<p>individual consensus variables and are updated via certain rules during the iterative procedure, which reduces the impact of the initial values of on the convergence performance; (3) heuristic rules are adopted to fix certain unit commitment variables to avoid oscillations during the iterative procedure; and (4) an asynchronous distributed strategy is studied, which solves NCUC subproblems of small areas multiple times and exchanges information with adjacent areas more frequently within one complete run of slower NCUC subproblems of large areas. Numerical cases illustrate the effectiveness of the proposed asynchronous fully distributed NCUC approach, and we investigate key factors that would affect its convergence performance.</p>			
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Complementarity between term-time forcing and delayed vaccination response in explaining irregular dynamics in childhood diseases	Eckalbar, John C., Eckalbar, Walter L.,	<p>This paper investigates an SIR model with the following properties: (i) demographics are present. (ii) The fraction vaccinating at any time is dependent on past levels of disease prevalence with distributed delay. (iii) The maximum fraction vaccinating is bounded below one by medical contraindications or unshakeable beliefs among a sub-set of the population that the vaccination is not beneficial. (iv) Disease transmissibility is higher when school is in session than when it is not. Our main findings are that the time series of prevalence can exhibit irregular inter-epidemic intervals, and the profile of outbreaks can be highly variable over time—sometimes exhibiting single large peaks and sometimes clusters of closely-spaced lesser peaks.</p>	10.1007/s11587-018-0363-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11587-018-0363-2	SpringerLink
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Optimal baggage sorting rule to reduce waiting time in baggage claim	Kim, Changhee, Yang, Hongsuk, Kim, Soo Wook,	To improve airport service quality, this study attempts to find the optimal baggage classification method to minimize the passengers' waiting time in the baggage claim area. The efficiency of different methods is verified through simulation for 27 cases. Analysis of the results reveals that the efficiency of row classification of an airplane increases as the number of airplane seats increases in the case of identical numbers of passengers and travel time of baggage. When a passenger arrives before his or her baggage, classifying the baggage into business class and economy class has the highest efficiency increase. Finally, the method of classifying the baggage into each row has the highest efficiency increase when baggage arrives before its owner.	10.1007/s11628-017-0350-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11628-017-0350-9	SpringerLink
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<p>Industrial IoT für Smart Grid-Anwendungen im Feld</p>	<p>Gawron-Deutsch, Tobias, Diwold, Konrad, Cejka, Stephan, Matschnig, Martin, Einfalt, Alfred,</p>	<p>Die Energiewende bewirkt eine Transformation des Energiesystems, die zu großen Herausforderungen für den Verteilernetzbetrieb führt. Dies ist der Tatsache geschuldet, dass bis dato passive Verteilernetz-Abschnitte, welche historisch reine Verbraucher waren, nunmehr durch dort verortete dezentrale Erzeugung und proaktive Netzteilnehmer – wie Photovoltaikanlagen, Speicher und E-Mobility – aktiv Einfluss auf den Netzbetrieb nehmen. Durch die Integration und den Einsatz intelligenter Automatisierung sollen diese Netzabschnitte in Zukunft aktiv gesteuert werden. Das daraus resultierende Gesamtsystem stellt ein cyber-physikalisches System dar, dass durch einen hohen Komplexitätsgrad gekennzeichnet ist und die elektrische und algorithmische Welt mittels geeigneter IKT-Infrastruktur koppelt. Es ist davon auszugehen, dass die Steuerung und Automatisierung in solchen Systemen immer individueller wird. Dafür bedarf es flexibler und (hinsichtlich Installation und Wartung) einfach zu bedienender Automatisierungssysteme, die es den Betreibern</p>	<p>10.1007/s00502-018-0617-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-018-0617-4</p>	<p>SpringerLink</p>
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		<p>von Verteilernetzen erlauben, individualisierte Lösungen nahtlos in ihren Netzen zu integrieren. Dieser Beitrag beschreibt einen Systemansatz, der aufbauend auf einer Industrial Internet-of-Things(IoT)-Plattform die Interaktion der notwendigen physikalischen Modelle und Anwendungen realisiert und somit zur Lösung dieser Herausforderungen eingesetzt werden kann.</p> <p>Currently an increased integration of distributed energy resources and prosumers into the distribution system can be observed. These new resources range from renewable energy resources such as PV-systems, to storage systems, and e-mobility charging stations. This trend is coined under the term "Energiewende" and presents a challenge for the system operators, as the grid-level (where the integration of these entities happens) was initially designed for distribution purposes only and was thus operated passively. In order to mitigate and solve resulting problems, intelligent automation systems can be used to actively operate these grids. The resulting system constitutes a cyber physical system, which is</p>			
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		<p>characterized by a high degree of complexity and connects the electrical and the algorithmic world, using a suitable ICT infrastructure. As the control and automatization of such systems becomes more and more individual, flexible and simple to use (regarding installation and maintenance) automation systems are required, which allow the operator the seamless integration of individualized solutions into their grids. This article describes a system approach that is based on industrial Internet-of-Things technology and allows realizing the required interaction between the physical models and applications; thus presenting a solution to solve these challenges.</p>			
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Framework to evaluate the performance and sustainability of a disperse productive system	Watanabe, Edson H., Silva, Robson M., Blos, Mauricio F., Junqueira, Fabricio, Santos Filho, Diolino J., Miyagi, Paulo E.,	In general, the performance of productive systems considers the efficient use of technological transformation resources (such as machines and raw materials), information processing, and handling/transportation operations. However, there are no normalized criteria or rules to evaluate the performance of a productive system in the context of sustainability. Thus, this paper introduces an approach to identify and evaluate the performance indicators related to the sustainability of productive systems, specifically for geographically dispersed cases, i.e., dispersed productive system (DPS), in which the processes are in a distributed and dispersive architecture. The proposed approach is based on a framework aimed to measure sustainability key performance indicators (SuKPIs) that evaluate the sustainability of a system. The framework considers the ANSI/ISA-95 standard, and the sustainability assessment methodology considers the balance of sustainability indicators, which depend on economic, environmental, social, and technological aspects. The	10.1007/s40430-018-1032-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40430-018-1032-9	SpringerLink
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		<p>Petri net and derived techniques are used to model and to verify the main functionalities of the proposed framework, and also to monitor the productive processes of DPS for data acquisition of the SuKPIs. An application example is also presented to show the feasibility and validity of the proposal.</p>			
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Model-driven performance prediction of systems of systems	Falkner, Katrina, Szabo, Claudia, Chiprianov, Vanea, Puddy, Gavin, Rieckmann, Marianne, Fraser, Dan, Aston, Cathlyn,	Systems of systems exhibit characteristics that pose difficulty in modelling and predicting their overall performance capabilities, including the presence of operational independence, emergent behaviour, and evolutionary development. When considering systems of systems within the autonomous defence systems context, these aspects become increasingly critical, as constraints on the performance of the final system are typically driven by hard constraints on space, weight and power. System execution modelling languages and tools permit early prediction of the performance of model-driven systems; however, the focus to date has been on understanding the performance of a model rather than determining whether it meets performance requirements, and only subsequently carrying out analysis to reveal the causes of any requirement violations. Moreover, such an analysis is even more difficult when applied to several systems cooperating to achieve a common goal—a system of systems. In this article, we propose an integrated approach to	10.1007/s10270-016-0547-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-016-0547-8	SpringerLink
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		performance prediction of model-driven real-time embedded defence systems and systems of systems. Our architectural prototyping system supports a scenario-driven experimental platform for evaluating model suitability within a set of deployment and real-time performance constraints. We present an overview of our performance prediction system, demonstrating the integration of modelling, execution and performance analysis, and discuss a case study to illustrate our approach.			
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<p>Internet of Things and Big Data: the disruption of the value chain and the rise of new software ecosystems</p>	<p>Jesse, Norbert,</p>	<p>IoT connects devices, humans, places, and even abstract items like events. Driven by smart sensors, powerful embedded microelectronics, high-speed connectivity and the standards of the internet, IoT is on the brink of disrupting today's value chains. Big Data, characterized by high volume, high velocity and a high variety of formats, is a result of and also a driving force for IoT. The datafication of business presents completely new opportunities and risks. To hedge the technical risks posed by the interaction between "everything", IoT requires comprehensive modelling tools. Furthermore, new IT platforms and architectures are necessary to process and store the unprecedented flow of structured and unstructured, repetitive and non-repetitive data in real-time. In the end, only powerful analytic tools are able to extract "sense" from the exponentially growing amount of data and, as a consequence, data science becomes a strategic asset. The era of IoT relies heavily on standards for technologies which guarantee the interoperability of everything. This paper outlines some fundamental standardization activities. Big</p>	<p>10.1007/s00146-018-0807-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-018-0807-y</p>	<p>SpringerLink</p>
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		Data approaches for real-time processing are outlined and tools for analytics are addressed. As consequence, IoT is a (fast) evolutionary process whose success in penetrating all dimensions of life heavily depends on close cooperation between standardization organizations, open source communities and IT experts.			
Theme section on performance modelling and engineering of software and systems	Lladó, Catalina M., Sachs, Kai,		10.1007/s10270-017-0624-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-017-0624-7	SpringerLink

Coordinated scheduling model of power system with active distribution networks based on multi-agent system	HU, Jingzhe, CONG, Hao, JIANG, Chuanwen,	<p>With the large-scale development of distributed generations (DGs) and the connection into the main grid of active distribution networks (ADNs), traditional centralized dispatch of power system has encountered enormous challenge. In a bilateral electricity market, introducing ADN resources in the day-ahead generation schedule will not only enrich the dispatch patterns to the power system, but also reflect the initiative of ADNs. This paper proposes a coordinated scheduling model of power system with a plurality of ADNs based on multi-agent system where ADN agents are brought in the day-ahead market clearing. The process of market clearing and the dispatch of DGs in ADNs are independent with each other but linked together through the market clearing price (MCP) and bid volume. The optimal operating point of the whole system is achieved through multiple information exchange. In comparison with the dispatch without interaction between ADNs and the market operator (MO), the coordinated scheduling model is applied in a system with four ADNs to verify that the proposed method can</p>	10.1007/s40565-017-0327-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40565-017-0327-7	SpringerLink
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		improve the overall interests of ADNs. Finally, the effects of storage device and tie-line power limit are analyzed.			
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<p>Toward an execution system for self-healing workflows in cyber-physical systems</p>	<p>Seiger, Ronny, Huber, Steffen, Schlegel, Thomas,</p>	<p>Cyber-physical systems (CPS) represent a new class of information system that also takes real-world data and effects into account. Software-controlled sensors, actuators and smart objects enable a close coupling of the cyber and physical worlds. Introducing processes into CPS to automate repetitive tasks promises advantages regarding resource utilization and flexibility of control systems for smart spaces. However, process execution systems face new challenges when being adapted for process execution in CPS: the automated processing of sensor events and data, the dynamic invocation of services, the integration of human interaction, and the synchronization of the cyber and physical worlds. Current workflow engines fulfill these requirements only to a certain degree. In this work, we present PROtEUS—an integrated system for process execution in CPS. PROtEUS integrates components for event processing, data routing, dynamic service selection and human interaction on the modeling and execution level. It is the basis for executing self-</p>	<p>10.1007/s10270-016-0551-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-016-0551-z</p>	<p>SpringerLink</p>
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		healing model-based workflows in CPS. We demonstrate the applicability of PROtEUS within two case studies from the Smart Home domain and discuss its feasibility for introducing workflows into cyber-physical systems.			
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Situation analytics — at the dawn of a new software engineering paradigm	Chang, Carl K.,	<p>In this paper, I first review the seminal work by Thomas Kuhn — The Structure of Scientific Revolutions — and elaborate my view on paradigm shifts in software engineering research and practice as it turns 50 years old in 2018. I then examine major undertakings of the computing profession since early days of modern computing, especially those done by the software engineering community as a whole. I also enumerate anomalies and crises that occurred at various stages, and the attempts to provide solutions by the software engineering professionals in the past five decades. After providing such a background, I direct readers' attention toward emerging anomalies in software engineering, at a severity level that is causing another software engineering crisis, and suggest a set of criteria for feasible solutions. The main theme of this paper is to advocate that situation analytics, equipped with necessary definitions of essential concepts including situation and intention as parts of a new computational framework, can serve as the foundation for a new software engineering</p>	10.1007/s11432-017-9372-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11432-017-9372-7	SpringerLink
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		<p>paradigm named the Situation-Centric Paradigm. In this framework, situation is considered a new abstraction for computing and is clearly differentiated from the widely accepted existing abstractions, namely function and object. I argue that the software engineering professionals will inevitably move into this new paradigm, willingly or unwillingly, to empower Human-Embedded Computing (HEC) and End-User Embedded Computing (EUEC), much more than what they have done with traditional humancentered or user-centric computing altogether. In the end, I speculate that an ultimate agile method may be on the rise, and challenge readers to contemplate “what if” hundreds of thousands “end-user developers” emerge into the scene where the boundaries between end users and developers become much more blurred.</p>			
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Research on Equipment Support Activity Process Simulation Based on Monte Carlo Method	Xing, Biao, Song, Tailiang, Cao, Junhai, Dong, Yuansheng, Li, Kai,	The influencing factors of the equipment support activity process have the characteristics of nonlinearity, high dimension, many constraints, random uncertainty and fuzzy uncertainty. Monte Carlo method can solve the above problems commendably. This paper analyzes the main equipment support activity process and establishes the sampling plan and simulation model of the medium maintenance process based on Monte Carlo method, and the simulation result verifies a fact that the medium maintenance time can be effectively reduced when parallel operation on some procedures is used. It has a practical value and can give good advice to achieve the capability of equipment supportability.	10.1007/s12204-017-1901-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12204-017-1901-x	SpringerLink
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Network protocol architectures for future deep-space internetworking	Zhao, Kanglian, Zhang, Qinyu,	<p>In the next two decades, humans are going to experience a grand age of deep-space exploration, especially in Mars and Lunar spaces. These relatively frequent and long-term activities provide the opportunity, and at the same time, demands the necessity for a true interplanetary network as an essential infrastructure for future deep-space exploration. In this study, we try to provide a picture and a perspective in the current network protocol architectures for future deep-space internetworking. We first investigate the recent technical advances for deep-space internetworking and the challenges to their network protocol architecture. Detailed technical characteristics of three effective network protocol architectures are presented. A special focus is casted on delay tolerant networking (DTN), which is a dedicated network protocol architecture for deep-space internetworking. Finally, several open questions in DTN for future deep-space internetworking are proposed for further study.</p>	10.1007/s11432-018-9386-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11432-018-9386-5	SpringerLink
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Medical cyber-physical systems: A survey	Dey, Nilanjan, Ashour, Amira S., Shi, Fuqian, Fong, Simon James, Tavares, João Manuel R. S.,	Medical cyber-physical systems (MCPS) are healthcare critical integration of a network of medical devices. These systems are progressively used in hospitals to achieve a continuous high-quality healthcare. The MCPS design faces numerous challenges, including inoperability, security/privacy, and high assurance in the system software. In the current work, the infrastructure of the cyber-physical systems (CPS) are reviewed and discussed. This article enriched the researches of the networked Medical Device (MD) systems to increase the efficiency and safety of the healthcare. It also can assist the specialists of medical device to overcome crucial issues related to medical devices, and the challenges facing the design of the medical device's network. The concept of the social networking and its security along with the concept of the wireless sensor networks (WSNs) are addressed. Afterward, the CPS systems and platforms have been established, where more focus was directed toward CPS-based healthcare. The big data framework of CPSs is also included.	10.1007/s10916-018-0921-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10916-018-0921-x	SpringerLink
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<p>The user-centred intelligent environments development process as a guide to co-create smart technology for people with special needs</p>	<p>Augusto, J., Kramer, D., Alegre, U., Covaci, A., Santokhee, A.,</p>	<p>This paper reports on the lessons learnt during the application of a methodology to develop intelligent environments. One important feature of the methodology is that of being strongly user-centred, and the authors report on how that interaction with users took place and how it continuously shaped our project aspirations and outcomes. The methodology was applied to a project which aimed at helping people with Down's Syndrome and those with similar conditions and needs, to be more included in society. The project was developed by a consortium of commercial, academic, and end user supporting organizations. The paper elaborates on what type of stakeholders engaging activities were considered and how these were distributed along the lifetime of the project and their impact.</p>	<p>10.1007/s10209-016-0514-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10209-016-0514-8</p>	<p>SpringerLink</p>
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<p>Konzepte zur Datenverarbeitung in Referenzarchitekturen für Industrie 4.0</p>	<p>Weber, Christian, Wieland, Matthias, Reimann, Peter,</p>	<p>Für produzierende Unternehmen stellt die effiziente Verarbeitung großer Datenmengen eine Herausforderung dar. Die Auswahl der richtigen Architekturkonzepte für IT-Lösungen zur Datenverarbeitung spielt dabei eine wichtige Rolle. Um die IT an den Herausforderungen von Industrie 4.0 auszurichten, stehen Unternehmen verschiedene Referenzarchitekturen internationaler Gremien zur Verfügung. Die Hauptbeiträge dieses Artikels haben das Ziel, (i) einen Überblick über die wichtigsten Referenzarchitekturen für Industrie 4.0 (I4.0) zu geben und (ii) diese unter dem Aspekt der Datenverarbeitung zu untersuchen. Dazu werden die Referenzarchitekturen anhand von Datenverarbeitungsanforderungen für I4.0 betrachtet. Die Untersuchung zeigt, dass die I4.0-Referenzarchitekturen jeweils einen Teilbereich der Anforderungen abdecken und sich die Konzepte gegenseitig ergänzen. (iii) Darauf aufbauend werden aus den Datenverarbeitungsanforderungen technische Konsequenzen abgeleitet und Architekturkonzepte für die Realisierung</p>	<p>10.1007/s13222-018-0275-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13222-018-0275-z</p>	<p>SpringerLink</p>
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		einer IT-Architektur für die Datenverarbeitung vorgestellt. Dadurch wird es IT-Architekten ermöglicht, einen Vergleich der Referenzarchitekturen hinsichtlich projektbezogener Anforderungen an die Datenverarbeitung vorzunehmen sowie geeignete Architekturentscheidungen zu treffen.			
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Energy-Transport Sector Interdependence in Extreme Events: the Case of a Hurricane Event in Boston	Dormady, Noah, Ellis, Ryan,	<p>Purpose of Review This paper examines the governance challenges of intersectoral critical infrastructure interdependencies. Between 2015 and 2017, the US Department of Homeland Security (DHS) supported a team of researchers at Northeastern University and The Ohio State University to evaluate critical infrastructure interdependencies between the energy and transportation sectors in the context of a potential hurricane event in the Boston metro region. The paper reports on 2 years of semi-structured interviews with key stakeholders and infrastructure operators. The results provide insights gained from the interviews and a workshop convened jointly by Northeastern University, the Boston Mayor's Office of Emergency Management, and the Massachusetts Emergency Management Agency. Recent Findings Research relating to the resilience of interdependent critical infrastructure has proliferated in recent years. Nearly all of this research involves analysis of secondary data or abstracted operational models, rather than in-depth interviews of on-the-ground infrastructure owners and</p>	10.1007/s40518-018-0095-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40518-018-0095-7	SpringerLink
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		<p>operators.</p> <p>Summary This paper identifies a number of important constraints that undermine critical infrastructure resilience. At its core, infrastructure resilience is less a question of managerial desire or skill, or technical resources or design, but is a larger institutional challenge. The institutional environment in which energy and transportation infrastructure operates ultimately informs and defines resilience efforts.</p>			
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Autonomous robotic system for tunnel structural inspection and assessment	Loupos, Konstantinos, Doulamis, Anastasios D., Stentoumis, Christos, Protopapadakis, Eftychios, Makantasis, Konstantinos, Doulamis, Nikolaos D., Amditis, Angelos, Chrobocinski, Philippe, Victores, Juan, Montero, Roberto, Menendez, Elisabeth, Balaguer, Carlos, Lopez, Rafa, Cantero, Miquel, Navarro, Roman, Roncaglia, Alberto, Belsito, Luca, Camarinopoulos, Stephanos, Komodakis, Nikolaos, Singh, Praveer,	This paper presents a robotic platform, capable of autonomous tunnel inspection, developed under ROBO-SPECT European union funded research project. The robotic vehicle consists of a robotized production boom lift, a high precision robotic arm, advanced computer vision systems, a 3D laser scanner and an ultrasonic sensor. The autonomous inspection of tunnels requires advanced capabilities of the robotic vehicle and the computer vision sub-system. The robot localization in underground spaces and on long linear paths is a challenging task, as well as the mm accurate positioning of a robotic tip installed on a five-ton crane vehicle. Moreover, the 2D and 3D vision tasks, which support the inspection process, should tackle with poor and variable lighting conditions, low textured lining surfaces and the need for high accuracy. This contribution describes the final robotic vehicle and the developments as designed for concrete lining tunnel inspection. Results from the validation and benchmarking of the system are also included following the final tests at the operating Egnatia Motorway tunnels in northern Greece.	10.1007/s41315-017-0031-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41315-017-0031-9	SpringerLink
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<p>A Gaussian process based big data processing framework in cluster computing environment</p>	<p>Manogaran, Gunasekaran, Lopez, Daphne,</p>	<p>Machine learning algorithms play a vital role in the prediction of an outbreak of diseases based on climate change. Dengue outbreak is caused by improper maintenance of water storages, lack of urbanization, deforestation, lack of vaccination and awareness. Moreover, a number of dengue cases are varying based on climate season. There is a need to develop the prediction model for modeling the dengue outbreak based climate change. To model the dengue outbreak, Gaussian process regression (GPR) model is applied in this paper that uses the seasonal average of various climate parameters such as maximum temperature, minimum temperature, precipitation, wind, relative humidity and solar. The number of dengue cases and climate data for each block of Tamil Nadu, India are collected from Integrated Disease Surveillance Project and Global Weather Data for SWAT Inc respectively. Local Moran's I spatial autocorrelation is used in this paper for geographical visualization of hotspot regions. The outbreak of dengue and its hot spot regions are geographically visualized with</p>	<p>10.1007/s10586-017-0982-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-017-0982-5</p>	<p>SpringerLink</p>
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		<p>the help of ArcGIS 10.1 software. The day wise big climate data is collected and stored in the Hadoop cluster computing environment. MapReduce framework is used to reduce the day wise climate data into seasonal climate averages such as winter, summer, and monsoon. The seasonal climate data and number of dengue incidence (health data) are integrated based on the geo-location (latitude and longitude). GPR is used to develop the prediction model for dengue based on the integrated data (climate and health data). The proposed Gaussian process based prediction model is compared with various machine learning approaches such as multiple regression, support vector machine and random forests. Experimental results demonstrate the effectiveness of our Gaussian process based prediction framework.</p>			
<p>Proceedings of the Panel Discussion on "Remote Sensing Business Opportunities in the Era of Free and Open Data Access" organized by Antrix Corporation Limited on September 15, 2017 on the Occasion of Its Silver Jubilee Anniversary</p>	<p>Navalgund, Ranganath,</p>		<p>10.1007/s12524-018-0762-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12524-018-0762-6</p>	<p>SpringerLink</p>

<p>Congestion avoidance in cognitive wireless sensor networks using TOPSIS and response surface methodology</p>	<p>Gholipour, M., Haghghat, A. T., Meybodi, M. R.,</p>	<p>Congestion in wireless sensor networks degrades the quality of the channel and network throughput. This leads to packet loss and energy dissipation. To cope with this problem, a two-stage cognitive network congestion control approach is presented in this paper. In the first stage of the proposed strategy, initially downstream nodes calculate their buffer occupancy ratio and estimate congestion degree in the MAC layer. Then, they send the estimated value to both network and transport layers of their upstream nodes. The network layer of the upstream node uses TOPSIS in order to rank all neighbors to select the best one as the next relay node. In the second stage, transport layer of the given node adjusts the transmission rate using an optimized regression analysis by RSM. Extensive simulations demonstrated that the proposed method not only decreases packet loss, but also significantly improves throughput and energy efficiency under different traffic conditions, especially in heavy traffic areas. Also, Tukey test is used to compare performance of algorithms as well as to demonstrate that</p>	<p>10.1007/s11235-017-0356-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11235-017-0356-6</p>	<p>SpringerLink</p>
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		the proposed method is significantly better than other methods.			
Coordinate international Earth observations for maximum impact	Ryan, Barbara J.,		10.1038/d41586-018-02067-1	https://www.nature.com/articles/d41586-018-02067-1.pdf	SpringerLink

<p>An Adaptive Use of Viable System Model with Knowledge System Diagnostics Serving Industrial Democracy in a Textile Manufacturing Company</p>	<p>Toprak, Saadet, Torlak, N. Gökhan,</p>	<p>The primary purpose of this research is to improve Beer's Viable System Model (VSM) which is built on cybernetic principles and tools and aims to design adaptive, responsive and goal-seeking organisations possessing all features of viability. Assessing the strengths and weaknesses of VSM, this research proposes to enhance the model by using it in combination with Topp's Knowledge System Diagnostics (KSD) which tries to uncover an organisation's rules of formation making possible the creation and maintenance of knowledge within an organisation. It is thought that, equipped with this information, an adaptive application of VSM with KSD might cure unhealthy managerial practice—a lack of employee involvement in decision making and responsibility and authority sharing—observed both in a textile manufacturer and VSM. Methodological implications of this version of multimethodology are discussed, and then research site issues are revealed and recommendations are made.</p>	<p>10.1007/s11213-017-9419-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-017-9419-6</p>	<p>SpringerLink</p>
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Cloud providers viability	Bartolini, Cesare, El Kateb, Donia, Le Traon, Yves, Hagen, David,	<p>A major part of the commercial Internet is moving toward the cloud paradigm. This phenomenon has a drastic impact on the organizational structures of enterprises and introduces new challenges that must be properly addressed to avoid major setbacks. One such challenge is that of cloud provider viability, that is, the reasonable certainty that the Cloud Service Provider (CSP) will not go out of business, either by filing for bankruptcy or by simply shutting down operations, thus leaving its customers stranded without an infrastructure and, depending on the type of cloud service used, even without their applications or data. This article attempts to address the issue of cloud provider viability, defining a possible way of modeling viability as a non-functional requirement and proposing some approaches that can be used to mitigate the problem, both from a technical and from a legal perspective. By introducing a structured perspective into the topic of cloud viability, describing the risks, factors and possible mitigators, the contribution of this work is twofold: it gives the customer a better understanding to determine when it can rely on the</p>	10.1007/s12525-018-0284-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12525-018-0284-7	SpringerLink
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		cloud infrastructure on the long term and what precautions it should take in any case, and provides the CSP with means to address some of the viability issues and thus increase its customers' trust.			
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<p>A Systematic Review of Agent-Based Test Case Generation for Regression Testing</p>	<p>Arora, Pardeep Kumar, Bhatia, Rajesh,</p>	<p>There is an urgent need to create awareness about the potential benefits of using agents in software test case generation and to identify the need to develop agent-based regression testing techniques and approaches. It may help in reducing time and cost required for testing. This study reports systematic literature review of existing test case generation approaches for regression testing and agent-based software testing systems. The emphasis is articulated on agent-based regression test case generation. Further research directions are recommended. In the systematic literature review, we framed three sets of research questions. Based on our inclusion and exclusion criteria, we identified 115 potential research papers on test case generation in regression testing and agent-based software testing. We explored journals, international conferences, workshops and identified 59 studies in test case generation for regression testing and 56 studies in agent-based software testing. The data extracted from our study are classified into seven broader areas of agent-based software testing. Based on our systematic literature survey, we recognized available</p>	<p>10.1007/s13369-017-2796-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13369-017-2796-4</p>	<p>SpringerLink</p>
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		<p>techniques, approaches, platforms as well as methodologies for regression test case generation and developing agent-based software testing systems. This study will benefit the researchers to carry forward their work in the domain of regression test case generation and agent-based software testing. To cut down on schedule and cost, mobile agent-based software testing can be a promising alternative.</p>			
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Multi agent system: concepts, platforms and applications in power systems	Sujil, A., Verma, Jatin, Kumar, Rajesh,	<p>The power system is presently experiencing vital changes: it is advancing from a centralized structure to a decentralized one, primarily because of the enormous advancement of distributed renewable energy sources, so future power system obliges new control strategies. These systems must have the capacity to withstand new requirements, for example, the exceedingly disseminated nature, the irregularity of renewable energy sources and the restricted data transfer capacity for communications. Multi agent systems (MAS) have attributes that meet these prerequisites. A certain degree of distributed or collective intelligence can be accomplished through the connection of these agents with one another, participating or contending to achieve their objectives. This paper introduces outline of the fundamental ideas of MAS and its different platforms. Also, it provides a comprehensive survey on the power system applications in which MAS technique has been applied. For each power system application, technical details are also discussed.</p>	10.1007/s10462-016-9520-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10462-016-9520-8	SpringerLink
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Challenges and research directions for Internet of Things	Hammoudi, Sarra, Aliouat, Zibouda, Harous, Saad,	<p>The emergence of Internet of Things (IoT) is empowered by the availability of the high volume of smart sensors, Radio Frequency Identification, a suitable communication technologies and protocols. In the near future, the Internet will be full of heterogeneous connected devices. In recent years, the IoT has drawn significant attention as it can solve difficult problems. However, the heterogeneity of devices and the large scale networks expose the IoT to many challenges that must be addressed; otherwise, the systems performance will deteriorate. As an attempt to identify these challenges, this paper comprehensively cites the main IoT concepts, the serious IoT challenges and the quality of services presented in the recent literature. It also investigates the corresponding main research directions and the proposed solutions. This paper can increase the knowledge of the reader since it is the first IoT survey that presents load balancing algorithms utilized in solving the extreme data storage challenge.</p>	10.1007/s11235-017-0343-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11235-017-0343-y	SpringerLink
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The Perceptual Computer: the Past, Up to the Present, and Into the Future	Mendel, Jerry M.,	This article is an overview of the perceptual computer (Per-C) and summarizes developments about it for three time frames: the past (prior to 2010), up to the present (2010–2016), and into the future (2017–). It explains what the Per-C is and locates it in the Venn diagram of computing with words (CWW) in both its Intermediate CWW and Advanced CWW sectors. For the first two time frames, the article focuses on what has been done for the three component blocks of the Per-C, namely its encoder , CWW engine , and decoder . For the third time frame it focuses on what needs to be done for those three component blocks. It also gives brief summaries of published applications for the Per-C for the first two time frames. Readers who are interested in potential research topics will be most interested in the time frame (2017–).	10.1007/s00287-018-1088-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00287-018-1088-z	SpringerLink
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Integrating Personalized and Accessible Itineraries in MaaS Ecosystems Through Microservices	Melis, Andrea, Mirri, Silvia, Prandi, Catia, Prandini, Marco, Salomoni, Paola, Callegati, Franco,	Mobility is a crucial sector for the livability of urban spaces, both in terms of accessibility for people with disabilities, and in terms of enjoyability by people with different interests. The deep transformation mobility is undergoing, heading towards commoditization of the full spectrum of transportation services, can lead to efficient solutions based on the same principle for all these needs. This paper shows how the approach based on the flexible orchestration of microservices allows to build applications that are, at the same time, more easily suited to the specific needs of different user categories, and more seamlessly integrated in the Mobility as a Service approach to smart mobility.	10.1007/s11036-017-0831-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11036-017-0831-z	SpringerLink
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Conceptual design of sacrificial sub-systems: failure flow decision functions	Short, Ada-Rhodes, Lai, Ann D., Van Bossuyt, Douglas L.,	<p>This paper presents a method to conceptually model sacrificing non-critical sub-systems, or components, in a failure scenario to protect critical system functionality through a functional failure modeling technique. Understanding the potential benefits and drawbacks of choosing how a failure is directed in a system away from critical sub-systems and toward sub-systems that can be sacrificed to maintain core functionality can help system designers to design systems that are more likely to complete primary mission objectives despite failure events. Functional modeling techniques are often used during the early stage of conceptual design for complex systems to provide a better understanding of system architecture. A family of methods exists that focuses on the modeling of failure initiation and propagation within a functional model of a system. Modeling failure flow provides an opportunity to understand system failure propagation and inform system design iteration for improved survivability and robustness. Currently, the ability to model failure flow decision-making is missing from</p>	10.1007/s00163-017-0258-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-017-0258-3	SpringerLink
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		<p>the family of function failure and flow methodologies. The failure flow decision function (FFDF) methodology presented in this paper enables system designers to model failure flow decision-making problems where functions and flows that are critical to system operation are protected through the sacrifice of less critical functions and flow exports. The sacrifice of less critical system functions and flows allows for mission critical functionality to be preserved, leading to a higher rate of mission objective completion. An example of FFDF application in a physical design is a non-critical peripheral piece of electrical hardware being sacrificed during an electrical surge condition to protect critical electronics necessary for the core functionality of the system. In this paper, a case study of the FFDF method is presented based on a Sojourner class Mars Exploration Rover (MER) platform.</p>			
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Resilience of small- and medium-sized enterprises as a correlation to community impact: an agent-based modeling approach	Sauser, Brian, Baldwin, Clifton, Pourreza, Saba, Randall, Wesley, Nowicki, David,	Access to government funding is one of the most effective ways to enhance the resilience for small- and medium-sized enterprises (SME) community after a disaster. Along these lines, a major focus of SME resiliency research has been on examining factors needed to keep an SME open after a disaster. This makes sense as SMEs are critical to community recovery. It seems logical that the severity of a disaster would indicate the impact to a community. Using a systems thinking methodology, we developed a hypothesis that this correlation of severity to impact breaks down over time, causing the community to quickly spiral into trouble. This paper presents an agent-based model to test our hypothesis. The results indicate the impact to a community becomes much more extreme after a threshold or "tipping point" is crossed.	10.1007/s11069-017-3034-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-017-3034-9	SpringerLink
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<p>A glimpse on big data analytics in the framework of marketing strategies</p>	<p>Ducange, Pietro, Pecori, Riccardo, Mezzina, Paolo,</p>	<p>Mining and analyzing the valuable knowledge hidden behind the amount of data available in social media is becoming a fundamental prerequisite for any effective and successful strategic marketing campaign. Anyway, to the best of our knowledge, a systematic analysis and review of the very recent literature according to a marketing framework is still missing. In this work, we intend to provide, first and foremost, a clear understanding of the main concepts and issues regarding social big data, as well as their features and technologies. Secondly, we focus on marketing, describing an operative methodology to get useful insights from social big data. Then, we carry out a brief but accurate classification of recent use cases from the literature, according to the decision support and the competitive advantages obtained by enterprises whenever they exploit the analytics available from social big data sources. Finally, we outline some open issues and suggestions in order to encourage further research in the field.</p>	<p>10.1007/s00500-017-2536-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00500-017-2536-4</p>	<p>SpringerLink</p>
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Universal knowledge discovery from big data using combined dual-cycle	Shen, Bin,	<p>Many people hold a vision that big data will provide big insights and have a big impact in the future. However, how to turn big data into deep insights with tremendous value still remains obscure. Here I highlight universal knowledge discovery from big data. The new concept focuses on discovering universal knowledge, which exists in the statistical analyses of big data and provides valuable insights into big data. Universal knowledge comes in different forms, e.g., universal patterns, rules, correlations, models and mechanisms. To accelerate big data assisted scientific discovery, a unified research paradigm should be built based on techniques and paradigms from related research domains, especially big data mining and complex systems science. Therefore, I propose a dual-cycle methodology with three types of cycle-driven UKD process, i.e., big-data-cycle-driven, mechanism-cycle-driven and combined-dual-cycle-driven mining. A case study is also given to illustrate the effectiveness of the proposed processes. This paper lays a foundation for the future development of universal knowledge discovery, and</p>	10.1007/s13042-015-0376-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13042-015-0376-z	SpringerLink
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		offers a pathway to the discovery of “treasure-trove” hidden in big data.			
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<p>The MED-SUV virtual research environment for enabling the GEO Geohazard supersites in Italy</p>	<p>Mazzetti, Paolo, Puglisi, Giuseppe, D'Auria, Luca, Roncella, Roberto, Reitano, Danilo, Merenda, Riccardo, Nativi, Stefano,</p>	<p>This paper presents the Virtual Research Environment (VRE) enabling two European GEO Geohazard Supersites in Italy. According to GEO (Group on Earth Observation) vision, Geohazard Supersites provide access to spaceborne and in-situ geophysical data and models for selected sites prone to natural hazards –noticeably, earthquakes and volcano eruptions. The VRE was implemented in the framework of the Mediterranean Supersite Volcanoes (MED-SUV) project, funded by the European Commission. MED-SUV realized one of the European supersite demonstrators covering the two Permanent Supersites selected in Italy: Mt. Etna and Campi Flegrei/Vesuvius. The MED-SUV VRE provides advanced services for heterogeneous data and information management and sharing. MED-SUV started identifying the main supersite requirements including: the interoperability with existing data/information supply systems, the support of policy-based access control, the access to processing capabilities provided by external</p>	<p>10.1007/s12145-017-0305-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-017-0305-7</p>	<p>SpringerLink</p>
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		<p>platforms, the management resources for publishing and sharing new products, the integration with significant global systems such as GEOSS and EPOS. MED-SUV adopted a System of Systems (SoS) approach to address interoperability with the identified heterogeneous systems supplying data and information. The SoS approach is based on a brokering architecture, where a specialized component (i.e the MED-SUV Broker: MSB) connects the existing and next-coming data sources leaving them autonomous. MSB carries out all the necessary mediation and harmonization tasks exposing standard interfaces enabling the interconnection with external systems like GEOSS and EPOS. In addition, MSB is accessible via a JavaScript library implementing Web APIs to facilitate the development of Web and mobile applications.</p>			
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<p>The design of a cloud-based tracker platform based on system-of-systems service architecture</p>	<p>Chu, Victor W., Wong, Raymond K., Chi, Chi-Hung, Zhou, Wei, Ho, Ivan,</p>	<p>Devices embedded with position tracking facilities are now widely available, such as smartphones, smartwatches, vehicle location trackers, etc. However, data mining and advanced analytics are rarely bundled with these devices that limits their utility. In this paper, we present the design of a generic, programmable position tracking platform, namely CQtracker. In particular, this platform is incorporated with a cloud-based engine of advanced analytics. CQtracker is constructed based on a concept of system-of-systems service architecture to deliver data-system-as-a-service. It is designed for the consumption by a variety of spatio-temporal applications. Spatio-temporal data exhibit strong heterogeneous patterns, data sparseness and distribution skewness. Hence, they are difficult to analyze. CQtracker reveals relationships and structures from these data by self-regularized time-varying dynamic Bayesian networks. In addition, a Bayesian parameter estimation approach is applied to an epidemic model</p>	<p>10.1007/s10796-017-9768-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-017-9768-9</p>	<p>SpringerLink</p>
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		for outbreak predictions. Sample applications are presented in this paper, in which CQtracker successfully reveals the evolution of time-varying structures from traffic trajectories.			
Big Data Analytics and Business Intelligence in Industry	Huang, Shih-Chia, McIntosh, Suzanne, Sobolevsky, Stanislav, Hung, Patrick C. K.,		10.1007/s10796-017-9804-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-017-9804-9	SpringerLink

Development of the Systematic Approach to Studying Agricultural Land and Agrolandscape Management	Trofimov, I. A., Trofimova, L. S., Yakovleva, E. P.,	This paper develops the methodological foundations of agrolandscape-environmental studies and management of agricultural land that are based on the concept of conservation and reproduction of land and other natural resources used in agriculture, soil fertility, productive longevity of agro-ecosystems and agrolandscapes (All-Russian Williams Fodder Research Institute), and the concept of the ecological framework of agricultural landscapes and ecological-economic balance (Moscow State University, Institute of Geography Russian Academy of Sciences). An integrative understanding of the essence of agricultural lands allows us to consider them as natural agricultural systems, which have a specific structure, functions, and links and are interrelated with other agrogeo-ecosystems and geo-ecosystems that form the environment. They supply agricultural products and other side derivatives of their functioning that are associated with the development of negative processes outside their limits. The features of study, construction, and management of agricultural land	10.1134/S1062359017100168	http://link.springer.com/openurl/pdf?id=doi:10.1134/S1062359017100168	SpringerLink
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		<p>are determined by the dual nature-productive essence of agrogeo-ecosystems and the presence of three subsystems in them (abiotic, biotic, and anthropogenic). A special role is played by a control and monitoring unit. Agrogeoecosystems are characterized by the presence of three types of relationships (substance-energy, informational, and management); three main functions of agrogeo-ecosystems (productive, environment-forming, and nature-protective); the ability of agrogeo-ecosystems to respond to anthropogenic impacts; the ability of adaptation and recovery; and their distinctive openness and dynamism. The priorities of studies and management of agricultural land are formulated in several principles (systematic approach, emergence, environmental framework, landscape-ecological balance, multilevel and multifactor adaptation, etc.). They are intended to improve the adaptability, sustainability, productivity, and resource-saving and environmental role of agro-ecosystems and agricultural landscapes, which is only</p>			
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		possible by creating favorable conditions for their functioning, ensuring a balance between the productive and protective agro-ecosystems and favorable conditions for the development of soil and soil biota, for the active life of major soil-formers (perennial grasses and microbes).			
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Design framework for reliable and environment aware management of smart environment devices	Sylla, Adja Ndeye, Louvel, Maxime, Rutten, Eric,	<p>A smart environment is equipped with numerous devices (i.e., sensors, actuators) that are possibly distributed over different locations (e.g., rooms of a smart building). These devices are automatically controlled to achieve different objectives related, for instance, to comfort, security and energy savings. Controlling smart environment devices is not an easy task. This is due to: the heterogeneity of devices, the inconsistencies that can result from communication errors or devices failure, and the conflicting decisions including those caused by environment dependencies. This paper proposes a design framework for the reliable and environment aware management of smart environment devices. The framework is based on the combination of the rule based middleware LINC and the automata based language Heptagon/BZR (H/BZR). It consists of: an abstraction layer for the heterogeneity of devices, a transactional execution mechanism to avoid inconsistencies and a controller that, based on a generic model of the environment, makes appropriate</p>	10.1186/s13174-017-0067-y	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-017-0067-y	SpringerLink
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		decisions and avoids conflicts. A case study with concrete devices, in the field of building automation, is presented to illustrate the framework.			
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Universities of the Kyrgyz Republic on the Web: accessibility and usability	Ismailova, Rita, Kimsanova, Gulida,	<p>Today the Internet is the easiest way to find information about any kind of organization, and the first impression about an organization is almost always based on its Web site. This study investigated whether the Web sites of the universities in the Kyrgyz Republic comply with prevailing standards of accessibility and usability and whether these qualities depend on location and type of ownership of the universities. The analysis was conducted using online evaluation tools. Based on the data collected, the hypotheses were further tested using the SPSS statistical package. The results show a low usability rating for the vast majority of the universities' Web sites. For 90.47 % of the Web sites upload time exceeds 30 s; 52.38 % of the Web sites have broken links; and 100 % have browser compatibility problems. The results of accessibility tests show low compliance with W3C-WCAG 1.0: error rates for Priority 1, 2, and 3 checkpoints of 83.33, 92.85, and 95.24 %, respectively. The results obtained and the results of an independent t test indicate that most of the issues of all Web sites tested are not of a technical nature,</p>	10.1007/s10209-016-0481-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10209-016-0481-0	SpringerLink
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		and occur mainly due to human factors related to Web application development.			
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Seeing the woods for the trees: the problem of information inefficiency and information overload on operator performance	Dadashi, Nastaran, Golightly, David, Sharples, Sarah,	One of the recurring questions in designing dynamic control environments is whether providing more information leads to better operational decisions. The idea of having every piece of information is increasingly tempting (and in safety critical domains often mandatory) but has become a potential obstacle for designers and operators. The present research study examined this challenge of appropriate information design and usability within a railway control setting. A laboratory study was conducted to investigate the presentation of different levels of information (taken from data processing framework, Dadashi et al. in Ergonomics 57(3):387–402, 2014) and the association with, and potential prediction of, the performance of a human operator when completing a cognitively demanding problem-solving scenario within railways. Results indicated that presenting users only with information corresponding to their cognitive task, and in the absence of other, non task-relevant information, improves the performance of their problem-solving/alarm handling. Knowing the key features of interest to various agents (machine or human) and	10.1007/s10111-017-0451-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-017-0451-1	SpringerLink
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		using the data processing framework to guide the optimal level of information required by each of these agents could potentially lead to safer and more usable designs.			
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Stimuli-SoS: a model-based approach to derive stimuli generators for simulations of systems-of-systems software architectures	Graciano Neto, Valdemar Vicente, Barros Paes, Carlos Eduardo, Garcés, Lina, Guessi, Milena, Manzano, Wallace, Oquendo, Flavio, Nakagawa, Elisa Yumi,	Background Systems-of-systems (SoS) are alliances of independent and interoperable software-intensive systems. SoS often support critical domains, being required to exhibit a reliable operation, specially because people's safety relies on their services. In this direction, simulations enable the validation of different operational scenarios in a controlled environment, allowing a benchmarking of its response as well as revealing possible breaches that could lead to failures. However, simulations are traditionally manual, demanding a high level of human intervention, being costly and error-prone. A stimuli generator could aid in by continuously providing data to trigger a SoS simulation and maintaining its operation. Methods We established a model-based approach termed Stimuli-SoS to support the creation of stimuli generators to be used in SoS simulations. Stimuli-SoS uses software architecture descriptions for automating the creation of such generators. Specifically, this approach transforms SoSADL, a formal architectural description	10.1186/s13173-017-0062-y	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13173-017-0062-y	SpringerLink
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		<p>language for SoS, into dynamic models expressed in DEVS, a simulation formalism. We carried out a case study in which Stimuli-SoS was used to automatically produce stimuli generators for a simulation of a flood monitoring SoS. Results We run simulations of a SoS architectural configuration with 69 constituent systems, i.e., 42 sensors, 9 crowdsourcing systems, and 18 drones. Stimuli generators were automatically generated for each type of constituent. These stimuli generators were capable of receiving the input data from the database and generating the expected stimuli for the constituents, allowing to simulate constituent systems interoperations into the flood monitoring SoS. Using Stimuli-SoS, we simulated 38 days of flood monitoring in little more than 6 h. Stimuli generators correctly forwarded data to the simulation, which was able to reproduce 29 flood alerts triggered by the SoS during a flooding event. In particular, Stimuli-SoS is almost 65 times more productive than a manual approach to producing data for the same type of simulation.</p> <p>Conclusions Our</p>			
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		<p>approach succeeded in automatically deriving a functional stimuli generator that can reproduce environmental conditions for simulating a SoS. In particular, we presented new contributions regarding productivity and automation for the use of a model-based approach in SoS engineering.</p>			
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<p>Inter-Cloud Communication Through Gatekeepers to Support IoT Service Interaction in the Arrowhead Framework</p>	<p>Varga, Pál, Hegeds, Csaba,</p>	<p>Although we live in the era of Internet of Things (IoT), many issues on system- interoperability are still not tackled at large. There are limitations for ever-growing IoT realms, especially in resource- constrained domains, where low latency is crucial, and local processing power is a scarce resource. Service Oriented Architectures (SOA) provide functional and configuration flexibility in closed communication environments, where security and service- related orchestration issues are controlled within the local network. For automation systems, these SOA-based networks can have core services, such as Service Registry, Orchestration, Authorization, and so on. A set of such core services are defined, implemented and made available through the Arrowhead Framework. Since the Core Services are distributed resources available for all systems that wish to consume them, these networked services can be considered a cloud. As one cloud cannot serve for all, there is a need for such automation system clouds to interact with each other: use the services of one from another.</p>	<p>10.1007/s11277-017-4137-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-017-4137-z</p>	<p>SpringerLink</p>
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		<p>This paper presents a solution for providing inter-Cloud servicing capabilities in the Arrowhead framework by introducing a gatekeeper concept. The main idea is to extend the service discovery functionality outside the boundaries of a single cloud, and solve the security and orchestration issues in a way that fits into the general Arrowhead concept. This paper also introduces the methodology of creating secure connections between service consumers and providers situated in different clouds.</p>			
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<p>The growing complexity in invention process</p>	<p>Luo, Jianxi, Wood, Kristin L.,</p>	<p>Technological and design process complexities may pose challenges to engineering design and related outcomes through invention. Understanding the trends related to the complexity of inventions and invention processes is crucial for informing engineering design research and education for invention, but has not been formally developed in the design literature. Herein, we utilize a set of patent-based metrics, drawn from complex systems research and engineering design research, to detect various aspects of the complexity in invention processes. By an analysis of U.S. patents from 1975 to 2011, our results suggest that technology inventions have been increasingly (1) requiring larger teams and more distant collaboration, (2) integrating a growing base of prior technologies, and (3) delivering more systemic and integrative new technologies. These trends may positively reinforce each other so as to contribute to a continual growth of the complexity in invention processes. Individual productivity for invention is also in decline, as we measured from the patent data. These findings suggest the increasing importance of</p>	<p>10.1007/s00163-017-0266-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-017-0266-3</p>	<p>SpringerLink</p>
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		research, education and application of complex system analysis methods and tools to control and manage the complexity in invention processes.			
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Community vulnerability to hazards: introducing local expert knowledge into the equation	Martín, Yago, Rodrigues Mimbbrero, Marcos, Zúñiga-Antón, María,	Assessments of social vulnerability have gained importance over the years, evolving from their initial emphasis on environmental factors surrounding natural disasters to a conceptual framework in which human agency plays a more decisive role. Up to know, most approaches to vulnerability were developed using an equally weighted approach in which each component contributes the same to vulnerability. To improve and enrich the information needed by authorities and stakeholders, we believe that a participatory approach would enhance our current understanding of vulnerability. Therefore, as an alternative to equally weighted approaches we propose and test the introduction of an expert panel to provide deeper insights into the relative contribution of vulnerability drivers. Our methodology has been applied to Aragón (Spain) at a municipality scale. The core of the analysis is a principal component analysis (PCA) applied to a set of socioeconomic and demographic variables. PCA allows extracting the main drivers of vulnerability in the region. Then, we introduce the role of a local expert panel by	10.1007/s11069-017-2969-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-017-2969-1	SpringerLink
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		<p>means of an analytical hierarchical process. Results are mapped and analyzed to (1) outline the spatial distribution of Community Vulnerability Index (CoVI), (2) determine the extent and location of vulnerable areas and (3) identify their main drivers. Overall, the introduction of the panel improves the ability of the method to differentiate strong (low CoVI) and weak (high CoVI) positions, compared to the original equally weighted approach.</p>			
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Prioritizing and Ranking the Big Data Information Security Risk Spectrum	Bharathi, S. Vijayakumar,	Big data research brings in a lot of research interest and excitement from both industry and academia. While several research works have addressed the characteristics, technology and business application of big data, less literature has addressed the information security risk assessment of big data, to which this paper contributes to. This research work shows a big data information security risk spectrum comprised of 25 well-defined risk factors into seven constructs that are prioritized and ranked. The unique contribution of the paper is the mix of analytic hierarchy process, one of the most popular multi-criteria decision-making methods with the Delphi technique, another popular group decision-making technique. The results state that new-age technology risk factors like data brokering, global exposure to personal data, lack of governance-based security design are the top three risk factors which are considered from the standpoint of security, privacy and governance in big data management.	10.1007/s40171-017-0157-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-017-0157-5	SpringerLink
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Strategy, Complexity and Cooperation: The Sino-American Climate Regime	Walker, Sean B., Hipel, Keith W.,	<p>The Graph Model for Conflict Resolution is applied to a potential climate negotiation between the United States of America (USA) and the People's Republic of China (PRC) in order to gain strategic insights into how a successful agreement to reduce greenhouse gas emissions could be reached. In light of the failure of many nations to meet their expected Kyoto Protocol emission reduction targets and the lack of involvement of the world's greatest emitters of airborne pollutants, the USA and PRC, there is a need to determine successful strategies for combating climate change. The issues surrounding the potential implementation of a bilateral agreement between the USA and PRC are systematically analyzed. Information gathered about the decision makers, options and preferences within the potential negotiations is utilized to create a valid conflict model which is used as a basis for carrying out strategic analyses. Moreover, a novel method is implemented within the Graph Model for Conflict Resolution to gain insights into the impact of attitudes on these negotiations. The strategic findings reflect reasonably</p>	10.1007/s10726-017-9528-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10726-017-9528-8	SpringerLink
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		well what actually occurred in November 2014 when the USA and PRC negotiated a bilateral deal.			
Integrated energy systems: Challenges, trends, philosophy	Voropai, N. I., Stennikov, V. A., Barakhtenko, E. A.,	The creation of an energy metasystem that combines electrical, heat, cooling, and gas supply systems on an intellectual framework is a manifestation of a new energy paradigm. Integrated intelligent power supply systems combine complexity, intelligence, efficiency, reliability, controllability, flexibility of energy conversion, transmission, storage technologies and assume an active consumer.	10.1134/S107570071705015X	http://link.springer.com/openurl/pdf?id=doi:10.1134/S107570071705015X	SpringerLink

Trust management technique in wireless sensor networks: challenges and issues for reliable communication: a review	Dhulipala, V. R. Sarma, Karthik, N.,	A wireless sensor networks (WSNs) is a conglomeration of distributed self-directed sensor nodes to cooperatively monitor the physical and environmental conditions with in their vicinity. Trust becomes more important for autonomous sensor nodes deployed in hostile and military environment. In this survey, we described an overview of existing trust management techniques meant for WSN and more importantly indicating their challenges and issues for reliable communication. We also mentioned some attributes and parameters of trust to aid the trust worthy system development in WSN.	10.1007/s40012-017-0169-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40012-017-0169-5	SpringerLink
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Contextual information fusion for intrusion detection: a survey and taxonomy	Aleroud, Ahmed, Karabatis, George,	Research in cyber-security has demonstrated that dealing with cyber-attacks is by no means an easy task. One particular limitation of existing research originates from the uncertainty of information that is gathered to discover attacks. This uncertainty is partly due to the lack of attack prediction models that utilize contextual information to analyze activities that target computer networks. The focus of this paper is a comprehensive review of data analytics paradigms for intrusion detection along with an overview of techniques that apply contextual information for intrusion detection. A new research taxonomy is introduced consisting of several dimensions of data mining techniques, which create attack prediction models. The survey reveals the need to use multiple categories of contextual information in a layered manner with consistent, coherent, and feasible evidence toward the correct prediction of cyber-attacks.	10.1007/s10115-017-1027-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10115-017-1027-3	SpringerLink
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<p>Nanotechnology and HFE: critically engaging human capital in small-scale robotics research</p>	<p>Kant, Vivek,</p>	<p>The aim of this article is to extend the Human Factors and Ergonomics (HFE) engagements with nanotechnology (specifically, small-scale robotics) in university settings, in terms of a broader view of human capital. Nanotechnology as a novel technology presents challenges for HFE not only in terms of design and optimization but also in terms of the human aspects involved in the nanotechnology settings. Therefore, it is important to comprehend the knowledge production and work practices in nanotechnology settings. Correspondingly, this article presents two interrelated contributions. First, it presents one of the foremost studies conducted at the intersection of HFE and small-scale robotics. Second, it addresses a broader notion of human capital in nanotechnology settings in terms of knowledge and practices. Toward this end, this article presents an ethnographic case study of small-scale (micro- and nano-) robotics using the viewpoint of Symbolic Interactionism. This article characterizes three main facets of nanotechnology: nanotechnology as mode 2 knowledge;</p>	<p>10.1007/s10111-017-0414-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-017-0414-6</p>	<p>SpringerLink</p>
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		<p>nanotechnology and university research; nanotechnology and innovation panarchy. Using these aspects as the overarching basis, the domain of nanorobotics is situated in university settings to capture a broader notion of human capital and work practices. The study revealed that the participants were constructing not only robots but also its ecology. The robot was best comprehended not as a technical artifact but as a sociotechnical endeavor. Thus, this research presents nanotechnology as a broader construct that goes beyond the limitations of size and scale and bridges the gap between teamwork, technical creations and the overarching ecology.</p>			
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Fast lightweight reconfiguration of virtual constellation for obtaining of earth observation big data	Dong, Lijun, Yao, Hong, Ranjan, Rajiv, Zhang, Feng, Pan, Mengqi,	Earth observation (EO) big data is playing the increasingly important role in spatial sciences. To obtain adequate EO data, virtual constellation is proposed to overcome the limitation of traditional EO facilities, by combining the existing space and ground segment capabilities. However, the current configuration pattern of virtual constellation is tightly coupled with the specific application requirements. This leads to the costly reconfigurations. Although the pattern of software defined satellite network can decouple topology reconfigurations from application requirements, it cannot be directly applied to the reconfigurations of virtual constellations because of some drawbacks. To address the problem, we propose a model of LEO-ground links control-covering (LGLC) to implement fast and lightweight reconfiguration for virtual constellation. LGLC uses a bipartite graph model to formalize the dispatch problem of the control information of virtual constellation reconfiguration, and the optimum solution can be got by the classical algorithm in polynomial time. According to the	10.1007/s10586-017-0905-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-017-0905-5	SpringerLink
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		strategy obtained, only if a few satellites and stations receive the control information, virtual constellation can be reconfigured quickly. We also establish some metrics to evaluate the effect of LGLC. Extensive experiments are conducted to confirm the above claims.			
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COmmunication and WORKload analyses to study the COLlective WORK of fighter pilots: the COWORK^2 method	Lassalle, Julie, Rauffet, Philippe, Leroy, Baptiste, Guérin, Clément, Chauvin, Christine, Coppin, Gilles, Saïd, Farida,	This paper presents the COWORK^2 method, designed to classify the collective tasks of a fighter jet patrol according to two classification criteria: mental workload (at individual level) and communication quality (at team level). The classification purpose is to detect the tasks for which collective work could be impaired. A three-stage method is developed. Stage 1 consists in carrying out a task analysis with a subject matter expert to identify the collective tasks and characterize them in terms of commonly occurring situations and functions (constraints). In Stage 2, data related to individual mental workload (physiological measures) and team communications (communication recordings) are collected from a low-intrusiveness device in a highly realistic simulation environment. Stage 3 finally produces the classification of patrol collective tasks according to the two levels of analysis: individual and team. This classification is corroborated by the risk-level categorization of collective tasks achieved by a subject matter expert. The results highlight the relevance of the COWORK^2 method.	10.1007/s10111-017-0420-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-017-0420-8	SpringerLink
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Latest Kugler Maag Cie Survey Predicts Digital Services Will Radically Transform the Auto Industry by 2030			10.1007/BF03545 945	http://link.springer.com/openurl/pdf?id=doi:10.1007/BF03545945	SpringerLink
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<p>Geospatial binding for transdisciplinary research in crop science: the GRASPGfs initiative</p>	<p>Leibovici, Didier G., Anand, Suchith, Santos, Roberto, Mayes, Sean, Ray, Rumiana, Al-Azri, Masoud, Baten, Abdul, King, Graham, Karunaratne, Asha S., Azam-Ali, Sayed, Jackson, Mike J.,</p>	<p>The paper retraces the GRASPGfs endeavor (Geospatial Resource for Agricultural Species and Pests with integrated workflow modelling to support Global Food Security) between multiple disciplines around a common objective of facilitating research and model simulations for sustainable food security. Within this endeavor, the geospatial media has been the enabler for multidisciplinary research in crop modelling. Geospatial genetic-trait variations and associations with environmental forecasting were the main focus of the GRASPGfs. Designing the platform achieving this objective generated a transdisciplinary vision of modelling and forecasting for sustainable agriculture. Based on interoperability principles, seamless access as well as sharing for data, metadata and processing models, the design is described in this paper. This geospatial binding facilitates and supports new types of hypotheses and analysis as illustrated in the paper with a landscape genetic case study (bambara groundnut) and a crop disease</p>	<p>10.1186/s40965-017-0034-3</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40965-017-0034-3</p>	<p>SpringerLink</p>
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		modelling (eyespot disease). The approach and the eGRASP platform are generic enough to accommodate further complexity into the integrated modelling that this geospatial binding enables.			
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Live governance, borders, and the time–space of the situation: EUROSUR and the genealogy of bordering in Europe	Walters, William,	<p>Genealogies of governance have a significant contribution to make to studies of the European Union (EU). Genealogies denaturalize relations of rule by revealing the overlooked or hidden history of the practices and knowledges that underpin the exercise of political power. They also sensitize us to little shifts in practices that are often overlooked by general theories of governance. This argument is developed through a critical analysis of EUROSUR, a project the EU has recently launched to enhance and better integrate border surveillance capabilities at EU external frontiers. The paper has three aims. First, to enhance the intelligibility of EUROSUR through a historical focus on one of its key concepts, situational awareness. Second, to explore the relationship between this concept, its material infrastructure, and the emergence of a new time–space that I call the situation . This time–space materializes in contexts where information, infrastructure, and reaction capabilities combine in such a way that social events and emergencies can be monitored and acted upon in</p>	10.1057/s41295-016-0083-5	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41295-016-0083-5	SpringerLink
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		<p>near real time: a state of affairs I call 'live governance'. Finally, the paper asks what is at stake when we write genealogies of very contemporary, fluid regimes of power. It concludes that EUROSUR is better analysed as a dynamic and experimental assemblage of elements rather than the kind of relatively stable and enduring apparatus that interested Foucault. Describing it as an assemblage is intended to counterbalance the tendency, evident in some areas of security studies, to overestimate the solidity of new governance arrangements.</p>			
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Assessing the Value of System Theoretic Process Analysis in a Pharmacovigilance Process: An Example Using Signal Management	Adesina, Ajibade A., Hussain, Qasim, Pandit, Sreenivas, Rejzek, Martin, Hochberg, Alan M.,	<p>Introduction To design and run an effective pharmacovigilance system, one must understand potential hazards that may cause the system to fail. System-Theoretic Process Analysis (STPA) is a hazard analysis technique that has been successfully applied in domains including aviation, nuclear power, and defence systems; however, it has not yet been applied to a critical pharmacovigilance process. Objectives The objective of this project was to assess the value of STPA in pharmacovigilance by using the example of signal management, in order to identify process risks, areas for improvement, and applicable process metrics. Methods Hierarchical control structure (HCS) is the starting point for STPA. The HCS models a process as a set of interacting feedback control systems, which maintain the system in a “safe state” where losses do not occur. “Losses” can be defined as harm to patients, regulatory non-compliance, or other negative consequences. The HCS viewpoint is a considerable departure from the usual consideration of a pharmacovigilance process as a series of sequential steps carried out by</p>	10.1007/s40290-017-0195-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40290-017-0195-5	SpringerLink
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		<p>responsible individuals. Following the definition of the HCS, a two-step STPA process was carried out, leading to a set of unsafe actions and scenarios by which process failures could lead to loss. Recommendations were then made to prevent those scenarios that were not already covered by existing features of the process.</p> <p>Results The signal management process was successfully modelled as a feedback control system, which dynamically ensures that an incoming stream of safety data is accurately reflected in the reference safety information for the product. After creating the HCS, we conducted the STPA itself. This yielded 215 scenarios through which the process could end up in an unsafe state where losses could occur. The scenarios included 91 that were covered by existing measures, 28 related to existing or planned metrics, and 25 were scenarios considered implausible, inconsequential, undetectable, or out-of-scope. The remaining 71 scenarios were consolidated into 8 proposed recommendations for enhancements to metrics, 10 proposed recommendations for enhancements to the process itself,</p>			
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		<p>and 8 proposed recommendations regarding infrastructure or related processes, including the associated quality management system. STPA considers “soft” factors such as cultural influences, and this was reflected in several recommendations , for instance regarding training.</p> <p>Conclusion STPA is a labour-intensive and time-consuming process, most appropriate for high-risk, compliance-critical processes. STPA is a powerful technique for identification of risks in pharmacovigilance systems, and can contribute to process reliability with the potential to improve patient safety and the maintenance of regulatory compliance.</p>			
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Empirical assessment of the accuracy of an interoperability prediction language	Ullberg, Johan, Johnson, Pontus,	Interoperability, defined as the satisfaction of a communication need between two or more actors, is an important aspect in many phases of an enterprise's development. Mastering the field of interoperability is a daunting task so aid in predicting interoperability can be of great benefit. Formalisms capable of such predictions of future information system architectures are however sparse, and when employed, it is essential that the prediction is accurate. In this paper, a previously proposed interoperability modelling and prediction language is subjected to case testing and evaluated toward interoperability predictions made by practitioners and experts in the field. The results show that although there are some areas not currently covered by the framework, in general, it performs better than the intended users, and would thereby provide additional support in various development and design contexts.	10.1007/s10796-016-9630-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-016-9630-5	SpringerLink
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Re-interpreting knowledge, expertise and EU governance: The cases of social policy and security research policy	Carmel, Emma,	<p>This article examines how ideas about what is to be governed, how and by whom, are made sense of in European Union governance. It interrogates the complex relationships of knowledge generation, knowledge circulation, expertise and policymaking in two contrasting policy areas. In social policy, the emergence and later privileging of a discourse of the 'social investment state' are traced through the 'linked ecologies' (Abbott, 2005) of formal 'European' social science research, academic politicians and the Open Methods of Co-ordination. In security research policy, mtis, or practical knowledge (Scott, 1998), has enabled major European corporations to assert a privileged discursive and political position in the 'linked ecologies' of formal scientific research, product development and EU policymaking. These two cases demonstrate the partial integration of elite discourses with scientific rationalities into EU governance. In each case, the generation of knowledge and expertise is articulated in governance practices in ways that generate politically specific and limited – but not the same – versions of 'the' EU to be</p>	10.1057/s41295-016-0079-1	http://link.springer.com/openurl/pdf?id=doi:10.1057/s41295-016-0079-1	SpringerLink
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		governed.			
Guaranteeing spoof-resilient multi-robot networks	Gil, Stephanie, Kumar, Swarun, Mazumder, Mark, Katabi, Dina, Rus, Daniela,	Multi-robot networks use wireless communication to provide wide-ranging services such as aerial surveillance and unmanned delivery. However, effective coordination between multiple robots requires trust, making them particularly vulnerable to cyber-attacks. Specifically, such networks can be gravely disrupted by the Sybil attack, where even a single malicious robot can spoof a large number of fake clients. This paper proposes a new solution to defend against the Sybil attack, without requiring expensive cryptographic key-distribution. Our core contribution is a novel algorithm implemented on commercial Wi-Fi radios that can “sense” spoofers using the physics of wireless signals. We derive theoretical guarantees on how this algorithm bounds the impact of the Sybil Attack on a broad class of multi-robot problems, including locational coverage and unmanned delivery. We experimentally validate our claims using a team of AscTec quadrotor servers and iRobot Create ground clients, and demonstrate spoofer detection rates over 96%.	10.1007/s10514-017-9621-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10514-017-9621-5	SpringerLink

Self-configuration in humanized Cyber-Physical Systems	Bordel, Borja, Alcarria, Ramón, Martín, Diego, Robles, Tomás, Rivera, Diego Sánchez,	<p>Most works on Cyber-Physical Systems (CPS) are based on classic hardware infrastructures made of sensors, actuators and processing devices. Usual self-configuration technologies, then, do not allow humans to be integrated in CPS as service providers. Therefore, in this work we propose a new self-configuration technology for humanized CPS. The proposed technology uses simple binary and mathematical operations in order to reduce the convergence time, improve the scalability and address the dynamism introduced by humans into CPS. Besides, a human-oriented quality-of-service algorithm based on the Maslow pyramid is also introduced. Moreover, an experimental validation is conducted in order to validate the proposed solution as a useful and scalable self-configuration technology for humanized Cyber-Physical Systems.</p>	10.1007/s12652-016-0410-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12652-016-0410-3	SpringerLink
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Identification of critical situations via Event Processing and Event Trust Analysis	Itria, Massimiliano L., Kocsis-Magyar, Melinda, Ceccarelli, Andrea, Lollini, Paolo, Giunta, Gabriele, Bondavalli, Andrea,	In crisis management systems, situational awareness is usually at the basis of guiding the intervention process, and it is required to rapidly process data acquired from information sources on the field such as sensors or even humans. Given the variety and heterogeneity of sources and the amount of information that can be collected, together with the urgency of taking decisions, such information needs to be rapidly collected, filtered and aggregated in a form that can be used in subsequent machine-assisted decision support processes. At the same time, uncertainties in the input data or approximations in the processing phase may lead to an incorrect interpretation of the real situation in progress, which may generate mismanagements and severe consequences. This paper presents an event processor for crisis management systems that combines heterogeneous input sources to detect a critical situation. Complex Event Processing technology is applied for correlating data and creating events that describe the critical situation. Anomaly detection techniques are then used to analyze such	10.1007/s10115-016-1009-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10115-016-1009-x	SpringerLink
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		<p>events and detect possible anomalies, i.e., events not pertaining to the identified critical situation. The devised event processor creates trusted events that describe a critical situation merging inputs from heterogeneous and potentially untrusted sources. A prototype of the solution has been implemented and exercised within the crisis management system developed during the Secure! project. The experimental validation activities performed make use of different input sources, such as Twitter and sensors deployed on field (a Doppler radar for people detection and accelerometers for vibrations detection). The objective of the experimental campaign is to show (i) the adequacy of the solution to rapidly process the information and describe the critical situation, and (ii) its capability in detecting anomalous events that could impair the accuracy of the description of the critical situation.</p>			
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<p>A Wireless On-line Temperature Monitoring System for Rotating Electrical Machine</p>	<p>Ben Brahim, Sonia, Bouallegue, Ridha, David, Jacques, Vuong, Tan Hoa, David, Maria,</p>	<p>Wireless communication can be a useful method to monitor the electrical machine as it provides the main characteristics of online signal processing. Our contribution in this current paper consists in studying a new system to monitor the rotating electrical machines based on wireless communication. The main objective of this system is to detect the temperature value of the squirrel cage induction machine's rotor, using the IEEE 802.11 protocol. However, the application of wireless communication inside the rotating electrical machines is not self-evident due to the fact that the electromagnetic compatibility problems between devices isn't obviously guaranteed. So, in order to obtain a good reliability for wireless communication, the study of the electromagnetic field inside rotating electrical machine is essential. As a first step in this paper, we are going to focus mainly on the flux effect of the rotating electrical machine through the finite element method which offers so much information on the phenomena characterizing the electrical machine operation. This method proves that the high</p>	<p>10.1007/s11277-016-3808-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11277-016-3808-5</p>	<p>SpringerLink</p>
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		<p>frequency domain transmitter won't be disturbed by the low frequency existing flux inside the machine. As a second step in this study, the proposed network system design is presented. Then, the communication protocol, the hardware design based on the transmitting chip Roving Networks (RN-171) as well as the software design are illustrated. Finally, the experimental results of the proposed system are investigated to validate its feasibility.</p>			
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GNSS satellite-based augmentation systems for Australia	Choy, Suelynn, Kuckartz, Joost, Dempster, Andrew G., Rizos, Chris, Higgins, Matt,	<p>We provided an overview of various satellite-based augmentation systems (SBAS) options for augmented GNSS services in Australia, and potentially New Zealand, with the aim to tease out key similarities and differences in their augmentation capabilities. SBAS can technically be classified into two user categories, namely SBAS for aviation and “non-aviation” SBAS. Aviation SBAS is an International Civil Aviation Organization (ICAO) certified civil aviation safety-critical system providing wide-area GNSS augmentation by broadcasting augmentation information using geostationary satellites. The primary aim was to improve integrity, availability and accuracy of basic GNSS signals for aircraft navigation. On the other hand, “non-aviation” SBAS support numerous GNSS applications using positioning techniques such as wide-area differential-GNSS (DGNSS) and precise point positioning (PPP). These services mainly focus on delivering high-accuracy positioning solutions and guaranteed levels of availability, and integrity remains secondary considerations. Next-generation GNSS satellites capable of</p>	10.1007/s10291-016-0569-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10291-016-0569-2	SpringerLink
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		<p>transmitting augmentation signals in the L1, L5 and L6 frequency bands will also be explored. These augmentation signals have the data capacity to deliver a range of augmentation services such as SBAS, wide-area DGNSS and PPP, to meet the demands of various industry sectors. In addition, there are well-developed plans to put in place next-generation dual-frequency multi-constellation SBAS for aviation. Multi-constellation GNSS increases robustness against potential degradation of core satellite constellations and extends the service coverage area. It is expected that next-generation SBAS and GNSS will improve accuracy, integrity, availability and continuity of GNSS performance.</p>			
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<p>An evaluation of train control information systems for sustainable railway using the analytic hierarchy process (AHP) model</p>	<p>Krmac, Evelin, Djordjevi, Boban,</p>	<p>Purpose In the process of nowadays efficiency evaluation of any mode of transportation, sustainability results are the most important factor. In regard to railway sustainability, Train Control Information Systems (TCIS) are such advanced systems with important positive impacts. The main purpose of this study was therefore the evaluation of these impacts as well as the evaluation of Key Performance Themes (KPT) for sustainable railways. Methods Firstly a very detailed literature review of papers that have focused on TCIS and their improvements on railway sustainability, published in the scientific journal in the period from 2005 and 2016, was performed. The number of studies was then used as a main criteria in Analytical Hierarchical Process (AHP) evaluations or rankings of these systems and their impacts. Results The paper offers results from the first systematic review of papers which investigate the role of TCIS in terms of sustainability and, additionally, represents a refined approach to TCIS classification with a new classes descriptions. During review KPT for sustainable railways were</p>	<p>10.1007/s12544-017-0253-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12544-017-0253-9</p>	<p>SpringerLink</p>
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		<p>also identified. Further, AHP evaluated the Train Management and Interlocking Systems and their subsystems as the most important TCIS, and safety and costs of equipment, installation, maintenance and operation as the most important themes.</p> <p>Conclusions The results are important for both, scholars for their future research and for other railway stakeholders and decision makers, who must select different systems and technologies for implementation in their railway systems with emphasis on increasing performance and sustainability. The study offers also the opportunities for further research in regard to railway sustainability.</p>			
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<p>The function structure analysis theory based on the factor space and space fault tree</p>	<p>Cui, Tie-Jun, Wang, Pei-Zhuang, Li, Sha-Sha,</p>	<p>In order to analyze system function structure, the system function structure analysis theory is put forward based on factor space theory. Factors space is more suitable for describing cognition process of intelligence science than the qualitative cartesian space. Based on factor logic, the justice system of the function structure analysis was built. It is proved that the system function logic structure is a minimal disjunctive normal form from the system function analysis. The relationship is discussed between the classification reasoning method of inward analysis of system structure in space fault tree (SFT) and the function structure analysis. The process of inward analysis of system function structure in SFT is realized by the function structure analysis theory. The original classification reasoning method is enhanced to the level of logic mathematics. The system function structures of both incomplete information and complete information are analyzed with the method respectively, and the minimal disjunctive normal forms obtained from the analyses are $T = x_1 x_4 + x_3 x_5 + x_1 x_2$ and $T = x_1 x_4 + x_3 x_5 + x_1 x_2$</p>	<p>10.1007/s10586-017-0835-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-017-0835-2</p>	<p>SpringerLink</p>
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		$x_{\{1\}}x_{\{4\}} + x_{\{3\}}x_{\{5\}} + x_{\{1\}}x_{\{2\}}$ $x_{\{3\}}T = x_1 x_4 + x_3 x_5 + x_1 x_2 \times 3.$ The findings indicate that there are some implicit relationships between $A_{\{3\}}$, A_3 and $A_{\{2\}}$, A_2 , $A_{\{1\}}$, A_1 . They added the phase set to the background sets and converted uncertain problems to certain ones.			
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Dynamic relationship between functional stress and strain capacity of post-disaster infrastructure	Choi, Juyeong, Deshmukh, Abhijeet, Naderpajouh, Nader, Hastak, Makarand,	<p>To mitigate the impact of natural or man-made hazards on the services of an infrastructure facility, it is important to quantitatively assess its available capacity. For example, in a post-disaster scenario, critical infrastructure is likely to experience (i) excessive demand for the service of an infrastructure and/or (ii) compromised capacity because of damage to the infrastructure and the failure of infrastructure interdependencies. As the demand grows and nears the capacity limit of an infrastructure facility, a shortage of services required for the community's recovery will occur. The development of mitigation strategies and an assessment of their effectiveness require a systematic approach. In this paper, a functional stress-strain principle for infrastructure facilities is proposed to quantitatively assess their serviceability in post-disaster scenarios. Functional stress in infrastructure management represents a service-related demand on an infrastructure facility, while strain indicates its coping capacity. The dynamic nature of infrastructure</p>	10.1007/s11069-017-2795-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-017-2795-5	SpringerLink
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		<p>services will be considered depending on the relationship between demand and available capacity. The allowable range of functional stress is then defined, considering plastic and elastic patterns of responses of a facility during recovery to explore strain capacity variations. The proposed principle facilitates a systematic understanding of how infrastructure facilities can adapt themselves to growing stress and the maximum level of stress they can handle. The application of the proposed functional stress–strain principle is demonstrated through case studies of two infrastructure facilities in a post-earthquake scenario: a medical facility and a power facility.</p>			
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Internet of Things, Real-Time Decision Making, and Artificial Intelligence	Tien, James M.,	In several earlier papers, the author defined and detailed the concept of a servgood, which can be thought of as a physical good or product enveloped by a services-oriented layer that makes the good smarter or more adaptable and customizable for a particular use. Adding another layer of physical sensors could then enhance its smartness and intelligence, especially if it were to be connected with other servgoods—thus, constituting an Internet of Things (IoT) or servgoods. More importantly, real-time decision making is central to the Internet of Things; it is about decision informatics and embraces the advanced technologies of sensing (i.e., Big Data), processing (i.e., real-time analytics), reacting (i.e., real-time decision-making), and learning (i.e., deep learning). Indeed, real-time decision making (RTDM) is becoming an integral aspect of IoT and artificial intelligence (AI), including its improving abilities at voice and video recognition, speech and predictive synthesis, and language and social-media understanding. These three key and mutually supportive technologies—IoT, RTDM, and AI—are considered herein, including	10.1007/s40745-017-0112-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40745-017-0112-5	SpringerLink
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		their progress to date.			
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A Security Perspective on Battery Systems of the Internet of Things	Lopez, Anthony Bahadir, Vatanparvar, Korosh, Deb Nath, Atul Prasad, Yang, Shuo, Bhunia, Swarup, Al Faruque, Mohammad Abdullah,	Battery (sub)systems are used in many systems (systems-of-systems) in the Internet of Things (IoT) ranging from everyday ones (e.g., mobile systems, home appliances, etc.) to safety-critical and/or mission-critical ones (e.g., electrical vehicles, unmanned aerial vehicles, autonomous underwater vehicles, etc.). As these systems become more interconnected with each other and their environments and batteries become more energy dense, the safety risks of using batteries increase. To guarantee effectiveness and prevent potential safety threats (i.e., failure, overheating, explosion), it is not only crucial to ensure that batteries are functioning correctly (via safety circuits and battery management system), but to also prevent security threats that specifically target the battery system from different parts of these systems. A security analysis is necessary for system manufacturers and users to understand what threats and solutions exist for battery system security. In this paper, we present a security perspective on battery systems, where we use a layered approach to analyze vulnerabilities, threats, and	10.1007/s41635-017-0007-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41635-017-0007-0	SpringerLink
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		potential effects. We divide the battery system into the Physical, Battery Management System, and Application layers and use mobile systems and cyber-physical systems as case studies for IoT applications. We then highlight and discuss some existing solutions and mention the potential research directions on battery system security.			
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A novel secure image transmission scheme based on synchronization of fractional-order discrete-time hyperchaotic systems	Kassim, Sarah, Hamiche, Hamid, Djennoune, Saïd, Bettayeb, Maâmar,	<p>In this paper, a secure image transmission scheme based on synchronization of fractional-order discrete-time hyperchaotic systems is proposed. In this scheme, a fractional-order modified-Hénon map is considered as a transmitter, the system parameters and fractional orders are considered as secret keys. As a receiver, a step-by-step delayed observer is used, and based on this one, an exact synchronization is established. To make the transmission scheme secure, an encryption function is used to cipher the original information using a key stream obtained from the chaotic map sequences. Moreover, to further enhance the scheme security, the ciphered information is inserted by inclusion method in the chaotic map dynamics. The first contribution of this paper is to propose new results on the observability and the observability matching condition of nonlinear discrete-time fractional-order systems. To the best of our knowledge, these features have not been addressed in the literature. In the second contribution, the design of delayed discrete observer, based on fractional-order discrete-time hyperchaotic</p>	10.1007/s11071-017-3390-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11071-017-3390-8	SpringerLink
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		<p>system, is proposed. The feasibility of this realization is demonstrated. Finally, different analysis are introduced to test the proposed scheme security. Simulation results are presented to highlight the performances of our method. These results show that, our scheme can resist different kinds of attacks and it exhibits good performance.</p>			
<p>Practical experiences in the usage of MIDAS in the logistics domain</p>	<p>Barcelona, M. A., García-Borgoñón, L., López-Nicolás, G.,</p>	<p>In this paper, we present the experience in the usage of MIDAS, an integrated framework for Service Oriented Architecture (SOA) testing automation that is available as Software as a Service (SaaS) in a cloud infrastructure, to test a GS1 Logistics Interoperability Model (GS1 LIM) compliant service architecture for the logistics domain. Activities performed, results achieved and the evaluation of success factors and key performance indicators (KPIs) are detailed as well as other insights: (1) 25 % of companies would pay for model-based testing (MBT), (2) GS1 LIM should be certifiable, and (3) companies identify as a major barrier how to calculate the MBT return on investment (ROI).</p>	<p>10.1007/s10009-016-0430-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10009-016-0430-5</p>	<p>SpringerLink</p>

Estimating the number of remaining links in traceability recovery	Falessi, Davide, Di Penta, Massimiliano, Canfora, Gerardo, Cantone, Giovanni,	<p>Although very important in software engineering, establishing traceability links between software artifacts is extremely tedious, error-prone, and it requires significant effort. Even when approaches for automated traceability recovery exist, these provide the requirements analyst with a, usually very long, ranked list of candidate links that needs to be manually inspected. In this paper we introduce an approach called Estimation of the Number of Remaining Links (ENRL) which aims at estimating, via Machine Learning (ML) classifiers, the number of remaining positive links in a ranked list of candidate traceability links produced by a Natural Language Processing techniques-based recovery approach. We have evaluated the accuracy of the ENRL approach by considering several ML classifiers and NLP techniques on three datasets from industry and academia, and concerning traceability links among different kinds of software artifacts including requirements, use cases, design documents, source code, and test cases. Results from our study indicate that: (i) specific estimation</p>	10.1007/s10664-016-9460-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-016-9460-6	SpringerLink
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		models are able to provide accurate estimates of the number of remaining positive links; (ii) the estimation accuracy depends on the choice of the NLP technique, and (iii) univariate estimation models outperform multivariate ones.			
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Integrated Economic and Environmental Assessment of Cellulosic Biofuel Production in an Agricultural Watershed	Song, Jingyu, Gramig, Benjamin M., Cibir, Raj, Chaubey, Indrajeet,	SWAT watershed model simulated biomass yield and pollutant loadings were integrated with associated economic costs of farm production and transport to study two dedicated energy crops, switchgrass and Miscanthus , and corn stover, as feedstocks for a cellulosic biorefinery. A multi-level spatial optimization (MLSOPT) framework was employed to get spatially explicit cropping plans for a watershed under the assumption that the watershed supplies biomass to a hypothetical biorefinery considering both the biochemical and the thermochemical conversion pathways. Consistent with previous studies, the perennial grasses had higher biomass yield than corn stover, with considerably lower sediment, nitrogen, and phosphorus loadings, but their costs were higher. New insights were related to the tradeoffs between cost, feedstock production, and the level and form of environmental quality society faces as it implements the Renewable Fuel Standard. Economically, this involved calculating the farthest distance a biorefinery would be willing to drive to source corn residue before procuring a single unit of perennial grasses	10.1007/s12155-017-9817-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12155-017-9817-8	SpringerLink
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		from productive agricultural soils.			
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Urban Space Administration in Nigeria: Looking into Tomorrow from Yesterday	Fabiyi, Oluseyi,	<p>Urban space administration is a branch of public administration designated for ordering, re-ordering, regulating and controlling urban systems and urban land uses for the purpose of human comfort, convenience, urban aesthetic or city's branding and economic and environmental sustainability. Urban space administration is not new in Nigeria; it dated back to precolonial periods when city management was vested in kings and a team of advisers including the local priests. The advent of colonial government introduced paper-assisted urban administration which continued after independence. The 1976 local government reforms and the subsequent fragmentations of states to many local government resulted in multiplicity of administrations and agencies governing urban areas in Nigeria. The results are manifested in blighted condition and pockets of slums in all Nigeria cities. The paper examined trends in urban administration in Nigeria and advanced two approaches to solving multifarious urban problems in Nigeria. The approaches include devolution of urban administration</p>	10.1007/s12132-016-9299-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12132-016-9299-3	SpringerLink
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		powers to local authorities and deployment of geospatial technology tools for urban system administrators (Knaap et al 1998). The paper further suggested recommendations for bridging the digital shortfall in the applications of modern technologies to city administration in Nigeria.			
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<p>The adaptive life cycle of entrepreneurial ecosystems: the biotechnology cluster</p>	<p>Auerswald, Philip E., Dani, Lokesh,</p>	<p>We propose an empirical framework for assessing the vibrancy and trajectory of regional entrepreneurial ecosystems. We apply this framework to study the US National Capital Region's localized cluster of biotechnology-related entrepreneurship by building our analysis around a set of indicators of ecosystem vitality proposed by Stangler and Bell-Masterson (2015). This application constitutes an initial attempt at mapping the dynamics of an industry cluster within the adaptive life cycle of a wider regional ecosystem. We find that the biotechnology cluster in the National Capital Region entered a "reorientation" stage in the early 2000s, building up stored energy, capital, and connectedness in non-research-oriented activities. An increasing regional presence of large biotech firms in the past 5 years, a highly active and diverse start-up sector, increasing merger and acquisition activity, and declines in regional public funding for medical and clinical trials all suggest a transition of entrepreneurial activity in the region from a dynamic driven by federal research spillovers to one</p>	<p>10.1007/s11187-017-9869-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11187-017-9869-3</p>	<p>SpringerLink</p>
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		increasingly driven by private sector actors.			
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Cognitive Effects of Air Pollution Exposures and Potential Mechanistic Underpinnings	Allen, J. L., Klocke, C., Morris-Schaffer, K., Conrad, K., Sobolewski, M., Cory-Slechta, D. A.,	<p>Purpose of Review This review sought to address the potential for air pollutants to impair cognition and mechanisms by which that might occur.</p> <p>Recent Findings Air pollution has been associated with deficits in cognitive functions across a wide range of epidemiological studies, both with developmental and adult exposures. Studies in animal models are significantly more limited in number, with somewhat inconsistent findings to date for measures of learning, but show more consistent impairments for short-term memory.</p> <p>Potential contributory mechanisms include oxidative stress/inflammation, altered levels of dopamine and/or glutamate, and changes in synaptic plasticity/structure. Summary Epidemiological studies are consistent with adverse effects of air pollutants on cognition, but additional studies and better phenotypic characterization are needed for animal models, including more precise delineation of specific components of cognition that are affected, as well as definitions of critical exposure periods for such effects and the components of air pollution responsible. This would permit development of</p>	10.1007/s40572-017-0134-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40572-017-0134-3	SpringerLink
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		more circumscribed hypotheses as to potential behavioral and neurobiological mechanisms.			
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Embracing cyber-physical system as cross-platform to enhance fusion-application value of spatial information	Um, Jung-Sup,	<p>The whole social paradigm is moving toward the cyber-physical systems society from information society. Cyber-physical systems (CPS) (e.g. self-driving car) are currently being emerged as one of important places that heavily depend on spatial data in order to facilitate intelligent control and improve real-time on-line performance. To expedite and accelerate the realization of cyber-physical systems (hereinafter CPS) in spatial information science, this paper suggests embracing CPS as cross-platform to strengthen fusion-application value of spatial information. This approach illustrates how fusion-added services by spatial information within the CPS framework are created, orchestrated, changed and managed from traditional approach in spatial information science. It offers a sound approach to overcome the uncertainties associated with emerging technology as well as to adequately accommodate real-time operating CPS system in spatial information science. Further, such paradigm of symbolic cross-platform offer new and exciting challenges for foundational</p>	10.1007/s41324-017-0112-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41324-017-0112-8	SpringerLink
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		research between CPS and spatial information and provide opportunities for maturation of spatial information science in the fourth industrial revolution era.			
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Improved discrete mapping differential evolution for multi-unmanned aerial vehicles cooperative multi-targets assignment under unified model	Ming, Zhao, Lingling, Zhao, Xiaohong, Su, Peijun, Ma, Yanhang, Zhang,	<p>The cooperative multi-targets assignment for multiple unmanned aerial vehicles (UAV) is a complex combinatorial optimization problem. Multi-UAVs cooperation increases the scale of problems which cause a noticeable increase in task planning time. Moreover, it is difficult to build a unified assignment model because different tasks often require different numbers of UAVs and targets. Besides, the cooperative constraints of multi-UAVs in a three-dimensional environments are more complex than that in a two-dimensional environments, which makes it difficult to obtain an optimal solution. To solve these problems, we present a unified gene coding strategy to handle various models in a consistent framework. Then, a cooperative target assignment algorithm in a three-dimensional environments based on discrete mapping differential evolution is given. First, we use flight path cost to indicate the assignment relationship between the UAV and the target, which turns the optimization problem from discrete space to continuous space, and so the solving process can be simplified. Secondly, in order to obtain reasonable</p>	10.1007/s13042-015-0364-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13042-015-0364-3	SpringerLink
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		<p>offspring for differential evolution, we map the solution back to the assignment relationship space according to inverse mapping rules. Finally, to avoid falling into a local optimal, a balance between exploration and exploitation is achieved by combining the dynamic crossover rate with the hybrid evolution strategy. The simulation results show that the proposed discrete mapping differential evolution algorithm with the unified gene coding strategy not only effectively solves the cooperative multi-targets assignment problem, but also improves the accuracy of the multi-targets assignment. It is also suitable for solving the large scale problem of assignment.</p>			
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Model-based approaches for interoperability of next generation enterprise information systems: state of the art and future challenges	Zacharewicz, Gregory, Diallo, Saikou, Ducq, Yves, Agostinho, Carlos, Jardim-Goncalves, Ricardo, Bazoun, Hassan, Wang, Zhongjie, Doumeingts, Guy,	Enterprise businesses are more than ever challenged by competitors that frequently refine and tailor their offers to clients. In this context, enterprise information systems (EIS) are especially important because: (1) they remain one of the last levers to increase the performance and competitiveness of the enterprise, (2) we operate in a business world where the product itself has reached a limit of performance and quality due to uniform capacity of industrial tools in a globalized economy and (3) the EIS can increase the product value thanks to additional digital services (built on data associated to the product) in order to meet and fit better client's needs. However, the use of EISs reaches a limit in collaborative environments because enterprises management methods diverge and EISs are mainly inflexible resource packages that are not built with an interoperability objective. Consequently, we need to make EISs interoperable in order to achieve the needed gains competitiveness and performance. This paper contribution can be summarized as follows: (1) it relates existing work and it examines barriers that, at the moment, are preventing further	10.1007/s10257-016-0317-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10257-016-0317-8	SpringerLink
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		improvements due to current methodological and technological limits, and (2) it proposes a conceptual framework and five challenges that model based approaches must overcome to achieve interoperability between EIS in the near and long term.			
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CubeSat quantum communications mission	<p>Oi, Daniel KL, Ling, Alex, Vallone, Giuseppe, Villoresi, Paolo, Greenland, Steve, Kerr, Emma, Macdonald, Malcolm, Weinfurter, Harald, Kuiper, Hans, Charbon, Edoardo, Ursin, Rupert,</p>	<p>Quantum communication is a prime space technology application and offers near-term possibilities for long-distance quantum key distribution (QKD) and experimental tests of quantum entanglement. However, there exists considerable developmental risks and subsequent costs and time required to raise the technological readiness level of terrestrial quantum technologies and to adapt them for space operations. The small-space revolution is a promising route by which synergistic advances in miniaturization of both satellite systems and quantum technologies can be combined to leap-frog conventional space systems development. Here, we outline a recent proposal to perform orbit-to-ground transmission of entanglement and QKD using a CubeSat platform deployed from the International Space Station (ISS). This ambitious mission exploits advances in nanosatellite attitude determination and control systems (ADCS), miniaturised target acquisition and tracking sensors, compact and robust sources of single and entangled photons, and high-speed classical communications systems, all to be incorporated</p>	10.1140/epjqt/s40507-017-0060-1	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1140/epjqt/s40507-017-0060-1	SpringerLink
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		within a 10 kg 6 litre mass-volume envelope. The CubeSat Quantum Communications Mission (CQuCoM) would be a pathfinder for advanced nanosatellite payloads and operations, and would establish the basis for a constellation of low-Earth orbit trusted-nodes for QKD service provision.			
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The Sputnik of servgoods: Autonomous vehicles	Tien, James M.,	<p>In an earlier paper (Tien 2015), the author defined the concept of a servgood, which can be thought of as a physical good or product enveloped by a services-oriented layer that makes the good smarter or more adaptable and customizable for a particular use. Adding another layer of physical sensors could then enhance its smartness and intelligence, especially if it were to be connected with each other or with other servgoods through the Internet of Things. Such sensed servgoods are becoming the products of the future. Indeed, autonomous vehicles can be considered the exemplar servgoods of the future; it is about decision informatics and embraces the advanced technologies of sensing (i.e., Big Data), processing (i.e., real-time analytics), reacting (i.e., real-time decision-making), and learning (i.e., deep learning). Since autonomous vehicles constitute a huge quality-of-life disruption, it is also critical to consider its policy impact on privacy and security, regulations and standards, and liability and insurance. Finally, just as the Soviet Union inaugurated the space age on October 4, 1957, with the launch of</p>	10.1007/s11518-016-5325-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-016-5325-1	SpringerLink
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		<p>Sputnik, the first man-made object to orbit the Earth, the U. S. has inaugurated an age of automata or autonomous vehicles that can be considered to be the U. S. Sputnik of servgoods, with the full support of the U. S. government, the U. S. auto industry, the U. S. electronic industry, and the U.S. higher educational enterprise.</p>			
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Securing the Operation of Socially Critical Systems from an Engineering Perspective: New Challenges, Enhanced Tools and Novel Concepts	Kröger, Wolfgang,	<p>Large-scale infrastructure systems, providing essential goods and services to our societies and economies, are witnessing tighter integration and coupling, notably by the sheer ubiquitous use of cyber-physical systems for integration, communication, and control. Putting the electric power system in focus, the pertinent supervisory and data acquisition systems are not only running through major changes allowing for increased levels of communications but also exposing them to new (cyber) threats. Furthermore, humans are an essential part of these systems interacting with them and developing them into a "system of socio-technical systems". In theory, and evidenced by past blackouts, power grids show complex behaviors and a strong influence of contextual factors. While the deterministic "N-1 security principle" has been successful in ensuring high performance of the European grid, it has been deemed insufficient to cope with multiple failures, cascading grid tripping scenarios, and non-technical factors and to capture a widened spectrum of threats. Thus, as traditional models often reach their</p>	10.1007/s41125-017-0013-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41125-017-0013-9	SpringerLink
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		<p>limits, advanced modeling and simulation techniques are necessary, which are partly available and applied. Moreover, past disasters prove the need of focusing on “after shock behavior” and precaution against unanticipated events by amplifying absorptive, adaptive, and recovery capabilities. This shift towards increased resilience requires substantial conceptual work and the further development of analytical tools. Here the latest achievements and future challenges in this field of active research, aiming at securing the operation of those systems, are highlighted.</p>			
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Uncovering the Dynamics of the Saudi Youth Unemployment Crisis	Assidmi, Luay M., Wolgamuth, Erin,	<p>This paper explores a systems thinking approach to the persistent and urgent issue of youth unemployment in the Kingdom of Saudi Arabia, a complex problem given the unique social contract between government and citizens in the Kingdom. Generations of government-dependent Saudi nationals have come of age in recent decades, unfit for private sector needs and unprepared for its realities. Attempts to force this population into the private workforce are futile, resisted by Saudi workers and by private sector employers. The authors present a systems map inclusive of employment trends, education, and social dynamics, whose interactions undermine employment among Saudi youth. This mental model indicates that unemployment among this particular demographic is exacerbated by increased government spending on education, and by government-initiated measures aimed at protecting Saudi nationals in the private sector. Uncovering an archetypal systems thinking relationship between major stakeholders, that of accidental adversaries, the authors present the first steps towards modeling</p>	10.1007/s11213-016-9389-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11213-016-9389-0	SpringerLink
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		solutions.			
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<p>This Is Not a Fish: On the Scale and Politics of Infrastructure Design Studies</p>	<p>Parmiggiani, Elena,</p>	<p>Interconnected workplace information technologies (information infrastructures) are distributed across user and system types, agendas, locales, and temporal rhythms. The term infrastructuring describes the design of information infrastructure not as a bounded phase but as a continuous collaborative and inherently political process. From the perspective of ethnographers, however, this conceptualization presents the practical challenge of dealing with the political work involved in infrastructuring and in its study. In this paper, I discuss the challenges of infrastructuring activities for ethnographic research. Based on a self-revealing account of my three-year ethnographic study of an oil company's project to design a platform for subsea environmental monitoring in the Arctic region, I discuss how my framing of infrastructuring was the result of my process of constructing the ethnographic field in my research. I combined four mechanisms to scale my ethnographic method to investigate infrastructuring across heterogeneous dimensions. Drawing on my practical experience, I</p>	<p>10.1007/s10606-017-9266-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10606-017-9266-0</p>	<p>SpringerLink</p>
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		discuss how my process of constructing the field let me discover richer possibilities for understanding the politics involved in the study of infrastructuring.			
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<p>A quality requirements model and verification approach for system of systems based on description logic</p>	<p>Wang, Qing-long, Wang, Zhi-xue, Zhang, Ting-ting, Zhu, Wei-xing,</p>	<p>System of systems engineering (SoSE) involves the complex procedure of translating capability needs into the high-level requirements for system of systems (SoS) and evaluating how the SoS quality requirements meet their capability needs. One of the key issues is to model the SoS requirements and automate the verification procedure. To solve the problem of modeling and verification, meta-models are proposed to refine both functional and non-functional characteristics of the SoS requirements. A domain-specific modeling language is defined by extending Unified Modeling Language (UML) class and association with fuzzy constructs to model the vague and uncertain concepts of the SoS quality requirements. The efficiency evaluation function of the cloud model is introduced to evaluate the efficiency of the SoS quality requirements. Then a concise algorithm transforms the fuzzy UML models into the description logic (DL) ontology so that the verification can be automated with a DL reasoner. This method implements modeling and</p>	<p>10.1631/FITEE.1500309</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1631/FITEE.1500309</p>	<p>SpringerLink</p>
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		verification of high-level SoS quality requirements. A crisp case is used to facilitate and demonstrate the correctness and feasibility of this method.			
Features of resilience	Connelly, Elizabeth B., Allen, Craig R., Hatfield, Kirk, Palma-Oliveira, José M., Woods, David D., Linkov, Igor,	The National Academy of Sciences (NAS) definition of resilience is used here to organize common concepts and synthesize a set of key features of resilience that can be used across diverse application domains. The features in common include critical functions (services), thresholds, cross-scale (both space and time) interactions, and memory and adaptive management. We propose a framework for linking these features to the planning, absorbing, recovering, and adapting phases identified in the NAS definition. The proposed delineation of resilience can be important in understanding and communicating resilience concepts.	10.1007/s10669-017-9634-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-017-9634-9	SpringerLink

A logic-based framework for the security analysis of Industrial Control Systems	Lemaire, Laurens, Vossaert, Jan, Jansen, Joachim, Naessens, Vincent,	Industrial Control Systems (ICS) are used for monitoring and controlling critical infrastructures such as power stations, waste water treatment facilities, traffic lights, and many more. Lately, these systems have become a popular target for cyber-attacks. Security is often an afterthought, leaving them vulnerable to all sorts of attacks. This article presents a formal approach for analysing the security of Industrial Control Systems, both during their design phase and while operational. A knowledge-based system is used to analyse a model of the control system and extract system vulnerabilities. The approach has been validated on an ICS in the design phase.	10.3103/S0146411617020055	http://link.springer.com/openurl/pdf?id=doi:10.3103/S0146411617020055	SpringerLink
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Risk reduction in a project portfolio	Guan, Dujuan, Guo, Peng, Hipel, Keith W., Fang, Liping,	<p>The positive impacts of managing projects as a portfolio are quantified by comparing the value of the integrated risk of a project portfolio and the aggregation of single project risks implemented separately. Firstly, the integrated risk is defined by proposing risky events based on set theory. Secondly, as projects interact with each other in a project portfolio, the integrated risk is evaluated by using a Bayesian network structure learning algorithm to construct an interdependent network of risks. Finally, the integrated risk of a practical case is assessed using this method, and the results show that the proposed method is an effective tool for calculating the extent of risk reduction of implementing a project portfolio and identifying the most risky project, so as to assist companies in making comprehensive decisions in the phase of portfolio selection and portfolio controlling.</p>	10.1007/s11518-016-5296-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-016-5296-2	SpringerLink
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<p>A new mathematical framework and spatial decision support system for modeling cascade interdependency of critical infrastructure during geo-disasters</p>	<p>Cheng, Qiuming,</p>	<p>Critical infrastructures (CI) are designated sectors that if incapacitated or destroyed by natural disasters would have a serious impact on national security and economic and social welfare. Due to the interdependency of critical infrastructures failure of one infrastructure during a natural disaster such as earthquake or flood may cause failure of another and so on through a cascade or escalating effect. Quantification of these types of interdependencies between critical infrastructures is essential for effective response and management of resources for rescue, recovery, and restoration during times of crises. This paper proposes a new mathematical framework based on an asymmetric relation matrix constructed in a bottom-up approach for modeling and analyzing interdependencies of critical infrastructures. Asymmetric dependency matrices can be constructed using the asymmetric incidence coefficient based on node-level relationships defined between nodes for measuring the strength of interdependency between node and node, node and network, and networks and networks. These asymmetric</p>	<p>10.1007/s12583-017-0746-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12583-017-0746-4</p>	<p>SpringerLink</p>
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		<p>matrices are further analyzed for ranking infrastructures in terms of their relative importance and for identifying nodes and infrastructure networks that play a critical role in chain effects among infrastructures involved in geo-disaster events such as flooding. Examples of interdependency analysis for the identification of vulnerabilities among fifteen national defense-related infrastructure sectors by the Australian government and a simulated example using the newly developed GIS-based network simulator GeoPN are used to validate and demonstrate the implementation and effectiveness of interdependency analysis methods in analyzing infrastructure interdependency during a flooding event.</p>			
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Revisiting the technologies of the old: a case study of cognitive work analysis and nanomaterials	Kant, Vivek,	<p>Nanotechnology is bringing about changes in everyday technologies in fundamental ways, both obvious and non-obvious. In order to address nanotechnology, Human Factors and Ergonomics (HFE) as a research discipline requires multiple methods in engaging this novel technology strategically. One mode of engagement is through nanomaterials. Nanomaterials can be addressed by HFE in four significant ways: health and safety; new products and embedding in existing technologies for improved qualities; industrial production; along with, through university laboratory research. The aim of this article is to present one manner of engaging nanomaterials and HFE through addressing nanomaterials as embedded in existing technologies and their involvement in university research laboratories. This aspect of engagement is depicted by addressing the use of nanomaterials in an existing well-entrenched technology of concrete to produce an enhanced product—nanoco ncrete. Using the framework of Cognitive Work Analysis (CWA), this article addresses the</p>	10.1007/s10111-016-0397-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-016-0397-8	SpringerLink
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		<p>work domain of nanoconcrete in terms of work practices in university laboratory settings. The models derived from CWA are used to identify the various constraints ranging from the environment to the people involved in the concrete domain. The results emphasize that to address nanomaterials (in this case, nanosilica), one has to comprehend its overarching matrix of the material (concrete) in which it is embedded. While the current article presents just one facet studying the intersection between nanomaterials and HFE, further research can identify new ways in which nanotechnology could be integrated robustly in the disciplinary viewpoint of HFE.</p>			
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Architectural refactoring for the cloud: a decision-centric view on cloud migration	Zimmermann, Olaf,	<p>Unlike code refactoring of programs, architectural refactoring of systems is not commonly practiced yet. However, legacy systems typically have to be refactored when migrating them to the cloud; otherwise, these systems may run in the cloud, but cannot fully benefit from cloud properties such as elasticity. One reason for the lack of adoption of architectural refactoring is that many of the involved artefacts are intangible—architectural refactoring therefore is harder to grasp than code refactoring. To overcome this inhibitor, we take a task-centric view on the subject and introduce an architectural refactoring template that highlights the architectural decisions to be revisited when refactoring application architectures for the cloud; in this approach, architectural smells are derived from quality stories. We also present a number of common architectural refactorings and evaluate existing patterns regarding their cloud affinity. The final contribution of this paper is the identification of an initial catalog of architectural refactorings for cloud application design. This refactoring</p>	10.1007/s00607-016-0520-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00607-016-0520-y	SpringerLink
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		catalog was compiled from the cloud patterns literature as well as project experiences. Cloud knowledge and supporting templates have been validated via action research and implementation in cooperation with practitioners.			
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Post-earthquake assessment and management for infrastructure systems: learning from the Canterbury (New Zealand) and L'Aquila (Italy) earthquakes	Kongar, Indranil, Esposito, Simona, Giovinazzi, Sonia,	Both the April 6, 2009 L'Aquila (Italy) earthquake, and the 2010–2011 Canterbury (New Zealand) earthquake sequence provided unprecedented opportunity to enhance the understanding on earthquake performance of infrastructure systems, and to analyse still-opened issues affecting the post-earthquake assessment and management of infrastructure. This paper provides a succinct and holistic overview on the physical and functional performances of the gas, water, waste water, road and electric networks (this one to a limited extent for the L'Aquila case-study), following the moment magnitude (M_w) 6.3 L'Aquila earthquake, and two main events of the Canterbury earthquake sequence, namely: the M_w 7.1 September 4, 2010 Darfield and the M_w 6.2 February 22, 2011 Christchurch earthquakes. A structured format, based on internationally recognised taxonomies and damage descriptors, is introduced to present the assets and to report on the earthquake-induced physical impacts for both above-ground and underground components. Functional impacts, interdependency	10.1007/s10518-015-9761-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10518-015-9761-y	SpringerLink
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		<p>issues and resilience attributes observed during the emergency management and recovery phases for the same infrastructure systems are furthermore discussed in the paper. It is envisaged that the data and overview on the seismic performance and management of infrastructure systems presented in the paper can be used to test the effectiveness of existing models and to inform the development of new models for seismic risk assessment and resilience analysis. Also, the structured framework presented within this paper can form the basis for defining specific and standardised survey tools for post-earthquake assessment of infrastructure systems.</p>			
Cyber Security für kritische Infrastrukturen	Leopold, Helmut,		10.1007/s00502-017-0485-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-017-0485-3	SpringerLink
Dagstuhl Manifesto	Redaktion,		10.1007/s00287-016-1016-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00287-016-1016-z	SpringerLink

Supporting design via the System Operational Dependency Analysis methodology	Guariniello, Cesare, DeLaurentis, Daniel,	<p>In this paper, we introduce the system operational dependency analysis methodology. Its purpose is to assess the effect of dependencies between components in a monolithic complex system, or between systems in a system-of-systems, and to support design decision making. We propose a parametric model of the behavior of the system. This approach results in a simple, intuitive model, whose parameters give a direct insight into the causes of observed, and possibly emergent, behavior. Using the proposed method, designers, and decision makers can quickly analyze and explore the behavior of complex systems and evaluate different architecture under various working conditions. Thus, the system operational dependency analysis method supports educated decision making both in the design and in the update process of systems architecture, without the need to execute extensive simulations. In particular, in the phase of concept generation and selection, the information given by the method can be used to identify promising architectures to be further tested</p>	10.1007/s00163-016-0229-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-016-0229-0	SpringerLink
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		and improved, while discarding architectures that do not show the required level of global features. Application of the proposed method to a small example is used to demonstrate both the validation of the parametric model, and the capabilities of the method for system analysis, design and architecture.			
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<p>What is interaction science? Revisiting the aims and scope of JoIS</p>	<p>Bahr, Gisela Susanne, Stary, Christian,</p>	<p>Interaction Science has undergone rapid development since JoIS' (the Journal of Interaction Science) founding in 2013. The advent of novel techniques and tools required reviewing the understanding of Interaction Science and the scope and aims of JoIS. More particularly, the set of methods and frameworks needed to be revisited and checked against the characteristics of today's ecological system and the resulting requirements for developing socio-technical systems. In this editorial, we tackle the interdisciplinary nature of Human-Computer-Interaction, the different thematic areas in Interaction Science, and diverse scientific research methods (and methodologies). We also examine the JoIS articles published so far, in order to provide a sound baseline for re-defining Interaction Science and update the mission of JoIS accordingly. The newly proposed definition of Interaction Science explicitly takes into account diversity and transdisciplinarity of interactional phenomena. We recognize the action space of Interaction Science being complex and ever-changing,</p>	<p>10.1186/s40166-016-0015-5</p>	<p>https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40166-016-0015-5</p>	<p>SpringerLink</p>
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		<p>and thus opt for wide generalization. Such way, the interaction is considered as the exchange of material or immaterial goods between acting parties (biological or technical entities) embodied in a certain context. Regarding scientific methodology, one of the important proposals relevant to JoIS is to relax emphasize on the use of empirical investigation based on traditional laboratory experiment. Traditional laboratory empiricism (usually empowered by statistics and hypothesis testing) is too restrictive to exclusively represent JoIS' aims and scope, so we make way to complementary methods such as modeling, simulation, case studies, and design as science. By acknowledging studies of new methodologies, metrics and measurements, as well as work grounded in theories and applications, we ask for future contributors to stay committed to the TEAM (Theory advancement, Empirical advancement, Applied advancement, Methodological advancements) approach. We finally anticipate for the next decade Interaction Science will</p>			
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		<p>progressively integrate its scientific concerns with the engineering goal of improving the interactive design of socio-technical systems, resulting in a body of transdisciplinary knowledge and methodology. Interaction Science continues to provide a challenging test domain for applying and developing psychological and social theory in the context of technology development and use.</p>			
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Issues on developing interoperable cloud applications: definitions, concepts, approaches, requirements, characteristics and evaluation models	Nogueira, Elias, Moreira, Ana, Lucrécio, Daniel, Garcia, Vinícius, Fortes, Renata,	<p>Among research opportunities in software engineering for cloud computing model, interoperability stands out. We found that the dynamic nature of cloud technologies and the battle for market domination make cloud applications locked-id, i.e, proprietary, non-portable and non-interoperable. In general context of cloud computing, interoperability goes beyond communication between systems like in other fields, it goes in direction of more dynamic, heterogeneous, complex and composed applications that take advantage of best features from different providers and services simultaneously. Interoperability in cloud constitutes a great challenge that must be overcome for that, in the future, software be more dynamic and improved.</p> <p>Objective: This paper aims at identifying how interoperability in cloud computing has been addressed in the existing literature, offering an up-to-date view of concepts relate to how to develop interoperable software that takes advantage of different cloud models. Thus, providing a basis for further research in the field and consolidating e better exploring existing concepts.</p> <p>Method: To fulfill this objective, we surveyed</p>	10.1186/s40411-016-0033-6	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40411-016-0033-6	SpringerLink
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		<p>literature. We defined six research questions and conducted the study according to a protocol that included planning, and execution.</p> <p>Results: A first result of the review is that there is no well established definition for cloud interoperability. This study also identified cloud interoperability concepts (e.g., cloud brokers, multi-cloud and cloud federation), requirements for interoperable applications and existing cloud interoperability solutions, showing that these are either too specific for particular situations. Finally, the survey found no evaluation models for cloud interoperability solutions. We also present a discussion on the findings of this study.</p> <p>Conclusion: Since the study observed that there are no well-established cloud interoperability solutions yet, we conclude that the issues raised by lack of interoperability persist. Selecting one interoperable solution or even a cloud standard can free the system from the underlying providers, but it would still be locked into the selected particular solution.</p>			
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Policy messes and their management	Roe, Emery,	<p>This paper presents a framework for better managing policy messes and draws implications for bad and good mess management in policy analysis and management. The framework has three foci: (1) the cognitive space in which policy messes develop, particularly in terms of gaps between macro-designers and micro-operators; (2) the unique domain of competence within that space where professionals manage the resulting messes by virtue of their skills in recognizing system-wide patterns, formulating locally specific contingency scenarios and translating both patterns and scenarios in highly reliable services; and (3) the ability of those mess and reliability professionals to be reliable in their domain and with these skills by maneuvering across different performance modes as conditions dictate—just-in-case, just-on-time, just-for-now or just-this-way.</p>	10.1007/s11077-016-9258-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11077-016-9258-9	SpringerLink
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<p>Big Data Reduction Methods: A Survey</p>	<p>ur Rehman, Muhammad Habib, Liew, Chee Sun, Abbas, Assad, Jayaraman, Prem Prakash, Wah, Teh Ying, Khan, Samee U.,</p>	<p>Research on big data analytics is entering in the new phase called fast data where multiple gigabytes of data arrive in the big data systems every second. Modern big data systems collect inherently complex data streams due to the volume, velocity, value, variety, variability, and veracity in the acquired data and consequently give rise to the 6Vs of big data. The reduced and relevant data streams are perceived to be more useful than collecting raw, redundant, inconsistent, and noisy data. Another perspective for big data reduction is that the million variables big datasets cause the curse of dimensionality which requires unbounded computational resources to uncover actionable knowledge patterns. This article presents a review of methods that are used for big data reduction. It also presents a detailed taxonomic discussion of big data reduction methods including the network theory, big data compression, dimension reduction, redundancy elimination, data mining, and machine learning methods. In addition, the open research issues pertinent to the big data reduction are also highlighted.</p>	<p>10.1007/s41019-016-0022-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s41019-016-0022-0</p>	<p>SpringerLink</p>
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Modeling landslide susceptibility in Greece: a weighted linear combination approach using analytic hierarchical process, validated with spatial and statistical analysis	Sakkas, G., Misailidis, I., Sakellariou, N., Kouskouna, V., Kaviris, G.,	A new model for Greece depicting, at a national scale, the spatial distribution of areas prone to landslide phenomena, taking into account preparatory and triggering criteria, is presented. This is a baseline study for prioritizing research in hazardous areas with more detail. Landslide occurrence is very high in certain areas of the Greek territory, such as Western Greece. Analysis is performed by applying two models, both based on slopes and geotechnical data, earthquake occurrence and precipitation. The first, which yields better results, also takes into account land use data. Since there was no access to landslide inventories, landslide susceptibility was performed on empirical estimates of the aforementioned criteria, using the analytic hierarchy process in order to derive the proper weights for each criterion. The final outcome is calculated based on the weighted linear combination of the above-mentioned criteria. The present study covers the area of Greece with an accuracy of 500 m × 500 m grid cell size. Results have been validated with observed events, landsliding urban areas and other studies, thus	10.1007/s11069-016-2523-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-016-2523-6	SpringerLink
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		identifying landslide prone areas in a satisfying manner.			
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Game modeling and policy research on the system dynamics-based tripartite evolution for government environmental regulation	Duan, Wei, Li, Changqing, Zhang, Pei, Chang, Qing,	Government regulation and policy strategies play very important roles in environmental pollution control. In this study on the evolutionary game theories and the relationship between the government, businesses, and the overall interests of society, we build two system dynamics-based tripartite evolutionary game models: a government environmental regulation-static punishment model and a dynamic punishment model. By factoring various policy strategies in the two models, including adjustments to the "Budget of pollution inspection", "Reward for no pollution discharge", "Enterprise production gain", and "Punishment coefficient" and additional combinations of the adjustment schemes; this study observes the changes in the action and the data outputs of the two models. Finally, the operation of the two models under the same policy strategy is compared and analyzed. The results show that loss of integrated social benefit and the type of punishment mechanism will significantly impact the selection of the environmental regulation strategies. However, compared with a	10.1007/s10586-016-0642-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-016-0642-1	SpringerLink
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		single strategy, a combination of policy strategies could work better in promoting the environmental regulatory model to achieve an “ideal state”.			
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Product backlog rating: a case study on measuring test quality in scrum	Kayes, Imrul, Sarker, Mithun, Chakareski, Jacob,	<p>Agile software development methodologies focus on software projects which are behind schedule or highly likely to have a problematic development phase. In the last decade, Agile methods have transformed from cult techniques to mainstream methodologies. Scrum, an Agile software development method, has been widely adopted due to its adaptive nature. This paper presents a metric that measures the quality of the testing process in a Scrum process. As product quality and process quality correlate, improved test quality can ensure high-quality products. Also, gaining experience from 8 years of successful Scrum implementation at SoftwarePeople, we describe the Scrum process emphasizing the testing process. We propose a metric Product Backlog Rating (PBR) to assess the testing process in Scrum. PBR considers the complexity of the features to be developed in an iteration of Scrum, assesses test ratings and offers a numerical score of the testing process. This metric is able to provide a comprehensive overview of the testing process over the development cycle of a product. We present a case study which</p>	10.1007/s11334-016-0271-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11334-016-0271-0	SpringerLink
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		<p>shows how the metric is used at SoftwarePeople. The case study explains some features that have been developed in a Sprint in terms of feature complexity and potential test assessment difficulties and shows how PBR is calculated during the Sprint. We propose a test process assessment metric that provides insights into the Scrum testing process. However, the metric needs further evaluation considering associated resources (e.g., quality assurance engineers, the length of the Scrum cycle).</p>			
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Autonomous vehicles: challenges, opportunities, and future implications for transportation policies	Bagloee, Saeed Asadi, Tavana, Madjid, Asadi, Mohsen, Oliver, Tracey,	<p>This study investigates the challenges and opportunities pertaining to transportation policies that may arise as a result of emerging autonomous vehicle (AV) technologies. AV technologies can decrease the transportation cost and increase accessibility to low-income households and persons with mobility issues. This emerging technology also has far-reaching applications and implications beyond all current expectations. This paper provides a comprehensive review of the relevant literature and explores a broad spectrum of issues from safety to machine ethics. An indispensable part of a prospective AV development is communication over cars and infrastructure (connected vehicles). A major knowledge gap exists in AV technology with respect to routing behaviors. Connected-vehicle technology provides a great opportunity to implement an efficient and intelligent routing system. To this end, we propose a conceptual navigation model based on a fleet of AVs that are centrally dispatched over a network seeking system optimization. This study contributes to the literature on two fronts: (i) it attempts to shed light on future</p>	10.1007/s40534-016-0117-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40534-016-0117-3	SpringerLink
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		opportunities as well as possible hurdles associated with AV technology; and (ii) it conceptualizes a navigation model for the AV which leads to highly efficient traffic circulations.			
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<p>Risk Considerations in the Use of Unmanned Aerial Vehicles in the Construction Industry</p>	<p>Wang, George, Hollar, Donna, Sayger, Susan, Zhu, Zhen, Buckeridge, John, Li, Jie, Chong, Jimmy, Duffield, Colin, Ryu, Dongryeol, Hu, Wei,</p>	<p>The use of unmanned aerial vehicles (UAVs) in the construction industry is swiftly growing worldwide. UAVs are changing the way construction companies do business. Contractors are increasingly using camera-mounted UAVs to monitor the full range of activities. Rapid advances in camera, sensing, aeronautics, battery and autopilot navigation technologies have helped make UAVs affordable, reliable and easy to operate. The US Federal Aviation Administration predicts that UAVs hold tremendous promise and commercial drone sales could increase from 600,000 to 2.7 million over the next four years. On the one hand, UAVs are extremely cost-effective in conducting aerial surveys, worksite surveillance, real-time inspections, and monitoring jobsite safety. On the other hand, with UAV ownership rapidly rising, the number of reported UAV safety, risk, and liability incidents is increasing. With this new technology use in the construction industry, construction companies must be aware of all regulations, legislations, privacy liability, and risks for construction related businesses.</p>	<p>10.2991/jrarc.2016.6.4.1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.2991/jrarc.2016.6.4.1</p>	<p>SpringerLink</p>
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		<p>Operating a drone or hiring a subcontractor to operate it is not something to do on the spur of the moment. Emphasis and effort should be placed on safety, risk control, training and education. The goal of this paper is to provide construction professionals with timely and pertinent information on UAV use with a focus on risk management based on current industry practice, experience and literature review.</p>			
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Rigorous development of component-based systems using component metadata and patterns	Oliveira, M. V. M., Antonino, P., Ramos, R., Sampaio, A., Mota, A., Roscoe, A. W.,	In previous work we presented a CSP-based systematic approach that fosters the rigorous design of component-based development. Our approach is strictly defined in terms of composition rules, which are the only permitted way to compose components. These rules guarantee the preservation of properties (particularly deadlock freedom) by construction in component composition. Nevertheless, their application is allowed only under certain conditions whose verification via model checking turned out impracticable even for some simple designs, and particularly those involving cyclic topologies. In this paper, we address the performance of the analysis and present a significantly more efficient alternative to the verification of the rule side conditions, which are improved by carrying out partial verification on component metadata throughout component compositions and by using behavioural patterns. The use of metadata, together with behavioural patterns, demands new composition rules, which allow previous exponential time verifications to be carried out now in linear time. Two	10.1007/s00165-016-0375-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00165-016-0375-1	SpringerLink
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		case studies (the classical dining philosophers, also used as a running example, and an industrial version of a leadership election algorithm) are presented to illustrate and validate the overall approach.			
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Dependability for the Internet of Things—from dependable networking in harsh environments to a holistic view on dependability	Boano, Carlo Alberto, Römer, Kay, Bloem, Roderick, Witrisal, Klaus, Baunach, Marcel, Horn, Martin,	Die Anwendungen des Internets der Dinge (IoT – Internet of Things), wie z. B. die Überwachung von zivilen Infrastruktureinrichtungen, Smart Grids oder intelligente Gesundheitspflege, sind für unsere Gesellschaft von größter Bedeutung und erfordern eine hohe Verlässlichkeit des IoT. Die je nach Gebiet unterschiedlichen Anforderungen an die Zuverlässigkeit zu gewährleisten, stellt jedoch immer noch eine große Herausforderung für die Wissenschaft dar. Tatsächlich sind die eingesetzten Geräte und Computer rauen Umgebungsbedingungen (wie z. B. Hitze oder elektromagnetische Strahlung) sowie physischen Angriffen ausgesetzt. Herkömmliche Methoden diesen Bedrohungen stand zu halten, beruhen meist auf Redundanzen – einem Konzept, das mit den beschränkten Ressourcen gängiger IoT-Plattformen nicht umsetzbar ist. Im vorliegenden Beitrag zeigen die Autoren Methoden und Werkzeuge auf, um die Zuverlässigkeit des IoT zu erhöhen, besser vorhersagbar zu machen und letztlich Verlässlichkeitsgarantien abzugeben. Sie berichten zunächst über Erfahrungen im	10.1007/s00502-016-0436-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00502-016-0436-4	SpringerLink
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		<p>Bereich der zuverlässigen drahtlosen Vernetzung und beschreiben eine effiziente Lösung, um auch in anspruchsvollen Umgebungen mit ressourcenarmen IoT-Plattformen verlässlich kommunizieren zu können. Um ein verlässliches IoT zu konstruieren, genügt die alleinige Betrachtung der drahtlosen Vernetzung jedoch nicht. Die Autoren beschreiben daher einen ganzheitlichen interdisziplinären Ansatz, um alle relevanten Aspekte des IoT verlässlich zu gestalten.</p> <p>Internet of Things (IoT) applications in several domains such as surveillance of civil infrastructure, smart grids, and smart healthcare are of utmost importance for our society and require dependable performance. Guaranteeing that application-specific dependability requirements are met is however still an open research challenge. The IoT indeed exposes highly resource-constrained computing devices to harsh environmental conditions (e.g., heat, mechanical shock, electromagnetic radiation) and physical attacks. Unfortunately, traditional methods to withstand these threats heavily rely on</p>			
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		<p>redundancy, a concept that is incompatible with the resource constraints of common IoT devices. In this article, we illustrate our efforts in providing methods and tools to predict, guarantee, and raise the level of dependability of the IoT. We first outline our contributions in the area of dependable wireless networking and describe a cost-effective solution allowing to guarantee that IoT applications meet specific performance requirements despite the challenging interaction of low-power wireless networks with their surrounding environment. We then argue that dependable networking alone is insufficient to guarantee the correct operation of a complex IoT system, and outline how we join different scientific disciplines in a long-term endeavor and work towards a coherent view of dependability.</p>			
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Supporting Situation Awareness in Spatio-Temporal Databases	Behrend, Andreas, Schmiegelt, Philip, Dohr, Andreas,	<p>Situation awareness refers to the capability of systems to perceive an existing or predicted context that determines the values of variables in a changing environment. Despite the enhanced support for managing temporal data, current database systems still lack mechanisms for handling highly dynamic situations in which data may change frequently. We present first results from an ongoing research project investigating these missing database features. In particular, we identify (i) the requirements for representing complex spatio-temporal data, (ii) the reasoning capabilities needed for detecting valid relationships between situations, and (iii) the operators necessary for supporting situation-based reasoning. Our investigations are based on a new perception concept, which comprises interval timestamped data derived from observed events and processed using the sequenced semantics. Perceptions provide a high level (and qualitative) description of past and current situations, complemented by projections into the future.</p>	10.1007/s13222-016-0233-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13222-016-0233-6	SpringerLink
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A Criticality-based Approach for the Analysis of Smart Grids	Katina, Polinapilinho F., Keating, Charles B., Zio, Enrico, Gheorghe, Adrian V.,	Smart Grids offer higher level capabilities intended to meet current and future energy demands. These demands include improved performance related to concepts of reliability, resiliency, environmentally friendly generation, transmission, and distribution as well as turning consumers into prosumers. This study focused on two primary objectives: (1) to understand how the concept of risk is currently being addressed in Smart Grids, and (2) to suggest a more holistic view of risk for Smart Grids. Pertinent literature on Smart Grids was collected and synthesized for the concept of risk which indicated the prevalence of two factors, probability and consequence, as the main factors for Smart Grid risk quantification. However, it was discovered that current literature appears to focus on risk within the different domains of Smart Grids (i.e., generation, transmission, distribution, customer, service provide, operations, markets) without consideration Smart Grids as an integrated whole. A criticality-based approach (CBA) is proposed and then used as the basis for development of an extended listing of measures,	10.1007/s40866-016-0013-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40866-016-0013-2	SpringerLink
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		<p>including dependency, interdependency, and resiliency, as well as accepted risk factors (i.e., probability and consequence). This confluence of factors can be utilized in a holistic Smart Grid analysis. Implications for CBA and future research directions for realizing enhanced Smart Grid capabilities are provided.</p>			
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<p>A multi-objective military system of systems architecting problem with inflexible and flexible systems: formulation and solution methods</p>	<p>Konur, Dinçer, Farhangi, Hadi, Dagli, Cihan H.,</p>	<p>System of systems (SoS) architecting is the process of bringing together and connecting a set of systems so that the collection of the systems, i.e., the SoS is equipped with a set of required capabilities. A system is defined as inflexible in case it contributes to the SoS with all of the capabilities it can provide. On the other hand, a flexible system can collaborate with the SoS architect in the capabilities it will provide. In this study, we formulate and analyze a SoS architecting problem representing a military mission planning problem with inflexible and flexible systems as a multi-objective mixed-integer-linear optimization model. We discuss applications of an exact and an evolutionary method for generating and approximating the Pareto front of this model, respectively. Furthermore, we propose a decomposition approach, which decomposes the problem into smaller sub-problems by adding equality constraints, to improve both the exact and the evolutionary methods. Results from a set of numerical studies suggest that the proposed decomposition approach reduces the computational time for generating the</p>	<p>10.1007/s00291-016-0434-2</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00291-016-0434-2</p>	<p>SpringerLink</p>
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		<p>exact Pareto front as well as it reduces the computational time for approximating the Pareto front while not resulting in a worse approximated Pareto front. The proposed decomposition approach can be easily used for different problems with different exact and heuristic methods and thus is a promising tool to improve the computational time of solving multi-objective combinatorial problems. Furthermore, a sample scenario is presented to illustrate the effects of system flexibility.</p>			
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Critical Infrastructures Vulnerability and Risk Analysis	Zio, Enrico,	Vulnerability and risk analysis are considered in relation to critical infrastructures protection. The complexity of critical infrastructures is presented as a challenging characteristic, which calls for new approaches of analysis and the integration of different modeling perspectives. The concepts of vulnerability, risk and resilience are discussed in details and analyzed with respect to their characterization in critical infrastructures (CIs) and the challenges therein. Recent new perspectives on these concepts and their interpretations are also discussed in relation to their applicability for analyzing CI vulnerability and risk, in view of decision making for protection. Throughout the paper, reference is made to systems like the (smart) electric power grid and the Internet, to further exemplify the concepts and issues discussed.	10.1007/s41125-016-0004-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s41125-016-0004-2	SpringerLink
The Geodesist's Handbook 2016	Drewes, Hermann, Kuglitsch, Franz, Adám, József, Rózsa, Szabolcs,		10.1007/s00190-016-0948-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00190-016-0948-z	SpringerLink

<p>The path towards healthier societies, environments, and economies: a broader perspective for sustainable engineered nanomaterials</p>	<p>Tolaymat, Thabet, Abdelraheem, Wael, El Badawy, Amro, Dionysiou, Dionysios, Genaidy, Ash,</p>	<p>Economic value is no longer adequate by itself as a proxy for the value-added benefits (VAB) assumed to be generated by emerging technologies such as engineered nanomaterials (ENMs). This study was conducted to explore the potential to establish an integrated sociotechnical framework with the end goal to assess whether or not ENMs and nano-enabled products contribute VAB. Based on the research in this study, it is suggested that all stakeholders in the larger society–environment–economy (SEE) system should develop an understanding of the multiple interrelationships within and between the diverse constituents along the particle lifecycle trajectory to capture their influence on the system benefit and risk outcomes. Furthermore, the sociotechnical framework establishes an additional three-step process: (1) at the pre-design stage, the test of VAB should be assessed using an expert panel representing the different segments of SEE, the social principles of design are detailed and customized to the needs of ENMs and nano-enabled products, and an economic appraisal is</p>	<p>10.1007/s10098-016-1146-7</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10098-016-1146-7</p>	<p>SpringerLink</p>
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		<p>conducted to justify the VAB on material grounds; (2) at the design stage, the technical principles should be examined and detailed to ensure the compatibility of stakeholder needs; and (3) an iterative adaptive cycle should be conducted to re-examine the sociotechnical principles on a periodic basis. Within this context, ENMs are considered sustainable when (a) the conditions of VAB and minimal risk elements are satisfied in a sequential order, with VAB demonstrated at the pre-design stage, then at the design stage ENMs posing no harm greater than minimal levels to the SEE constituents; and (b) ENMs and nano-enabled products are bounded by a finite time limit. In addition, to reach the conditions of sustainability, the role of all SEE stakeholders should be broadened (e.g., regulatory agencies should transform their roles from not only the control of risks of negative implications, but also the establishment of positive implications as well).</p>			
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A hierarchical autonomous system based space information network architecture and topology control	Zhang, Wei, Zhang, Gengxin, Xie, Zhidong, Bian, Dongming, Li, Yongqiang,	<p>SIN (Space Information Network) has recently emerged as a promising approach to solving the collaboration difficulty among current space programs. However, because of the SIN's large scale, high component complexity, and dynamic characteristics, designing a proper SIN architecture is challenging. Firstly, we propose a novel SIN architecture, which is composed of GEO (Geostationary Earth Orbit) satellites as backbone network nodes, LEO (Low Earth Orbit) or other types of satellites as enhanced coverage nodes, and high-altitude platforms to meet the service requirements of emergency or hotspot applications. Unlike most existing studies, the proposed architecture is AS (Autonomous-System) based. We decouple the complex SIN into simpler sub-networks using a hierarchical AS model. Then, we propose a topology control algorithm to minimize the time delay among sub-AS networks. We prove that the proposed algorithm achieves logical k-connectivity provided that the original physical topology has k-connectivity. Simulation results validate the theoretic analysis and effectiveness</p>	10.1007/BF03391572	http://link.springer.com/openurl/pdf?id=doi:10.1007/BF03391572	SpringerLink
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		of the algorithm.			
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Quality in model-driven engineering: a tertiary study	Goulão, Miguel, Amaral, Vasco, Mernik, Marjan,	Model-driven engineering (MDE) is believed to have a significant impact in software quality. However, researchers and practitioners may have a hard time locating consolidated evidence on this impact, as the available information is scattered in several different publications. Our goal is to aggregate consolidated findings on quality in MDE, facilitating the work of researchers and practitioners in learning about the coverage and main findings of existing work as well as identifying relatively unexplored niches of research that need further attention. We performed a tertiary study on quality in MDE, in order to gain a better understanding of its most prominent findings and existing challenges, as reported in the literature. We identified 22 systematic literature reviews and mapping studies and the most relevant quality attributes addressed by each of those studies, in the context of MDE. Maintainability is clearly the most often studied and reported quality attribute impacted by MDE. Eighty out of 83 research questions in the selected secondary studies have a structure that is	10.1007/s11219-016-9324-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11219-016-9324-8	SpringerLink
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		<p>more often associated with mapping existing research than with answering more concrete research questions (e.g., comparing two alternative MDE approaches with respect to their impact on a specific quality attribute). We briefly outline the main contributions of each of the selected literature reviews. In the collected studies, we observed a broad coverage of software product quality, although frequently accompanied by notes on how much more empirical research is needed to further validate existing claims. Relatively, little attention seems to be devoted to the impact of MDE on the quality in use of products developed using MDE.</p>			
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Integration of data and computing infrastructures for earth science: an image mosaicking use-case	Mazzetti, Paolo, Roncella, Roberto, Mihon, Danut, Bacu, Victor, Lacroix, Pierre, Guigoz, Yaniss, Ray, Nicolas, Giuliani, Gregory, Gorgan, Dorian, Nativi, Stefano,	<p>This paper addresses the emerging issue of integrating data sharing and computing e-infrastructures for multidisciplinary applications. In the recent years several solutions have been proposed to implement digital infrastructures for sharing and processing scientific data and observations. Spatial data infrastructures currently enable effective and efficient geo-information data sharing in many disciplinary communities, and innovative solutions are under development to support new open data and linked data paradigms. In parallel, High Performance Computing systems, computing grids and more recently cloud services, enable fast processing of big data. However, the integration of data and computing e-infrastructures is a raising issue in multidisciplinary research. In the context of the Global Earth Observation System of Systems (GEOSS) initiative, an innovative approach has been proposed. Taking into account that the heterogeneity of data and computing e-infrastructures and related technologies cannot be reduced beyond a certain extent, since it is due to the need of</p>	10.1007/s12145-016-0255-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-016-0255-5	SpringerLink
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		<p>supporting use cases and scenarios from different scientific communities, a brokering solution has been designed and developed. A Business Process Broker (BPB) is a component which takes a formal description of a scientific business process, and translates it in an executable process which can be run on multiple and remote processing and workflow services. In doing this it solves all the interoperability issues in a (semi-)automated way. It allows lowering the entry barrier for both computing service providers and users, decoupling the specification of the scientific process from the underlying enabling infrastructures. The paper presents and discusses a BPB use-case from the European project IASON, implementing an Earth Observation application involving satellite image mosaicking, HPC computing services and spatial data e-infrastructures.</p>			
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Changing Arctic snow cover: A review of recent developments and assessment of future needs for observations, modelling, and impacts	Bokhorst, Stef, Pedersen, Stine Højlund, Brucker, Ludovic, Anisimov, Oleg, Bjerke, Jarle W., Brown, Ross D., Ehrich, Dorothee, Essery, Richard L. H., Heilig, Achim, Ingvander, Susanne, Johansson, Cecilia, Johansson, Margareta, Jónsdóttir, Ingibjörg Svala, Inga, Niila, Luoju, Kari, Macelloni, Giovanni, Mariash, Heather, McLennan, Donald, Rosqvist, Gunhild Ninis, Sato, Atsushi, Savelle, Hannele, Schneebeli, Martin, Sokolov, Aleksandr, Sokratov, Sergey A., Terzago, Silvia, Vikhamar-Schuler, Dagrun, Williamson, Scott, Qiu, Yubao, Callaghan, Terry V.,	Snow is a critically important and rapidly changing feature of the Arctic. However, snow-cover and snowpack conditions change through time pose challenges for measuring and prediction of snow. Plausible scenarios of how Arctic snow cover will respond to changing Arctic climate are important for impact assessments and adaptation strategies. Although much progress has been made in understanding and predicting snow-cover changes and their multiple consequences, many uncertainties remain. In this paper, we review advances in snow monitoring and modelling, and the impact of snow changes on ecosystems and society in Arctic regions. Interdisciplinary activities are required to resolve the current limitations on measuring and modelling snow characteristics through the cold season and at different spatial scales to assure human well-being, economic stability, and improve the ability to predict manage and adapt to natural hazards in the Arctic region.	10.1007/s13280-016-0770-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13280-016-0770-0	SpringerLink
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An adaptive self-managing platform for cabin management systems	Riedlinger, M., Marquardt, O., Ahmadi, R., Reichel, R.,	<p>In the cabin domain, the degree of changeability is an important commercial parameter. This includes customization before initial aircraft delivery as well as in-service cabin rearrangements and upgrades. This requires a highly flexible cabin management system (CMS). Today's CMSs face this challenge with configurable system architectures offering a vast change domain, however, the change process itself is very time consuming and error-prone. To overcome this issue our approach of an Adaptive Platform will make manual configuration widely dispensable. Thereby adaptivity means that all components of the platform's software architecture are able to adapt to any CMS instance nearly without human intervention. Most of the system knowledge needed for this purpose, e.g., topology or communication requirements, is autonomously obtained by discovery mechanisms. The adaptive software architecture contains the following: (1) a data-centric communication middleware, (2) management services clearly separated from the application and (3) plug and</p>	10.1007/s13272-016-0205-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13272-016-0205-4	SpringerLink
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		<p>play mechanisms for the integration of new application software and peripheral devices. Focus of this paper is the management service which abstracts faulty resources and coordinates global system behaviour w.r.t. aircraft's state. As a proof of concept, an adaptive CMS demonstration system was realized. We think that the proposed architecture will increase the flexibility within the lifecycle of a CMS substantially. In addition, the contained management services raise the application's abstraction level by disburden it from any management tasks. Further work on this topic may cover evaluation of the adaptive approach for more safety critical avionic systems or incorporate certification aspects such as automated documentation and testing.</p>			
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<p>Infrastructures and services for remote sensing data production management across multiple satellite data centers</p>	<p>Zhang, Jie, Yan, Jining, Ma, Yan, Xu, Dong, Li, Pengfei, Jie, Wei,</p>	<p>With the number of satellite sensors and data centers being increased continuously, it is becoming a trend to manage and process massive remote sensing data from multiple distributed sources. However, the combination of multiple satellite data centers for massive remote sensing (RS) data collaborative processing still faces many challenges. In order to reduce the huge amounts of data migration and improve the efficiency of multi-datacenter collaborative process, this paper presents the infrastructures and services of the data management as well as workflow management for massive remote sensing data production. A dynamic data scheduling strategy was employed to reduce the duplication of data request and data processing. And by combining the remote sensing spatial metadata repositories and Gfarm grid file system, the unified management of the raw data, intermediate products and final products were achieved in the co-processing. In addition, multi-level task order repositories and workflow templates were used to construct the production workflow automatically. With the help of</p>	<p>10.1007/s10586-016-0577-6</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10586-016-0577-6</p>	<p>SpringerLink</p>
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		<p>specific heuristic scheduling rules, the production tasks were executed quickly. Ultimately, the Multi-datacenter Collaborative Process System (MDCPS) were implemented for large-scale remote sensing data production based on the effective management of data and workflow. As a consequence, the performance of MDCPS in experiments environment showed that those strategies could significantly enhance the efficiency of co-processing across multiple data centers.</p>			
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Impact of impulsive detoxication on the spread of computer virus	Zhang, Xianxiu, Li, Chuandong, Huang, Tingwen,	<p>We discuss the dynamical properties of a SIRS computer virus propagation model with impulsive detoxication and saturation effect. By the Internet, new antivirus software can be released immediately and take effect quickly after it is running. This leads to the circumstance that many infected computers can be cured in a short time. So impulsive detoxication is a vitally important way for prohibiting the spread of network viruses. The theoretical results show that: (a) the virus-free equilibrium is globally stable when the basic reproduction ratio (BRR) is less than unity, (b) the system is uniformly permanent when BRR exceeds unity, and (c) a supercritical bifurcation occurs when BRR equals unity. Several numerical examples also clearly display the results obtained. Finally, some feasible strategies of eradicating electronic viruses are advised.</p>	10.1186/s13662-016-0944-x	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13662-016-0944-x	SpringerLink
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Tools to operate and manage early warning systems for natural hazards monitoring in El Salvador	Rivera, Jacqueline Yamileth,	<p>Background This article explores the concerns from the institutions to include information from the field into geographical information systems (GIS). This task is becoming an essential action to strengthen and speed up the response to an imminent threat. Specially creating strategies supported by national plans such as risk reduction national plans, and climate change national plans among others.</p> <p>Methods The research is based on the case of the Ministry of Environment and Natural Resources of El Salvador (MARN for its acronym in Spanish) that has performed various actions in monitoring disasters. The telemetry technology has started to be one of the main system for data collection.</p> <p>Despite the fact that El Salvador is a developing country, the first steps have been performed to form an integrated system. Results To develop an effective EWS in the recent year the implementation of GIS is one of the tool to manage data. Among this, different software classified in principle as an open or proprietary source exists. The research explain how the monitoring center implements such a software as one of the main bases</p>	10.1186/s40965-016-0010-3	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40965-016-0010-3	SpringerLink
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		<p>for the daily tasks that needs to be accomplished.</p> <p>Discussion</p> <p>Therefore, we discuss two case examples to elaborate on the importance of this study (El Salvador case and Korean case). Presenting the procedures of both countries, the centers have started to use different tools that combine the use of open source software and proprietary software to develop applications that are easily understood by people and offers easy access and transmission in real time.</p> <p>Conclusion The final product proposes is to propose an integrated and comprehensive system, sharing information in the shortest time possible, and achieving a big database available to make risk assessments would be the main goals of such a system.</p>			
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Technologist engagement with risk management practices during systems development? Approaches, effectiveness and challenges	Organ, John, Stapleton, Larry,	<p>The inability to engage with systems risk during the development of integrated socio-technical systems presents a real threat to global and local socio-economic stability. Current theories on system risk engagement are driven by a functionalist orthodoxy. Accordingly, risk management is either non-existent, done in parallel to other development activity, or used by organisations as an instrument of control. Systems risk management needs to be addressed at the source of the problem: the systems engineering process. This paper addresses the predominant failure to appropriately engage with systems risk during development. It provides, with respect to the theoretical dimensions, a diversity of risk perspectives, complexity and socio-technical systems theory. A broad literature review on different risk concepts, risk management perspectives and organisational paradigms (functionalist, interpretive, radical humanist and radical structuralist) is also presented. In order to overcome a lack of a holistic and reflective risk management approach to systems development, this</p>	10.1007/s00146-015-0597-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00146-015-0597-4	SpringerLink
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		paper sketches an integrated soft systems methodology approach which can be used for engaging with systems risk during systems development.			
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<p>A general perspective of Big Data: applications, tools, challenges and trends</p>	<p>Rodríguez-Mazahua, Lisbeth, Rodríguez-Enríquez, Cristian-Aarón, Sánchez-Cervantes, José Luis, Cervantes, Jair, García-Alcaraz, Jorge Luis, Alor-Hernández, Giner,</p>	<p>Big Data has become a very popular term. It refers to the enormous amount of structured, semi-structured and unstructured data that are exponentially generated by high-performance applications in many domains: biochemistry, genetics, molecular biology, physics, astronomy, business, to mention a few. Since the literature of Big Data has increased significantly in recent years, it becomes necessary to develop an overview of the state-of-the-art in Big Data. This paper aims to provide a comprehensive review of Big Data literature of the last 4 years, to identify the main challenges, areas of application, tools and emergent trends of Big Data. To meet this objective, we have analyzed and classified 457 papers concerning Big Data. This review gives relevant information to practitioners and researchers about the main trends in research and application of Big Data in different technical domains, as well as a reference overview of Big Data tools.</p>	<p>10.1007/s11227-015-1501-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-015-1501-1</p>	<p>SpringerLink</p>
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Knowledge base support for dynamic information system management	Caione, Adriana, Guido, Anna Lisa, Martella, Angelo, Paiano, Roberto, Pandurino, Andrea,	Enterprise activities are governed by regulations and laws that are multiple, heterogeneous and not always easy to understand. The arising and/or the modification of these regulations and laws can cause a significant impact in the business context, especially in terms of enterprise information systems adaptation. Currently, there are many methodological and technological tools that facilitate the application of regulations and procedures, but they are not integrated enough to ensure a complete problem management. Therefore, they are not sufficient to support organizations and companies in the management of their business processes. In this paper we propose a methodological and technological solution, able to model, manage, execute and monitor business processes of complex domains. The system allows both the design of an information system and its prototyping as a web application, by the extension of an appropriately selected Business Process Management suite. During both the design and the usage phases of the prototyped information system, it is	10.1007/s10257-015-0294-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10257-015-0294-3	SpringerLink
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		possible to interface with a knowledge base that contains information about regulations and aspects that characterize the enterprise (organizational chart, tasks, etc.).			
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Effective Risk Assessment in Resilient Communication Networks	Rusek, Krzysztof, Guzik, Piotr, Choda, Piotr,	<p>The paper discusses business impact analysis in the context of resilient communication networks. It is based on the total (aggregated) penalty that may be paid by an operator when the services (identified with transport demands) provided are interrupted due to network failures. The level of penalty is expressed as a commonly accepted business risk measure, Value-at-Risk ($\$\$\$VaR\$\$\$ V a R$).</p> <p>First, the main concern over $\$\$\$VaR\$\$\$ V a R$, namely the theoretical lack of subadditivity, is discussed. The study shows that, in practice, disadvantages do not appear in resilient network design, and $\$\$\$VaR\$\$\$ V a R$ can be used without the need to apply more complex and less informative measures.</p> <p>Second, a method for calculating the upper bound of the total penalty is presented. The assessment is performed for unprotected and protected services with a broad variety of compensation policies used to translate technical loss to monetarily expressed penalty. The proposed bounds are experimentally shown to be effective in comparison with alternative calculation</p>	10.1007/s10922-016-9370-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10922-016-9370-3	SpringerLink
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		methods, and also in the case when some of the assumptions taken during the modelling stage are not met.			
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Rotated top-bottom dual-kinect for improved field of view	Song, Wanbin, Yun, Seokmin, Jung, Seung-Won, Won, Chee Sun,	Existing commodity depth sensors have limited the field of view (FOV) of depth scanning. Our solution for extending the FOV is to use multiple depth sensors and stitch the captured depth images to a depth panorama. In our case study, we use two Kinects to address the following two questions: what is the best layout of the two Kinects to maximize the FOV and, second, how to combine the depth images together to form the depth panorama. We answer these questions by proposing a rotated top-bottom (RTB) arrangement of the two Kinects to maximize the FOV. Since the two Kinects capture the depth images from their own views, the depth values are not necessarily identical for the same object. To solve this problem, the depth adjustments are made for a frontal reference coordinate. Moreover, the perspective distortions of the two Kinects with respect to the frontal reference coordinate are corrected by perspective transformations. Experimental results show that our RTB sensor can generate panorama depth images with an almost doubled FOV.	10.1007/s11042-015-2772-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11042-015-2772-5	SpringerLink
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Smart cities – enabling services and applications	Curry, Edward, Dustdar, Schahram, Sheng, Quan Z., Sheth, Amit,		10.1186/s13174-016-0048-6	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13174-016-0048-6	SpringerLink
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Five years after Fukushima: scientific advice in Japan	Sato, Yasushi, Arimoto, Tateo,	In the last 5 years, scientific advice has emerged as a new policy theme in Japan. In 2010, virtually no one in Japan's science policy circle spoke of scientific advice. By 2015, Japan was proactively involved in international discussions on scientific advice, and both the government and the scientific community recognized it as a key area of concern. This article describes how the issue of scientific advice came to attain recognition in Japan's science policy community in the first half of the 2010s. It can be regarded as a study of a case in which attention to scientific advice greatly increased in a relatively short period of time and progress towards the goal of constructing an effective national scientific advisory system was witnessed. In Japan's case, two coinciding developments powerfully drove the phenomenon observed: the unfolding of debate on the roles and responsibilities of scientists and the government, prompted by the Great East Japan Earthquake and the ensuing tsunami and nuclear disaster in March 2011; and a parallel surge in attention to scientific advice in the international community. Having considered the path that Japan	10.1057/palcomm s.2016.25	https://www.nature.com/articles/palcomms201625.pdf	SpringerLink
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		has taken, the last part of this article will call for the nation's sustained effort to be engaged in ongoing international endeavours to strengthen scientific advice. This article is published as part of a collection on scientific advice to governments.			
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Informating Smart Cities Governance? Let Us First Understand the Atoms!	Paulin, Alois,	<p>This paper discusses the atomic factors that make up governance with a focus on Smart Cities informatability. The guiding question is whether or not, or how, respectively, governance can be informed; informatization is defined as the ability of systems to be steered/controlled /created from within the digital dimension by means of software tools and applications. The disciplinary theories of Downs (public choice theory), Jellinek (Statuslehre), and Hohfeld (fundamental legal conceptions) are confronted with the abilities of modern information and communication technology in the quest to apply them for informatization of governance. It is found that the atomic components of governance identified by these theories cannot be directly informed; there is however indication for their indirect informatability, which is discussed further. The vision of a society in which governance is informed is presented after the discussion to aid in understanding of the context, its potentials, and the relevance of basic research for sustainable governance evolution.</p>	10.1007/s13132-016-0368-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13132-016-0368-6	SpringerLink
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Impulsive synchronization for TS fuzzy model of memristor-based chaotic systems with parameter mismatches	Yang, Shiju, Li, Chuandong, Huang, Tingwen,	In this paper, the effect of parameter mismatch on the impulsive synchronization for TS fuzzy model of memristor-based chaotic system is investigated and some new and useful criteria are derived. Moreover, using the linear decomposition and comparison system methods, the global quasisynchronization for memristor-based chaotic systems based on the TS fuzzy model in the presence of parameter mismatch is discussed. Finally, numerical simulation results are presented to illustrate the effectiveness of the theoretical results.	10.1007/s12555-015-0075-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12555-015-0075-2	SpringerLink
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MaxMinMax problem and sparse equations over finite fields	Semaev, Igor,	Asymptotical complexity of polynomial equation systems over finite field \mathbb{F}_q is studied. Let $\{X\} = \{X_1, \dots, X_m\}$, $\bigcup_{i=1}^m X_i \leq n$ $X = \{X_1, \dots, X_m\}$, $i = 1, \dots, m$ be a fixed family of variable sets and the polynomials $f_i(X_i)$ are taken independently and uniformly at random from the set of all polynomials of degree $\leq q-1$ in each of the variables in X_i . In particular, it is proved if $ X_i \leq 3$, $m = n$, then the average complexity of finding all solutions in \mathbb{F}_q to $f_i(X_i) = 0$, $(1 \leq i \leq m)$ $f_i(X_i) = 0$ is at most $q^{\frac{n}{5.7883}} + O(\log n)$ $5.7883 + O(\log n)$ for arbitrary $\{X\}$ X and q . The proof is based on a detailed analysis of MaxMinMax problem, a novel problem for hypergraphs.	10.1007/s10623-015-0058-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10623-015-0058-6	SpringerLink
Middleware for Internet distribution in the context of cloud computing and the Internet of Things	Blair, Gordon, Schmidt, Douglas, Taconet, Chantal,		10.1007/s12243-016-0493-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12243-016-0493-z	SpringerLink

A self-organized volunteer Cloud for e-Science	Saad, Walid, Abbes, Heithem, Cérin, Christophe, Jemni, Mohamed,	<p>Nowadays, the adoption of Cloud Computing platforms and Service Computing technologies are almost natural for the different e-Science communities. Cost benefits for data-intensive applications, ease of access, rich and varied offers for services are examples of positive returns by users. However, beyond this favorable welcome for the technology, some research problems remain and are still challenging. In this paper, we focus on the problems of automatically deploying IaaS for computing and for data management, using the SlapOS Cloud. The core of the system is a distributed protocol for orchestrating data and compute nodes. Using this interaction scheme, users are able to deploy, without any system administrator intervention, a PaaS inside the IaaS basically a Desktop Grid middleware. The aim of this paper is to demonstrate that the Desktop Grid and Cloud paradigms may merge and may be widely used by non-experts in the different areas of e-Science. We propose a fully self-organized volunteer Cloud for researchers where they can carry out e-Science experiments and process large</p>	10.1007/s11227-015-1564-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11227-015-1564-z	SpringerLink
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		amounts of data in a coherent way.			
Big Earth Data from space: a new engine for Earth science	Guo, Huadong, Wang, Lizhe, Liang, Dong,	<p>“20156, Big data is a strategic highland in the era of knowledge-driven economies, and it is also a new type of strategic resource for all nations. Big data collected from space for Earth observation—so-called Big Earth Data—is creating new opportunities for the Earth sciences and revolutionizing the innovation of methodologies and thought patterns. It has potential to advance in-depth development of Earth sciences and bring more exciting scientific discoveries. The Academic Divisions of the Chinese Academy of Sciences Forum on Frontiers of Science and Technology for Big Earth Data from Space was held in Beijing in June of 2015. The forum analyzed the development of Earth observation technology and big data, explored the concepts and scientific connotations of Big Earth Data from space, discussed the correlation between Big Earth Data and Digital Earth, and dissected the potential of Big Earth Data from space to promote scientific discovery in the Earth sciences, especially concerning global changes.</p>	10.1007/s11434-016-1041-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11434-016-1041-y	SpringerLink

A food politics of the possible? Growing sustainable food systems through networks of knowledge	Blay-Palmer, Alison, Sonnino, Roberta, Custot, Julien,	There is increased recognition of a common suite of global challenges that hamper food system sustainability at the community scale. Food price volatility, shortages of basic commodities, increased global rates of obesity and non-communicable food-related diseases, and land grabbing are among the impediments to socially just, economically robust, ecologically regenerative and politically inclusive food systems. While international political initiatives taken in response to these challenges (e.g. Via Campesina) and the groundswell of local alternatives emerging in response to challenges are well documented, more attention is needed to the analysis of similarities between community approaches to global pressures. While we are not suggesting the application of a template set of good practices, the research reported in this paper point to the benefits of both sharing good practices and enabling communities to adopt good practices that are suited to their place-based capacities. The work also suggests that sharing community-derived good practices can	10.1007/s10460-015-9592-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10460-015-9592-0	SpringerLink
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		support and reinforce global networks of sustainable community food systems, foster knowledge co-creation and ultimately cement collective action to global pressures. In turn these networks could enhance the sustainability and resilience of community food systems and facilitate wide scale food system transformation.			
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Reflections on a Science and Technology Agenda for 21st Century Disaster Risk Reduction	Aitsi-Selmi, Amina, Murray, Virginia, Wannous, Chadia, Dickinson, Chloe, Johnston, David, Kawasaki, Akiyuki, Stevance, Anne-Sophie, Yeung, Tiffany,	The first international conference for the post-2015 United Nations landmark agreements (Sendai Framework for Disaster Risk Reduction 2015–2030, Sustainable Development Goals, and Paris Agreement on Climate Change) was held in January 2016 to discuss the role of science and technology in implementing the Sendai Framework for Disaster Risk Reduction 2015–2030. The UNISDR Science and Technology Conference on the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 aimed to discuss and endorse plans that maximize science's contribution to reducing disaster risks and losses in the coming 15 years and bring together the diversity of stakeholders producing and using disaster risk reduction (DRR) science and technology. This article describes the evolution of the role of science and technology in the policy process building up to the Sendai Framework adoption that resulted in an unprecedented emphasis on science in the text agreed on by 187 United Nations member states in March 2015 and endorsed by the	10.1007/s13753-016-0081-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13753-016-0081-x	SpringerLink
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		<p>United Nations General Assembly in June 2015. Contributions assembled by the Conference Organizing Committee and teams including the conference concept notes and the conference discussions that involved a broad range of scientists and decision makers are summarized in this article. The conference emphasized how partnerships and networks can advance multidisciplinary research and bring together science, policy, and practice; how disaster risk is understood, and how risks are assessed and early warning systems are designed; what data, standards, and innovative practices would be needed to measure and report on risk reduction; what research and capacity gaps exist and how difficulties in creating and using science for effective DRR can be overcome. The Science and Technology Conference achieved two main outcomes: (1) initiating the UNISDR Science and Technology Partnership for the implementation of the Sendai Framework; and (2) generating discussion and agreement regarding the content and endorsement process of the UNISDR Science and Technology Road Map to</p>			
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		2030.			
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<p>Spatial computing perspective on food energy and water nexus</p>	<p>Eftelioglu, Emre, Jiang, Zhe, Ali, Reem, Shekhar, Shashi,</p>	<p>In the coming decades, the increasing world population is expected to grow the demand for food, energy, and water resources. In addition, these resources will be under stress due to the climate change and urbanization. Previously, more problems were caused by piecemeal approaches analyzing and planning those resources independent of each other. The goal of the food, energy, and water (FEW) nexus approach is to prevent such problems by understanding, appreciating, and visualizing the interconnections and interdependencies of FEW resources at local, regional, and global levels. The nexus approach seeks to use the FEW resources as an interrelated system of systems, but data and modeling constraints make it a challenging task. In addition, the lack of complete knowledge and observability of FEW interactions exacerbates the problem. Related work focused on physical science solutions (e.g., desalination, bio-pesticides). No doubt these are necessary and worthwhile for FEW resource security. Overlooked in these work is that spatial computing may help domain scientists achieve their goals for the FEW nexus. In this paper, we</p>	<p>10.1007/s13412-016-0372-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13412-016-0372-y</p>	<p>SpringerLink</p>
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		describe our vision of the spatial computing's role in understanding the FEW nexus using a Nexus Dashboard analogy. From a spatial data lifecycle perspective, we provide more details on the spatial computing components behind the Nexus Dashboard vision. In each component, we list new technical challenges that are likely to drive future spatial computing research.			
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Option prioritization for unknown preference	Yu, Jing, Hipel, Keith W., Kilgour, D. Marc, Zhao, Min,	An option prioritization technique is developed to efficiently elicit the preferences, both unknown and crisp, of decision makers (DMs) in strategic conflicts. In the Graph Model for Conflict Resolution, each DM has one or more options, each of which may be selected or not. A state, or possible scenario, is formed when all DMs make an option selection. The software GMCR II contains an option prioritization procedure that makes it easy for a modeller to enter a DM's crisp preference ordering over the states using prioritized statements describing the DM's preferred option combinations. This procedure is extended by adding two new logical connectives that describe uncertainty of preference. For each DM, a range of possible scores for each feasible state can then be calculated, facilitating the determination of a preference ordering containing uncertainty by comparing and ranking scores. To demonstrate how this new methodology can be used to represent unknown preferences in a real-world decision problem, it is applied to a Canadian dispute over proposed water exports.	10.1007/s11518-015-5282-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-015-5282-0	SpringerLink
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Modeling and simulation of the vulnerability of interdependent power-water infrastructure networks to cascading failures	Zhang, Yanlu, Yang, Naiding, Lall, Upmanu,	<p>Critical infrastructures are becoming increasingly interdependent and vulnerable to cascading failures. Existing studies have analyzed the vulnerability of interdependent networks to cascading failures from the static perspective of network topology structure. This paper develops a more realistic cascading failures model that considers the dynamic redistribution of load in power network to explore the vulnerability of interdependent power-water networks. In this model, the critical tolerance threshold is originally proposed to indicate the vulnerability of network to cascading failures. In addition, some key parameters that are important to network vulnerability are identified and quantified through numerical simulation. Results show that cascading failures can be prevented when the values of tolerance parameter are above a critical tolerance threshold. Otherwise interdependent networks collapse after attacking a critical fraction of power nodes. Interdependent networks become more vulnerable with the increase in interdependence strength, which</p>	10.1007/s11518-016-5295-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-016-5295-3	SpringerLink
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		<p>implies the importance of protecting those interconnected nodes to reduce the consequences of cascading failures. Interdependent networks are most vulnerable under high-load attack, which shows the significance of protecting high-load nodes.</p>			
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Coordinating the Complexity of Tools, Tasks, and Users: On Theory-based Approaches to Authoring Tool Usability	Murray, Tom,	Intelligent Tutoring Systems authoring tools are highly complex educational software applications used to produce highly complex software applications (i.e. ITSs). How should our assumptions about the target users (authors) impact the design of authoring tools? In this article I first reflect on the factors leading to my original 1999 article on the state of the art in ITS authoring tools and consider some challenges facing authoring tool researchers today. Then, in the bulk of the paper, I propose some principled foundations for future authoring tool design, focusing on operationalizing the construct of complexity—for tool, task, and user. ITS authoring tools are major undertakings and to redeem this investment it is important to anticipate actual user needs and capacities. I propose that one way to do this is to match the complexity of tool design to the complexity of authoring tasks and the complexity capacity of users and user communities. Doing so entails estimating the complexity of the mental models that a user is expected to build in order to use a tool as intended. The goal is not so much to support the design of	10.1007/s40593-015-0076-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40593-015-0076-6	SpringerLink
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		<p>more powerful authoring tools as it is to design tools that meet the needs of realistic user audiences. This paper presents some exploratory ideas on how to operationalize the concept of complexity for tool, task, and user. The paper draws from the following theories and frameworks to weave this narrative: Complexity Science, Activity Theory, Epistemic Forms and Games, and adult cognitive developmental theory (Hierarchical Complexity Theory). This exploration of usability and complexity is applicable to the design of any type of complex authoring application, though the application area that motivated the exploration is ITS authoring.</p>			
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<p>Present and future of the water-energy-food nexus and the role of the community of practice</p>	<p>Mohtar, Rabi H., Lawford, Richard,</p>	<p>The paper discusses an integrated approach to the management of three primary resources: water, energy, and food (WEF), as these increasingly represent the greatest global risks because they are expected to be highly impacted by climate change, demographics, aging infrastructure, and other challenges in the twenty-first century. As background, the WEF nexus is defined; significant historical developments of nexus thinking noted; and important connections to systems-science theory presented. An interdisciplinary WEF nexus platform is defined and proposed to support scholarship and to be a bridge between science, policy, and the general community of stakeholders. The interdisciplinary nexus platform is then differentiated from more common discipline-specific approaches. A review of the WEF nexus history, important benchmarks, and the foundation in system-science theory are presented. The paper concludes with a call for a WEF nexus community of practice (NCoP) to promote and enable an integrative approach to develop and</p>	<p>10.1007/s13412-016-0378-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s13412-016-0378-5</p>	<p>SpringerLink</p>
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		<p>employ tools with the purpose of strengthening sustainable food security, increasing energy production, and bridging water supply gaps that have arisen in demands for both food and energy. The transdisciplinary platform created by the NCoP will carry strong societal impact while addressing the scarcity and sustainable management of these primary resources.</p>			
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<p>'SoS call' at the other edge of chaos</p>	<p>Mahmood, Asif,</p>	<p>The focus of this study is to understand and pave the way to build theory of System of Systems (SoS). The authors try to marshal the established thoughts and develop new insights to shed light on the topic. Although the research thrashes the proposed rudimentary concepts, yet they are important to caste clarity to lay the concrete foundation for the emerging concept of SoS. The first part of the paper discusses about the conceptual milieu of SoS. It tries to help resolve their identity crisis by proposing two edges of chaos. SoS and monolithic systems self-organize at two opposite edges. Then the research work defines SoS locus on extended system of systems methodology (E-SoSM) framework, and dissects it to decode its contradictory and aberrant behavior. Upon this understanding, the second part traces out the incapacitation of traditional military techniques for asymmetric warfare, typifying with a friendly fire incident of the current Afghan War. Seeing through this lens, conjures up that military SoS and anti SoS (enemy) fight to annihilate each other during the clashes of systems of</p>	<p>10.1007/s11424-015-3189-y</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11424-015-3189-y</p>	<p>SpringerLink</p>
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		systems in the theater of war.			
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Systematic literature review of the objectives, techniques, kinds, and architectures of models at runtime	Szvetits, Michael, Zdun, Uwe,	In the context of software development, models provide an abstract representation of a software system or a part of it. In the software development process, they are primarily used for documentation and communication purposes in analysis, design, and implementation activities. Model-Driven Engineering (MDE) further increases the importance of models, as in MDE models are not only used for documentation and communication, but as central artefacts of the software development process. Various recent research approaches take the idea of using models as central artefacts one step further by using models at runtime to cope with dynamic aspects of ever-changing software and its environment. In this article, we analyze the usage of models at runtime in the existing research literature using the Systematic Literature Review (SLR) research method. The main goals of our SLR are building a common classification and surveying the existing approaches in terms of objectives, techniques, architectures, and kinds of models used in these approaches. The contribution of this article is to provide an	10.1007/s10270-013-0394-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-013-0394-9	SpringerLink
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		overview and classification of current research approaches using models at runtime and to identify research areas not covered by models at runtime so far.			
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<p>Cyber-physical systems challenges: a needs analysis for collaborating embedded software systems</p>	<p>Mosterman, Pieter J., Zander, Justyna,</p>	<p>Embedding computing power in a physical environment has provided the functional flexibility and performance necessary in modern products such as automobiles, aircraft, smartphones, and more. As product features came to increasingly rely on software, a network infrastructure helped factor out common hardware and offered sharing functionality for further innovation. A logical consequence was the need for system integration. Even in the case of a single original end manufacturer who is responsible for the final product, system integration is quite a challenge. More recently, there have been systems coming online that must perform system integration even after deployment—that is, during operation. This has given rise to the cyber-physical systems (CPS) paradigm. In this paper, select key enablers for a new type of system integration are discussed. The needs and challenges for designing and operating CPS are identified along with corresponding technologies to address the challenges and their potential impact. The intent is to contribute to</p>	<p>10.1007/s10270-015-0469-x</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-015-0469-x</p>	<p>SpringerLink</p>
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		a model-based research agenda in terms of design methods, implementation technologies, and organization challenges necessary to bring the next-generation systems online.			
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SAMM: an architecture modeling methodology for ship command and control systems	Fan, Zhiqiang, Yue, Tao, Zhang, Li,	Ship command and control systems (SCCSs) are composed of large-scale, complex, real-time and software-intensive systems that complete tasks collaboratively. Open architecture has been introduced to design the architecture of SCCSs and has been refined into functional architecture (FA) and technical architecture (TA) to meet architectural requirements such as adapting fast-speed functional and technical changes. Thereby, specifying the architecture of SCCSs, based on FA and TA, becomes a key issue for stakeholders of the domain. In this paper, we propose an architecture modeling methodology (named as SAMM) for describing the architecture of SCCSs. SAMM is derived by following a systematic and generic framework—modeling Goal, domain-specific Conceptual model, architecture Viewpoint, and architecture description Language (GCVL), which guides domain experts to devise domain-specific architecture modeling methodologies of large-scale software-intensive systems. SAMM contains three	10.1007/s10270-013-0393-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-013-0393-x	SpringerLink
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		<p>viewpoints and 22 models, and a UML/SysML-based architecture description language. An industrial application of SAMM, along with the subsequent application of the derived SAMM architecture model (i.e., a deployed SCCS prototype) was conducted to evaluate SAMM. A questionnaire-based survey was also conducted to subjectively evaluate whether SAMM meets the modeling goals and its applicability. Results show that SAMM meets all modeling goals and is easy to apply.</p>			
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Designing for patient risk assessment in primary health care: a case study for ergonomic work analysis	Jatobá, Alessandro, Bellas, Hugo Cesar, Bonfatti, Renato, Burns, Catherine M., Vidal, Mario Cesar R., Carvalho, Paulo Victor R.,	In this paper, we study the importance of a consistent description of real work in patient risk assessment in the primary healthcare domain. Through a case study in the context of primary health care, we address the research problem of finding ways to build consistent real work descriptions of the patient risk assessment system in the primary healthcare domain, in order to foster the design of improved work situations and support devices. This is a qualitative field study based on ethnographic observation and semi-structured interviews carried out among professionals involved in the risk assessment process in a primary healthcare facility. The objects of ergonomic work analysis were work places and work situations with focus on human activity, as well as surrounding aspects. The analysis identified elements in the work domain with high cognitive demand and operations that could increase mental workload, providing elements for the earlier stages of the design of work situations and support devices to improve the risk assessment in primary health care. This paper shows the usefulness of real	10.1007/s10111-015-0355-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-015-0355-x	SpringerLink
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		work descriptions in the design for complex situations like the risk assessment in health care, as well the impact of poor descriptions in generating harmful situations for both the patient and healthcare practitioners in the explored domain.			
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Industry 4.0 as a Cyber-Physical System study	Mosterman, Pieter J., Zander, Justyna,	<p>Advances in computation and communication are taking shape in the form of the Internet of Things, Machine-to-Machine technology, Industry 4.0, and Cyber-Physical Systems (CPS). The impact on engineering such systems is a new technical systems paradigm based on ensembles of collaborating embedded software systems. To successfully facilitate this paradigm, multiple needs can be identified along three axes: (i) online configuring an ensemble of systems, (ii) achieving a concerted function of collaborating systems, and (iii) providing the enabling infrastructure. This work focuses on the collaborative function dimension and presents a set of concrete examples of CPS challenges. The examples are illustrated based on a pick and place machine that solves a distributed version of the Towers of Hanoi puzzle. The system includes a physical environment, a wireless network, concurrent computing resources, and computational functionality such as, service arbitration, various forms of control, and processing of streaming video. The pick and place machine is of medium-size</p>	10.1007/s10270-015-0493-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-015-0493-x	SpringerLink
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		complexity. It is representative of issues occurring in industrial systems that are coming online. The entire study is provided at a computational model level, with the intent to contribute to the model-based research agenda in terms of design methods and implementation technologies necessary to make the next generation systems a reality.			
Towards the development of interoperable sensing systems for the future enterprise	Moisescu, M. A., Sacala, I. S.,	Current research efforts in the area of enterprise systems are focusing on the development and standardization of new technologies to sustain the "Future Internet based Enterprise". In this context, emerging Internet technologies are integrated into enterprise information systems in order to provide sustainable business benefits. These new systems have been included in a broad concept of "Future Internet Based Enterprise Systems". The present paper proposes a sensing based approach to the design of Future Internet Based Enterprise Systems. To sustain the seamless integration and system interoperability a framework to integrate the sensing ability with enterprise information systems is discussed.	10.1007/s10845-014-0900-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-014-0900-0	SpringerLink

<p>A high-assurance trust model for digital community control system based on internet of things</p>	<p>Li, Hongtao, Xing, Jinsheng, Ma, Jianfeng,</p>	<p>Security issues and Internet of Things (IoT) become indispensable part in digital community as IoT develops with the pervasive introduction of additional “smart” sensors and devices over the last decades, and it necessitates the implementation of information security principle in digital community system. A three-level criticality model to determine the potential impact is proposed in digital community system when various devices lost in this paper. Combining the actual security requirement of digital community and characteristics of IoT, a hierarchical security architecture including defense-in-depth cybersecurity and distribute secure control is proposed. A high-assurance trust model, which assumes insider compromise, which exists in the digital community, is finally proposed according to the security issues analysis.</p>	<p>10.1007/s11859-016-1135-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11859-016-1135-z</p>	<p>SpringerLink</p>
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Engaging nanotechnology: ethnography of lab-on-a-chip technology in small-scale fluidics research	Kant, Vivek, Burns, Catherine M.,	<p>Growth of novel small-scale technologies (micro- and nanotechnology) is expected to change the nature of work in the future. Currently, Human Factors and Ergonomics (HFE) research in small-scale technologies, especially nanotechnology, is in its infancy. Since small-scale technologies are expected to bring about radical changes, aligning HFE to these technologies allows for usable products from the inception, rather than an afterthought. This paper presents an ethnographic study conducted on lab-on-a-chip (LOC) technology in the area of small-scale fluidics. LOC devices are small devices where laboratory processes are shrunk into miniature size, often no bigger than a credit card. LOC technology promises low-cost point-of-care devices in health care, as well as applications in other emerging sectors. In this study, the fabrication and testing of the LOC devices using soft lithography techniques were addressed in detail. Specifically, it is shown that device fabrication in the laboratory entails a considerable amount of skilled workmanship on part of the researcher. Further, this study was</p>	10.1007/s10111-015-0344-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-015-0344-0	SpringerLink
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		<p>conducted at a research laboratory at the University of Waterloo. Addressing laboratory research as a domain of study is a novel venture for HFE. With the growth of universities as major players in the innovation system, the university research laboratory has emerged as an important aspect of the commercialization and technology transfer process. Thus, conducting research in university laboratories will, in the long run, allow HFE professionals to play a greater role in the innovation process linking the university, industry and society. Thus, emphasizing the principle: good economics requires good ergonomics.</p>			
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Research experimental platforms to study microgrids issues	Haritza, Camblong, Octavian, Curea, Aitor, Etxeberria, Alvaro, Llaría, Amélie, Hacala Perret,	Microgrid (MG) concept is becoming increasingly mature. It allows integrating better distributed generation, and especially renewable energy sources, in the grid. However, many issues have still to be resolved before implementing this concept in the real power system extensively. This paper presents first a review of the main issues associated to microgrids dealt with in the scientific literature. The different issues are classified and some examples of carried out studies are given for each issue. Then, a short review of existing experimental microgrids is done. They are classified in small-size and real-size experimental MGs. After that, the EneR-GEA experimental MG or platform of ESTIA Engineering School is presented, describing its different components. Then, some carried out experiments are explained. To finish, the main planned projects at short and medium term related to this platform are given.	10.1007/s12008-015-0288-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12008-015-0288-x	SpringerLink
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<p>A federated approach to develop enterprise interoperability</p>	<p>Tu, Zhiying, Zacharewicz, Gregory, Chen, David,</p>	<p>Interoperability is one of the requisite features for existing enterprises in the increasing competitive and complex global market. In the last decade, enterprise interoperability has been developed and prescribed by various kinds of frameworks, methods, and techniques. However interoperability development is still not mature enough to become a science. Meanwhile, it keeps evolving according to different business requirement and market environment. Nowadays, networked environment causes unpredictable dynamical situations, thus sustainable interoperability becomes a new research dimension in the interoperability of enterprise systems and applications domain. In the sustainable interoperability, enterprise interoperability dynamics is one of the focal topics. This dynamic approach also called federated is originated from Enterprise Interoperability Framework of INTEROP NoE, which aims to establish interoperability on the fly. This paper presents current state on federated approaches to develop enterprise interoperability</p>	<p>10.1007/s10845-013-0868-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10845-013-0868-1</p>	<p>SpringerLink</p>
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		<p>dynamics. Based on this study, a novel Federated interoperability approach is proposed. It aims at bridging the gap from interoperability concepts to the implementation of interoperable enterprise information systems development. This approach reuses distributed simulation interoperability concepts to facilitate and coordinate the communication between heterogeneous distributed information systems of the enterprises. This simulation part has been implemented into a software platform. This platform is compliant with the latest version of the high level architecture that is a distributed communication standard. This approach also proposes a development lifecycle that intends to reuse existing information systems without recoding them but by adapting them to the new requirements of interoperability dynamics.</p>			
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Estimating tsunami run-up	Smart, G. M., Crowley, K. H. M., Lane, E. M.,	<p>Tsunami risk reduction activities rely on a sound knowledge of the hazard characteristics. Our understanding of these characteristics is derived from empirical measurements, numerical models or established rules. Conventional methods used to delineate areas vulnerable to tsunami inundation are often calculated from estimated maximum wave height at the coast and "rules-of-thumb". Applying such rules may give unreliable results for decision-makers. Using basic hydraulic principles and assumptions, this paper improves on the existing rules by developing and testing new equations for predicting tsunami maximum depth profiles and inundation distances. The proposed equations require knowledge of shoreline wave-crest level, the onshore ground profile and an index for onshore roughness (a ratio of distance between protrusions to a local friction factor). As a tsunami wave moves inland, the equations demonstrate that there will usually be an exponential decline in peak water depth. The equations also confirm that a smaller spacing between onshore roughness elements, such</p>	10.1007/s11069-015-2052-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11069-015-2052-8	SpringerLink
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		<p>as trees or houses, will give a steeper decline in peak depth due to increased friction as a wave moves inland. Furthermore, where ground level is rising faster than friction head is being lost, it is predicted that the water level of a tsunami will rise above the shoreline wave-crest level. The ground slope at which run-up starts to exceed shoreline wave-crest level can be predicted from the shoreline wave-crest level and roughness spacing. Results predicted by the new equations are verified by comparison with tsunami run-up measurements made in Samoa and Java.</p>			
<p>'Some tactical problems in digital simulation' for the next 10 years</p>	Nelson, B L,	<p>In his influential 1963 paper 'Some Tactical Problems in Digital Simulation', Conway identified important issues that became the pillars of research in simulation analysis methodology. Naturally these 'problems' were a product of the applications of interest at the time, as well as the state of simulation and computing, much of which has changed dramatically. In light of those changes, we attempt to identify the tactical problems that might occupy simulation researchers for the next 10 years.</p>	10.1057/jos.2015.22	http://link.springer.com/openurl/pdf?id=doi:10.1057/jos.2015.22	SpringerLink

Reliable and energy aware query-driven routing protocol for wireless sensor networks	Omar, Mawloud, Yahiaoui, Souraya, Bouabdallah, Abdelmadjid,	Wireless sensor networks become very attractive in the research community, due to their applications in diverse fields such as military tracking, civilian applications and medical research, and more generally in systems of systems. Routing is an important issue in wireless sensor networks due to the use of computationally and resource limited sensor nodes. Any routing protocol designed for use in wireless sensor networks should be energy efficient and should increase the network lifetime. In this paper, we propose an efficient and highly reliable query-driven routing protocol for wireless sensor networks. Our protocol provides the best theoretical energy aware routes to reach any node in the network and routes the request and reply packets with a lightweight overhead. We perform an overall evaluation of our protocol through simulations with comparison to other routing protocols. The results demonstrate the efficiency of our protocol in terms of energy consumption, load balancing of routes, and network lifetime.	10.1007/s12243-015-0482-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12243-015-0482-7	SpringerLink
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From monocausality to systems thinking: a complementary and alternative conceptual approach for better understanding the development and prevention of sports injury	Hulme, Adam, Finch, Caroline F.,	<p>The science of sports injury control, including both its cause and prevention, has largely been informed by a biomedical and mechanistic model of health. Traditional scientific practice in sports injury research has routinely involved collapsing the broader socioecological landscape down in order to analyse individual-level determinants of injury - whether biomechanical and/or behavioural. This approach has made key gains for sports injury prevention research and should be further encouraged and allowed to evolve naturally. However, the public health, Applied Human Factors and Ergonomics, and injury epidemiological literature more broadly, has accepted the value of a socioecological paradigm for better understanding disease and injury processes, and sports injury research will fall further behind unless it does the same. A complementary and alternative conceptual approach towards injury control known as systems thinking that builds on socioecological science, both methodologically and analytically, is readily available and fast developing in other research areas. This review outlines</p>	10.1186/s40621-015-0064-1	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40621-015-0064-1	SpringerLink
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		<p>the historical progression of causal concepts in the field of epidemiology over the course of the modern scientific era. From here, causal concepts in injury epidemiology, and models of aetiology as found in the context of sports injury research are presented. The paper finishes by proposing a new research agenda that considers the potential for a systems thinking approach to further enhance sports injury aetiological understanding. A complementary systems paradigm, however, will require that sports injury epidemiologists bring their knowledge and skillsets forwards in an attempt to use, adapt, and even refine existing systems-based approaches. Alongside the natural development of conventional scientific methodologies and analyses in sports injury research, progressing forwards to a systems paradigm is now required.</p>			
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<p>Military system of systems architecting with individual system contracts</p>	<p>Konur, Dinçer, Dagli, Cihan H.,</p>	<p>This paper studies the process of architecting a System of Systems (SoS) where the SoS architect can negotiate with individual systems. Particularly, the SoS architect aims to select a set of systems to provide a set of capabilities required for the SoS as well as the interfaces that enable communications amongst the selected systems. The SoS architect regards a set of three objectives: cost and deadline minimization and performance maximization. The performance levels of the capabilities provided by a system can be improved through additional funds contracted by the SoS architect. The system decides on how to use the allocated funds. We model the resulting Stackelberg game between the SoS architect and the individual systems as a multi-objective multi-level optimization problem. Three evolutionary heuristic methods are proposed and compared in a set of numerical studies. Further numerical studies illustrate the benefits of the modeling approach compared to system contracting after system selection.</p>	<p>10.1007/s11590-014-0821-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11590-014-0821-z</p>	<p>SpringerLink</p>
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On environments as systemic exoskeletons: crosscutting optimizers and antifragility enablers	De Florio, Vincenzo,	<p>Classic approaches to general systems theory often adopt an individual perspective and a limited number of systemic classes. As a result, those classes include a wide number and variety of systems that result equivalent to each other. This paper presents a different approach: first, systems belonging to a same class are further differentiated according to five major general characteristics. This introduces a "horizontal dimension" to system classification. A second component of our approach considers systems as nested compositional hierarchies of other sub-systems. The resulting "vertical dimension" further specializes the systemic classes and makes it easier to assess similarities and differences regarding properties such as resilience, performance, and quality of experience. Our approach is exemplified by considering a telemonitoring system designed in the framework of Flemish project "Little Sister". We show how our approach makes it possible to design intelligent environments able to closely follow a system's horizontal and vertical organization and</p>	10.1007/s40860-015-0006-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-015-0006-2	SpringerLink
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		to artificially augment its features by serving as crosscutting optimizers and as enablers of antifragile behaviors.			
A service-oriented framework to the design of information system service	de Oliveira, Valter Castelhana, Silva, José Reinaldo,	The beginning of this century is marked by a paradigm shift due to the move of the production focus from goods-dominant to a service-dominant. At the same time, manufacturing automation and integration are undergoing changes, which open the possibility for classical model oriented products to be replaced by service models, supported by cognitive information systems. This paper analyzes a proposal to achieve a sound design process for service systems, which follows the model driven tendency. In fact, the aim is to bring together practical and formal approach, and therefore, to propose a good design discipline based on SOMF (Service Oriented Model Framework). Based on this model driven approach a new environment were developed which supports elicitation, modeling and requirements analysis supported by semi-formal methods (SOMF and UML) and formal methods (by using SysML and Petri Nets). The proposed method is applied to a case study based in an urban Smart Grid.	10.1007/s12927-015-0003-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12927-015-0003-2	SpringerLink

Facilitating open exchange of data and information	Gallagher, James, Orcutt, John, Simpson, Pauline, Wright, Dawn, Pearlman, Jay, Raymond, Lisa,	By broad consensus, Open Data presents great value. However, beyond that simple statement, there are a number of complex, and sometimes contentious, issues that the science community must address. In this review, we examine the current state of the core issues of Open Data with the unique perspective and use cases of the ocean science community: interoperability; discovery and access; quality and fitness for purpose; and sustainability. The topics of Governance and Data Publication are also examined in detail. Each of the areas covered are, by themselves, complex and the approaches to the issues under consideration are often at odds with each other. Any comprehensive policy on Open Data will require compromises that are best resolved by broad community input. In the final section of the review, we provide recommendations that serve as a starting point for these discussions.	10.1007/s12145-014-0202-2	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-014-0202-2	SpringerLink
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Beyond a series of security nets: applying STAMP & STPA to port security	Williams, Adam D.,	<p>Port security is an increasing concern given the significant role of ports in global commerce and today's increasingly complex threat environment. Current approaches to port security mirror traditional models of accident causality – 'a series of security nets' based on component reliability and probabilistic assumptions. Traditional port security frameworks result in isolated and inconsistent improvement strategies. Recent work in engineered safety combines the ideas of hierarchy, emergence, control and communication into a new paradigm for understanding port security as an emergent complex system property. The 'System-Theoretic Accident Model and Process (STAMP)' is a new model of causality based on systems and control theory. The associated analysis process – System Theoretic Process Analysis (STPA) – identifies specific technical or procedural security requirements designed to work in coordination with (and be traceable to) overall port objectives. This process yields port security design specifications that can mitigate (if</p>	10.1007/s12198-015-0161-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12198-015-0161-y	SpringerLink
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		<p>not eliminate) port security vulnerabilities related to an emphasis on component reliability, lack of coordination between port security stakeholders or economic pressures endemic in the maritime industry. This article aims to demonstrate how STAMP's broader view of causality and complexity can better address the dynamic and interactive behaviors of social, organizational and technical components of port security.</p>			
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Modelling food system resilience: a scenario-based simulation modelling approach to explore future shocks and adaptations in the Australian food system	Candy, Seona, Biggs, Che, Larsen, Kirsten, Turner, Graham,	<p>This paper outlines a process for exploring food system vulnerability and resilience using scenario modelling with the Australian Stocks and Flows Framework (ASFF). The capacity of ASFF to simulate how diverse shocks and stressors affect food system behaviour across multiple sectors—with diverse, interconnected and dynamic variables shaping system response—renders ASFF particularly suited for exploring complex issues of future food supply. We used ASFF to explore the significance of alternative agricultural policies for land use, crop production, livestock production, fisheries, food processing, transport, food waste and ultimately food supply. Policies in different scenarios varied with regard to the timetable for reducing greenhouse gas emissions, the degree of government participation or regulation in the food system and the scale of solutions (varying from centralized and global to decentralized and local). Results from the scenarios suggest that Australia does not have the ability to maintain a domestic surplus of foods required for a nutritious diet. In</p>	10.1007/s13412-015-0338-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s13412-015-0338-5	SpringerLink
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		<p>particular, the health of the current food system is highly vulnerable to constraints in oil supply, and increased food production threatens to precipitate a drastic decline in critical water supplies. We conclude by outlining a proposed method for using ASFF to delve deeper into the dynamics of the food system, probe the consequences of various adaptive responses to food production and supply challenges and devise potential indicators for food system resilience. Shocks and stressors to be added to the next phase of scenario modelling include soil salinity, climate extremes and credit scarcity. The ASFF methodology should be applicable to other parts of the world, although appropriate recalibration and adjustment of model assumptions would be required to reflect regional differences.</p>			
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Antifragility: systems engineering at its best	Verhulst, Eric, Spath, Bernhard, Van Schaik, Pieter,	Systems engineering has emerged because of the growing complexity of systems and the growing need for systems to provide a reliable service. The latter has to be defined in a wider context of trustworthiness and covering aspects like safety, security, human-machine interface design and even privacy. What the user expects is an acceptable quality of service (QoS), a property that is difficult to measure as it is a qualitative one. In this paper, we present a novel criterion, called assured reliability and resilience level (ARRL) that defines QoS in a normative way, largely by taking into account how the system deals with faults. ARRL defines 7 levels of which the highest one can be described as the level where the system becomes antifragile.	10.1007/s40860-015-0013-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-015-0013-3	SpringerLink
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Dispatch and bidding strategy of active distribution network in energy and ancillary services market	JIN, Yao, WANG, Zhengyu, JIANG, Chuanwen, ZHANG, Yu,	<p>The active distribution network (ADN) is able to manage distributed generators (DGs), active loads and storage facilities actively. It is also capable of purchasing electricity from main grid and providing ancillary services through a flexible dispatching mode. A competitive market environment is beneficial for the exploration of ADN's activeness in optimizing dispatch and bidding strategy. In a bilateral electricity market, the decision variables such as bid volume and price can influence the market clearing price (MCP). The MCP can also have impacts on the dispatch strategy of ADN at the same time. This paper proposes a bi-level coordinate dispatch model with fully consideration of the information interaction between main grid and ADN. Simulation results on a typical ADN validate the feasibility of the proposed method. A balanced proportion between energy market and ancillary services market can be achieved.</p>	10.1007/s40565-015-0161-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40565-015-0161-8	SpringerLink
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Using Bayesian networks for highly available cloud-based web applications	Marrone, Stefano,	Bayesian networks have demonstrated their capability in several applications spanning from reasoning under uncertainty in artificial intelligence to dependability modelling and analysis. This paper focuses on the use of this language for allocating cloud resources to maximise service dependability. This objective is accomplished by the definition of a model-driven approach able to guide the software engineering to define a cloud infrastructure (applications, services, virtual and concrete resources) using a semi-automated process. This process exploits both high-level languages such as UML as well as Bayesian networks. Using all their features (backward analysis, ease of usage, low analysis time), Bayesian networks are used in this process as a driver for the optimization, learning and estimation phases. The paper discusses all the issues that the application of Bayesian networks in the proposed process arises.	10.1007/s40860-015-0009-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-015-0009-z	SpringerLink
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Symmetrica: test case for transportation electrification research	Farid, Amro M.,	<p>In recent years, transportation electrification has emerged as a trend to support energy efficiency and CO₂ emissions reduction targets. The true success, however, of this trend depends on the successful integration of electric vehicles into the infrastructure systems that support them. In effect, electric vehicles and their supporting charging infrastructure couple the transportation and electrical power systems into a nexus. In the absence of fully deployed large scale electrified transportation systems, this paper argues the need for a transportation electrification test case analogous to those used ubiquitously in the power systems engineering field. It then presents such a test case; aptly called Symmetrica. It consists of a multi-modal electrified transportation system topology, an electric power topology, and activity-based use case data that spans transportation and charging. The paper concludes with several potential research areas where the test case may be applied.</p>	10.1186/s40551-015-0012-9	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40551-015-0012-9	SpringerLink
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Dealing with Emergencies: The Case of a Heavy Disruption of the Mexico City Metro System	Padilla-Pérez, Diego, Santos-Reyes, Jaime, Olmos-Peña, Samuel,	<p>The paper presents the results of a forecasting model associated with the affluence of users of the metro line-B of Mexico City's metro system. It also presents in a way a retrospective analysis of the metro incident that occurred on September, 2011, in the same metro line; the incident affected seven metro stations and about 17 thousand commuters. The approach has been the use of Artificial Neural Networks (ANN). The main conclusions may be summarized as follows: (i) the metro incident has illustrated the fact that different modes of urban transport are highly interdependent; (ii) the proposed ANN model has the potentiality to be used to forecasting the affluence of users for any metro line for the case of Mexico City's metro system; (iii) the above (ii) can be used as input to the decision process in order to implement the required number of coaches to assist the affected commuters; (iv) Both (ii) and (iii) should be part of an emergency response plan to mitigate the impact of cascading failures due to interdependencie s amongst the different modes of urban transport.</p>	10.2991/jrarc.2015.5.3.1	http://link.springer.com/openurl/pdf?id=doi:10.2991/jrarc.2015.5.3.1	SpringerLink
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<p>A simulation-based method to evaluate the impact of product architecture on product evolvability</p>	<p>Luo, Jianxi,</p>	<p>Products evolve over time via the continual redesigns of interdependent components. Product architecture, which is embodied in the structure of interactions among components, influences the ability for the product to be subsequently evolved. Despite extensive studies of change propagation via inter-component connections, little is known about the specific influences of product architecture on product evolvability. Related metrics and methods to assess the evolvability of products with given architectures are also under-developed. This paper proposes a simulation-based method to assess the isolated effect of product architecture on product evolvability by analyzing a design structure matrix. We define product evolvability as the ability of the product's design to subsequently generate heritable performance-improving variations, and propose a quantitative measure for it. We demonstrate the proposed method by using it to investigate a wide spectrum of model-generated DSMs representing products with varied architectures, and show that</p>	<p>10.1007/s00163-015-0202-3</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00163-015-0202-3</p>	<p>SpringerLink</p>
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		<p>modularity and inter - component influence cycles promote product evolvability. Our primary contribution is a repeatable method to assess and compare alternative product architectures for architecture selection or redesign for evolvability. A second contribution is the simulation-based evidence about the impacts of two particular product architectural patterns on product evolvability. Both contributions aim to aid in designing for evolvability.</p>			
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Applying UML/MARTE on industrial projects: challenges, experiences, and guidelines	Iqbal, Muhammad Zohaib, Ali, Shaukat, Yue, Tao, Briand, Lionel,	Modeling and Analysis of Real-Time and Embedded Systems (MARTE) is a Unified Modeling Language (UML) profile, which has been developed to model concepts specific to Real-Time and Embedded Systems (RTES). In the last 5 years, we have applied UML/MARTE to three distinct industrial problems in three industry sectors: architecture modeling and configuration of large-scale and highly configurable integrated control systems, model-based robustness testing of communication-intensive systems, and model-based environment simulator generation of large-scale RTES for testing. In this paper, we report on our experience of solving these problems by applying UML/MARTE on four industrial case studies. We highlight the challenges we faced with respect to the industrial adoption of MARTE. Based on our combined experience, we derive a framework to guide practitioners for future applications of UML/MARTE in an industrial context. The framework provides a set of detailed guidelines that help reduce the gap between the modeling	10.1007/s10270-014-0405-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-014-0405-5	SpringerLink
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		notations and real-world industrial application needs.			
A literature survey on smart cities	Yin, ChuanTao, Xiong, Zhang, Chen, Hui, Wang, JingYuan, Cooper, Daven, David, Bertrand,	, , , , , , , , , Rapid urbanization creates new challenges and issues, and the smart city concept offers opportunities to rise to these challenges, solve urban problems and provide citizens with a better living environment. This paper presents an exhaustive literature survey of smart cities. First, it introduces the origin and main issues facing the smart city concept, and then presents the fundamentals of a smart city by analyzing its definition and application domains. Second, a data-centric view of smart city architectures and key enabling technologies is provided. Finally, a survey of recent smart city research is presented. This paper provides a reference to researchers who intend to contribute to smart city research and implementation.	10.1007/s11432-015-5397-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11432-015-5397-4	SpringerLink

On rapid releases and software testing: a case study and a semi-systematic literature review	Mäntylä, Mika V., Adams, Bram, Khomh, Foutse, Engström, Emelie, Petersen, Kai,	<p>Large open and closed source organizations like Google, Facebook and Mozilla are migrating their products towards rapid releases. While this allows faster time-to-market and user feedback, it also implies less time for testing and bug fixing. Since initial research results indeed show that rapid releases fix proportionally less reported bugs than traditional releases, this paper investigates the changes in software testing effort after moving to rapid releases in the context of a case study on Mozilla Firefox, and performs a semi-systematic literature review. The case study analyzes the results of 312,502 execution runs of the 1,547 mostly manual system-level test cases of Mozilla Firefox from 2006 to 2012 (5 major traditional and 9 major rapid releases), and triangulates our findings with a Mozilla QA engineer. We find that rapid releases have a narrower test scope that enables a deeper investigation of the features and regressions with the highest risk. Furthermore, rapid releases make testing more continuous and have proportionally smaller spikes before the main release. However, rapid releases make it more difficult to</p>	10.1007/s10664-014-9338-4	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-014-9338-4	SpringerLink
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		<p>build a large testing community , and they decrease test suite diversity and make testing more deadline oriented. In addition, our semi-systematic literature review presents the benefits, problems and enablers of rapid releases from 24 papers found using systematic search queries and a similar amount of papers found through other means. The literature review shows that rapid releases are a prevalent industrial practice that are utilized even in some highly critical domains of software engineering, and that rapid releases originated from several software development methodologies such as agile, open source, lean and internet-speed software development. However, empirical studies proving evidence of the claimed advantages and disadvantages of rapid releases are scarce.</p>			
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Estimating economic loss from cascading infrastructure failure: a perspective on modelling interdependency	Kelly, Scott,	<p>Infrastructure failure can cause significant disruption of economic activity. The size of economic loss is a direct function of the interdependencies between infrastructure and economic systems raising important questions about infrastructure vulnerability and resilience. Economic theory is important in this regard as it makes a distinction between damage to infrastructure (stock) and how this may transfer to losses in economic productivity (flow). In order to capture the economic consequences of infrastructure failure, various economic models have been proposed to represent the multimodal complex networks and capture the effects of cascading infrastructure failure. There is still no consensus on the correct approach for estimating economic loss. The method commonly known as input-output analysis has gained the most attention in recent years for its ability to model indirect or higher-order economic losses. The typical input-output approach has spawned an entire field of related models which include: the inoperability input-output model (IIM); Ghosh supply-side model;</p>	10.1186/s40551-015-0010-y	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40551-015-0010-y	SpringerLink
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		<p>dynamic input-output models; key-linkages analysis; as well as inventory based models amongst others. Amongst the various methods used to model infrastructure failure this paper identifies the assumptions and shortcomings that must be overcome to produce better estimates of economic loss. Firstly, critical infrastructure systems are connected to the economy through both physical and economic linkages. Models need to capture both types of linkage to accurately represent how cascading infrastructure failure will lead to economic loss and then how sectoral losses may have an indirect impact on infrastructure systems. Secondly, input-output based approaches assume that the economic structure within an economy remains stable during a disaster and throughout the recovery process. New models are required that are able to capture substitution of goods and structural change within an economy. Thirdly, models of economic loss are generally deterministic in nature and thus give no indication about the uncertainty behind model-based estimates. Economic loss estimates using probability theory</p>			
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		and methods such as Monte-Carlo simulations or fuzzy logic may prove to be important avenues for quantifying uncertainty in economic loss estimates resulting from infrastructure failure.			
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<p>An initial categorization of foundational research in complex technical systems</p>	<p>Horváth, Imre,</p>	<p>,, , 1. ;2. ;3. :;(1);;(2);;(3), There has been intense foundational research in complex technical systems (CTSs) over the last half century. These systems are exemplified by advanced mechatronics systems, embedded control systems, real-time systems, agent-based smart systems, distributed software systems, internet of things systems, and cyber-physical systems. The objective of this paper is to offer an initial cataloguing of the various research domains and to identify the major research issues. The paper has an ontological flavour, because it concentrates on what research has been and is being done, rather than on why and how research is done. The underpinning study has been done in three stages: (i) intuition-driven exploration of a reference set of related academic publications, (ii) evidence-based specification of a categorization of the domains and subdomains of research, and (iii) refinement and validation of the proposed classification based on a control set of related academic publications. The proposed reasoning model identifies three categories of research domains. The ‘intellectualization</p>	<p>10.1631/jzus.A1500172</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1631/jzus.A1500172</p>	<p>SpringerLink</p>
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		<p>s' category includes research domains such as: (i) philosophy, (ii) ontology, and (iii) epistemology of CTSs. The research domains included in the 'realizations' category are: (iv) methodology, and (v) creation of CTSs. The domains considered in the 'influences' category are: (vi) manifestations, and (vii) axiology of CTSs. Based on the proposed reasoning model a landscape of foundational research in CTSs is proposed for public debate. Our follow-up study focuses on the extension of the proposed classification to other families of complex engineered systems such as sociotechnical systems and social ecosystems.</p>			
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Multi-model groundwater-management optimization: reconciling disparate conceptual models	Timani, Bassel, Peralta, Richard,	<p>Disaccordo fra politici spesso implica questioni politiche e differenze tra le funzioni di utilità implicite dei decisori. Un Disaccordo significativo può esistere anche in merito ai modelli concettuali del sistema fisico. Disaccordo sulla validità di un unico modello di simulazione ritarda la discussione sulle questioni politiche e impedisce l'adozione di strategie per la gestione consensuale. A causa di una tale situazione contenziosa, il modello di ottimizzazione multi-concettuale (MCMO) proposto può aiutare gli azionisti a raggiungere un compromesso strategico. Il MCMO calcola matematicamente strategie ottimali che simultaneamente soddisfano confini analoghi legati a svariati modelli numerici che differiscono nelle condizioni limite, stratigrafia idrogeologica, e discretizzazione. Prezzi ombra e compromessi guidano il processo di perfezionamento della prima strategia multi modello del MCMO in un compromesso di strategia realistica di gestione. La ciclicità automatizzata, è un metodo pratico per l'utilizzo dei sistemi di falde acquifere lineari e non lineari. In questo studio esplorativo,</p>	10.1007/s10040-015-1259-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10040-015-1259-9	SpringerLink
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		<p>l'applicazione MCMO, nel sistema fiume-acquifero multistrato di Cache Valley (Utah e Idaho, USA), utilizza due modelli con condizioni di fondo analoghe ma con diverse discretizzazioni verticali e condizioni di limite. L'obiettivo è di sfruttare al massimo, con tutta sicurezza, ulteriori pompaggi (in aggiunta a quelli attuali), soggetti ai limiti del carico piezometrico dell'acqua di falda ed infiltrazione della stessa sulle acque di superficie. L'impiego del MCMO rivela che per proteggere l'ecosistema locale, l'incremento del pompaggio delle acque di falda può soddisfare soltanto il 40% della domanda d'aumento prevista. Nell'esplorare la possibilità di aumentare il pompaggio, proteggendo allo stesso tempo l'ecosistema, MCMO indentifica chiaramente le località che necessitano ricerche addizionali. MCMO è applicabile ad altri soggetti e problemi di ottimizzazione, a parte quelli sopra discussi. I passi per preparare sub-modelli adatti all'uso del MCMO, sono specificamente adattati per l'uso della località di provenienza.</p> <p>(MCMO) (MCMO)</p>			
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		<p>(Discretization). Shadow prices)) (Trade-offs) · (Automated cycling) (MCMO) (Linear) · (MCMO) (Cache Valley) () · ()</p> <p>40 % · (MCMO) · (MCMO) · (MCMO) ·</p> <p>Divergências entre legisladores geralmente envolvem questões políticas e diferenças entre as funções de utilidade implícitas aos tomadores de decisão. Divergências significativas também podem existir quanto a modelos conceituais do sistema físico. Desacordo sobre a validade de um simples modelo simulado adia a discussão sobre questões de política e impede a adoção de estratégias de gestão consensuais. Para uma situação tão controversa, a otimização de modelos multiconceitual (OMMC) proposta pode ajudar os interessados a chegar a uma estratégia de consenso. OMMC calcula matematicamente estratégias ótimas que satisfazem simultaneamente restrições análogas e limites em modelos numéricos múltiplos que diferem em condições de contorno, estratigrafia hidrogeológica, e discretização.</p>			
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		<p>Preços sombra (shadow prices) e permutações (trade-offs) orientam o processo de refinamento da primeira estratégia multimodelo OMMC desenvolvida na direção de uma estratégia de gestão consensual realista. Com o emprego de ciclos automatizados, OMMC é útil para sistemas aquíferos lineares e não lineares. Nesse estudo exploratório, a aplicação da OMMC ao sistema rio-aquífero multicamadas do Vale Cache (Utah e Idaho, EUA) emprega dois modelos de simulação com condições de conhecimento análogas mas diferentes discretizações verticais e condições de contorno. O objetivo é maximizar bombeamentos seguros adicionais (além dos bombeamentos em curso), sujeitos a limitações de potencial hidráulico e descarga do aquífero às águas superficiais. A aplicação da OMMC revela que, a fim de proteger o ecossistema local, um aumento no bombeamento das águas subterrâneas pode satisfazer apenas 40 % do aumento da demanda de água projetada. Para explorar a</p>			
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		<p>possibilidade de aumentar esse bombeamento e ao mesmo tempo proteger o ecossistema, OMMC identifica claramente localidades que requerem dados de campo adicionais. OMMC é aplicável a outras áreas e problemas de otimização além do utilizado aqui. Passos para preparar submodelos comparáveis para uso OMMC são dependentes da área. Le désaccord parmi les décideurs politiques implique souvent des questions de police de l'eau et des différences entre les fonctions d'utilité implicites des décideurs. Un désaccord significatif peut aussi porter sur les modèles conceptuels des systèmes physiques. Le désaccord sur la validité d'un modèle unique de simulation retarde la discussion sur les problèmes de politique de l'eau et empêche l'adoption de stratégies consensuelles de gestion. Pour une telle situation litigieuse, l'optimisation proposée de modèles multi-conceptuels (OMMC) peut aider les décideurs à dégager une stratégie consensuelle. OMMC calcule les stratégies optimales qui satisfont simultanément les contraintes analogues et relie la stratigraphie hydrogéologique</p>			
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		<p>et la discrétisation dans des modèles numériques multiples qui diffèrent par les conditions aux limites. Des coûts cachés et des compromis guident le processus d'affinage de la première stratégie multi-modèle développée vers une stratégie réaliste de gestion des compromis. En employant un cycle automatisé, OMMC est adapté pour les systèmes aquifères linéaires et non linéaires. Dans cette étude test, l'application d'OMMC au système aquifère multi-couches-rivière de Cache Valley (Utah et Idaho, Etats Unis d'Amérique) emploie deux modèles de simulation avec des conditions analogues mais différant par la discrétisation verticale et les conditions aux limites. L'objectif est de maximiser des pompages d'appoint (en deçà des pompages actuels), susceptibles d'impacter la charge hydraulique de l'aquifère et les écoulements de l'aquifère vers les eaux de surface. L'application d'OMMC révèle que l'accroissement du pompage d'eau souterraine destiné à protéger l'écosystème local peut satisfaire seulement 40 % de l'augmentation</p>			
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		<p>projetée de la demande en eau. Pour explorer la possibilité d'accroître ce pompage en protégeant l'écosystème, OMMC identifie clairement les emplacements nécessitant des données additionnelles de terrain. OMMC est applicable à d'autres secteurs et problèmes d'optimisation que ceux utilisés dans ce cas d'étude. Les étapes de préparation de sous-modèles comparables pour l'utilisation d'OMMC dépendent du terrain.</p> <p>Disagreement among policymakers often involves policy issues and differences between the decision makers' implicit utility functions. Significant disagreement can also exist concerning conceptual models of the physical system. Disagreement on the validity of a single simulation model delays discussion on policy issues and prevents the adoption of consensus management strategies. For such a contentious situation, the proposed multi-conceptual model optimization (MCMO) can help stakeholders reach a compromise strategy. MCMO computes mathematically optimal strategies that simultaneously satisfy analogous constraints and</p>			
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		<p>bounds in multiple numerical models that differ in boundary conditions, hydrogeologic stratigraphy, and discretization. Shadow prices and trade-offs guide the process of refining the first MCMO-developed multi-model strategy into a realistic compromise management strategy. By employing automated cycling, MCMO is practical for linear and nonlinear aquifer systems. In this reconnaissance study, MCMO application to the multilayer Cache Valley (Utah and Idaho, USA) river-aquifer system employs two simulation models with analogous background conditions but different vertical discretization and boundary conditions. The objective is to maximize additional safe pumping (beyond current pumping), subject to constraints on groundwater head and seepage from the aquifer to surface waters. MCMO application reveals that in order to protect the local ecosystem, increased groundwater pumping can satisfy only 40 % of projected water demand increase. To explore the possibility of increasing that pumping while protecting the ecosystem, MCMO clearly identifies localities</p>			
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		<p>requiring additional field data. MCMO is applicable to other areas and optimization problems than used here. Steps to prepare comparable sub-models for MCMO use are area-dependent. , ,,,()Cache - ,,,() , 40% ,,, Ketidaksepakatan di antara pembuat kebijakan sering melibatkan isu dalam pengambilan keputusan dan perbedaan preferensi dalam hal strategi manajemen air. Ketidaksepakatan yang substansial juga bisa terjadi mengenai keakuratan model konseptual terhadap sitem aktual. Keraguan atas validitas model simulasi tunggal menyebabkan tertundanya pembahasan isu-isu kebijakan dan mencegah tercapainya konsensus dalam strategi manajemen. Pada situasi dimana kesepakatan sulit dicapai, teknik Multi-Conceptual Model Optimization (MCMO), yang artinya optimasi secara multi model konseptual, dapat membantu para pemangku kepentingan mencapai strategi yang dapat disepakati bersama. Secara matematis, MCMO menghitung strategi optimal dari beberapa model numerik yang memiliki constraint and boundary conditions yang</p>			
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		<p>sama secara simultan. Model-model numerik ini memiliki boundary condition , stratigrafi hidrogeologi, dan metode diskretisasi yang berbeda. Shadow price dan trade-off memandu proses penyempurnaan strategi multi-model menjadi strategi manajemen yang realistis dan dapat dikompromikan. Dengan menggunakan automatic cycling , MCMO dapat digunakan untuk akuifer linear maupun nonlinear. Dalam study kasus untuk sistem sungai–akuifer berlapis di Lembah Cache (Utah dan Idaho, Amerika Serikat), MCMO digunakan untuk dua model simulasi dengan kondisi latar belakang yang sama, tetapi berbeda dalam diskretisasi vertikal dan boundary condition . Tujuannya adalah untuk memaksimalkan safe pumping yield (diluar pumping yield saat ini), berdasarkan constraint untuk tinggi muka air tanah dan rembesan dari akuifer ke air permukaan. Pengaplikasian MCMO memperlihatkan bahwa guna melindungi ekosistem lokal, peningkatan pemompaan air tanah hanya dapat memenuhi 40 % dari proyeksi kenaikan</p>			
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		<p>kebutuhan air. Untuk menjajaki kemungkinan peningkatan pumping yield tersebut dan sekaligus melindungi ekosistem, MCMO mengidentifikasi secara spesifik daerah yang membutuhkan data lapangan tambahan. MCMO dapat digunakan pada daerah dengan masalah optimasi yang berbeda dari yang digunakan di sini. Proses dalam mempersiapkan sub-model MCMO yang sesuai untuk digunakan sangat tergantung pada kondisi daerah tersebut.</p> <p>.</p> <p>.</p> <p>(MCMO)</p> <p>. MCMO</p> <p>(</p> <p>(Discretization)</p> <p>) . (Trade-Offs) MCMO</p> <p>.</p> <p>(Cycling) MCMO</p> <p>. MCMO</p> <p>- Cache</p> <p>Valley ()</p> <p>.</p> <p>MCMO</p> <p>%</p> <p>MCMO</p> <p>MCMO</p> <p>. MCMO</p> <p>. El desacuerdo entre los funcionarios a menudo implica temas de política y diferencias entre las funciones de utilidad implícitas de los tomadores de decisiones. También puede existir un desacuerdo significativo en relación con los modelos conceptuales del sistema físico. El desacuerdo en la validez de un único modelo de simulación</p>			
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		<p>retrasa el debate sobre temas políticos y dificulta la adopción de estrategias de manejo consensuadas. Para tal situación conflictiva, la optimización del modelo multi-conceptual propuesto (MCMO) puede ayudar a las partes interesadas para alcanzar una estrategia de compromiso. MCMO calcula matemáticamente las estrategias óptimas que satisfagan simultáneamente las restricciones análogas y limita los modelos numéricos múltiples que difieren en las condiciones límites, estratigrafía hidrogeológica y discretización. Los precios ocultos y las compensaciones guían el proceso de refinamiento de la primera estrategia multi-modelo-MCMO convertida en una estrategia realista de manejo de compromiso. Mediante el empleo de la ciclicidad automática, el MCMO es práctico para los sistemas acuíferos lineales y no lineales. En este estudio de reconocimiento, la aplicación del MCMO al sistema multicapa acuífero—rio del Cache Valley (Utah e Idaho, EEUU) emplea dos modelos de simulación con análogas condiciones de fondo pero diferente discretización vertical y</p>			
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		<p>condiciones de contorno. El objetivo es maximizar el bombeo seguro adicional (más allá de bombeo actual), sujeto a las limitaciones en la carga hidráulica de las aguas subterráneas y las filtraciones desde el acuífero hacia las aguas superficiales. La aplicación MCMO revela que con el fin de proteger el ecosistema local, el aumento de bombeo de agua subterránea puede satisfacer sólo el 40 % del aumento proyectado de la demanda de agua. Para explorar la posibilidad de incrementar el bombeo y al mismo tiempo proteger el ecosistema, MCMO identifica claramente localidades que requieren datos de campo adicionales. MCMO es aplicable a otras áreas y a problemas de optimización que se utilizan aquí. Los pasos para preparar sub-modelos comparables para el uso MCMO son dependiente del área.</p>			
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<p>TiQi: answering unstructured natural language trace queries</p>	<p>Pruski, Piotr, Lohar, Sugandha, Goss, William, Rasin, Alexander, Cleland-Huang, Jane,</p>	<p>Software traceability is a required element in the development and certification of safety-critical software systems. However, trace links, which are created at significant cost and effort, are often underutilized in practice due primarily to the fact that project stakeholders often lack the skills needed to formulate complex trace queries. To mitigate this problem, we present a solution which transforms spoken or written natural language queries into structured query language (SQL). TiQi includes a general database query mechanism and a domain-specific model populated with trace query concepts, project-specific terminology, token disambiguators, and query transformation rules. We report results from four different experiments exploring user preferences for natural language queries, accuracy of the generated trace queries, efficacy of the underlying disambiguators, and stability of the trace query concepts. Experiments are conducted against two different datasets and show that users have a preference for written NL queries. Queries were transformed at accuracy rates ranging from 47</p>	<p>10.1007/s00766-015-0224-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-015-0224-4</p>	<p>SpringerLink</p>
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Towards intelligent GIServices	Yue, Peng, Baumann, Peter, Bugbee, Kaylin, Jiang, Liangcun,	<p>Distributed information infrastructures are increasingly used in the geospatial domain. In the infrastructures, data are being collected by distributed sensor services, served by distributed geospatial data services, transformed by processing services and workflows, and consumed by smart clients. Consequently, Geographical Information Systems (GISs) are moving from GISystems to GIServices. Intelligent GIServices are enriched with new capabilities including knowledge representation, semantic reasoning, automatic workflow composition, and quality and traceability. Such Intelligent GIServices facilitate information discovery and integration over the network and automate the assembly of GIServices to provide value-added products. This paper provides an overview of intelligent GIServices. The concept of intelligent GIServices is described, followed by a review of the state-of-the-art technologies and methodologies relevant to intelligent GIServices. Visions on how GIServices can perceive, reason, learn, and act intelligently are</p>	10.1007/s12145-015-0229-z	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-015-0229-z	SpringerLink
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		highlighted. The results can provide better services for big data processing, semantic interoperability, knowledge discovery, and cross-discipline collaboration in Earth science applications.			
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<p>An elicitation instrument for operationalising GQM^+Strategies (GQM^+S-EI)</p>	<p>Petersen, Kai, Gencel, Cigdem, Asghari, Negin, Betz, Stefanie,</p>	<p>A recent approach for measurement program planning, GQM^+Strategies , provides an important extension to existing approaches linking measurements and improvement activities to strategic goals and ways to achieve these goals. There is a need for instruments aiding in eliciting information from stakeholders to use GQM^+Strategies . The success of GQM^+Strategies highly depends on accurately identifying goals, strategies and information needs from stakeholders. The research aims at providing an instrument (called GQM^+S-EI), aiding practitioners to accurately elicit information needed by GQM^+Strategies (capturing goals, strategies and information needs). The research included two phases. In the first phase, using action research method, the GQM^+S-EI was designed in three iterations in Ericsson AB. Thereafter, a case study was conducted to evaluate whether the information elicited with the designed instrument following the defined process was accurate and complete. We identified that the industry requires elicitation instruments that are capable to elicit information</p>	<p>10.1007/s10664-014-9306-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10664-014-9306-z</p>	<p>SpringerLink</p>
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		<p>from stakeholders, not having to know about the concepts (e.g. goals and strategies). The case study results showed that our proposed instrument is capable of accurately and completely capturing the needed information from the stakeholders. We conclude that GQM⁺S-EI can be used for accurately and completely eliciting the information needed by goal driven measurement frameworks. The instrument has been successfully transferred to Ericsson AB for measurement program planning.</p>			
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On resilient behaviors in computational systems and environments	De Florio, Vincenzo,	The present article introduces a reference framework for discussing resilience of computational systems. Rather than a property that may or may not be exhibited by a system, resilience is interpreted here as the emerging result of a dynamic process. Said process represents the dynamic interplay between the behaviors exercised by a system and those of the environment it is set to operate in. As a result of this interpretation, coherent definitions of several aspects of resilience can be derived and proposed, including elasticity, change tolerance, and antifragility. Definitions are also provided for measures of the risk of unresilience as well as for the optimal match of a given resilient design with respect to the current environmental conditions. Finally, a resilience strategy based on our model is exemplified through a simple scenario.	10.1007/s40860-015-0002-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40860-015-0002-6	SpringerLink
5G Networks Coming to Autos, Possibly by 2025			10.1007/BF03545881	http://link.springer.com/openurl/pdf?id=doi:10.1007/BF03545881	SpringerLink

Information and communications technologies for elderly ubiquitous healthcare in a smart home	Deen, M. Jamal,	<p>Over the past century, in most countries, there has been a continual increase in life expectancy primarily due to improvements in public health, nutrition, personal hygiene and medicine. However, these improvements are now coupled with aging population demographics and falling birth rates, which, when combined, are expected to significantly burden the socioeconomic well-being of many of these countries. In fact, never before in human history have we been confronted with such a large aging population, nor have we developed solid, cost-effective solutions for the well-being, healthcare and social needs of the elderly. One efficient and cost-effective solution to the problem of elderly/patient care is remote healthcare monitoring so they can continue to live at home rather than in nursing homes or hospitals that are very expensive and with limited spaces. These remote monitoring systems will allow medical personnel to keep track of important physiological signs with reduced human resources, at less cost and in real time. This paper introduces several low-cost, noninvasive, user-friendly sensing and actuating</p>	10.1007/s00779-015-0856-x	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00779-015-0856-x	SpringerLink
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		<p>systems using information and communication technologies. Such systems can be used to create engineering solutions to some of the pressing healthcare problems in our society, especially as it pertains to the elderly. One example is the integration of sensors, wireless communications, low-power electronics and intelligent computing to determine health-related information using signals from walking patterns. Such a sensing system will be suitable for prolonged use in a home environment. It will be wearable, noninvasive and non-intrusive, similar to smart socks , smart wrist - bands or smart belts . Other examples such as a smart joint monitor and a smart sleeping environment will be discussed, and future perspectives and research challenges in smart home technologies will be described.</p>			
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<p>Internet of connected ServGoods: Considerations, consequences and concerns</p>	<p>Tien, James M.,</p>	<p>In an earlier paper (Tien 2012), the author augurs that, in contrast to the first and second industrial revolutions which respectively focused on the development and the mass production of goods, the next – or third – industrial revolution is focused on the integration of services and/or goods; it began in this second decade of the 21st Century. The Third Industrial Revolution (TIR) is underpinned by the integration or mass customization of services and/or goods. The benefits of real-time mass customization cannot be overstated as goods and services become indistinguishable and are co-produced as “ServGoods”, resulting in an overwhelming economic advantage to the industrialized countries where the consuming customers are at the same time the co-producing producers. Adding sensors to these ServGoods and letting them connect or communicate among themselves or with other ServGoods can result in an Internet of Things (i.e., connected ServGoods). A number of considerations, consequences and concerns relating to such an Internet of Connected ServGoods are</p>	<p>10.1007/s11518-015-5273-1</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11518-015-5273-1</p>	<p>SpringerLink</p>
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		discussed herein.			
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Systems engineering framework for cyber physical security and resilience	DiMase, Daniel, Collier, Zachary A., Heffner, Kenneth, Linkov, Igor,	As our infrastructure, economy, and national defense increasingly rely upon cyberspace and information technology, the security of the systems that support these functions becomes more critical. Recent proclamations from the White House, Department of Defense, and elsewhere have called for increased resilience in our cyber capabilities. The growth of cyber threats extends well beyond the traditional areas of security managed by Information Technology software. The new cyber threats are introduced through vulnerabilities in infrastructures and industries supporting IT capital and operations. These vulnerabilities drive establishment of the area of cyber physical systems security. Cyber physical systems security integrates security into a wide range of interdependent computing systems and adjacent systems architectures. However, the concept of cyber physical system security is poorly understood, and the approach to manage vulnerabilities is fragmented. As cyber physical systems security is better understood, it will require a risk management framework that	10.1007/s10669-015-9540-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-015-9540-y	SpringerLink
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		<p>includes an integrated approach across physical, information, cognitive, and social domains to ensure resilience. The expanse of the threat environment will require a systems engineering approach to ensure wider, collaborative resiliency. Approaching cyber physical system security through the lens of resilience will enable the application of both integrated and targeted security measures and policies that ensure the continued functionality of critical services provided by our cyber infrastructure.</p>			
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Analysis of Critical Infrastructure Network Failure in the European Union: A Combined Systems Engineering and Economic Model	Jonkeren, Olaf, Azzini, Ivano, Galbusera, Luca, Ntalampiras, Stavros, Giannopoulos, Georgios,	Over the past few years, the European Commission has placed Critical Infrastructure Protection under the spotlight. Therefore, the Joint Research Centre is developing a tool to estimate the economic impact of Critical Infrastructure (CI) network failure, resulting from a hazard, on the regional or national level. This tool, which is presented in this study, is a combined Systems Engineering and Dynamic Inoperability Input-output model (SE-DIIM). The resilience of infrastructures and economic sectors, in terms of their ability to withstand and recover from disruptions, is included in the model. We discuss the model by analyzing the economic losses incurred in the 2003 Italian electricity network outage. The losses are estimated at both national and regional levels i.e. northern, central and southern parts of Italy and Sicily with a focus on 9 CI's. We estimate that the economic loss for the case study under consideration is between €46 million and €173 million. We conclude that the combination of the SE and the DIIM components provides a complete framework for assessing the economic impact of critical	10.1007/s11067-014-9259-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11067-014-9259-1	SpringerLink
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		infrastructure network failure on the national or regional level taking account of resilience.			
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Towards disaster-resilient cities: an approach for setting priorities in infrastructure mitigation efforts	McDaniels, Timothy L., Chang, Stephanie E., Hawkins, David, Chew, Gerard, Longstaff, Holly,	Making cities more disaster resilient is an important goal for civil society. We develop and apply a method to elicit ranked preferences to set priorities among alternatives for a small set of selected contexts for improving regional infrastructure resilience. Our approach is based on preference judgments from representatives of infrastructure systems and civil society, in which we characterize the key steps in framing how to select, characterize, and evaluate alternatives in a given decision context. We then provide an approach to ranking alternatives for a given potential infrastructure failure interaction risk, relying on an expert panel approach. We discuss the evaluation of this approach by the participants and views of its advantages and disadvantages. We also offer some caveats and suggestions for future applications. Key findings include understanding of what is needed to set responsible priorities for regional infrastructure resilience, and the specific findings, for the region of interest, include priorities for enhancing fuel supply, water supply, and road mobility.	10.1007/s10669-015-9544-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10669-015-9544-7	SpringerLink
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Flexible Pricing Models for Cloud Computing Based on Group Decision Making Under Consensus	Kar, Arpan Kumar, Rakshit, Atanu,	<p>Today, cloud computing is transforming the consumption of IT/ITeS. Numerous vendors are offering services where computing, storage and application resources, can be dynamically provisioned on a pay per use basis, purely based on the user's need. However, the demands and requirements of different users vary significantly. In order to maximize the revenue, a flexible pricing approach is required, which can address these diverse requirements systematically. These systemic approaches need to estimate the potential value of such services to specific users for a specific context. The tradeoffs from potential value drivers also need to be accounted for while prioritizing the value drivers. In these lines, the current study proposes a flexible pricing approach for Infrastructure as a Service (IaaS), one of the important delivery models, based on its perceived value to multiple key stakeholders. The proposed approach prioritizes and aggregates the key features of IaaS for the migration to cloud, from multiple key users' perspective by integrating fuzzy set theory and analytic hierarchy process for group</p>	10.1007/s40171-015-0093-1	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40171-015-0093-1	SpringerLink
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		decision making under consensus. Subsequently, the prioritization is mapped with a utility function to estimate the trade-offs from each value driver. The performance of the proposed approach has also been compared with that of another flexible pricing model through a case study.			
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Practical interruptible conversations: distributed dynamic verification with multiparty session types and Python	Demangeon, Romain, Honda, Kohei, Hu, Raymond, Neykova, Romyana, Yoshida, Nobuko,	<p>The rigorous and comprehensive verification of communication-based software is an important engineering challenge in distributed systems. Drawn from our industrial collaborations (Ocean Observatories Initiative, http://www.oceanobservatories.org/, JBoss Savara Project, http://www.jboss.org/savara) on Scribble, a choreography description language based on multiparty session types, and its theoretical foundations (Honda et al., in POPL, pp 273–284, 2008), this article proposes a dynamic verification framework for structured interruptible conversation programming. We first present our extension of Scribble to support the specification of asynchronously interruptible conversations. We then implement a concise API for conversation programming with interrupts in Python that enables session types properties to be dynamically verified for distributed processes. Finally, we expose the underlying theory of our interrupt mechanism, studying its syntax and semantics, its integration in MPST theory and proving the correctness of our design. Our</p>	10.1007/s10703-014-0218-8	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10703-014-0218-8	SpringerLink
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		<p>framework ensures the global safety of a system in the presence of asynchronous interrupts through independent runtime monitoring of each endpoint, checking the conformance of the local execution trace to the specified protocol. The usability of our framework for describing and verifying choreographic communications has been tested by integration into the large scientific cyberinfrastructure developed by the Ocean Observatories Initiative. Asynchronous interrupts have proven expressive enough to represent and verify their main classes of communication patterns, including asynchronous streaming and various timeout-based protocols, without introducing any implicit synchronisations. Benchmarks show conversation programming and monitoring can be realised with little overhead.</p>			
Internet of Things	Wortmann, Felix, Flüchter, Kristina,		10.1007/s12599-015-0383-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12599-015-0383-3	SpringerLink

Rapid Mapping: geomatics role and research opportunities	Ajmar, Andrea, Boccardo, Piero, Disabato, Franca, Giulio Tonolo, Fabio,	In recent years an increasing number of extreme meteorological events have been recorded. Geomatics techniques have been historically adopted to support the different phases of the Emergency Management cycle with a main focus on emergency response, initial recovery and preparedness through the acquisition, processing, management and dissemination of geospatial data. In the meantime, the increased availability of geospatial data in terms of reference topographic datasets, made available by authoritative National Mapping Cadastre Agencies or by Collaborative Mapping initiatives like OpenStreetMap, as well as of remotely sensed imagery, poses new challenges to the Geomatics role in defining operational tools and services in support of emergency management activities. This paper is mainly focused on the role of Geomatics in supporting the response phase of the Emergency Management cycle through Rapid Mapping activities, which can be defined as "the on-demand and fast provision (within hours or days) of geospatial information in support of emergency management	10.1007/s12210-015-0410-9	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12210-015-0410-9	SpringerLink
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		<p>activities immediately following an emergency event” (source: European Union, http://emergency.copernicus.eu/mapping/ems/service-overview).</p> <p>Management of geospatial datasets (both reference and thematic), Remote Sensing sensors and techniques and spatial information science methodologies applied to Rapid Mapping will be described, with the goal to highlight the role that Geomatics is currently playing in this domain.</p> <p>The major technical requirements, constraints and research opportunities of a Rapid Mapping service will be discussed, with a specific focus on: the time constraints of the service, the data quality requirements, the need to provide replicable products, the need for consistent data models, the advantages of data interoperability, the automation of feature extraction procedures to reduce the need for Computer Aided Photo Interpretation, the dissemination strategies.</p>			
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<p>The Consequences of Explicit and Implicit Gender Attitudes and Candidate Quality in the Calculations of Voters</p>	<p>Mo, Cecilia Hyunjung,</p>	<p>How much does a voter's attitude towards female versus male leadership manifest itself at the ballot box and when does information regarding candidate qualifications or the lack thereof matter in this relationship? I conduct an in-depth survey, which includes a vote choice experiment randomizing the sex of the more qualified candidate, a novel gender and leadership Implicit Association Test, and a measure of explicit gender attitudes to explore this question. I find that the propensity to pick a female candidate increases as explicit and implicit attitudes against female leadership decrease, suggesting that traditional explicit measures underestimate the effects of gender attitudes and miss a key dimension of people's preferences. Gender attitudes in the electoral process remain consequential, but have grown subtler, which is missed when only assessing people's self-reported explicit attitudes. Fortunately, the effects of voters' gender attitudes can be attenuated by candidate qualification information; however, it does not rid the effects of gender on vote choice uniformly.</p>	<p>10.1007/s11109-014-9274-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s11109-014-9274-4</p>	<p>SpringerLink</p>
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		<p>People who explicitly state a preference for male leaders do not respond to individuating information, even if the female candidate is clearly more qualified than her male counterpart. However, people who implicitly prefer male leaders, but explicitly state being gender-equitable respond to individuating information and tend to select the more qualified candidate regardless of the candidate's sex. The study points to the significance of dual process account of reasoning—acknowledging that individuals operate on two levels, System 1 (automatic and implicit) and System 2 (effortful and explicit)—in understanding voting behavior.</p>			
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<p>The economics of microgravity research</p>	<p>DiFrancesco, Jeanne M, Olson, John M,</p>	<p>In this introduction to the economics of microgravity research, DiFrancesco and Olson explore the existing landscape and begin to define the requirements for a robust, well-funded microgravity research environment. This work chronicles the history, the opportunities, and how the decisions made today will shape the future. The past 60 years have seen tremendous growth in the capabilities and resources available to conduct microgravity science. However, we are now at an inflection point for the future of humanity in space. A confluence of factors including the rise of commercialization, a shifting funding landscape, and a growing international presence in space exploration, and terrestrial research platforms are shaping the conditions for full-scale microgravity research programs. In this first discussion, the authors focus on the concepts of markets, tangible and intangible value, research pathways and their implications for investments in research projects, and the collateral platforms needed. The opportunities and implications for adopting new</p>	<p>10.1038/npjmgrav.v.2015.1</p>	<p>https://www.nature.com/articles/npjmgrav20151.pdf</p>	<p>SpringerLink</p>
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		approaches to funding and market-making illuminate how decisions made today will affect the speed of advances the community will be able to achieve in the future.			
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Introducing system interdependency into infrastructure appraisal: from projects to portfolios to pathways	Young, Kate, Hall, Jim W,	Current methods for appraisal of infrastructure projects have been developed to consider multiple criteria, wider economic impacts and uncertainty, yet their focus on standalone projects and sector specific methods ignores the widely acknowledged 'system of system' interactions between infrastructure networks. Here we draw inspiration from real options 'in' projects to build on current appraisal methods, extending the analysis from single projects to cross-sector regional portfolios and finally to temporally differentiated development pathways; quantifying each stage through a case study on the Thames Hub Vision. The result is a system perspective of the investments, including: (i) the emergent effects of infrastructure asset interactions and how these are affected by the timing and order of development; (ii) an understanding of the 'opportunity' value of an investment through its ability to restrict or enable further developments; and (iii) the total required resources and potential environmental outcomes. Through our case study we demonstrate these effects,	10.1186/s40551-015-0005-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s40551-015-0005-8	SpringerLink
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		<p>identifying system effects sufficient to reverse the outcome of the analysis from a net negative, to a net positive result. Furthermore, we show that the enabling effects of an asset on future developments can create impacts an order of magnitude larger than those observed through current individual asset appraisals. Our developments allow the creation of a decision support tool capable of more fully evaluating the effects of infrastructure investments, with a focus on the long-term opportunity provided by development strategies. The work provides a platform for prioritisation of investments across sectors and for highlighting cross-sector effects, thereby encouraging stakeholder engagement and collaboration. Further work is necessary to explore the effects of intrinsic socio-economic uncertainty in the modelling assumptions and feedbacks between investments and future projections, such as population change and economic growth.</p>			
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<p>The position of the Low Carbon Growth Partnership (LCGP): at the end of Japan's navigation between the Kyoto Protocol and the APP</p>	<p>Oh, Chaewoon, Matsuoka, Shunji,</p>	<p>A new climate change institutional package, the East Asia Low Carbon Growth Partnership (LCGP), has been recently developed. The LCGP has significant implications because it was initiated by Japan, which has navigated between the Kyoto Protocol (KP) and the Asia-Pacific Partnership on Clean Development and Climate (APP) but ended the navigation by announcing its intention not to participate in the second commitment period of the KP. This paper investigates the position of the LCGP on the spectrum drawn by the KP and the APP using the theoretical ground of normative contestation. Results show that the normative stance of the LCGP is skewed toward the APP; however, the LCGP differentiates itself from the APP by its own functional properties and through its institutional fit with another regional institution, the East Asia Summit. The LCGP puts another complexion on global climate change governance.</p>	<p>10.1007/s10784-013-9219-0</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10784-013-9219-0</p>	<p>SpringerLink</p>
<p>Introduction to the special section on managing system change in aviation: What makes for successful change?</p>	<p>Corrigan, Siobhán, McDonald, Nick,</p>		<p>10.1007/s10111-014-0308-9</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-014-0308-9</p>	<p>SpringerLink</p>

<p>An approach to collaborative learning and the serious game development</p>	<p>Corrigan, S., Zon, G. D. R., Maj, A., McDonald, N., Mårtensson, L.,</p>	<p>This paper presents the overall learning process that evolved during the MASCA project (MAnaging System Change in Aviation—EU FP7 funded project (2010–2013), specifically focusing on the one of the key elements of the overall learning approach, the development of a serious game (SKYBOARD) and the role the game played in supporting the implementation of airport collaborative decision-making (A-CDM) in a major European airport. The underlying principles of the learning process was based on ongoing and collaborative learning in the workplace, with each phase of learning involving preparation and guidance, collaborative learning, consolidation of that learning and practically focused next steps that can be deployed to support overall change management. The aim of SKYBOARD was to aid communication and collaboration when introducing A-CDM, and thereby supporting the cultural change that comes with this introduction. The development of SKYBOARD was based upon an initial training needs analysis and an iterative development and implementation approach at a</p>	<p>10.1007/s10111-014-0289-8</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10111-014-0289-8</p>	<p>SpringerLink</p>
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		<p>major European airport. The research demonstrated that we are at the beginning of a fundamental shift in the way both learning and working is happening in organisations. Therefore, the establishment of a collaborative learning process and integrated learning package needs to focus on supporting continuous performance improvement and learning (competency and capability at all levels) and to ensure this overall learning is fully aligned to the overall strategic blueprint of the organisation. The evaluation of SKYBOARD demonstrated that serious games can support collaborative learning and enhanced communication and that such games should be key resource in any learning environment and proved to be a highly effective support to the implementation of A-CDM in this case.</p>			
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Improving performance in medical practices through the extended use of electronic medical record systems: a survey of Canadian family physicians	Raymond, Louis, Paré, Guy, Ortiz de Guinea, Ana, Poba-Nzaou, Placide, Trudel, Marie-Claude, Marsan, Josianne, Micheneau, Thomas,	<p>Background Numerous calls have been made for greater assimilation of information technology in healthcare organizations in general, and in primary care settings in particular. Considering the levels of IT investment and adoption in primary care medical practices, a deeper understanding is needed of the factors leading to greater performance outcomes from EMR systems in primary care. To address this issue, we developed and tested a research model centered on the concept of Extended EMR Use. Methods An online survey was conducted of 331 family physicians in Canadian private medical practices to empirically test seven research hypotheses using a component-based structural equation modeling approach. Results Five hypotheses were partially or fully supported by our data. Family physicians in our sample used 67% of the clinical and 41% of the communicational functionalities available in their EMR systems, compared to 90% of the administrative features. As expected, extended use was associated with significant improvements in perceived performance benefits.</p>	10.1186/s12911-015-0152-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s12911-015-0152-8	SpringerLink
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		<p>Interestingly, the benefits derived from system use were mainly tied to the clinical support provided by an EMR system. The extent to which physicians were using their EMR systems was influenced by two system design characteristics: functional coverage and ease of use. The more functionalities that are available in an EMR system and the easier they are to use, the greater the potential for exploration, assimilation and appropriation by family physicians.</p> <p>Conclusions Our study has contributed to the extant literature by proposing a new concept: Extended EMR Use. In terms of its practical implications, our study reveals that family physicians must use as many of the capabilities supported by their EMR system as possible, especially those which support clinical tasks, if they are to maximize its performance benefits. To ensure extended use of their software, vendors must develop EMR systems that satisfy two important design characteristics: functional coverage and system ease of use.</p>			
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Industrialization Value, Market Maturity and Ethics	Chauvet, Emmanuel,	<p>The identification of regularities in time-dependent functional structures leads to turn patterns, observed according to a given time resolution, into functional attractors on which it is first possible to found any complex system. Rationality is introduced under the form of probabilities for functions to make up a given attractor beyond the first rough descriptive pattern. These physically characterized attractors are the medium enabling the definition of value as an extension of the Prospect Theory (PT) overall utility, considering that the actions produced by their functions are outcomes which are modulated by PT psychological value functions and an operational value appears naturally as an optimization taking account of diminishing sensitivity to action efficiency. Nevertheless, this diminishing sensitivity, when applied to negative actions, introduces also a bias of negative externalities underestimation. An attractor-based complex system evolution in an industrial context is described according to Manufacturing Readiness Level and to the main milestones of an industrial project, corresponding to singular points of maturity</p>	10.1007/s10551-014-2086-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10551-014-2086-y	SpringerLink
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		<p>expressed in terms of probability—or decision—weighting, up to the system release to the market. So, a maturity assessment heuristics is proposed both for the system development and for its marketing. The supply and demand law is established, highlighting that the ideal case of a purely mature economy can be a good approximation reducing the complexity of the exchanges analysis. Equilibria are discussed as depending on an initial point from which the usual Gaussian probability distribution and a speculative weight qualify equilibrium.</p>			
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<p>An integrated systems approach to plateau ecosystem management—a scientific application in Qinghai and Tibet plateau</p>	<p>Liu, Fang, Bi, Zhuming, Xu, Eric L., Ga, Qin, Yang, Quanyu, Yang, Yingzhong, Ma, Lan, Wuren, Tana, Ge, Rili,</p>	<p>There is a global trend of the shortage of nature resources, such as water and wildlife, which have suffered dramatic losses due to over-use, pollution, habitat loss, and, increasingly, changes caused by global warming. To make the planet more sustainable, abundant data has to be collected and analyzed from ecosystems for scientific decision-making, restoring and preserving natural resources. In this paper, an integrated systems approach has been proposed for the data acquisition and analysis in information management of an ecosystem; it is a direct extension of an agriculture ecosystem enterprise information system (AEEIS) developed by Xu et al. (Genomics Proteomics Bioinformatics 3:5–17, 2008). The challenges in system development have been discussed, and the significance of the developed system has been illustrated through a thorough discussion and a case study on the genetic coding and expression of antelopes. In the case study, an IoT-based enterprise information system (EIS) has been applied to investigate the effects of the signal transducer</p>	<p>10.1007/s10796-012-9406-5</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-012-9406-5</p>	<p>SpringerLink</p>
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		<p>and activator of transcription 3 (STAT3) on the adaptation mechanism to high altitude hypoxia. Two remarkable conclusions are (i) the levels of the STAT3 mRNA and protein vary from one tissue to another, and the highest level is in the lung tissue, and (ii) Tibetan antelope's expression of STAT3 mRNA and protein are higher than that from plain sheep. Based on the fact that a Tibetan antelope has a higher adaptability to hypoxia; it has illustrated that the hypoxic STAT3-specific expression is one of the molecular bases of high altitude hypoxia adaptation in Tibetan antelope.</p>			
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Reuse of requirements reduced time to market at one industrial shop: a case study	Goldin, Leah, Berry, Daniel M.,	<p>Many a computer-based system (CBS) developed in one division of the Israel Aerospace Industries, is a derivation of formerly delivered CBSs. Sometimes, a CBS that was developed over decades needs to be redesigned for a new customer or for new technology. In addition, the requirements management process in the division has to deal with an extensive system of systems, a matrix organizational structure, and many subcontractors in order to develop any fully operational CBS. It has become obvious that any generic building block in any product developed by any project in a project family stands a chance to be reused to build new products in other projects of the same project family. Moreover, this reuse is best if it begins with the consideration of the reuse of a requirements specification of the building block, in order to save the time and money of the block's development. The reused artifact can be the contract description of the building block, from very early in the lifecycle. Alternatively, the reused artifact can be detailed hardware and software specifications for the building block, from later</p>	10.1007/s00766-013-0182-7	http://link.springer.com/openurl/pdf?id=doi:10.1007/s00766-013-0182-7	SpringerLink
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		<p>in the lifecycle. With which specification reuse begins depends on the purpose of the reuse. No matter when a reuse began, it led to some significant reduction in the product's time to market, i.e., its time to delivery. This paper is a case study of several instances in an industrial setting of building-block reuse within a large-scale system being developed in the division. It reports how these reuses were discovered and carried out. Among the contributions of this paper is a description of the division's multilevel requirements hierarchy that is based on the multilevel architecture of the CBS to be developed. Also contributed the division's idea of project-family-based reuse, as opposed to product-line-based reuse. The paper shows how basing reuse on a project family made proactive reuse possible. The paper then analyzes data from the division's requirements-management tool about these reuses to assess the impact of requirements reuse on time to market. Finally, it confirms this quantitative assessment by a qualitative assessment garnered from quotations gathered from interviews of four key people two-and-a-half years</p>			
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		after the end of the period of the case study.			
Water for Energy: Inconsistent Assessment Standards and Inability to Judge Properly	Madani, Kaveh, Khatami, Sina,	The water-energy nexus field is experiencing growing attention to assessing the impacts of energy generation on water resources. Numerous studies in recent years have used a range of metrics and methods for measuring and quantifying the water impacts of energy. This article argues that the field is suffering from a lack of consistency in the interpretation and application of different evaluation metrics due to competition for the development of the 'correct' evaluation method. The uncertainties caused by inconsistent analysis methods, assumptions, scales and boundaries make the available information confusing and hamper our abilities to understand comprehensively and judge properly. The article highlights some of the major caveats that need to be considered in using the results of the previous studies and applying the existing metrics for evaluating the impacts of energy production on water resources.	10.1007/s40518-014-0022-5	http://link.springer.com/openurl/pdf?id=doi:10.1007/s40518-014-0022-5	SpringerLink

Peer-to-peer aggregation for dynamic adjustments in power demand	Pournaras, Evangelos, Warnier, Martijn, Brazier, Frances M. T.,	Energy demand-side management becomes a well-established approach in the Smart Power Grid. Aggregation of consumption information is a critical operation performed by most demand-side energy management mechanisms as it provides information about the required adjustment of power demand. However, a centralized demand-side energy management approach controlled exclusively by utility companies is not always scalable, robust and aligned to the privacy requirements of consumers. A large amount of end-user consumption information is aggregated continuously in centralized approaches. This paper introduces an alternative demand-side energy management scheme: ALMA , the Adaptive Load Management by Aggregation . In ALMA , consumers adjust their demand by selecting between different incentivized demand-options based on aggregate consumption information provided by peer-to-peer aggregation mechanisms. The feasibility of dynamic adjustment in power demand is evaluated and confirmed analytically using data from the	10.1007/s12083-013-0246-y	http://link.springer.com/openurl/pdf?id=doi:10.1007/s12083-013-0246-y	SpringerLink
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		current reality and practice of Smart Power Grids.			
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<p>Intelligent polar cyberinfrastructure: enabling semantic search in geospatial metadata catalogue to support polar data discovery</p>	<p>Li, Wenwen, Bhatia, Vedit, Cao, Kai,</p>	<p>Polar regions have garnered substantial research attention in recent years because they are key drivers of the Earth's climate, a source of rich mineral resources, and the home of a variety of marine life. Nevertheless, global warming over the past century is pushing the polar systems towards a tipping point: the systems are at high-risk from melting snow and sea ice covers, permafrost thawing, and acidification of the Arctic oceans. To increase understanding of the polar environment, the National Science Foundation established a Polar Cyberinfrastructure (CI) program, aimed at utilizing advanced software architecture to support polar data analysis and decision-making. At the center of this Polar CI research are data resources and data discovery components that facilitate the search and retrieval of polar data. This paper reports our development of a semantic search tool that supports the intelligent discovery of polar datasets. This tool is built on latent semantic analysis techniques, which improves search performance by identifying hidden semantic associations between terminologies used in the various datasets'</p>	<p>10.1007/s12145-014-0185-z</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s12145-014-0185-z</p>	<p>SpringerLink</p>
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		<p>metadata. The software tool is implemented using an object-oriented design pattern and has been successfully integrated into a popular open source metadata catalog as a new semantic search support. A semantic matrix is maintained persistently within the catalogue to store the semantic associations. A dynamic update mechanism was also developed to allow automated update of semantics once more metadata are loaded into or removed from the catalog. We explored the effects of rank reduction to the effectiveness of this semantic search module and demonstrated its better performance than the traditional search techniques.</p>			
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Towards cloud based big data analytics for smart future cities	Khan, Zaheer, Anjum, Ashiq, Soomro, Kamran, Tahir, Muhammad Atif,	A large amount of land-use, environment, socio-economic, energy and transport data is generated in cities. An integrated perspective of managing and analysing such big data can answer a number of science, policy, planning, governance and business questions and support decision making in enabling a smarter environment. This paper presents a theoretical and experimental perspective on the smart cities focused big data management and analysis by proposing a cloud-based analytics service. A prototype has been designed and developed to demonstrate the effectiveness of the analytics service for big data analysis. The prototype has been implemented using Hadoop and Spark and the results are compared. The service analyses the Bristol Open data by identifying correlations between selected urban environment indicators. Experiments are performed using Hadoop and Spark and results are presented in this paper. The data pertaining to quality of life mainly crime and safety & economy and employment was analysed from the data catalogue to measure the indicators spread over years to	10.1186/s13677-015-0026-8	https://www.biomedcentral.com/openurl/pdf?id=doi:10.1186/s13677-015-0026-8	SpringerLink
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		assess positive and negative trends.			
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<p>Repertoires of collaboration for common operating pictures of disasters and extreme events</p>	<p>Bunker, Deborah, Levine, Linda, Woody, Carol,</p>	<p>Disasters are dynamic, emergent scenarios involving diverse stakeholders in complex decision making and as such, disaster response systems must account for these conditions. We suggest that emergency service agencies should consider supplementing their traditional command and control approaches and common operating pictures (COP), with purposeful collaborative approaches. These would facilitate the generation of common operating pictures incorporating dynamic and emergent characteristics, providing a range of options with which to better respond to disasters. Collaborative management and negotiated integration of information represent a paradigmatic shift in our thinking about disaster response. We have utilized McCann's (1983) Social Problem Solving Negotiated Arrangements (SPS-NA) to highlight problems with conventional approaches during three disaster scenarios. As a result of lessons learned from this analysis we suggest that developing supplementary repertoires of collaboration would have a positive impact</p>	<p>10.1007/s10796-014-9515-4</p>	<p>http://link.springer.com/openurl/pdf?id=doi:10.1007/s10796-014-9515-4</p>	<p>SpringerLink</p>
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		on improved COP for effective disaster response outcomes.			
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Environment modeling and simulation for automated testing of soft real-time embedded software	Iqbal, Muhammad Zohaib, Arcuri, Andrea, Briand, Lionel,	<p>Given the challenges of testing at the system level, only a fully automated approach can really scale up to industrial real-time embedded systems (RTES). Our goal is to provide a practical approach to the model-based testing of RTES by allowing system testers, who are often not familiar with the system's design but are application domain experts, to model the system environment in such a way as to enable its black-box test automation. Environment models can support the automation of three tasks: the code generation of an environment simulator to enable testing on the development platform or without involving actual hardware, the selection of test cases, and the evaluation of their expected results (oracles). From a practical standpoint—and such considerations are crucial for industrial adoption—environment modeling should be based on modeling standards (1) that are at an adequate level of abstraction, (2) that software engineers are familiar with, and (3) that are well supported by commercial or open source tools. In this paper, we propose a precise environment modeling</p>	10.1007/s10270-013-0328-6	http://link.springer.com/openurl/pdf?id=doi:10.1007/s10270-013-0328-6	SpringerLink
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		methodology fitting these requirements and discuss how these models can be used to generate environment simulators. The environment models are expressed using UML/MARTE and OCL, which are international standards for real-time systems and constraint modeling. The presented techniques are evaluated on a set of three artificial problems and on two industrial RTES.			
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Risk-neutral equilibria of noncooperative games	Nau, Robert,	<p>Game-theoretic solution concepts such as Nash and Bayesian equilibrium start from an assumption that the players' sets of possible payoffs, measured in units of von Neumann–Morgenstern utility, are common knowledge, and they go on to define rational behavior in terms of equilibrium strategy profiles that are either pure or independently randomized and which, in applications, are often taken to be uniquely determined or at least tightly constrained. A mechanism through which to obtain a common knowledge of payoff functions measured in units of utility (or common priors over predetermined sets of such functions) is not part of the model. This paper describes an operational method of constructing a state of common knowledge of the key parameters of the players' utility functions in terms of conditional small bets on the game's outcome. When the rationality criterion of joint coherence (no arbitrage) is applied in this setting, the solution of a game is typically characterized by a convex set of correlated equilibria. In the most general case, where players are risk averse, the</p>	10.1007/s11238-013-9413-0	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11238-013-9413-0	SpringerLink
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		parameters of the equilibria are risk-neutral probabilities, interpretable as products of subjective probabilities and relative marginal utilities for money, as in financial markets. Risk aversion generally enlarges the set of equilibria and may present opportunities for Pareto-improving modifications of the rules of the game.			
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River management system development in Asia based on Data Integration and Analysis System (DIAS) under GEOSS	Koike, Toshio, Koudelova, Petra, Jaranilla-Sanchez, Patricia Ann, Bhatti, Asif Mumtaz, Nyunt, Cho Thanda, Tamagawa, Katsunori,	This paper introduces the process of development and practical use implementation of an advanced river management system for supporting integrated water resources management practices in Asian river basins under the framework of GEOSS Asia water cycle initiative (AWCI). The system is based on integration of data from earth observation satellites and in-situ networks with other types of data, including numerical weather prediction model outputs, climate model outputs, geographical information, and socio-economic data. The system builds on the water and energy budget distributed hydrological model (WEB-DHM) that was adapted for specific conditions of studied basins, in particular snow and glacier phenomena and equipped with other functions such as dam operation optimization scheme and a set of tools for climate change impact assessment to be able to generate relevant information for policy and decision makers. In situ data were archived for 18 selected basins at the data integration and analysis system of Japan (DIAS) and demonstration projects were carried out	10.1007/s11430-014-5004-3	http://link.springer.com/openurl/pdf?id=doi:10.1007/s11430-014-5004-3	SpringerLink
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		showing potential of the new system. It included climate change impact assessment on hydrological regimes, which is presently a critical step for sound management decisions. Results of such three case studies in Pakistan, Philippines, and Vietnam are provided here.			
Integrated Design Flow Methodology for Open-Source Innovations in Smart Transportation: Empowering Accountable AI and Cybersecurity	Kanak A.		10.1007/978-3-032-06763-0_112	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105019311291&origin=inward	Scopus
Co-Design of Communication, Computing and Control in Cyber-Physical Systems, CoC3CPS 2025				https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105014740058&origin=inward	Scopus
Tracks and workshops which complemented the 19th European Conference on Software Architecture, ECSA 2025				https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105016240197&origin=inward	Scopus
Workshops and other satellite events organized alongside the 22nd International Conference on Service-Oriented Computing, ICSOC 2024				https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105013052713&origin=inward	Scopus
Data-driven management for cyber-physical-social distribution networks: A comprehensive review and complex system-of-systems data analytics framework	Pourramezani K.		10.1016/j.egyr.2025.08.049	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105015042876&origin=inward	Scopus
Navigating the future: the expanding role of unmanned surface vehicles in maritime security	Boretti A.		10.1007/s12198-025-00314-x	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105018640774&origin=inward	Scopus
Organizational factors of software performance testing for systems of systems: A case study using high-reliability organization theory to understand an outage	Brataas G.		10.1016/j.jss.2025.112444	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105005220231&origin=inward	Scopus
Cyber-Resilient Controllers for Smart Distribution Grid Control Layers	Vijayasekharan Chandramathi J.S.		10.3390/en18153916	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105013155033&origin=inward	Scopus

MS-GERT model for effectiveness evaluation of multi-stage offensive and defensive adversarial system-of-systems	Zhang J.		10.12305/j.issn.1001-506X.2025.07.17	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105016317090&origin=inward	Scopus
Integrating Systems Methodologies for Australian Undersea Surveillance: A Systematic Literature Review	Milledge T.J.		10.1002/sys.21806	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85215686348&origin=inward	Scopus
Can Urban Air Mobility become reality? Opportunities and challenges of UAM as innovative mode of transport and DLR contribution to ongoing research	Pak H.		10.1007/s13272-024-00733-x	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85192226615&origin=inward	Scopus
Formal methods in industrial critical systems	Cimatti A.		10.1007/s10009-025-00815-z	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105007767781&origin=inward	Scopus
Strengths and Limitations of Existing STAMP Tools for Analyzing System of Systems Risks	Pettersson M.N.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105008012063&origin=inward	Scopus
Grey principal component analysis model of effectiveness evaluation for Joint Operation system-of-systems considering indicator synergism reconstruction	Chen D.		10.12305/j.issn.1001-506X.2025.05.18	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105008435374&origin=inward	Scopus
Application of Systems-of-Systems Theory to Electromagnetic Warfare Intentional Electromagnetic Interference Risk Assessment	Davies N.		10.3390/systems13040244	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105003698322&origin=inward	Scopus
Understanding multiple resilience dividends and system boundaries in disaster- and climate-risk management: a systems approach for enhanced decision-making	Hochrainer-Stigler S.		10.1088/1748-9326/adac7a	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105001168840&origin=inward	Scopus
Computational Framework for Assessing Mission Outcomes with Humans and Robots	Liu X.		10.2514/1.J063846	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105003018775&origin=inward	Scopus
Designing a Method for Identifying Functional Safety and Cybersecurity Requirements Utilizing Model-Based Systems Engineering	Nolte B.		10.3390/asi8020045	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105003535999&origin=inward	Scopus
A Blockchain-Driven Cyber-Systemic Approach to Hybrid Reality	Pirani M.		10.3390/systems13040294	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105003692867&origin=inward	Scopus

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HabSim-HMS: A Systems Testbed to Investigate Situational Awareness for Extraterrestrial Habitation	Krishnan R.M.		10.2514/1.J064693	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85219749603&origin=inward	Scopus
Deriving optimal defensive resource deployment of complex system-of-systems for risk response considering cascading effect	Zhang J.		10.1080/01605682.2024.2346610	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85193735737&origin=inward	Scopus
Artificial Intelligence-Driven Optimization for Three-Dimensional Integrated Circuit Manufacturing: A System of Systems Framework	Sheikh A.		10.1109/TCPMT.2025.3549707	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105000100002&origin=inward	Scopus
CSoS-STRE: A combat system-of-system space-time resilience enhancement framework	Xu R.		10.1007/s42524-025-4179-y	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105001648893&origin=inward	Scopus
Adaptive Resilience and Self-Healing in Aerospace System-of-Systems (SoS) Using Graph Neural Networks and Adversarial Machine Learning	Das A.K.		10.1109/ICORT64008.2025.11115648	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105016181626&origin=inward	Scopus
System-of-System Combat Efficiency Evaluation Methods Based on DoDAF-GERT	Luo T.		10.1109/IEEECONF65522.2025.11136956	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105016787055&origin=inward	Scopus
Towards Continuous Security Assessment: Integrating Model-Based Risk Assessment and Large Language Models	Werthwein M.		10.1109/ICNS65417.2025.10976786	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105005198036&origin=inward	Scopus
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A boundary-based framework for analysing cross-sector cooperation in societal security—Svalbard case studies	Zarghooni-Hoffmann S.		10.1080/09662839.2025.2566513	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105019650233&origin=inward	Scopus

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Risk of Cyberattacks Arising from Strategic Alliances with Big Tech	Lee J.S.		10.1080/07421222.2025.2520176	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105013958341&origin=inward	Scopus
Design and Development of Automated Test Equipment for Airborne Surveillance System	Kumar A.		10.1109/SPACE65882.2025.11171075	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105018465662&origin=inward	Scopus
Scalable Discrete Event Simulation Tool for Large-Scale Cyber-Physical Energy Systems: Advancing System Efficiency and Scalability	Haque K.A.		10.1109/ACCESS.2025.3578948	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105007911978&origin=inward	Scopus
Cybersecurity Challenges of Autonomous Systems	Hamad M.		10.23919/DATE64628.2025.10992708	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105006895464&origin=inward	Scopus
Cascading impacts to critical national infrastructure in connected places triggered by cyber-attacks on smart EV charging infrastructure	Shukla M.		10.1093/iti/liaf007	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105013351568&origin=inward	Scopus
Energy Monitoring Systems Analysis and Development: A Case Study for Graph-Based Modelling	Carvalho T.		10.5220/0013170000003896	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105001860731&origin=inward	Scopus
Correction to AIAA SCITECH 25-2418: [Aircraft Stores Compatibility and novel uses of analogy] (American Institute of Aeronautics and Astronautics Inc, AIAA)	Tutty M.G.		10.2514/6.2025-2418.c1	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105001481656&origin=inward	Scopus

Identifying and Architecting Microservices for Edge Computing	Vora U.		10.1109/ICSA-C65153.2025.00032	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105007920758&origin=inward	Scopus
Establishing Common Values in Design for Sustainability	Kroculick J.B.		10.1109/RAMS48127.2025.10935048	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105002274180&origin=inward	Scopus
Application of OOSEM Method in Requirements Analysis of System Security Engineering	Xin C.		10.1109/EECT64505.2025.10966935	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105004722182&origin=inward	Scopus
A framework for resilience analysis of infrastructure systems	Altabey W.A.		10.1016/B978-0-443-29861-5.00014-7	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105010988858&origin=inward	Scopus
Sustainability and Resiliency in Airport Energy Infrastructure: A Multidisciplinary Methodology for Optimizing Building Operations	Kimanya H.M.		10.2514/6.2025-1034	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105001112541&origin=inward	Scopus
A framework for the assurance of AI-enabled systems	Kapusta A.S.		10.1117/12.3056719	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105015305598&origin=inward	Scopus
Towards a SoIS model for University Surveillance	De Cerqueira Figueiredo R.		10.1109/SES6601.2025.00009	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105011043977&origin=inward	Scopus
A Review on the Application of Model-Based Systems Engineering in the Development of Safe Circular Systems	Lipšini Z.		10.1109/ACCESS.2025.3575578	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105007306596&origin=inward	Scopus
Managing Trustworthiness in Advanced Autonomous Systems	Sarathy S.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105005141559&origin=inward	Scopus
Secure and Efficient Integration of Blockchain, Digital Twins, and Metaverse for Real-Time Asset Management	Singh M.K.		10.1109/ICDT63985.2025.10986435	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105006452108&origin=inward	Scopus
Assessment and Optimization of System Resilience: A Critical Review	Savachkin A.		10.1007/978-3-031-76440-0_20	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=105003560077&origin=inward	Scopus

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Multidirectional modular conditional safety certificates	Amorim T.		10.1007/978-3-319-24249-1_31	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84969834624&origin=inward	Scopus
Multidirectional modular conditional safety certificates	Amorim T.		10.1007/978-3-319-24249-1_31	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84969834624&origin=inward	Scopus
Connected autonomous vehicles and systems-can combining safety & security standards help to avoid economic loss, security breaches and catastrophes?	Schoitsch E.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84947056403&origin=inward	Scopus
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Multidisciplinary systems engineering: Architecting the design process	Crowder J.A.		10.1007/978-3-319-22398-8	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85008940822&origin=inward	Scopus
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Using structured assurance case approach to analyse security and reliability of critical infrastructures	Netkachova K.		10.1007/978-3-319-24249-1_30	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84969802542&origin=inward	Scopus
Composing message translators and inferring their data types using tree automata	Andriescu E.		10.1007/978-3-662-46675-9_3	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84944204462&origin=inward	Scopus
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Towards a framework for alignment between automotive safety and security standards	Schmittner C.		10.1007/978-3-319-24249-1_12	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84969850455&origin=inward	Scopus
A modeling framework based on SCOR model towards supply chain risk management	Ben Jbara S.E.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84963690439&origin=inward	Scopus
Analyzing ballistic missile defense system effectiveness based on functional dependency network analysis	Yao J.		10.2174/1874110x01509010678	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84976546192&origin=inward	Scopus
NnCs: Randomization and informed search for novel naval cyber strategies	Rubin S.H.		10.1007/978-3-319-26450-9_8	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84951274824&origin=inward	Scopus
Vulnerability analyses of interdependent critical infrastructures: Case study of the Swedish national power transmission and railway system	Svegrup L.		10.1201/b19094-590	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84959019691&origin=inward	Scopus
Algorithms and tools for risk/impact evaluation in critical infrastructures	Foglietta C.		10.1007/978-3-662-44160-2_8	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84921341242&origin=inward	Scopus
Optimum concept of management and trade-off with risks	Prochazkova D.		10.1201/b17399-200	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84906709098&origin=inward	Scopus

Global food security support analysis data at nominal 1 km (GFSAD1km) derived from remote sensing in support of food security in the twenty-first century: Current achievements and future possibilities	Teluguntla P.		10.1201/b19322	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85051140400&origin=inward	Scopus
Multiscale habitat mapping and monitoring using satellite data and advanced image analysis techniques	Lang S.		10.1201/b19322	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=85054622388&origin=inward	Scopus
A Guide to develop Community Resilience performance goals and assessment metrics for decision making	McAllister T.P.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84978745367&origin=inward	Scopus
Conclusions	Kyriakides E.		10.1007/978-3-662-44160-2_13	https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84921417331&origin=inward	Scopus
Bulgarian coastal observing system	Palazov A.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84957967108&origin=inward	Scopus
Space & energy - Opportunities for space in a global energy grid	Versloot T.			https://www.scopus.com/inward/record.uri?partnerID=HzOxMe3b&scp=84994309583&origin=inward	Scopus

<p>A model based approach to system of systems risk management</p>		<p>This paper discusses the approaches required for risk management of 'traditional' (single) Systems and System of Systems (SoS) and identifies key differences between them. When engineering systems, the Risk Management methods applied tend to use qualitative techniques, which provide subjective probabilities and it is argued that, due to the inherent complexity of SoS, more quantitative methods must be adopted. The management of SoS risk must be holistic and should not assume that if risks are managed at the system level then SoS risk will be managed implicitly. A model-based approach is outlined, utilizing a central Bayesian Belief Network (BBN) to represent risks and contributing factors. Supporting models are run using a Monte Carlo approach, thereby generating results, which may be 'learnt' by the BBN, reducing the reliance on subjective data.</p>	<p>10.1109/SYSOSE.2015.7151940</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151940</p>	<p>IEEE Xplore</p>
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Security Assessment of Systems of Systems		<p>Engineering Systems of Systems is one of the new challenges of the last few years. This depends on the increasing number of systems that must interact one with another to achieve a goal. One peculiarity of Systems of Systems is that they are made of systems able to live on their own with well-established functionalities and requirements, and that are not necessarily aware of the joint mission or prepared to collaborate. In this emergent scenario, security is one crucial aspect that must be considered from the very beginning. In fact, the security of a System of Systems is not automatically granted even if the security of each constituent system is guaranteed. The aim of this paper is to address the problem of assessing security properties in Systems of Systems. We discuss the specific security aspects of such emergent systems, and propose the TeSSoS approach, which includes modelling and testing security properties in Systems of Systems and introduces the Red and Blue Requirements Specification concepts.</p>	10.1109/SESoS/WDES.2019.00017	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8882841	IEEE Xplore
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Safe Integration for System of Systems: The Safety Cube Theory		<p>This paper highlights the importance of integration in engineering practices and provides an overview for integration from two perspectives: system hierarchy and system behavior. Furthermore, the paper presents the Safety Cube theory for system of systems integration. Safety Cube simultaneously captures both hierarchical and behavioral perspectives required for integration in system of systems. An example application for the house hold robots has been presented through the paper.</p>	10.1109/SYSOSE.2019.8753867	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753867	IEEE Xplore
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System of Systems Engineering Approach for Complex Deterministic and Nondeterministic Systems (ACDANS)		<p>As new commercial and military systems evolve, engineers face significant challenges that require solutions beyond traditional systems engineering. For example, military commanders recognize that in order to confront threats from high-tech adversaries, an advanced system of systems (SoS) is required to coordinate combat across multiple battlefield domains: land, sea, air, space, and cyberspace. System of Systems Engineering (SoSE), along with associated Modeling and Simulation (M&S) tools, can fill some of this need, especially for operational decision-support for complex multi-domain environments. This paper presents an M&S-based SoSE approach for complex SoS composed of deterministic and non-deterministic subsystems supported with reinforcement learning. The paper presents this new methodology, use cases, and preliminary results that address specific SoS challenges for a set of complex decision-support challenges.</p>	10.1109/SOSE52739.2021.9497496	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9497496	IEEE Xplore
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<p>The Risk Assessment of System of Systems Considering Multistate Feature - A Case Study on Constellation</p>		<p>In this paper, we focus on the risk of System of Systems (SoS) considering multistate feature. The concept of SoS, the concept of risk of SoS, and the expression of multistate feature in SoS are discussed. Based on these conclusions, the risk assessment model is proposed by using the Markov chain and the universal generating function. In the end, a satellites constellation case is used to illustrate the methodological framework.</p>	<p>10.1109/RAM.2018.8463035</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8463035</p>	<p>IEEE Xplore</p>
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Towards Attack Models in Autonomous Systems of Systems		<p>In context of safety-critical Systems of Systems (SoS) that are built as a collection of several systems capable of fulfilling their own function as well as the overall SoS function, increase production efficiency and decrease human effort in such systems, one has to be able to guarantee critical properties such as safety and security. It is not sufficient to analyze and guarantee these critical properties isolated one from another, but one has to be able to provide joint analysis and guarantees on safety and security. This paper is our initial effort towards building a common safety and security assurance approach for complex SoS, where we start from identification and analysis of attack models and connecting them to the already identified functional safety requirements. In this way we will be able to assess system assets and vulnerabilities, and identify ways how an attacker could exploit them. We aim to connect attack modeling process to safety process by aligning mitigation strategies with safety requirements.</p>	10.1109/SYSOSE.2018.8428701	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428701	IEEE Xplore
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<p>A system of systems engineering perspective on IoT trustworthiness</p>		<p>The Internet of Things essentially refers to a distributed system consisting of interconnected objects and computing resources that provide services to human or other systems. Systems of this nature already are embedded in Systems of Systems (SoS) like smart factories and smart cities. This paper explores succinctly the concept of trustworthiness and how it can be applied to IoT systems and systems of systems.</p>	<p>10.1109/SYSOSE.2018.8428757</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428757</p>	<p>IEEE Xplore</p>
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System of Systems Characterisation assisting Security Risk Assessment		<p>System of Systems (SoS) is a term often used to describe the coming together of independent systems, collaborating to achieve a new or higher purpose. However, clarity is needed when using this term given that operational areas may be unfamiliar with the terminology. In this paper, we present an approach for refining System and SoS descriptions to aid multistakeholder communication and understanding; building on previous work, we illustrate an example of characterising a likely SoS. By identifying key stakeholders, systems, management and control, this approach supports the initial steps of a SoS security risk assessment approach using a tool-supported framework that supports operational needs towards requirements engineering.</p>	10.1109/SYSOSE.2018.8428765	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428765	IEEE Xplore
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Assessing Security Risk and Requirements for Systems of Systems		<p>A System of Systems (SoS) is a term used to describe independent systems converging for a purpose that could only be carried out through this interdependent collaboration. Many examples of SoSs exist, but the term has become a source of confusion across domains. Moreover, there are few illustrative SoS examples demonstrating their initial classification and structure. While there are many approaches for engineering of systems, less exist for SoS engineering. More specifically, there is a research gap towards approaches addressing SoS security risk assessment for engineering and operational needs, with a need for tool-support to assist modelling and visualising security risk and requirements in an interconnected SoS. From this, security requirements can provide a systematic means to identify constraints and related risks of the SoS, mitigated by human-user and system requirements. This work investigates specific challenges and current approaches for SoS security and risk, and aims to identify the alignment of SoS factors and concepts suitable</p>	10.1109/RE.2018.00061	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8491168	IEEE Xplore
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		for eliciting, analysing, validating risks with use of a tool-support for assessing security risk in the SoS context.			
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<p>Towards an automated security-by-design approach in automotive system-of-systems architectures</p>		<p>The development of future autonomous vehicles will become a challenging task, especially concerning the integration into a smart city context. Nowadays, vehicles must communicate with the surrounding environment to provide efficient driving features that prevent crashing and thus save passenger lives. However, the constant information exchange with the vicinity leads to growing attack surfaces of vehicles, which endangers the functional safety of vehicles in particular. Security-by-design seems to be a promising approach to overcoming security challenges and will become essential for the development of automotive architectures in the future. Therefore, the standard ISO-21434 was invented providing guidelines on how to tackle cybersecurity in the automotive context. One proposed method by this standard is the Threat Analysis and Risk Assessment (TARA) process used for analyzing cybersecurity threats. Nevertheless, no tools or approaches exist that provide full automation of the TARA process from an ISO-21434 perspective.</p>	<p>10.23919/SpliTech58164.2023.10193084</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10193084</p>	<p>IEEE Xplore</p>
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		Therefore, this paper proposes a concept to automate the TARA method by combining the security pattern engineering process with the Automotive Reference Architecture Model (ARAM) to enable a multi-layered security-by-design approach for the development of secure system-of-systems (SoS) architectures in conformity with ISO-21434.			
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<p>Training Support System for the Use of One ICT System of Systems in Risk and Emergency Management in the Transport of Dangerous Goods</p>		<p>Using AI, IoT, applied to a human digitality information and communication technology system, it is possible to innovate the way to inform, communicate, and train people and operators. The main objective of this paper is to propose a system of systems in training, to achieve trainers in risk assessment and emergency management, and to acquire and transfer knowledge to target institutional subjects, stakeholders, maritime, port, logistics, and dangerous goods transport operators, in a given area of interest, using ICT tools. The training of trainers involved in technological risk management is the basis of risk prevention. Safety and sustainability are specific training objectives, which are pursued by identifying the most appropriate ICT and training tools to deal with the risks associated with the transport of dangerous goods, reconciling the need for such transport with safety, protection of the environment, and people. The training support system developed will therefore allow users to define and support dynamic training paths, aimed at providing or improving the skills of the</p>	<p>10.1109/SoSE66311.2025.11083859</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083859</p>	<p>IEEE Xplore</p>
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		figures, who operate, with different responsibilities, and functions in the area between the port and the hinterland, passing through urban areas.			
From Requirements to Operation: Components for Risk Assessment in a Pervasive System of Systems		Framing Internet of Things (IoT) applications as a System of Systems (SoS) can help us make sense of complexity associated with interoperability and emergence. However, assessing the risk of SoSs is a challenge due to the independence of component systems, and their differing degrees of control and emergence. This paper presents three components for SoS risk assessment that integrate with existing risk assessment approaches: Human System Integration (HSI), Interoperability identification and analysis, and Emergent behaviour evaluation and control measures. We demonstrate the application of these components by assessing a pervasive SoS: a SmartPowerchair.	10.1109/REW.2017.36	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8054834	IEEE Xplore

Medicaid IT as a System of Systems		<p>This paper illustrates how information technology (IT) systems of systems (SoS) exist at three hierarchical levels, a micro, a meso, and a macro level, in the environment of the U.S. Medicaid program. An example at the micro level is used to illustrate the opportunity inherent in the Medicaid SoS to integrate Internet-of-Things technologies to advance specific outcomes in managing the delivery of Medicaid services.</p>	10.1109/SYSOSE.2019.8753878	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753878	IEEE Xplore
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Towards Analyzing Doctoral Studies in Sweden from a System of Systems Perspective		<p>This paper takes a holistic perspective of doctoral studies in the Swedish educational system, and extract several lessons learned from a doctoral student union regarding doctoral studies. To provide this holistic view we conceptualize the Swedish educational system towards doctoral studies (also referred to as third cycle studies) and the primary stakeholders. There are several frictions between the involved stakeholders in addition to differences in the academic system on a local and global scale that creates several challenging decisions for doctoral students and management of doctoral studies. We argue that expressing the educational system as a System of Systems (SoS) provides a useful lens to describe and discuss these tensions on a holistic level. The main contribution of this paper is an initial conceptual model of doctoral studies in Sweden as an SoS, mapping actors, systems, and their relationships. We anchor the paper through findings of a recent survey for doctoral students work environment.</p>	10.1109/SoSE66311.2025.11083784	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083784	IEEE Xplore
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On functional safety methods: A system of systems approach		<p>The advent of automated driving and mobility as a service brings the automotive industry to a new era. Moreover, connectivity plays a crucial role in enabling automated vehicles to navigate, as well as in regulating this newly established network of connected vehicles as efficiently and safely as possible. As a result, modern vehicles are equipped with Vehicle to Vehicle (V2V) and Vehicle to other systems (V2X) communication capabilities. Vehicles, traditionally considered as a monolithic system, now become part of an ecosystem of vehicles, infrastructure and mobility services that can be characterized as a System of Systems (SoS). This creates a need for safety methods that are applicable for analyzing SoS. In this paper, we investigate the impact of applying safety analysis to a SoS with a conventional, "vehicle-centric" development process. We propose a tailored safety lifecycle based on guidelines of ISO 26262 that is augmented to encompass additional considerations pertinent to a SoS. We performed a comparative study by applying our proposed method as well</p>	10.1109/SYSCON.2018.8369598	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8369598	IEEE Xplore
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		<p>as the traditional (vehicle-centric) approach as per ISO 26262 for safety engineering of a truck platooning application. The comparison results show the overall effectiveness of the proposed method. The "connected vehicles" development process resulted in more safety goals compared with the vehicle-centric approach. This may, at first thought, suggest that this approach requires a significant effort increase as the number of safety goals is an indicator of the amount of needed effort for the safety engineering process. However, the safety analysis (e.g. fault tree analysis) of the platoon system from a vehicle-centric approach exponentially grows in size. This increase in complexity of analyses of the traditional vehicle-centric approach means that the actual effort required of the proposed method for the SoS is comparatively more efficient. Besides, the proposed method showed us that the resulting safety analysis, in particular, the fault trees are less prone to error as the complexity of the analysis is greatly reduced. Creating an appropriate level of abstraction for the vehicle and the platoon makes the</p>			
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		analysis more effective. The reduced complexity also impacts verification and validation activities as vehicle and platoon level testing are specified and conducted separately. This research shows the increased trust in the safety of the platoon system by performing a "connected vehicles" safety analysis.			
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Department of defense system of systems reliability challenges		<p>Increased U.S. military preparedness and capabilities are achieved through a system of system approach which is forecasted to continue in the foreseeable future. Systems of systems differ from traditional systems in ways that require tailoring of systems engineering processes to successfully deliver their capabilities.[1]</p> <p>This paper describes the distinct characteristics of systems of systems that impact their reliability, discusses their unique challenges, and recommends strategies for managing them. DoD has shifted from a system perspective to a capability perspective where the value to users is the collective effect of a set of systems rather than any one system.[1-2]</p> <p>The SOS approach to meeting requirements remains a challenge when defense systems continue to demonstrate poor reliability during operational testing (OT). Director Operational Test and Evaluation (DOT&E) reported in 2015 to Congress that only “38 percent of systems that had an Initial Operational Test and Evaluation (IOT&E) or Follow-on Operational Test and Evaluation (FOT&E) met</p>	10.1109/RAM.2017.7889676	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7889676	IEEE Xplore
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		<p>their reliability requirements.” [5] This leads to questions about how to better define capabilities, impacts to design and how to integrate and test at the SoS level to achieve reliable systems. [1-5] This paper looks at SoS and reliability from the perspective of systems engineering and addresses the questions: What are the critical characteristics of SoS that affect T&E and reliability? What are the reliability implications for SoS? This paper reviews the characteristics of SoS as they impact reliability, and how aspects of reliability are addressed by the practice of SoS SE. Finally, it discusses the implications for Reliability of SoS, including specific challenges and the strategies currently employed to address them.</p>			
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Use case based approach for an integrated consideration of safety and security aspects for smart home applications		<p>An increasing number of Cyber Physical Systems is used in different areas of applications like smart grid, smart factory or smart home. This paper demonstrates a first approach for an integrated consideration of safety and security for Cyber Physical Systems in a System of Systems by a use case based model for smart home applications. To realize a safe and secure operation of Cyber Physical Systems in System of Systems a high number of elements, relations and functions have to be taken into account. A Systems Engineering based approach will be introduced in this paper to deal with this complexity. The approach consists of a SysML based model which is associated with a procedure to ensure the safe and secure design of Cyber Physical Systems. Defined safety use cases will be used in a following security analysis and assessment. By harmonizing security assessment and safety use cases the integrated consideration is accomplished. The results can be used for an early technically solution neutral design planning.</p>	10.1109/SYSOSE.2016.7542908	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542908	IEEE Xplore
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Using Systems of Systems to Manage Enterprise Contacts		This paper discusses how one could use a Systems of Systems Approach to manage contacts inside an enterprise. The major problem is the interoperability of existing systems in charge of handling information regarding addresses. We show how an MBA (Memory-Broker-Agent) approach could help to design a global system.	10.1109/RTSI.2018.8548382	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8548382	IEEE Xplore
Contribution to system of systems modeling		Modeling a system of systems, for supervision purpose, is a complex issue influenced by security constraints more important than those of its component systems. This work proposes a hierarchical model of system of systems based on Hypergraphs and Constraint Satisfaction Problems. First of all, the developed model allows the operator to show, by a bottom up analysis of the hyper-graphs, the failure of a local system, and its influence on the other systems. In the other hand, the top down analysis of the hypergraphs, allows to check the possible reconfigurations of the global system of systems that satisfy a maximum number of constraints.	10.1109/SYSOSE.2015.7151910	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151910	IEEE Xplore

Systems of Systems Management and Governance from a Risk-Handling Perspective		<p>Managing a system can be critical for its successful functioning. This is especially crucial for the socio-technical systems of systems (SoS) that characterize many of modern society's critical operations. However, the management of SoS becomes complex as systems are increasingly interconnected and the dependence among connected systems intensifies. This paper explores the current state of the art on SoS management and governance from a risk management perspective. Our findings show a higher focus on SoS management; however, many studies do not holistically deal with the SoS. Moreover, our findings indicate fewer studies in SoS governance. Hence there is still a research gap. The study contributes to the body of knowledge by adding insight into how risk management fits in these domains and provides direction on the possible areas of mitigating risks.</p>	10.1109/SOSE62659.2024.10620940	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620940	IEEE Xplore
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<p>A conditional value-at-risk approach to risk management in system-of-systems architectures</p>		<p>The development of a system-of-systems (SoS) is challenging due to the complex dynamics attributed to the interdependencies between systems and the inherent technical and programmatic uncertainties. The sheer number of decision variables that need to be considered in SoS development prompts the need for effective analytical support frameworks. Current frameworks and guidelines in addressing SoS challenges lack analytical means of objective SoS level decision-making. Research in this paper adopts computational decision methods rooted in financial risk management that allow SoS practitioners the means to identify optimal 'portfolios' of systems based on dimensions of capability, cost and operational risk. Many risk management processes are in place for individual systems, but these tools and techniques are not always compatible for SoS. Our research leverages a Conditional Value-at-Risk (CVaR) perspective to managing risks that can incorporate simulation/observed data in the decision-making process. We demonstrate the method using a simple SoSE problem.</p>	<p>10.1109/SYSOSE.2015.7151969</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151969</p>	<p>IEEE Xplore</p>
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<p>A System of Systems Approach for Global Supply Chain Management in the Big Data Era</p>		<p>Global supply chain management (GSCM) is increasingly complex and managers find that traditional methods fall short in adequately addressing many associated challenges. As such, it calls for innovative managerial measures. In this paper, we discuss how the system of systems (SoS) approach and big data technologies can be applied to improve GSCM. We first show that the global supply chain is an SoS and examine various principles of the SoS approach. Then, we review various big data related technologies which are commonly employed in global supply chain management. After that, we propose how big data related technologies can be incorporated into the SoS approach to enhance global supply chain operations by presenting an example. This paper provides practitioners a new perspective on how big data related technologies can be used for global supply chain management with an SoS mindset.</p>	<p>10.1109/EMR.2018.2810069</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8334864</p>	<p>IEEE Xplore</p>
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<p>A System of Systems Framework for the Water-Energy-Food Nexus</p>		<p>A system of systems (SoS) framework is proposed to describe the complex interactions among water, energy and food systems. Through the investigation of the key interconnections among the three systems, improving water use efficiency is considered as one entry point for this framework. Implementation steps of the framework are explained in detail. From an SoS perspective, meaningful insights for policy-making can be garnered for enhancing the security level of water, energy, and food systems at regional or national scales.</p>	<p>10.1109/SMC.2019.8913946</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8913946</p>	<p>IEEE Xplore</p>
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Towards Joint SoS and Threat Mission-based Modeling for Operational Impact Identification		Several application domains targeted by systems of systems (SoS), like defense, healthcare, transportation, are critical domains. So, securing such SoS is mandatory. Even if risk management frameworks root the analyses at the organizational, mission and business process levels, how to effectively integrate risk management and mission-based SoS engineering is not clear yet. In this paper, we explore how several SoS and cyber threat modeling approaches could be combined, both using a mission-based approach, and we illustrate it by a case study. Our ultimate goal is to enable the identification of the operational impact at the level of the SoS.	10.1109/SOSE62659.2024.10620955	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620955	IEEE Xplore
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Power system operation incorporating active distribution grids: A system of systems framework		<p>In restructured power systems, the transmission and distribution grids are autonomously utilized by independent system operator (ISO) and distribution companies (DISCOs), respectively. As the operating condition of one grid influences the decisions made by operators of other grids, the ISO and DISCOs should collaborate and cooperate with each other in order to operate the entire power system in a secure and economic manner. According to the concept of system of systems (SoS) engineering, this paper presents a decentralized decision-making framework to determine a secure and economical hourly generation schedule for a transmission system encompassing numbers of active distribution grids. Taking into consideration the physical connections and shared information between ISO and DISCOs, a SoS-based SCUC framework is designed and a hierarchical optimization algorithm is presented to find optimal operating points of all independent systems in the SoS-based power system architecture. The numerical results show the effectiveness of</p>	10.1109/PESGM.2015.7286126	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7286126	IEEE Xplore
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		the proposed SoS framework and solution methodology.			
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Major Challenges of Systems-of-Systems with Cloud and DevOps – A Financial Experience Report		<p>The term Systems-of-Systems (SoS) refers to a complex system that comprises other systems (the constituent systems), which have operational and managerial independence, geographical distribution, emergent behavior, and evolutionary development processes. DevSecOps (or SecDevOps) offers an approach to guide the implementation of IT Processes, which in turn may support the integration of a cloud environment to a systems-of-systems environment, incorporating information security practices, as well as fostering collaboration between both development and operation teams. It also aims to promote automation of IT processes so that the development of applications and / or services is fast and secure. However, there is a lack of detail in the process definitions to guide the implementation and use of DevSecOps in a Systems-of-Systems environment, especially when it is intended to merge cloud computing into pre-existing conventional infrastructures. In this context, this paper aims at describe the main actions, concerns and lessons learned, during</p>	10.1109/SESoS/WDES.2019.00010	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8882802	IEEE Xplore
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		<p>planning and implementation phases, about IT Processes and IT Governance Model to transform an IT traditional environment into Systems-of-Systems environment, considering DevSecOps standards in a large Brazilian financial institution. It will show how IT Processes and IT Governance Model should be changed for incorporating a Cloud environment to a SoS. For doing so, we proposed the use of DevOps techniques as a means to reduce development time without to affect the quality and information security.</p>			
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<p>Risk Management for System of Systems: A Systematic Mapping Study</p>		<p>Context: System of Systems (SoS) is a set of independent systems that cooperate to achieve an emergent behavior. SoSs have been used in different domains such as defense, transportation, energy, and health care, which directly impact on the society. The critical nature of SoS, in which a failure in one of its Constituent Systems (CSs) may lead to catastrophic damages to the property, environment, injuries or loss of human's life, demands risk management activities. Existing risk management practices applied to SoS are extensions of risk management techniques at the CS level.</p> <p>Objective: in this paper, we present an overview of risk management approaches and tools for SoS.</p> <p>Method: we performed a Systematic Mapping (SM) study by searching into five databases to identify primary studies. We identified 22 primary studies related to risk management practices for SoS.</p> <p>Results: from the analysis of these primary studies, we identified a set of risks and risk management practices for SoS and their differences to risk management techniques at the CS level.</p> <p>Conclusion: the identified</p>	<p>10.1109/ICSA-C50368.2020.00050</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9095601</p>	<p>IEEE Xplore</p>
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		approaches and support tools for risk management in the SoS level are not well established yet.			
Integrating Intelligent Transport Systems in a Risk Management System of Systems		<p>This paper discusses the approaches required for the disaster risk management in the widened framework of a System of Systems (SoS) and identifies the key differences compared with traditional centralized systems. It was argued that, due to the inherent complexity of SoS, the management of risk must be holistic and in the same time more quantitative methods must be adopted rather than the qualitative ones. A multi-layer model-based approach is outlined, to represent risks and contributing factors. In particular was studied Intelligent Transport Systems (ITS) integration in SoS, as well as methods for assessing urban transportation networks criticality. Finally, a case study on disaster damages mitigation in Bucharest based on a web-based user interface with support for GIS data representation was discussed.</p>	10.1109/CSCS.2017.60	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7968588	IEEE Xplore

Architecting System of Systems Solutions with Security and Data-Protection Principles		<p>The rapid advancement of communication technology realized the dream of interconnected systems. In addition to enabling scalability and flexibility of solutions, this paradigm created new system design challenges. One such challenge is to holistically address security and privacy concerns of solutions early in design while respecting the system of systems context. This paper proposes a method for the concept design phase on how to create design alternatives with the help of security and data-protection principles. The outcome is a set of design concepts that reflect stakeholders' concerns and best practices.</p>	10.1109/SOSE52739.2021.9497461	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9497461	IEEE Xplore
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<p>Navigating the Cyber-Security Risks and Economics of System-of-Systems</p>		<p>Cybersecurity is an important concern in systems-of-systems (SoS), where the effects of cyber incidents, whether deliberate attacks or unintentional mistakes, can propagate from an individual constituent system (CS) throughout the entire SoS. Unfortunately, the security of an SoS cannot be guaranteed by separately addressing the security of each CS. Security must also be addressed at the SoS level. This paper reviews some of the most prominent cybersecurity risks within the SoS research field and combines this with the cyber and information security economics perspective. This sets the scene for a structured assessment of how various cyber risks can be addressed in different SoS architectures. More precisely, the paper discusses the effectiveness and appropriateness of five cybersecurity policy options in each of the four assessed SoS archetypes and concludes that cybersecurity risks should be addressed using both traditional design-focused and more novel policy-oriented tools.</p>	<p>10.1109/SoSE59841.2023.10178677</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178677</p>	<p>IEEE Xplore</p>
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Understanding System of Systems Management: A Systematic Review and Key Concepts		<p>The growth of knowledge required for the management of software projects is directly related to the growth of systems' complexity and integration efforts. In this sense, Systems Engineering and Project Management teams must strengthen their relationships toward being involved in large-scale projects. This relationship is even more challenging in System of Systems Engineering, in which different constituent systems for achieving a common goal. The management of system of systems is an open research area with several gaps, especially those related to authority, responsibility, and scale. This article investigates approaches for an improved management of system of systems and constituent systems. A systematic review was conducted for the understanding of the current gaps related to managerial concepts in the system of systems context, as well as problems, challenges, and benefits. Open research issues have been delineated and a set of appropriate definitions related to both management and governance has been established. The systematic review returned</p>	10.1109/JSYST.2020.3018068	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9187218	IEEE Xplore
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		3495 studies that mostly describe “best practices” for the management, and 31 were selected for data extraction. Our aim is to open new perspectives of research, toward contributing to the management of system of systems.			
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<p>On Systems of Systems Engineering: A Requirements Engineering Perspective and Research Agenda</p>		<p>The emergence of Systems of Systems (SoSs) and Systems of Systems Engineering (SoSE) is largely driven by global societal needs including energy-water-food nexus, population demographics, global climate, integrated transport, security and social activity. However, due to their scale, structural and functional complexity and emergent properties, these global spanning Cyber-Physical Systems of Systems are becoming increasingly complex and more difficult for current requirements engineering (RE) practices to handle. In this paper, we firstly introduce SoSE as an emerging discipline and key characteristics of SoSs. We then highlight the challenges that the RE discipline must respond to. We discuss some weaknesses of current RE techniques and approaches to cope with the complexity of SoSs. We then argue that there is a need for the global RE community to evolve current RE approaches and to develop new ways of thinking, new RE capabilities and possibly a new RE science as a key mechanism for addressing requirements engineering complexities posed by Systems of Systems. We then outline a</p>	<p>10.1109/RE.2018.00021</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8491128</p>	<p>IEEE Xplore</p>
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		requirements engineering perspective and research agenda that identifies 'top-10' research themes informed by a cluster of four Systems of Systems Engineering projects funded by the European Commission's Horizon 2020 research programme.			
Teaching Conceptualization in System of Systems		<p>The growing interest in the study of system of systems (SoS) is evident due to the increasing number of such systems especially in cities. Unfortunately, it is often challenging to articulate a SoS concept due to the multiple subsystems and numerous stakeholders and their interactions and the many possible unintended consequences of such a system. Without a proper front end or concept development, such a SoS is likely to face many more problems and challenges later on in engineering development and post development. Hence, knowing how to carry out concept development of a SoS is of great importance. This paper examines how concept development of a system of systems could be taught.</p>	10.1109/SYSOS E.2018.8428740	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428740	IEEE Xplore

Are SoIS the Majority of SoS? An Exploratory Investigation of Subtypes of Systems-of-Systems in the Literature		<p>The growing complexity and interconnectivity of modern systems have led to the evolution of Systems-of-Systems (SoS), which integrate independent systems to achieve shared goals. Among SoS subtypes, Systems-of-Information Systems (SoIS) and Cyber-Physical Systems-of-Systems (CPSoS) are gaining attention, although SoIS remains underexplored in literature. This study examines SoS types in current research, identifying key characteristics that differentiate SoIS from general SoS, particularly their reliance on information systems to enable data-driven interoperability and dynamic coordination. From a rapid review, we highlight SoIS's critical role in domains such as smart cities and smart grids, in which real-time data exchange and system interoperability are essential. Our findings underscore the need for targeted methodologies to advance SoIS-specific research and provide a foundation for future exploration of this SoS class.</p>	10.1109/SESoS6601.2025.00007	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11050838	IEEE Xplore
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System of Systems for Tripwires Activation of Algorithms and Reasoning (STAAR) for Analysis of Mission Success		The flood of data from Multi-Intelligence sources (e.g., air and space sensors, street cameras, and social media) is overwhelming mission operators who manually or semi-autonomously ingest and make decisions on these data. This data glut is driving the development of Systems of Systems (SoS) solutions that exhibit emergent behavior evolving to fully autonomous methods that allow end users to focus on critical data first in order to make timely decisions and assure mission success.	10.1109/SYSOSE.2018.8428742	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428742	IEEE Xplore
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<p>Enhancing System of Systems Orchestration with Artificial Intelligence</p>		<p>In many areas, independent and heterogeneous systems collaborate towards a common goal, and their assembly is referred to as a System of Systems (SoS). The mediating actors that orchestrate the SoS are frequently used to enhance collaboration. They support onboarding new constituent systems, monitoring and capability identification, goal transformation, workflow composition and execution, world modelling, data curation, and interoperability translation, as well as ensuring security and data privacy. With recent advances in artificial intelligence (AI) and machine learning (ML), there is potential to improve orchestration, management, and overall performance. Thus, SoS is transitioning towards an enhanced, intelligent System of Systems (iSoS). This paper explores the opportunities and challenges of enhancing intelligent governance. Industrial and academic experts on SoS and AI have systematically analysed the potential and challenges for AI-based enhancement in each orchestration role. These contributions</p>	<p>10.1109/SoSE66311.2025.11083787</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083787</p>	<p>IEEE Xplore</p>
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		indicate the most promising areas for improvement, primarily in terms of more efficient and effective functionality and adaptability to changing circumstances.			
ISO/IEC/IEEE Draft International Standard Systems and software engineering -- Guidelines for the utilization of ISO/IEC/IEEE 15288 in the context of system of systems (SoS)				https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11170402	IEEE Xplore

Modeling human-technology interaction as a sociotechnical system of systems		As system of systems (SoS) models become increasingly complex and interconnected a new approach is needed to capture the effects of humans within the SoS. Many real-life events have shown the detrimental outcomes of failing to account for humans in the loop. This research introduces a novel and cross-disciplinary methodology for modeling humans interacting with technologies to perform tasks within an SoS specifically within a layered physical security system use case. Metrics and formulations developed for this new way of looking at SoS termed sociotechnical SoS allow for the quantification of the interplay of effectiveness and efficiency seen in detection theory to measure the ability of a physical security system to detect and respond to threats. This methodology has been applied to a notional representation of a small military Forward Operating Base (FOB) as a proof-of-concept.	10.1109/SYSOSE.2017.7994934	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994934	IEEE Xplore
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Development of Secure System of Systems Needing a Rapid Deployment		<p>In certain cases, such as secure humanitarian corridors in a conflict zone, a special type of SoS, needing a rapid deployment, has to be developed. Because of the tense time constraint, usually only a domain expert is responsible with this development. However, many such SoSs also have to take into account the security aspect. How to help a domain expert integrate the security aspect into the rapid development of an SoS? In this proposal paper, we present an approach and a tool suite that help the domain expert tag business assets using security properties, which are then used to identify vulnerabilities and to propose possible security control mechanisms. We illustrate our proposal on a case study.</p>	10.1109/SYSOSE.2019.8753857	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753857	IEEE Xplore
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Security Standard Compliance Verification in System of Systems		<p>Standard compliance in system of systems (SoS) means complying with standards, laws, and regulations that apply to services from several sources and different levels. Compliance is a major challenge in many organizations because any violation will lead to financial penalties, lawsuits fines, or revocation of licenses to operate within specific industrial market. To support the business lifecycle, organizations also need to monitor the actual processes during run time and not only in their design time. Standard compliance verification is important in the lifecycle for reasons, such as detection of noncompliance as well as operational decisions of running processes. With the promotion of connectivity of systems, existing and new security standards can be employed but there are important aspects, such as technically measurable indicators, in the standards and automation of compliance verification that need to be addressed. This article presents an automated and continuous standard compliance verification framework used to check devices, systems, and</p>	10.1109/JSYST.2021.3064196	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9404224	IEEE Xplore
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		services for standard compliance during secure onboarding and run time. In addition, a case study for the Eclipse Arrowhead framework is used to demonstrate the functionality of the standard compliance verification in SoS.			
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Automated and Secure Onboarding for System of Systems		<p>The Internet of Things (IoT) is rapidly changing the number of connected devices and the way they interact with each other. This increases the need for an automated and secure onboarding procedure for IoT devices, systems and services. Device manufacturers are entering the market with internet connected devices, ranging from small sensors to production devices, which are subject of security threats specific to IoT. The onboarding procedure is required to introduce a new device in a System of Systems (SoS) without compromising the already onboarded devices and the underlying infrastructure. Onboarding is the process of providing access to the network and registering the components for the first time in an IoT/SoS framework, thus creating a chain of trust from the hardware device to its hosted software systems and their provided services. The large number and diversity of device hardware, software systems and running services raises the challenge to establish a generic onboarding procedure. In this paper, we present an automated and secure</p>	10.1109/ACCESS.2021.3102280	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9505607	IEEE Xplore
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		<p>onboarding procedure for SoS. We have implemented the onboarding procedure in the Eclipse Arrowhead framework. However, it can be easily adapted for other IoT/SoS frameworks that are based on Service-oriented Architecture (SoA) principles. The automated onboarding procedure ensures a secure and trusted communication between the new IoT devices and the Eclipse Arrowhead framework. We show its application in a smart charging use case and perform a security assessment.</p>			
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Towards Model Driven Architecture and Analysis of System of Systems Access Control		<p>Nowadays there is growing awareness of the importance of Systems of Systems (SoS) which are large-scale systems composed of complex systems. SoS possess specific properties when compared with monolithic complex systems, in particular: operational independence, managerial independence, evolutionary development, emergent behavior and geographic distribution. One of the current main challenges is the impact of these properties on SoS security modeling and analysis. In this research proposal, we introduce a new method incorporating a process, a language and a software architectural tool to model, analyze and predict security architectural alternatives of SoS. Thus security will be taken into account as soon as possible in the life cycle of the SoS, making it less expensive</p>	10.1109/ICSE.2015.280	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7203101	IEEE Xplore
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Towards Standards-based Execution of System of Systems Models		<p>The ongoing transformation in the industry from a document-based systems engineering to a model-based systems engineering approach reveals a need for new methods of capturing and analyzing knowledge about the system. Moreover, complex real-life problems require the application of MBSE practices to enable evolving systems to communicate independently to achieve a common goal. This is the level of system of systems. At this level similar standardized model-based approaches are used to capture knowledge; however, most analysis is far from being standards based. Most of the tools provide proprietary approaches to analyze a system of systems. Is there a way to apply a standards-based approach to execute engineering analysis and behavioral simulation on a system of systems model? This paper describes the research used to answer this question.</p>	10.1109/SoSE50414.2020.9130510	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130510	IEEE Xplore
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<p>A Sequential Game of Defense and Attack on an Interdependent System of Systems</p>		<p>This research studies defense strategies of an interdependent system in the face of rational attacks. We propose a sequential game between an attacker and a defender for an interdependent System of Systems (SoS) to explore the effect of interdependency on an optimal defense strategy. We develop an algorithm of backward induction to obtain the Nash equilibrium of the game. The attacker is the first mover as he applies an attack strategy on constituent systems that maximizes his utility. The defender observes and responds by a defense strategy that maximizes her utility. Both players' utilities are expressed as the difference between a player's reward due to SoS functionality (dysfunctionality) and the cost of the action. The sensitivity analysis compares the effects of different parameters on the attacker's and defender's strategies such as the effectiveness of defense (attack), the unit cost of defense (attack) and the interdependency level of constituent systems.</p>	<p>10.23919/ICIF.2018.8455314</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8455314</p>	<p>IEEE Xplore</p>
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Assessing System of Systems Security Risk and Requirements with OASoSIS		When independent systems come together as a System of Systems (SoS) to achieve a new purpose, dealing with requirements conflicts across systems becomes a challenge. Moreover, assessing and modelling security risk for independent systems and the SoS as a whole is challenged by a gap in related research and approaches within the SoSs domain. In this paper, we present an approach for bridging SoS and Requirements Engineering by identifying aligning SoSs concepts to assess and model security risk and requirements. We introduce our OASoSIS approach modifying OCTAVE Allegro for SoSs using CAIRIS (Computer Aided Integration of Requirements and Information Security) with a medical evacuation (MEDEVAC) SoS exemplar for Security Requirements Engineering tool-support.	10.1109/ESPRE.2018.00009	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8501327	IEEE Xplore
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<p>A Model Driven Method to Design and Analyze Secure Architectures of Systems-of-Systems</p>		<p>Context: Systems-of-Systems (SoS) is becoming the major paradigm for engineering next generation solutions such as smart cities, health-care and emergency response. However, SoS differentiating characteristics, such as emergent behavior, may introduce specific issues that make ensuring their security a critical challenge. Objective: the aim of this study is to investigate how Software Engineering approaches can be extended to model and analyze secure SoS solutions for discovering high impact cascading attacks at the architecture stage. Method: in order to achieve our objective, we followed the guidelines of Model Driven Engineering to propose a method, Systems-of-Systems Security (SoSSec), that comprises: (1) an architectural description language for modeling SoS and its vulnerabilities and (2) a MultiAgent System for security analysis of SoS architectures.</p>	<p>10.1109/ICECCS.2017.31</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8292818</p>	<p>IEEE Xplore</p>
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<p>A systematic mapping of the research literature on system-of-systems engineering</p>		<p>The research area systems-of-systems engineering has increased rapidly over the last decade and now contains a substantial body of literature. To get an overview of the field, a systematic mapping of the literature has been done, covering over 3000 papers. It revealed a field massively dominated by US researchers, with an emphasis on military and space systems. A large number of people are involved, but few researchers focus on the area, and citations are fairly low compared to other fields. Important research topics include architecture, modeling and simulation, integration and interoperability, communication, sustainability, and safety and security. There are signs of immaturity within the research area, and it is recommended that existing venues are complemented with an international scientific event with very high standards for submissions.</p>	<p>10.1109/SYSOSE.2015.7151918</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151918</p>	<p>IEEE Xplore</p>
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<p>An Efficient Architecture for Trust Management in IoE Based Systems of Systems</p>		<p>Internet of Everything (IoE) is a network that integrates a variety of heterogeneous nodes, such as connected portable devices, connected cars, smart home appliances, humans, etc. to Internet. The constituents of IoE are heterogeneous, distributed by nature and also autonomous in most of cases, which meet the criteria of what we call Systems of Systems (SoS). These smart objects communicate and collaborate between each other in dynamic environments which are subject to several security attacks. In this paper, we propose a hierarchical based blockchain trust management architecture with mobility support in highly distributed IoE based Systems of Systems. This architecture deals efficiently with scalability issues. It allows smart objects to disseminate the trustworthiness of the service providers they interact with them to the blockchain. This later makes the access to this information possible from anywhere and ensures a global view of trustworthiness information. Thanks to the blockchain technology, our architecture outperforms the existing trust management solutions especially in</p>	<p>10.1109/SYSOSE.2018.8428732</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428732</p>	<p>IEEE Xplore</p>
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		terms of scalability and mobility support.			
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Improving Performance and Cybersecurity in an IoT-based System of Systems Integrating Robots and Virtual Human		<p>Two humanoid robots and a virtual human were separately integrated through an IoT-based common platform as a system of systems to collaborate with each other for performing a selected real-world task. The task was to collaboratively search for a hidden or missing object in a social setting (e.g., home) for human beneficiaries. Both robots were human-like, but one was more human-like than the other. The virtual human was also made human-like. The robots and the virtual human (called the agents) were made intelligent and autonomous by enriching them with similar functions and interaction modes, and they were integrated through the IoT-based common platform. The agents were then animated via the common platform based on some intelligent control algorithms to perform the selected task in collaboration. The IoT-based platform was then evaluated for performance towards achieving success in the collaboration and maintaining cybersecurity in the IoT network. The cybersecurity assessment results were compared with that when the agents were controlled individually without being integrated via the</p>	10.1109/SYSOSE.2019.8753854	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753854	IEEE Xplore
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		<p>IoT for the same collaborative task. The results showed that the performance in the IoT -based collaboration was satisfactory in various terms, which proved the effectiveness of the IoT -based integration of the agents as a system of systems. The assessment results also showed higher potential of the IoT -based system to secure cybersecurity over the non IoT -based individual control of the agents. The results can help develop system of systems integrating intelligent real and virtual agents via IoT frameworks to perform real-world complex tasks for humans with higher performance and better cybersecurity.</p>			
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Alignment of practices for an efficient management of Systems Engineering processes during the development of systems of systems		<p>Nowadays, because of the increasing complexity of systems and projects, more and more people focus on the systems of systems. At the same time, Systems Engineering and Project Management are considered as two independent activities during the development of systems of systems, but many inconsistencies appear between Systems Engineering and Project Management teams during engineering projects although their relationships is needed to be integrated as they get involved in large scale systems of systems. For the most part, these inconsistencies are due to a not close enough coordination and sometimes a lack of communication. As a result, there is a great need for international companies to understand the standards or guides from both domains to better integrate them and enhance their chances of success. Although numerous Systems Engineering and Project Management standards or guides have been published to help people get better organized and improve the quality of products or services, a lot of their projects still fail due to the poor integration</p>	10.1109/ICoCS.2015.7483234	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7483234	IEEE Xplore
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		<p>of both domains. At the same time, the number of small and medium enterprises has quickly increased because the social division of labor is becoming more and more meticulous with the rapid development of the science and technology. The ability for small and medium enterprises to analyze and apply the Systems Engineering and Project Management standards or guides is not the same as for international companies, due to their limited resources. So the aim of this paper is to select two references from the most frequently used standards or guides in Systems Engineering and Project Management domains, the ISO/IEC 15288 and the PMBoK, and to illustrate how to help the systems engineers and project managers to compare and align the references from both domains quickly and effectively.</p>			
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A World of Systems of Systems		<p>Originally, at the time of the Semi Automatic Ground Equipment (SAGE) and Naval Tactical Data System (NTDS) projects, the first systems were entities that were isolated from each other with no connections other than those created by human operators who could switch from one to the other as required. "Real time" machines disappeared because the performance that accompanied the rise in power of the VLSI, the famous "Moore's Law", means that there is no longer a requirement for any specialization from an equipment point of view; the same is true for operating systems. The complexity of systems will increase objectively, which is a risk when it is approached incorrectly, but an opportunity when approached in the right way. This evolution is very clear in defense and security systems where a notion that later became very important came to light: interoperability, from the end of the 1980s/the beginning of the 1990s.</p>	10.1002/9781119751519.part2	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=9189979.pdf&bkn=9189947&pdfType=chapter	IEEE Xplore
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Model-based Development of a System of Systems Using Unified Architecture Framework (UAF): A Case Study		<p>In the development of safety- and security-relevant systems the V-model is established providing verification possibilities at each development stage. Usually, methods and tools of Model-based Systems Engineering (MBSE) are used in combination with the V-model for the development of single and self-contained complex systems. Nowadays, ubiquitous connectivity leads to a high degree of communication between systems enabling their cooperation for the provision of new services in a so-called System of Systems (SoS). In contrast to conventional systems engineering new methods and tools are required for service enabling SoS. In order to fulfill requirements of System of Systems Engineering (SoSE) the Object Management Group (OMG) developed the Unified Architecture Framework (UAF) for representation of enterprise architecture. This paper presents an approach for model-based development of SoS using UAF according to the V-model. In addition, an application of this new method shows differences between single system and SoS development</p>	10.1109/SYSCON.2019.8836749	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8836749	IEEE Xplore
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		methods.			
Towards an Integrated Safety-Security Ontology for System of Systems		<p>In the modern world, connectivity and shared intelligence enable independent constituent systems (CS) to form systems of systems (SoS) capable of performing sophisticated missions. However, the sheer scale of an SoS can make it challenging to manage all components comprehensively, hiding potential security and safety concerns. These factors underscore the need for advancing conceptual models that permit a better understanding of the SoS intricacies. This paper presents a conceptual model for an integrated safety-security ontology for SoS, called SSO-SoS. Such a model is based on international standards, existing literature, and relevant conceptual models, where we pay special attention to safety, security, and mitigation for SoS. We also illustrate the SSO-SoS with a case study from the construction sector. Our conceptual model provides a hierarchical organization that permits stakeholders to navigate through different layers of information, enhancing their ability to identify, address, and understand the required SoS knowledge.</p>	10.1109/ISSE63315.2024.10741154	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10741154	IEEE Xplore

<p>A system of systems framework for sustainable fashion supply chain management in the big data era</p>		<p>Sustainability is a timely topic. A sustainable supply chain is one which aims to maximize the system's performance in three dimensions, namely environment, economics, and society. In the fashion industry, with the advance of big data related information technologies, achieving a sustainable supply chain is no longer a dream. In this paper, we first establish that a fashion supply chain is in fact a typical system of systems. Then, we examine several critical big data related technologies and applications which are related to sustainable fashion supply chain management. After that, we develop and present the design principles, from a system of systems perspective, for developing a sustainable fashion supply chain. Based on these principles, we further propose a novel five steps framework for achieving sustainable fashion supply chain management in the big data era. A sustainable fashion supply chain system of systems matrix is also constructed.</p>	<p>10.1109/INDIN.2016.7819290</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7819290</p>	<p>IEEE Xplore</p>
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<p>Irrational System Behavior in a System of Systems</p>		<p>System of systems (SoS) failures can sometimes be traced to a system within the SoS behaving in unexpected ways. Due to their emergent complexity, these types of failures are notoriously challenging to foresee. This paper presents a method to aid in predicting unknown unknowns in a SoS. Irrationality initiators – failure flows emanating from one system that serve as unexpected initiating events in another system – are introduced into quantitative risk analysis methods such as the Failure Flow Identification and Propagation framework and Probabilistic Risk Assessment. Analysis of models built using this approach yield a probability distribution of failure paths through a system within the SoS that are initiated by unexpected behaviors of other systems within the SoS. The method is demonstrated using an example of an autonomous vehicle network operating in a partially denied environment with hostile forces present. Using the concept of irrationality initiators, it is possible to identify and prioritize vulnerabilities in the system of interest in the SoS.</p>	<p>10.1109/SYSOSE.2018.8428778</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428778</p>	<p>IEEE Xplore</p>
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Identifying Conflicting Requirements in Systems of Systems		<p>A System of Systems (SoS) is an arrangement of useful and independent sub-systems, which are integrated into a larger system. Examples are found in transport systems, nutritional systems, smart homes and smart cities. The composition of component sub-systems into an SoS enables support for complex functionalities that cannot be provided by individual sub-systems on their own. However, to realize the benefits of these functionalities it is necessary to address several software engineering challenges including, but not limited to, the specification, design, construction, deployment, and management of an SoS. The various component sub-systems in an SoS environment are often concerned with distinct domains; are developed by different stakeholders under different circumstances and time; provide distinct functionalities; and are used by different stakeholders, which allow for the existence of conflicting requirements. In this paper, we present a framework to support management of emerging conflicting requirements in an SoS. In particular, we describe an</p>	10.1109/RE.2017.48	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8049153	IEEE Xplore
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		<p>approach to support identification of conflicts between resource-based requirements (i.e. requirements concerned with the consumption of different resources). In order to illustrate and evaluate the work, we use an example of a pilot study of an IoT SoS ecosystem designed to support food security at different levels of granularity, namely individuals, groups, cities, and nations.</p>			
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Software contributions to the reliability of systems of systems		<p>Systems of great complexity that require high levels of reliability are increasingly foundational to national security as well as economic and social activities. Many of these systems are in fact systems of systems - an arrangement in which independent and separately useful systems are integrated into a larger functioning system to deliver unique capabilities. Systems of systems depend on the proper functioning of both the constituent systems and the coordination that software can provide to assure reliable accomplishment of a given mission. Software that not only provides the logic for much of the capability of the individual systems but - in bridging between constituent systems with data and control flows - it is may also be leveraged to coordinate and direct the assembled system of systems. This paper will address how software and systems engineering can be key to ensuring that an assembled system of systems accomplishes its mission.</p>	10.1109/RAMS.2015.7105182	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7105182	IEEE Xplore
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Towards security software engineering the Smart Grid as a System of Systems		<p>The Smart Grid, the next generation power grid, comes with promises of widely distributed automated energy delivery, self-monitoring, self-healing, energy efficiency, utility and cost optimization. However, as attacks on the current power grid and similar systems indicate, the Smart Grid will be vulnerable to all kinds of attacks and will even raise new security challenges, due to its complex nature. In this paper we analyze this complexity of the Smart Grid as a System of Systems, and the specific security challenges it raises. To address these challenges we propose a vision/framework based on principles of Software Engineering. This framework structures and brings together the research on Smart Grid security.</p>	10.1109/SYSOSE.2015.7151950	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151950	IEEE Xplore
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On the study of human reliability in transportation systems of systems		<p>Humans are and will remain one of the critical constituents of a technological system. The study of Human Factors is a broad domain with equally varying applications. Quantification thereof, with a Human Reliability Analysis (HRA) poses considerable challenges and advantages. In increasingly complex modern systems where large resources are allocated towards ensuring system's operational safety, it becomes necessary to analyze the actions of human operator who directly or indirectly influences system reliability. This paper envisages establishing a base towards a HRA model, to address existing issues. Railway systems and Advanced Driver Assistance Systems for automobiles are our application domains; we aim to identify the need of and usability in both. Human considered as a component of the System of Systems for risk assessment allows us to study its impact on system reliability and give feedback to improve system safety.</p>	10.1109/SYSOSE.2015.7151980	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151980	IEEE Xplore
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<p>DevOps Value Flows in Software-Intensive System of Systems</p>		<p>DevOps has become a widely adopted approach in the software industry, especially among companies developing web-based applications. The main focus of DevOps is to address social and technical bottlenecks along the software flow, from the developers' code changes to delivering these changes to the production environments used by customers. However, DevOps does not consider the software flow's content, e.g., new features, bug fixes, or security patches, and the customer value of each content. In addition, DevOps assumes that a streamlined software flow leads to a continuous value flow, as customers use the new software and extract value-adding content intuitively. However, in a Software-intensive System of Systems (SiSoS), customers need to understand the content of the software flow to validate, test, and adopt their operation procedures before using the new software. Thus, while DevOps has been extensively studied in the context of web-based applications, its adoption in SiSoS is a relatively unexplored area. Therefore, we conducted a case study at a multinational</p>	<p>10.1109/SEAA64295.2024.00065</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10803309</p>	<p>IEEE Xplore</p>
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		telecommunication s provider focusing on 5G systems. Our findings reveal that DevOps has three sub-flows: legacy, feature, and solution. Each sub-flow has distinct content and customer value, requiring a unique approach to extracting it. Our findings highlight the importance of understanding the software flow's content and how each content's value can be extracted when adopting DevOps in SiSoS.			
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Defining an enterprise lead systems integration (LSI) framework		<p>In the modern operational environment, multiple systems forming a System of Systems (SoS) are required to satisfy the spectrum of capabilities needed to satisfy the mission. Accomplishing the mission has always been a SoS endeavor, where integrating multiple systems into a SoS has been left to small communities of "hero engineers," or to the operators responsible for the mission. The acquisition and management of these mission capabilities across the SoS lifecycle requires the complex integration of interdependent new and legacy systems from the lowest component level to the highest enterprise level. In 2008, Congress directed government organizations to adopt a Lead System Integration (LSI) process to address the issues with the acquisition, development, and integration of a SoS. This paper introduces an LSI Enterprise Framework that identifies the various levels of interaction, organizational functions, and the universal resources to ensure the enterprise provides a SoS that delivers the required capabilities.</p>	10.1109/SYSOSE.2017.7994943	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994943	IEEE Xplore
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On the Application of MIMO Space-Time Coding to Physical Layer Security in sub-6 GHz 5G		<p>This paper investigates the application and performance improvement of MIMO Space Time Block Coding (STBC) for Physical Layer Security. The paper analyzes a Precoder Matrix Index (PMI) based scheme called Private Random Precoding (PRP). Key-based Physical Layer Security protects against eavesdroppers in wireless communication links, invaluable in emerging 5G and IoT networks. This paper derives improvements in PRP based on STBC. Also presented are simulation results which show as much as 7 dB improvement in Key bit Error Rate performance vs SINR of the enhanced PRP-STBC scheme for a 1-bit codebook at the cost of decreased transmission rate. In addition, the paper derives a closed form expression for the Key bit Error Rate for both the PRP and enhanced PRP-STBC schemes as a function of dense 5G cellular geometries. Furthermore, we present the effective information rate of the PRP key based communication framework in low SNR scenarios.</p>	10.1109/SYSOSE.2019.8753826	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753826	IEEE Xplore
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Re-framing "the AMN": A case study eliciting and modelling a System of Systems using the Afghan Mission Network		<p>The term System of Systems (SoS) is often used to classify an arrangement of independent and interdependent systems delivering unique capabilities. There appear to be many examples of SoSs, but the term has become a source of confusion. While many approaches have been proposed for engineering SoSs, there are few illustrative examples demonstrating their initial classification and resulting SoS structure. This paper presents an approach for framing a candidate SoS using the Afghan Mission Network defined as an Acknowledged SoS, and presents issues associated with SoSs stakeholders, human factors and interoperability considerations resulting from such an approach.</p>	10.1109/RCIS.2017.7956524	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7956524	IEEE Xplore
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Autonomous Distributed Electronic Warfare System of Systems		<p>There is significant interest in and ongoing development activities related to artificial intelligence. Software systems are now routinely developed and deployed to perform - and make decisions about performing - complicated tasks. Artificial intelligence is being used in systems ranging from search engines to video games to weapon controllers. Cyber and electronic warfare is also in a growth phase and the demand for cyber security professionals is skyrocketing. Even without staffing limitations, humans can't fight a logic war at computers' speed. This paper describes a framework for a system of system for cyber and electronic warfare. This system automatically scans networks, searches for vulnerabilities, exploits these vulnerabilities and utilizes these new hosts as resources for expansion. This system can serve as a countermeasure or deterrent. Alternately, an adversary could develop such a system for offensive purposes. The automated intelligent system described herein is designed to be used to quickly gain control of adversarial infrastructure, which can then be leveraged as necessary.</p>	10.1109/SYSOSE.2019.8753838	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753838	IEEE Xplore
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Current Landscape of System of Systems Engineering		<p>This paper presents a description of the current landscape of systems of systems (SoS) engineering based on the results of a meta-analysis of 168 IEEE papers published between 2020 and 2023 on SoS. Using IEEE Xplore, papers with 'system of systems' in their title were downloaded and reviewed to develop a description of the current state of SoS engineering. Using ChatGPT 4.0 as an assist, the papers were reviewed, and the results are presented in this paper. This includes how SoS was defined across these papers, the geographical distribution of authors, the domain areas addressed, the technologies included in both the SoS themselves and in the SoS engineering methods. This includes the use of model-based approaches, graph analysis and artificial intelligence. Finally challenges and benefits cited across the papers are summarized.</p>	10.1109/SOSE62659.2024.10620929	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620929	IEEE Xplore
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<p>A knowledge-in-the-loop approach to integrated safety&security for cooperative system-of-systems</p>		<p>A system-of-systems (SoS) is inherently open in configuration and evolutionary in lifecycle. For the next generation of cooperative cyber-physical system-of-systems, safety and security constitute two key issues of public concern that affect the deployment and acceptance. In engineering, the openness and evolutionary nature also entail radical paradigm shifts. This paper presents one novel approach to the development of qualified cyber-physical system-of-systems, with Cooperative Intelligent Transport Systems (C-ITS) as one target. The approach, referred to as knowledge-in-the-loop, aims to allow a synergy of well-managed lifecycles, formal quality assurance, and smart system features. One research goal is to enable an evolutionary development with continuous and traceable flows of system rationale from design-time to post-deployment time and back, supporting automated knowledge inference and enrichment. Another research goal is to develop a formal approach to risk-aware dynamic treatment of safety and security as a whole in the context of system-of-systems. Key base technologies</p>	<p>10.1109/IntelCIS.2015.7397237</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7397237</p>	<p>IEEE Xplore</p>
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		include: (1) EAST-ADL for the consolidation of system-wide concerns and for the creation of an ontology for advanced run-time decisions, (2) Learning Based-Testing for run-time and post-deployment model inference, safety monitoring and testing, (3) Provable Isolation for run-time attack detection and enforcement of security in real-time operating systems.			
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<p>A complexity-based heuristic decision analysis model to recommend systems engineering domain</p>		<p>All science and engineering involves abstraction of the complexity of the world into approaches and models that use simplifying assumptions, which allow generalization from one complex situation to another. The best engineering methods take advantage of the simplicity in the models without diverging so far from reality that behavior can no longer be predicted and controlled, if possible. As a system's complexity increases, however, the risks associated with using simpler methods and simplifying assumptions also increases, and something more than traditional system engineering (TSE) or conventional system engineering (CSE) is needed to deal effectively with system-of-systems, enterprises, and complex systems. While system engineering (SE) has evolved beyond TSE with additional SE bodies of knowledge including systems-of-systems engineering, enterprise systems engineering, and CSE, there is no agreed upon best practice for SE domain selection so the SE practitioner must apply personal judgment to select an appropriate SE domain and tailor</p>	<p>10.1109/EMR.2017.2734358</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8048445</p>	<p>IEEE Xplore</p>
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		applicable SE processes. We provide a heuristic decision analysis model, based on complexity and the Cynefin framework, as a novel approach to recommend an appropriate SE domain to eliminate or reduce misclassifying systems and by extension system failure. We demonstrate this model using a United States National HealthCare case study.			
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Model Driven Software Security Architecture of Systems-of-Systems		<p>Recently, there is a growing interest in Systems of Systems (SoS), their architecture, security and application domains. However, their specific characteristics such as the operational independence of SoS constituent systems (CS), the absence of central authority and their emergent behavior make the modeling of their structure, behavior and security a complex task. One of the current main security challenges in the context of SoS is the cascading attack problem. The challenge is to predict the concatenation/sequence of CS's vulnerabilities that could be triggered resulting in destructive cascading failures and take corrective actions to reduce the cost, development time and effect of later changes. In this paper, we propose a domain specific modeling language (DSML) to represent SoS security architecture. Having SoS security models will enable the discovery, analysis and resolution of cascading attacks, in the architecture phase, preventing development time and cost wastage. Following a Model Driven Engineering (MDE) approach, we generate a</p>	10.1109/APSEC.2016.023	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7890575	IEEE Xplore
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		graphical editor for our DSML and use it to model a Smart Campus case study.			
ISO/IEC/IEEE International Standard - Systems and software engineering -- Guidelines for the utilization of ISO/IEC/IEEE 15288 in the context of system of systems (SOS)		This document provides guidance on the application of processes in ISO/IEC/IEEE 15288 to systems of systems (SoS). The scope of this document is the same as ISO/IEC/IEEE 15288, which addresses more than systems engineering activities.	10.1109/IEEESTD.2019.8929110	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8929110	IEEE Xplore

<p>Cybersecurity Vulnerability Identification in System-of-Systems using Model-based Testing</p>		<p>When operationally and managerially independent constituent systems are integrated to form a System of Systems (SoS), cybersecurity vulnerabilities can be exploited by cyber threats that can break the security requirements of SoS due to its collaborative nature. Using model-based testing to generate test cases automatically can potentially aid in discovering vulnerabilities. However, security test case generation is time-consuming, error-prone, and labor-intensive; therefore, it is desirable to fully or partially automate security testing processes. This paper proposes the automatic test data generation using formal models presented as communicating sequential processes. We use the model-checking technique that generates counterexamples when the specified security properties are violated. Our approach then converted those counterexamples into executable test data by applying the conversion rule and defined mapping algorithm. We demonstrate our approach with an experiment using an operation of an air traffic control (ATC) system, a representative of SoS. We</p>	<p>10.1109/SOSE55472.2022.9812676</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9812676</p>	<p>IEEE Xplore</p>
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		developed an agent simulation program to test the operation of the ATC by using the generated test data and evaluating it in terms of vulnerability identification. We incorporated four attack types, and our experimental results show that the security tests generated from the models can identify the known vulnerabilities in the ATC system.			
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Game-theoretic analysis of system of systems with inherent robustness parameters		<p>Large-scale infrastructures are critical to economic and social development, and hence their continued performance and security are of high national importance. Such an infrastructure often is a system of systems, and its functionality critically depends on the inherent robustness of its constituent systems and its defense strategy for countering attacks. Additionally, interdependencies between the systems play another critical role in determining the infrastructure robustness specified by its survival probability. In this paper, we develop game-theoretic models between a defender and an attacker for a generic system of systems using inherent parameters and conditional survival probabilities that characterize the interdependencies. We derive Nash Equilibrium conditions for the cases of interdependent and independent systems of systems under sum-form utility functions. We derive expressions for the infrastructure survival probability that capture its dependence on cost and system parameters, and also on dependencies that are specified by conditional probabilities. We apply the results</p>	10.23919/ICIF.2017.8009876	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8009876	IEEE Xplore
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		to cyber-physical systems which show the effects on system survival probability due to defense and attack intensities, inherent robustness, unit cost, target valuation, and interdependencies.			
Improving Applications of Systems of Systems using Ultra Fast Instance Segmentation		Computer Vision is a valuable tool that can be used to enhance the components of many working systems. In particular, many applications can be improved by incorporating instance segmentation into their designs to help better process visual information in the surrounding environment. However, instance segmentation algorithms have traditionally been too slow to be used by any real-time systems that could benefit from using them. This includes examples such as self-driving vehicles or autonomous drones. In this work we provide an overview of the shortcomings for current instance segmentation algorithms, introduce an ongoing effort to create a new one that achieves ultrafast speeds without sacrificing competitive accuracy, and explain the advantages of employing an ultra-fast real-time version of one as a component in different systems.	10.1109/SoSE50414.2020.9130537	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130537	IEEE Xplore

<p>A Trust Management Architecture for Energy Efficient Mobile IoT</p>		<p>In mobile IoT applications, managing connectivity, security, and data exchange presents significant challenges. Mobility introduces critical issues such as seamless handovers between networks, energy efficiency in battery-powered devices, and the maintenance of stable connections despite fluctuating network conditions. Additionally, ensuring the security and privacy of IoT devices becomes even more complex when they are in motion, as they may encounter untrusted networks, unauthorized access attempts, or data interception threats. While IoT offers vast opportunities, mobility introduces an additional layer of complexity. It requires robust network management, strengthened security protocols, and optimized data handling strategies to ensure seamless, reliable, and uninterrupted connectivity. A fundamental question arises: when a node moves from one network to another, how can the new network assess its trustworthiness and seamlessly integrate it? In this paper, we propose a novel solution to</p>	<p>10.1109/SoSE66311.2025.11083818</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083818</p>	<p>IEEE Xplore</p>
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		address this challenge by leveraging clustering, software-defined networks (SDN), and machine learning algorithms. Our approach ensures that mobile IoT nodes are reliably assessed and securely integrated into new networks, all while maintaining seamless connectivity energy efficiency and robust security.			
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Research on Assessment of Technical Importance Based on Weapon Technology System-of-Systems Network Model		<p>Technological importance assessment is a fundamental problem in the field of technological innovation management research. Assessing the importance of weapon technology can help to identify the innovative and disruptive technologies, and is of considerable significance to the future development and planning of weapon technology. From the perspective of system-of-systems and the complex network theory, this paper puts forward a unified frame to evaluate the technical importance based on a technology system-of-systems network model. First of all, considering the complicated correlation between weapon technologies, the weapon technology system-of-systems is modeled as a complex network by abstracting the technical entities as nodes and the relationships between technologies as edges. Next, three classical node centrality indexes of the complex network are introduced, and the TOPSIS method is utilized to synthesize the advantages of the three indexes to measure the node importance. Finally, a case of the unmanned combat technology system-of-systems is studied to</p>	10.1109/SoSE50414.2020.9130495	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130495	IEEE Xplore
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		demonstrate the feasibility and effectiveness of our proposed method. The results show that our proposed method achieves excellent performance in evaluating the importance of the technical nodes, which provides useful insight into the management and development of technological innovation for the relevant decision-making departments.			
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Challenges in providing sustainable analytic of system of systems with long life time		<p>Embedded systems are today often self-sufficient systems with limited communication. However, this traditional view of an embedded system is changing rapidly. Embedded systems are nowadays evolving, e.g., an evolution pushed by the increased functional gain introduced with the concept of System of Systems (SoS) that is connecting multiple subsystems to achieve a combined functionality and/or information of a higher value. In such a SoS the subsystems will have to serve a dual purpose in a) the initial purpose that the subsystem was originally designed and deployed for, e.g., control and protection of the physical assets of a critical infrastructure system that could be up and running for 30-40 years, and b) at the same time provide information to a higher-level system for a potential future increase of system functionality as technology matures and/or new opportunities are provided by, e.g., greater analytics capabilities. In this paper, within the context of a "dual purpose use" of a) and b), we bring up three central challenges related to i) information gathering, ii) life-</p>	10.1109/SOSE52739.2021.9497465	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9497465	IEEE Xplore
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		cycle management, and iii) data governance, and we propose directions for solutions to these challenges that need to be evaluated already at design time.			
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System of Systems Hazard Analysis Using HAZOP and FTA for Advanced Quarry Production		<p>The advanced production systems are composed of separate and distinct systems that operate in both isolation and conjunction, and therefore forms the System-of-Systems (SoS). However, a lot of production systems are classified as safety-critical, for example, due to the interactions between machines and involved materials. From the safety perspective, besides the behaviour of an individual system in SoS, the emergent behaviour of systems that comes from their individual actions and interactions must be considered. An unplanned event or sequence of events in safety-critical production systems may results in human injury or death, damage to machines or the environment. This paper focuses on the construction equipment domain, particularly the quarry site, which solely produce dimension stone and/or gravel products. The principal contribution of this paper is SoS hazard identification and mitigation/elimination for the electric quarry site for which the combination of guide words based collaborative method Hazard and Operability (HAZOP) and Fault Tree Analysis (FTA) are used. The</p>	10.1109/ICSR48664.2019.8987613	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8987613	IEEE Xplore
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		published studies on HAZOP and FTA techniques have not considered the emergent behaviours of different machines. The applicability of particular techniques is demonstrated for individual and emergent behaviours of machines used in the quarry operations, such as autonomous hauler, wheel loader, excavator and crusher.			
Development of a Lightweight Framework Implementation of the Blackboard Architecture		The implementation of a distributed system-of-systems using hardware with limited computational capabilities requires a lightweight decision-making system. This paper describes and analyzes a proposed Blackboard Architecture-based command system for an autonomous lightweight agent-bot-based cybersecurity system. The design of the lightweight implementation, which simplifies its core functionality, developed for this system is presented and analyzed herein and its benefits and limitations are reviewed.	10.1109/SOSE62659.2024.10620959	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620959	IEEE Xplore

System of Systems integration via a structured naming convention		<p>During the last decade, technology changes and digitization have introduced numerous improvements and challenges in multiple areas of the industry, automation, and design of new architecture. However, the definitions of new naming conventions and identifiers that can be adapted to the new paradigm have not yet been considered. This paper analyzes aspects and characteristics that have to be included in the design of a naming convention consistent with the current Industry 4.0 requirements. As a result, this paper proposes a new naming convention for the Arrowhead Framework following the requisites and characteristics defined in the system of systems (SoS) integration. The proposed Arrowhead naming convention represents a renovated vision of the identification of services, systems, devices, and networks. A powerful tool in the quest of interoperability, security, service discovery, topology, and dynamic orchestration, as well as, a structured manner of defining meaningfully identifiers as help for developers</p>	10.1109/INDIN41052.2019.8972250	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8972250	IEEE Xplore
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Performance Assessment in Complex Engineering Projects Using a System-of-Systems Framework		<p>In this paper, a system-of-systems (SoS) framework is proposed for bottom-up assessment of complex engineering projects. Two principles of SoS analysis (i.e., base-level abstraction and multilevel aggregation) are used to develop the proposed framework. At the base level, complex engineering projects are abstracted as various entities (i.e., human agents, resources, and information) whose attributes and interactions influence the dynamic behaviors of project systems. The performance of project systems at higher levels (i.e., activity level, process level, and project level) is then determined by aggregating entities at the levels below. Through the use of the proposed SoS framework, new dimensions of analysis for better understanding of the performance of engineering projects were explored. One application example of the proposed framework was demonstrated in a case study of a complex construction project. The findings highlight the capability of the proposed framework in providing a novel approach for bottom-up assessment of performance in</p>	10.1109/JSYST.2017.2671738	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7885050	IEEE Xplore
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		engineering projects.			
Enhancing Usage Control for Performance: A Proposal for Systems of Systems (Research Poster)		<p>Modern interconnected systems of systems, such as the Internet of Things (IoT), demand the presence of access and usage control mechanisms which will be able to manage the right of access to the corresponding services, and the plethora of information being generated in a daily basis. The Usage Control (UCON) model offers the means for fine-grained dynamic control of access to specific resources, by monitoring and evaluating the attributes defined within a dedicated security policy. However, a number of improvements can be introduced to the standard model regarding the simplification of the policy writing, but also the improvement of run-time efficiency and scalability. In this article, we discuss the limitations of the original UCON, and propose suitable enhancements for their remediation. Specifically, a risk aggregation framework is proposed to be added to the existing architecture, for dynamic role allocation and service grouping management, in order to improve the scalability, and run-time efficiency of the existing model.</p>	10.1109/HPCS.2018.00169	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8514474	IEEE Xplore

<p>A risk and threat assessment approaches overview in autonomous systems of systems</p>		<p>Systems of systems (SoS) have been introduced in early 1990s in air traffic control domain, defense and information technologies. Systems like this contain a set of components, being systems itself, with constituent components retaining operational independence. The definition and configuration of SoS have evolutionary nature and emergent behavior is one of the many important characteristics to be mentioned. Over the past ten years fast technological and industrial advances in the domain of autonomous and cooperating systems started to occur, which created new opportunities to use the benefits of SoS. In the near future, fully autonomous and cooperating systems are expected to become our reality and increase the production efficiency, while decreasing the human effort in harmful environments. There exist the need to make sure that critical properties of SoS, such as safety and security are guaranteed as a joint effort, since it is not sufficient anymore to address these properties independently in the development process. In this paper an overview of the</p>	<p>10.1109/ICAT.2017.8171624</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8171624</p>	<p>IEEE Xplore</p>
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		most common approaches and methods used to provide reasoning about joint safety and security is provided, as well as a check of the latest updates in standards related to these properties.			
Forest Fire Risk Mapping Beyond Borders in Türkiye and Western Balkans: Guidelines From the IPA FF Programme		The IPA Floods and Fires (IPAFF) Project, an EU funded initiative, aimed to enhance disaster risk management capabilities across the Western Balkans and Türkiye. Among its key outputs is the development of technical guidelines for forest fire risk assessment, a critical component in mitigating the increasing threat of wildfires exacerbated by climate change. This paper summarizes the methodology, applications, and recommendations for wildfire risk assessment and mapping as outlined in the guidelines. It highlights the importance of harmonized approaches, the role of machine learning and geospatial technologies, and the necessity of cross-border collaboration to improve risk management effectiveness. By integrating modern risk assessment methodologies, these guidelines provide a valuable tool for authorities, planners, and emergency responders in mitigating wildfire risks.	10.1109/SoSE66311.2025.11083857	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083857	IEEE Xplore

System of Systems for Quality-of-Service Observation and Response in Cloud Computing Environments		<p>As military, academic, and commercial computing systems evolve from autonomous entities that deliver computing products into network centric enterprise systems that deliver computing as a service, opportunities emerge to consolidate computing resources, software, and information through cloud computing. Along with these opportunities come challenges, particularly to service providers and operations centers that struggle to monitor and manage quality of service (QoS) for these services in order to meet customer service commitments. Traditional approaches fall short in addressing these challenges because they examine QoS from a limited perspective rather than from a system-of-systems (SoS) perspective applicable to a net-centric enterprise system in which any user from any location can share computing resources at any time. This paper presents a SoS approach to enable QoS monitoring, management, and response for enterprise systems that deliver computing as a service through a cloud computing environment. A concrete example is provided for application of this</p>	10.1109/JSYST.2013.2295961	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6729062	IEEE Xplore
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		new SoS approach to a real-world scenario (viz., distributed denial of service). Simulated results confirm the efficacy of the approach.			
Red teaming in the age of IOT: Thoughts on framing the next generation of technical vulnerability assessment		Red teaming, as it has been traditionally practiced, cannot adequately support assessment of the kinds of system of systems that IOT and related technologies will deliver. Ways must be found to transfer responsibility for system assessment from humans to the systems themselves. This will require an intentional, fundamental reframing of how the system assessment R&D community approaches its work.	10.1109/SYSOSE.2017.7994949	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994949	IEEE Xplore

<p>Safety & Security in the Context of Autonomous Driving</p>		<p>With the advent of cypher-physical (systems of) systems, new challenges for safety and security arise. Especially in the context of autonomous driving we are currently facing a complex environment, where security problems can easily result in safety-relevant issues, and vice versa. There have been multiple approaches in the past to combine the approaches from safety and security best practices into a combined view, all with their individual challenges. We propose a fully integrated approach, combining safety with security and modelling their complex interactions. In this work we start by giving a thorough definition of the basic terms and concepts used in safety and security, in order to identify similarities and differences. We then propose and outline a combined view on the safety and security causal chains and define their interdependencie s.</p>	<p>10.1109/ICCVE45908.2019.8965092</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8965092</p>	<p>IEEE Xplore</p>
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An internetworked self-driving car system-of-systems		This paper presents an overview of the architecture of an internetworked self-driving car system-of-systems. The architecture considers both the car as a system-of-systems as well as multiple cars participation in a larger multi-vehicle system-of-systems. Each relevant aspect of the architecture is reviewed.	10.1109/SYSOSE.2017.7994957	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994957	IEEE Xplore
Process Meta Model extended for the improvement cycle in a SoS Context		The following topics are dealt with: voltage control; adaptive control; feature extraction; photovoltaic power systems; maximum power point trackers; control system synthesis; nonlinear control systems; power generation control; complex networks; cloud computing.	10.1109/ICoCS.2019.8930769	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8930769	IEEE Xplore

Introducing Meta-Requirements for Describing System of Systems		<p>Complex, evolutionary systems operating in an open world can be seen as a composition of components which interact each other in order to fulfill their requirements. Following this vision, Systems of Systems (SoSs) literature aims at supporting the life of such complex systems taking into account key viewpoints such as emergence, time, mobility, evolution, dynamicity. Although different attempts can be found in the literature to address mostly specific viewpoints separately, it is still missing a unifying approach to analyze the whole set of viewpoints and their relationships, based on the identification of meta-requirements that can be exploited to describe any System of Systems (SoS). To this end, we developed a unifying meta-requirements model to describe SoSs viewpoints and relate them. The model is meant to be used to support the derivation of the requirements for any SoS. This paper introduces the problem, and presents the main notions of the meta-requirements model with the support of a domain-specific scenario.</p>	10.1109/HASE.2015.31	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7027426	IEEE Xplore
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Decision-Making in Complex Dynamical Systems of Systems With One Opposing Subsystem		<p>Many complex dynamical systems consist of a large number of interacting subsystems that operate harmoniously and make decisions that are designed for the benefit of the entire enterprise. If, in an attempt to disrupt the operation of the entire system, one subsystem gets attacked and is made to operate in a manner that is adversarial with the others, then the entire system suffers, resulting in an adversarial decision-making environment among its subsystems. Such an environment may affect not only the decision-making process of the attacked subsystem but also possibly the other remaining subsystems as well. The disruption caused by the attacked subsystem may cause the remaining subsystems to either coalesce as a unified team making team-based decisions, or disintegrate and act as independent decision-making entities. The decision-making process in these types of complex systems of systems is best analyzed within the general framework of cooperative and non-cooperative game theory. In this paper, we will develop an analysis that provides a theoretical basis for modeling the decision-making process in such</p>	10.23919/ECC.2019.8796292	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8796292	IEEE Xplore
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		<p>complex systems. We show how cooperation among the subsystems can produce Noninferior Nash Strategies (NNS) that are fair and acceptable to all subsystems within the team while at the same time provide the subsystems in the team with the security of the Nash equilibrium against the opposing attacked subsystem. We contrast these strategies with the all Nash Strategies (NS) that would result if the operation of the entire system disintegrated and became adversarial among all subsystems as a result of the attack. An example of a system consisting of three subsystems with one opposing subsystem as a result of an attack is included to illustrate the results.</p>			
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<p>Analyzing hazards in system-of-systems: Described in a quarry site automation context</p>		<p>Methods for analyzing hazards related to individual systems are well studied and established in industry today. When system-of-systems are set up to achieve new emergent behavior, hazards specifically caused by malfunctioning behavior of the complex interactions between the involved systems may not be revealed by just analyzing single system hazards. A structured process is required to reduce the complexity to enable identification of hazards when designing system-of-systems. In this paper we first present how hazards are identified and analyzed using hazard and risk assessment (HARA) methodology by the industry in the context of single systems. We describe systems-of-systems and provide a quarry site automation example from the construction equipment domain. We propose a new structured process for identifying potential hazards in systems-of-systems (HISoS), exemplified in the context of the provided example. Our approach helps to streamline the hazard analysis process in an efficient manner thus helping faster certification of system-of-</p>	<p>10.1109/SYSCON.2017.7934783</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7934783</p>	<p>IEEE Xplore</p>
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<p>Extending a Multi-Agent Systems Simulation Architecture for Systems-of-Systems Security Analysis</p>		<p>Security is an important concern for software-intensive Systems-of-Systems (SoS). Architectural analysis for SoS security assessment should be performed at early stages of development. Such activity could prevent vulnerabilities and avoid potential cascading attack emergent behaviors, i.e., a succession of security vulnerabilities that emerge from individual constituents security fragilities, potentially causing interruption and collapse of SoS operation. Model simulation can prevent these issues by predicting, at design-time, how SoS will behave regarding its reaction to potential attacks. As security is a quality attribute, i.e., a property that comes up from the relation between software parts, software architecture analysis and simulation are an additional support for the prediction of SoS security. However, despite recent advances in such area, few simulation approaches have tackled simulation of secure SoS architectures where the basis of the described models are the SoS behavior or the interactions among the SoS Constituent Systems (CS). The main contribution of this paper is</p>	<p>10.1109/SYSOSE.2018.8428776</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428776</p>	<p>IEEE Xplore</p>
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		<p>offering a big picture of how recent advances on SoS security analysis via simulations can form a robust framework for SoS security prediction. We argue the pertinence of Multi-Agent Systems (MAS) for SoS simulation due to similarities between MAS and SoS concepts, and we report how MAS simulation enables the visualization of emergent behaviors and how they impact the SoS security. Our results to foster SoS security analysis include (i) an extension of a MAS conceptual model and platform to include security concepts, (ii) a Model-Driven Engineering (MDE) approach that adopts automatic mappings between secure SoS architecture modeled using an existing SysML-based modeling language, namely the SoSSecML, and (iii) a MAS platform to support such analysis.</p>			
Modelling Complex System-Of-Systems for Creating Situation Awareness : (Late Breaking Report)		<p>This project is in its early phase therefore the presented report is superficial and suggests a suite of models for modelling SoS. Requirements to the suite and to each particular model may change during further development because of pragmatic considerations.</p>	10.1109/COGSIM A.2018.8423969	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8423969	IEEE Xplore

<p>A systems engineering approach applied to U-Space drones: concepts and challenges</p>		<p>The last few years, the concept of Unmanned Traffic Management (UTM), adopted in Europe as U-Space by the Warsaw Declaration, has triggered numerous research and development projects on new technologies and procedures enabling Remote Piloted Aircraft Systems (RPAS) flights at low altitudes while respecting other airspace users' safety. As a new field, this U-Space concept can be defined as a set of innovative services based on latest technologies such as Artificial Intelligence, or Internet of Things and thus opening up a new range of domain of applications. This emerging field of research requires different approaches in order to design a safe and efficient U-Space. We believe that a Systems of Systems Engineering approach could be suitable to design a functional architecture of U-Space. This paper outlines how a framework of Systems Engineering could be suitable for designing a U-Space for Spain while considering requirements from SESAR Joint Undertaking projects for Single European Sky (SES).</p>	<p>10.1109/SYSOSE.2019.8753880</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753880</p>	<p>IEEE Xplore</p>
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Disaster response system framework analysis of the SoS approach		<p>In the context of the frequent occurrence of disasters in the world, disaster response mechanism operations to maximize the safety of citizens and minimize damage to life and property have been a constant concern. Thus, this study will explore the framework of disaster response systems in seven countries. Using research methods of qualitative analysis and keyword searches across academic databases, the disaster response framework of seven countries and the technical means involved in various fields are sorted out, analyzed, and summarized. Preliminary findings indicate that based on the complexity of disaster response systems, more complex systems can instill a way of thinking to help improve disaster response. Furthermore, from a system of systems (SoS) perspective, multiple factors can be simultaneously considered in future research to establish a complex disaster response system that would minimize the impact of disasters on society.</p>	10.1109/IEEM62345.2024.10857226	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10857226	IEEE Xplore
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CyberSecurity considerations for an interconnected self-driving car system of systems		The vehicle intercommunications required to enable the some of the most beneficial features of self-driving cars also pose significant security risks. To coordinate, cars must advise other cars of their plans, status and actions and be able to rely on the information provided by other cars. This paper presents an intrusion detection system, based on system-of-systems principles for the self-driving car system-of-systems.	10.1109/SYSOSE.2017.7994973	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994973	IEEE Xplore
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Functionality evaluation of system of systems architecture based on extended influence diagrams		<p>System of systems architecture (SoSA) has received increasing emphasis by scholars since Zachman ignited its flame in 1987. Given its complexity and abstractness, it is critical to validate and evaluate SoSA to ensure requirements have been met. Multiple qualities are discussed in the literature of SoSA evaluation, while research on functionality is scarce. In order to assess SoSA functionality, an extended influence diagram (EID) is developed in this paper.</p> <p>Meanwhile, a simulation method is proposed to elicit the conditional probabilities in EID through designing and executing SoSA. An illustrative anti-missile architecture case is introduced for EID development, architecture design, and simulation.</p>	10.21629/JSEE.2018.03.08	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8407048	IEEE Xplore
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Combat System-of-Systems Network Modeling Research		<p>In the modern combat field, the operational patterns rapidly shift from “platform-centric warfare” to confrontation between the various Combat system-of-systems (CSoS). Generating the network model of CSoS is an essential issue in combat analysis. In this paper, we give the general constraints of CSoS modeling, and propose a CSoS network modeling method. Then, under different attacking strategies in two battlefield attacking scenarios, a kill-chain-based evaluation metric was used to evaluate the functional robustness of CSoS, and verified that our proposed modeling method is consistent with battlefield realities. These conclusions can provide some guidance for the layout design of the future CSoS.</p>	10.1109/ICUS55513.2022.9987241	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9987241	IEEE Xplore
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Modeling Approaches for System-of-Systems Dynamic Architecture: Overview, Taxonomy and Future Prospects		<p>System-of-Systems (SoS) result from the collaboration of independent Constituent Systems (CSs), connected in a certain configuration known as an architectural configuration, to achieve a common mission. The architectural configuration may change as new CS may join SoS and/or existing CS may leave SoS at runtime. These architectural configuration changes have affect on the overall system quality attributes (i.e. performance, security and reliability). Therefore, modelling SoS architecture is a challenging task as CSs and the possible architectural configurations are not entirely known at design time. Architectural description languages (ADLs) have been proposed and used to deal with SoS dynamic architecture. However, we still envision gaps to be bridged and challenges to be addressed in the forthcoming years. This paper outline a taxonomy for modeling SoS and provides a broad discussion on the state-of-the-art modeling notations to model and analyze SoS architectural configuration. An SoS case is presented to explain the impact of architectural configurational</p>	10.1109/SYSOSE.2019.8753877	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753877	IEEE Xplore
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		changes on the SoS properties. Besides, we also discuss challenges and future directions to be overcome in the forthcoming years.			
A Hybrid Ontology for Identifying Safety Hazards and Security Threats		<p>This paper introduces the Hazard and Threat Ontology, a hybrid ontology designed to illustrate safety hazards and security threats in complex systems of systems. Hazard Ontology and Combined Security Ontology are two ontologies with extensive terminology and complementary methodologies. They allow us to develop a hybrid approach that enables safety and security experts to analyze complex systems thoroughly. Combining these ontologies enhances the depth and scope of experts' analysis and decision-making process, and several tangible benefits are associated with using a hybrid approach across different industrial sectors. In this paper, an industrial use case illustrates the practical utility of the Hazard and Threat Ontology. Our approach facilitates the identification of hazards and threats, providing actionable insights into how to mitigate them. Consequently, assets and personnel can be protected, downtime can be reduced, and operational resilience can be enhanced.</p>	10.1109/ICSR563046.2024.10927510	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10927510	IEEE Xplore

<p>Geospatial Geodetic Engineering Contributions to Specialty Engineering Activities or a dedicated Specialty Engineering Discipline on their own in System of Systems Engineering?</p>		<p>This article reflects the abundant uses and applications of geodetic and geospatial technologies (like GNSS & GPS; GIS; spatial reference systems; processing, analysis and visualization of geospatial data) in Systems of Systems. It briefly analyzes to what extent the Systems Engineering Specialty Activities listed by INCOSE and modeling and simulation may be supported by related subject matter expertise. In addition it discusses whether Geospatial and Geodetic Engineering should be considered as dedicated Specialty Engineering activities themselves within the frame of Systems Engineering.</p>	<p>10.1109/SYSOSE.2018.8428775</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428775</p>	<p>IEEE Xplore</p>
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<p>Secure-by-component: A System-of-systems Design Paradigm for Securing Space Missions</p>		<p>Space missions face increasing adversarial threats, making security a more critical concern than ever before. As space becomes congested and contested, the success and safety of these missions rely heavily on the security and resilience of complex systems. Unfortunately, most standards, guidance, and frameworks for space cybersecurity often fall short in emphasizing security as a primary consideration during the initial design phases and are typically applied as an afterthought once the mission is deployed. A secure-by-design approach for space missions should address the wide diversity of missions and the unique characteristics of each one. To tackle this challenge, we introduce secure-by-component, a system-of-systems approach to thinking about secure-by-design for space missions. Our design strategy involves the concept of secure blocks as foundational building blocks for securing space missions. These blocks can be flexibly combined to create secure architectures tailored to meet the unique requirements of each space mission. We demonstrate the usability of our</p>	<p>10.23919/3S60530.2024.10592289</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10592289</p>	<p>IEEE Xplore</p>
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		<p>approach by applying it to a critical component of a spacecraft, specifically the star tracker. We discuss the practicality, flexibility, and scalability of our strategy and its applicability to the forthcoming IEEE technical standard on space system cybersecurity. Our proposal is designed to enhance, not replace, top-down approaches to security by complementing existing system engineering strategies. Furthermore, we emphasize that our approach can be readily adopted by individual space organizations and adapted to other domains that include systems-of-systems, highlighting its potential for broad application beyond space missions.</p>			
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Towards a SoIS model for University Surveillance		<p>University surveillance systems that use sensors (cameras, GPS) operate in dynamic and heterogeneous environments. Interaction with other systems is, therefore, an important aspect to consider. We should consider these types of systems as a system of information systems (SoIS). Modeling this type of system and integrating its components presents a significant challenge, as various factors may hinder achieving the desired security solution. It is fundamental to consider the interoperability property of a SoIS as a requirement for implementing a university surveillance system. Interoperability achievement is an obstacle when heterogeneity between systems is present turning achieving a SoIS-based surveillance solution into a critical issue to address. Our proposal, an architecture designed to interoperate with various systems related to university security, is a crucial step in addressing the complex interoperability issues. We developed an architectural model and implemented a mediator to analyze the level of interoperability that can be achieved. We</p>	10.1109/SESOS6601.2025.00009	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11050811	IEEE Xplore
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		<p>then applied this mediator to a risk scenario that could escalate into a high-impact incident for the university community, demonstrating its practical viability. We identified the systems involved in university surveillance and how their heterogeneous data can be managed to ensure the necessary communication for appropriate risk detection and prevention of high-impact incidents. In summary, through exploratory study, we validate our solution. We achieved syntactic interoperability through the video stream protocol. We achieved semantic interoperability through communication between the camera and license plate recognition system with 96.79% accuracy. We also achieved semantic and pragmatic interoperability between camera and suspicious behavior detection systems with better adaptation to the actual context, with a precision of 95.24% and a recall of 76.92%. IT can prevent high-impact situations by analyzing suspicious behavior scenarios.</p>			
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Investigating Attack Propagation in a SoS via a Service Decomposition		<p>A term systems of systems (SoS) refers to a setup in which a number of independent systems collaborate to create a value that each of them is unable to achieve independently. Complexity of a SoS structure is higher compared to its constitute systems that brings challenges in analyzing its critical properties such as security. An SoS can be seen as a set of connected systems or services that needs to be adequately protected. Communication between such systems or services can be considered as a service itself, and it is the paramount for establishment of a SoS as it enables connections, dependencies, and a cooperation. Given that reliable and predictable communication contributes directly to a correct functioning of an SoS, communication as a service is one of the main assets to consider. Protecting it from malicious adversaries should be one of the highest priorities within SoS design and operation. This study aims to investigate the attack propagation problem in terms of service-guarantees through the decomposition</p>	10.1109/SERVICE.2019.00017	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8817189	IEEE Xplore
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		into sub-services enriched with preconditions and postconditions at the service levels. Such analysis is required as a prerequisite for an efficient SoS risk assessment at the design stage of the SoS development life cycle to protect it from possibly high impact attacks capable of affecting safety of systems and humans using the system.			
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<p>Resilient System Engineering in a Multi-UAV System of Systems (SoS)</p>		<p>The use of Unmanned Aerial Vehicles (UAVs) in multi-mission Unmanned Aerial Systems (UASs) has grown exponentially in recent years. Multi-UAV System of Systems (SoS) have proliferated due to their abilities to work autonomously, to decentralize mission workload and to exhibit resiliency in the ability to retain mission functionality even if a UAV node or network connectivity is lost. This resiliency is not inherent, and must be architected into both the SoS and UAV node/payload, especially in the areas of communications, control, ad-hoc networking, and path planning. As an exemplar, the Resilient System Engineering (RSE) process will be used to derive and identify resilience attributes for a Multi-UAV SoS architecture. For this paper, the Multi-UAV SoS will be tasked for Search and Rescue (SAR) and use a Time/Frequency Difference of Arrival (T/FDOA) based location algorithm to locate agents in distress. A simulation of the SAR SoS, using Contract-Based Design (CBD) invariant contracts are used to quantify the intended resilience/emergence attributes of the Multi-UAV SAR SoS and the T/FDOA location</p>	<p>10.1109/ISSE46696.2019.8984509</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8984509</p>	<p>IEEE Xplore</p>
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<p>Autonomous and Composable M&S System of Systems with the Simulation, Experimentation, Analytics and Testing (Seat) Framework</p>		<p>A simulation System of Systems (SoS) comprised of various simulation systems may have dissimilar modeling paradigms. For performing autonomy research and development, various types of simulation systems need to be brought together to build a multi-domain virtual SoS wherein effects of autonomous entities/agents can be observed. While the distributed simulation community has solved the integrability challenge using standards like Distributed Interactive Simulation (DIS) or High Level Architecture (HLA), the model composability challenge is an open research problem. Many software/systems can now be made available as docker applications which can be readily plugged into existing simulation systems. However, the trust issues with such integration limit their usage as established systems cannot trust third party apps. This paper highlights some of the challenges with building a cloud-based simulation SoS, proposes an architecture framework using the concept of structural autonomy and leverages Modeling & Simulation as a fundamental key</p>	<p>10.1109/WSC48552.2020.9384040</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9384040</p>	<p>IEEE Xplore</p>
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		enabler for autonomy research.			
An Architecture of System of Systems (SoS) for Commercial Flight Security in 5G OGCE		Based on the fifth generation of mobile communication (5G), 5G open grid computing environment (5G OGCE), an architecture of system of systems (SoS) for commercial flight security is presented by this paper, and this architecture contains an autonomous large wide-body commercial aircraft model that carries unmanned aerial vehicles (UAVs) and is called air aircraft carrier. Its purpose is to safeguard the commercial flight safety and to build up the new SoS that can track all commercial flight process. With the development of swarm technology, there will be more and more interference and attacks on commercial flight safety by the swarm UAV system. Autonomous air aircraft carrier can capture these swarm UAVs by catching fish (other UAVs) process, thus they can avoid commercial aviation accidents and using commercial flights to attack public city infrastructure.	10.1109/ICSAI.2018.8599363	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8599363	IEEE Xplore

How to Analyze the Safety of Concepts for a System-of-Systems?		<p>Developing safety-critical products like cars, trains, or airplanes requires rigor in following development processes, and evidence for product safety must be collected. Safety needs to be considered during each development step and traced through the development life cycle. The current standards and approaches focus on single human-operated products. The technical evolution enables integrating existing products and new autonomous products into system-of-systems to automate workflows and production streams. Developing safety-critical systems-of-systems requires similar processes and mapping to safety-related activities. However, it is unclear how to consider safety during different development steps for a safety-critical system-of-systems. The existing hazard analysis methods are not explicitly mapped to developing a system-of-systems and are vague about the required information on the intended behavior. This paper focuses on the concept phase for developing a system-of-systems, where different technical concepts for a specific product feature are</p>	10.1109/ISSE51541.2021.9582527	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9582527	IEEE Xplore
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		<p>evaluated. Specifically, we concentrate on the evaluation of the safety properties of each concept. We present a process to support the concept phase and apply a model-driven approach to capture the system-of-systems' relevant information. We then show how this knowledge is used for conducting an FMEA and HAZOP analysis. Lastly, the results from the analysis are mapped back into the sequence diagrams. This information is made available during the next development stages. We apply the method during the concept phase for designing an industrial system-of-systems. Our approach helps to design complex system-of-systems and supports concept evaluation considering the criticality of the concept under consideration.</p>			
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Decentralized, Secure and Cognitive Architecture for Automotive CyberPhysical System of Systems		<p>In this paper, a holistic, decentralized and cognitive design and operation approach that supports CyberPhysical System of Systems (CPSoS), autonomic (without human intervention) behavior, making such systems aware of their physical and cyber environment and reacting to it accordingly so that they constantly match their intended purpose. We propose using a model based design approach to describe a CPSoS in a holistic and abstract way and to allocate computational power/resources to the CPS end devices of the System by determining and generating autonomously what cyber-physical processes will be handled by a device's each heterogenous component (processor cores, GPUs, FPGA fabric) and software components (software stacks). The proposed solution uses this methodology to strengthen reliability, fault tolerance and security at system level but also to support CPS designs that work in a decentralized way, collaboratively, in an equilibrium, by sharing tasks and data with minimal central intervention. Also, the proposed system supports</p>	10.1109/MECO49872.2020.9134336	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9134336	IEEE Xplore
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		<p>the interaction of the CPSoS with their human users/operators through extended reality modules (AR glasses, haptics interfaces) to increase human situational awareness but also to include human behavior in the CPSoS design and operation phase. The proposal key points are highlighted in this paper and their usage in an automotive use case that involves connected cars is presented.</p>			
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System of Systems Thinking in Policy Development: Challenges and Opportunities		<p>This chapter reviews the literature on scale system of systems (SoS) thinking with respect to value systems and ethics, complex adaptive systems, risk, and cooperation and frame the content in the context of policy development for solving global problems. Several policies are discussed in the chapter to exemplify areas of effective policy design and domains for future work. Preference relations can be used to evaluate alternatives, but more importantly to create alternatives that complement the modeled value systems. In modeling complex adaptive systems, the focus is on how local interactions create global structures and patterns. The chapter reviews the systems-level implications of uncertainty and unpredictability in risk management for policy development. A SoS model of the global food system is discussed in the hope of developing the understanding of the system and to provide insight into which policy mechanisms may work to achieve global food security.</p>	10.1002/9781119036821.ch2	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=7090258.pdf&bkn=7089495&pdfType=chapter	IEEE Xplore
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OnToRisk – a formal ontology approach to automate cyber security risk identification		<p>The everchanging cyber risks landscape poses a significant threat to organisations and requires them to continuously manage their risks. Risk identification is the driving force of risk management, and it is typically performed manually, integrating expert knowledge and information from various systems. This hinders the ability to systematically identify new risks as they emerge. This paper introduces a new approach – OnToRisk – to automate aspects of the cyber security risk identification. The approach uses a formal ontology to integrate information from multiple constituent systems and organisational definitions, and then reason about the current organisational situation with respect to formally defined cyber risks. We describe an implementation of the approach to identify cyber vulnerability induced risks, as they become an emergent property of the organisation.</p>	10.1109/SOSE55472.2022.9812653	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9812653	IEEE Xplore
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<p>"Fifty Shades of Grey and More": Medical Use of Systems of Systems, Trends, Challenges and, Implications for EMC</p>		<p>The complexity and diversity of medical electrical equipment and their intended use environments are increasing. The complexity and diversity make clinical environments "grey" in terms of EM behaviour compared to controlled laboratory environments in which they are tested for EMC compliance. Different clinical environments (even functionally similar ones) may have different EM behaviour making them have different "shades of grey" compared to each other depending on factors such as types of equipment, the density of equipment, and structural differences. On the other hand, the susceptibility of medical devices to EMI (Electromagnetic Interference) tends to increase posing more challenges [1]. This "greyness" due to the growing complexity of medical equipment and their intended use environments and increasing susceptibility has led to unprecedented EMC concerns. This paper briefs current trends in the clinical use of systems of systems (SoS), challenges that arise regarding EMC/EMI and suggestions for potential ways to address such challenges in the medical technology domain.</p>	<p>10.1109/EMCEurope57790.2023.10274273</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10274273</p>	<p>IEEE Xplore</p>
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Modelling Integral Risk Assessment (MOIRA): Experiments on the Dutch Railway Departure Process		<p>Risk assessment is mostly document-based at this moment. In this paper, we present a study to compare two ways of integral risk assessment of the Dutch railway departure process. First, a document-based risk assessment about the departure process executed by NS in 2011. Second, a risk assessment about this same departure process with modelling of integral risk assessment (MOIRA). The aim is to measure and compare four key performance indicators: (1) validity of the risk assessment elements, (2) consistency of the data processing, (3) clarity of the boundaries, and (4) comprehension of the overall safety architecture. For this purpose, we have designed experiments that included direct, detailed observations in which we controlled the execution of performing risk assessment tasks. In total, twelve test sessions were performed, with in total 42 participants. Data was collected through the month of January 2019. In the end, we compare the two, to see if there are any objective differences, and also, we validate their usability by surveying the findings of the participants, resulting in a fifth KPI.</p>	10.1109/SYSOSE.2019.8753828	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753828	IEEE Xplore
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SoS capability schedule prediction		<p>The Australian Defence Materiel Organisation recently developed a process for determining the probability that a system development program will meet their stated delivery or completion date as well as predicting the actual schedule and identifying factors that are driving the schedule. This process, the Schedule Compliance Risk Assessment Methodology (SCRAM), provides a framework for identifying and communicating the issues and risks to, and the root causes of, schedule slippage and providing recommendations to mitigate and/or remediate issues and risks. To date, SCRAM has been successfully applied to a number of major development acquisition programs in Australia and the United States. This paper describes the application of the SCRAM process to predict the completion date of an SoS capability, conduct a root cause analysis of any identified schedule slippage, and identify possible remedial actions that can be taken to reduce schedule slippage.</p>	10.1109/SYSOSE.2015.7151942	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151942	IEEE Xplore
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Identifying Security Issues with MBSE while Rebuilding Legacy Software Systems		<p>in this paper, we introduce how Model-based System Engineering (MBSE) could be leveraged in order to tackle security issues while recreating legacy software systems. Originally, MBSE was dedicated to managing the complex system creation in terms of system requirements, design, analysis, verification and validation activities leaving security aspects aside. However, previous research shows that security analysis activity could be integrated into MBSE activity and powerful MBSE tools such as change impact analysis, simulation, validation, and verification could be successfully applied in cross-cutting disciplines. The paper presents guidelines on how and when to apply various security techniques (e.g. security requirements, misuse cases, attack scenarios) in the MBSE environment. The case study demonstrates and proves the adaptability of the security guidelines on the realworld software system modernization project.</p>	10.1109/SoSE50414.2020.9130491	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130491	IEEE Xplore
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<p>SGAM Toolbox Revisited: A Standards-Based Domain-Specific Modeling Language and Toolset</p>		<p>The SGAM Toolbox has established itself as a valuable modeling tool in the energy sector, particularly for interdisciplinary system-of-systems use cases. Built on a domain-specific modeling language that is anchored in European smart grid standardization, the toolbox has been adopted across academia and industry. Drawing on this extensive experience, we introduce the new and improved SGAM Toolbox. First, we review published applications of the tool; it has been widely used for high-level architecture modeling, often alongside other software in areas such as security, privacy, and e-mobility integration. Based on our findings, the key updates for the new toolbox include a strong formal foundation, a clear definition on how the tool should interface with requirements engineering, comprehensive semantics, and a viewpoint structure that segregates logical from technical aspects; these improvements enhance usability and real-world applicability. Second, the updated toolbox is presented in accordance with the TILO language-engineering stack; the specification</p>	<p>10.1109/ACCESS.2025.3586722</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11072468</p>	<p>IEEE Xplore</p>
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		<p>includes the underlying ontology, a MOF-conformant metamodel, a UML-based implementation, and a modeling add-in for Enterprise Architect for advanced features. Third, we offer a practical demonstration of the toolbox, showing use case-driven architecture modeling. The SGAM Toolbox aims to strengthen its role as a platform for collaborating on system-of-systems use cases, bringing together the diverse stakeholders in smart grid projects.</p>			
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Towards a risk analysis method for systems-of-systems based on systems thinking		<p>The characteristics of systems-of-systems (SoS) present fundamental challenges regarding properties such as safety, security, reliability, and robustness. This is due to the SoS nature where a collection of independent systems cooperate to fulfil certain high-level objectives. Risk analysis is thus an important activity in SoS engineering. This paper presents a risk analysis method which extends the existing STAMP safety analysis method that is based on systems thinking. Our extensions are aimed at coping with other risks than safety, and the usage is tailored to SoS. The method aims at deriving requirements on the constituent systems that will reduce the emergent risks on the SoS as a whole. The method has been applied to a case study of vehicle platooning.</p>	10.1109/SYSCON.2018.8369501	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8369501	IEEE Xplore
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Testing Techniques		<p>Summary</p> <p><p>Testing should be seen as verification and validation. Static tests and reviews are component verification activities that do not require that component to be running. The acronym create, read, update and delete represents the order of data management, applies to the testing of data and their life cycle.</p> <p>Path&#x2010;based techniques can be seen as the application to functional testing of the white&#x2010;box techniques</p> <p>&#x201c;Instruction Coverage&#x201d; and</p> <p>&#x201c;Branch Coverage&#x201d;. The equivalence partitions (EP) test technique is simple to understand, but more difficult to apply correctly. Boundary value analysis is very efficient and finds faults at the boundaries of valid ordered EPs. This technique therefore requires the prior implementation of the technique of EPs. Decision table testing is a powerful technique to test combinations of functional decisions, business rules in detail.</p> <p>Exploratory testing is not really a testing technique, as it is not based on an existing baseline technique.</p></p>	10.1002/9781394188451.ch9	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10524326.pdf&bkn=10523215&pdfType=chapter	IEEE Xplore
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<p>An Improved SoSE Model – The “V+” Model</p>		<p>An improved model from the V-model called V+ model is proposed in this paper based on the existing SoSE research and our engineering experience. This model aims to solve the problems arising from the lack of integrity, inability to decompose SoS's capability in a static way and untimely verification of SoS's capability when the traditional V-model of systems engineering is applied to SoSE. This V+ model divides the SoSE process into two levels, the SoS level and the system level. At the SoS level, a system top-level operational process model and a unified information space database have been established, and the key process model “DE-CAMPS” model has been established also. At the system level, the constituent systems are classified according to their engineering phases, and choose different system engineering cutting processes, therefore building a complete SoSE model. Finally, the feasibility of this model is verified during the engineering practice of the complex aviation support system.</p>	<p>10.1109/SoSE50414.2020.9130496</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130496</p>	<p>IEEE Xplore</p>
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Standards and Regulations		<p>Summary</p> <p><p>More and more areas are subject to standards and regulations. The standards are mainly defined by international standardization bodies such as the IEEE (Institute of Electrical and Electronic Engineers) or the ISO (International Standard Organization); and so on. Standards define a minimum level of quality or process in the production of hardware or software products. In general, using a standard provides a reference framework defining the minimum actions to be implemented. The implementation of one &#x2013; or more &#x2013; standard within a company begins with a management decision, sometimes following an audit, an evaluation of the benefits of such an implementation. In industries subject to regulations or standards, it is necessary to demonstrate the compliance of the implementation of the applicable standards, in addition to providing proof of compliance with functional and technical requirements. Conformance must be developed throughout the system&#x2010;of&#x2010;system s design cycle, according to the</p>	10.1002/9781394188482.ch11	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10515246.pdf&bkn=10513545&pdfType=chapter	IEEE Xplore
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		acronym IADT (Inspection, Analysis, Demonstration, and Test).			
Error Rate Analysis of Physical Layer Security for Sub-6 GHz 5G Network Planning		<p>1, This paper investigates the application of Key-based Physical Layer Security to future 5G and IoT network dimensioning, not previously considered in other works. Results indicate a Key bit Error Rate of 1% at a cell separation of 500m with a reuse of 7. A derivation for a closed form expression of the Key bit Error Rate as a function of radio network parameters is presented for a specific Precoder Matrix Index (PMI) based Physical Layer Security scheme known as MOPRO. The equation, which accounts for Rayleigh fading environments, is verified against simulated data, and shows a gain of 6dB for 1-bit codebooks over 2-bit codebooks. Also shown is a closed form statistical expression for the probability density function of the Key bit Error Rate. The expression for direct computation of Key bit Error Rate statistics points the way forward toward future physical layer security based planning in heterogeneous networks.</p>	10.1109/SYSOSE.2019.8753853	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753853	IEEE Xplore

System of systems cyber effects simulation ontology		<p>This paper outlines the requirements for a series of ontologies necessary to provide a meaningful answer to the question: How do we model and simulate the System of Systems effects of a cyber attack on an organization or military unit? This work provides the data model specification for a simulation to answer this question by explaining the required domains of knowledge. We introduce mechanisms to federate these domains, and then provide an exemplar use-case to contextualize one type of scenario the model must be capable of representing within a simulation environment. The model demonstrates the granularity necessary for the modeling and simulation of a SoS effect of a cyber attack on an organization or military unit.</p>	10.1109/WSC.2015.7408358	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7408358	IEEE Xplore
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<p>Risk Management Objectives for Distributed Development of Interoperable Medical Products</p>		<p>Medical devices are increasingly being built using interoperability and platform approaches that enable devices and service components from different manufacturers to be combined flexibly into “systems of systems”, so as to achieve integrated care-giving solutions that aim to exceed the capabilities of standalone devices with reduced likelihood of medical errors. In these situations, the primary medical device domain tasks such as risk management are distributed across the organization boundaries of multiple stakeholders, each of whom contributes components as well as development and assurance artifacts to establish the final system and support system assurance arguments. However, ISO 14971 - the primary medical device risk management standard - focuses on single-manufacturer monolithic device and hence cannot effectively guide distributed risk management activities across stakeholders. In this paper, we provide a set of risk management objectives for distributed development of interoperable medical systems. These objectives can be seen as augmenting the</p>	<p>10.1109/SPCE47297.2019.8950764</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8950764</p>	<p>IEEE Xplore</p>
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		requirements of ISO 14971 to provide additional criteria for achieving safe and secure interoperability via integration of components from multiple vendors. These objectives may also be used as top-level claims in assurance cases for interoperable medical products or form the basis of requirements in emerging standards for safe and secure interoperability.			
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Static Tests, Reviews and Inspections		<p>Summary</p> <p><p>Defects are the result of human error, static in a deliverable that upon execution generate an unintended result. In the software design phases, defects can occur in: the requirements elicitation phase, the software analysis and design phase, the coding phase, and the test design phases. Static testing and reviews are component verification activities that do not require those components to be running. Technical reviews can be formal or not have any formalism and a product can undergo several technical reviews during its development. Inspections are the most formal reviews, led by a moderator trained in this type of review. Implementing efficient and cost-effective reviews requires identifying when in the life cycle the defect is introduced, and the root cause of the defect. The purpose of safety analyses is to ensure that the system does not generate risks to human life.</p></p>	10.1002/9781394188451.ch10	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10523813.pdf&bkn=10523215&pdfType=chapter	IEEE Xplore
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Multi-pursuer pursuit-evasion games under parameters uncertainty: A Monte Carlo approach		<p>The traditional pursuit-evasion game considers a situation where one or more pursuers try to catch an evader, while the evader is trying to escape. Instead of moving entities, a more general scope of the pursuit-evasion game could also consider systems of systems. In a system consisting of many subsystems, when one subsystem decides to dissent and operate in a manner that is inconsistent with the others, a game situation similar to the pursuit-evasion game occurs. The dissenting subsystem can be viewed as an evader and the remaining conforming subsystems can be viewed as pursuers who oppose and try to prevent the dissention from succeeding. This is a more general system of systems, approach to the pursuit-evasion problem where the players are now subsystems of a system rather than moving entities. Clearly, any control strategy by any one of the subsystems to separate needs to be assessed against a variety of options that the remaining subsystems may use. In this paper, we consider a game where the pursuer subsystems consider three possible strategies: (1) act independently as</p>	10.1109/SYSOSE.2017.7994937	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994937	IEEE Xplore
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		<p>Nash players, (2) act optimally as a team, and (3) act individually as greedy pursuers. The evader subsystem, on the other hand, will consider strategies against all possible strategies by the pursuer subsystems. We assume that no subsystem knows which strategies the other subsystems are implementing and none of the subsystems has information about any of the parameters in the objective functions of the other subsystems. We deal with these uncertainties by first developing the Nash strategies for each of the resulting games for all possible options available to both sides. Given the prevailing parameter uncertainty in developing the strategies, we perform a Monte Carlo analysis to determine probabilities of success (or failure) for each of the strategies considered by each side. We illustrate the results using two simulation scenarios of a pursuit-evasion example consisting of three pursuers moving on a plane and chasing one evader.</p>			
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<p>Risk Analysis for System of Systems Management: The Swedish COVID-19 Management Case</p>		<p>A socio-technical system of systems (SoS) is a collaboration of independently operated and managed systems. These constituent systems join the SoS to work together for a common goal: to achieve positive emergent behaviors such as greater capability, efficiency, resource utilization, reliability, and robustness. To achieve such a goal, an SoS needs to be well-managed with mitigation plans for all system risks. However, existing risk management strategies were developed for individual, non-integrated systems and are therefore inadequate for use with SoS. This paper uses the COVID-19 pandemic in Sweden as a case study for exploring risk analysis for SoS management. We performed a risk analysis of this SoS based on STAMP (System-Theoretical Accident Model and Processes), an existing method from the safety domain, as part of developing a preliminary risk analysis process for practitioners. Preliminary results reveal that extended SoS structures, uncertainty-driven decision-making, emerging behavior, and changes in trust, policy, and legislation pose significant challenges. The study's</p>	<p>10.1109/SysCon61195.2024.10553576</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10553576</p>	<p>IEEE Xplore</p>
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		contribution is that our findings provide a knowledge base to act as a guide for risk management of SoS. Applying a method for safety analysis to crisis management also extends the body of knowledge on methods for SoS risk analysis.			
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Using a systems of systems modeling approach for developing Industrial Internet of Things applications		<p>Nowadays the modeling development process suffers from being an effort to meet project deadlines. Typically, the architecture effort is separated from the Systems Engineering (SE) leading to a lack of traceability from the system requirements and design to the architecture. An Industrial Internet of Things (IIoT) system connects and integrates systems and software engineering with enterprise systems, business processes, and analytics, which supports decision makers. Though it sounds promising, there are very limited formal techniques to define IIoT architectures. In this paper, an emerging international standard called the Unified Architecture Framework (UAF), its potential application to capture IIoT architectures, its ability to help the systems integrator to develop interoperable systems, with traceability to requirements and across different viewpoints, is analyzed. A mapping of the Industrial Internet Reference Architecture (IIRA) to UAF is described and a real-world case study is provided to show the application of the UAF to modeling IIoT architectures.</p>	10.1109/SYSOSE.2017.7994942	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994942	IEEE Xplore
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Using Bayesian Networks for a Cyberattacks Propagation Analysis in Systems-of-Systems		<p>System of Systems (SoS) represent a set of independent Constituent Systems (CS) that collaborate in order to provide functionalities that they are unable to achieve independently. We consider SoS as a set of connected services that needs to be adequately protected. The integration of these independent, evolutionary and distributed systems, intensifies SoS complexity and emphasizes the behavior uncertainty, which makes an SoS security analysis a critical challenge. One of the major priorities when designing SoS, is to analyze the unknown dependencies among CS services and vulnerabilities leading to potential cyberattacks. The aim of this work is to investigate how Software Engineering approaches could be leveraged to analyze the cyberattack propagation problem within an SoS. Such analysis is essential for an efficient SoS risk assessment performed early at the SoS design phase and required to protect the SoS from possibly high impact attacks affecting its safety and security. In order to achieve our objective, we present a model-driven analysis approach, based</p>	10.1109/APSEC48747.2019.00056	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8945743	IEEE Xplore
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		on Bayesian Networks, a sensitivity analysis and Common Vulnerability Scoring System (CVSS) with aim to discover potential cyberattacks propagation and estimate the probability of a security failure and its impact on SoS services. We illustrate this approach in an autonomous quarry example.			
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A Holistic Viewpoint-Based SysML Profile to Design Systems-of-Systems		<p>In recent decades more and more efforts have been devoted in supporting the design of Systems-of-Systems (SoSs). These systems are composed of autonomous Constituent Systems (CSs) which are integrated together to achieve a higher level goal that cannot be achieved by any of its CSs in isolation. Designing such an SoS is a multidisciplinary problem which involves considering emergent phenomena, assuring the achievement of dependability and security requirements, guaranteeing system responsiveness, supporting dynamicity and evolution and multi-criticality of provided services. We believe that a first step towards a viable design approach is to provide a conceptual model of SoSs which captures SoS concepts (e.g., methods, characteristics, and technologies related to SoSs) and their inter-relationships. Such a conceptual model should enhance the understandability of SoSs to stakeholders and provide the basis for further automated analysis. In this context, the AMADEOS European project is bringing together researchers and</p>	10.1109/HASE.2016.21	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7423166	IEEE Xplore
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		<p>practitioners to provide the support to design SoSs starting from the definition of a domain specific ontology serving as a vocabulary for SoSs. Our contribution consists of semi-formalizing the key SoS concepts and relationships defined in AMADEOS adopting a SysML visual modeling language. We propose a SysML profile for SoSs and we show its applicability in a Smart Grid scenario.</p>			
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<p>A State-based Extension to STPA for Safety-Critical System-of-Systems</p>		<p>Automation of earth moving machinery enables improving existing production workflows in various applications like surface mines, material handling operations or material transporting. Such connected and collaborating autonomous machines can be seen as a system-of-systems. It is not yet clear how to consider safety during the development of such system-of-systems (SoS). One potentially useful approach to analyze the safety for complex systems is the System Theoretic Process Analysis (STPA). However, STPA is essentially suitable to static monolithic systems and lacks the ability to deal with emergent and dysfunctional behaviors in the case of SoS. These behaviors if not identified could potentially lead to hazards and it is important to provide mechanisms for SoS developers/integrators to capture such critical situations. In this paper, we present an approach for enriching STPA to provide the ability to check whether the distributed constituent systems of a SoS have a consistent perspective of the global state which is necessary to ensure safety. In other words,</p>	<p>10.1109/ICSR48664.2019.8987632</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8987632</p>	<p>IEEE Xplore</p>
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		<p>these checks must be capable at least to identify and highlight inconsistencies that can lead to critical situations. We describe the above approach by taking a specific case of state change related issues that could potentially be missed by STPA by looking at an industrial case. By applying Petri nets, we show that possible critical situations related to state changes are not identified by STPA. In this context we also propose a model-based extension to STPA and show how our new process could function in tandem with STPA.</p>			
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Conceptualization of a System-of-Systems in the Defense Domain: An Experience Report in the Brazilian Scenario		<p>National sovereignty and protection require a diversity of interdependent systems that jointly provide a large infrastructure for the national security, making possible a continuous monitoring and control. These systems assure the confidential information exchange while providing more complex functionalities when working together and forming alliances known as Systems-of-Systems (SoS). This paper reports an experience in the Brazilian defense scenario, externalizing the acquired knowledge in the form of lessons learned during the conduction of a real, strategic project called SisGAAz (Blue Amazon Management System), which has its main goal to develop the Brazilian navy management SoS. In particular, we focus on reporting our experience in the architectural design of this SoS as a quality driver in our project. We also raise challenges that were overcome, and also others that must still be faced. The results communicated herein contribute to deliver a panorama of the Brazilian state of the practice about SoS engineering. Such results are important, as they report the current situation and gaps to be</p>	10.1109/JSYST.2018.2876836	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8520921	IEEE Xplore
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		bridged by both academics and practitioners, not only in Brazil but also worldwide, especially in those developing countries that are also living and implementing such technological revolution.			
IEEE Draft Standard for Space System Cybersecurity Design		Space missions face an increasing level of adversarial threats, making security a more critical concern than ever before. With space becoming congested and contested, the success and safety of these missions rely heavily on the security and resilience of these complex systems. This standard defines a component-level technical design process for developing secure space systems.		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11216131	IEEE Xplore

<p>Application of FMVEA by Design for Adding Smart Functionalities to an Existing Campervan</p>		<p>Due to the increasing use of software and information technologies in the industrial sector and for consumer goods, the engineering of these smart systems is becoming ever more challenging. Existing OT architectures need to be revised and OT security aspects need to be addressed. In order to address these challenges in a systematic way, the prior use of Model-Based Systems Engineering (MBSE) can create a holistic system description that satisfies all stakeholders and ensures seamless technological implementation. The Failure Modes, Vulnerabilities and Effect Analysis (FMVEA) can be used as a template for a vulnerability cause-effect chain analysis technique extended with security. This represents a unified model for security cause-effect analysis. While the classic Failure Mode & Effects Analysis (FMEA) is usually applied very late in the systems engineering process, we show that the FMVEA should ideally be used by Design to identify necessary components and functions for threat scenarios. As an example the FMVEA by Design technique is then applied to add smart</p>	<p>10.1109/ISSE63315.2024.10741112</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10741112</p>	<p>IEEE Xplore</p>
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		functionalities to an existing campervan.			
Enabling design of agile security in the IOT with MBSE		Design for system security within the IOT is a critical issue for Systems Engineering. The threat is agile and always evolving. One promising approach is the application of agile systems architecture to the design of system security. However, to be successful, systems engineers and security engineers will require a design process and framework that supports the definition of a system combining both resilience and continuous evolution of security capability. This paper presents an overview of the agile systems architecture, along with an approach to model and describe the specific elements of the agile architecture through application of model-based systems engineering and use of enterprise architecture frameworks to address features of the architecture that reside in both the design time and operating time domains.	10.1109/SYSOSE.2017.7994938	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994938	IEEE Xplore

Systems-based cyber security in the supply chain		<p>The importance of the many sources of risk to the supply chain has been recognized by the practitioners and leadership in this sector of the economy. Cyber security is paramount to the success of the supply chain sector, which constitutes a safety-critical system for the U.S. and global economy. The diverse consequences from a malevolent attack could adversely affect inventory, product quality, time of delivery and the multiple sequential chain-effects due to these interdependent and interconnected economies. As a team, we leveraged the knowledge that we have accrued throughout our academic career with the knowledge and experience of our Technical Advisor, Yacov Haimes. The vast research opportunities at the University of Virginia and the seminal contributions to the field of systems of systems risk analysis further enhanced this comprehensive report. Building on our research and on Hierarchical Holographic Modeling, we performed risk assessment and management. Furthermore, as a team, we developed an overview of this complex system of systems, and generated</p>	10.1109/SIEDS.2016.7489299	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7489299	IEEE Xplore
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		<p>multiple scenarios of malevolent penetration to the supply chain. Then through the use of Risk Filtering and Risk Management we reduced the large number of risk scenarios to a small set of critical scenarios. To apply our modeling and analytical skills to an emergent "risk" we examined the impact of malevolent use of the three-dimensional (3D) printers might pose to the integrity of the supply chain and the possibilities of this revolutionary technology as a malevolent medium to decimate the safety-critical supply chain systems of systems. In sum, through the use of modeling and analyzing supply chains as complex systems of systems, and by identifying shared-states, resources, decisions, and other variables among the subsystems of the supply chain, we have been able to identify and isolate safety critical features of the supply chain.</p>			
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Will safety-security co-engineering pay off? A quality and cost perspective in two case studies		<p>Safety and Security concerns are usually interlinked while building critical software-intensive systems of systems. Several efforts try to approach both domains of expertise to increase the overall reliability of the systems and reduce costs by an earlier detection of issues and trade-offs. Despite the growing number of co-engineering practices at different life-cycle stages, there is a lack on business justifications such as economic costs of their adoption. We report on using a cost model to evaluate the convenience (or not) of adopting co-engineering practices in two industrial case studies (space and medical devices). Simulation results with the collected data suggest an improvement in quality if any of the selected co-engineering practices are integrated while cost increases in one case but reduces in the other. We discuss the results but, as they cannot be generalized, the main contribution is on proposing the cost model for answering the title's question.</p>	10.1109/SESoS-WDES52566.2021.00007	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9474621	IEEE Xplore
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Quality Characteristics		<p>Summary</p> <p><p>The quality of a component, product or system and of a system&#x2010;of&#x2010;systems is not limited to its ability to do what is required of it &#x2013;the functional aspect&#x2013;but extends far beyond: it must ensure the security of data, the speed of execution, the volume of resources required, the ease of maintenance of its components, products or systems, etc. The quality characteristics to be processed must be defined from the start of the project or at the latest from the start of construction. In general, for a system&#x2010;of&#x2010;systems, all quality characteristics are important. Ensuring that the system&#x2010;of&#x2010;systems, the preponderant software system or the application, provides the level of quality in use requires the establishment of quantified and measurable objectives and a policy of taking periodic measurements and analyzing these measurements in order to identify trends.</p></p>	10.1002/9781394188451.ch5	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10524401.pdf&bkn=10523215&pdfType=chapter	IEEE Xplore
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Identification of Emergent Properties Occurrences Factors in System-of-Systems		<p>Systems-of-systems (SoS) is a term used to describe independent systems that collaborate to accomplish a task they are unable to complete separately. One of the challenges of developing SoS is to manage the emergent properties that arise from the interaction of independent systems. The emergent properties can be desirable or undesirable. It is important to comprehend the undesirable emergent properties by foreseeing them before they manifest due to potentially adverse effects. Identifying and anticipating them as soon as they appear to minimize any adverse effects is crucial. Notwithstanding the thorough research and efforts, undesirable emergent behavior continues to appear in SoS. Such emergent properties are essential to prevent the SoS from deviating from its intended requirements and objectives. One way to understand the emergent properties is to examine the factors that influence their occurrence. Therefore, a study has been conducted to identify factors of undesirable emergence properties in SoS across different phases of the software</p>	10.1109/ICOCO59262.2023.10397923	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10397923	IEEE Xplore
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		development lifecycle. The identified factors could further derive solutions for overcoming the challenges of undesirable emergent properties in SoS. Hence, SoS can have long lifespans as each constituent system evolves.			
Cybersecurity Pathways Towards CE-Certified Autonomous Forestry Machines		The increased importance of cybersecurity in autonomous machinery is becoming evident in the forestry domain. Forestry worksites are becoming more complex with the involvement of multiple systems and system of systems. Hence, there is a need to investigate how to address cybersecurity challenges for autonomous systems of systems in the forestry domain. Using a literature review and adapting standards from similar domains, as well as collaborative sessions with domain experts, we identify challenges towards CE-certified autonomous forestry machines focusing on cybersecurity and safety. Furthermore, we discuss the relationship between safety and cybersecurity risk assessment and their relation to AI, highlighting the need for a holistic methodology for their assurance.	10.1109/DSN-W60302.2024.00030	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10647045	IEEE Xplore

Exploring Systemic Risks in Systems-of-Systems Within a Multiobjective Decision Framework		Physical infrastructures are commonly composed of interconnected and intra- and interdependent subsystems, which in their essence constitute systems-of-systems (S-o-S) with multiple functions, operations, and stakeholders. Their complexity is characterized by highly interconnected and interdependent physical, cyber, organizational, and economic subsystems through shared resources, decisions, and states. This paper explores potential sources of systemic risks in complex S-o-S by analyzing unique failure modes of such systems in a nonlinear dynamic multiobjective sequential decision-making process. We posit that certain preferences of decision-makers when choosing among multiple competing objectives may reduce the safety margin of a specific subsystem within the S-o-S to withstand unexpected external perturbations due to the interdependencies manifested by shared states among the subsystems. This can contribute to the failure of an entire S-o-S even though all decisions are made based on Pareto-optimality. By quantifying the level of subsystem	10.1109/TSMC.2016.2523918	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7442539	IEEE Xplore
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		interdependency caused by shared states, this paper develops a method to mitigate such systemic risks through decomposing and coordinating the interconnected subsystems of an S-o-S in a decentralized way. The implication of the proposed theory is demonstrated using an illustrative example of a highway bridge S-o-S.			
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<p>Risk ontology development from a system of systems framework for engineering projects</p>		<p>Complex engineering projects (CEP) delivered by alliance is a form of system of systems with intricate interactions and are inevitably plagued with diverse risks. This research adopts the system modeling approach to develop an alliance risk ontology framework, a Systematic Literature Review (SLR) method for alliance risk extraction, and NVivo qualitative analysis for data analytics and risk visualization. The research developed the System of Systems (SOS) alliance risk ontology framework and found two hundred and seven alliance risks from interactions of systems. Research provides the fundamental framework for risk categorization, analytical depth, and data treatment method, which can be significant to pre-analyze and mitigate critical risks in engineering projects involving alliances.</p>	<p>10.1109/SysCon61195.2024.10553560</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10553560</p>	<p>IEEE Xplore</p>
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Defending mechanisms for protecting power systems against intelligent attacks		<p>The power system forms the backbone of a modern society, and its security is of paramount importance to nation's economy. However, the power system is vulnerable to intelligent attacks by attackers who have enough knowledge of how the power system is operated, monitored and controlled. This paper proposes a game theoretic approach to explore and evaluate strategies for the defender to protect the power systems against such intelligent attacks. First, a risk assessment is presented to quantify the physical impacts inflicted by attacks. Based upon the results of the risk assessment, this paper represents the interactions between the attacker and the defender by extending the current zero-sum game model to more generalized game models for diverse assumptions concerning the attacker's motivation. The attacker and defender's equilibrium strategies are attained by solving these game models. In addition, a numerical illustration is demonstrated to warrant the theoretical outcomes.</p>	10.1109/SYSOSE.2015.7151941	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151941	IEEE Xplore
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Federated Learning Based State of Health Estimation for Lithium-Ion Batteries		<p>Research on lithium-ion batteries focuses on parameters such as Remaining Useful Life (RUL), State of Health (SoH), and State of Charge (SoC). As batteries age, their capacity degrades, and their charging and discharging performance declines. SoH is a critical parameter that directly reflects the aging state of the battery and plays a significant role in maintenance processes. Therefore, real-time SoH monitoring in battery management systems (BMS) has become an important research area. In this study, SoH estimation using federated learning is proposed. The most critical moment for obtaining SoH information is at the end of the charging process. This information enables users to better plan which tasks the battery will be suitable for. Federated learning is a decentralized machine learning approach that processes data on local devices while aggregating model updates on a central server. This approach provides significant advantages in terms of privacy and data security. As a result of the study, the control parameters RMSE, MAE, and $\mathbf{R}^{\mathbf{2}}$ were calculated, yielding approximate</p>	10.1109/SoSE66311.2025.11083856	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083856	IEEE Xplore
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		values of 0.109, 0.086, and 0.994, respectively.			
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Towards an UML-based SoS Analysis and Design Process		<p>Systems of Systems or SoSs are an emerging class of systems built from large-scale constituent systems, that are often heterogeneous, with independent management, goals and resources. The heterogeneity and managerial independence of the constituent systems is both a strength and a drawback of SoS engineering. Although, the individual systems of an SoS may operate autonomously, their interactions present and usually provide important emerging properties that are constantly evolving. Therefore, coordination and interaction within the SoS constituent systems gives rise to an emerging behavior which defines the SoS overall goal. However, this may lead to unpredictable behavior (arrival/departure, failure to fulfill commitments) of the SoS constituent systems. As a result, a well-defined process for SoS engineering; where missions, capabilities and mainly the expected interactions of the constituent systems are well-established, is missing. Our objective in the present work is to propose an UML-based SoS analysis and design process (USDP). The process is</p>	10.1109/ICAASE 51408.2020.9380112	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9380112	IEEE Xplore
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		<p>iterative and incremental and will be instrumented and documented with various diagrams to ensure clarity and understandability of the USDP artifacts. Besides, a meta-model for SoS modelling will be defined, it mainly defines the SoS structure in terms of constituent systems, their missions, capabilities, and interactions. With the aim of reducing the abstraction of interactions and in order to ensure a high interoperability, a precise and coherent definition of the interactions among the heterogeneous constituent systems of an SoS is given to make the description of the SoS more truthful. From a practical point of view, we develop a graphical editor for modeling an SoS, based on the strengths of the MDE approach.</p>			
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Towards trustworthy smart cyber-physical-social systems in the era of Internet of Things		<p>The advent of a new wave of computing driven by the Internet of Things (IoT) and Big Data is reshaping the landscape of engineering systems design, operations, and management. As traditional devices and systems are transforming into smart devices and smart cyber-physical systems powered by IoT, more and more applications of Internet of Things are emerging as complex systems of smart systems, such as smart cities, in which an entity (including both human, software, and machines) highly relies on other entities in a network with respect to security, privacy, trustworthiness of data / information, and trustworthiness of services. Trust is emerging as a critical factor in systems design, operations and management. In this paper, we use Smart and Connected Senior Caring Systems as driving application, to discuss the features of Cyber-Physical-Social Smart Systems (CPS3) powered by IoT, to address the needs of trust in CPS3 design, and to explore approaches of trust formalisms for CPS3 design.</p>	10.1109/SYSOSE.2016.7542961	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542961	IEEE Xplore
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Establishing a framework for disaster management system-of-systems		<p>The objective of this paper is to propose a System-of-Systems (SoS) framework for disaster management systems and processes to better analyze, design and operate the heterogeneous, interconnected, and distributed systems involved in disasters. With increasing frequency and severity of disasters, improvement of efficiency and effectiveness of disaster management systems and processes is critical. However, the current approaches for conceptualization and analysis of disaster management processes do not provide a holistic perspective for analysis of multiple heterogeneous systems and processes that are interconnected and embedded in networks across various spatial and temporal scales. In this paper, a disaster management system-of-systems (DM-SoS) framework was proposed to identify the dimensions of analysis and characteristics towards a more integrative approach to disaster management. Three dimensions of analysis (definition, abstraction, and implementation) and their corresponding components for examining disaster</p>	10.1109/SYSCON.2018.8369545	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8369545	IEEE Xplore
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		management SoS are explored. The DM-SoS framework would enable specification and characterization of system attributes and interdependencie s, as well as capturing emergent properties and cross-scale interactions.			
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Impact assessment of cyber attacks: A quantification study on power generation systems		<p>Vulnerability of critical infrastructures have increased with widespread use of information technologies. Although individual hackers whose major aims are self-satisfaction and financial gain are already on the stage, nation sponsored attacks are considered as important threats after Stuxnet attack. An important intention of targeted attacks by nation states may be the degradation of cyber physical systems of their enemies. After these developments, cyber-attacks have become an agenda item of the academics, practitioners and policy makers. In this study, we employed Monte-Carlo reliability analysis technique to quantify the impact of cyber-attacks on industrial control systems used in power generation systems. Economic value of cyber-attacks can help decision makers to decide if a cyber-security investment is feasible or not. The results showed that cyber-attacks may have significant impact on reliability of power generation systems.</p>	10.1109/SYSOSE.2016.7542959	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542959	IEEE Xplore
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No Resilience without Security		<p>In this paper we discuss the core capabilities that a system needs to provide in order to ensure resilience. In short such a system needs to be capable of detecting its own state in the sense of recognizing errors and then reacting appropriate in order to restore its full functionality. In addition we argue why security is the essential prerequisite to achieve resilience. If a system can be compromised the attacker is in control of what the system does i.e. he can for example switch it off or simply disable error recovery mechanisms. This is the reason why we argue for proper design and assessment of security means used in any system that aims at achieving resilience.</p>	10.1109/MECO49872.2020.9134179	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9134179	IEEE Xplore
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Improved Technology Readiness Assessment Framework for System-of-Systems From a System Integration Perspective		<p>The military of the Republic of Korea utilizes technology readiness assessment (TRA) to quantitatively evaluate the maturity of domestic technologies. TRA is a key tool for determining the research and development potential in the country. As TRA employs hardware (HW)-oriented technology readiness levels (TRLs), it is suitable for independently assessing individual technologies. However, it has limitations in terms of evaluation from a system-integration perspective. Additionally, the results of checklist-based assessments are highly likely to involve subjectivity, which may yield sparse quantitative insights. This study proposes an enhanced TRA framework in which TRA procedures and criteria are redefined from the system-integration perspective. A framework that can overcome the limitations of the current TRL and TRA frameworks and enable easier, more intuitive assessments is developed. The proposed framework distinguishes between a technology element and a critical technology element (CTE) in terms of HW,</p>	10.1109/ACCESS.2024.3362229	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10419355	IEEE Xplore
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		<p>software (SW), and interface (IF) and redefines TRLs. Under this framework, TRA is performed according to the TRLs that are redefined in terms of HW, SW, and IF; considering risk management, the lowest evaluation value is used as the system maturity level. The proposed CTE selection method minimizes external evaluator interventions by considering the quantitative goals of the key required operational capabilities, development difficulties, and applications of commercial off-the-shelf technologies. The effectiveness of this framework is confirmed through a case study involving three systems of systems. The results of this study can inspire research at the framework level and contribute to the improvement of existing TRA systems.</p>			
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Foundations for Modelling Conscientious Attacking in Electromagnetic Cyberspace		Conscientious military attackers deciding to perform targeted Electromagnetic attacks have an ethical problem because their actions may adversely impact non-target victim systems. Their decision-making process should account for the assessed risk to victim systems before engaging in Electromagnetic attacks. In short: Risk-Informed Decision-Making within a complex, dynamic, uncertain environment involving Systems-of- Systems is essential. But how is the related risk assessment performed? This paper identifies some important foundations for modelling this context.	10.1109/CSR616 64.2024.1067944 0	https://ieeexplore. ieee.org/stamp/st amp.jsp?tp=&arn umber=10679440	IEEE Xplore
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Towards Threat Modelling of IoT Context-Sharing Platforms		<p>The Internet of Things (IoT) involves complex, interconnected systems and devices that depend on contextsharing platforms for interoperability and information exchange. These platforms are, therefore, critical components of real-world IoT deployments, making their security essential to ensure the resilience and reliability of these “systems of systems.” In this paper, we take the first steps toward systematically and comprehensively addressing the security of IoT context-sharing platforms. We propose a framework for threat modelling and security analysis of a generic IoT context-sharing solution, employing the MITRE ATT&CK framework. Through an evaluation of various industry-funded projects and academic research, we identify significant security challenges in the design of IoT context-sharing platforms. Our threat modelling provides an in-depth analysis of the techniques and sub-techniques adversaries may use to exploit these systems, offering valuable insights for future research aimed at developing resilient solutions. Additionally, we have developed an open-source threat analysis tool that</p>	10.1109/NCA61908.2024.00025	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10945290	IEEE Xplore
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		incorporates our detailed threat modelling, which can be used to evaluate and enhance the security of existing context-sharing platforms.			
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System of System Composition Based on Decentralized Service-Oriented Architecture		<p>As society has progressed through periods of evolution and revolution, technology has played a key role as an enabler. In the same manner, mechanical machines of the 1800s drove the industrial revolution, now digitalized machines are driving another industrial revolution. Manufacturers are increasing the digital footprint on the factory floor. It is challenging to harness the vast amounts of data generated, stored, analyzed, archived, and returned. Data centralization has several well-known challenges, such as collection bottlenecks, secure retrieval, single point of failure, and data scheme fragility as data heterogeneity increases. This paper proposes a method of information distribution based on the principle of data at its source. It proposes that contextual data be used at runtime through the creation of dynamic queries that build compositions of different systems. Such system of systems (SoS) compositions handle the flow of data across its life cycle and present it as information to the initiating system. The proposal starts by creating a graph model of the Arrowhead framework. Then, building on the graph model, the query-based</p>	10.1109/JSYST.2019.2894649	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8639013	IEEE Xplore
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		<p>approach for specifying, validating, and forming the SoS is proposed. The proposed graph model allows for unambiguous description of systems and their interrelations, including security relations. The proposed composer operates on the edge computing hardware and gives the production floor the ability to extract information without impacting the overall operation of the factory.</p>			
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Climate Variability and Its Impact on Flood Risk in the Vjosa River Basin: An Analysis of Precipitation Trends and Vulnerability		<p>This paper analyzes climate variability and its impact on flood risks in the Vjosa River basin. It first provides an overview of the current water flow situation in the Vjosa River and the natural disasters that have occurred in the area during the analyzed period. Precipitation is identified as the primary cause of flooding in the basin. The distribution of precipitation over the years is examined, and an analysis of anomalies reveals that since 2000, the river basin has experienced a period of increased precipitation. Vulnerability to flooding in the basin has grown significantly, considering physical, social, economic, and environmental factors. The methodology employed in this paper relies on detailed data analysis. Historical disaster data are analyzed using the DesInventar methodology, developed by UNISDR and implemented in Albania in 2013 [16]. This methodology is a key component of the Sendai Framework for Disaster Risk Reduction (2015–2030), which is to be adopted by all UN member states [2]. The results of the analysis highlight the most affected areas by the municipality. Furthermore, as maximum</p>	10.1109/SoSE66311.2025.11083837	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083837	IEEE Xplore
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		precipitation values continue to rise, an increase in flood frequency in the river basin is anticipated.			
Building Dynamic, Long-Running Systems		Complex applications that are effectively systems-of-systems are becoming more common and more useful. Our goal is to devise new ways of architecting such systems that will make their programming easier. We take a component oriented approach. A component's interface, which we call an outface, includes not only the syntax of the component, but also its semantics and constraints on its use. Implementations of outfaces are defined separately. Our underlying framework, TAIGA, lets the user code directly to the outface and automatically finds, validates and binds an appropriate implementation. The framework handles component evolution and failure by detected changes and dynamically revalidating and rebinding possibly new implementations to existing outfaces while maintaining the running system. We are currently working on extending this framework to handle modern, distributed systems-of-systems.		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7809803	IEEE Xplore

<p>ilities for Responsive Manufacturing: A Case from Offshore Wind Turbine Manufacturing</p>		<p>We present here a discussion of responsiveness and related ilities in an Offshore Wind Manufacturer. This is stated first by the understanding that these terms may be vague and hard to define. To tackle this issue, a prescriptive semantic is used, which gives us a qualitative and quantitative starting point to define responsiveness in terms of reactivity an agility time. This is followed by a sports analogy, which gives insight for more ilities. A framework for categorization of these extra ilities is presented, based on detection, interpretation, computation, enforcement and adaptation time. A real case study in manufacturing from a production task (joint bolting) is used. Here, we discuss the initial problem, the solution, the consequences of the solution, with pros (e.g. visibility) and cons (e.g. wrong traceability). A discussion on an improved solution using digital tools is commented, as well as a list of improved ilities compared to the initial case. We finish the paper with a call for peers for more work in ilities using real and concrete examples from the industry.</p>	<p>10.1109/SoSE59841.2023.10178507</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178507</p>	<p>IEEE Xplore</p>
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<p>Investment Decision-Making for Transport Infrastructure Projects: optimizing vs. Satisficing</p>		<p>Transport infrastructure development plays a crucial role in facilitating strategic economic growth in countries. However, optimizing project investment often requires a huge amount of resources and therefore the cost spent on such investments is a critical issue. Thus, decision-makers tend to fall back on conventional approaches such as cost-benefit analysis and use optimizing criteria. However, literature indicates that there are some issues with relying on optimizing criteria based on hard data, including that this approach is passive and lacks the important inclusion of key stakeholders' perspectives and motivations. Consequently, investment transport infrastructure decisions made can be unaligned with the views of many project stakeholders, and these shortcomings can lead to problems. Therefore, it is essential to seek out a new approach to decision-making that can take advantage of the conventional approach but also reflect key stakeholders' perspectives and motivations. In line with this goal, our paper proposes a novel approach, the use of 'satisficing' criteria applied within infrastructure</p>	<p>10.1109/SoSE50414.2020.9130540</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130540</p>	<p>IEEE Xplore</p>
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		project investment. The 'satisficing' approach will enhance decision-makers' confidence as well as improving the outcomes of investment decisions and making them more feasible and sustainable.			
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COSSIM: An Open-Source Integrated Solution to Address the Simulator Gap for Systems of Systems		<p>In an era of complex networked heterogeneous systems, simulating independently only parts, components or attributes of a system under design is not a viable, accurate or efficient option. The interactions are too many and too complicated to produce meaningful results and the optimization opportunities are severely limited when considering each part of a system in an isolated manner. The presented COSSIM simulation framework is the first known open-source, high-performance simulator that can handle holistically system-of-systems including processors, peripherals and networks; such an approach is very appealing to both CPS/IoT and Highly Parallel Heterogeneous Systems designers and application developers. Our highly integrated approach is further augmented with accurate power estimation and security sub-tools that can tap on all system components and perform security and robustness analysis of the overall networked system. Additionally, a GUI has been developed to provide easy simulation set-up, execution and visualization of results. COSSIM has been evaluated using real-world</p>	10.1109/DSD.2018.00033	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8491804	IEEE Xplore
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		applications representing cloud (mobile visual search) and CPS systems (building management) demonstrating high accuracy and performance that scales almost linearly with the number of CPUs dedicated to the simulator.			
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<p>Cybersecurity challenges of systems-of-systems for fully-autonomous road vehicles</p>		<p>We are seeing rapid development of in-vehicle, vehicle-to-vehicle, intelligent roadway, infrastructure and ride-hailing systems. However, progress in some areas is much faster than in others. For example, in-vehicle self-driving systems are evolving rapidly, but development of intelligent road systems is relatively sluggish. These systems are beginning to interconnect and interoperate to become complex systems-of-systems for which attack surfaces and vulnerabilities are expanding exponentially. Many of these systems are standalone and proprietary and do not interoperate. However, systems must be seamlessly integrated if we are to arrive at safe and secure fully-autonomous road vehicles. If we do not create broad standards early on, we can expect vulnerabilities to grow so much that they could overwhelm potential benefits from improved safety and fuel economies. Warnings about cybersecurity consequences of such complexities appear from time to time in academic publications and the popular press, but few companies and government agencies do not</p>	<p>10.1109/CEWIT.2017.8263141</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8263141</p>	<p>IEEE Xplore</p>
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		<p>seem to heed these admonitions and suggestions. Meanwhile, the self-driving juggernaut ploughs ahead. Here, we identify likely cybersecurity consequences that will arise because current efforts reflect uncoordinated design and development, particularly of supporting infrastructure systems. We describe how such risks might be mitigated proactively by introducing cybersecurity requirements early in the design, development and deployment processes. We also discuss how we might establish universal automotive and transportation security and safety standards that are enforceable and can be enforced globally across in-vehicle and ex-vehicle systems. While we see impressive near-term advances, particularly with in-vehicle systems and vehicle-to-vehicle systems, such innovations will eventually hit a roadblock if infrastructure systems, both physical and cyber, do not receive the attention required to achieve acceptable levels of cybersecurity and safety.</p>			
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Self-Organizing Cooperative Dynamics in Government Extended Enterprises		<p>This paper presents the results of our research into cooperation in Government Extended Enterprises, a type of system of systems. The effort proposed and evaluated a novel theory that these decisions are the result of the interaction of four canonical forces-Sympathy, Trust, Fear, and Greed. A computational simulation involving the Stag Hunt game examined information sharing decisions in a series of key decision points in three large case studies. For the five hypotheses tested, exploratory data analysis and nonparametric statistical testing show strong support for three of the hypotheses (cooperation is positively correlated with actors' levels of Sympathy and Trust and negatively correlated with actors' levels of Fear) and moderate support for the fourth (cooperation is negatively correlated with actors' levels of Greed). Indications are that the fifth hypothesis (cooperation is correlated with history of behavior) is not needed to explain observed behavior. Multiple correspondence analysis showed significant interactions both among pairs of forces and when a force is paired with decision making</p>	10.1109/JSYST.2016.2647598	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7829303	IEEE Xplore
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		strategies. These results can form the basis for: 1) analysis of additional case studies; 2) development of an agent-based simulation; and 3) creation of training programs for current and future organizational leaders.			
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<p>A Benchmark of Security Metrics in Cyber-Physical Systems</p>		<p>The usage of connected devices and their role within our daily- and business life gains more and more impact. In addition, various derivations of Cyber-Physical Systems (CPS) reach new business fields, like smart healthcare or Industry 4.0. Although these systems do bring many advantages for users by extending the overall functionality of existing systems, they come with several challenges, especially for system engineers and architects. One key challenge consists in achieving a sufficiently high level of security within the CPS environment, as sensitive data or safety-critical functions are often integral parts of CPS. Being system of systems (SoS), CPS complexity, unpredictability and heterogeneity complicate analyzing the overall level of security, as well as providing a way to detect ongoing attacks. Usually, security metrics and frameworks provide an effective tool to measure the level of security of a given component or system. Although several comprehensive surveys exist, an assessment of the effectiveness of the existing solutions for CPS environments is insufficiently investigated in</p>	<p>10.1109/SECON Workshops50264.2020.9149779</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9149779</p>	<p>IEEE Xplore</p>
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		literature. In this work, we address this gap by benchmarking a carefully selected variety of existing security metrics in terms of their usability for CPS. Accordingly, we pinpoint critical CPS challenges and qualitatively assess the effectiveness of the existing metrics for CPS systems.			
A Software Ecosystem for a Virtual Learning Environment: SOLAR SECO		A Software Ecosystem (SECO) refers to a set of software products with a certain degree of symbiotic relationship, and may consist of actors interacting with a market, supported by a technology platform. Virtual Learning Environments (VLE) integrate Information and Communication Technology, aiming the creation of Internet-based environments, enabling a knowledge construction process and autonomy by its interactors. SOLAR VLE is a virtual environment for presential or semi-presential courses. In this context, the main objective of this work is to present an e-learning SECO denominated SOLAR SECO, its technologies, development aspects and relations. At the end, we present some research challenges related to SOLAR SECO.	10.1109/JSOS.2017.2	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7961692	IEEE Xplore

Introduction of Electric Vertical Takeoff and Landing System with Systemigram Approach		With the technology readiness and the introduction of electric vertical takeoff and landing (eVTOL) aircraft into the market as the urban air mobility (UAM) services, it is crucial to develop a cohesive and environmentally friendly process to persuade the involved parties and the public to accept this service. In this study, we propose systemigram approaches to engage stakeholders from the prototype stage for eVTOL and have demonstrated a framework for introducing new technologies into the market using the systemigram process. The proposed approach focuses on the introduction and testing phases in a multi-phases development cycle. Using systemigram as a qualitative approach, this study goes beyond just the system's design and introduces the eVTOL system to the public and the local, state, and federal governments as well as consumers and the community with the eVTOL ports.	10.1109/SoSE59841.2023.10178673	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178673	IEEE Xplore
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Enterprise Architecture and EA Modelling from Systems Theory Perspective		<p>In today's digital transformation era, technology has become an integral part of enterprises and organizations; this integration can only be efficacious when technology is aligned with business strategies. This business-IT alignment can be achieved via Enterprise Architecture (EA). Previous research extensively studied the benefits of EA adoption, frameworks, and processes, mostly from an information systems perspective. However, not an insignificant number of these frameworks and processes were criticized as being ambiguous, inconsistent, and infeasible to be used in the real world and EA theory construction. Hence, in this work, we will promote the general systems theory perspective to express EA more rigorously, holistically, and consistently. This study contributes to EA understanding by providing the initial grounds for modelling and constructing an EA theory from the systems theory perspective to making EA more conceivable and practical.</p>	10.1109/SoSE59841.2023.10178615	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178615	IEEE Xplore
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<p>Future proof IoT: Composable semantics, security, QoS and reliability</p>		<p>IETF impressively defined internet interoperation across 30 years of unforeseeable syntax API. IOT needs similar future proof, but for connected things' composable semantics, security, reliability and Quality of Service (QoS). This paper overviews these with simplifying tradeoffs from a bottom up approach using Data Distribution Service (DDS). Then high level semantic additions to DDS are suggested for semantics that are backward compatible, while maintaining the security, reliability and QoS of DDS. Finally, further work is suggested toward out-of-the-box composability and interoperability between common IoT data models and compliant solutions.</p>	<p>10.1109/WISNET.2017.7878740</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7878740</p>	<p>IEEE Xplore</p>
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System-of-Systems to Support Mobile Safety Critical Applications: Open Challenges and Viable Solutions		<p>A dramatic shift in system complexity is occurring, bringing monolithic system designs to be progressively replaced by modular approaches. In the latest years, this trend has been emphasized by the system of systems (SoS) concept, in which a complex system or application is the result of the integration of many independent, autonomous constituent systems (CS), brought together in order to satisfy a global goal under certain rules of engagement. The overall behavior of the SoS, emerging from such complex interactions and dependencies, poses several threats in terms of dependability, timeliness, and security, due to the challenging operating and environmental conditions caused by mobility, wireless connectivity, and the use of off-the-shelf components. Referring to our experience in mobile safety-critical applications gained from three different research projects, in this paper, we illustrate the challenges and benefits posed by the adoption of an SoS approach in designing, developing, and maintaining mobile safety-critical applications, and we report on some possible</p>	10.1109/JSYST.2016.2588284	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7523896	IEEE Xplore
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Towards Continuous Security Assessment: Integrating Model-Based Risk Assessment and Large Language Models		<p>Cyber threats and attacks on aircraft ground infrastructure as well as communication, navigation, and surveillance service providers have increased significantly in recent years. Due to the dynamic nature of cyber threats, a once securely designed architecture will not stay secure throughout its life-cycle. Ensuring the safety and security of large systems of systems requires continuous reassessment of security risks. Currently, while useful building blocks exist, no comprehensive framework supports the continuous and automated risk reassessment in aviation. To address this gap, we propose a conceptual framework that integrates model-based system specification, model-based security assessment, and Large Language Models (LLMs) to automate the continuous reassessment of residual risks in cyber-physical systems. This framework dynamically analyzes and adapts to emerging threats, enabling proactive and up-to-date risk management. This paper outlines the high-level requirements of the proposed framework and presents a state-of-the-art analysis of technology readiness and existing gaps</p>	10.1109/ICNS65417.2025.10976786	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10976786	IEEE Xplore
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		necessary for its implementation. To demonstrate its feasibility and effectiveness, we apply the framework to an Air Traffic Management use case.			
Security Risk Assessment of Critical Infrastructure Systems: A Comparative Study		Recent cyberattacks on critical infrastructure systems coupled with the technology-induced complexity of the system of systems have necessitated a review of existing methods of assessing critical systems security risk exposure. The question is; do existing security risk assessment methods adequately address the threats of modern critical infrastructure systems? Having examined six existing assessment frameworks, we argue, the complexities associated with modern critical infrastructure systems make existing methods insufficient to assess systems security risks exposure. From systems dynamics perspectives, this paper proposes a dynamic modelling approach as an alternative.	10.1093/comjnl/bxy002	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8488885	IEEE Xplore

<p>An Empirical Study of Reliability Analysis for Platooning System-of-Systems</p>		<p>As a type of advanced autonomous vehicle software, platooning system-of-systems (SoS) has received tremendous attention as a next-generation system. Platooning SoS can attain several benefits, such as increasing fuel efficiency and alleviating traffic congestion by grouping autonomous vehicles in close proximity. Many studies have focused on analyzing the reliability of platooning SoS, as it is a safety-critical system. However, existing studies have two major limitations in their reliability analysis: (1) the studies did not fully cover the internal uncertainties of platooning SoS, such as heterogeneity; (2) they restricted external uncertainties by limiting the test scenarios to a single platoon, which could adversely affect the confidence of the analysis results. In addition, there exists no common fault dataset for the analysis of platooning SoS. Therefore, we provide an open dataset for platooning SoS by considering internal and external uncertainty factors during simulations. We empirically analyzed the execution logs of random platooning SoS scenarios in terms of</p>	<p>10.1109/QRS-C55045.2021.00079</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9742152</p>	<p>IEEE Xplore</p>
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		<p>reliability. We found 16 types of failure scenarios and root causes of the failures, as a result of the empirical study. Further, we generated the benchmark dataset, PLTBench, by classifying all failed logs based on the detected failure cases. We provide all the artifacts and descriptions in our benchmark web page as well as example codes to utilize the PLTBench. The conclusions of this study can enrich the general failure scenarios and experimental data set of platooning SoS for future studies.</p>			
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Increasing SoS dependability by DevSecOps		<p>The dependability plays an increasingly important role for complex systems. A dependable system is one that meets the customer's requirements in terms of reliability, performance, availability, functionality, usability, maintainability, security, and safety even in the event of a failure. Dependability of System of Systems (SoS) is a major concern these days when the interconnection of systems is controlled by the Internet and cyber security aspects have become much more important. The new DevSecOps approach ensures phased development and rapid deployment of components for customer testing prior to full SoS integration. The presentation will display the principles of DevSecOps, the types and characteristics of SoS, and the dependability of new SoS developed according to the DevSecOps approach.</p>	10.1109/ICETEC C56662.2022.10069468	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10069468	IEEE Xplore
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Infrastructures, Integration and Architecting during and after Digital Transformation		In this paper we look at infrastructure and architecting challenges stemming from digital transformation of companies, which changes both their infrastructure and architectural work. Companies will use increasingly external digital infrastructures for their business operations and this will change both architecting and the role of architects. We outline challenges brought by using external digital infrastructures and finally propose research topics based on the identified changes in architectural practice.	10.1109/JSOS.2017.1	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7961689	IEEE Xplore
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<p>Clock synchronization considerations in security informed safety assurance of autonomous systems of systems</p>		<p>Over the past decade, fast technological and industrial advances have been happening in the area of autonomous Systems of Systems (SoS). A SoS is built upon integration of several systems, where the complexity of such a structure is exponentially higher which brings challenges to its analysis. However, it also has provided a large set of new opportunities in domains such as air traffic control, defense, construction industry, etc. It is expected that fully autonomous and cooperating systems will increase the production efficiency, while decreasing (potentially completely replacing) the human effort in harmful environments. In order to enable this, we need to make sure that critical properties of SoS, such as safety and security are guaranteed. We believe that it is not sufficient anymore to analyze and guarantee these properties independently, but we have to be able to address safety and security in a joint effort. Communications in systems with any type of real-time requirements, where data validity is based on its freshness, rely on clock synchronization (CSyn) allowing its subsystems to cooperate and</p>	<p>10.1109/IECON.2017.8217473</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8217473</p>	<p>IEEE Xplore</p>
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		<p>work coherently. Considering reliable and predictable communication as one of the main assets contributing to correct functionality of such systems, protecting CSyn from malicious adversaries should be one of the highest priority efforts in SoS. In this paper we show how CSyn breaches can influence security, and ultimately safety of complex and autonomous SoS, further we identify a missing piece to consider in safety assurance, namely assurance with respect to reliable communications between systems within the SoS. We demonstrate how an outcome of a security analysis can be used as input for the overall safety analysis and we use an autonomous quarry as an example application to illustrate our findings.</p>			
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<p>Cybersecurity in the age of autonomous vehicles, intelligent traffic controls and pervasive transportation networks</p>		<p>Technologies for autonomous vehicles, “smart” roadways and ride-hailing services are advancing at a dizzying pace. They are also beginning to interconnect and interoperate to form complex systems-of-systems. The cyberattack surfaces of these systems-of-systems are expanding exponentially. Currently, many related systems are standalone, but when they are integrated, vulnerabilities of, and threats to, the resulting systems-of-systems could grow so much that they might well detract from the potential of these systems to improve safety and gain fuel use due to reduced travel times. Despite warnings, few are focusing on improving cybersecurity of the entire system-of-systems as the self-driving, ground-vehicle juggernaut ploughs ahead. Far too little attention is being paid to vulnerabilities throughout the systems-of-systems that will undoubtedly arise when the myriad of systems is interconnected and interoperate. In this paper, we discuss the cybersecurity consequences of the current uncoordinated evolution of these systems-of-systems and describe how such risks might be mitigated by, among other approaches,</p>	<p>10.1109/LISAT.2017.8001966</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8001966</p>	<p>IEEE Xplore</p>
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		proactively introducing cybersecurity requirements early in the design, development and deployment process.			
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<p>An Effective Semantic Security Metric for Industrial Cyber-Physical Systems</p>		<p>The emergence of Industrial Cyber-Physical Systems (ICPS) in today's business world is still steadily progressing to new dimensions. Although they bring many new advantages to business processes and enable automation and a wider range of service capability, they also propose a variety of new challenges. One major challenge, which is introduced by such System-of-Systems (SoS), lies in the security aspect. As security may not have had that significant role in traditional embedded system engineering, a generic way to measure the level of security within an ICPS would provide a significant benefit for system engineers and involved stakeholders. Even though many security metrics and frameworks exist, most of them insufficiently consider an SoS context and the challenges of such environments. Therefore, we aim to define a security metric for ICPS, which measures the level of security during the system design, tests, and integration as well as at runtime. For this, we try to focus on a semantic point of view, which on one hand has not been considered in security metric definitions yet, and on the other hand allows us to</p>	<p>10.1109/ICPS48405.2020.9274710</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9274710</p>	<p>IEEE Xplore</p>
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		handle the complexity of SoS architectures. Furthermore, our approach allows combining the critical characteristics of an ICPS, like uncertainty, required reliability, multi-criticality and safety aspects.			
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Assessment of Cyber Security Implications of New Technology Integrations into Military Supply Chains		<p>Military supply chains play a critical role in the acquisition and movement of goods for defence purposes. The disruption of these supply chain processes can have potentially devastating affects to the operational capability of military forces. The introduction and integration of new technologies into defence supply chains can serve to increase their effectiveness. However, the benefits posed by these technologies may be outweighed by significant consequences to the cyber security of the entire defence supply chain. Supply chains are complex Systems of Systems, and the introduction of an insecure technology into such a complex ecosystem may induce cascading system-wide failure, and have catastrophic consequences to military mission assurance. Subsequently, there is a need for an evaluative process to determine the extent to which a new technology will affect the cyber security of military supply chains. This work proposes a new model, the Military Supply Chain Cyber Implications Model (M-SCCIM), that serves to aid military decision makers in understanding the potential cyber security</p>	10.1109/SPW50608.2020.00038	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9283889	IEEE Xplore
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		impact of introducing new technologies to supply chains. M-SCCIM is a multiphase model that enables understanding of cyber security and supply chain implications through the lenses of theoretical examinations, pilot applications and system wide implementations.			
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<p>Hierarchical Flow Model-Based Impact Assessment of Cyberattacks for Critical Infrastructures</p>		<p>Critical infrastructures (CIs) are essential for the national security, economy, and public safety, whose protection against cyberattacks has become the focus of significant attention. Impact assessment plays an important role in this protection, which provides real-time situations for security managers. The assessment of CIs not only need to analyze the cyberattack's impact on any specific station, but also to consider the spreading process of the negative impact. However, few research in this domain consider the above two aspects simultaneously due to the complexity of CIs and their operation. To tackle this problem, a hierarchical flow model (HFM)-based impact assessment is presented. In this approach, a novel HFM method is proposed to describe a system from a function system perspective, which combines a flow model and hierarchical knowledge. By using this method, a CI model which considers cyber-physical interaction within a station, dependence among stations, and the topological structure of the physical network is established. Next, based on the CI model, an</p>	<p>10.1109/JSYST.2019.2912626</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8713361</p>	<p>IEEE Xplore</p>
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		impact assessment is proposed to quantify the loss which is caused by the impact spreading within the CI network. Finally, case studies on a gas supply system are conducted to verify the effectiveness of the proposed approach.			
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<p>Cloud Based Architecture Design of System of Systems</p>		<p>"Infrastructure as code" (IaC) does not quite trip off the tongue, and its meaning is not always clear. However, IaC has been with us since the beginning of Development Operations Engineering (DevOps) - and some experts say DevOps would not be possible without it. To remain competitive, digital-first companies must build, deploy, and integrate applications faster than ever. Currently Enterprise Application Integration (EAI) mediation and façade function commonly achieved by ESB solutions, which hard to maintain, evolve and assess operational quality. In this paper, we described perspective direction of System Of Systems (SoS) architecture design responsible for façade and mediation EAI functions based on cloud resources. Outlined major complications and challenges to integrate innovative approaches with computer aided design (CAD), computer aided engineering (CAE) and product lifecycle management (PLM) software. Described industry-wide trends to tackle challenges and market options available. Proposed an approach to</p>	<p>10.1109/CADSM.2019.8779307</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8779307</p>	<p>IEEE Xplore</p>
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		evaluate quality of service (QoS) for solution architecture. Compared performance of existing approach with cloud based.			
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Introducing a MOF-based Profile Generator to automate DSL Implementation from Formal Metamodels		<p>Graphical domain-specific languages (DSLs) often result in tool-specific, non-reusable implementations due to the lack of standardized specification for their visual (concrete) syntax. This paper presents the MOF-based Profile Generator (MOPRO), a prototype that transforms a formally specified metamodel into a UML Profile implementation, enabling direct use of the DSL in the modeling tool Enterprise Architect. The specification builds on our previous work, which extended the MOF standard with a machine-readable definition of the concrete syntax model (CSM), but had not yet demonstrated its practical interpretability. MOPRO addresses this gap and is evaluated using a security DSL that shares structural similarities with the RAMI 4.0 Toolbox—whose evolution has required time-consuming manual DSL updates. The results confirm that a single standardized specification is sufficient to automate DSL implementation. While currently tailored to Enterprise Architect, the transformation process is adaptable to other tools, providing a foundation for reusable,</p>	10.1109/ETFA65518.2025.11205578	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11205578	IEEE Xplore
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		consistent, and less error-prone DSL development across platforms.			
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Security and Privacy Issues in Mobility-as-a-Service (MaaS): A Systematic Review		Amid climate change challenges, rethinking transportation has become crucial. Mobility-as-a-Service (MaaS) emerges as a sustainable alternative to individual car use, offering eco-friendly multimodal options. MaaS operates as a system of systems, integrating data producers, backend systems, third-party providers, and endpoints to provide comprehensive mobility solutions. This complex integration requires adequate security and privacy measures to protect users and their data. While existing studies address security and privacy challenges in MaaS, a comprehensive review is lacking. Our study fills this gap by presenting a systematic review on the state-of-the-art of security and privacy issues in MaaS. In doing so, we identify common themes such as data security, single-point-of-failure, privacy issues, security design flaws, insider threats, spoofing, and denial of service. We also highlight challenges in identity management, interoperability, single intermediaries, privacy and data sharing, paving the way for future research.	10.1109/SOSE62659.2024.10620969	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620969	IEEE Xplore
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<p>A New SoS Engineering Philosophy - Vitality Theory</p>		<p>As engineered systems increase their complexities, a new engineering nature of Systems of System (SoS) vitality is proposed aiming for a development trend from systems to self-adaption and self-recovery Cyber-physical Systems (CPS) in its adaptability to dynamic environmental changes. In terms of engineered system formalisms, an inorganic engineered system is transformed into a SoS composition with the characteristics of an organic lifeform, becoming a self-adaptive agent. Regarding to a way for constructing an engineering SoS, a traditional engineered system process model emerges in a new challenge with the addition of a virtual system in cyber space. In this paper, by analogy with the organic characteristics of living systems in nature, SoS vitality theory is proposed, which includes a technical framework and maturity level model for measuring the organic characteristics of engineering SoS for current technological development. This provides a conceptual reference for future directions in the development of engineered</p>	<p>10.1109/SYSOSE.2019.8753870</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8753870</p>	<p>IEEE Xplore</p>
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<p>A model based safety architecture framework for Dutch high speed train lines</p>		<p>This paper presents a model-based safety architecture framework (MBSAF) for capturing and sharing architectural knowledge of safety cases of safety-critical systems (SoS). Whilst architecture frameworks in the systems engineering domain consider safety often as dependent attribute, this study focusses specifically on sharing architectural knowledge of safety cases between stakeholders and managing safety in systems development. For this purpose, we adapt the A3 architecture overview (A3AO) tool. The application is shown through the case study of Dutch high speed train lines and shows how to derive requirements from various stakeholders by carrying out iterative validations of the A3AOs. The implemented technique consists of systems modeling language-based (SysML) diagrams. Outcomes of the assessment lead to guidelines for two A3AOs. This results in increasing and effective interaction between stakeholders, more overview for managing safety complexity, more insight into</p>	<p>10.1109/SYSOSE.2015.7151933</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151933</p>	<p>IEEE Xplore</p>
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		finding required safety information, and therefore; an increasing efficiency in safety engineering.			
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<p>Incorporating Systems Thinking Into a Cyber Resilience Maturity Model</p>		<p>Achieving cyber resilient critical infrastructure poses a significant engineering management challenge. Society relies on infrastructure and services that extend beyond the managerial boundaries of a specific organizational entity, yet existing cybersecurity maturity models typically aim to assess a single organization. We offer a systems thinking approach to cyber resilience. Specifically, we relate to critical infrastructure and services in their sectoral system context, reimagining them as a system of systems. We then suggest exploring cyber resilience as a system property, with its expressions relating to the multiple dimensions of operation of the sector and to the different domains of practice. We discuss the dimensions of operation and domains of practice concepts that are embedded into a sectoral cyber resilience maturity model, which is under development. We demonstrate how these concepts frame a set of expressions that is designed to probe the sectoral design space; and propose how they may be further used as design considerations for improving the sector's cyber resilience.</p>	<p>10.1109/EMR.2020.3046533</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9302574</p>	<p>IEEE Xplore</p>
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<p>SAM-SoS: A Stochastic Software Architecture Modeling and Verification Approach for Complex System-of-Systems</p>		<p>A System-of-Systems (SoS) is a complex, dynamic system whose Constituent Systems (CSs) are not known precisely at design time, and the environment in which they operate is uncertain. SoS behavior is unpredictable due to underlying architectural characteristics such as autonomy and independence. Although the stochastic composition of CSs is vital to achieving SoS missions, their unknown behaviors and impact on system properties are unavoidable. Moreover, unknown conditions and volatility have significant effects on crucial Quality Attributes (QAs) such as performance, reliability and security. Hence, the structure and behavior of a SoS must be modeled and validated quantitatively to foresee any potential impact on the properties critical for achieving the missions. Current modeling approaches lack the essential syntax and semantics required to model and verify SoS behaviors at design time and cannot offer alternative design choices for better design decisions. Therefore, the majority of existing techniques fail to provide qualitative and quantitative verification of</p>	<p>10.1109/ACCESS.2020.3025934</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9203892</p>	<p>IEEE Xplore</p>
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		<p>SoS architecture models. Consequently, we have proposed an approach to model and verify Non-Deterministic (ND) SoS in advance by extending the current algebraic notations for the formal models as a hybrid stochastic formalism to specify and reason architectural elements with the required semantics. A formal stochastic model is developed using a hybrid approach for architectural descriptions of SoS with behavioral constraints. Through a model-driven approach, stochastic models are then translated into PRISM using formal verification rules. The effectiveness of the approach has been tested with an end-to-end case study design of an emergency response SoS for dealing with a fire situation. Architectural analysis is conducted on the stochastic model, using various qualitative and quantitative measures for SoS missions. Experimental results reveal critical aspects of SoS architecture model that facilitate better achievement of missions and QAs with improved design, using the proposed approach.</p>			
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Critical infrastructure automated immuno-response system (CIAIRS)		<p>Over the last decade, critical infrastructures have become increasingly complex. They now possess levels of automation which requires the integration of, often, mutually incompatible technologies. In addition, the data sets generated are t, vast and intricate level of interdependency between infrastructures has grown. Any failures, caused by cyber-attacks, have the ability to spread through a system of systems and are a challenge to detect. Therefore, this paper firstly discusses the interdependency challenges facing critical infrastructures; and how it can be used towards creating a support network against cyber-attacks. In much the same way as the human immune system is able to respond to intrusion, our proposed system is able to detect cyber-attacks and share the knowledge with interconnected partners. In order to demonstrate our approach, a simulation framework of 8 critical infrastructures is presented. Furthermore, our Big Data analysis techniques, used to identify and share threats between infrastructures, are discussed in depth.</p>	10.1109/CoDIT.2016.7593542	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7593542	IEEE Xplore
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Using the architecture of Socio-Technical System to analyse its vulnerability		<p>Today, most complex and large systems, such as healthcare systems, integrate the physical and human aspects of computing and networking. They constitute a system of systems with a socio-technical part. The human element is nowadays one of the most important attack vectors in the context of systems of systems (SoS). In this context, the estimation of the impact of human vulnerability on these systems enables for a more secure design and for an integration of the system development cycle with security concerns. This approach is known as "security by design". To improve the resilience of these SoS with respect to the vulnerability that humans bring, it is necessary to be able to estimate the impact that an individual can have on the system. In this article, we present an approach that enables to assess the impact of human vulnerability on a SoS composed of humans, which in this case will be a social technical system (STS). We propose to use behavioral models to model the propagation of a human vulnerability in a STS. We propose to use different models in order</p>	10.1109/SOSE55472.2022.9812648	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9812648	IEEE Xplore
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		to capture the plurality of attacks on STS.			
Kalix: A Java 11 Library for Developing Eclipse Arrowhead System-of-Systems		Eclipse Arrowhead, an upcoming open source framework for designing cyber-physical system-of-systems, is starting to become complete enough to be the subject of serious evaluation and prototyping. As a consequence, it has become increasingly pertinent to provide software that makes it straightforward to use and learn it. To address this, we here present Arrowhead Kalix, a Java 11 library designed for the efficient and effective development of correct, concise and relatively performant Arrowhead-compliant systems. In this paper, we outline the philosophy behind the design of the library, its architecture, its fundamental components and give some examples of how it can be used. The purpose of the paper is both to educate and to provide academics using Kalix with a credible point of reference.	10.1109/ETFA46521.2020.9211873	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9211873	IEEE Xplore

<p>A Middleware Framework to Address Security Issues in Integrated Multisystem Applications</p>		<p>Integrating multiple programmable components and subsystems developed by different manufacturers into a final system (a system of systems) can create some security concerns. While there are many efforts for developing interoperability approaches to enable smooth, reliable and safe integration among different types of components to build final systems for different applications, less attention is usually given for the security aspects of this integration. This may leave the final systems exposed and vulnerable to potential security attacks. The issues elevate further when such systems are also connected to other networks such as the Internet or systems like fog and cloud computing. This issue can be found in important industrial applications like smart medical, smart manufacturing and smart city systems. As a result, along with performance, safety and reliability; multisystem integration must also be highly secure. This paper discusses the security issues instigated by such integration. In addition, it proposes a middleware</p>	<p>10.1109/SYSCON.2019.8836792</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8836792</p>	<p>IEEE Xplore</p>
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		framework to address the security issues for integrated multisystem applications.			
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On the impact of emergent properties on SoS security		<p>Cyber security is becoming more and more relevant with the advent of System of Systems (SoSs). The latter are large scale systems made of independent and autonomous Constituent Systems which interoperate to achieve higher level goals also with the intervention of humans. Providing security in a cyber-physical SoS means, among other features, forecasting and anticipating evolving SoS functionalities and consequently detecting emerging phenomena resulting from the interactions among entailed Constituent Systems. This paper clarifies the relations occurring among SoS evolution, emergence phenomena and security requirements. We show how to enact an evolution step by means of changing SoS functionalities and how to perform the threat analysis consequently. An illustrative scenario in the Smart City domain shows how to dynamically generate security guarantees according to the evolving SoS thus supporting the enactment of mitigation strategies from SoS administrators.</p>	10.1109/SYSOSE.2016.7542895	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542895	IEEE Xplore
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Cybersecurity Challenges of Autonomous Systems		<p>With the recent dramatic increase in performance of artificial intelligence and related computing systems, together with advanced sensing, connectivity, and technological platforms, autonomous systems are poised to enter many application domains such as transportation and manufacturing. As autonomy increases, the risks of cybersecurity threats are equally rising, requiring the development of sophisticated methods on all layers of autonomous systems architectures. Therefore, this paper systematically introduces cybersecurity challenges ranging from the physical layer to the system of systems layer defining the collaboration of autonomous systems. Without loss of generality, autonomous vehicles are used to highlight current developments, illustrating which efforts are necessary to achieve secure and safe autonomous systems. Our discussions are comprehensively highlighting which research domains require further investigation and offer promising opportunities to contribute to mitigating cybersecurity challenges of autonomous systems.</p>	10.23919/DATE64628.2025.10992708	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10992708	IEEE Xplore
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Arguing Operational Safety for Mixed Traffic in Underground Mining		Practitioners report improved productivity as one of the main benefits of using autonomous dump trucks in underground mining. However, manned vehicles are still needed to transport materials and personnel in the tunnels, which requires practices that may diminish autonomy benefits. Thus, both fleets shall be efficiently mixed to maximize the autonomy potential. In addition, sufficient safety shall be demonstrated for operations approval. This paper proposes a strategy to populate a GSN (Goal Structuring Notation) structure to argue for the sufficient safety of mixed traffic operations in underground mining. Our strategy considers SoS (System of Systems) concepts to describe the operations baseline and the initial argumentation line, i.e., risk reduction mitigation strategies for existing SoS components. Such a strategy is further detailed with risk reduction mitigation arguments for control systems. Mitigation strategies at both levels are derived from safety analysis supported by STPA (System-Theoretic Process Analysis), a safety analysis	10.1109/SoSE59841.2023.10178525	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178525	IEEE Xplore
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		<p>technique that aligns well with the SoS perspective. We also incorporate regulatory frameworks addressing machinery to align the arguments with mandatory statements of the machinery directive. Our strategy combines SoS concepts with analysis techniques and regulatory frameworks to facilitate safety case argumentation for operations approval in the European mining context.</p>			
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Co-pilots for Arrowhead-based Cyber-Physical System of Systems Engineering		<p>One benefit of Large Language Model (LLM) based applications (e.g. chat assistants or co-pilots) is that they can bring humans closer to the loop in various IT and OT solutions. Co-pilots can achieve many things at once, i.e. provide a context-aware natural language interface to knowledge bases, reach various systems (via APIs), or even help solving multi-step problems with their planning and reasoning abilities. However, making production-grade chat assistants is a topical challenge, as fast-evolving LLMs expose new types of application design and security issues that need tackling. These especially rise to power when we try to apply these solutions to industrial automation use cases, as they need additional explainability and reliability engineered into the architecture. This paper describes the envisioned use cases and the findings of proof of concept copilots for the Cyber-Physical System of Systems (CPSoS) engineering domain. The paper suggests three types of copilots to support the stages throughout the CPSoS engineering lifecycle – and shows Proof-of-</p>	10.1109/NOMS59830.2024.10575845	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10575845	IEEE Xplore
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		Concept scenarios for the Eclipse Arrowhead engineering process.			
Analytics for smart grid cybersecurity		<p>Guidelines, directives, and policy statements are usually presented in "linear" text form - word after word, page after page. However necessary, this practice impedes full understanding, obscures feedback dynamics, hides mutual dependencies and cascading effects and the like, - even when augmented with tables and diagrams. The net result is often a checklist response as an end in itself. All this creates barriers to intended realization of guidelines and undermines potential effectiveness. We present a solution strategy using text as "data", transforming text into a structured model, and generate a network views of the text(s), that we then can use for vulnerability mapping, risk assessments and control point analysis. We apply this approach using two NIST reports on cybersecurity of smart grid, more than 600 pages of text. Here we provide a synopsis of approach, methods, and tools. (Elsewhere we consider (a) system-wide level, (b) aviation e-landscape, (c) electric vehicles, and (d) SCADA for smart grid).</p>	10.1109/THS.2017.7943512	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7943512	IEEE Xplore

<p>Singapore's smart nation program — Enablers and challenges</p>		<p>Internet of Things (IoT) and Cyber Physical Systems (CPS) have opened up possibilities for countries to become smart cities. Many countries feel that having smart cities will enhance quality and performance of urban services to better the lives of citizens through enhanced city planning and development, improved productivity and service and economic development. Singapore is no exception. This paper examines the reasons for Singapore to become a Smart Nation. It discusses the enablers it is implementing and some of the challenges it is facing. In particular, the need to have a “whole of nation” approach to give better assurance of success and experiment new technologies and concepts of IoT and CPS to ensure maturity of technology, ease of use and public acceptance. While there are technological challenges, the biggest challenge is likely to come from organizational and human behaviors.</p>	<p>10.1109/SYSOSE.2016.7542892</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542892</p>	<p>IEEE Xplore</p>
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<p>A Measure of Systems Engineering Effectiveness in Acquisition of Complex Information Systems: A Bayesian Belief Network Approach</p>		<p>In this paper, the authors present an innovative means of gauging systems engineering (SE) effectiveness. This paper describes the development of a SE relative effectiveness index model that can be used to identify and analyze SE patterns and subsequently predict possible areas of SE performance risk in the acquisition and deployment of complex information systems. The approach employs a Bayesian belief network to model causal relationships in SE activities that can be used to assess SE performance in projects and organizations.</p>	<p>10.1109/JSYST.2014.2321232</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6819416</p>	<p>IEEE Xplore</p>
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Prototyping Automotive Smart Ecosystems		<p>The breakthrough of smart ecosystems formed by open adaptive systems requires new testing methods. The need for safety and security on the roads is pushed ahead by new developments in the area of autonomous driving. Frameworks that support testing of control functions are therefore needed. We present a prototype platform for automotive smart ecosystem that enables testing of smart ecosystems with a special focus on visualization and integration with real world. An abstract and a detailed description of the platform components, together with argumentation of the chosen components and interface description is presented as well. The platform provides a meaningful visualization of scenarios that verify and validate behavior interaction between component of the real and virtual world.</p>	10.1109/DSN-W.2018.00072	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8416257	IEEE Xplore
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Researching Resilience a Holistic Approach		<p>With the advent of the Internet of things and 5G the number of devices that are controlling parts of our lives increases dramatically. As we rely on these devices it is essential that they work properly over long times and under unpredictable conditions. If a system can ensure the aforementioned properties the system is considered to be resilient. In this paper we discuss the idea of a holistic approach that covers redundancy, reliability and security of individual components up to complex systems to networked cyber physical systems of systems. We also introduce the preliminary work done at IHP on which we build our resilience approach.</p>	10.1109/EWDTS.2019.8884447	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8884447	IEEE Xplore
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Resilience based importance measure analysis for SoS		<p>In a system of systems (SoS), resilience is an important factor in maintaining the functionality, stability, and enhancing the operation effectiveness. From the perspective of resilience, this paper studies the importance of the SoS, and a resilience-based importance measure analysis is conducted to provide suggestions in the design and optimization of the structure of the SoS. In this paper, the components of the SoS are simplified as four kinds of network nodes: sensor, decision point, influencer, and target. In this networked SoS, the number of operation loops is used as the performance indicator, and an approximate algorithm, which is based on eigenvalue of the adjacency matrix, is proposed to calculate the number of operation loops. In order to understand the performance change of the SoS during the attack and defense process in the operations, an integral resilience model is proposed to depict the resilience of the SoS. From different perspectives of enhancing the resilience, different measures, parameters and the corresponding algorithms for the resilience importance of</p>	10.21629/JSEE.2019.05.10	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8868301	IEEE Xplore
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		components are proposed. Finally, a case study on an SoS is conducted to verify the validity of the network modelling and the resiliencebased importance analysis method.			
The Safety Dilemmas of Autonomous Driving		We still do not see fully autonomous cars on our roads, although expectations were high a few years ago. We argue that this is at least partly due to the challenges to make them acceptably safe. These challenges are a lack of suitable standards for these highly complex systems, where functional safety is not sufficient. Additionally, the "safety dilemma" of artificial intelligence – the fact that artificial intelligence is needed but undesired by safety standards, poses a challenge. Security needs to be considered along with safety, as these two properties are highly interlinked.	10.1109/ZINC52049.2021.9499306	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9499306	IEEE Xplore

<p>The Need for Cyber-Resilience in Complex Systems</p>		<p>Ensuring safety and security on today's systems, and systems of systems (SoS), has become a challenge. Systems have become large and complex, they operate in dynamic context and face an ever-changing threat landscape. Realistically, potential hidden weaknesses and residual flaws must be expected in an SoS, potentially causing undesired emergent behavior. Consequently, safety and security have become full lifecycle concerns. Cyber-resilience is needed for safeguarding mission continuity, through minimizing impact of any potential disruption, and by providing rapid response and recovery capabilities. This paper provides an overview of how safety and security of a complex system are affected by an expanding system of systems landscape, and have become systems engineering and system lifecycle concerns. The contribution of this paper is to help guiding organizations why and how to incorporate cyber-resilience thinking/engineering in their systems engineering (SE) processes. An SE workflow is proposed to address cyber-resilience in</p>	<p>10.1109/CSR61664.2024.10679396</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10679396</p>	<p>IEEE Xplore</p>
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		systems engineering.			
Considering Risk in Infrastructure Internet of Things: Observations and Recommendations		<p>This article explores the impact of the Internet of Things (IoT)-the emerging set of embedded sensors, actuators, controllers, and communications devices-on future utilities and infrastructures from the perspective of risk, reliability, and resilience. Given the need to safeguard public infrastructure, utility managers are typically well versed in managing risk; however, the IoT presents a new and fundamentally different component with a highly uncertain risk profile. These IoT systems will be densely deployed, highly integral, and likely autonomous in operation, meaning that they could directly affect the operational reliability of a utility. While much has been written about the IoT's potential to offer benefits and possibly harm future infrastructure, this article looks at the topic from the perspective of the utilities? risk and presents a set of observations and recommendations concerning utility deployment of the IoT. I highlight why utility and infrastructure operators should carefully consider risk as they incorporate this embedded, often autonomous networked technology into their systems.</p>	10.1109/MSMC.2018.2885984	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8782858	IEEE Xplore

Managing Pandemic Resilience with Other Cascading Disruptions of a Socio-Technical System		<p>The COVID-19 pandemic spurred the development of methodologies to assess risk to economic development plans. To increase local recovery efforts, the federal government provides funding for regional economic development. Funds are allocated based on immediate needs as well as growth potential. This work advances the risk register methodology to prioritize infrastructure initiatives – potential projects, policies, or other actions an organization may take – while considering the influence of exogenous scenarios on priorities given the impact of COVID-19. The risk register identifies performance criteria which measure performance – for example, an initiative incentivizing restaurants to increase outdoor seating improves a create new jobs criterion. Next, the register identifies disruptive events and groups these events into scenarios. There are now two sets of data: the initiatives considered for implementations, and a set of disruptive scenarios, including a baseline. The register evaluates the impact of each scenario on each initiative. For each</p>	10.1109/SysCon53536.2022.9773915	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9773915	IEEE Xplore
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		<p>scenario, the initiative with greatest impact on performance criteria is ranked first, and so on for the remaining scenarios. These rankings mathematically capture the influence of each scenario on the priority of each initiative. The risk register mathematically quantifies the disruptiveness of each scenario, allowing the comparison of different disruptive events. This information can help determine how to allocate resources to improve system resilience. The risk register methodology is applied to a socio-technical system of systems. This work advances methods outlined in the Systems Engineering Body of Knowledge, specifically the System of Systems knowledge area.</p>			
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Condition monitoring for distributed systems with reconfigurable user interfaces and data permissions		<p>Building complex industrial systems from smaller systems provides flexibility and reconfigurability to the production environment. The reconfigurability of the machines in highly digitalized industrial environments causes however also challenges for the condition monitoring as the emergent behaviour of the system-of-systems can be unknown. System-of-systems approach brings reconfigurability for the production systems, but also increases the configuration need for the monitoring system for instance access right for different information and visualization methods for different user groups such as maintenance personnel, operators and managers. This paper presents an Arrowhead framework compliant solution for system-of-systems condition monitoring where several users require customized views and may have different access rights for the monitored information. The objective is to provide reconfigurable user interfaces for multiple users which can evolve during the operation life of the systems.</p>	10.1109/IECON.2016.7794139	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7794139	IEEE Xplore
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<p>Risk analysis for hazardous material transport by road: case study on Tangier-Tetouan region, Morocco</p>		<p>— From a System of System (SoS) perspective, quantitative risk assessment in hazardous material transportation presents several specific criticism. The Quantitative Risk Analysis (QRA) methodology requires elaborating large amount of data to estimate the frequency and the consequences of each accidental scenario which involves hazardous material. In this paper, a Quantitative Risk Analysis methodology dedicated to hazmat road transport based on simplified approach is presented. The frequency analysis is realized by considering preselected event tree schemes for hazmat product. The consequences analysis is based on the innovative Speditive method to compute impact areas. Societal risk measures have been performed to compare the risk to transport gasoline by tank trucks covering two alternative paths from the Med Tangier Port to Tangier in the Tangier-Tetouan region, in Morocco.</p>	<p>10.1109/SYSOSE.2018.8428700</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428700</p>	<p>IEEE Xplore</p>
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<p>Can STPA be used for a System-of-Systems? Experiences from an Automated Quarry Site</p>		<p>Automation is becoming prevalent in more and more industrial domains due to the potential benefits in cost reduction as well as the new approaches/solutions they enable. When machines are automated and utilized in system-of-systems, a thorough analysis of potential critical scenarios is necessary to derive appropriate design solutions that are safe as well. Hazard analysis methods like PHA, FTA or FMEA help to identify and follow up potential risks for the machine operators or bystanders and are well-established in the development process for safety critical machinery. However, safety certified individual machines can no way guarantee safety in the context of system-of-systems since their integration and interactions could bring forth newer hazards. Hence it is paramount to understand the application scenarios of the system-of-systems and to apply a structured method to identify all potential hazards. In this paper, we 1) provide an overview of proposed hazard analysis methods for system-of-systems, 2) describe a case from construction equipment domain, and 3) apply the well-known System-</p>	<p>10.1109/SysEng.2018.8544433</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8544433</p>	<p>IEEE Xplore</p>
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		<p>Theoretic Process Analysis (STPA) to our case. Our experiences during the case study and the analysis of results clearly point out certain inadequacies of STPA in the context of system-of-systems and underlines the need for the development of improved techniques for safety analysis of system-of-systems.</p>			
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<p>I²ML: An Infrastructure Resilience-Oriented Modeling Language</p>		<p>Critical infrastructure (CI) modeling and analysis is a very challenging research topic. One of the most pressing issues is to find an effective representation for addressing the system vulnerabilities caused by interdependencies, which, if exploited, could result in nontrivial accident scenarios. Until now, this question has been tackled for different sector-specific infrastructures (electricity grid, telecommunications networks, supply chains, etc.), and very few generalizable analysis tools have been developed. However, all CI share some features that can be leveraged in order to build a common modeling framework. This paper identifies these common features, which it exploits to develop a modeling language: the infrastructure resilience-oriented modeling language (I²ML). I²ML is designed to facilitate the analysis of operational interdependencies among the infrastructure components and overall resilience, i.e., the ability of the infrastructure to withstand and recover under off-nominal (anomalous) conditions. A number of examples are used to illustrate the modeling concepts and</p>	<p>10.1109/TSMC.2014.2343751</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6875911</p>	<p>IEEE Xplore</p>
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		highlight the analytical capability of I@ML.			
Digital Twin and IoT-Cloud System: Case Study on Durrës Port		Ports worldwide are facing challenges in optimizing operations while maintaining environmental sustainability. Digital Twin (DT) and Internet of Things (IoT) technologies provide real-time monitoring, predictive maintenance, and operational efficiency. This paper presents an IoT-enabled cloud system integrated with Digital Twin for smart environmental and operational management of the Port of Durrës. The system employs IoT sensors to collect real-time environmental and operational data, processed using Azure Cloud Services, Python-based analytics, and Power BI visualization. The results demonstrate improved energy efficiency, predictive maintenance capabilities, and enhanced port management. The study contributes to smart port research by offering a scalable, secure, and data-driven approach for maritime infrastructure optimization.	10.1109/SoSE66311.2025.11083850	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083850	IEEE Xplore

Attack Modeling and Verification for Connected System Security		In the development process of critical systems, one of the main challenges is to provide early system validation and verification against vulnerabilities in order to reduce cost caused by late error detection. We propose in this paper an approach that, firstly allows formally describe system security specifications, thanks to our suggested extended attack tree. Secondly, static and dynamic system modeling by using a SysML connectivity profile to model error propagation is introduced. Finally, a model checker has been used in order to validate system specifications.	10.1109/SYSOSE.2018.8428695	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428695	IEEE Xplore
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<p>A System Architecture Approach to Risks Prioritization in Multi-disciplinary Engineering Projects</p>		<p>Complex engineering projects are usually developed by alliances. An alliance is a form of system of systems with at least one common goal. However, there are more risks in alliance than conventional thinking acknowledges. As the project progresses, these risks become visible and hard to eliminate. This paper presents a new system of systems architecture that assists in identifying these risks. Risks are identified from conflicting interactions between systems. Furthermore, the new architecture framework provides a quantified method to prioritise across interaction types so that appropriate resources can be applied to mitigate the most critical risks.</p>	<p>10.1109/SysCon53073.2023.10131153</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10131153</p>	<p>IEEE Xplore</p>
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Satisfaction analysis of public services using Evidential Network model		<p>Public services are one of the basic functions of governments. How to improve the quality of public services under the limited budget has attracted significant attention. Most studies have tried to analysis the satisfaction of public services from statistical description or subjective decomposition. In this study, the evidential network model is employed to describe the relationship between the public services to analysis the satisfaction of them systematically. The advantage of the Evidential Network model is that the relationship between the public services can be represented using directed acyclic graph, and the subjective uncertainty in the relationship can be reflected by the D-S evidence theory. This study uses the Evidential Network structure learning approach to mine the relationship between public services from the questionnaire data, and analyzes the satisfaction of public services on this basis. A case study of the China General Social Survey (2015) is presented to demonstrate the methodology proposed in this study.</p>	10.1109/SoSE50414.2020.9130501	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130501	IEEE Xplore
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Integrating Digital Twins and Machine Learning for Enhanced Predictive Maintenance, Real-Time Analytics, and Cost Savings: A Review		Digital Twins (DTs) have emerged as a powerful approach for creating virtual representations of physical systems and assets, enabling real-time monitoring, control, and optimization. When combined with Machine Learning (ML), these virtual replicas can unlock new possibilities in predictive maintenance, real-time analytics, and cost-efficient operations across multiple industries. This paper offers an in-depth review of the latest developments in DT-ML integration, with a particular focus on manufacturing, healthcare, and smart city applications. We highlight challenges related to scalability, privacy, and data quality, and we examine how the Internet of Things (IoT) can supply the continuous, high-volume data needed to support ML-driven insights. The discussion also covers typical performance metrics—such as accuracy, latency, and resource savings—and explores ongoing research directions that use edge computing, quantum ML, and multi-agent methods to build more adaptable and sustainable systems.	10.1109/SoSE66311.2025.11083831	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083831	IEEE Xplore
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<p>A standards-based approach for domain specific modelling of smart grid system architectures</p>		<p>The ongoing integration of decentralized, renewable energies is a major challenge for today's power system. In order to control the volatile behaviour of these Distributed Energy Resources (DER), the electricity system has to evolve towards a Smart Grid. The development of this critical and complex System-of-Systems involves different stakeholder from different disciplines. Thus, domain specific engineering concepts on system level are needed. To foster the interdisciplinary development, the proposed approach presents a standards-based architecture framework, implemented as Domain Specific Language (DSL). Moreover, the DSL is used to develop a reference architecture on basis of the NIST Logical Reference Model. To evaluate the applicability of the reference architecture model it is used for instantiation of a particular system solution.</p>	<p>10.1109/SYSOS E.2016.7542888</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542888</p>	<p>IEEE Xplore</p>
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<p>The present and future of the precision agriculture</p>		<p>The article would like to introduce the main steps of agricultural changes, followed by the appearance and main analysis of precision production. One of the possible answers to the emerging problems of pollution and efficiency is the use of precision agriculture. The one of the greatest challenges of the agricultural sector is to feed significantly more people on more or less the same size of agricultural land. The size of the utilized agricultural cannot be expanded significantly. The other pillar of the production growth is the higher yields. It can be reached in various ways starting from optimal fertilizer use, more fertile seeds to irrigation. Precision agriculture use most of these opportunities. PA can contribute to food security and safety, it supports sustainable farming (EP, 2016). The high initial costs, PA technologies are closely related to the farm size, which is an important factor of the adoption.</p>	<p>10.1109/SoSE50414.2020.9130481</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130481</p>	<p>IEEE Xplore</p>
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Two-Tier analyzed content filtering based Data Management Architecture in Industry 4.0		<p>Industrial sector advancement expedites large industrial data by leveraging new electro-mechanical and information communication technologies. This is an ascent towards fully automated smart industries. It brings new challenges, but also an opportunity to make industrial manufacturing entities and process part of internet. Due to the delay and security requirements, the flooding of industrial data performing local real time task should be restricted, and only business-relevant, structured data are to be transmitted. For achieving this, we have proposed a two-tier data management architecture based on content filtering. In this context, two different layers are used to process data locally and globally. Additionally, we also discussed a typical industrial automation stack, its underlying processes and relevant technologies. Finally, we touched some research challenges at the last section of this paper as opportunities towards achieving the goal of smart industries.</p>	10.1109/SoSE50414.2020.9130464	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130464	IEEE Xplore
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Security Testing for Naval Ship Combat System Software		<p>Military weapon systems are considered as “system of systems” (SoS). They comprise various equipment based on computers and networks and have been developed using commercial computing technology for several decades. The state-of-the-art weapon systems are information technology (IT) systems, for example, the cyber-physical system. In particular, the naval combat system, which is a weapon system, is a representative system interconnecting a number of equipments by using commercial computing technology. It is a software-based complex system, which produces and shares information about naval tactical situations by interconnecting the various systems installed on ships or remote platforms. Moreover, it performs tactical combat functions automatically or manually for assigned missions. As the core function and performance of the combat system shift from being hardware-centric to software-centric, cybersecurity threats to software that can affect the combat systems may emerge as a novel issue. The failure of the combat system to perform normal combat functions in an actual naval</p>	10.1109/ACCESS.2021.3076918	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9420062	IEEE Xplore
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		<p>combat situation owing to cybersecurity issues is a very serious risk to naval operations. However, software security testing is not conducted systematically during system development because the cybersecurity of the combat system is evaluated to be less important than its function and performance, resulting in the development of an insecure and vulnerable combat system against cybersecurity threats. To build a secure combat system against cyberattacks, it is important to derive systematic and practical security testing for the combat system software during system development. This paper analyzes the previous researches on a software security test, characteristics of the combat system software, and guidelines for the software security testing of the Korean military's weapon system development. In addition, it proposes improved software security testing to strengthen the cybersecurity of the combat system based on its characteristics and missions.</p>			
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<p>A Security Qualification Matrix to Efficiently Measure Security in Cyber-Physical Systems</p>		<p>Implementations of Cyber-Physical Systems (CPS), like the Internet of Things, Smart Factories or Smart Grid gain more and more impact in their fields of application, as they extend the functionality and quality of the offered services significantly. However, the coupling of safety-critical embedded systems and services of the cyber-space domain introduce many new challenges for system engineers. Especially, the goal to achieve a high level of security throughout CPS presents a major challenge. However, it is necessary to develop and deploy secure CPS, as vulnerabilities and threats may lead to a non- or maliciously modified functionality of the CPS. This could ultimately cause harm to life of involved actors, or at least sensitive information can be leaked or lost. Therefore, it is essential that system engineers are aware of the level of security of the deployed CPS. For this purpose, security metrics and security evaluation frameworks can be utilized, as they are able to quantitatively express security, based on different measurements and rules. However, existing security scoring</p>	<p>10.1109/ICM50269.2020.9331797</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9331797</p>	<p>IEEE Xplore</p>
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		<p>solutions may not be able to generate accurate security scores for CPS, as they insufficiently consider the typical CPS characteristics, like the communication of heterogeneous systems of physical- and cyber-space domain in an unpredictable manner. Therefore, we propose a security analysis framework, called Security Qualification Matrix (SQM). The SQM is capable to analyses multiple attacks on a System-of-Systems level simultaneously. With this approach, dependencies, potential side effects and the impact of mitigation concepts can quickly be identified and evaluated.</p>			
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Interoperability		<p>The interoperability of systems is a new term, forged in the 1980s and 1990s in systems engineering environments. It refers to things that are old and already known, without necessarily knowing in detail how they worked, and the mastery of their engineering. A good way to present the problem of the interoperability of systems is to start with the notions in the logic that belonged to G. Simondon. Made up of its communities of users/endusers and its technical/physical component, itself comprising a “hard” material part, also known as brick and mortar, and a “soft” programming part. Studying the “growth” of a system therefore comes down to studying the interactions and reciprocal influences between the three components of the symbiotic relationship that defines the system. In-depth knowledge of the “matter” that they manipulate is a requirement for engineering designer architects of the system, including when the latter relates to information.</p>	10.1002/9781119751519.ch8	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=9189986.pdf&bkn=9189947&pdfType=chapter	IEEE Xplore
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Design of a home multi-robot system for the elderly and disabled		<p>Home-based assistive robotic care for the elderly and disabled has long been a goal of robotics researchers. Unfortunately, no single group has solved the problem of making robots that will perform a set of tasks sufficient enough to warrant the cost to the end consumer. Numerous advances and improvements in computing, communication and related robotic technologies have been paving the way towards cheaper, more capable robots. We propose a home robot system consisting of a set of heterogeneous robots with different task spaces, cloud computing to enhance the abilities of the system, integration with existing home infrastructure, and compatibility with mobile technology. A high level of integration with the open source software of the Robot Operating System (ROS) is proposed to accelerate the design process. For the exact types of robots, we propose to use an enhanced floor cleaning robot and a mobility and vision assistance robot in the form of an improved rollator walker.</p>	10.1109/SYSOSE.2015.7151907	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151907	IEEE Xplore
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<p>A Dynamic Modular Ecosystem Approach for Risk Assessment Systems: Feasibility, design methodology, and generalisable application to a case study on ionising radiation and space exploration scenarios with realisation of a proof of concept</p>		<p>It is proposed a design methodology definition for a system of systems (or "ecosystem") for risk assessment, including elements based on different approaches and technologies, and its development and validation through application to a case study, radiation health risk hazard in the context of long-term space exploration, including a Proof of Concept. Characteristics and reasons for the choice of the case study are discussed, together with results of the analysis so far, possible evolution, and possible generalisation to a number of cases beyond and outside the case study, for other types of risks or even not for risk assessment.</p>	<p>10.1109/AICT47866.2019.8981798</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8981798</p>	<p>IEEE Xplore</p>
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<p>A review of critical infrastructure protection approaches: Improving security through responsiveness to the dynamic modelling landscape</p>		<p>As new technologies such as the Internet of Things (IoT) are integrated into Critical National Infrastructures (CNI), new cybersecurity threats emerge that require specific security solutions. Approaches used for analysis include the modelling and simulation of critical infrastructure systems using attributes, functionalities, operations, and behaviours to support various security analysis viewpoints, recognising and appropriately managing associated security risks. With several critical infrastructure protection approaches available, the question of how to effectively model the complex behaviour of interconnected CNI elements and to configure their protection as a system-of-systems remains a challenge. Using a systematic review approach, existing critical infrastructure protection approaches (tools and techniques) are examined to determine their suitability given trends like IoT, and effective security modelling and analysis issues. It is found that empirical-based, agent-based, system dynamics-based, and network-based modelling are more</p>	<p>10.1049/cp.2019.0131</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9037995</p>	<p>IEEE Xplore</p>
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		<p>commonly applied than economic-based and equation-based techniques, and empirical-based modelling is the most widely used. The energy and transportation critical infrastructure sectors reflect the most responsive sectors, and no one Critical Infrastructure Protection (CIP) approach — tool, technique, methodology or framework — provides a fit-for-all' capacity for all-round attribute modelling and simulation of security risks. Typically, deciding factors for CIP choices to adopt are often dominated by trade-offs between 'complexity of use' and 'popularity of approach', as well as between 'specificity' and 'generality' of application in sectors. Improved security modelling is feasible via; appropriate tweaking of CIP approaches to include a wider scope of security risk management, functional responsiveness to interdependency, resilience and policy formulation requirements, and collaborative information sharing between public and private sectors.</p>			
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<p>Interoperability by construction: code generation for Arrowhead Clients</p>		<p>This document describes a process to design and develop service-oriented clients to be used within the Arrowhead platform. The approach is centered on the definition of an OpenAPI interface, which is then used to generate the communication code to reach the servers. The paper discusses how to define the interfaces, how to generate a client library using the OpenAPI-generator system, what must be taken into account when configuring the security capabilities of the client to either communicate in cleartext or protect communication by means of Transport Layer Security, and discusses how to use the library to develop a client system. This work then applies the approach to the problem of implementing an Arrowhead-compliant client in the C programming language, which can communicate securely with Arrowhead services. The work highlights peculiarities that emerge from the interaction of programming concepts related to the C programming language, which we used to implement a client, and the Java programming language, which is the main language currently used to implement</p>	<p>10.1109/ICPS48405.2020.9274746</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9274746</p>	<p>IEEE Xplore</p>
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		Arrowhead clients and servers.			
Analysis of Reliable Architecture Techniques for Adaptive Adversarial Systems of System		<p>Driven by new technological innovations, Adaptive Adversarial Systems of Systems (AASS) are rapidly developing, and their reliability issues are increasingly receiving widespread attention. This architecture efficiently integrates heterogeneous combat resources from different fields to achieve rapid fusion and collaboration of multi-source information, ensuring its ability to continuously, accurately, and stably execute predetermined tasks in complex, high-pressure, and adversarial environments. However, how to design and implement an efficient, reliable, adaptive, and adversarial system architecture still faces many challenges. This paper aims to delve into the design principles and key technologies of the architecture of AASS. Finally, AASS and its future development trends and challenges are proposed, and a brief summary of AASS reliability architecture is provided.</p>	10.1109/QRS-C63300.2024.00083	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10727071	IEEE Xplore

<p>Cognitive interference avoidance in 4th generation GPS</p>		<p>GPS systems have revolutionized the way people and social networks in society interact. As GPS becomes more ubiquitous in road transportation, energy, or autonomous delivery drones, there is increasing opportunity for adversaries and malicious attackers to exploit GPS infrastructure so as to hijack or damage position-sensitive systems. We propose the development of a precise positioning system that can be implemented in terrestrial metropolitan networks that is also capable of interference avoidance, hi-jack prevention, and operational in GPS denied environments. The significant contribution of this work is the development of cognitive GPS system that utilizes a novel anti-jamming algorithm to dynamically allocate signal power so as to avoid interference. We also propose a resource elements encryption algorithm to prevent hi-jacking and GPS spoofing.</p>	<p>10.1109/SYSOSE.2015.7151973</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151973</p>	<p>IEEE Xplore</p>
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<p>A Standards-based Approach for Cross-Domain Modelling of Smart City System Architectures</p>		<p>The inherent complexity of systems in the domain of smart cities demands a suitable modelling framework to facilitate development and interdisciplinary communication. In the domain of smart grids, the Smart Grid Architecture Model (SGAM) framework provided means for coping with complexity whilst supporting a cross-disciplinary understanding of modelled systems. Similar approaches exist for the automotive and industry domains. As a complex smart city system may combine various application domains, interoperability between applied modelling frameworks is imperative to simplify cross-domain collaboration. Therefore, to be suitable, a modelling framework needs to target the concerns of stakeholders from the smart city, whilst simultaneously enabling interoperability between all connected application domains. The presented approach is a standards-based systems engineering framework, implemented as Domain Specific Language (DSL) and based upon the Smart City Reference Architecture Methodology (SCRAM). Moreover, the</p>	<p>10.23919/SpliTech58164.2023.10193583</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10193583</p>	<p>IEEE Xplore</p>
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		DSL is used to model a particular system solution to evaluate its applicability.			
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<p>The contribution of InSAR deformation time series for geohazard in urban environment for HARMONIA project</p>		<p>In the framework of the HARMONIA (Development of a Support System for Improved Resilience and Sustainable Urban areas to cope with Climate Change and Extreme Events based on GEOSS and Advanced Modelling Tools) project we adopted remote sensed SAR data to study possible ground movements for selected urban areas. In fact, HARMONIA focuses on developing integrated solutions for urban environments, tailored to the European needs of security, health, prosperity and wellbeing, with regards to the detrimental impact of Climate Change (CC). HARMONIA will combine multiple Earth Observation (EO) datasets - including GEOSS and Copernicus datasets and services - with ensemble modelling, socioeconomic and in-situ data at the spatial and temporal scales. HARMONIA will test modern Remote Sensing (RS) tools, Machine Learning (ML)/Deep Learning (DL) AI techniques to develop a modular scalable data-driven multi-layer urban areas observation information knowledge base, using Satellite data time series, spatial information and auxiliary data, which will also integrate detailed</p>	<p>10.1109/JURSE57346.2023.10144192</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10144192</p>	<p>IEEE Xplore</p>
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		<p>information on local level. In this work, we will show the results from the monitoring of the surface through multi-temporal InSAR (MT-InSAR) technique, over three European cities: Piraeus (Greece), Sofia (Bulgaria), and Milan (Italy). In fact, we are going to show how the well-consolidated MT-InSAR techniques are able to provide a fundamental instrument to Local Authorities and stakeholders in different contexts and among them the one topic of this project that is the to assess multihazard risks in urbanized sites.</p>			
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System of System Architecture for Cybersecurity of Power Systems Operations		<p>Smart grids are at risk of cyber-attacks due to more connected devices being introduced. Different kinds of attacks may incur different consequences in the operation of smart grids. Attackers have identified different vulnerable points in smart grid operations and have developed malicious stealthy attacks to disrupt the operation of physical systems. In this paper we have formulated the power system cyber security problem as a five-dimensional optimization problem. A general framework is developed using the system of system explorer tool providing a defensive solution to the vulnerable points of a smart grid prone to malicious attacks. An optimal meta-architecture composed of defensive system constituents is achieved using Genetic algorithm (GA) and fuzzy inference system providing a solution to ensure cybersecurity of power system operations.</p>	10.1109/ICEEE62185.2024.10779313	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10779313	IEEE Xplore
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<p>A Solution Analysis of U.S. Weapon Equipment Systems-of-Systems Development and Application</p>		<p>In recent years, the development and deployment of the U.S. weapon equipment systems-of-systems (SoS) have yielded rich research results. However, there are still large gaps in the SoS development, joint testing, and design and acquisition of our own equipment SoS. The barriers of these steps have not yet been opened up. This article mainly analyzes the solutions of the U.S. weapon equipment SoS from three aspects, such as capability-based requirement generation and architecture design technology, interconnected-oriented integration test technology, and weapon equipment design and acquisition technology based on complex adaptive systems. We explore key technologies involved in order to form an overall understanding and explore related research approaches.</p>	<p>10.1109/ICISCE50968.2020.00038</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9532162</p>	<p>IEEE Xplore</p>
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<p>The industrial internet of things and cyber security: An ecological and systemic perspective on security in digital industrial ecosystems</p>		<p>All over the world, objects are increasingly connected in networks such as the Industrial Internet of Things. Interconnections, intercommunications and interactions are driving the development of an entirely new whole in the form of the Industrial Internet of Things. Communication and interaction are the norm both for separate components, such as cyber-physical systems, and for the functioning of the system as a whole. This new whole can be likened to a natural ecosystem where the process of homeostasis ensures the stability and security of the whole. Components of such an industrial ecosystem, or even an industrial ecosystem as a whole, are increasingly targeted by cyber attacks. Such attacks not only threaten the functioning of one or multiple components, they also constitute a threat to the functioning of the new whole. General systems theory can offer a scientific framework for the development of measures to improve the security and stability of both separate components and the new whole.</p>	<p>10.1109/ICSTCC.2017.8107108</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8107108</p>	<p>IEEE Xplore</p>
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<p>A Systems Engineering Approach To Appraise Cybersecurity Risks Of CNS/ATM and Avionics Systems</p>		<p>The aggregate use of complex cyber-physical systems, incorporation of artificial intelligence and autonomy in flight operations has reconceptualised the aerospace cybersecurity paradigm to a new era. Cybersecurity is about the prevention or mitigation of malicious acts undertaken to either compromise systems directly or access valuable information that could be subject to criminal misuse. The cybersecurity of Communication, Navigation, and surveillance / Air Traffic Management (CNS/ATM) systems is aimed at controlling the effects of such threats and enhancing the safety of flying passengers. Besides, the cybers resilience of state-of-the-art CNS/ATM and avionics systems have been impacted by convoluted risk management issues. The security of legacy aviation and airport infrastructure has been curtailed owing to their annexure to public networks, which constitute a significant risk to the aviation industry and the general public as a whole. The existing control mechanisms in place, with the aim of assuring Confidentiality, Integrity, and Availability (CIA) of information, have a multitude</p>	<p>10.1109/ICNSUR V.2019.8735376</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8735376</p>	<p>IEEE Xplore</p>
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		<p>of deficiencies in deciding the extent of vulnerability of systems, the severity of impact and subsequently overall risk rating. Weaknesses in some of the security controls which are intended to mitigate the impact of cyber-attacks also contribute towards this issue. A risk-based system engineering solution is envisioned in managing today's cyber-physical systems which may comprise of interwound Systems of Systems (SoS). This paper aims to investigate threats to aviation assets, vulnerabilities of aviation systems and to adopt a holistic approach to mitigate possible risks. The article also recommends a novel methodology to manage risks by enhancing the consistency and accuracy of risk attributes of CNS/ATM systems, avionics and airport systems.</p>			
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<p>Cooperative safety critical CPS platooning in SafeCOP</p>		<p>This paper presents the platooning research within the Safe Cooperating Cyber-Physical Systems using Wireless Communication (SafeCOP) project. Cooperating Cyber-Physical Systems (CO-CPS) using wireless communication and having multiple stakeholders, dynamic system definitions (openness), and unpredictable operating environments, are the main application of SafeCOP. In addition to safety assurance methods and tools, SafeCOP devises a runtime manager architecture that detects irregular operation, hence, prompting a safe degraded mode in case of need. SafeCOP lays a safety and security umbrella over the usage of current wireless technologies, contributes to new standards and regulations by providing scientifically validated solutions to establish standards which also addresses cooperation and system-of-systems issues. SafeCOP addresses several use cases that solve customer related problems. However, in this paper we will present a use case that extract generic principles from the combination of the previous use cases to</p>	<p>10.1109/MECO.2017.7977210</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7977210</p>	<p>IEEE Xplore</p>
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		stimulate the European collaboration around the project objectives, and to collect general requirements for the SafeCOP solution, applicable across all the areas considered. We consider a CO-CPS composed of two or more systems moving in a platoon while cooperating in a safe function.			
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Securing Cooperative Intersection Management through Subjective Trust Networks		<p>Connected, Cooperative, and Autonomous Mobility (CCAM) will take intelligent transportation to a new level of complexity. CCAM systems can be thought of as complex Systems-of-Systems (SoSs). They pose new challenges to security as consequences of vulnerabilities or attacks become much harder to assess. In this paper, we propose the use of a specific type of a trust model, called subjective trust network, to model and assess trustworthiness of data and nodes in an automotive SoS. Given the complexity of the topic, we illustrate the application of subjective trust networks on a specific example, namely Cooperative Intersection Management (CIM). To this end, we introduce the CIM use-case and show how it can be modelled as a subjective trust network. We then analyze how such trust models can be useful both for design time and run-time analysis, and how they would allow us a more precise quantitative assessment of trust in automotive SoSs. Finally, we also discuss the open research problems and practical challenges that need to be addressed before such trust models can be applied in practice.</p>	10.1109/VTC2023-Spring57618.2023.10200789	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10200789	IEEE Xplore
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Secure and trusted inter-cloud communications in the arrowhead framework		<p>The concept of local automation clouds was first initiated by the Arrowhead framework in order to cover special requirements of the Industrial Internet of Things domain. The security, real-time, and engineering requirements are tackled in local clouds, in which systems can exchange information with external systems through inter-cloud servicing. There are various challenges with information exchange between local clouds. First, service consumers and the service providers must find each other and then their interactions must be monitored. This is already supported through the inter-cloud orchestration process, carried out by the core systems of Arrowhead. This mechanism involves the administration of the connections, aided by Gatekeepers. Secure end-to-end data transfer, however, is still troublesome - especially in-between closed local clouds. Challenges include issues with trust, data path control, and relaying between clouds. The current paper proposes a new, supporting core system, the Gateway, which can facilitate solving these issues, when controlled by the Gatekeeper.</p>	10.1109/ICPHYS.2018.8390802	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8390802	IEEE Xplore
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Behavioral detection in the maritime domain		<p>The maritime domain is important to the security, prosperity and vital interests of the global community. In order to protect these interests, governments require capabilities that provide situational awareness of the maritime domain. In [11] a spatiotemporal analysis approach is proposed that autonomously analyzes and classifies ship movement and possible intent at sea. The analysis focuses on detection of vessels of interest that exhibit one behavior, paralleling or following behavior. In this paper, we extend this approach by proposing a generalized semantic method that enables consideration of other behaviors of interest. Additionally we conduct a series of simulations using simulated and real AIS data to assess the performance of the algorithm to variation in behavior thresholds.</p>	10.1109/SYSOSE.2015.7151927	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7151927	IEEE Xplore
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<p>Multimodal Person Identification through the Fusion of Face and Voice Biometrics</p>		<p>Person identification is used in a variety of everyday applications from access control and security cameras to social media and face ID on smartphones. There are still, however, various limitations to this technology that do not make it completely reliable. This paper focuses on face and voice biometrics in particular and takes advantage of their fusion to produce a more accurate final decision. The Michigan State University (MSU-AVIS) dataset is used which contains 50 subjects whose faces are captured from different angles and whose voices are recorded as they read from a random script. For the face dataset, videos are first split into frames which are passed into the Viola-Jones algorithm for face detection. A convolutional neural network (CNN) is trained to identify the subjects based on their facial features. For the voice dataset, each audio file is split into frames and any silence or unvoiced speech is removed. Two features are extracted: pitch and Mel frequency cepstrum coefficients which are then passed into another CNN. Finally, outputs of both CNNs are fused at the decision level by choosing the output of</p>	<p>10.1109/SOSE55472.2022.9812670</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9812670</p>	<p>IEEE Xplore</p>
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		higher confidence in each case.			
Evolving the Ecosystem: Eclipse Arrowhead integrates Eclipse IoT		Eclipse Arrowhead is an open and flexible framework for industrial IoT scenarios based on service-oriented principles. It allows building highly configurable Systems of Systems by connecting systems running on devices in a local cloud. Part of Arrowhead's flexibility is its ability to integrate other systems and tools through core services. In a previous study, we identified projects from Eclipse IoT, one of the largest open source communities for Internet of Things (IoT), building production-ready systems and tools for IoT. Based on this study, we integrated suitable projects into the Eclipse Arrowhead Framework, validating our initial findings and providing integrations complementing Arrowhead's core functionality. The paper summarizes the integrations and gives an outlook on the next steps.	10.1109/NOMS54207.2022.9789922	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9789922	IEEE Xplore

Towards Security of Cyber-Physical Systems using Quantum Computing Algorithms		<p>For cyber-physical systems (CPS), ensuring process and data security is critically important since the corresponding infrastructure needs to have high operational efficiency with no downtime. There are many techniques available that make communications in CPS environments secure – such as enabling traffic encryption between sensors and the computers processing the sensor's data, incorporating message authentication codes to achieve integrity, etc. However, most of these techniques are dependent on some form of symmetric or asymmetric cryptographic algorithms like AES and RSA. These algorithms are under threat because of the emerging quantum computing paradigm: with quantum computing, these encryption algorithms can be potentially broken. It is therefore desirable to explore the use of quantum cryptography – which cannot be broken by quantum computing – for securing the classical communications infrastructure deployed in CPS. In this paper, we discuss possible consequences of this option. We also explain how quantum</p>	10.1109/SoSE50414.2020.9130525	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130525	IEEE Xplore
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		computers can help even more: namely, they can be used to maximize the system's security where scalability is never a constraint, and to ensure we are not wasting time cycles on communicating and processing irrelevant information.			
Agile Systems Engineering		There is no software without systems engineering. Software is always part of a bigger system. Even a simple application interacting with a human user consists of software building blocks, a service delivery, various hardware systems, user experience, energy management, connectivity and many more. Systems engineering or "systems thinking," as it is often called, ensures that products deliver more value than the capabilities of their individual parts. Such value beyond the individual components is what we call a system, or even a system of systems. A system is a set of interacting elements that together achieve a purpose.	10.1109/MS.2021.3071806	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9460982	IEEE Xplore

Towards Safety-Awareness and Dynamic Safety Management		<p>Future safety-critical systems will be highly automated or even autonomous and they will dynamically cooperate with other systems as part of a comprehensive ecosystem. This together with increasing utilization of artificial intelligence introduces uncertainties on different levels, which detriment the application of established safety engineering methods and standards. These uncertainties might be tackled by making systems safety-aware and enabling them to manage themselves accordingly. This paper introduces a corresponding conceptual dynamic safety management framework incorporating monitoring facilities and runtime safety-models to create safety-awareness. Based on this, planning and execution of safe system optimizations can be carried out by means of self-adaptation. We illustrate our approach by applying it for the dynamic safety assurance of a single car.</p>	10.1109/EDCC.2018.00027	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8530768	IEEE Xplore
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Analysis of Systems Security Engineering Design Principles for the Development of Secure and Resilient Systems		<p>The increasing prevalence of cyber-attacks highlights the need for improved systems security analysis and engineering in safety-critical and mission-essential systems. Moreover, the engineering challenge of developing secure and resilient systems that meet specified constraints of cost, schedule, and performance is progressively difficult given the trend toward increasing complexity, interrelated systems-of-systems. This paper analyzes the 18 design principles presented in the National Institute of Standards and Technology Special Publication (NIST SP) 800-160 Volume 1 and considers their applicability for the development of secure and resilient systems of interest. The purpose of this work is to better understand how these design principles can be consistently and effectively employed to meet stakeholder defined security and resiliency needs as part of a comprehensive systems security engineering approach. Specifically, this work uses the Design Structure Matrix (DSM) analysis to study the 18 design principles presented in NIST SP 800-160 Vol. 1, Appendix F, along with their intra- and inter-</p>	10.1109/ACCESS.2019.2930718	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8771142	IEEE Xplore
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		<p>dependencies to develop complex cyber-physical systems that are secure, trustworthy, and resilient. The DSM analysis results increase understanding of the various relationships between the 18 design principles and identifies two clusters for secure systems design: Architecture and Trust. Lastly, this work provides a notional command and control system case study, along with a detailed listing of engineering considerations, to demonstrate how these principles and their groupings can be systematically applied as part of a comprehensive approach for developing cyber-physical systems which are designed to operate in hostile environments.</p>			
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<p>Blockchain in Supply Chain Management</p>		<p>A supply chain is the connected network of all the entities involved in the manufacture and final distribution of a product or service. It starts with the delivery of raw materials from a supplier to a manufacturer and ends with the delivery of the finished product or service to the customer. Supply chain management is the management of the flow of goods and services in order to cut excess costs and better meet customer expectations. Although supply chains have existed for a long time, the way they are managed is not as efficient as expected. The use of blockchains in supply chain management offers a number of advantages. A blockchain is a constantly growing ledger which keeps a permanent record of all the transactions that have taken place, in a secure, chronological and immutable way and can be shared by all the entities in the supply chain. The combination of supply chain management and blockchain adds trust in partners' interactions, reduces paperwork, increases security as well as transparency of records and transactions. Such an enhancement, indeed cuts excess costs and better meets customer</p>		<p>https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=9450189.pdf&bkn=9431972&pdfType=chapter</p>	<p>IEEE Xplore</p>
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		expectations.			
A Cyber Attack Taxonomy for Microgrid Systems		Microgrid systems play a pivotal role in utilizing the distributed energy sources for reaching a more economic, safe, and environment-friendly energy ecosystem. A coherent adaptation of such systems requires a serious consideration of their resistance to cyber attacks due to the increasing threat profile of cyberspace and the potentially huge impact of malicious cyber actions on the energy systems. This study provides the results of our literature review regarding the cyber attacks on Microgrid systems. We created an attack taxonomy based on the review findings. This attack taxonomy can be utilized by practitioners for various purposes including security assessments of Microgrid systems or relevant cyber threat modeling studies.	10.1109/SOSE55472.2022.9812642	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9812642	IEEE Xplore

IEEE/UL Standard for Clinical Internet of Things (IoT) Data and Device Interoperability with TIPPSS--Trust, Identity, Privacy, Protection, Safety, and Security		A framework with TIPPSS principles (trust, identity, privacy, protection, safety, and security) for Clinical Internet of Things (IoT) data and device interoperability is established in this standard. This includes wearable clinical IoT and interoperability with healthcare systems including electronic health records (EHR), electronic medical records (EMR), other Clinical IoT devices, in-hospital devices, and future devices and connected healthcare systems.	10.1109/IEEESTD.2024.10697446	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10697446	IEEE Xplore
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Secure Virtual Desktop Infrastructure Solution Using Homomorphic Encryption and Machine Learning Models		<p>In the recent past, Virtual Desktop Infrastructure (VDI) technology has experienced rapid growth. Although many enterprise companies have implemented VDI systems, previous research has highlighted several critical issues, including data breaches and session hijacking. Security measures identified for such threats were suboptimal, especially for the firms with fewer resources. In this paper, authors combat existing threats to VDI systems with different technologies such as Homomorphic Encryption (HE) for the safe exchange of location data, and the Machine Learning (ML) model is used for real-time log analysis, thereby making it easy to detect some level of anomaly in the complex VDI environments. According to the result, this integrated posture introduces a new and positive dimension in VDI strengthening the security and privacy of data, while protecting against various threats. Additionally, the paper also addresses setting a new and more secure base for any virtualization technologies all while securely handling consumer data.</p>	10.1109/ICONAT 61936.2024.10775056	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10775056	IEEE Xplore
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<p>A Language for Analyzing Security of IOT Systems</p>		<p>The control and protection of a user data is a very important aspect in the design and deployment of the Internet of Things (IoT). In this paper we propose a security-based modelling language for IoT systems, which explicitly represents data access controls. The language leverages the analysis of potential security failures resulting from a series of interactions between heterogeneous components of a system. We implemented a tool that automatically transforms IoT models into BIP models, which can then be simulated and analyzed for security guarantees. We illustrate the features of our language with a use-case inspired by an industrial scenario.</p>	<p>10.1109/SYSOSE.2018.8428704</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428704</p>	<p>IEEE Xplore</p>
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Developing a Framework for Autonomous Control Software for a Human Colony on Mars		<p>We propose a system of systems architecture to command and control a complex colony on Mars. The architecture is structured largely around the goals of construction, discovery, operations and risk management. Each of these goals is supported by autonomous systems with the ability to perform a diverse set of tasks. As a whole, the system presented is a hybrid distributed-centralized architecture with homogeneous autonomous agents within tasks of smaller scope but heterogeneous agents across the system as a whole. The system leverages the strengths of each element of the hybrid architecture to create a more robust, capable autonomous unit.</p>	10.1109/EIT.2019.8833860	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8833860	IEEE Xplore
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Enhancing Security and Reliability for Smart-Systems' Architectures		<p>The vision of a fourth industrial revolution lately strongly captured the attention of research. A Cyber-physical system (CPS) is one of the main drivers of this vision. Such system controls an underlying factory interacting with sensors, actuators and other systems creating systems-of-systems. A main point of interest is how these components are built and interconnected, i.e. the system's architecture, and how it might be improved to increase reliability and security. Unfortunately, a recently completed systematic mapping study has shown that security based research for CPS architectures is only weakly present. The target of this research is therefore to find generalized architectural models and patterns that improve reliability and security. The results will enable the improvement of reliability and security of cyber-physical systems in general, leading to a variety of application scenarios and possible use cases.</p>	10.1109/ISSREW.2018.000-8	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8539186	IEEE Xplore
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Sandboxing Adoption in Open Source Ecosystems		<p>Sandboxing mechanisms allow developers to limit how much access applications have to resources, following the least-privilege principle. However, it's not clear how much and in what ways developers are using these mechanisms. This study looks at the use of Seccomp, Landlock, Capsicum, Pledge, and Unveil in all packages of four open-source operating systems. We found that less than 1% of packages directly use these mechanisms, but many more indirectly use them. Examining how developers apply these mechanisms reveals interesting usage patterns, such as cases where developers simplify their sandbox implementation. It also highlights challenges that may be hindering the widespread adoption of sandboxing mechanisms.</p>		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10669721	IEEE Xplore
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<p>An interconnected network of UAS as a system-of-systems</p>		<p>Technological advancements and miniaturization have made it possible for Unmanned Aerial Systems (UAS) to perform a diverse range of tasks. UAS are being used in various applications ranging from remote sensing[1] to disaster response[2] to package delivery[3]. As drones rapidly fill the airspace, there are several threats that the system can encounter. These threats include mid-air collisions, loss of remote command connection, security breach of the drone's software system and critical damage to the hardware. To ensure the integrity of the drone in flight, an interconnected UAS architecture, having a fully functional system capable of responding to these situations, is required. This paper presents a system meeting these requirements. An interconnected UAS system of systems is proposed that includes systems for onboard GPS, obstacle avoidance central control and safety response. It focuses on the coordination level that the UAS systems will need to have amongst themselves. It proposes a control system to ensure effective monitoring of UAS. The UAS system architecture is comprised of eleven systems</p>	<p>10.1109/DASC.2017.8102148</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8102148</p>	<p>IEEE Xplore</p>
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		<p>that are essential for a safe flight. In addition, the control system includes five different systems that are involved in the decision-making process. The importance and operation of these systems are discussed in detail. The proposed UAS software architecture is capable of performing autonomous self-control. It has decision making modules that can receive data from various sensors and integrate it to provide efficient route planning and data management. The software systems monitor the area surrounding the UAV to facilitate routing and decision making. The software architecture includes self-awareness to respond to situations such as adverse climatic conditions that impact the flight capabilities of the UAS. The proposed UAS system also includes hardware to monitor and update the list of obstacles in its path. This requires the UAS to be equipped with sensors for obstacle determination and a software system that accepts the inputs from these sensors, makes decisions and performs actions, promptly. An emergency response system is included to ensure that the drone will land safely in an appropriate</p>			
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		<p>location, if its systems are compromised. This response system is capable of deciding the severity of the situation and sends commands to the flight control system regarding the recovery steps that should be taken. The proposed system architecture incorporates cybersecurity in its design framework so that it is equipped to handle potential hackers that might try to gain access to onboard navigation controls and reroute the UAS for personal gain or another agenda. If the system senses a threat, it launches the emergency response system. The proposed UAS software architecture includes a maintenance and diagnostics system that coordinates and monitors drone activities. It performs functions ranging from monitoring the health of the hardware systems to uploading error reports to the central server. The system transmits error reports to the control unit which further processes the data to determine the source of the error and resolve the issue. In UAS systems, a computerized framework takes input from at least one sensor, and uses a pre-characterized set of guidelines to make decisions [4]. This paper</p>			
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		aims to achieve an interconnected UAS system of systems that can address several issues and solutions related to flight autonomously.			
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<p>Internet of Things: Proposed security aspects for digitizing the world</p>		<p>The Internet is a Heterogeneous entity which is constantly changing and evolving. The concept of "Internet of Things" (IOT) refers to extending the intelligent sensors in our day to day objects such as televisions, fridge, media players, heating appliances etc. This would help in extending the ability of the objects to provide feedback to the user. This enables the object to have some sort of consciousness. What we have today is the human interacting with the object and not vice-versa, but the IOT would help us to complete this loop. This kind of digitization would mean that our next generation of refrigerators would know more about our diet than our current dieticians. This would help in creating a "system of systems". Considering a current scenario where the number of digital security threats and attacks are increasing day by day, the notion of IOT would be incomplete if we ignore its security aspects. In this paper, we would be exploring the various security aspects of IOT such as security of remote frequency identifiers(RFID), wireless sensors etc. We have proposed a taxonomy of the security aspects</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7724648</p>	<p>IEEE Xplore</p>
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		of IOT. We have also explained the basic concepts and motivation behind the evolution of IOT, its architecture, and applications.			
Towards a Systemic Asset Characterization of Electrical Systems for Multi-Risk Resilience		Traditional reliability analysis tools for electrical systems must be advanced to represent the potential impacts from climate change and other natural hazards and must embed system-of-systems approaches to account for critical infrastructures' (CIs) interdependencies. The Italian project RETURN, funded by the PNRR, within the activity-line "Multi-Risk Resilience Assessment of Critical Infrastructures" is adopting an interdisciplinary and holistic approach for developing impact modelling methods with an all-hazards perspective. The paper provides an overview of the methodology under development towards the systemic modelling and analysis of CIs, including the electrical transmission and distribution systems, aiming to support decision making processes targeting multi-risk resilience.	10.23919/AEIT60520.2023.10330429	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10330429	IEEE Xplore

Systems architecture in failure analysis (Applications of architecture modeling to system failure analysis)		<p>This paper describes research into the applicability and value of architecture modeling techniques in conducting failure analysis on a system that is currently in service. Many Systems of Systems (SoS) currently in service did not include architecture modeling in their design and integration phases. In the absence of architectural models, knowledge of critical items, interfaces, and interactions, is difficult to learn, communicate, and maintain. Failure analysis, particularly for SoS, requires comprehensive system knowledge to produce accurate and timely results. This paper contributes specifically by summarizing existing model-based failure analysis research in terms of applicability to in-service systems and by focusing on Fault Tree Analysis (FTA) and Failure Modes Effects Analysis (FMEA). Much of the existing research in this area is either specific to design or development phases of system lifecycle, or presupposes that architectural models exist, and does not approach the topic from the perspective of value and practicality to an in-service system. Firstly, a</p>	10.1109/SYSOSE.2017.7994966	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994966	IEEE Xplore
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		<p>general analysis of the commonality of principles, methods, and resources used for failure analysis with those of system architecture modeling is presented. The second contribution is a review of system and SoS modeling techniques and current research as applied to these failure analysis methods. The paper concludes with a summary of model applicability to FTA and FMEA, and a brief analysis of the studied methods, which will guide future research and evaluation of architecture modeling-based methods for failure analysis.</p>			
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Towards Data-Centric Genetic Cryptography for Telemonitoring and Ambient Assisted Living Systems		<p>The integration of wireless sensor networks into Internet of things, led to a new generation of sensor nodes, directly connected to remote servers, for signal processing and decision making. The migration of data processing from local node, achieved by decoupling the node hardware from the required processing capabilities, is only possible through implementations of network softwarization. The softwarization which brings, new services that are executed remotely has led to security challenges, yet to be resolved, due to the increasing amount of data being continually exchanged between the sensor node-hub and the remote servers. In this regard we introduce a novel genetic algorithm for data security with a powerful security architecture that performs one-time key, single block enciphering instead of a block chaining or weak stream enciphering. The algorithm architecture produces variable (stealthy) keys and data that adopts white noise statistical behavior, therefore, having high immunity to cryptanalysis. The algorithm combines gene fusion and Horizontal Gene Transfer inspired from the spread of antibiotic</p>	10.1109/SYSOSE.2018.8428768	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428768	IEEE Xplore
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		resistance in bacteria. A Salt extracted from the data block hash-value adds the stealthy-key feature to the cipher. An application in eHealth tele-monitoring with WSN/IoT is described.			
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<p>Risk Assessment of an Electrical Power System Considering the Influence of Traffic Congestion on a Hypothetical Scenario of Electrified Transportation System in New York State</p>		<p>With the increasing penetration of electric vehicles (EVs), more and more interactions appear between the transportation system and the power system, which might provide new hazards and channels for the proliferation of failures across the boundaries of the individual systems. In this context, this paper proposes an integrated risk assessment framework for an electric power system, considering scenarios that involve the electrified transportation system enabled by EVs charging technology in New York (NY) State. Firstly, scenarios in the transportation network of NY State, e.g. of reduced capacity and incident, are generated by a Monte Carlo non-sequential algorithm. Then, the cell transmission model (CTM) is used to simulate the evolution of the traffic flows under such scenarios. This allows evaluating the spatial-temporal EV charging loads in different areas of the electrified transportation system of NY State. Correspondingly, the running parameters in the studied power system are updated by the alternative current (AC) power flow model. Finally, the risk for the power system coming from the</p>	<p>10.1109/TITS.2019.2955359</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8926527</p>	<p>IEEE Xplore</p>
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		<p>transportation system scenarios is assessed within a probabilistic risk analysis framework. The proposed integrated risk assessment framework is able to model the propagation of the effects of scenarios in the transportation system onto the power system of NY State and quantify the consequences. A real test case is used to illustrate the proposed framework.</p>			
<p>System Engineering in an Unknown Aerial Environment for a Communications System</p>		<p>This paper presents a case study regarding risk management for a large system-of-system communications prototype. The focus of the risk is the unknown airborne environment and how that influences the risk of the design, build, and test phases of the program. Additionally, the impact of known uncertainties on schedule are discussed. The paper steps through how the team successfully identified and mitigated the risk of designing and building a communications pod without knowing the operational environment.</p>	<p>10.1109/SysEng.2018.8544441</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8544441</p>	<p>IEEE Xplore</p>

Validating a European ATM Security System Architecture		<p>The awareness about security threats and vulnerabilities in Air Traffic Management (ATM) has been steadily growing over the last years. The number of recent security research projects shows that the effort taken to close these vulnerabilities and to make air traffic more robust against security attacks is increasing in the same way. As Air Traffic Management is often done across national borders, related security incidents could affect several air navigation service providers and stakeholders in different nations at the same time. A quick and efficient exchange of security-relevant information as well as a multi-national level of security management is needed. In the frame of the Global ATM Security Management Project (GAMMA), several prototypic security systems were developed and designed as part of a European security management system architecture. This concept foresees a local, a national and a European level of security management while essential information is shared between those levels. In order to validate this approach, several real-time human-in-the-loop simulations</p>	10.1109/DASC.2018.8569498	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8569498	IEEE Xplore
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		<p>were conducted in the first half of 2017. Both, the connected security systems and also the validation environment were set up in a geo-distributed way across Europe integrating different components from several project partners. During these trials, special attention was paid to information exchange and transmission times, the performance of automatic correlation as well as the role of human operators embedded in this system of systems. The trials showed that - even in a geo-distributed setup - information can be exchanged and countermeasures can be initiated in less than 2 minutes through the different levels of security management. This paper provides information about the experimental setup and conduction of the GAMMA project's third geo-distributed validation exercise. It illustrates selected results as well as provides a discussion and an outlook.</p>			
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Enforcing security, safety and privacy for the Internet of Things		<p>The connecting of physical units, such as thermostats, medical devices and self-driving vehicles, to the Internet is happening very quickly and will most likely continue to increase exponentially for some time to come. Valid concerns about security, safety and privacy do not appear to be hampering this rapid growth of the so-called Internet of Things (IoT). There have been many popular and technical publications by those in software engineering, cyber security and systems safety describing issues and proposing various “fixes.” In simple terms, they address the “why” and the “what” of IoT security, safety and privacy, but not the “how.” There are many cultural and economic reasons why security and privacy concerns are relegated to lower priorities. Also, when many systems are interconnected, the overall security, safety and privacy of the resulting systems of systems generally have not been fully considered and addressed. In order to arrive at an effective enforcement regime, we will examine the costs of implementing suitable security, safety and privacy and the economic consequences of failing to do so.</p>	10.1109/LISAT.2015.7160214	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7160214	IEEE Xplore
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		<p>We evaluated current business, professional and government structures and practices for achieving better IoT security, safety and privacy, and found them lacking.</p> <p>Consequently, we proposed a structure for ensuring that appropriate security, safety and privacy are built into systems from the outset. Within such a structure, enforcement can be achieved by incentives on one hand and penalties on the other.</p> <p>Determining the structures and rules necessary to optimize the mix of penalties and incentives is a major goal of this paper.</p>			
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Establishing Common Values in Design for Sustainability		<p>Sustainability is central to the engineering and manufacturing development (EMD) process and systems of systems such as complex electronics, software systems, and physical platforms. The DoD definition of sustainability typically signifies maintaining an operational capability as part of the sustainment function, which includes systems readiness [1] and supportability concepts [2] to enable a mission [3]. A sustainment concept accompanies each system to maintain its operations. Sustainability can be approached from different perspectives, such as economic, environmental, and social. One popular perspective is the environmental dimension of doing business [4]. The U.S. DoD Sustainability Plan, which views sustainability as essential to ensuring the nation's security, has adopted an environmental perspective in addition to managing the supply chain and resources for missions [5] [OBJ]. Technical analysis is needed to support a system and implement sustainability requirements throughout its operational lifecycle. These requirements will be aligned with the system's</p>	10.1109/RAMS48127.2025.10935048	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10935048	IEEE Xplore
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		<p>intended usage and mission requirements, as well as an understanding of its behavior. The functionality and physics of systems must be understood to apply models that adjust performance and behavior adequately. Sustainability requirements may include readiness, supportability, and operations and should be interrelated and decomposed to achieve desired outcomes. If environmental sustainability is an objective, associated technical analyses may need to be performed to understand physical processes' impact on the environment. For example, manufacturing complex electronics is resource-intensive and can deplete resources such as land and air. Software systems control these systems and indirectly affect heat dissipation and power use. Software-intensive systems that involve data processing technologies offer opportunities to consider how sustainability requirements can be incorporated [6]. Establishing a shared vision is considered a core sustainability leadership practice [7]. Central to establishing a shared vision is achieving common values that can guide the</p>			
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		<p>engineering process in a multi-functional team. Establishing shared values also makes teams more effective [8]. This paper presents a conceptual architecture schema that can inform sustainability leadership practices. The desired outcome is to inform engineering leadership practices better to achieve the sustainable development goals (SDGs) that address planetary challenges for the benefit of society [9].</p>			
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<p>Misbehaviour Detection System for Intelligent Speed Assistance (ISA)</p>		<p>Higher levels of automation and connectivity can improve the performance of existing Advanced Driver Assistance Systems (ADAS) / Automated Driving Systems (ADS) or enable new Connected, Cooperative, and Automated Mobility (CCAM) applications. But this will also introduce new cybersecurity risks. An example of an ADAS which is becoming mandatory in all vehicles sold in Europe is the Intelligent Speed Assistance (ISA). This system will receive information from traffic signs, High-Definition (HD) maps and Infrastructure-to-Vehicle (I2V) communication in order to set the recommended/mandatory speed. In this research, we design a Misbehaviour Detection System (MDS) for ISA, in the scope of the NIST cybersecurity cycle, capable of securing the network (for I2V communication) and protecting the integrity of the data used and shared for ISA. During the operation of the system, the MDS assigns a Trust Score (for tracking misbehaviours) and a Validity Score (for tracking reputation) to each of the ISA input signals.</p>	<p>10.1109/IV55156.2024.10588773</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10588773</p>	<p>IEEE Xplore</p>
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Transition from closed system to Internet of Things: A study in standardizing building lighting systems		<p>Internet of Things (IoT) is triggering changes in lighting industry from the traditional closed and propriety systems to flexible, interoperable and service oriented systems. To address the challenges of this transition and catering the specific requirements of lighting networks, an Open Architecture for Intelligent Solid State Lighting Systems has been proposed. The architecture is open and extensible to future technologies with security and interoperability as its integral features. A side effect of this transition is the impact on stakeholders and changes in the lighting value chain and building sector. This paper provides an overview of the architecture and zooms into the challenges in one important area, namely installation and commissioning. It proposes potential solutions to prominent issues raised by the lighting industry.</p>	10.1109/SYSOSE.2016.7542912	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7542912	IEEE Xplore
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<p>A Theoretical Approach for Reliability Within Information Supply Chains With Cycles and Negations</p>		<p>Complex networks of information processing systems, or information supply chains, present challenges for performance analysis. We establish a mathematical setting, in which a process within an information supply chain can be analyzed in terms of the functionality of the system's components. Principles of this methodology are rigorously defended and induce a model for determining the reliability for the various products in these networks. Our model does not limit us from having cycles in the network, as long as the cycles do not contain negation. It is shown that our approach to reliability resolves the nonuniqueness caused by cycles in a probabilistic Boolean network. An iterative algorithm is given to find the reliability values of the model, using a process that can be fully automated. This automated method of discerning reliability is beneficial for systems managers. As a systems manager considers systems modification, such as the replacement of owned and maintained hardware systems with cloud computing resources, the need for</p>	<p>10.1109/TR.2021.3068737</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9430600</p>	<p>IEEE Xplore</p>
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		<p>comparative analysis of system reliability is paramount. The model is extended to handle conditional knowledge about the network, allowing one to make predictions of weaknesses in the system. Finally, to illustrate the model's flexibility over different forms, it is demonstrated on a system of components and subcomponents.</p>			
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<p>A Security Scoring Framework to Quantify Security in Cyber-Physical Systems</p>		<p>The need to achieve a suitable level of security in Cyber-Physical Systems (CPS) presents a major challenge for engineers. The unpredictable communication of highly constrained, but safety-relevant systems in a heterogeneous environment, significantly impacts the number and severity of vulnerabilities. Consequently, if security-related weaknesses can successfully be exploited by attackers, the functionality of critical infrastructure could be denied or malfunction. This might consequently threaten life or leak sensitive information. A toolkit to quantitatively express security is essential for security engineers in order to define security-enhancing measurements. For this purpose, security scoring frameworks, like the established Common Vulnerability Scoring System can be used. However, existing security scoring frameworks may not be able to handle the proposed challenges and characteristics of CPS. Therefore, in this work, we aim to elaborate a security scoring system that is tailored to the needs of CPS. In detail, we analyze security on a System-of-Systems level, while considering</p>	<p>10.1109/ICPS49255.2021.9468168</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9468168</p>	<p>IEEE Xplore</p>
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		<p>multiple attacks, as well as potential side effects to other security-related objects. The positive effects of integrated mitigation concepts should also be abbreviated by our proposed security score. Additionally, we generate the security score for interacting AUTOSAR platforms in a highly-connected Vehicle-to-everything (V2x) environment. We refer to this highly relevant use case scenario to underline the benefits of our proposed scoring framework and to prove its effectiveness in CPS.</p>			
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<p>The SafeCOP ECSEL Project: Safe Cooperating Cyber-Physical Systems Using Wireless Communication</p>		<p>This paper presents an overview of the ECSEL project entitled "Safe Cooperating Cyber-Physical Systems using Wireless Communication" (SafeCOP), which runs during the period 2016 - 2019. SafeCOP targets safety-related Cooperating Cyber-Physical Systems (CO-CPS) characterised by use of wireless communication, multiple stakeholders, dynamic system definitions (openness), and unpredictable operating environments. SafeCOP will provide an approach to the safety assurance of CO-CPS, enabling thus their certification and development. The project will define a runtime manager architecture for runtime detection of abnormal behaviour, triggering if needed a safe degraded mode. SafeCOP will also develop methods and tools, which will be used to produce safety assurance evidence needed to certify cooperative functions. SafeCOP will extend current wireless technologies to ensure safe and secure cooperation. SafeCOP will also contribute to new standards and regulations, by providing certification authorities and standardization committees with</p>	<p>10.1109/DSD.2016.25</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7723596</p>	<p>IEEE Xplore</p>
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		<p>the scientifically validated solutions needed to craft effective standards extended to also address cooperation and system-of-systems issues. The project has 28 partners from 6 European countries, and a budget of about 11 million Euros corresponding to about 1,300 person-months.</p>			
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Reflection of Critical Thinking on the Sustainable Educational Development: A Case Study of the Middle East and North Africa		<p>The development of education through critical thinking is becoming the ultimate goal in developing countries. However, there are numerous factors and challenges in the implementation and adopting of a unique educational system particularly in the developing countries. Most countries in the Middle East and North Africa have made significant progress toward raising children's school enrollment and completion. However, the quality of education and coherence in content between countries' education systems are still considered as a major issue. To achieve the sustainability of the higher education system, educators must have the knowledge and skills to integrate the critical thinking approach in the development and delivery of the educational curriculum. The purpose of this paper is to simplify the understanding of the importance of critical thinking in the sustainable educational system. Also, this study aims to propose a critical thinking approach that might help to improve the performance and raise the production efficiency of the educational system in Saudi Arabia and Libya. This paper</p>	10.23919/PICMET.2019.8893834	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8893834	IEEE Xplore
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		defines both regions in the Middle East and North Africa with cases of Saudi Arabia and Libya, respectively. We focus on determining the educational system needs, its development cycle, and documenting requirements in each country, and we proceed with design synthesis and system validation while considering the complete problem.			
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Mapping of Open Architectures Applied to Military Systems		<p>Many military systems have long lifecycles, which brings challenges such as technological obsolescence management and the need to adapt to changes in the operational scenario. Another growing challenge for military platforms is achieving interoperability within a system of systems context, as they are becoming more distributed and delivering new and expanded capabilities. To address these engineering and integration issues, an approach gaining popularity over the last decades, is a move toward standardization delivered through Open Architectures as part of the information structure of these complex systems. This paper presents a synthesis of Open Architecture standards to help readers understand how this approach has been applied over the years and the current practice. Over 80 standards or associated initiatives have been identified and analyzed from multiple domains (land, maritime, air), various nations, and consortia. Analysis shows there are similar and overlapping initiatives, but also discontinuities in some programs, which may reduce the credibility of the approach and hinder the</p>	10.1109/SoSE59841.2023.10178668	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10178668	IEEE Xplore
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		<p>adoption of open architecture standards if the implementation is not adequately addressed and contextualized. Thus, this paper presents the initial findings of ongoing research on the principles of implementing open architectures, to provide programme managers with the information and parameters required to select or tailor the most appropriate approach for their needs.</p>			
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<p>CPSoSaware: Cross-Layer Cognitive Optimization Tools & Methods for the Lifecycle Support of Dependable CPSoS</p>		<p>Cyber-physical Systems of Systems (CPSoS) are large complex systems where physical elements interact with and are controlled by a large number of distributed and networked computing elements as well as human users. Their increasingly stringent demands on efficient use of resources, high service and product quality levels and, of course low cost and competitiveness on the world market introduce big challenges related to the design operation continuum of dependable connected CPSs. The CPSoSaware project aims at developing the models and software tools to allocate computational power/resources to the CPS end devices and autonomously determining what cyber-physical processes will be handled by the devices' heterogeneous components (CPUs, GPUs, FPGA fabric, software stacks). The project relies on Artificial Intelligence (AI) support to strengthen reliability, fault tolerance and security at system level and also to lead to CPS designs that work in a decentralized way, collaboratively, in an equilibrium, by sharing tasks and data with minimal central intervention. The</p>	<p>10.1109/ISVLSI49217.2020.00-12</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9155036</p>	<p>IEEE Xplore</p>
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		<p>CPSoSaware system will interact with the human users/operators through extended reality visual and touchable interfaces increasing situational awareness. The CPSoSaware system will be evaluated: i) in the automotive sector, in mixed traffic environments with semi-autonomous connected vehicles and ii) in the manufacturing industry where inspection and repair scenarios are employed using collaborative robots.</p>			
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Protecting LoRaWan data against untrusted network servers		<p>LoRaWAN is a wireless network technology applied in the Internet of Things long-range communication. Even though LoRaWAN is an end-to-end data encryption protocol by design, security risks in the IoT LoRaWAN-based applications should be carefully analyzed. The LoRaWAN-based application is a system of systems and integrates numerous parties. It usually applies a third-party network server to avoid infrastructure costs so that the network server is not a trusted entity. This work aims to improve data security resilience in IoT LoRaWAN-based applications that employ untrusted network servers. A security risk assessment was performed to demonstrate the data hazards of using an untrusted network server. Subsequently, this work set out a security measure that is a payload format to mitigate the identified risks against assessed scenarios. Finally, tests were carried out in an IoT LoRaWAN-based system prototype to verify results without and with the security measure. In conclusion, IoT LoRaWAN-based applications using third-party network servers cannot assume network servers as trusted entities. The</p>	10.1109/iThings-GreenCom-CPSCCom-SmartData-Cybermatics53846.2021.00029	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9694139	IEEE Xplore
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		payload format proposed in this work provides additional data confidentiality and integrity layers to mitigate the risks of using an untrusted network server.			
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<p>Multilevel Fuzzy Logic-Based Approach for Critical Energy Infrastructure's Cyber Resilience Assessment</p>		<p>This paper presents approach for critical energy infrastructure's (CEI) cyber resilience assessment. The CEI is the vital physical system of systems, whose accidents and failures lead to damage of economy, environment, impact on health and lives of people. The analysis of cyber incidents with Ukrainian CEI confirms the importance of the task of increasing its cyber resilience to external hostile influences and keeping of the appropriate level of functionality, safety and reliability. This paper is devoted to development of approach for CEI's cyber resilience assessment considering the important capacities of its systems (adaptivity, restoration, absorbability, preventive) and interdependences between them. This approach is based on application of multilevel fuzzy logic models (called as logic-linguistic models, LLM) taking into consideration the data available from expert's knowledge. The comparison between risk management and resilience assurance is performed. The new risk-oriented definition of resiliency is suggested.</p>	<p>10.1109/DESSE RT.2019.8770034</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8770034</p>	<p>IEEE Xplore</p>
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<p>IoT in Agriculture: Designing a Europe-Wide Large-Scale Pilot</p>		<p>The technologies associated with the Internet of Things have great potential for application in the domain of food and agriculture, especially in view of the societal and environmental challenges faced by this sector. From farm to fork, IoT technologies could transform the sector, contributing to food safety, and the reduction of agricultural inputs and food waste. A major step toward greater uptake of these technologies will be the execution of IoT-based large-scale pilots (LSPs) in the entire supply chain. This article outlines the challenges and constraints that an LSP deployment of IoT in this domain must consider. Sectoral and technological challenges are described in order to identify a set of technological and agrifood requirements. An architecture based on a system of systems approach is briefly presented, the importance of addressing the interoperability challenges faced by this sector is highlighted, and we elaborate on requirements for new business models, security, privacy, and data governance. A description of the technologies and solutions involved in designing pilots for four agrifood domains (dairy, fruit, arable, meat and vegetable supply chain) is</p>	<p>10.1109/MCOM.2017.1600528</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8030481</p>	<p>IEEE Xplore</p>
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		eventually provided. In conclusion, it is noted that for IoT to be successful in this domain, a significant change of culture is needed.			
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Data-Driven Workflow Execution in Service Oriented IoT Architectures		<p>System of systems within the cyber-physical context often have a greater goal to achieve - such as a product to deliver, or a series of services to be executed. Once this greater goal is described, physical elements should execute steps leading towards that goal. They often supposed to take into account the dynamically changing environment, as well as the availability and the capabilities of the surrounding systems and their services. While the Arrowhead Framework already provides support for tackling interoperability, integrability, service discovery, security and other challenges, it does not intrinsically support the execution of such, runtime workflows. The current paper proposes a supporting system - namely: the Choreographer - to be utilized for service chaining, and workflow execution. Besides describing the main services provided by the Choreographer, the principles behind its operation we detail how its control sequences fit into the orchestration and event handling procedures of Arrowhead. Furthermore, we describe a novel, Petri Net based method to demonstrate how</p>	10.1109/ETFA.2018.8502665	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8502665	IEEE Xplore
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		data-driven methodology can support parallelized service execution.			
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<p>A Quality Model for AAL Software Systems</p>		<p>The Ambient Assisted Living (AAL) domain aims to support the daily life activities of elders, patients with chronic conditions or disabled people, with a focus on ICT (Informatics and Communication Technologies). Important advances in AAL software systems have been already made, assisting people in their home, work, and social environments. Because of their critical nature, these systems must be developed focused on their quality. Hence, quality attributes (QAs), such as safety, reliability, and security, must be identified and well defined to successfully achieve the system purposes. However, there is not a set of QAs specific for AAL systems, hence, new systems have been developed based on general standards, such as ISO/IEC 25010, or based on particular experiences. This paper introduces the QM4AAL, a quality model (QM) for AAL systems. The QM4AAL was established and evaluated based on evidence from several published works found through conduction of a systematic mapping study. As result, the QM4AAL details QAs requirements, adaptive (e.g., self-configuring or situation-aware) or static</p>	<p>10.1109/CBMS.2016.46</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7545979</p>	<p>IEEE Xplore</p>
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		properties, and stakeholders of AAL systems and their constituents systems (e.g., activity monitoring or health status monitoring systems). We intend this QM can orient the design and assessment of current and future AAL systems.			
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<p>Cybersecurity Planning for Artificial Intelligent Systems in Space</p>		<p>CubeSats continue to proliferate and are an excellent low-cost method of remote sensing. A key piece of intelligent systems is sensory input, data storage, and data communications. With the continued miniaturization of technology, CubeSats will increase their sensory inputs with future miniaturization and enhance their robustness for autonomous operations if data and communications are secure. These futures inspire an intelligent system solution to on-orbit communications. This paper explores a dual-microprocessor approach to improve hardware cybersecurity of intelligent systems, with a view toward intensional intelligence as a means of adjudicating access to sensitive data onboard the CubeSat. With enhanced cybersecurity, Artificial Intelligent Systems (AIS) will add vital utility to otherwise vulnerable, autonomous systems. Using Systems Models-Based Thinking, we shed light on our plan to apply artificial intelligent system concepts to advance CubeSat technology. Managing technology for AIS reduces</p>	<p>10.23919/PICMET.2019.8893814</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8893814</p>	<p>IEEE Xplore</p>
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		some of the uncertainties and risks associated with the space environment.			
How are combined expertise elements in early-warning systems? Observations and propositions from the French system		Warnings can help to prevent damage and harm if they are issued timely and provide information that helps respondents and population to adequately prepare for the disaster to come. Today, many indicators and sensor systems are designed to produce alert and reduce disaster risks. These systems have proved to be effective but they remain complex, include different expertise components, and are difficult to manage. We study in this paper the case of the National Early-Warning System in France (called SAIP), which can be seen as a System of Systems (SoS). A lot of SoSs exist. They can be directed, collaborative, virtual or even acknowledged systems. We study here what type of system corresponds to the French Early-Warning System, which openings may reasonably be considered for this system and we introduce a new category of SoSs: "delimited systems".	10.1109/RCIS.2018.8406666	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8406666	IEEE Xplore

<p>Industrial Frameworks for Internet of Things: A Survey</p>		<p>The Internet of Things (IoT) has gained popularity and is increasingly used in large scale deployments for industrial applications. Such deployments rely on the flexibility and scalability of systems and devices. Heterogeneous systems need to be interoperable and work together seamlessly. In order to manage such system of systems, it is important to work with a framework that not only supports the flexible nature of IoT systems but also provides adequate support for industrial requirements, such as real-time and runtime features, architectural approaches, hardware constraints, standardization, industrial support, interoperability, and security. The selection of an appropriate framework results difficult due to the rising number of available frameworks and platforms, which offer different support for the aforementioned requirements. Therefore, this article investigates the features of seven prominent frameworks for the purpose of simplifying the selection of a suitable framework for an industrial application. The aim of this article is to present the recent developments and state-of-the-art of industrial</p>	<p>10.1109/JSYST.2020.2993323</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9099983</p>	<p>IEEE Xplore</p>
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		IoT frameworks and provide a technical comparison of their features and characteristics.			
Model-based assessment of QoS adaptation in complex networked systems		<p>The paper formulates methods to measure the trustworthiness of a network system S under hostile environment conditions incident on S. How good is the system S in meeting the QoS expectations of applications (i.e. the QoS capability of S) is quantitatively measured - say on a [0,1] scale. We employ model-based assessment tools (e.g. PO-MDP) to benchmark the QoS capability by stress-testing S with artificially injected failure conditions. As a case study we describe the model-based assessment of the performance and security of a CDN (content distribution network). The study focuses on the optimal placement of content caching nodes in a distribution topology under performance and security induced constraints.</p>	10.1109/SYSOSE.2017.7994958	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7994958	IEEE Xplore

Modeling a Heavy-duty Vehicle Data Collection Process for Authenticating Driver Identity and Analyzing Driver Behavior Under Duress		<p>Heavy-duty vehicle security is critical to safeguarding the supply chain of essential goods and materials. Implementing a continuous driver authentication system based on unique driving behaviors enhances security through improved access control without the use of personally identifiable information (PII). This ensures that only authorized drivers operate the vehicle and reduces the risk of unauthorized use. Designing this complex system to reduce this risk can be done effectively through SysML modeling and MagicGrid systems modeling. Through the use of systems modeling, this study was split into two main objectives. The first objective is to develop this driver authentication system by analyzing behavior patterns through three sets of vehicle sensor data: CANbus, GPS, and IMU data. These collect extensive vehicle data like vehicle speed, engine speed, pedal positions, location, and heading degree. This data is then used to train several different machine learning models to create a driver profile report for identity verification. The second objective is to run cyberattacks on the vehicle and analyze the</p>	10.1109/SOSE62659.2024.10620958	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620958	IEEE Xplore
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		<p>driver's behavior with physiological data like heart rate variability and with the vehicle sensor data. The cyberattacks cause a malfunction on the vehicle's instrument cluster by sending various messages to the CANbus. This is used to create a report on how drivers respond in high pressure conditions, which can be used to train drivers transporting hazardous material to react properly in these situations. The purpose of this paper is to show how the application of the MagicGrid method and SysML modeling improved the development of the stakeholder needs, requirements, use cases, and system structure.</p>			
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<p>Evaluating Interdependencies and Cascading Failures Using Distributed Attack Graph Generation Methods for Critical Infrastructure Defence</p>		<p>Attack graphs facilitate modelling, detection and analysis of networks, along with providing the functionality to identify potential vulnerabilities and risks within networked systems. When attack graphs are applied to large heterogeneous collaborative infrastructures i.e. Systems-of-Systems (such as critical infrastructures), existing schemas struggle to detect and evaluate interdependencies and cascading failures. The failings of these existing schemas include but are not limited to, the inability to accurately ascertain the relationships and interdependencies between risks, to adequately identify and visualise the consequences of identified risks, and the inability to reduce attack graph size and generation complexity. Having simulated a city based on real-world scenarios and critical infrastructures, we can visualise the effects of cascading failure. Data extracted from the simulation will be used to evaluate our schema, and will assist in the analysis of the potential consequences of component and system failures. We discuss the benefits of a distributed schema which utilises attack graph generation methods, which provides a means</p>	<p>10.1109/DeSE.2015.34</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7563612</p>	<p>IEEE Xplore</p>
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		for collaborative interdependent systems to be fully analysed, along with assisting in the identification of interdependencie s and cascading failures which will be visualised and reported.			
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Decision Provenance: Harnessing Data Flow for Accountable Systems		<p>Demand is growing for more accountability regarding the technological systems that increasingly occupy our world. However, the complexity of many of these systems—often systems-of-systems—poses accountability challenges. A key reason for this is because the details and nature of the information flows that interconnect and drive systems, which often occur across technical and organizational boundaries, tend to be invisible or opaque. This paper argues that data provenance methods show much promise as a technical means for increasing the transparency of these interconnected systems. Specifically, given the concerns regarding ever-increasing levels of automated and algorithmic decision-making, and so-called “algorithmic systems” in general, we propose decision provenance as a concept showing much promise. Decision provenance entails using provenance methods to provide information exposing decision pipelines: chains of inputs to, the nature of, and the flow-on effects from the decisions and actions taken (at design and run-time) throughout systems. This paper introduces the concept of</p>	10.1109/ACCESS.2018.2887201	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8579125	IEEE Xplore
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		<p>decision provenance, and takes an interdisciplinary (tech-legal) exploration into its potential for assisting accountability in algorithmic systems. We argue that decision provenance can help facilitate oversight, audit, compliance, risk mitigation, and user empowerment, and we also indicate the implementation considerations and areas for research necessary for realizing its vision. More generally, we make the case that considerations of data flow, and systems more broadly, are important to discussions of accountability, and complement the considerable attention already given to algorithmic specifics.</p>			
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<p>MBSE Driven IoT for Smarter Cities</p>		<p>The future of the Internet of Things (IoT) success, including technology advancements and revenue generating potential across the business spectrum, is dependent on the application of robust Systems Engineering processes, methods, and tools. Without Model Based Systems Engineering (MBSE), the complexity involved in the design, development, and deployment of IoT systems would require more system and operational providers' resources. Regardless of any industry standards, IoT systems cannot be built in a vacuum. Technology advancements in consumer products will continue to evolve to facilitate connection to IoT networks. This will be the catalyst for driving entire infrastructures changes to: federal, state, city, and local authorities and governments; product development companies; utility and service providers; and even to consumers. The infrastructure and management setup needs to be adopted prior to create smart systems. Such smart system will be shown in this paper by a traffic management system and its connected systems, as well</p>	<p>10.1109/SYSOSE.2018.8428705</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428705</p>	<p>IEEE Xplore</p>
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		as how a MBSE approach can help.			
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Expanding the Emergency Alert System Enterprise with Space-Based Emergency Alerts		<p>This paper investigates Space-Based Emergency Alerts (SBEA) as an additional alert system that is less susceptible to disruption by complex disasters such as wildfires or other widespread devastation. Emergency services play a crucial role in ensuring the survival and resilience of individuals, businesses, and communities in the face of disasters. There are numerous existing emergency alert systems managed by the Federal Emergency Management Agency (FEMA) and Federal Communications Commission (FCC) such as Emergency Alert System (EAS), Wireless Emergency Alerts (WEA), and Non-Weather Emergency Messages (NWEM). The most used system, WEA, is highly vulnerable to disruption by destructive disasters as it relies heavily on terrestrial-based infrastructure such as cellular towers. In this paper, an analysis of the existing systems is conducted and feasibility assessment for a new system is performed. The results of the analysis indicate that through recent advancement in mobile smartphone and satellite communication technology, the</p>	10.1109/SOSE62659.2024.10620961	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620961	IEEE Xplore
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		employment of a Space-Based Emergency Alert system, operating in conjunction with existing alert systems is likely, over time, to greatly enhance emergency alert performance and ultimately public safety.			
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Transformation of the UML Deployment Model into a Distributed Ledger Network Configuration		<p>A distributed ledger is a decentralized database spread across many participants. Various models describe software architecture and represent different architectural views. The paper concentrates on the deployment view. Model-Driven Development (MDD) is a software engineering approach that leverages models and transformations. The paper describes the UML2Deployment transformation of the distributed ledger's deployment model into its deployment script. The deployment model, expressed in Unified Modeling Language (UML), is augmented with stereotypes and tagged values from UML Profile for Distributed Ledger Deployment. The target of the transformation is Gradle Groovy Domain Specific Language (DSL) deployment script for DLT network configuration. The transformation has been designed for R3 Corda framework. The authors propose the complete solution. The transformation has been incorporated into Visual Paradigm modeling tool.</p>	10.1109/SoSE50414.2020.9130492	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9130492	IEEE Xplore
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<p>An Experimental Study in Generating Electricity Using Earth Battery System for Street lightings</p>		<p>This study aims to generate electrical energy using the earth battery system as an alternative power source and charge a 12-volt lead acid battery that powers two 9-watt streetlights. The earth battery system involves loam soil and sewage water as the medium for generating electrical energy. The selection of loam soil is due to its capability to hold plenty of moisture and well-draining type of soil. Copper and zinc metals are used to conduct electricity, and the consideration of the arrangement of the cells within the system was taken to achieve the maximum voltage output value. The prototype consisted of 36 earth battery cells which were arranged in series, and the use of water with dissolved salt to increase the efficiency of each cell was considered. Multiple testing was conducted to each cell which resulted in generating electrical energy from 0.3 volts up to 0.8 volts, and by interconnecting it all together, the system gathered a total of 26 volts equivalent to 96 watts which can power up to ten streetlights. This experimental study is very inspiring and portrays the feasibility of the earth battery system as an alternative source</p>	<p>10.1109/SOSE62659.2024.10620927</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620927</p>	<p>IEEE Xplore</p>
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		of electricity in an environment where supply of electricity is lacking.			
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<p>IVHM Development and the Big Data Paradigm (2013-01-2332)</p>		<p>This paper discusses the correlation of IVHM (Integrated Vehicle Health Management) as an emerging aerospace discipline and the Big Data paradigm widely discussed in the Information Technology industry. The 4-V model is discussed to qualify a Big Data problem in terms of the volume, variety, velocity and veracity of the data involved. Big Data management allows, for example, correlations to be found to “spot business trends, determine quality of research, prevent diseases, combat crime, and determine real-time roadway traffic conditions”. Examining these two fields side by side is necessary and desirable because innovation is very likely to occur when and where different but correlated domains interface. This paper compares the most significant technical components required for Big Data Analytics and IVHM to work. Most aerospace players have recognized the strategic value of IVHM, but only a few have been able to establish coordinated action plans that allow them to offer advanced services in line with the possibilities envisioned. To help address this fact, the paper will discuss the</p>		<p>https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=8504730.pdf&bkn=8503550&pdfType=chapter</p>	<p>IEEE Xplore</p>
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		challenges for IVHM implementation, including how the aircraft design process needs to be modified to incorporate IVHM trade studies complete enough to allow the enterprise to compare development costs to long term savings on operations, maintenance and sustaining efforts. A generic IVHM platform will be described, including examples for the ground analytics components, which are identified as the most value added parts.			
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Convolutional Neural Network Based Health Monitoring System with Thermal Scanning Temperature Detection		<p>This research took place at the Lyceum of the Philippines Cavite Campus and aimed to create a Health Monitoring System for the LPU-Cavite community. The system utilized Face Recognition based on the Convolutional Neural Network (CNN) Algorithm along with Thermal Scanning Temperature Detection. By employing a camera for facial recognition, it determined whether the individual was a student or an employee. Additionally, a thermal scanner prototype equipped with an MLX90614 IR temperature sensor was used to detect a person's temperature. The screening data could be accessed by the admin and clinic staff through a website. The research employed a Generic Software Development Life Cycle (SDLC) as its methodology, encompassing various stages including Planning, Analysis, Design, Development, Testing, Integration, and Maintenance. The evaluation of the developed system involved 27 participants who completed survey questionnaires based on ISO/IEC 25010 criteria. The system received a positive assessment, with respondents strongly agreeing with its overall</p>	10.1109/SOSE62659.2024.10620967	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620967	IEEE Xplore
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		<p>performance. The system overall evaluation is 3.9447 wherein the equivalent remark is "Strongly Agree". This result demonstrates that the system effectively achieves its intended function and objectives. It is recommended to incorporate a graphics processing unit to enhance the system's speed and performance. Additionally, prioritizing user-friendliness in the software design will lead to an improved overall user experience.</p>			
IoT Safety: State of the Art		<p>Reports on safety issues relating to the Internet of Things (IoT). Users, developers, managers, and other stakeholders are concerned that the heterogeneity and complexity of this technology, essentially composed of systems of systems, may open the door to security breaches on an unprecedented scale. There is, however, another important system property, which is not very often brought up as an imminent concern, but is equally important. This is device safety, the violation of which may cause severe harm to the environment in which the device operates.</p>	10.1109/MITP.2018.2883858	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8657467	IEEE Xplore

<p>The Role of Software Trust in Selection of Open-Source and Closed Software</p>		<p>Software selection is a critical part of any software engineering project, as projects depend on a rich ecosystem of components and frameworks. Software engineers always find it challenging to select a trustworthy software product despite the availability of a large number of software selection tools. This study explores the trust factors in open-source and closed software selection from a practitioner's perspective, to gain insight into perceptions of software trust. To this aim, we conducted semi-structured interviews with 24 software practitioners from different businesses, including 12 experts in open-source software selection and 12 experts in closed software selection. By summarizing we found: (1) software selection is affected by three categories of factors, being technical, organizational, and structural assurance factors; (2) the most important factors are technical factors and organizational factors; and (3) software selection process and trust factors differ depending on the project risk tolerance. In addition, we compared the trust factors derived from the</p>	<p>10.1109/SESOS59159.2023.00010</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10190584</p>	<p>IEEE Xplore</p>
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		interviews with those found in the literature. Our findings revealed that there is a difference between the two.			
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<p>Customer Review Analytics using Subjective Loss Function for Conceptual-based Learning</p>		<p>Deep neural networks (DNNs) are currently among the most commonly used machine learning methods in content understanding such as computer vision and natural language understanding (NLU). One of the best characteristics of these methods is their modular design - the ability to change the connectivity patterns of layers, try different activation functions, inject different statistical approaches such as normalization and dropout in the network, and many other actions - in every aspect of deep learning networks. While the majority of deep learning applications simply use cross-entropy, L1, and L2 losses, subjective loss function can actually result in impressive performance improvement. In addition, architecting the last layer of DNNs - referred to as the prediction layer - according to the needs of the application increases the discriminative power of the DNNs. This paper aims to investigate how particular choices of loss functions and prediction layer architecture affect deep neural networks and their learning dynamics, as well as the robustness of various effects. Furthermore a real-life application to</p>	<p>10.1109/SYSOSE.2018.8428702</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428702</p>	<p>IEEE Xplore</p>
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		measure customer loyalty called Deep Net Promoter Score (DeepNPS) from online product reviews is also proposed. The results are promising for learning more latent features and matching the customer feedback with the NPS score.			
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Attack-driven Test Case Generation Approach using Model-checking Technique for Collaborating Systems		<p>The formal verification technique of model-checking can be used to derive test cases. This approach has become popular as it provides the capabilities of exhaustively exploring the state space of the modeled system and generates counterexamples for properties specified over the model. However, counterexamples only show states, transitions and the values of their parameters. In addition, its semantics are also dependent on input model specification languages and trace representation notations. In this paper, we present a focused test case generation approach from PAT model checker for collaborating systems. The focus is driven by specific and putative attack behaviours. To this end, we devised test specification rules/algorithm to translate counterexamples to test cases. The translation aims at reducing semantic gaps between counterexamples and the corresponding test cases. We assess the viability of the test cases generated from our approach by using JADE simulation framework for aircraft landing scenario in air traffic control domain.</p>	10.1109/EnCyCriS52570.2021.00008	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9476060	IEEE Xplore
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<p>A Framework to identify People, Devices and Services in Cyber-physical system of systems</p>		<p>Many online services and their service providers require the electronic proof of identity for the secure authentication of citizens. Internet of Things (IoT)- and Cyber-Physical Systems (CPS)-services and devices are increasing and these are used in different areas. Furthermore, the increasing distribution of online services and IoT devices need to be monitored, especially in critical infrastructure. The proposal of a framework to authenticate and identify people, devices and services can be a useful tool to improve security and trust in CPS, linking them with identified people by utilizing and combining tools which do exist in isolation. IoT frameworks and identity protocols combined with responsible people, hardware, smartphone-applications, and certification authorities can provide secure authentication, trustworthy communication and the management of identities and permissions. This position paper proposes an IoT-framework for (critical infrastructure) service providers and public administration to authenticate, identify and manage their running devices and services as well as people, their electronic identification and</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9463980</p>	<p>IEEE Xplore</p>
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		sent records. This can improve the reaction time and processes additionally providing trust and secure communication between people, devices and services, especially for authorities in critical infrastructure areas, where humans and their safety are particularly important.			
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Safety and Security of Citizens in Smart Cities		<p>Smart cities have frontline responsibility to ensure a secure and safe physical and digital ecosystem promoting cohesive and sustainable urban development for the wellbeing of human beings. In this paper, we propose to integrate advanced technological solutions in a market-oriented unified Cyber-Physical Security Management framework, aiming at raising the resilience of cities' infrastructures, services, ICT, IoT, and fostering intelligence and information sharing among city's security. The project we implement, "Smart Spaces Safety and Security for All Cities" (S4ALLCITIES), is dealing with Systems of Systems Architecture to deploy and validate its intelligent components and functionalities on actual environment, ensuring the delivery of solutions and services in line with smart cities emerging requirements, focused on: risk-based open smart spaces security management; cyber security shielding; and behavior tracking; real-time estimation of cyber-physical risks in multiple locations and measures activation for effective crisis</p>	10.1109/RoEduNet54112.2021.9637717	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9637717	IEEE Xplore
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<p>Weapons systems and cyber security - a challenging union</p>		<p>A broad range of weapons systems are in service in forces all over the world. Nowadays, state-of-the-art weapons systems are deployed beside legacy high-value systems that have been used for decades, and will continue to be used for some time. Modern weapons systems can contain hundreds of thousands of chips; each of these chips can be of a sophisticated design, containing billions of transistors, making highly complex systems-of-systems. Elderly weapons systems' service lives are often extended or their performance enhanced due to reduced budget funds or delays in new procurement. Therefore, aged and state-of-the art systems have to function together, not only from a communications prospective, but also from a complete systems integration point of view. Modern Network Centric Warfare scenarios rely upon all of these systems being well integrated and be able to interoperate. This spans an incredibly complex range of sensors, communications systems, and weapons of various ages, opening up countless attack vectors and presenting severe challenges to weapons systems</p>	<p>10.1109/CYCON.2016.7529435</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7529435</p>	<p>IEEE Xplore</p>
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		security. The paper analyses the parties involved in today's battlespace, examines the impact of the weapons systems' ages on IT security, and surveys the critical factors for cyber security. Numerous highly dangerous factors are identified and essential necessities and countermeasures are recommended.			
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<p>An Information Theoretic Approach to Platform Technology Selection to Aid Influence Operations</p>		<p>The influence operations domain would benefit from a strategic adoption of automation, technological adaptability, and agile processes. The focus of this article is on the technical aspects of determining the required technologies to fully support conducting an influence operation rather than cognitive aspects of an operation. A unified approach to the application of these technologies does not appear to have occurred in this domain. A conceptual information theoretic framework for identifying appropriate technologies to support influence and other cyber operations is presented. It provides a holistic framework for making planning decisions about the development and employment of technology capabilities independent of specific detailed operational requirements, while allowing assessments of risk, cost, and effectiveness to be considered in the process. The framework defines the data, information needs, and acquisition process in the context of specific technology insertion point data, information, or knowledge requirements and services to facilitate execution of an operation. The framework allows for identification,</p>	<p>10.1109/JSYST.2020.2966817</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8977545</p>	<p>IEEE Xplore</p>
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		down-selection, and prioritization of specific shared technologies that support multiple phases of the decision process and stages of an operation. This allows for concentration of limited engineering, programmatic, and financial resources on technologies with the widest applicability irrespective of the specific operation.			
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Validation of Assurance Case for Dynamic Systems		<p>Aviation safety has accrued and applied decades of understanding on known risks and effective mitigations. That knowledge captured in compliance standards - can be tested for predictable outcomes. Autonomy that involves learning systems tend to be dynamic and may continuously be adapting to their environment. Such continuous adaptation has inherent unknown risks depending upon the guardrails imposed on the learning systems. Design assurance and use of traditional standards are inadequate for these dynamic systems. Assurance Cases are used to present an argument for the assurance of systems. Dynamic systems require that assurance cases be continuously validated. One method of validation is using real time collection of Safety Performance Indicators (SPIs) which are crafted during the development of the system. This paper presents the need for SPIs and methods for creating and nurturing the SPIs to help all stakeholders. This method shadows regulations and allows risk-based approvals that may be applied for both conventional and for novel technology. Aviation is facing</p>	10.1109/DASC55683.2022.9925731	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9925731	IEEE Xplore
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		<p>enormous growth in autonomous technology, reuse of components of unknown pedigree, and new aircraft designs that do not fit into Type classification. Mitigations are more heavily connected to operations, training, and other components of the ecosystem itself. The challenge is to make an assurance case for vehicles within the ecosystem. The automobile industry, which is similarly challenged by dynamically changing autonomous systems, is finding some possible solutions to build safer systems. UL 4600, a Standard for Safety for the Evaluation of Autonomous Products applies to fully autonomous road vehicles. The goal-based, technology-neutral features of UL 4600 have been extended to apply to aviation. So applied, the assurance process is adaptable to innovation and discovery while encouraging the current practices of standards compliance and taking a System of Systems (SoS) view. It proposes an assurance case that is an organized argument that a system is acceptable for its intended use with respect to specified concerns (such as safety, security, correctness). This</p>			
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		<p>paper gives guidance for validation of an assurance case through monitoring SPI within the operational context. The method by monitoring safety performance indices in the operational environment provides continued validation even as the ecosystem, components and controls change. For approval of novel systems including UAS and AAM, with features that do not lend themselves to traditional compliance methods, regulators have embraced the Safety Continuum perspective, which focuses on safety performance achieving expected outcomes. The performance-based assurance methods can be used with initially wider performance margins for certification of novel products, components of unknown pedigree, and autonomous vehicles. As the performance range is better known the margins can be decreased. Further, this paper recognizes that a one-time initial approval/acceptance is not adequate for learning systems and novel features. The continued validation through performance supports fast-paced development and</p>			
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		<p>product evolution. The initial assurance case for a product can limit risk through a closed environment until the margin for some unknowns is validated. for example, if the performance of collision avoidance function using new technology is not known, larger alert limits may be implemented until more confidence is gained after validating the assurance case via SPIs. The approach of monitored SPI throughout the life of the product is now feasible with the aid of big data processing. The aviation industry is already using similar methods for identifying maintenance problems. As systems grow more autonomous, more machine-to-machine exchanges are involved, making it easy to extend the monitoring and prediction practices to SPI. The method also allows for variants and derivatives of the baseline to have their own assurance case within the context of the baseline argument. The key is replacing design approval with through-life assurance that connects continuous operational safety into both the design and airworthiness determinations. The determination is predicated on the monitored SPIs and predicted</p>			
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		<p>performance of the product remaining consistent with the assurance argument predictions. This enables even complex automated products to be audited for airworthiness with an evolving ecosystem based on monitored and predictive data. Another advantage of the performance-based assurance case is the public comprehensibility of safety. With SPIs and predictions of performance the automobile segment has paved the way for public scrutiny of automated vehicles. The use of SPIs in aeronautical product assurance will facilitate transparency. This could be accomplished through appropriate dashboards to aid public perception and explain events and precautions taken during the evolution toward more autonomous aviation vehicles. This could reflect a stepwise evolution of complexity. This paper explores how the aviation industry can apply performance-based assurance case methods to assure new and novel as well as systems of unknown pedigree. The same framework could then be extended to autonomous systems and new types of aircraft which do not fit</p>			
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		the current Type classification. One of the major benefits of this technology agnostic method are faster risk-based approvals of novel technology within a Safety Continuum.			
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Modeling and Simulation Challenges for Cyber Physical Systems from Operational Security Perspective		<p>As Critical Infrastructures become more dependent on Cyber Physical Systems, their design and deployment in reliable, secure and safe manner has become more important. Such systems are bridging the gap between operational and information technologies as physical systems are interconnected and dependent upon underlying computational and communication infrastructure. The operational and information level vulnerabilities can cause physical damage and destruction in the event of system compromise. Appropriately verified modeling and simulation frameworks are therefore essential that may be incorporated from design till deployment stage of software, firmware, hardware and underlying connectivity fabric of physical systems or System of Systems. However, the heterogeneous nature of CPS limits full scale modeling and simulation in a single framework. In this study, state of art in CPS modeling and simulation is introduced for designing resilient systems with new methods and paradigms. Most relevant platforms are then analyzed for modeling CPS from</p>	10.1109/ICCWS53234.2021.9703029	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9703029	IEEE Xplore
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		mathematical, system theory, process control, interoperability and resiliency aspects. Lastly, we discuss challenges to CPS modeling and propose game theoretic approaches for formulation of operational security research through scenario building.			
Security and privacy challenges in IoT-based machine-to-machine collaborative scenarios		Currently, the IoT discussion is focused primarily on the operational phase. This includes how a IoT device behaves, operates, communicates, and interacts with other IoT devices during operation. However, IoT devices and systems have other lifecycle phases before and after operation. This extended abstract provides an overview of how other IoT lifecycle phases (e.g., design and service) can be improved with information feedback and feedforward flows between them. Digital Twins are a new mechanism to manage IoT devices and IoT systems-of-systems throughout their lifecycle. We present our vision on the industrial IoT lifecycle managed and optimized at scale via Digital Twins.		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7750991	IEEE Xplore

AutomationML-Based Risk Modeling for Decision Support in Engineering Lifecycles		<p>This paper discusses the challenges and associated risks that companies face due to the growing complexity of systems engineering. It highlights the significance of effective and efficient decision making during the early design phase, known as basic engineering, to mitigate potential risks. The paper recommends the representation of basic engineering data and associated risk models in the AutomationML data exchange format. This tool-neutral approach supports data-driven decisions in the design of production systems and enables continuous data expansion throughout the production system's lifecycle. The implementation of this approach and its potential impact on improving efficiency and risk management in systems engineering are also discussed.</p>	10.1109/ETFA61755.2024.10710639	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10710639	IEEE Xplore
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Reengineering the lifecycle of Arrowhead applications: from skeletons to the client library		Traditionally, the development workflow of Arrow-head applications is based on the usage of source code skeletons. This makes it difficult to update applications when the skeletons are changed, for example to fix security vulnerabilities or add new functionality. In fact, to update an application the developer has to either recreate the application on the new skeleton version or recreate the skeleton changes on the previous version of the application. Instead, we propose a client library, which allows the developers to create Arrowhead applications by referring to a library. Not only does this allow the Arrowhead Consortium to update the library without requiring changes to applications, it also eases the creation of new Arrowhead applications, reduces code duplication and increases readability. This paper describes the design and the structure of this client library, provides insights on how to employ the library in applications, and surveys a few sample applications that use the library.	10.1109/IECON.2019.8927423	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8927423	IEEE Xplore
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<p>An autonomic approach to extend the business value of a legacy order fulfillment system</p>		<p>In the modern retailing industry, many enterprise resource planning (ERP) systems are considered legacy software systems that have become too expensive to replace and too costly to re-engineer. Countering the need to maintain and extend the business value of these systems is the need to do so in the simplest, cheapest, and least risky manner available. There are a number of approaches used by software engineers to mitigate the negative impact of evolving a legacy systems, including leveraging service-oriented architecture to automate manual tasks previously performed by humans. A relatively recent approach in software engineering focuses upon implementing self-managing attributes, or "autonomic" behavior in software applications and systems of applications in order to reduce or eliminate the need for human monitoring and intervention. Entire systems can be autonomic or they can be hybrid systems that implement one or more autonomic components to communicate with external systems. In this paper, we describe a commercial development project in which a legacy multi-</p>	<p>10.1109/SYSCON.2015.7116816</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7116816</p>	<p>IEEE Xplore</p>
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		<p>channel commerce enterprise resource planning system was extended with service-oriented architecture an autonomic control loop design to communicate with an external third-party security screening provider. The goal was to reduce the cost of the human labor necessary to screen an ever-increasing volume of orders and to reduce the potential for human error in the screening process. The solution automated what was previously an inefficient, incomplete, and potentially error-prone manual process by inserting a new autonomic software component into the existing order fulfillment workflow.</p>			
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Machine Learning Security of Connected Autonomous Vehicles: A Systems Perspective		Machine Learning security is vital for the safe operation of Autonomous Vehicles. When Autonomous Vehicles are connected and cooperating, they form a system of systems that have shared objectives. However, adversarial environments and adversarial vehicles in the system can cause security challenges for the whole system. Current research focuses on the Machine Learning security challenges from the perspective of a single vehicle. We argue that there is a need to consider these security challenges from the perspective of multiple interconnected vehicles, as a system. In this paper, we explore these challenges from the perspective of many Connected Autonomous Vehicles as a system with respect to Machine Learning security. We include attack scenarios that demonstrate the system interactions that can lead to cascading failures, which test the resilience of the system. We also outline some of the challenges in researching this perspective, where a key challenge is identifying indicators and metrics to describe the system resilience when under attack. To observe the	10.1109/ICIT58233.2024.10540922	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10540922	IEEE Xplore
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		system, experimentation via simulation is identified as a suitable environment that can capture the complex and dynamic system interactions in this security context.			
Mapping Cyber Attacks on the Internet of Medical Things: A Taxonomic Review		<p>The Internet of Medical Things (IoMT) constitutes the core technology of various contemporary healthcare applications, such as remote patient monitoring, telemedicine, and surgical robotics. Due to their complex system-of-system nature, IoMT systems are prone to numerous cyber attacks with implications ranging from physical harm to data theft. This study surveys the literature to identify the cyber attack categories and their taxonomy to induce a knowledge base for systematic threat modelling methods. Contrary to similar studies, we paid attention to review papers demonstrating solid attack techniques and tactics in healthcare systems. The knowledge base consisting of attacks, their categories, and taxonomy can be utilized by system developers to identify security requirements at the early stage of development.</p>	10.1109/SOSE62659.2024.10620925	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10620925	IEEE Xplore

Challenges for the Self-Safety in Autonomous Vehicles		<p>The combination of multiple functions having different and complementary capabilities enables the emergence of Autonomous Vehicles. Their deployment is limited by the level of complexity they represent together with the challenges encountered in real environments with strong safety concerns. Thus a major concern prior to massive deployment is on how to ensure the safety of autonomous vehicles despite likely internal (e.g. malfunctions) and external (e.g., aggressive behaviors) disturbances they might undergo. This paper presents the challenges that undergoes the design and development of autonomous vehicles with respect to their functional architecture and adaptive behaviors from a safety perspective. For the purpose of the rationales, we define needs and requirements that lead to the formulation of an architectural framework. Our approach is based on paradigms and technologies from non-automotive domains to address non-functional system properties like safety, reliability and security. The notion of micro-services is also introduced for the self-safety of autonomous vehicles. These</p>	10.1109/SYSOSE.2018.8428718	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8428718	IEEE Xplore
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		are part of the proposed framework that should facilitate the analysis, design, development and validation for the adequate composition and orchestration of services aimed to warrant the required non-functional properties, such as safety. In the present paper, we introduce the structural and behavioral adaptations of the framework to offer a holistic and scalable vision of the safety over the system.			
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Optimal Operation of a Smart Greenhouse-Integrated Microgrid for Strawberry Growth in Atlantic Climate		Greenhouses are essential for sustainable agriculture, supporting increased crop production while providing food security and economic stability in rural areas. This paper introduces a nonlinear optimization approach to enhance greenhouse efficiency by integrating automation, climate control, and energy management. A comprehensive mathematical model is developed, incorporating key components such as renewable energy sources, water systems, pumps, a reservoir, and a controlled greenhouse environment. The model also accounts for a CHP heating system, artificial lighting, sensors, a CO2 injector, a dehumidifier, a fogger, and energy storage to maintain optimal growing conditions. To validate its effectiveness, the proposed model is applied to a case study greenhouse, demonstrating its reliability and optimal performance. The results highlight the system's potential for broader applications in smart agriculture, showcasing its scalability and efficiency in optimizing greenhouse operations.	10.1109/SoSE66311.2025.11083815	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11083815	IEEE Xplore
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<p>A Design Change, Knowledge, and Project Management Flight Simulator for Product and Project Success</p>		<p>Cost overruns and schedule delays are pervasive in complex projects despite the use of systems engineering and traditional project management models and tools. These disciplines can often work in isolation leading to inconsistencies in product information, tracking of design changes, and challenges in decision-making. While the literature proposes theoretical approaches to integrating these disciplines, there does not appear to be a practical approach offered. In response, this article presents a management flight simulator that represents a digital twin of set-based design, design change, knowledge, and agile project management practices. It integrates discipline-specific submodels through key linkages that are derived from the intrinsic properties of a system case study and intangible assets such as knowledge, communication, culture, and process maturity. It captures the techno-socio-economic and cultural factors involved in design change decisions and project management. The simulator provides immediate feedback on whether a change is going to help or disrupt design integrity through the monitoring of</p>	<p>10.1109/JSYST.2020.3006747</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9145681</p>	<p>IEEE Xplore</p>
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		system attribute trends and cues. It also provides the impact on lifecycle management curves using a system dynamics submodel. From this feedback, several system, policy, and process levers are available within the simulator for what-if scenarios with the goal to improve product, organizational, and project performance.			
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Modeling and Analysis of Dependencies between Microservices in DevSecOps		<p>Complex microservices-based applications relying on multiple microservices are increasingly commonplace in DevSecOps. These applications are made of microservices that retain their independent ownership, objectives, development, and sustainment approaches. The constituent microservices can have recognized objectives, a designated manager, and resources to provide a desired capability. An outage of a microservices-based application can affect one or more microservices. Although these can be restored or replaced, the ability to cope with this sudden change creates an additional dimension of unpredictability to the overall application. Therefore, rapid and cost-effective recovery of critical applications depends on the ability to identify and focus attention on the most crucial microservices dependencies and interdependencies. The technique used in this research to mathematically model and analyze critical links between microservices relies on an existent effective dependency analysis method called the design structure matrix</p>	10.1109/SmartCloud49737.2020.00034	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9265952	IEEE Xplore
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		<p>DSM. DevSecOps requires quick, repeatable, and efficient identification of critical links between microservices in a microservices-based application. Therefore, the methodology and techniques used in DSM can be leveraged to address the key technical considerations of microservices-based applications in DevSecOps. In this research an outage-impacted microservices-based application is modeled using the proposed methodology and the results are analyzed. Mapping and subsequently prioritizing microservices dependencies and interdependencies directly support the resilience of microservices-based applications.</p>			
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Potential factors influencing systems engineering and integration: A model and its application to the ELI-ALPS' research technology systems		<p>ELI (Extreme Light Infrastructure) is the first civilian large-scale high-power laser research facility to be realized with trans-European cooperation and the worldwide scientific community. The main objective of the ELI Attosecond Light Pulse Source (ELI-ALPS) pillar is the establishment of a unique attosecond facility that provides ultrashort light pulses between THz and X-ray frequency range with high repetition rates. The simultaneous development and implementation of the building infrastructure together with several interconnected light sources has a great need for broad systems engineering and integration activities. Potential factors influencing these systems engineering and integration activities have been collected and modelled. This based on a literature survey as well as in-house experiences. The model is applied to the system engineering and integration of ELI-ALPS' research technology.</p>	10.1109/SysEng.2017.8088284	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8088284	IEEE Xplore
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<p>Multi-Actor Value Modeling for Federated Systems</p>		<p>Design methods for federated systems must consider local incentives and interactive effects among independent decision-makers. This paper extends value-centric design methodology to multi-actor cases by using game-theoretic principles. Federated systems are represented as a Stag Hunt game where players choose between independent (noncooperative) and federated (cooperative) strategies. Risk arises from the possibility of withdrawn cooperation and can be quantitatively assessed for particular design alternatives with subjective estimates of the probability for cooperation and objective measures such as the weighted average log measure of risk. The value of cooperation can be bounded below by designing for the independent strategy and above by designing for a centralized strategy controlled by a single authority. An application case considers a stylized system value model of a distributed satellite system with two players and symmetric design decisions. Results demonstrate lower and upper bounds to the value of a federated strategy with opportunistic,</p>	<p>10.1109/JSYST.2016.2626981</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7756322</p>	<p>IEEE Xplore</p>
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		fixed-cost communication services. Quantitative risk analysis shows the value-maximizing federated design under mutual cooperation carries risk which can be mitigated by more conservative design alternatives with only minor loss of value.			
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<p>CyberFactory#1 — Securing the industry 4.0 with cyber-ranges and digital twins</p>		<p>The 4th Industrial revolution is driven by increased connectivity, digitization, automation and autonomy of manufacturing assets, which trigger strong optimization perspectives, new businesses as well as a handful of new threats which need to be properly addressed. The CyberFactory#1 project (ITEA nr 17032) aims at solving this dilemma between productivity and security through the design, development and demonstration of a System of Systems that embraces the technical, economical, human and the societal dimensions of future factories. It relies on innovative simulation, optimization and resilience capabilities. Pilots from transportation, automotive, electronics and machine manufacturing will host demonstrations of these achievements in a real operational environment at the end of a 3 years collaborative project. An approach based on digital twins' integration with cyber-range will be implemented, to analyze the impact of attacks in the quality monitoring of avionics electronic, to manufacturing cobotic systems in a virtual environment to</p>	<p>10.1109/WFCS.2018.8402377</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8402377</p>	<p>IEEE Xplore</p>
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		improve their ability to withstand manipulation attempts, and as a tool for iterative design of safety/security functions for cobots.			
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Hybrid Simulation and Test of Vessel Traffic Systems on the Cloud		<p>This paper presents a cloud-based hybrid simulation platform to test large-scale distributed system-of-systems for the management and control of maritime traffic, the so-called vessel traffic systems (VTS). A VTS consists of multiple, heterogeneous, distributed, and interoperating systems, including radar, automatic identification systems, direction finders, electro-optical sensors, and gateways to external VTSs, information systems; identifying, representing, and analyzing interactions is a challenge to the evaluation of the real risks for safety and security of the marine environment. The need for reproducing in fabric the system behaviors that could occur in situ demands for the ability of integrating emulated and simulated environments to cope with the different testability requirements of involved systems and to keep testing cost sustainable. The platform exploits hybrid simulation and virtualization technologies, and it is deployable on a private cloud, reducing the cost of setting up realistic and effective testing scenarios.</p>	10.1109/ACCESS.2018.2865683	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8451869	IEEE Xplore
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Link-Centric Research on the Capability Resilience of Heterogeneous Information Combat Networks		<p>The combat system-of-systems (CSoS) in high-tech information warfare consists of multiple interconnected combat entities, which can be abstracted as a complex heterogeneous information combat network (HICN). Research on the capability resilience of a HICN is highly valuable for optimizing network structure, enhancing network survivability, and improving network security. Accordingly, this paper presents an integrated framework called HICN capability resilience framework based on network percolation (HICNCR) for assessing the capability resilience of HICN.</p> <p>Specifically, first, we establish a HICN model of a CSoS, taking into account the heterogeneity of entities as well as the diversity and weight of information flow. Based on this, we present an index called operational capability resilience index (OCRl) to evaluate the capability resilience of HICN. This index directly identifies which CSoS is more resilient when facing identical operational tasks, while simultaneously considering both network structure and function. Finally, we conduct extensive experiments on a</p>	10.1109/TNSE.2025.3555384	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10945655	IEEE Xplore
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		<p>military case to demonstrate the effectiveness and superiority of the proposed HICNCR. Compared to natural connectivity and other resilience metrics, it provides more valuable insights to inform the operation and design of more resilient CSoS.</p>			
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<p>IoT SAT: A formal framework for security analysis of the internet of things (IoT)</p>		<p>The new attack surface being crafted by the huge influx of IoT devices is both formidable and unpredictable, as it introduces a rich set of unexplored attack techniques and unknown vulnerabilities. These new attack techniques are hard to perceive through traditional means, owing to concealed and cascaded inter-device, inter-system and device-environment dependencies. In this paper, we present IoT SAT, a formal framework for security analysis of IoT. IoT SAT formally models the generic behavior of IoT system of systems, based on device configurations, network topologies, user policies and IoT-specific attack surface. The model is then used to measure system's resilience against potential attacks and identify threat vectors and specific attack techniques, which can be used to achieve higher-level adversary's objectives. We evaluate IoT SAT over realistic IoT networks, which concludes that our approach is scalable and highly beneficial for uncovering complex attack vectors of IoT systems.</p>	<p>10.1109/CNS.2016.7860484</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7860484</p>	<p>IEEE Xplore</p>
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Smart Water Networks as Cyber-Physical-Socio-Environmental Systems		<p>This position paper introduces a novel Cyber-Physical-Socio-Environmental Systems (CPSES) framework for Smart Water Networks (SWN). The proposed framework introduces environmental aspects as a key constituent, which is important for addressing the interconnected challenges of water systems, such as climate change impacts, contamination risk, and sustainability. The CPSES framework dynamically incorporates interactions between physical components (sensors, actuators), cyber systems (control, monitoring, digital twins), social factors (policy, demand management, crisis response), and environmental impacts (emissions, resource availability). The significance of this framework lies in its potential to enable more resilient, sustainable, and secure SWNs by incorporating feedback loops among the CPSES constituents. Key CPSES research challenges are outlined, such as modeling the impacts of climate change, dynamic risk estimation, and ethical and fairness aspects within SWN. A real-world use case on water contamination crisis management</p>	10.1109/TICPS.2024.3520558	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10817792	IEEE Xplore
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		demonstrates the framework's practical application and relevance for researchers.			
Smart cities and critical infrastructure		The paper gives results of study between smart city performance and critical infrastructure safety. It concentrates to cyber infrastructure problems, especially to problems of I&C system. On the basis of analyses of I&C system failures, it shows their impacts on public assets in human communities. At the end, the possible countermeasures for smart cities safe operation are discussed.	10.1109/SCSP.2018.8402676	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8402676	IEEE Xplore

Assessing the impact of attacks on OPC-UA applications in the Industry 4.0 era		<p>The advent of the Internet of Things (IoT) is leading to create “System-of-Systems”, where disparate information systems, sensors, devices, people and software solutions are used altogether. Industrial companies tend to apply the same concept for gaining in productivity. Several consortia, such as the German initiative Industrie 4.0, recommend to use the OPCUA framework to manage interoperability issues. Associate to the convergence of the Operational Technology (OT) and the Information Technology (IT) domains, it may lead to create a new attack surface, that needs to be apprehended. The contribution is therefore to identify, based on the specifications, the threats and countermeasures that may occur/be applied when using OPC-UA in an Industry 4.0 environment and to highlight the impact of the eavesdropping and message flooding attacks on an OPC-UA application implemented on a real testbed.</p>	10.1109/CCNC.2019.8651671	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8651671	IEEE Xplore
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<p>A Hybrid Space Architecture for Robust and Resilient Satellite Services</p>		<p>A 'hybrid space architecture' has been proposed to facilitate robust and resilient satellite data downlink, integration and analysis; however, the technical details for what may comprise a hybrid space architecture are severely lacking. Thus far, 'hybrid' principally entails the diversity of commercial providers. While diverse suppliers can contribute to hybrid space architectures, we argue that robustness and resilience will only be achieved through heterogeneous network and asset architectures. A connected satellite services ecosystem composed of the union of different networks with different characteristics would limit single points of failure, thereby generating high levels of redundancy, resilience and scalability. This research outlines parameters of a hybrid space architecture, documents satellite service reference architectures and provides a comparative analysis of the features for each architecture. Further, through a case study of existing satellite service providers, we propose how a hybrid space architecture could be piloted in Northern Europe and the High North.</p>	<p>10.1109/SMC-IT56444.2023.00021</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10207306</p>	<p>IEEE Xplore</p>
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ASSESSING CRITICAL INFRASTRUCTURE DEPENDENCIES AND INTERDEPENDENCIES		<p>Today's infrastructure is connected to many other infrastructure assets, systems, and networks that it depends on for normal day-to-day operations. These connections, or dependencies, may be geographically limited or span great distances (NIPP 2013). The many points of infrastructure connections, and their geographic distribution, make the infrastructure environment much more complex. The U.S. Department of Homeland Security (DHS) works to strengthen critical infrastructure security and resilience by generating greater understanding and action across a (largely) voluntary partnership landscape. This is achieved by working with private and public infrastructure stakeholders to resolve infrastructure security and resilience knowledge gaps, inform infrastructure risk management decisions, identify resilience-building opportunities and strategies, and improve information sharing among stakeholders through a collaborative partnership approach. This paper highlights the Department's efforts to present a more comprehensive picture of security and resilience</p>	10.1109/WSC.2018.8632498	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8632498	IEEE Xplore
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		through a "system of systems" approach.			
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<p>Integrated Systems Engineering, Safety, Reliability and Risk Management – Minimizing Black Swan Events</p>		<p>This paper examines key barriers that can possibly inhibit safe and reliable mission execution and, in the worst case, result in loss of human life due to many unknown contributory factors that can lead to Black Swan events. Some of the representative contributory factors include decision errors, overconfidence and a host of common causes including cultural and human factors. Decisions are always easy to criticize in hindsight when more information is available after a major accident. Depending on the type and complexity of the project and/or mission, the catastrophic risks of drifting into failure can be alleviated by implementing uniquely and strategically tailored Integrated-System-of-Systems, dynamic, risk-informed decision management processes. This paper presents some of the lessons learned from James Webb Space Telescope (JWST), NASA's Human Space Flight program, and industry that provide motivation to organizations working on mega-complex missions to prudently accomplish targeted mission success. These lessons are important for future human Lunar, Mars and Beyond missions</p>	<p>10.1109/RAMS51492.2024.10457700</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10457700</p>	<p>IEEE Xplore</p>
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		<p>planned to be pursued by NASA through a public-private partnership using nimble but effective safety-conscious, proven sound engineering practices including implementation of integrated risk mitigation practices.</p> <p>Background: NASA flagship missions explore the unknown in air and space, innovate for the benefit of humanity and inspire the world through discovery. Complex flagship missions include major programs such as Artemis - Mission to Moon, Mars and Beyond; International Space Station; recent-past Space Shuttle Program and advanced robotic space exploration missions such as James Webb Space Telescope (JWST), and Mars Sample Return. Mission failures have serious consequences on safety of astronauts, future scientific exploration missions, national pride, cost, and reputation.</p>			
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<p>Predictive Analytics for Digital Twins: The Concept and Systems Applications</p>		<p>Digital twins were introduced to offer digitalized models of real-world systems. These systems can contain systems of systems and processes to perform important tasks in the system. The digital twin technology offers a virtual representation (an operational digital replica) of the real system that can be employed for performing assessments and continuous improvements of these systems and their operations and processes. This paper introduces the concept of integrating predictive analytics with digital twins. A predictive analytics process can be applied on a series of historical digitalized models created from time stamped digital twins to construct future digitalized models that emulate the expected future behaviors and performance of their corresponding physical systems. These generated future digital models can have many potential applications in the industry and business fields and in this paper, we discuss some of these potential applications.</p>	<p>10.1109/ICICT62343.2024.00069</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10541771</p>	<p>IEEE Xplore</p>
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Defensive Programming for Smart Home Cybersecurity		<p>Cybersecurity has become a real issue in the development of smart services in the smart home domain, which is formed by a System of Systems where several smart objects are connected to each other and to the Internet. However, these connections expose the devices to possible attackers inside or outside the network, who may exploit software or hardware vulnerabilities to achieve malicious goals. To alleviate this issue, the use of defensive programming assertions can allow the behaviour of smart objects to be monitored and checked for correctness. Furthermore, open source intelligence tools, such as the Shodan search engine, provide features that could be leveraged to detect potential vulnerabilities. In this paper, we propose an approach for the monitoring of Systems of Systems in the smart home domain exploiting the defensive programming paradigm in combination with Shodan APIs.</p>	10.1109/EuroSPW51379.2020.00087	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9229690	IEEE Xplore
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Threat framework for 5G cellular communications		<p>5G networks are rapidly gaining traction as the technology of choice for not only traditional cellular networks, but also new verticals such as business, industrial and military deployments. The complexity of 5G as a system of systems poses new security challenges. Even though 5G is generally viewed as more secure than previous generations such as 4G (LTE), 5G incorporates Internet technologies (e.g., service-based architectures, cloud services, virtualization), which increase the attack surface. In addition, the much larger number of devices connecting, and the new types of such devices (e.g., affecting human safety) also raise new security concerns. The urgency of protecting these networks is increased as 5G is incorporated into human safety critical infrastructure and military establishments. This paper introduces FiGHT-Five G Hierarchy of Threats, a framework of adversarial tactics and techniques applicable to the 5G system, similar to that of MITRE ATT&CK.</p>	10.1109/MILCOM55135.2022.10017976	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10017976	IEEE Xplore
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<p>A modelling & simulation based engineering approach for socio-cyber-physical systems</p>		<p>Today, most large and complex systems such as aircrafts or power grids integrate physical and human aspects with computing and networking, and therefore constitute so-called socio-cyber-physical systems (SCPS). Their engineering, from prospective and conceptual studies (to determine the scope of the system) through design and construction to operation, maintenance and upgrades, necessitates the cooperation and coordination of many teams representing different disciplines and viewpoints. In addition, such systems are subject to many constraints such as tight budget and schedule; high dependability, safety and security; need to innovate; long lifetime; changing and uncertain environments. This paper presents a modelling and simulation (M&S) based engineering approach that can address the challenges of large and complex SCPS, and more generally, of systems of SCPS (SoS). Contrary to "classical" M&S approaches relying on deterministic behavioural models that can be developed only in the final stages of the design process, the proposed</p>	<p>10.1109/ICNSC.2017.8000176</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8000176</p>	<p>IEEE Xplore</p>
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		<p>approach relies on constraints models that specify envelopes of required or assumed behaviours, and that can be applied at any phase of the system lifecycle. Also, in order to manage complexity and the variety of viewpoints, the approach supports models composition, whereby models from different teams or at different phases of the process can be aggregated (top-down or bottom-up) and verified for consistency.</p>			
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<p>Local Monitoring of Embedded Applications and Devices using Artificial Neural Networks</p>		<p>Reliability, security, and safety become even more challenging in times of the Internet of Things (IoT). Devices operate jointly in large distributed networks and may affect each other's functionality due to failures or attacks. Identifying abnormal system behavior is therefore the solution to protect the device itself and other network participants to ensure service availability and system integrity. We propose a monitor concept based on long short-term memory recurrent neural networks which adapts to new devices by learning the nominal behavior automatically. No fault model is needed to identify erroneous behavior. The monitor can operate locally on the device, so our approach addresses the limited bandwidth and connectivity of IoT devices. Experiments evaluate our approach for a simulated controller under varying runtime conditions.</p>	<p>10.1109/DSD.2019.00076</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8875056</p>	<p>IEEE Xplore</p>
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<p>Morse: Reducing the Feature Interaction Explosion Problem using Subject Matter Knowledge as Abstract Requirements</p>		<p>The feature interaction problem appears in many different kinds of complex systems, especially systems whose elements are created or maintained by separate entities - for example, a modern automobile that incorporates electronic systems produced by different suppliers. Cross-cutting concerns, such as safety and security, require a comprehensive analysis of the possible interactions. However, there is a combinatorial explosion in the number of feature combinations to be considered. Our work approaches the feature interaction problem from a novel point of view: we seek to use the abstract subject matter knowledge of domain experts to deduce why some features will NOT interact, rather than trying to discover or resolve the interactions. In this paper, we present a method that can automatically reduce the required number of combinations and situations that have to be evaluated or resolved for feature interactions. Our tool, called Morse, rules out feature combinations that cannot have interactions based on traceable deductions from relatively simple</p>	<p>10.1109/RE.2018.00033</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8491140</p>	<p>IEEE Xplore</p>
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		<p>abstract requirements that capture relevant subject matter knowledge. Our method is useful as a means of focusing attention on particular situations where more detailed functional requirements may be needed to avoid unacceptable risk arising from unintended interactions between features.</p> <p>abstract requirements that capture relevant subject matter knowledge. Our method is useful as a means of focusing attention on particular situations where more detailed functional requirements may be needed to avoid unacceptable risk arising from unintended interactions between features.</p>			
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Security vs. safety: Why do people die despite good safety?		<p>This paper will show in detail the differences between safety and security. An argument is made for new system design requirements based on a threat sustainable system (TSS) drawing on threat scanning, flexibility, command and control, system of systems, human factors and population dependencies. Principles of sustainability used in historical design processes are considered alongside the complex changes of technology and emerging threat actors. The paper recognises that technologies and development methods for safety do not work for security. Safety has the notion of a one or two event protection, but cyber-attacks are multi-event situations. The paper recognizes that the behaviour of interconnected systems and modern systems requirements for national sustainability. System security principles for sustainability of critical systems are considered in relation to failure, security architecture, quality of service, authentication and trust and communication of failure to operators. Design principles for operators are discussed along with recognition of human factors failures. These principles are then applied as the basis for</p>	10.1109/ICNSUR V.2015.7121213	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7121213	IEEE Xplore
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		recommended changes in systems design and discuss system control dominating the hierarchy of design decisions but with harmonization of safety requirements up to the level of sustaining security. These new approaches are discussed as the basis for future research on adaptive flexible systems that can sustain attacks and the uncertainty of fast-changing technology.			
Validating the BIECO Security Evaluation Methodology within a Smart Grid Monitoring SW		Cyber Physical Systems of Systems encompassing heterogeneous components also require an, however, ever-growing need for cybersecurity and trust assurance mechanisms to ensure their trustworthiness and integrity. The BIECO project devises a holistic framework that provides mechanisms to help companies understanding and managing the cybersecurity risks and threats they are subject to when they become part of the ICT supply chain. In this paper we provide an instantiation of a partially automated and evidence-based security evaluation methodology integrating BIECO tools, within a software for monitoring Smart Grid.	10.1109/ISSREW60843.2023.00069	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10301312	IEEE Xplore

Ensuring the Safe and Secure Operation of Electronic Control Units in Road Vehicles		<p>With the increasing connectivity and complexity of road vehicles, security heavily impacts the safety of vehicles. In fact, researchers demonstrated that the lack of security in vehicles can lead to dangerous and even life-threatening situations. A threat that has been insufficiently addressed in existing vehicular security solutions are software attacks, in which the adversary compromises the software of Electronic Control Units (ECUs). A promising technique to defend against software attacks is remote attestation, as it enables to detect compromised devices. This paper presents a novel attestation scheme that ensures the software integrity of ECUs to warrant the vehicle's safety. In our scheme, a trusted master ECU verifies the integrity of all safety-critical ECUs and refuses to start the engine in case an untrustworthy, and hence, unsafe state is detected. As modern vehicles are highly heterogeneous system of systems, we propose two different attestation techniques that enable the attestation of simple ECUs, such as basic sensors or actuators, as well as advanced,</p>	10.1109/SPW.2019.00032	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8844627	IEEE Xplore
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		more complex ECUs like sensor fusion systems. We implement our attestation scheme on an exemplary automotive network that incorporates CAN and Ethernet, and show that our solution imposes an imperceptible overhead for passengers.			
Evaluation of open source SIEM for situation awareness platform in the smart grid environment		The smart grid as a large-scale system of systems has an exceptionally large surface exposed to cyber-attacks, including highly evolved and sophisticated threats such as Advanced Persistent Threats (APT) or Botnets. When addressing this situation the usual cyber security technologies are prerequisite, but not sufficient. The smart grid requires developing and deploying an extensive ICT infrastructure that supports significantly increased situational awareness and enables detailed and precise command and control. The paper presents one of the studies related to the development and deployment of the Situation Awareness Platform for the smart grid, namely the evaluation of open source Security Information and Event Management systems. These systems are the key components of the platform.	10.1109/WFCS.2015.7160577	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7160577	IEEE Xplore

Analysis of Vulnerabilities in Satellite Software Bus Network Architecture		<p>With the rapid expansion of the space industry, there has been a strong push to develop simple, reusable, and easy to deploy satellite system architecture solutions. The space industry may have assumed that the complexity of their systems of systems would make the vulnerability discovery process too difficult for attackers. However, focused research into the design of modern Software-Bus (SB) dependent satellite systems has the ability to reveal numerous vulnerabilities in deployed space system architectures. In particular, our in-depth analysis of NASA's open source core Flight System (cFS) resulted not only in the discovery of various novel vulnerabilities, but also the implementation of several straight-forward, practical exploits. Due to the lack of authentication required to execute commands via the SB as well as the inability to recover from an attack in a robust manner, cFS is vulnerable to a number of attacks through the SB entry point. This paper presents four exploit demonstrations on the unsecured cFS bus architecture, and then provides recommendations on how to secure against these attacks and make a modern satellite</p>	10.1109/MILCOM55135.2022.10017967	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10017967	IEEE Xplore
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		system architecture more robust.			
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<p>Live Virtual Constructive Environment for Assuring the Safety and Security of Complex Autonomous Vehicles</p>		<p>Autonomous and connected vehicle technologies are rapidly emerging and being introduced to society. Traditional vehicles are becoming more sophisticated with integrated driver-assist features incorporating AI algorithms, control systems, and communication interfaces. Modern vehicles are tightly-coupled into a system of systems more robust than the commonly leveraged physical world simulations used in the research community and industry today. This means that components beyond just the AI model effect the safety and security of operating vehicles. It is imperative to consider the complex and interconnected nature of these systems during pre-deployment development and testing. In this paper, we discuss our preliminary work on a multi-level simulation and hardware-in-the-loop (HITL) testbed capable of evaluating vehicle reactions to diverse driving situations based on virtually constructed worlds. Our framework is able to evaluate vehicle behavior at scale in a simulated world while seamlessly integrating physical hardware via a digital-twin approach.</p>	<p>10.1109/ICAA58325.2023.00015</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10207574</p>	<p>IEEE Xplore</p>
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<p>Industry-university collaboration on IoT cyber security education: Academic course: "Resilience of Internet of Things and cyber-physical systems"</p>		<p>Internet of Things (IoT) and Cyber-Physical Systems (CPS) are an expansive heterogeneous field, where technologies are replaced faster than the engineering staff. As a consequence, traditions for education and graduation of engineers of IoT and CPS are not yet established. Cybersecurity is essential for new innovations, economic growth and public safety. On the other hand, Center for Cyber Safety and Education estimates that by 2022 there is a deficit of 350 000 cybersecurity specialists in the private sector in Europe. This paper has two contributions: First, it presents an example how an industry-university collaboration on IoT cyber security education could be organized. Then, the data be produced during the collaboration course is analyzed and compared to literature for answering to the main research question: How can future educational competences with regard to resilient cyber-physical systems be understood? Due to the multifaceted nature of the cybersecurity, previous development of degree programmes tend to synthesize either technical or societal subjects. Real multi-disciplinary synthesis has</p>	<p>10.1109/EDUCO N.2018.8363477</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8363477</p>	<p>IEEE Xplore</p>
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		remained complicated. Our main conclusion is that future competences with regard to CPS are multidisciplinary including many industrial sectors and academic disciplines as well as multiple theories. On the other hand, traditional security thinking is not possible within new heavily interconnected systems of systems, and we should move towards resilience thinking.			
Cyber security via formal methods: A framework for implementing formal methods		This paper demonstrates a methodology for how the organizations that employ complex enterprise systems of systems can significantly improve cyber defense while decreasing overall operating costs by using formal methods. The paper demonstrates an approach that uses an event-based methodology to formalize all types of enterprise behavior, to include system, human, and environmental events.	10.1109/CYCONUS.2017.8167500	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8167500	IEEE Xplore

<p>A safety-case approach to ethical considerations for autonomous vehicles</p>		<p>Ethical considerations for autonomous vehicles (AVs) go beyond the “trolley problem” to include such aspects as risk/benefit trade-offs, informed consent, risk responsibility and risk mitigation within a system of systems. In this paper we present a methodology for arguing that the behaviour of a given AV meets desired ethical characteristics. We identify some of the ethical imperatives surrounding the introduction of AVs and consider how decisions made during development can impact the ethics of the AV's behaviour.</p>	<p>10.1049/cp.2017.0174</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8361400</p>	<p>IEEE Xplore</p>
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<p>A Distributed MAPE-K Framework for Self-Protective IoT Devices</p>		<p>Internet of Things (IoT) devices have become ubiquitous in our everyday life, with security becoming an ever-growing issue as more and more cyber-attack incidents being reported, primarily due to deficiencies in existing security mechanisms. However, while, for example, cloud-based applications, or industrial automation systems of systems possess significant resources for monitoring health, and determining their status and correct behavior at runtime, IoT devices operate with limited hardware capabilities and under tight resource constraints, making monitoring, analysis, and response activities a challenging endeavor. Following the NIST Cybersecurity Framework, IoT devices need to identify, protect, detect, respond, and recover from cyber-attacks, unauthorized access, and other security threats. A common way to provide self-adaptation to changing conditions is the MAPE-K loop with four pivotal phases: Monitor, Analyze, Plan, and Execute. This paper presents DSec4IoT, a “Distributed MAPE-K Framework for Self-Protective IoT Devices”. Our framework</p>	<p>10.1109/SEAMS59076.2023.00034</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10174186</p>	<p>IEEE Xplore</p>
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		<p>leverages the idea of distributed MAPE-K patterns and establishes a model for managing and controlling Self-Protective IoT Devices. We evaluate our approach by simulating port scans and performing adaptation activities. Results have confirmed that DSec4IoT can be easily applied to detect and mitigate them.</p>			
<p>ISO/IEC/IEEE International Standard - Systems and software engineering-- System life cycle processes</p>		<p>This document establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint. These processes can be applied to systems of interest, their system elements, and to system of systems. Selected sets of these processes can be applied throughout the stages of a system's life cycle. This is accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction.</p>	<p>10.1109/IEEESTD.2023.10123367</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10123367</p>	<p>IEEE Xplore</p>

ISO/IEC/IEEE Draft Standard - Systems and Software engineering -- System Life Cycle Processes		<p>This document establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint. These processes can be applied to systems of interest, their system elements, and to system of systems. Selected sets of these processes can be applied throughout the stages of a system's life cycle. This is accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction.</p>		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9765407	IEEE Xplore
ISO/IEC/IEEE International Standard - Systems and software engineering-- System life cycle processes - Redline		<p>This document establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint. These processes can be applied to systems of interest, their system elements, and to system of systems. Selected sets of these processes can be applied throughout the stages of a system's life cycle. This is accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction.</p>		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10877742	IEEE Xplore

Key Pre-Distributions From Graph-Based Block Designs		<p>With the development of wireless communication technologies which considerably contributed to the development of wireless sensor networks (WSNs), we have witnessed ever-increasing WSN-based applications which induced a host of research activities in both academia and industry. Since most of the target WSN applications are very sensitive, security issue is one of the major challenges in the deployment of WSN. One of the important building blocks in securing WSN is key management. Traditional key management solutions developed for other networks are not suitable for WSN, since WSN networks are resource (e.g., memory, computation, and energy) limited. Key pre-distribution algorithms have recently evolved as efficient alternatives of key management in these networks. Secure communication is achieved between a pair of nodes either by the existence of a key allowing for direct communication or by a chain of keys forming a key path between the pair. In this paper, we consider prior knowledge of network characteristics and application constraints in terms of communication</p>	10.1109/JSEN.2015.2501429	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7331238	IEEE Xplore
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		<p>needs between sensor nodes, and we propose methods to design key pre-distribution schemes, in order to provide better security and connectivity while requiring less resources. Our methods are based on casting the prior information as a graph. Motivated by this idea, we also propose a class of quasi-symmetric designs referred here to as g-designs. Our proposed key pre-distribution schemes significantly improve upon the existing constructions based on the unital designs. We give some examples and point out open problems for future research.</p>			
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Knowledge Driven Cyber-Convergent Systems Based on Situational Agents		<p>Cyberization of different kinds of activity, as a base for providing Industry 5.0 services, is concerned with the formation of needed capabilities for the target system or system of systems in a specific domain. The formation of needed system capabilities is achieved by merging particular capabilities of constituent components (systems) within cyber-convergent systems. Convergence can be achieved on the basis of system orderliness with the appropriate value of structural entropy of the target system according to the situation in the subject area. Conceptual factors of architectural components for constructing knowledge-driven cyber-convergent systems are discussed in the paper.</p>	10.1109/CSIT56902.2022.10000762	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10000762	IEEE Xplore
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A Partition-Driven Integrated Security Architecture for Cyberphysical Systems		<p>Emerging cyberphysical systems incorporate systems of systems that have functional interdependencies. With the increase in complexity of cyberphysical systems, the attack surface also expands, making cyberphysical systems more vulnerable to cyberattacks. We present a novel security architecture that localizes the cyberattack in a timely manner and simultaneously recovers the affected cyberphysical system functionality.</p>	10.1109/MC.2019.2914906	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9034241	IEEE Xplore
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<p>Spiking Spatiotemporal Neural Architecture Search for EEG-Based Emotion Recognition</p>		<p>Spiking neural network (SNN) has the promising ability to take advantage of the spatiotemporal information from electroencephalogram (EEG) for emotion recognition. However, manually designing suitable SNN architectures needs considerable effort. In this article, we propose a novel and effective method, spiking spatiotemporal neural architecture search (SSTNAS), for EEG-based emotion recognition. SSTNAS exploits the discriminative spatial and temporal EEG features via spiking convolution neural network (SCNN) and spiking long short-term memory (SLSTM), respectively. Then, SSTNAS explores a proper SNN architecture for each task by investigating the spike activation patterns of pretrained networks based on genetic search, which is free of training. Experimental results on three public benchmark datasets, namely, FACED, DEAP, and DREAMER, demonstrate the superiority of the proposed method over the related state-of-the-art approaches.</p>	<p>10.1109/TIM.2024.3472838</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10741587</p>	<p>IEEE Xplore</p>
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<p>Robust Duality Learning for Unsupervised Visible-Infrared Person Re-Identification</p>		<p>Unsupervised visible-infrared person re-identification (UVI-ReID) aims at retrieving pedestrian images of the same individual across distinct modalities, presenting challenges due to the inherent heterogeneity gap and the absence of cost-prohibitive annotations. Although existing methods employ self-training with clustering-generated pseudo-labels to bridge this gap, they always implicitly assume that these pseudo-labels are predicted correctly. In practice, however, this presumption is impossible to satisfy due to the difficulty of training a perfect model let alone without any ground truths, resulting in pseudo-labeling errors. Based on the observation, this study introduces a new learning paradigm for UVI-ReID considering Pseudo-Label Noise (PLN), which encompasses three challenges: noise overfitting, error accumulation, and noisy cluster correspondence. To conquer these challenges, we propose a novel robust duality learning framework (RoDE) for UVI-ReID to mitigate the adverse impact of noisy pseudo-labels. Specifically, for noise overfitting, we propose a novel Robust</p>	<p>10.1109/TIFS.2025.3536613</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10858072</p>	<p>IEEE Xplore</p>
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		<p>Adaptive Learning mechanism (RAL) to dynamically prioritize clean samples while deprioritizing noisy ones, thus avoiding overemphasizing noise. To circumvent error accumulation of self-training, where the model tends to confirm its mistakes, RoDE alternately trains dual distinct models using pseudo-labels predicted by their counterparts, thereby maintaining diversity and avoiding collapse into noise. However, this will lead to cross-cluster misalignment between the two distinct models, not to mention the misalignment between different modalities, resulting in dual noisy cluster correspondence and thus difficult to optimize. To address this issue, a Cluster Consistency Matching mechanism (CCM) is presented to ensure reliable alignment across distinct modalities as well as across different models by leveraging cross-cluster similarities. Extensive experiments on three benchmark datasets demonstrate the effectiveness of the proposed RoDE.</p>			
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ISO/IEC/IEEE Draft Standard - Systems and Software engineering -- System Life Cycle Processes		<p>This document establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint. These processes can be applied to systems of interest, their system elements, and to system of systems.</p> <p>Selected sets of these processes can be applied throughout the stages of a system's life cycle. This is accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction.</p>		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9409830	IEEE Xplore
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Enhancing Secrecy Energy Efficiency in UAV-RIS Assisted Mobile IoV Networks Through DRL		<p>To address the challenges of information leakage, low energy efficiency, and the Doppler effect in mobile Internet of Vehicles (IoV), this paper proposes an enhanced IoV cooperation framework, where privacy information is forwarded by the untrusted relay assisted by unmanned aerial vehicle (UAV) and reconfigurable intelligent surface (RIS), which can improve security and energy efficiency. To meet the requirements of green communication, we formulate a secrecy energy efficiency maximization problem by jointly optimizing the transmit power allocation, the relay's amplification factor, the two-hop RIS phase shift matrices, and the UAV trajectory. Given the non-convex nature of this problem, we introduce an iterative algorithm based on the convex-concave procedure and Dinkelbach's method to optimize the transmit power and amplification factor. Additionally, we conceive the majorization-minimization (MM) algorithm to optimize the two-hop RIS phase shift matrices, and a designed firefly algorithm-deep deterministic policy gradient (FA-DDPG) algorithm is</p>	10.1109/TWC.2025.3594691	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11121573	IEEE Xplore
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		proposed to obtain the UAV trajectory. Simulation results demonstrate the effectiveness of the proposed scheme in enhancing secrecy energy efficiency. Specifically, compared to the DDPG-only and FA-based schemes, the proposed scheme achieves an improvement of 33.3% and 64.2%, respectively, in secrecy energy efficiency.			
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<p>IoT Framework for Effective and Fine-Grain Access Control</p>		<p>The standardized protocols and new generation of hardware for communications increased interoperability more than ever. However, the increasing interoperability causes a rise in offensives from vicious people and hardware. Therefore, there is a necessity to apply encryption algorithms to guard the communications between clients and servers. Nevertheless, the current encryption techniques do not protect the service access at a fine-grain level. Furthermore, in wireless sensors and actuators, each network endpoint is integrated constrained-resource; thus, the interoperability increase necessitates a high computation rate. On the other hand, the endpoints inherent to processing and memory restrictions negatively affect communication delays and power consumption, leading to a shorter battery lifetime. Consequently, there is a need for new methods to increase interoperability, dependability, scalability, security, and energy efficiency. This study proposes a theoretical design of a new and effective IoT model that supports authentication, authorization, and fine grain access control with no</p>	<p>10.1109/IOTSMS53705.2021.9704977</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9704977</p>	<p>IEEE Xplore</p>
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		network configuration and dynamic reconfiguration. The proposed framework demonstrates the possibility of the integration of IoT devices powered by batteries and a functional System of Systems.			
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<p>Marsupial Walking-and-Flying Robotic Deployment for Collaborative Exploration of Unknown Environments</p>		<p>This work contributes a marsupial robotic system-of-systems involving a legged and an aerial robot capable of collaborative mapping and exploration path planning that exploits the heterogeneous properties of the two systems and the ability to selectively deploy the aerial system from the ground robot. Exploiting the dexterous locomotion capabilities and long endurance of quadruped robots, the marsupial combination can explore within large-scale and confined environments involving rough terrain. However, as certain types of terrain or vertical geometries can render any ground system unable to continue its exploration, the marsupial system can –when needed– deploy the flying robot which, by exploiting its 3D navigation capabilities, can undertake a focused exploration task within its endurance limitations. Focusing on autonomy, the two systems can colocalize and map together by sharing LiDAR-based maps and plan exploration paths individually, while a tailored graph search onboard the legged robot allows it to identify where and when the ferried aerial platform should</p>	<p>10.1109/SSRR56537.2022.10018768</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10018768</p>	<p>IEEE Xplore</p>
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		be deployed. The system is verified within multiple experimental studies demonstrating the expanded exploration capabilities of the marsupial system-of-systems and facilitating the exploration of otherwise individually unreachable areas.			
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Opinion Formation for Decision Making Process in Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance		<p>Our life consists of decision making processes, ranging from the easy one to the hard one. In a crucial and critical situation where national politics, economics, socio-culture, and defense-security comes into the equation, the decision making could be a quite difficult task. Adding a time limit to it makes the task extremely stressful, so it can be handled only by certain people.</p> <p>“Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance” (C4ISR) is a framework for developing a system of systems that enables information delivery from gathered and processed data, to national defence leader and his supporting staffs to have a complete situational awareness in order to preserve the national security. The data collected by the C4ISR system is then processed and concluded to obtain the information regarding the situation being observed. The conclusions then become a foundation to the national leader as the decision maker, to choose the most suitable act in order to maintain the national stability. A C4ISR's decision should be considered</p>	10.1109/ACDT.2018.8592979	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8592979	IEEE Xplore
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		<p>carefully before it is finalized, because of its impactful consequences. This paper proposes an opinion formation model based on Hegselmann-Krause (HK) model, to be implemented in the decision making process to enable the decision maker to see the direction of the data assimilation would be. It is prospectful to help decision maker to act accordingly to the information, and at the same time, shortening data processing in the decision making.</p>			
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Blockchain for Supply Chain Cybersecurity, Optimization and Compliance		<p>The U.S. power grid is a complex system of systems that requires a trustworthy, reliable, and secure global supply chain. A formidable challenge considering the increasing number of networked industrial control systems (ICS) and energy delivery systems (EDS) and growing number of intermediary distributors, vendors and integrators involved. Grid modernization has increased the use of “smart” energy devices that automate, digitize, network, and bring together the cyber-physical energy supply chain. In the current Energy Internet of Things (EIoT) environment, the growth of data speed and size requirements as well as the number of critical cyber assets has generated new North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection (CIP) compliance requirements and cyber supply chain security challenges for vendors, regulators, and utilities. The issuance of Order No. 829 by the Federal Energy Regulatory Commission (FERC) instructed the North American Electric Reliability Corporation (NERC) to confront cybersecurity supply chain risk</p>	10.1109/RWEEK.2018.8473517	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8473517	IEEE Xplore
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		<p>management for ICS software and hardware, as well as the networking and computing services associated with Bulk Electric System (BES) operations. To meet these goals, current technology and processes must be improved to better identify, monitor, and audit vulnerable EIoT environments. This paper examines how blockchain technology can enable NERC CIP compliance as well as aid in the security of the BES supply chain through an immutable cryptographically signed distributed ledger that allows for improved data security, provenance and auditability.</p>			
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Improving Security and Interoperability of Interwoven Systems through Rigorous Selective Encapsulation of Critical Physical Resources		<p>Creation of large systems beyond systems of systems has begun. These interwoven systems (IwSs) create possibilities for extensive benefits, but also pose challenges to the safety of the critical infrastructure elements which are included. Encapsulation of the highest-value processes and functions of these critical infrastructures provides not only increased security, but also presents opportunities to develop more efficient means of discovery and description for use in the construction of IwSs. Encapsulation also presents opportunities to simplify the overall control challenges and the development of symbols and languages to support IwSs.</p>	10.1109/FAS-W.2018.00053	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8599560	IEEE Xplore
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Advances in an Autonomous Healthcare Mobile Robot for Contact-Less Vital-Sign Measurement		<p>The US healthcare system struggles to provide access to quality healthcare in the face of shortages of healthcare workers. Robots have the potential to support healthcare, offloading common, simpler tasks from nurses to robots, and allowing humans to focus on higher-complexity work. They could also improve access to healthcare in areas with limited care workers and increase equity in healthcare. There may be particular value in a mobile manipulation robot that could perform various tasks, including common clinical tasks like vital sign measurement and medicine delivery. To allow adoption of autonomous healthcare robots and other care automation in clinical settings, these technologies require methods to ensure their safety and effectiveness. We present a robotic system in which a mobile manipulation robot performs contact-free vital sign measurement in a healthcare setting. Our work focuses on assured development of the system, creating redundant, fail-safe systems-of-systems to avoid particularly harmful or undesirable outcomes.</p>	10.1109/ISMR67322.2025.11025987	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11025987	IEEE Xplore
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Planning for Change in the Electric Power Industry: A Primer for Transactive Energy Scenario Development		<p>The electric power industry and its associated infrastructures (a.k.a. "the grid") are evolving from centrally planned, organized, and operated networks of players, technologies, and resources to systems of systems that are increasingly digitized and distributed in their operation and innovative capacity. Subsequently, strategic planners and technology managers associated with the electric power industry are faced with a range of scenarios to evaluate, including one that considers the emergence of commercialized transactive energy systems in the coming ten-year time horizon. The crafting of a transactive energy scenario can help inform technology innovation and management efforts that benefit consumers, electricity providers, and society by providing planners with a tool to investigate key drivers of change and a range of desired attributes of future technologies that could be employed to address emerging customer needs, wants, and expectations. This paper introduces readers to key elements associated with the market emergence and</p>	10.23919/PICMET.2019.8893913	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8893913	IEEE Xplore
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		adoption of transactive energy systems in order to encourage their inclusion in long-term scenario portfolios being utilized to inform electric power industry planning efforts.			
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Modeling Interdependencies with Complex Network Theory in a Combined Electrical Power and ICT System		<p>The extensive integration of information and communication technology (ICT) in the future electrical power system transforms the power system to a cyber physical system (CPS), making it a system-of-systems. This new system topology creates interdependent relationships between the cyber and the physical parts in the power system and introduces new possible vulnerabilities and risks which might lead to unwanted events such as outages and blackouts. For electrical power system operators, it is important to understand the new complexity of the system and how to address these new changes in order to ensure safe system operation and security of electricity supply. This paper focuses on the introduction of complex network theory as a method to discover and measure the importance of the system nodes, both electrical and ICT, in a combined electrical power distribution and communication network. There are two different methods used for measuring the importance, 1) betweenness centrality and 2) node attack method. The methods are evaluated through a case study and found suitable in capturing the</p>	10.1109/PMAPS47429.2020.9183667	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9183667	IEEE Xplore
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		important nodes in the combined electrical power and communication network.			
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Control of Multilayer Mobile Autonomous Systems in Adversarial Environments: A Games-in-Games Approach		<p>A mobile autonomous system (MAS) becomes pervasive especially in the vehicular and robotic networks. Multiple heterogeneous MAS networks can be integrated together as a multilayer MAS network to offer holistic services. The network connectivity of the multilayer MAS plays an important role in the information exchange between agents within and across different layers of the network. In this article, we establish a games-in-games framework to capture the uncoordinated nature of decision making under adversarial environment at different layers. Specifically, each network operator controls the mobile agents in his own subnetwork and designs a secure strategy to maximize the global network connectivity by considering the behavior of jamming attackers that aim to disconnect the network. The solution concept of metalequilibrium is proposed to characterize the system-of-systems behavior of the autonomous agents. For online implementation of the control, we design a resilient algorithm that improves the network algebraic connectivity iteratively. We show that the designed</p>	10.1109/TCNS.2019.2962316	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8943277	IEEE Xplore
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		algorithm converges to a metaequilibrium asymptotically. Finally, we use case studies of a two-layer MAS network to corroborate the security and agile resilience of the network controlled by the proposed strategy.			
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Efficiency evaluation model based on belief rule base with insufficient data		<p>National defense is very important since it has great influence on the stabilization of a nation and the welfare of its people. To accomplish the mission and tasks of national defense, the weapon systems need to be in its best conditions and be most effective. However, it is rather difficult to directly construct an effectiveness evaluation model from a national defense level since there are multiple influential factors that are interacted and can not be analytically integrated in one single function. Moreover, there are insufficient data which makes it more difficult for the modeling and training approaches. The Armored System of Systems (ASoS) is used as the combatant background. Moreover, the belief Rule Base (BRB) expert system with a training approach is applied to construct the effectiveness model. The proposed approach is validated by a Missile Armored System of System (M-ASoS) case study.</p>	10.1109/CCDC.2018.8407676	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8407676	IEEE Xplore
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Testing and Debugging Autonomous Driving: Experiences with Path Planner and Future Challenges		Summary form only given, as follows. The complete presentation was not made available for publication as part of the conference proceedings. Ensuring safety and reliability of autonomous driving systems is a crucial challenge. One of the difficulties is how to check the intelligent control that should work in a variety of environments. In this talk, I will report our recent studies on testing and debugging path-planning software with our industry partner. Our approach is to adapt techniques originally for software programs to work with the path-planning software driven by optimization and weight design. Specifically, we use search-based (optimization-driven) testing and repair techniques as well as fault localization techniques to detect, explain, and fix “significant” crash cases. I will also discuss future directions from the perspective of “systems of systems”.	10.1109/ISSREW51248.2020.00015	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9307712	IEEE Xplore
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Applying ISO 26702 and IEEE 1490 for data center project management		<p>Data center defines as a system of systems concept. Moreover, it consists of at least 16 systems. More complex systems can be turning uncontrollable and unmanageable in perspective of project management.</p> <p>ISO 26702- Systems engineering are confronted with transformation of requirements to system elements subject to system breakdown structure (SBS).</p> <p>IEEE 1490 PMBOK are coped with system planning sequence and management perspective of scope, time, cost, and quality in project management.</p> <p>Therefore, applying ISO 26702 and IEEE 1490 for data center project management requires modeling, prototyping, and development strategies. Within this paper framework, the stakeholder participation is analyzed during the data center project implementation of integrated ISO 26702 and IEEE 1490; as well as the sequence in which the system engineering process (SEP), inputs, and outputs relate in time of system life cycle to guide and control the technical efforts of the data center project, factor variants in the effort for the project success of data center project</p>	10.1109/ICMIT.2016.7605051	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7605051	IEEE Xplore
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		management (DCPM).			
Integrated Quality Management System Aligning System Engineering with Aerospace Standard AS9100D 2016		<p>Airborne early warning and control systems are complex system of systems performing varied functionalities to achieve emergent mission objectives, with high reliability and performance requirements. For these systems, to manage complexity and to meet stringent timelines, system engineering processes are adopted. At the same time the organization would like to adhere to aerospace standard AS9100D Quality Management system(QMS). In the scenario, it is imperative to have an Integrated QMS (IQMS) to ensure quality and customer satisfaction at the same time. This paper brings out alignment of SE processes with AS9100D to bring out IQMS for organizations developing avionics systems.</p>	10.1109/SPACE63117.2024.10667875	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10667875	IEEE Xplore

<p>Spatio-Temporal Aware Testing for Complex Systems</p>		<p>Nowadays, more and more systems are coordinated and controlled to compose globally-distributed, highly-complex systems of systems (SoS). Existing testing methods focus on single devices and on performance characteristics from the network architecture upwards, but ignore the innate complexity caused by the spatial and temporal separation of these systems over vastly differing scales. As a result, quality assurance of today's SoS is a major challenge, especially where there is a need to consistently and robustly account for the spatial and temporal context of systems. In this paper, we propose the development of a methodology that tests the rich spatial and temporal properties specified in the spatio-temporal aware models. We illustrate our approach based on a spatio-temporal modeling and reasoning language, namely BeSpaceD. Our research highlights the opportunity of developing a comprehensive tool framework for supporting the quality maintenance and improvement of today's spatio-temporal aware SoS.</p>	<p>10.1109/QRS-C.2017.97</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8004376</p>	<p>IEEE Xplore</p>
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Testing of Federated Autonomics in 5G Multi-Operator Scenarios, as a Use Case for Testbeds Federations for 5G & Beyond		<p>Future Networks in B5G and 6G will continue to expand in scale, complexity and interconnectivity, and will be highly shaped by distributed systems that serve various use cases that go beyond current Use Cases like mMTC (massive Machine Type Communications) and URLLC (Ultra Reliable Low Latency Communications) . This will be coupled with an increasing demand for autonomy in self-organization and self-management, automation and interoperability on a very dynamic flexible basis in what are called Autonomic/Autonomous Networks (ANs) [1]–[3]. Systems-of-systems architectures will become more relevant as multiple autonomous/semi-autonomous systems adaptively seek to operate and interact with their peers (including symbiotic autonomous systems). The envisioned area of Federated Autonomics, Federated Testbeds and Testbed as a Service (TaaS) allows various SDOs/Fora to share the burden on specifications and standardization of the APIs prescribed by the recently standardized ITU-T Testbeds Federations Reference Model (ITU-T Q.4068). Furthermore, the need to align on</p>	10.1109/ICTC55196.2022.9952823	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9952823	IEEE Xplore
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		<p>roadmaps on Standards for Testbeds Federations by various SDOs/Fora in a harmonized and collaborative way is central to this work, while in general, all various stakeholders can then help contribute to capturing requirements to be fulfilled by the Testbeds Federations APIs. This work offers an opportunity in order to foster such developments. This paper presents Testing of Federated Autonomics in 5G Multi-Operator Scenarios, as a Use Case for Testbeds Federations for 5G & Beyond, and to provide</p>			
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Engineering Roles and Information Modeling for Industry 4.0 Production System Engineering		<p>Industrial production systems are complex automated systems-of-systems. Especially in case of Industry 4.0 production systems, their design phase relies on parallel cooperative work of engineers coming from several disciplines. This paper identifies key engineering roles and their interactions in the design phase. Based on the analysis of shared information among engineers, this paper contributes to the specification of an information model of shared common concepts. Such an information model is useful for designing a central repository in production system engineering projects as well as a basis for standardization processes and engineering tool evaluation. The roles and relevant information are based on lessons learned from the use case of an Industry 4.0 Testbed environment.</p>	10.1109/ETFA.2019.8869141	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8869141	IEEE Xplore
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About the Authors		<p>Integrated Vehicle Health Management: Implementation and Lessons Learned is the fourth title in the IVHM series published by SAE International. This new book introduces a variety of case studies, lessons learned, and insights on what it really means to develop, implement, or manage an integrated system of systems. Integrated Vehicle Health Management: Implementation and Lessons Learned brings to the reader a wide set of hands-on stories, made possible by the contribution of twenty-three authors, who agreed to share their experience and wisdom on how new technologies are developed and put to work. This effort was again coordinated by Dr. Ian K. Jennions, Director of the IVHM Centre at Cranfield University (UK), and editor of the previous books in the series.</p> <p>Integrated Vehicle Health Management: Implementation and Lessons Learned, with seventeen, fully illustrated chapters, covers diverse areas of expertise such as the impact of trust, human factors, and evidential integrity in system development. They are complemented by valuable insights on implementing APU health</p>		https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=8506002.pdf&bkn=8503530&pdfType=chapter	IEEE Xplore
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		management, aircraft health trend monitoring, and the historical perspective of how rotorcraft HUMS (Health and Usage Monitoring Systems) opened doors for the adoption of this cutting-edge technology by the global commercial aviation industry.			
Systems Engineering Baseline Concept of a Multispectral Drone Detection Solution for Airports		The baseline concept for a multispectral drone detection (MSDD) system for use in airports is generated. The baseline development process is based on a modified system of systems architecting withilities (SAI) method. The solution uses multiple independent sensors, which when the sensor outputs are combined, provide functionality that the individual systems were never intended to provide. Also, several sensors are pre-existing and have their own funding, operations, and management. The problem of drone detection is described and examples are given, which justify the need for the system. Then the specific need for airport protection is described. The result is a feasible baseline design that is capable of meeting the need.	10.1109/ACCES S.2017.2697979	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7911176	IEEE Xplore

Requirements for smart cities: Results from a systematic review of literature		<p>Smart cities are gaining increasingly more importance in both research and business circles. Much effort is spent to defining what a smart city is and how it could be realized with today's or future technologies. However, from requirements engineering perspective, our knowledge of smart cities is fragmented; little is known about the requirements for smart cities as complex systems, or as systems of systems, in specific application domains. In this paper, we elicit requirements for smart city systems by carrying out a systematic review of scientific literature focused on the so-called "hard" domains of smart cities. Based on 32 selected publications, we gathered and classified requirements in respect to three types of smart city systems (instrumented, interconnected, and intelligent systems) and four classes of requirements: end-to-end experience, architectural, security, and infrastructure requirements. Our most important findings are that: (1) most authors took a bottom-up approach to defining requirements for smart cities; their efforts focused mainly on requirements important for designing an</p>	10.1109/RCIS.2018.8406655	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8406655	IEEE Xplore
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		architecture that could scale up to any size and include any device or system; and (2) very little is mentioned on the newly emerging security and privacy challenges that are critical to gain the citizens' acceptance of smart city apps.			
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An Arrowhead and Mimosa Based IoT Framework with an Industrial Predictive Maintenance Application		<p>Manufacturing is undergoing an immense change triggered with widespread sensorisation, volumes of data being generated, and advanced machine learning technologies. Problems once solvable via simpler approaches considering more monolithic paradigms have evolved to become larger systems (Cyber Physical Systems; CPS) and Systems of Systems. The scaling, manageability, security, data handling requirements of such systems, as well as the industry's common goal to reusability have led to several outcomes at the broader European level, Arrowhead and Mimosa being two of those so far. In this study, we consider an Industry 4.0 "Predictive Maintenance" problem. Instead of a rushing with straight data analysis approach as defined under CRISP-DM, we first delve into creating a more widely consumable and reusable set of building blocks by implementing an Arrowhead and Mimosa framework, which together form the route to the machine learning steps that finally lead to the solution.</p>	10.1109/INISTA52262.2021.9548127	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9548127	IEEE Xplore
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Information Modeling of Cyber-Physical Systems using OPC-UA		<p>Achieving interoperability is a great challenge in the area of Cyber-Physical Systems (CPSs) because of the specificities of these systems, which are complex distributed systems, mostly in the form of systems of systems that are an intersection of information and operational technologies with emergent behavior, acting in different time scales, with different granularities and accuracies, interacting with the operating environment. The main purpose of the research is to propose an information model for the development of service-oriented CPSs using OPC UA and generate sub-models for the Asset Administrative Shell (ASS). CPSs are multi-layered, service-oriented, and agent-based systems that enable the grouping of system elements at levels, reduce connections between modules, facilitate abstractions, and allocate responsibilities. The proposed approach is illustrated by an example of improving the interoperability of a pilot batch reactor.</p>	10.1109/ICA152893.2021.9639480	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9639480	IEEE Xplore
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Statistical Analysis Methods for Interdependency Communication in Distributed Systems		Critical infrastructure assets contribute to the economy and society as a whole. Their impact on the security, economy and health sector are extremely vital. However, their increasing complexity has led to the creation of direct and indirect interdependent connections amongst the infrastructure groupings. In this paper, the development of a distributed support system is presented. The system employs behaviour analysis techniques to support interconnected infrastructures and distribute security advice throughout a distributed system of systems. The approach put forward is tested through a statistical analysis method approach in order to investigate the cascading failure effect whilst taking in to count the independent variables.	10.1109/DeSE.2016.42	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7930659	IEEE Xplore
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ISO/IEC/IEEE Approved Draft Standard - Systems and Software engineering - - System Life Cycle Processes		<p>This document establishes a common framework of process descriptions for describing the life cycle of systems created by humans, defining a set of processes and associated terminology from an engineering viewpoint. These processes can be applied to systems of interest, their system elements, and to system of systems.</p> <p>Selected sets of these processes can be applied throughout the stages of a system's life cycle. This is accomplished through the involvement of stakeholders, with the ultimate goal of achieving customer satisfaction.</p>		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10048748	IEEE Xplore
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<p>Scalable prototyping testbed for MMW imager system</p>		<p>A prototyping testbed for an experimental millimeter-wave multiple-input multiple-output (MIMO) radar system for security applications in high foot-traffic areas will be presented. The system is designed for flexible operation at a 10 Hz video rate, enabled by high-speed electronic scanning and real-time signal processing. Overall imaging system costs are reduced by the use of an innovative ultra-sparse multistatic radar solution and a 3-D near-field beamforming image construction technique targeted for low-cost high-throughput GPU processors. The testbed is architected with FPGAs, GPUs, CPU, storage, and networking, capable of supporting future growth in capabilities, such as interference suppression & advanced signal processing algorithms, auxiliary sensing modalities, near-sensor analytics, and integration into a system-of-systems security architecture.</p>	<p>10.1109/ARRAY.2016.7832574</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7832574</p>	<p>IEEE Xplore</p>
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Reengineering autonomic components in legacy software systems: A case study		<p>Modern enterprise-scale software systems in the retail industry are often implemented as systems of systems that are composed of one or more legacy software components making up parts of a supply chain that deliver products to both in-person and online customers. The systems are often one-off complex implementations tailored to the needs of that particular stakeholder. System components may communicate with other internal legacy components like accounting and warehousing systems or external third-party components that handle order processing, security screening, or shipping-related tasks. From time to time, stakeholders may need to adapt their systems by replacing or modifying one or more of the sub-system components to operate on new hardware, communicate with other components using different data communication techniques, or to interact with new external third-party solutions. It is therefore useful for solutions for the individual components to be designed with an architecture that lend themselves to be easily reengineered or replaced without disturbing the other system</p>	10.1109/SYSCON.2017.7934780	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7934780	IEEE Xplore
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		<p>components, and without adding significant complexity to the overall system of systems. In prior works, the authors of this paper introduced in a series of case studies a repeatable architectural design pattern that implemented self-adaptive autonomic interaction managers (AIMs) that not only reduced or eliminated the need for human operators to monitor, tune, or troubleshoot the implemented components, but could be easily modified or reengineered in the future to adapt to new operating environments. The contribution of this paper is the testing of the efficacy of the AIM design introduced in prior works by the authors, by simulating the reengineering of a set of AIMs tasked with handling web-based order traffic between the stakeholder system and Amazon.com. In this effort, the AIMs were re-implemented on a different operating system, coded in a different programming language than the original implementation, using a different data communication protocol to communicate with other systems. The authors simulated web-based order traffic to test the resulting implementation.</p>			
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		<p>The effort demonstrated that using the original autonomic design patter, AIMS could be rapidly adapted to a new environment, while maintaining original behavior and without adding complexity to the stakeholder's system.</p>			
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Enforcing domain segregation in unified cabin data networks		<p>In systems of systems designing access control policies is a complex task, especially when each system has its own high-level security policy requirements. There is no general way of expressing policies with generic rules, because policies commonly have scenario-specific characteristics. A graph-based system of systems model is applied, which incorporates an attribute-based approach to model scenario-specific characteristics of policies. The model is based on simple graph and set theoretical methods. The access control system establishes virtual channel objects, which enforce access to a resource. Channels are characterized by attributes of channel source and channel destination. The specific channel characteristics are computed at run-time and policy evaluation is performed on these virtual channel objects. This allows policy design for channels without explicitly knowing a specific channel. The concept is evaluated by simulating three use cases to demonstrate scalability and feasibility.</p>	10.1109/DASC.2017.8102105	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8102105	IEEE Xplore
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Towards Efficient Control-Flow Attestation with Software-Assisted Multi-level Execution Tracing		<p>In the face of an increasing attack landscape, it is necessary to cater for efficient mechanisms to verify software and device integrity for detecting run-time modifications in next-generation systems-of-systems. In this context, remote attestation is a promising defense mechanism that allows a third party, the verifier, to ensure a remote device's configuration integrity and behavioural execution correctness. However, most of the existing families of attestation solutions suffer from the lack of software-based mechanisms for the efficient extraction of rigid control-flow information. This limits their applicability to only those cyber-physical systems equipped with additional hardware support. This paper proposes a multi-level execution tracing framework capitalizing on recent software features, namely the extended Berkeley Packet Filter and Intel Processor Trace technologies, that can efficiently capture the entire platform configuration and control-flow stacks, thus, enabling wide attestation coverage capabilities that can be applied on both resource-constrained devices and cloud services.</p>	10.1109/MeditCom49071.2021.9647635	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9647635	IEEE Xplore
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		Our goal is to enhance run-time software integrity and trustworthiness with a scalable tracing solution eliminating the need for federated infrastructure trust.			
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Identifying and Architecting Microservices for Edge Computing		<p>Microservices architecture (MSA) paradigm extends Service Oriented Architecture (SOA) to focus on specific aspects such as design of small lightweight services as independent cohesive components, development and service management using agile and DevOps methodologies and service delivery based on distributed data management and decentralized service governance and more. MSA thus has become a widely used architectural style for designing modern applications due to advantages like granular scalability and maintainability, especially in today's world of 'system of systems'. Edge computing facilitates segregation of computing responsibilities between edge devices and cloud infrastructure to process and analyze data acquired by edge devices. The number of IoT devices is increasing at such a high rate that the need for Edge AI is expected to reach the value of investment to USD 72.6 billion by 2030. The edge analytics bring correlated research challenges from the areas of cyber and physical security, data privacy, maintenance support, access,</p>	10.1109/ICSA-C65153.2025.00032	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11015071	IEEE Xplore
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		latency, reliability, power consumption and remoteness into the scope and require innovation at architecture level as does the improvement in all systems' quality related attributes. In this tutorial we discuss how microservices paradigm can be used effectively for edge computing-based systems resulting in a sustainable architecture with lower dependency on the data-center / cloud architecture.			
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Reference Architectures for Smart Grids: Towards a Standard-based Comparative Framework		<p>To overcome the challenge of the architectural design of smart grid as complex system of systems, several Smart Grid Reference Architectures (SGRAs) have been developed. These architectures not only guide the design and implementation of smart grid, but also address the critical underlying issues like security and interoperability. However, existing SGRAs are neither lexically aligned, nor structured alike. This impedes their understanding, transferability to other projects, and hence dissemination, essentially in the absence of a unified framework for analyzing them. To fill this research gap, the current paper proposes a standard-based framework for comparing SGRAs. By clarifying the similarities and differences, such framework would be actionable for both academics and practitioners who are interested in, but not acquainted with the SGRAs. Moreover, being standard-based, the proposed framework paves the way for improving and aligning legacy and future SGRAs. Hence, it yields a first step towards a unified framework for SGRAs comparison. For the sake of validity, the framework is applied to two</p>	10.1109/ICEET53442.2021.9659739	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9659739	IEEE Xplore
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		well-known SGRAs.			
Advanced Visualisation of Big Data for Agriculture as Part of Databio Development		<p>There is an increasing tension in agriculture between the requirements to assure full safety on the one hand and keep costs under control on the other hand, both with respect to (inter)national strategies. Farmers need to measure and understand the impact of huge amount and variety of data which drive overall quality and yield in their fields. Among others, those are local weather data, Global Navigation System of Systems data, orthophotos and satellite imagery, data on soil specifics etc. A strong need to secure Big Data arises due to various repositories and heterogeneous sources. Data storage and visualisation requirements are in some cases competing as they are a common interest as well as a threat that helps one part of a value chain to gain a higher profit. As demonstrated in this paper, handling (Big) data is therefore a sensitive topic, where trust of producers on data security is essential.</p>	10.1109/IGARSS.2018.8517556	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8517556	IEEE Xplore

<p>ISO/IEC/IEEE Draft Standard - Systems and software engineering -- Part 9: Application of system and software life cycle processes in epidemic prevention and control systems</p>		<p>Many countries have adopted information-based prevention and control measures during the epidemic, and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are most likely to be completed in the event of an epidemic. Compared with the normal state, there will be special situations such as poor communication caused by the need for personnel to maintain a safe distance; limited transportation and logistics, resulting in insufficient infrastructure protection; short delivery cycles and frequent iterative upgrades; and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In this case, it is believed that in the development process of epidemic prevention and control systems, the application of the life cycle process method specified in the ISO/IEC/IEEE 15288:2015 or ISO/IEC/IEEE 12207 standards can effectively help guide the process management and application of the</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9844680</p>	<p>IEEE Xplore</p>
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		epidemic prevention and control systems.			
Smart Connected Homes		<p>Nowadays, a growing interest from industry has caused the smart home to evolve from a place that was focused on automation of home appliances to an intelligent Internet connected environment. This environment features sensors, actuators, and systems implementing services that enhance the comfort and convenience as well as contribute to a more energy efficient and safe society. The modern home has become a complex information system with huge potential gains, but also in need of a broad scientific approach. This chapter introduces smart connected homes, describing their underlying technologies, architectures, and offered services that surround this domain. Based on the idea of the smart connected home as a system of systems, a discussion of ongoing and emerging research challenges with respect to security and privacy, interoperability support, reliability, and usability, is also provided.</p>	10.1002/9781119456735.ch13	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=8390861.pdf&bkn=8390726&pdfType=chapter	IEEE Xplore

Accountability in the IoT: Systems, Law, and Ways Forward		<p>The physical, ubiquitous, and autonomous nature of the emerging Internet of Things (IoT) raises various accountability challenges relating to safety and security, privacy and surveillance, and governance and responsibility. The authors consider the IoT's emerging systems-of-systems nature, providing the broad legal context for addressing these concerns and highlighting directions and opportunities for improving levels of accountability in the applications, systems, and services that will increasingly pervade society.</p>	10.1109/MC.2018.3011052	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8423131	IEEE Xplore
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Securing user identity and transactions symbiotically: IoT meets blockchain		<p>Swarms of embedded devices provide new challenges for privacy and security. We propose</p> <p>Permissioned Blockchains as an effective way to secure and manage these systems of systems. A long view of blockchain technology yields several requirements absent in extant blockchain implementations. Our approach to Permissioned Blockchains meets the fundamental requirements for longevity, agility, and incremental adoption. Distributed Identity Management is an inherent feature of our Permissioned Blockchain and provides for resilient user and device identity and attribute management.</p>	10.1109/GIOTS.2017.8016280	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8016280	IEEE Xplore
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Domain Process Model Overcome Limitations of Engineering Models for Developing Artificial Intelligent Systems		<p>The integrated set of prognostic domains (ISPD) of technology presented here provides a normative means to construct a wholly new process model for guiding Technology Management of Artificial Intelligent Systems (AIS). Seventeen domains represent all-inclusive stakeholder perspectives that encapsulate lifecycle analyses, evaluations, feasibilities, and tradeoffs with the domain contexts. Following Systems Model-Based thinking (SMBT), a postulated focal point interaction is the entry condition from which each domain is considered and thereafter traversed. Domains are interactive with each other through concurrent, iterative, recursive, and non-recursive processes. This interactive work continues until the completion milestones of each domain are satisfied. Techniques such as agile, progressive, prescriptive, and spiral are used as appropriate to reconcile functional and process requirements, risk, schedule, and budget. An important factor of ISPD is that multiple concepts of operation, widely diverse architectures, and explicitly</p>	10.23919/PICMET.2019.8893881	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8893881	IEEE Xplore
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		<p>differentiable designs are inevitable and highly desirable. The entire gamut of interactions of AIS with other posited systems is exposed and examined by the work carried out in each domain. While the ISPD was inspired by the use of SMBT with traditional process models, the essences of ISPD were extracted from developing systems of systems products and services. SMBT was piloted on a one-year project to integrate informational, social, and behavioral exchanges between humans and intelligent systems. This paper introduces SMBT for designing and building AIS by applying ISPD.</p>			
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<p>A Governance Model for Local and Interconnecting Arrowhead Clouds</p>		<p>Information exchange between various elements of industrial systems is one of the cornerstones of the Industry 4.0 movement. Building system-of-systems based on the principles of Service Oriented Architectures (SOA) brings flexibility to these heterogeneous infrastructures. In the SOA concept, information exchange is realized through services provided and consumed by systems. This paper proposes new elements to the a governance model of the SOA-based Arrowhead framework that aims to provide interoperability and integrability solutions for industrial system-of-systems. As some operational aspects are already covered within the Arrowhead Local Clouds - and even for inter-cloud servicing - while these clouds are set up and running, there are uncovered issues regarding the development and deployment procedures. The gaps this paper intends to fill include governing Arrowhead Local Cloud deployments, as well as enabling secure and trusted interactions among Local Clouds with the help of various systems from a global Arrowhead interconnect.</p>	<p>10.1109/IECON43393.2020.9254354</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9254354</p>	<p>IEEE Xplore</p>
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From Systems to Ecosystems: Rethinking Adaptive Safety		<p>The evolution of software systems into more complex ecosystems creates new challenges in ensuring their safe and secure behavior. As the complexity of software ecosystems is inherently higher than regular systems, existing safety mechanisms are no longer reliable in their context. This paper introduces a research path towards adaptive safety mechanisms that can support the degree of dynamism and high level of uncertainty introduced by these systems of systems. Our planned approach is to use runtime trust evaluation as a decision factor when enabling or disabling safety features on demand.</p>	10.1145/3524844.3528067	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9799888	IEEE Xplore
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Comprehensive Assessment of Orbital Robotics, Space Application Simulation/Machine Learning, and Methods of Hardware in the Loop Validation		<p>The space industry's continued focus and advances in safe reusable launch vehicles have ushered in a new affordable age of space flight, enabling a wider range of enterprises and organizations to launch and operate space-based assets in low earth orbit and beyond. Ensuring and extending mission life cycles of these orbital assets to include launch vehicles, satellites, and space stations will require a new generation of adaptive, robust, and autonomous robotic systems. Merging proven orbital dynamics, relative motion, robotic kinematics, and spacecraft rendezvous/docking with new advances in Machine Learning, Computer Vision, Data communications, and many more exciting fields of study. These efforts intend to provide future enterprises with the capability to perform On-Orbit Servicing and Maintenance (OSAM) of failed or damaged space assets, in-space assembly of new platforms, and manufacturing of components. However, the means to validate individual hardware and software components of these technologies and test the collaborative "system of systems" at a</p>	10.1109/AERO53065.2022.9843216	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9843216	IEEE Xplore
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		<p>large scale are still largely in their development stages. This paper is a comprehensive survey and assessment of the current and near-future technical developments in the fields of space simulation and validation, orbital robotics, and space-based automation; identifying the current gaps and capability necessary for large scale industry validation and employment of these systems. Finally, it will also illustrate some of the on-going research being conducted at Virginia Tech's space labs to address some of these gaps in the future.</p>			
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Detection of the False Data Injection Attack in Home Area Networks using ANN		<p>The combination of high penetration of distributed energy resources with fusion of unprotected data from several sources such as digital sensors (e.g., synchrophasors, smart meters, digital relays etc.) and controllers of systems of systems (SoS) that are connected via internet networks invites more vulnerability and thus become possible vectors for potential security risks. These cyber-risks could compromise the confidentiality (C), integrity (I), and availability (A) of the system, and eventually can lead to physical tampering of devices and its systems resulting in severe economic loss. In this paper, an Artificial Neural Network (ANN) based approach is proposed to detect the false data injection attack in the Home Area Networks. An early and accurate detection of false injected measurements are essential to undertake appropriate countermeasures to avert potential risks. The implemented ANN model is trained and tested extensively on a data set containing energy profile of 200 U.S. households that models FDI attack using two attack scenarios (e.g., on-peak and off-peak hours) with</p>	10.1109/EIT.2019.8834036	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8834036	IEEE Xplore
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		<p>Sigmoid and Trapezoidal representations, and three activation functions. Then, ANN model is compared against other machine learning methods for evaluation. Several performance metrics such as accuracy (a) and probability of detection (Pd) are used. The preliminary results of ANN show promising results with Pd values reaching 99.4% on over support vector machine (Pd =80.5%) and random forest (Pd =88.2%) methods. Thus, deploying such detection algorithms at home area network levels will help identify and reduce these false data injection attacks.</p>			
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Research on Cyber-Physical Fusion Test and Verification for Remote-Controlled Ship		<p>In recent years, with the development of cyber technology in the fields of control, communication and computer, the Cyber-Physical System which integrates sensing, network and computing power has been widely concerned by academia and industry, and has been applied in the complex system (System of systems, SOS) of automobile, aerospace, rail transit and so on. Ship remote-control refers to the application of mobile communication and other high technology to control the ship navigation at the remote-control station and non-pilot position, which is a typical Cyber-Physical system with timely human-machine-environment interaction and cooperative operation. In order to realize the on-demand response, fast iteration and dynamic optimization of resource allocation and operation in the ship remote-control system and verify the reliability and safety of ship navigating in the remote-control mode, based on the theory of cyber-physical fusion, and on the basis of analyzing the functions of the remote-control system, this paper constructs the ship remote-control cyber-physical fusion architecture and test verification</p>	10.1109/ICTIS60134.2023.10243800	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10243800	IEEE Xplore
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		system. Conduct research on testing methods for hardware reliability, software reliability, network reliability, and cyber security of remote-controlled ships, and construct a comprehensive testing and verification method for ship remote-control. Finally, we selected a model test method of network connectivity to verify the effectiveness of the method.			
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<p>ISO/IEC/IEEE Approved Draft International Standard - Systems and software engineering -- Part 9: Application of system and software life cycle processes in epidemic prevention and control systems</p>		<p>Many countries have adopted information-based prevention and control measures during the epidemic, and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are most likely to be completed in the event of an epidemic. Compared with the normal state, there will be special situations such as poor communication caused by the need for personnel to maintain a safe distance; limited transportation and logistics, resulting in insufficient infrastructure protection; short delivery cycles and frequent iterative upgrades; and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In this case, it is believed that in the development process of epidemic prevention and control systems, the application of the life cycle process method specified in the ISO/IEC/IEEE 15288:2015 or ISO/IEC/IEEE 12207 standards can effectively help guide the process management and application of the</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10011143</p>	<p>IEEE Xplore</p>
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		epidemic prevention and control systems.			
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Zero-crossing analysis of Lévy walks for real-time feature extraction: Composite signal analysis for strengthening the IoT against DDoS attacks		<p>This paper compares the probability similarities between a cyberattack, the distributed denial-of-service, and the mathematical model of probability, Lévy walks. This comparison aims to explore the validity of Lévy walks as a model resembling the DDoS probability features. This research also presents a method, based on the Smirnov transform, for generating synthetic data with the statistical properties of Lévy-walks. This method for synthetic data generation can be utilized for generating arbitrary prescribed probability density functions (pdf). The Smirnov transform is used to solve a cybersecurity engineering problem associated with Internet traffic. The synthetic Lévy-walk process is intertwined with sections of other distinct characteristics (uniform noise, Gaussian noise, and an ordinary sinusoid) to create a composite signal, which is then analyzed with zero-crossing rate (ZCR) within a varying-size window. This paper shows that it is possible to identify the distinct sections present in the composite signal through ZCR. The differentiation of these sections</p>	10.1109/ICCI-CC.2016.7862027	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7862027	IEEE Xplore
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		<p>shows an increasing ZCR value as the section under analysis exhibits a higher activity or complexity (from the sinusoid, to a synthetic Lévy-walk process, and uniform and Gaussian noise, respectively). The advantages of the ZCR computation directly in the time-domain are appealing for real-time implementations. The varying window in the ZCR produces more defined values as the window size increases. The changing world of security systems is deeply considered, in an approach for its improvement. This as our society is highly dependent on electronically interconnected systems-of-systems demanding operational robustness and security. The approach proposed for providing a higher degree of security aiming to the development of cognitive security systems.</p>			
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<p>CrowdStrike: Lessons in Mission Assurance to Build Resilience for Complex Cyber-Physical-Social-Systems</p>		<p>Computer systems exist to meet the explicit needs of the organisations they support. As such, the drive to protect computer systems increasingly relies on Mission Assurance - a need to guarantee service outcomes to the organisation. Building resiliency in Complex Cyber-Physical-Social Systems (C-CPSS) is an imperative challenge that requires a mission-centric approach to cyber security that extends beyond the traditional considerations of hardware and software. C-CPSS are complex systems-of-systems that contain cyber, physical, and social components. They sit on the edge of chaos and can exhibit emergent behaviours that are difficult to predict or control. Due to their interconnection across a broad range of societal services, a single cyber security incident in a C-CPSS can have cascading consequences. This work examines the 2024 CrowdStrike outage as a case study of a C-CPSS failure, where services across the world were significantly degraded due to a lack of error handling in a misconfigured file. This degradation extended beyond the cyber domain,</p>	<p>10.1109/ACCESS.2025.3634514</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11259065</p>	<p>IEEE Xplore</p>
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		<p>and included aircraft cancellations, hospitals cancelling surgeries, failures in e-commerce, and impacts on essential government services across the globe. This lowers the trust in those services and had impacts beyond the cyber domain. This paper explicitly examines the C-CPSS elements affected to illustrate the importance of considering C-CPSS factors in cyber security design and Mission Assurance practices, so that wider systems can become more resilient to emergent, unexpected, and potentially catastrophic effects. Although this event was not explicitly an intentional security failure, this work also discusses how the need for resilience would be applied to large-scale attacks such as the type conducted by Advanced Persistent Threats.</p>			
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Computational Intelligence Approach to SoS Architecting and Analysis		<p>Summary</p> <p><p>&#x201c;System&#x2010;of&#x2010;Systems&#x201d; (SoS) is an emerging and essential multidisciplinary area of systems engineering impacting various systems across multiple disciplines. SoS are difficult to optimize and understand due to their adaptive emergent behaviors, dynamically changing system boundaries, nonlinear inputs and outputs, as well as multiple stakeholders with competing goals. The individual systems alone cannot independently achieve the overall goal of the SoS and are dependent upon each other. The constant interaction between the systems and the interdependencies produces emergent properties that cannot be fully accounted for, analyzed, and optimized by the &#x201c;normal&#x201d; systems engineering practices and tools. SoS engineering (SoSE) is an emerging discipline in systems engineering that attempts to create methodologies for approaching SoS problems in various disciplines. The SoS architecture organization of these systems involves many of web&#x2010;like connections and demonstrates the ability of individualized</p>	10.1002/9781394203314.ch30	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10524702.pdf&bkn=10523217&pdfType=chapter	IEEE Xplore
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		<p>adaptability. Meta-architecting can help achieve the optimized architecture for these complex SoS. A form of meta-architecting is the Flexible and Intelligent Learning Architectures for System of Systems (FILASOS) utilizes a straightforward system definitions methodology and an analysis framework that supports the exploration and understanding of the key trade-offs and requirements by a broad range of SoS stakeholders and decision-makers. FILASOS and the Wave Process address SoS architecting's most challenging aspects and pain points. Developing models of acknowledged SoS architectures can assist in discovering and defining issues, satisfying problems with stakeholder needs, and analyzing the impact of policies through the rules on architecture selection. Key performance attributes that depend on architecture selection can be discovered through facilitated interactions with stakeholders and subject-matter experts (SMEs). Relatively simple fuzzy rule-based systems can be created and</p>			
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		<p>combined with the key performance attributes (KPA)s evaluations for an overall SoS assessment. A fuzzy genetic approach is utilized for finding solutions to several SoS architecting problems integrated with a restrictive meta-model of undirected network graphs representing the system interfaces. Defining the boundaries of the membership functions and changing them independently is an excellent way to quickly get answers about the problem. Following the FILA-SoS makes it relatively easy to switch back to the real values to perform a what-if analysis. Two use cases highlighted in this chapter are cybersecurity and healthcare, but a list of many more use cases in research are given at the end of the chapter. Both use cases utilized the SoS Explorer. For the health care use case, a meta-architecture was created for the organ procurement SoS to optimize for selecting the best participating systems for a given set of donor kidneys. Utilizing the KPAs, fuzzy membership functions, rules, and genetic algorithms, two use cases were optimized using a fuzzy inference to</p>			
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		<p>find the best meta-architecture for the healthcare SoS. The rules of the fuzzy inference engine represent non-linear trade-offs associated with KPAs of multiple stakeholders. For the cybersecurity use case, meta-architecture and optimization is demonstrated through connecting genetic algorithm with fuzzy inference system (FIS) to provide an intuitive and interactive visualization of meta-architectures.</p>			
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<p>Critical Analysis of Palliative Homecare Using the \mathbf{i}^{\ast} Framework's Strategic and Social Requirements Modelling Applied to a Cancer Care Organisation</p>		<p>Home Health Care (HHC) is an essential and critical part of palliative care and especially for terminal cancer patients. This research is aimed as a first attempt to align with the research gap in modelling the social requirements of palliative care processes and the HHC process in particular. Consequently, this research is a first attempt at developing an \mathbf{i}^{\ast} framework visual goal-oriented and social requirements models of the HHC process of the domain of palliative care with a reflected application using a case study from a leading regional cancer centre in the Middle East, namely KHCC. Furthermore, this research has made it possible for palliative care domain experts in the HHC process and using the associated \mathbf{i}^{\ast} framework strategic dependency and strategic rationale models to visually trace the most critical and strategic actors in the HHC process along with the highly interacting dependers and dependees. Finally, the HHC \mathbf{i}^{\ast} strategic models contribute to bridging the gap between the world of palliative care requirements and their reflective computer-based information systems and \mathbf{IoT}</p>	<p>10.1109/ACIT57182.2022.9994182</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9994182</p>	<p>IEEE Xplore</p>
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		<p>smart devices. Hence, this sheds light towards the realisation of the field of palliative care as being a “systems of systems” virtual organisation with the respective socio-technical systems involvement, for the best care of the palliative patient and especially terminal cancer patients. A further corollary of this research is the insufficiency and less representativeness of palliative care process models to utilise in guiding the development of the HHC \mathbf{i}^{last} framework strategic models without linking to the full associated strategic and policy documents of palliative care.</p>			
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Entrepreneurship as a Multidisciplinary Project		<p>This chapter elaborates on a holistic perspective to entrepreneurship, with details on its various components and interrelations. It presents a systemic model for the planning and operation of an entrepreneurship initiative in context of the Fourth Industrial Revolution (4IR). Main features and insights of entrepreneurship as a multidisciplinary project can be naturally integrated into the 4IR. An entrepreneurship is a complex and complicated entity due to the many ingredients involved and to the reciprocity between them, especially in a dynamic environment characterized by uncertainty, threats, and risks. The purpose of the entrepreneurship is to offer a noticeable added value based on innovation. Given the external world conditions, if the entrepreneurship can identify and utilize the opportunity to initiate an activity that is accepted by the market, it can be defined as a multiple disciplinary systemic project. The leadership and management team of the entrepreneurship initiative is running a “system of systems” project, requiring an embedded systematic approach.</p>	10.1002/9781119513957.ch20	https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=9822947.pdf&bkn=9820812&pdfType=chapter	IEEE Xplore
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<p>Integrating R&M Throughout UAF, Case Study: NASA Infrastructure</p>		<p>This paper proposes an approach to incorporate Reliability and Maintainability (R&M) tasks into the digital model of a complex system of systems, leveraging model-based systems engineering (MBSE) and the unified architecture framework (UAF). The benefits and significance of this integration are analyzed, and a real-world implementation as part of an ongoing effort with NASA is presented. The effective handling of R&M tasks, such as risk analysis, Fault Tree Analysis (FTA), or Failure Mode and Effect Analysis (FMEA), is critical to large organizations that are faced with significant backlogs of deferred maintenance and large annual maintenance budgets. A significant accomplishment highlighted in this article is the integration and unified modeling of questions within the FMEA process. The approach presented herein aims to model the infrastructure of a large organization to help address the backlog of deferred maintenance and minimize the risk that unreliable and/or unavailable infrastructure may have on the ability of such organizations to successfully carry their missions. The integration of risk and reliability</p>	<p>10.1109/RAMS51492.2024.10457674</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10457674</p>	<p>IEEE Xplore</p>
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		<p>information is essential to the development of a comprehensive digital representation of a system. Inevitably, integrating R&M activities into the digital engineering ecosystem (DEE) has become a recognized need. This is illustrated by recent efforts from the Object Management Group (OMG) to develop a beta version of a new modeling language called RAAML (Risk Analysis and Assessment Modeling Language). RAAML [1] helps assess the performance of various analysis techniques including FMEA, FTA, Systems Theoretic Process Analysis (STPA), Goal Structuring Notation (GSN), and ISO 26262 Road Vehicles Functional Safety using MBSE. While MBSE serves as a valuable foundation for the DEE, it alone does not offer a complete solution for modeling complex enterprise architectures. One of the key challenges is the absence of a standardized modeling approach, which can hinder effective collaboration and information sharing across organizations. To address this gap, enterprise architecture frameworks have been developed to provide a unified modeling approach. Among</p>			
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		<p>these frameworks, the UAF stands out as a recent development that enables organizations to establish a cohesive and standardized architecture [2]. By adopting UAF, organizations can collaborate seamlessly, share information effectively, and achieve a unified architecture that spans various domains and stakeholders. UAF serves as a valuable tool in enhancing the modeling capabilities within the DEE and enables organizations to tackle the complexities of enterprise architecture more efficiently. Collaborating with NASA stakeholders, Global Technology Connection, Inc. (GTC) and the Aerospace Systems Design Laboratory (ASDL) at the Georgia Institute of Technology are creating a digital representation of NASA Goddard Space Flight Center (GSFC)'s enterprise, enabling data-driven decision-making to help minimize the impact that unavailable facilities/capabilities (due to repair, etc.) may have on mission success. This effort aligns with NASA's goal of modernizing digital systems for managing aging infrastructure [3]. In particular, the objective of this paper is to further emphasize and</p>			
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		<p>demonstrate, through a real-world implementation of MBSE/UAF to an infrastructure problem, the benefits that such model-based approaches can bring to the R&M community at large. This paper also recommends two practical initiatives to facilitate the integration of R&M activities into a DEE: • Skill Enhancement for Reliability and Safety Engineers in MBSE • Collaboration between MBSE and R&M Software Vendors to share knowledge and expertise</p>			
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Needle-in-the-Haystack: On Automatic Risk-based Searching to Stop Cyber- Physical Threats in Large- Scale Power Systems		Power grid infrastructure is cyber-physical in nature where a geographically distributed electrical network is monitored and controlled using a vast network of computers or cyber infrastructure. Understanding this cyber-physical interconnectedness is critical to assessing and improving the risk posture of the power grid with respect to cyber threats. We present an analysis of cyber-physical risk approaches to help utilities improve grid defense: cyber-physical situational awareness and control under adversarial presence. A 200-bus cyber-physical power system is analyzed as a case study. Finally, we discuss opportunities for improved automated risk analysis in decision-making problems, for trustworthy response in emerging cyber-physical-human system-of-systems.	10.1109/CISS59072.2024.10480201	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10480201	IEEE Xplore
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<p>An architecture for mitigating near earth object's impact to the earth</p>		<p>Near-Earth Objects (NEOs), like species extinction events, present a great threat to our home planet and human kind. The motivation of designing this architectural framework is the current lack of structured architecture for the process of detecting, characterizing and mitigating these NEO threats. Due to the recent establishment of the NASA's Planetary Defense Coordination Office (PDCO), it is critical to link the individual facilities conducting separate research with an objective of forming a clearly defined collaborative system based on data reporting and sharing. The architectural framework is designed for integrating the process of detecting, characterizing and mitigating NEO threats. The goal of designing the architecture is to organize current data and resources into useful information and correlate that information with the goals of the NEO mitigation study. The architectural framework will enable scientists, organizations, and decision makers to locate, identify and resolve semantic confusion, properties, facts, constraints and issues with potentially hazardous asteroids. Our</p>	<p>10.1109/AERO.2017.7943594</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7943594</p>	<p>IEEE Xplore</p>
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		<p>major focus is to design the data and information flow that models the complete process from NEO detection, to designing the mitigation strategies. A secondary focus is to develop a system-of-systems architecture to describe the supporting infrastructure for the framework. The framework is also built with the opportunity to leverage future assets from the broader Planetary Defense (PD) community, and identify/speed up relevant PD research and response.i</p>			
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<p>Risk-Based Software Development Practices for CREATE Multiphysics HPC Software Applications</p>		<p>The January/February 2016 issue of this magazine presented descriptions of the US Defense Department's Computational Research and Engineering Acquisition Tools and Environments (CREATE) program and the software engineering approach for managing its programmatic risks. This article describes the software engineering methodology deployed to manage the development risks faced by CREATE, that is, the risks arising in the product development cycle and environment. The approach here is similar to the one for the management of CREATE programmatic risks and is based on a set of shared development practices. The management of these risks is especially challenging in the environment of distributed teams developing physics-based, system-of-systems, high-performance computing software anchored in the three military departments. The CREATE experience provides a concrete example of successful implementation of best software engineering practices in a computational science and engineering milieu that has</p>	<p>10.1109/MCSE.2016.108</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7723798</p>	<p>IEEE Xplore</p>
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		historically questioned the value of traditional software engineering wisdom and has resisted the adoption of plan-centered software engineering processes. It has allowed CREATE to adopt important software engineering practices such as use case-centered requirements management, use of pilot projects to align customer and developer expectations, continuous code integration of modular components, and scalable product support models, among others.			
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Keyless Signature Blockchain Infrastructure: Facilitating NERC CIP Compliance and Responding to Evolving Cyber Threats and Vulnerabilities to Energy Infrastructure		<p>The U.S. power grid is a complex system of systems that requires secure, reliable and trustworthy energy delivery systems. Grid modernization has increased the speed and size of data sets exchanged on these systems. Exasperating the challenge is these systems are increasingly distributed creating new data fidelity and interoperability challenges for grid operators struggling to balance and incorporate distributed energy resources. Blockchain technology provides an atomically verifiable cryptographic signature to help increase the trustworthiness of energy delivery systems at the grid's edge. This is especially important as distribution level as energy delivery systems and field devices have increasing operational and security requirements that are often diametrically opposed: as data, speed and analytic requirements increase, security and functionality requirements increase, as the grid's edge incorporate distributed energy resources and transacts in real time, availability is prioritized over the integrity and confidentiality of that data. This paper explores how a keyless signature blockchain</p>	10.1109/TDC.2018.8440380	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8440380	IEEE Xplore
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		infrastructure (KSBI) technology may help facilitate NERC CIP compliance and securing critical energy infrastructure from evolving cyber threats and vulnerabilities.			
ISO/IEC/IEEE Draft International Standard - Systems and software engineering – Methods and Tools for Model-based Systems and Software Engineering		<p>This International Standard, within the context of methods and tools for MBSSE:</p> <ul style="list-style-type: none"> • Provides terms and definitions related to MBSSE; • Defines MBSSE-specific processes for model-based systems and software engineering; the processes are described in terms of purpose, inputs, tasks, and outcomes; • Defines methods to support the defined tasks of each process; • Defines tool capabilities to automate/semi-automate tasks or methods. The processes defined in this document are applicable for a single project, as well as for an organization performing multiple projects. These processes are applicable for managing and performing the systems engineering activities based on models within any stage in the life cycle of a system of interest. Annex D (informative) Relationship with other standards describes the relationships between this document and other standards. 		https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9123713	IEEE Xplore

<p>Digital Twin-enabled MBSE Testbed for Prototyping and Evaluating Aerospace Systems: Lessons Learned</p>		<p>With increasing interconnectedness and complexity of aerospace systems and system-of-systems, it no longer suffices to perform experimentation and integration without an overarching framework to organize modeling, simulation, and analysis artifacts. With recent advances in Model Based Systems Engineering (MBSE), several key building blocks for such a framework are already in place. However, important challenges remain. No longer isolated MBSE tools can suffice without a flexible infrastructure to support model integration, tool interoperability, experimentation, and data collection. This recognition provides the impetus for developing a MBSE research testbed for prototyping and evaluating aerospace systems and system-of-systems. This paper presents progress made and lessons learned in the development of a MBSE research testbed for experimentation with aerospace systems such as multi-UAV swarms. Multi-UAV swarms are used in a variety of missions ranging from search and rescue and perimeter security of high value physical assets to emergency</p>	<p>10.1109/AERO50100.2021.9438439</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9438439</p>	<p>IEEE Xplore</p>
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		<p>response and infrastructure inspection. These operations are characterized by adaptive coordination, ability to survive systemic malfunctions and unexpected external disruptions, ability to discern and reach safe states when attempting to cope with unknown disruptions, ability to course correct and continuously adapt in partially observable, reactive environments. This paper discusses the implementation of digital twin-enabled MBSE testbed which employs a smart dashboard to support experimentation with dynamic scenario execution, monitoring, visualization and control.</p>			
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<p>Cybersecurity Attacks in Vehicular Sensors</p>		<p>Today's modern vehicles contain anywhere from sixty to one-hundred sensors and exhibit the characteristics of Cyber-Physical-Systems (CPS). There is a high degree of coupling, cohesiveness, and interactions among vehicle's CPS components (e.g., sensors, devices, systems, systems-of-systems) across sensing, communication, and control layers. Cyber-attacks in the sensing or communication layers can compromise the security of the control layer. This paper provides a detailed review of potential cyber threats related to the sensing layer. Notably, the focus is mainly towards two categories of sensors: vehicle dynamics sensors (e.g., Tire Pressure Monitoring Systems (TPMS), magnetic encoders, and inertial sensors) and environment sensors (e.g., Light Detection and Ranging (LiDAR), ultrasonic, camera, Radio Detection and Ranging (Radar) systems, and Global Positioning System (GPS) units). The paper also offers perspectives through existing countermeasures from literature and stresses the need for data-driven cybersecurity solutions.</p>	<p>10.1109/JSEN.2020.3004275</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9122502</p>	<p>IEEE Xplore</p>
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<p>A Cross-Layer Design Approach to Strategic Cyber Defense and Robust Switching Control of Cyber-Physical Wind Energy Systems</p>		<p>Due to the increasing adoption of smart sensing and Internet of things (IoT) devices, wind energy system (WES) becomes more vulnerable to cyber and physical attacks. Therefore, designing a secure and resilient WES is critical. This paper first proposes a system-of-systems (SoS) framework for the cyber-physical WES. Specifically, on the one hand, we adopt a game-theoretic model to capture the interactions between the WES system defender and the adversary at the cyber layer. The outcome of this cyber defense game is reflected by control-aware Nash equilibria. On the other hand, we devise a cyber-aware robust and resilient switching controller based on a Markov jump linear system model for the physical WES. The performances of the WES cyber and physical layers are interdependent due to their natural couplings. We further investigate the SoS equilibrium of the integrated WES, which considers the system security, robustness, and resilience holistically. Finally, we use case studies to corroborate the developed cross-layer design principles for the cyber-physical WES. Note to</p>	<p>10.1109/TASE.2022.3164860</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9755939</p>	<p>IEEE Xplore</p>
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		<p>Practitioners—Cybersecurity becomes a critical concern of wind energy system (WES) operators as an increasing amount of IoT devices are adopted for WES's communication, monitoring, and operation support purposes. This cyber-physical integration in WES creates a much broader attack surface because adversaries can compromise the physical WES by attacking its dependent cyberspace. To mitigate the impact of attacks, the operator should not only design intelligent control strategies for WES but also strategically secure the WES's cyber layer. These two goals are naturally coupled together. On the one hand, the WES operates under different compromised conditions depending on the attack actions at the cyber layer. Thus, the control design needs to be adversary-aware by taking the real-time cyber state into account. On the other hand, the adversary's cyberattack strategy is influenced by the induced performance degradation of WES. Hence, the corresponding attack measures and countermeasures, in turn, should be physically control-aware. This paper establishes a holistic</p>			
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		<p>mathematical framework to simultaneously address these two challenging objectives. The obtained solution provides guidelines for the WES operator on the optimal security resource investment in defending against cyberattacks and the robust switching control design to mitigate the impacts of attacks further. This methodology creates a defense-in-depth paradigm for the WES operators to maintain the energy system efficiency in the adversarial environment. This cross-layer design approach is also efficient and user-friendly for online implementation with the developed iterative algorithm. The simulated-based case studies in this paper show the effectiveness of the proposed approach. However, a more thorough validation of the method in practice is necessary before its integration with the production standard.</p>			
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Improving Resilience in Cyber-Physical Systems based on Transfer Learning		<p>An essential aspect of resilience within Cyber-Physical Systems stands in their capacity of early detection of faults before they generate failures. Faults can be of any origin, either natural or intentional. Detection of faults enables predictive maintenance, where faults are managed through diagnosis and prognosis. In this paper we focus on intelligent predictive maintenance based on a class of machine learning techniques, namely transfer learning, which overcomes some limitations of traditional approaches in terms of availability of appropriate training datasets and discrepancy of data distribution. We provide a conceptual approach and a reference architecture supporting transfer learning within intelligent predictive maintenance applications for cyber-physical systems. The approach is based on the emerging paradigms of Industry 4.0, the industrial Internet of Things, and Digital Twins hosting run-time models for providing the training data set for the target domain. Although we mainly focus on health monitoring and prognostics of industrial machinery as a</p>	10.1109/CSR54599.2022.9850282	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9850282	IEEE Xplore
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		<p>reference application, the general approach is suitable to both physical- and cyber-threat detection, and to any combination of them within the same system, or even in complex systems-of-systems such as critical infrastructures. We show how transfer learning can aid predictive maintenance with intelligent fault detection, diagnosis and prognosis, and describe some the challenges that need to be addressed for its effective adoption in real industrial applications.</p>			
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<p>IoT Device Lifecycle – A Generic Model and a Use Case for Cellular Mobile Networks</p>		<p>We have reached the point with Internet of Things (IoT) end-devices, when procedures of dismantling have to be discussed and put into practice. The first machine-to-machine (M2M) devices were those sensors and actuators that have been exchanging information over the Internet for over 10 years. The early M2M devices are now reaching their end of life, and we start experiencing the first challenges regarding their final termination. In the meantime, the IoT phenomena industrialized data collection, processing and presentation. The number of IoT devices keeps increasing, and their communication capabilities keep widening from year to year. Still, their lifecycle is neither defined nor managed well; and this is partially the reason why the number of abandoned zombie devices keeps increasing. Besides taking care of their bitter end, the beginning and middle of life phases have stages that needs attention – including the management of their deployment, configuration, and mobility, among other issues. The current paper introduces a generic IoT device lifecycle model, first of its kind. Furthermore, the paper defines</p>	<p>10.1109/FiCloud.2018.00033</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8458010</p>	<p>IEEE Xplore</p>
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		<p>ultrashort, short, medium and long term changes, depending on how long the given configuration (in space, in environment, in hardware or software setup) lasts. It is sensible to track these stages for both semi-static and dynamic operating scenarios in order to keep the overall status of the system of systems in a healthy state. In order to demonstrate the capabilities of the model, we describe a typical device lifecycle scenario for data and device security through a real-life, cellular mobile networking example.</p>			
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<p>A Case Study of Command and Control Center; A DSS Perspective</p>		<p>Summary <p>The Decision Support System (DSS) is a vital component in smart cities. The major advances in the field of ICT have discrete impression in the field of mobility and utility services. India has latterly introduced smart cities, wherein the preliminary objective was to ensure standard and performance of various utility services through integration of information and communication technologies. Using the high level of interactivity, decision support system, including its extreme support to data access is adaptable and flexible having complete control onto the semi-structured and unstructured problems (programmed and nonprogrammed). The critical system, including the command and control center, completely operates on the deep learning and synthetic information processing. Despite the critical systems in the field of smart cities, the artificial intelligence applied system is extensively referred as artificial intelligence DSS (AIDSS) or intelligence DSS (IDSS). In present days, DSS and IDSS systems are greatly in use in the field of healthcare, finance,</p>	<p>10.1002/9781119896951.ch2</p>	<p>https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10953179.pdf&bkn=10950256&pdfType=chapter</p>	<p>IEEE Xplore</p>
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		<p>environment, security, etc.</p> <p>DSS refers to a system of systems, which synchronizes with each other in the process of decision making and mostly does not intend to give a decision itself. Such systems are used to validate decision by performing sensitivity analysis on multilevel guidelines of the problem. Using the standard mathematical and statistical models, DSS analyses the complex data, thereby producing the required information. The amount of information generated/used as input is always dealt with the big data and requires classificational analysis. This paper is an attempt to discuss the intelligent transport system and command and control center implemented under smart cities mission and understanding the role of DSS via a case study.</p>			
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<p>Local Cloud Internet of Things Automation: Technology and Business Model Features of Distributed Internet of Things Automation Solutions</p>		<p>The hype concerning digitalization is increasing the demand for new generations of automation systems. Concepts like Reference Architecture Model Industry 4.0 (RAMI 4.0) give us models but do not tell us how to facilitate actual implementations. This article discusses the transition from legacy automation technology as defined by ISA-95 to highly distributed Internet of Things (IoT)- and system of systems (SoS)-based automation systems that fully utilize Internet technologies, thus enabling the implementation of Industry 4.0 and RAMI 4.0 models. Distributed IoT automation systems have a number of general requirements concerning real-time performance, security, engineering cost, scalability, and interoperability. Meeting these requirements is necessary to enable possibilities for a realworld implementation of IoT automation. A key concept is local automation clouds. The discussion is based on a particular example of such an automation integration platform, the Arrowhead Framework.</p>	<p>10.1109/MIE.2017.2759342</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8241149</p>	<p>IEEE Xplore</p>
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Safe cooperative CPS: A V2I traffic management scenario in the SafeCOP project		<p>SafeCOP (Safe Cooperating Cyber-Physical Systems using Wireless Communication) is an European project that targets cyber-physical systems-of-systems whose safe cooperation relies on wireless communication. In particular, SafeCOP will provide an approach to the safety assurance of such systems in the healthcare, maritime, vehicle-to-vehicle and vehicle-to-infrastructure sectors. The vehicle-to-infrastructure (V2I) cooperation for the traffic management scenario is a key use cases of SafeCOP, where the cooperation between different cyber-physical systems can also include a significant interaction with remote servers. In this paper, we outline the V2I traffic management scenario and assess the research goals that arise from it, with special focus on the IoT characteristics.</p>	10.1109/SAMOS.2016.7818365	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7818365	IEEE Xplore
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<p>Unique Challenges in Mission Engineering and Technology Integration</p>		<p>Summary <p>Undertaking mission engineering and technology integration in large enterprise systems such as automotive manufacturing or space&#x2010;based communication systems offer many challenges. These systems are typically composed of multiple interconnected systems and subsystems, each developed and maintained by multiple vendors operating on different timelines and priorities. Mission engineering refers to applying systems engineering processes and principles to the complete product lifecycle &#x2013; requirements analysis, design, development, integration, testing, deployment, and sustainment of a complex systems of systems project. Such processes and principles include DevSecOps, digital engineering, model&#x2010;based systems engineering (MBSE), Agile and other systems design and development processes. Technology integration refers to the processes and principles of inserting technology into both the engineering and development processes of a system's acquisition program. Examples of</p>	<p>10.1002/9781394203314.ch31</p>	<p>https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10524844.pdf&bkn=10523217&pdfType=chapter</p>	<p>IEEE Xplore</p>
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		<p>technology insertion include adding or expanding system requirements to meet changing market conditions or reacting to changing operating environments. This chapter discusses the unique challenges and offers recommended strategies in undertaking mission engineering and technology insertion in large enterprise systems with a particular focus on software-based systems. Where appropriate, reference to hardware-only or hybrid hardware and software-based systems will also be noted.</p>			
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Quality of service on the arrowhead framework		<p>Quality of Service (QoS) is an important enabler for communication in industrial environments. The Arrowhead Framework was created to support local cloud functionalities for automation applications by means of a Service Oriented Architecture. To this aim, the framework offers a number of services that ease application development, among them the QoSSetup and the Monitor services, the first used to verify and configure QoS in the local cloud, and the second for online monitoring of QoS. This paper describes how the QoSSetup and Monitor services are provided in a Arrowhead-compliant System of Systems, detailing both the principles and algorithms employed, and how the services are implemented. Experimental results are provided, from a demonstrator built over a real-time Ethernet network.</p>	10.1109/WFCS.2017.7991959	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7991959	IEEE Xplore
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<p>The Challenges and Solutions for Building an Integrated Video Analytics Platform</p>		<p>This paper describes a distributed multi-user video analytics platform supporting multiple video providers and multiple analytics. Scalability, portability, adaptability and resiliency are the objectives of a well-integrated video analytics platform. Being an integrated system of systems comprised of various resource nodes, the challenges in building such an infrastructure ranges from efficient system interconnects to providing user affordances comparable with that of video providers. In this work we outline the challenges and approaches to solve them. SIGMA, a video analytics platform that was implemented to support very large networks of video infrastructures is presented in this context. Our implementation allows for integration of platform-neutral analytics and vendor-neutral video providers. The structure of the implemented platform lends itself to accommodating both real-time and on-demand analytics. Also, the platform is independent of any application domain.</p>	<p>10.1109/IRI.2017.53</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8102967</p>	<p>IEEE Xplore</p>
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AI Toolbox Concept for the Arrowhead Framework		<p>Artificial Intelligence (AI) has become a game-changer across numerous industrial areas, revolutionizing the way businesses operate and enhancing their competitiveness. The Arrowhead Framework, renowned for its service-oriented architecture and interconnectivity principles, presents an ideal platform for the development and deployment of AI-driven solutions for industrial Cyber-physical System of Systems (CPSoS). This paper delves into the formulation of an AI Toolbox that enhances the capabilities of the Arrowhead Framework, aiming to harness the synergies between AI and a robust architectural foundation. The paper presents the main objectives and requirements for the AI Toolbox, and also describes its concept, operation, and deployment principles. For a better understanding, the paper demonstrates how the AI Toolbox works through a generic industrial safety use case. In conclusion, this paper contributes a comprehensive perspective on the formulation of the Arrowhead AI Toolbox, demonstrating how the Arrowhead Framework can offer AI-based services for industrial use</p>	10.23919/CNSM59352.2023.10327821	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10327821	IEEE Xplore
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<p>Integrated Energy Systems: The Engine for Energy Transition</p>		<p>Summary <p>Addressing climate change is one of the most important drivers for national energy policies worldwide by defining the urgent need to decarbonize energy systems through mitigating their environmental impacts. The needed energy transition brings many challenges and opportunities, and a significant progress is necessary so that today's energy systems change toward satisfying the needs of the society and the economy by becoming as environmentally sustainable as possible. Achieving this goal requires fully integrated energy systems able to supply low&#x2010;carb on energy for all sectors from different energy sources, while integrating multiple energy carriers and exploiting the synergies coming from this interplay. An integrated energy system can be seen as &#x201c;a system of systems,&#x201d ; namely, an integrated infrastructure for all energy carriers with the electrical system as a backbone, characterized by a high level of integration between all networks of energy carriers, coupling electrical networks with gas networks, heating, and cooling, supported by energy storage</p>	<p>10.1002/9783527833634.ch2</p>	<p>https://ieeexplore.ieee.org/xpl/ebooks/bookPdfWithBanner.jsp?fileName=10515005.pdf&bkn=10513508&pdfType=chapter</p>	<p>IEEE Xplore</p>
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		<p>and conversion processes. In this new energy paradigm, citizens become active consumers and prosumers using local and user-friendly energy exchanges, as well as peer-to-peer exchanges, for a wide range of services and optimal energy prices. This chapter discusses the concept of integrated energy systems as the engine for the energy transition by analyzing the challenges and opportunities to move to low-carbon energy systems, as well as the enabling technologies and paradigms for such systems as storage and power conversion and the empowerment of final users.</p>			
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<p>Fluid Boundaries in Emerging Complex Intelligent Systems: System, Operational, and Organizational Perspectives</p>		<p>Rapid developments in artificial intelligence (AI) are driving the evolution of complex products and systems (CoPS) into complex intelligent systems (CoIS). The introduction of AI implies generativity and increasingly fluid boundaries in such systems and presents challenges for organizations to control and manage systems that are safety critical. Building on a case study represents future CoIS, this article explores fluid boundaries in CoIS, including approaches for navigating system criticality and generativity. The findings point to the relationship between fluid boundaries and a stable organizational and system core, along with a shared core mission. Together, they serve as a platform that enables both contributions from various constituent systems and dynamic reconfigurations of the overall system-of-systems. System criticality and generativity are navigated through setting bounds to generativity by checks and balances involving both human and AI, including safety requirements for constituent systems and overall human oversight. Such an approach extends beyond</p>	<p>10.1109/EMR.2024.3503757</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10759785</p>	<p>IEEE Xplore</p>
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		traditional system integration activities and alters the role of CoIS integrators.			
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Implementing Artificial Thinking Autonomy with Model-Based Systems Engineering		<p>Complex autonomous systems capable of successfully operating independently under 'known unknowns' and harsh conditions require paradigm innovation in modern development strategies. In the field of autonomy, developing a system-of-systems which can ostensibly think for itself in the face of 'unknown unknowns' is still a field of ongoing research. Maturing the systems architecting and modeling methodologies for developing henceforth named Thinking Autonomous Systems, which are verified with digital mission simulation, can potentially usher in the next generation of artificial intelligence for space exploration. The concept presented in this paper incorporates multiple Model-Based Systems Engineering and simulation methodologies combined as a new paradigm to design a novel, biomimetic thinking autonomy strategy. Anachronistic concepts from classical Kantian philosophy will be leveraged to inspire architectural designs that could be used for complex distributed systems in deep space. To accomplish this, digital</p>	10.1109/AERO63441.2025.11068647	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11068647	IEEE Xplore
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		<p>transformation of a document-based implementation plan for Thinking Autonomous Systems, generated by experienced NASA software engineers, is implemented for NASA's Platform for Autonomous Systems by creating descriptive and executable software models in SysML to prototype real-time operating capabilities. This conceptual implementation has been developed by incorporating model-based digital simulations to theorize how a cyberphysical thinking system would achieve specific strategies without crew reliance, while simultaneously being resilient to all operating conditions and remaining functional when devoid of ground communication. Additionally, ensuring that an autonomous system framework is an ethical Artificial Intelligence requires careful consideration of system behavior and accountability, human factors for teaming with a thinking autonomous system, and comparison to other modern approaches used for implementing true autonomy. This paper presents the first steps in formalizing the metacognition required for instantiating a truly Thinking Autonomous</p>			
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		<p>System; the approach described symphonizes autonomy characteristics from classical philosophical into a unified software architecture describing human thought. In the future, the foundational models described in this paper can be further leveraged to help advance research into thinking autonomy requirements for future deep space missions as well as for current near-term applications, i.e., living aboard crewed spacecraft like a NASA Gateway cislunar habitat.</p>			
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Enhancements of the Arrowhead Framework to refine inter-cloud service interactions		<p>Solving interoperability and integrability issues for the Internet of Things - and especially for the automation domain - is a great challenge. The Arrowhead Framework addresses these issues by providing the innovative concept of Local Clouds, within which some well-defined core systems support the applications, based on the principles of Service Oriented Architectures. Several additions and refinements of the Arrowhead Framework are introduced in this paper - from system and service hierarchies through core system capabilities, as well as interfaces for application systems. The presented enhancements support the advanced functionalities for System-of-Systems, including Quality-of-Service and resource allocation capabilities, inter-cloud servicing, advanced authentication and authorization, and event handling. All mandatory core systems of the Arrowhead Framework are affected somehow in the process: the Service Registry, the Orchestrator and the Authorization System.</p>	10.1109/IECON.2016.7793757	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7793757	IEEE Xplore
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Airbus flexible payload perspective		<p>The satellite industry is evolving at a rate not seen in its previous 60 year history. The industry is attracting investment from new players resulting in billions of euros being invested in new space mega constellations. This massive investment in the space ecosystem is driving innovation in flexible payload technologies across LEO, MEO and GEO, supporting commercial governmental and military satellite applications. Airbus Defence and Space has long been a leading player and first to market innovator in the domain of flexible payloads building fully digitally beamformed flexible payloads for GEO mobile applications for Inmarsat and Thuraya, The Eutelsat Quantum fully flexible software defined satellite, and more recently the Onesat product for Inmarsat, Intelsat, Optus and JSAT. Airbus experience in high performance fully flexible payloads spans both the commercial and governmental market places. Indeed Airbus provided huge contributions ranging from full build launch and operating services, to payload subsystem provision for all major European Military SATCOM</p>	10.1049/icp.2023.1362	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10152530	IEEE Xplore
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		<p>systems. Airbus experience in flexible payloads is not limited to GEO orbit, Airbus has worked closely with Oneweb and produced and launched to date many hundreds of LEO satellites having highly flexible payloads, leveraging novel new space methodologies and automated final assembly (FAL) techniques. Despite the huge success and achievements to date, innovation at Airbus never stands still. With this in mind Airbus has devoted millions of Euros of research and development funding with backing from ESA, ARTES and national institutions to study and shape the next generation of satellite communications. We have studied LEO MEO and GEO orbits, the projected use cases of each orbit, the required technology roadmaps and means to interconnect these orbits resulting in a system of systems able to leverage the pros of a given orbit, without being constrained by its cons. Within this paper Airbus will discuss our perspective on next generation payload technology supporting all orbits and many end use cases. We will discuss some of the basic physics behind the roadmaps and the key technology</p>			
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		challenges and innovations needed to overcome these challenges. The overall scope of innovation can broadly be split into three main categories Airbus believes that these core technologies are applicable in differing scopes across the future of LEO, MEO and GEO systems.			
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<p>ISO/IEC/IEEE Draft Standard - Systems and software engineering – Part 9: Application of system and software life cycle processes in epidemic prevention and control systems</p>		<p>Many countries have adopted information-based prevention and control measures during the epidemic, and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are most likely to be completed in the event of an epidemic. Compared with the normal state, there will be special situations such as poor communication caused by the need for personnel to maintain a safe distance; limited transportation and logistics, resulting in insufficient infrastructure protection; short delivery cycles and frequent iterative upgrades; and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In this case, it is believed that in the development process of epidemic prevention and control systems, the application of the life cycle process method specified in the ISO/IEC/IEEE 15288:2015 or ISO/IEC/IEEE 12207 standards can effectively help guide the process management and application of the</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9416389</p>	<p>IEEE Xplore</p>
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		epidemic prevention and control systems.			
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<p>ISO/IEC/IEEE Draft Standard - Systems and software engineering – Part 9: Application of system and software life cycle processes in epidemic prevention and control systems</p>		<p>Many countries have adopted information-based prevention and control measures during the epidemic, and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are most likely to be completed in the event of an epidemic. Compared with the normal state, there will be special situations such as poor communication caused by the need for personnel to maintain a safe distance; limited transportation and logistics, resulting in insufficient infrastructure protection; short delivery cycles and frequent iterative upgrades; and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In this case, it is believed that in the development process of epidemic prevention and control systems, the application of the life cycle process method specified in the ISO/IEC/IEEE 15288:2015 or ISO/IEC/IEEE 12207 standards can effectively help guide the process management and application of the</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9536676</p>	<p>IEEE Xplore</p>
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		epidemic prevention and control systems.			
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From Embedded to AI-powered Cyberphysical Systems and Beyond		<p>Cyber-physical Systems of Systems (CPSoS) are large complex systems where physical elements interact with many distributed computing elements and human users. The main challenges associated with the design operation of reliable connected CPSs stem from continuously increasing demands for resources availability, novel service of high added value and product quality, while adhering to requirements for low cost, low power and competitiveness in the global market. This paper puts forward a set of CPSoS systems aiming at developing models, architectures and software tools for allocating computing resources to CPS end devices, while autonomously detecting what cyber-physical processes will be performed by the device components including heterogeneous CPU elements and communication interfaces, GPUs, FPGA fabrics, and Software stacks. Collaborating in a decentralized way and ensuring the exchange of tasks and data without central intervention, the proposed projects are leveraging state of the art artificial intelligence</p>	10.23919/MIXDES58562.2023.10203211	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10203211	IEEE Xplore
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		technologies to improve their performance, reliability, robustness as well as security.			
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Empowering The Eclipse Arrowhead Framework with a Digital Twin as a Proxy Service		<p>Eclipse Arrowhead is an open-source framework for industrial automation based on service-oriented principles. It allows the creation of a highly flexible System of Systems (SoS) by defining local clouds for connecting application systems running on industrial cyber-physical systems (ICPSs). However, in an ICPS context, resource constraints and battery-powered devices are facing issues such as high energy consumption, poor service availability, and low-security capabilities. The concept of Digital Twins (DTs) as a proxy (DTaaP) has been defined to address these CPS challenges by providing valuable properties such as energy efficiency, availability, and security. In this paper, we propose a solution to empower the Eclipse Arrowhead Framework (EAF) with DTaaP. Specifically, the proposed solution introduces AHDitto, an Arrowhead-compliant supporting core system, enabling EAF to achieve three DTaaP properties by integrating Eclipse Ditto with EAF.</p>	10.23919/ICCAS55662.2022.10003919	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10003919	IEEE Xplore
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Reduction of error rate in Sybil attack detection for MANET		<p>Mobile ad hoc networks (MANETs) require a unique, distinct, and persistent identity per node in order for their security protocols to be viable, Sybil attacks pose a serious threat to such networks. Fully self-organized MANETs represent complex distributed systems that may also be part of a huge complex system, such as a complex system-of-systems used for crisis management operations. Due to the complex nature of MANETs and its resource constraint nodes, there has always been a need to develop security solutions. A Sybil attacker can either create more than one identity on a single physical device in order to launch a coordinated attack on the network or can switch identities in order to weaken the detection process, thereby promoting lack of accountability in the network. In this research, we propose a scheme to detect the new identities of Sybil attackers without using centralized trusted third party or any extra hardware, such as directional antennae or a geographical positioning system. Through the help of extensive simulations, we are able to demonstrate that</p>	10.1109/ISCO.2015.7282328	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7282328	IEEE Xplore
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		our proposed scheme detects Sybil identities with 95% accuracy (true positive) and about 5% error rate (false positive) even in the presence of mobility.			
IEEE Standard Model Process for Addressing Ethical Concerns during System Design		<p>A set of processes by which organizations can include consideration of ethical values throughout the stages of concept exploration and development is established by this standard. Management and engineering in transparent communication with selected stakeholders for ethical values elicitation and prioritization is supported by this standard, involving traceability of ethical values through an operational concept, value propositions, and value dispositions in the system design. Processes that provide for traceability of ethical values in the concept of operations, ethical requirements, and ethical risk-based design are described in the standard. All sizes and types of organizations using their own life cycle models are relevant to this standard. (The PDF of this standard is available in the IEEE GET program at https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=93)</p>	10.1109/IEEESTD.2021.9536679	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9536679	IEEE Xplore

<p>Native OPC UA Handling and IEC 61499 PLC Integration within the Arrowhead Framework</p>		<p>The Arrowhead framework enables interoperability and integrability for new and legacy systems by applying Service Oriented Architecture (SOA) principles at the Industrial Internet of Things (IIoT) domain. The core systems of Arrowhead provide service registration, discovery, security and other services for application systems within the System of Systems domain under their authority. While the application systems can communicate with each other using any protocol that fits them, the core Arrowhead services have been available as RESTful HTTP implementation only. This practically meant that those application systems with-out built-in HTTP protocol support, must have used translators to connect to the Arrowhead services. The current paper describes a pragmatic enhancement for OPC Unified Architecture (OPC UA) endpoints, so they are now able to utilize Arrowhead core services natively. Moreover, the paper provides a solution for IEC 61499 Programmable Logic Controller (PLC) integration, and a practical use case description as proof of concept.</p>	<p>10.1109/ICPS48405.2020.9274768</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9274768</p>	<p>IEEE Xplore</p>
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<p>UBT 5S (Small Scale Smart Sustainable System)</p>		<p>We are living today in the convergence revolution where interoperability, modularization, sustainability, real-time capability and responsible innovation are the main frameworks of the design and development of the complex smart systems. Entrepreneurial Innovation based Ecosystem University is a Complex System and is going to consider as system of systems, knowledge of knowledges, Hub of Hubs. In this paper we present such a Smart Innovation Ecosystem made from different Innovation systems (HUBs, Centers, Labs) design and developed at UBT – University for Business and Technology, in order to support an integrated approach of the sustainable smart based innovation ecosystem and present the university as a key role player. UBT 5S includes different technologies like 5G, AR/VR, IoT, Robotics, AI, Cyber Security, etc.</p>	<p>10.1109/IWSSIP5020.2022.9854428</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9854428</p>	<p>IEEE Xplore</p>
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Exploiting Advances in Video Analytics to Support Military Operations and Related Applications		<p>As the prime contractor for the U.S. Army's Persistent Surveillance and Dissemination System of Systems (PSDS2) program, we have witnessed firsthand the U.S. military's video glut problem. Established in 2005 to address an urgent requirement for a video processing, exploitation, and dissemination (PED) capability, the PSDS2 program has provided the core video dissemination backbone used by the U.S. Central Command (CENTCOM) in Iraq and by the International Security Assistance Force (ISAF) in Afghanistan, where it is still in active use. PSDS2 integrates realtime sensor data from multiple sensor types-including hundreds of video sensors-and makes it available on-demand simultaneously to thousands of users both in near real time and streamed from forensic archives. Given the large number of stationary and mobile video and other sensors that are being integrated, the criticality of the services provided, and the austerity-in terms of available communications bandwidth, equipment size, weight, power, cost and cooling (SWaP+C2) limitations, and military personnel availability-we are</p>	10.1109/MPOT.2018.2824858	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8419106	IEEE Xplore
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		motivated to investigate the use of analytics to address the video glut problem.			
Situation Modelling, Representation, and Querying in Context-as-a-Service IoT Platform		<p>As the Internet of Things (IoT) is entering the System-of-Systems phase, the demand for effortless access to contextual information will be a fundamental factor for IoT expansion, sustainability, interoperability and acceptance. A number of context management platforms are competing in the area, while the standardization efforts on the interfaces are still in the early stage. In this paper, we extend our previous work on the Context-as-a-Service platform and its interface - Context Definition and Query Language (CDQL). We propose a generic approach to represent and query situations in IoT environment. Moreover, we show how the temporal relations between situations can be used in situation descriptions and queries to define highlevel situations.</p>	10.1109/GIOTS.2018.8534571	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8534571	IEEE Xplore

<p>Digital Society Future Transformation Perspectives in the Informational Age</p>		<p>Understanding the digital society transformation is a rather fascinated challenge, especially for the future. This naturally, provokes numerous tangible and intangible assets that have to be properly handled in order to catch the right social dynamic trends direction. This however is also requiring an agile & holistic study approach towards a resilient future. In this sense, the idea of the present work is to briefly outline a comprehensive study on the problem, organized in the last few years. The results are mostly based on crowdsourcing analysis, encompassing more than hundred expert beliefs from about fifty countries, spread among five continents throughout the world. Both matrix-based morphological scenario planning and dynamic system-of-systems risk vs utility assessments are implemented in the analytical process. The obtained results are further validated, using pseudo-periodic stochastic probability assessment and verified via simulated mixed reality experiments with human factor active multimodal role. Being somewhat prognostic, the presented findings are not claiming for total</p>	<p>10.1109/DESSE RT50317.2020.9125057</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9125057</p>	<p>IEEE Xplore</p>
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		comprehensiveness, but rather for producing a fruitful analytical pool with some useful recommendations that will be finally understood when the forecasted period is reached.			
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Studying Adversarial Attacks on Behavioral Cloning Dynamics		High-fidelity visual simulation-based environments and advanced learning algorithms can be used to train robots to carry out specific tasks. Behavior cloning is a fast and easy way to train robots to learn from experience by modeling their actions according to human actions. As we make use of these agents in our day-to-day life, the robustness of such system-of-systems trained on simulation environments are of great concern. In this paper, we explore adversarial attacks in simulation environments, specifically for behavioral cloning models that cause the adversary to be able to take control of the steering mechanism of an autonomous agent. We focus our attention on improving latency and noticeability, two fundamental issues with adversarial attacks, by reducing the number of iterations to a single step during a white-box adversarial attack within a noticeability threshold. More specifically, the gradients at the image input layer and the output layer of the neural network are utilized in the adversarial attack. We implement a hybridized version of the fast gradient sign and basic iterative methods to attack	10.1109/ICTAI50040.2020.00077	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9288282	IEEE Xplore
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		the input image and fool the agent. We've shown that our method reduces the attack time per frame to within 3 milliseconds.			
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<p>Architecting an Enterprise-of-Enterprises with the 10-Layer Rubric: Transforming EoE Decision-Making</p>		<p>In modern global business, municipal, and government environments, the complexities of architecting an Enterprise go well beyond the borders of the Enterprise itself. Today's large-scale systems require a system-of-systems (SoS) or, more effectively, an Enterprise-of-Enterprises (EoE) strategy to fulfill mission requirements. The 10-layer rubric (10LR) provides an organizing framework that starts with identifying mission requirements and decomposes an SoS or EoE to better understand and abstract capability, complexity, extensibility, interoperability and scalability, with the goal of facilitating the architecture process effectively and efficiently. In a complex and dynamic multi-enterprise environment, a disciplined architecture methodology is essential for decision-makers to recognize the resources that are required to support the mission, vision, requirements, goals, and capabilities for an organization. The 10LR is a tool that can be used to identify key architectural elements to define system strategies, components, and standards. It is sufficiently abstract to enable decision-makers</p>	<p>10.1109/SysCon53073.2023.10131052</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10131052</p>	<p>IEEE Xplore</p>
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		to see the relationships between the essential operational domains for rapid decision-making and specific enough to aid in thought processing the EoE technical complexities in simple layers and components. Decision-makers who wish to quickly recognize the supporting activities, applications, and elements that will enable their joint domain mission requirements and capabilities should consider adopting the 10LR.			
IEC/IEEE Draft International Standard - Information technology: Information for Use of Products -- Part 1: Principles and General Requirements				https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7888875	IEEE Xplore
IEC/IEEE Draft International Standard - Information technology: Information for Use of Products -- Part 1: Principles and General Requirements				https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7524641	IEEE Xplore

Towards Creation of Automated Prediction Systems for Trust and Dependability Evaluation		<p>We advance the ability to design reliable Cyber-Physical Systems of Systems (CPSoSs) by integrating artificial intelligence to the engineering methods of these systems. The current practice relies heavily on independent validation of software and hardware components, with only limited evaluation during engineering integration activities. Furthermore, our changing landscape of real-time adaptive systems allows software components to be dynamically included or re-distributed within a Cyber-Physical System (CPS), with mostly unknown implications on the overall systems integrity, reliability and security. This paper introduces an approach consisting of scientific and engineering processes that enable development of concepts for automated prediction systems for evaluating the dependability and trust of CPSoS. This significantly moves the security and reliability design process ahead by opening the doors for far more relevant design strategies and the opportunity to develop protocols, methods, and tools aimed at dealing with a wide variety of platforms with poorly calibrated</p>	10.23919/SoftCO M50211.2020.9238329	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9238329	IEEE Xplore
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		reliability characteristics.			
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<p>ISO/IEC/IEEE International Standard - Systems and software engineering -- Life cycle management -- Part 9: Application of system and software life cycle processes in epidemic prevention and control systems</p>		<p>Many countries have adopted information-based prevention and control measures during the epidemic, and have developed numerous epidemic prevention and control systems and software. Most of the processes in the entire life cycle of the epidemic prevention and control systems are most likely to be completed in the event of an epidemic. Compared with the normal state, there will be special situations such as poor communication caused by the need for personnel to maintain a safe distance; limited transportation and logistics, resulting in insufficient infrastructure protection; short delivery cycles and frequent iterative upgrades; and special requirements such as accuracy, disaster tolerance, degradation capability, safety, user capacity and stress testing, and rapid demand capture. In this case, it is believed that in the development process of epidemic prevention and control systems, the application of the life cycle process method specified in the ISO/IEC/IEEE 15288:2015 or ISO/IEC/IEEE 12207 standards can effectively help guide the process management and application of the</p>	<p>10.1109/IEEESTD.2023.10137418</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10137418</p>	<p>IEEE Xplore</p>
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		epidemic prevention and control systems.			
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<p>Scalable Discrete Event Simulation Tool for Large-Scale Cyber-Physical Energy Systems: Advancing System Efficiency and Scalability</p>		<p>Modern power systems face growing risks from cyber-physical attacks, necessitating enhanced resilience due to their societal function as critical infrastructures. The challenge is that defense of large-scale systems-of-systems requires scalability in their threat and risk assessment environment for cyber-physical analysis including cyber-informed transmission planning, decision-making, and intrusion response. Hence, we present a scalable discrete event simulation tool for analysis of energy systems, called DESTinE. The tool is tailored for large-scale cyber-physical systems, with a focus on power systems. It supports faster-than-real-time traffic generation and models packet flow and congestion under both normal and adversarial conditions. Using three well-established power system synthetic cases with 500, 2000, and 10,000 buses, we overlay a constructed cyber network employing star and radial topologies. Experiments are conducted to identify critical nodes within a communication network in response to a disturbance. The findings are incorporated into a constrained optimization problem to assess the</p>	<p>10.1109/ACCESS.2025.3578948</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=11030558</p>	<p>IEEE Xplore</p>
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		<p>impact of the disturbance on a specific node and its cascading effects on the overall network. Based on the solution of the optimization problem, a new hybrid network topology is also derived, combining the strengths of star and radial structures to improve network resilience. Furthermore, DESTinE is integrated with a virtual server and a hardware-in-the-loop (HIL) system using Raspberry Pi 5. The performance of star, radial, and hybrid topologies is quantified under standalone operation, virtual server integration, and HIL setup to evaluate scalability and network performance. Results are compared for accuracy with the Common Open Research Emulator (CORE). The results show that DESTinE is efficient and scalable for large-scale test cases. These findings highlight DESTinE's potential for real-time applications in large-scale cyber-physical systems.</p>			
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<p>ISO/IEC/IEEE Draft International Standard - Systems and software engineering – Methods and Tools for Model-based Systems and Software Engineering</p>		<p>This International Standard, within the context of methods and tools for MBSSE:</p> <ul style="list-style-type: none"> • Provides terms and definitions related to MBSSE; • Defines MBSSE-specific processes for model-based systems and software engineering; the processes are described in terms of purpose, inputs, tasks, and outcomes; • Defines methods to support the defined tasks of each process; • Defines tool capabilities to automate/semi-automate tasks or methods. The processes defined in this document are applicable for a single project, as well as for an organization performing multiple projects. These processes are applicable for managing and performing the systems engineering activities based on models within any stage in the life cycle of a system of interest. Annex D (informative) Relationship with other standards describes the relationships between this document and other standards. 		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9652504</p>	<p>IEEE Xplore</p>
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<p>ISO/IEC/IEEE Draft International Standard - Systems and software engineering – Methods and Tools for Model-based Systems and Software Engineering</p>		<p>This International Standard, within the context of methods and tools for MBSSE:</p> <ul style="list-style-type: none"> • Provides terms and definitions related to MBSSE; • Defines MBSSE-specific processes for model-based systems and software engineering; the processes are described in terms of purpose, inputs, tasks, and outcomes; • Defines methods to support the defined tasks of each process; • Defines tool capabilities to automate/semi-automate tasks or methods. The processes defined in this document are applicable for a single project, as well as for an organization performing multiple projects. These processes are applicable for managing and performing the systems engineering activities based on models within any stage in the life cycle of a system of interest. Annex D (informative) Relationship with other standards describes the relationships between this document and other standards. 		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9652492</p>	<p>IEEE Xplore</p>
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<p>Self-aware systems for the Internet-of-Things</p>		<p>The IoT will host a large number of co-existing cyber-physical applications. Continuous change, application interference, environment dynamics and uncertainty lead to complex effects which must be controlled to give performance and application guarantees. Application and platform self-configuration and self-awareness are one paradigm to approach this challenge. They can leverage context knowledge to control platform and application functions and their interaction. They could play a dominant role in large scale cyber-physical systems and systems-of-systems, simply because no person can oversee the whole system functionality and dynamics. IoT adds a new dimension because Internet based services will increasingly be used in such system functions. Autonomous vehicles accessing cloud services for efficiency and comfort as well as to reach the required level of safety and security are an example. Such vehicle platforms will communicate with a service infrastructure that must be reliable and highly responsive. Automated continuous self-configuration of data storage might be a good basis for such</p>		<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7750988</p>	<p>IEEE Xplore</p>
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		<p>services up to the point where the different self-x strategies might affect each other, in a positive or negative form. This paper contains three contributions from different domains representing the current status of self-aware systems as they will meet in the Internet-of-Things and closes with a short discussion of upcoming challenges.</p>			
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<p>LEO-PNT for Augmenting Europe's Space-based PNT Capabilities</p>		<p>With GNSS as flagship, space-based PNT enables the single largest downstream space sector, worth about €150 billion annually and growing at the rate of 10 per cent per year [29]. The associated infrastructures (e.g. Galileo, GPS) are evolving and introducing new capabilities to meet more demanding needs, in a context of hybrid and system-of-systems PNT solutions. Meanwhile, PNT solutions which exploit signals from LEO (what is being called LEO-PNT) are emerging as a major trend of evolution for space-based PNT, backed by the benefits of multi-layer architectures and new industrial and business models in the Space sector (the so-called New Space). Many initiatives are now being taken worldwide, driven either by institutional or commercial stakes. Europe is taking part to the evolution of this landscape, supported by solid industrial grounds in New Space capabilities and PNT technologies, as well as by institutional initiatives. For instance, the proposal for a regulation of the European Union to establish IRIS2 ("Infrastructure for Resilience, Interconnection & Security by</p>	<p>10.1109/PLANS53410.2023.10139999</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10139999</p>	<p>IEEE Xplore</p>
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		<p>Satellites”) refers to LEO-PNT as potential non-communication mission. In this context, this paper provides an overview of the current initiatives, and in particular, objectives, opportunities, trade-offs and possible solutions for LEO- PNT in the context of evolutions of European space-based infrastructures. The scope comprises an overview of the global LEO-PNT landscape, and in particular of the European one, for both purpose-built LEO- PNT and more opportunistic approaches such as the integration of PNT capabilities in existing or future satcom signals (e.g. 5G NTN). Possible use cases leveraging LEO-PNT are presented together with the associated design drivers and technologies, trade-offs and some examples of working points illustrating the differentiators of LEO-PNT in augmenting and complementing European GNSS capabilities. Technological enablers on the payload side as well as on the user side are addressed and discussed, based on ongoing studies and proof-of-concept developments, as well as incoming opportunities, such as the LEO-PNT In-Orbit Demonstrator under preparation.</p>			
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Survey on Cloud Robotics Architecture and Model-Driven Reference Architecture for Decentralized Multicloud Heterogeneous-Robotics Platform		<p>Robotics engineering is gradually becoming an essential part of our daily life. However, it has been generating Big Data and seeking large computation cost because of the diversified sensors and processing requirements involved in heterogeneous robotics and their workflows. Therefore, cloud computing has become the incumbent platform for robotics. There are numerous works related to the architecture for cloud robotics. However, most cloud robotics architectures are ad hoc and are not based on a model. Inherent drawbacks of ad hoc approaches include being strictly domain specific and minimally customizable and adaptable. Moreover, heterogeneous cloud robotics platforms have been operating diverse requirements of industries and households. Nevertheless, there are certain benchmarks set to be achieved by Industry 4.0 and norms by Society 5.0. Those benchmarks and norms lead to new products and services in cross industries and alleviate the impending drawbacks. However, those should be achieved while retaining both the sovereignty and security of the respective systems and</p>	10.1109/ACCESS.2021.3064192	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9371712	IEEE Xplore
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		<p>industries. This is equally applicable and an enormous challenge to the system-of-systems involving the cloud robotics domain. Therefore, we surveyed cloud robotics architectures. Then, we learned a top-down design approach involving a unified architectural framework as the cognitive approach for the highly variable and systematically complex challenges to be achieved in the next-generation cloud robotics domain. Reference architecture is a well-known approach for instantiating top-down unified architectural framework processes. Therefore, we proposed an architectural design process and modeling for the reference architecture for next-generation cloud robotics platforms.</p>			
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<p>A Techno-Economic Feasibility Studies of an Off-Grid Community MG Using Predictive Control</p>		<p>The worldwide concerns of increasing urbanization and climate change, introduced the concepts of smart buildings as well as sustainable community living. Both these ideas envisions the use of renewable energy sources (RESSs), viz., wind turbines and solar photovoltaic (PV) and, electric vehicles (EVs). These isolated entities having their own loads and sources can be tied to the low voltage (LV) distribution network or use diesel generator (DG) for backup purposes. People spend most of their time living inside a building (residence or workplace), which emphasizes the need to develop the living space as community buildings having energy efficiency and fulfils the comfortness requirements. Such smart community buildings have multiple loads like lighting, security, cooling and heating, along with the motor loads. This aggregation of multiple RESSs and loads gives rise to a system of systems (SoSs) structure to the community microgrids (CMGs). In this paper, model predictive control (MPC) is used to establish an off-grid CMG and achieve its optimal sizing/rating, component selection, and energy management in an economic and technically</p>	<p>10.1109/PIICON56320.2022.10045162</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10045162</p>	<p>IEEE Xplore</p>
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		efficient way. The process includes several test conditions and actual operating scenarios like forecasting data of both energy production and load variations, capacity of battery based storage unit and coordination of EVs for using in demand scheduling, and minimize the use of fuel consumption for DG set.			
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Pre-Installation Techno-Economic Feasibility Studies of a Food-Energy Park as a Community MG		<p>Rising difficulties of fast urbanization and climate related issues, have popularize the concepts of community living at sub-urban areas meeting the basic needs of shelter, food and energy. Such entities are called Food-Energy Park (FEP) that are a part of community microgrids (CMG) having multiple energy efficient green buildings. The FEPs envisions the idea to be self-sufficient (fully or partially) in terms of growing its own food by applying modern high density farming strategies and producing energy using renewable energy sources (REsSs). It mostly installs solar photovoltaic (PV), solar water heaters, wind turbines, battery banks and electric vehicles (EVs). Such CMGs with its own sources and loads could be attached to the low voltage (LV) power system and use diesel generator (DG) as a needed backup. Such CMGs have green buildings, viz., residential, school with community kitchen, primary health centre, etc., have multiple loads like lights, heating and cooling, security, as well as motor loads. Similarly, the agricultural loads comprises of pumps for drip irrigation, livestock shed, and miniature cold storage. All these</p>	10.1109/SEFET61574.2024.10718100	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10718100	IEEE Xplore
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		aggregation results in system of systems (SoSs) architecture for CMGs. In this paper, pre-installation techno-economic studies of an FEP on a 1 hectare (2.5 acres) land is done using predictive control as a part of CMG for attaining proper land utilization, component selection, optimal sizing, and energy management. It involves several testing and true operational conditions such as forecasted data for energy output and load deviations, use of batteries and EVs for scheduling, and reduce DGs dependency.			
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<p>Architecting the Next Generation Computing Platform to Deliver Protected Differentiated Services</p>		<p>Many of today's systems were built either as custom racks of computing and networking infrastructure to support specific functions or have been migrated to homogeneous computing clouds. Each platform was selected to serve a specific purpose, however, as technology advances and the type and volume of data increases, commercial and government customers are seeking a better solution. This research studied mission needs, data types, data speed, processing requirements, and potential automation. The proposed architecture has shown higher efficiency in terms of processing speed, reliability, and security. This research analyzes the options to create optimal solutions where automated data identification, steering, and data processing scheduling is done behind the scenes to deliver a better mission outcome. The optimal system is actually a System of Systems (SoS) that combines various compute, store, interconnect architectures, and technologies as well as software platforms to create an ideal environment for a diverse operational base.</p>	<p>10.1109/SYSCON.2019.8836870</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8836870</p>	<p>IEEE Xplore</p>
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<p>A Colored Petri Net Model for Control Problem of Border Crossing Under Constraints</p>		<p>In this paper, we consider the European Rail Traffic Management System (ERTMS) as a System-of-Systems (SoS) and propose modeling it using colored Petri nets. We formally control the European rail transport, while guaranteeing a set of cross-border security properties. This becomes an essential and challenging task since each of them have mainly developed safety and trackside rules regardless of its neighbors. The feature of this work lies in the approach that considers ERTMS Level 2 as an SoS and addresses the cross-border railway as a mode management problem. In addition, the aspects of mode activation/deactivation, starting state and handling of resource states common to multiple operating modes are taken into account in the proposed model.</p>	<p>10.1109/ICRA46639.2022.9811549</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9811549</p>	<p>IEEE Xplore</p>
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Predictive Controller Based EMS and Techno-Economics of an Electrical-Thermal Community MG		<p>The growing population in cities around the globe creates concerns for issues related to rapid urbanization and changing climatic conditions. To accommodate this large-scale dweller, the concepts of smart buildings and community based sustainable living were started. These two considers application of renewable energy sources (RESs), viz., solar photovoltaic (PV), wind turbines as well as electric vehicles (EVs) to the maximum extent with a backup diesel generator (DG). Most hours of a day is spent by a person staying inside a building (be it residential or workplace), emphasizing the need of creating energy efficient and comfortable living spaces as community buildings. These smart infrastructures consists of various loads like lighting, pumps and motors, cooling and heating, as well as security. Integration of different RESs along with the dedicated loads within community microgrids (CMGs) forms system of systems (SoSs) architecture. This paper presents application of model predictive control for establishing an isolated CMG with optimal sizing of components, and energy management system applying</p>	10.1109/GlobConHT56829.2023.10087854	https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10087854	IEEE Xplore
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		both technical as well as economic aspects. It is verified by including multiple testing and actual operational conditions like time-varying energy output and load changes, storage capacity of batteries, load scheduling coordinated EVs, and minimum fuel consumption.			
ISO/IEC/IEEE Draft International Standard for Enterprise, Systems and Software -- Reference architectures				https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=10851958	IEEE Xplore

<p>Guest Editorial: Military and Government Systems Applications</p>		<p>The papers in this special section focus on military and government systems applications. Organizations in this sectors seek to stay on the leading edge of warfare, communications development, smart infrastructure configuration, and efficient and effective service delivery through the design of complex systems. These complex systems are referred to as System of Systems (SoS) and are defined by the internal and external integration of individual systems and subsystems working together to create new capabilities that could not otherwise be achieved by individual systems. Due to advances in technology and engineering and the proliferation of available information, the complexity of systems continues to increase. Engineering managers and systems engineers are faced with having to integrate multiple complex systems, in which different constituents and configurations, both legacy and new, are integrated to accomplish emergent national security and humanitarian missions, as well as delivery of citizen-centered services.</p>	<p>10.1109/TEM.2022.3206565</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=9937054</p>	<p>IEEE Xplore</p>
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<p>Guest Editorial Circuit and System Design Automation for Internet of Things</p>		<p>Internet-of-Things (IoT) is the technical backbone of smart cities which are envisioned to cope up with rapid urbanization of human population with limited resources. IoT provides three key features of smart cities such as intelligence, interconnection, and instrumentation. IoT is essentially a system-of-systems which can be considered as a configurable dynamic global network of networks. The main components of IoT include the following: 1) The Things; 2) Internet; 3) LAN; and 4) The Cloud. IoT is built by various diverse components including electronics, sensors, actuators, controllers, networks, firmware, and software. However, the existing electronics, controllers, and processors do not meet IoT requirements, such as multiple sensors, communication protocols, and security requirements. The existing computer-aided design (CAD) or electronic design automation tools are not enough to meet diverse challenges such as time-to-market, complexity, and cost of IoT. The required electronic circuits and systems need to be developed by</p>	<p>10.1109/TCAD.2017.2779960</p>	<p>https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=8232442</p>	<p>IEEE Xplore</p>
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		<p>handling and solving specific requirements. Real-time and ultralow power plays a major role since mobile devices in the IoT have to provide a long availability with a relative small energy budget. At the same time, reliability, availability, real-time constraints, and performance requirements pose significant challenges, and therefore, lead to a high interest in research. In this special issue, different approaches to design novel devices, circuits, and systems for solving the challenges with IoT are targeted. Various novel design automation components including modeling, design flows, simulation methods, and optimizations for designing of modern IoT are targeted, from system level down to device level. The current special issue was envisioned with the above technical considerations. After a rigorous review process, a set of articles were selected for this special issue. These papers are briefly discussed in the rest of the editorial.</p>			
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