

C.5. Digital Transformations

Digital Transformations. This stream invites submissions from all domains that explore efforts to transform systems engineering towards digital engineering, including the adoption and/or adaptation of digital practices, methods, applications & tools; the digitalisation of existing products/systems/solutions, and; emergent digital products/systems/solutions & corresponding challenges (eg safety assurance, end user skills, etc)

Lead: Kerry Lunney, Thomas Manley

Domains: All domains welcome

Submissions Summary:

1. **Embracing AI in Digital Engineering: A Holistic Approach to Managing Work, Workforce and Workplace**

[Panels and Workshops](#)

Ren S King 1, Project Performance International, Lilydale, VIC, Australia

2. **Practical Approach to Generation Site Using Digital Transformation Technology for Data Driven Monitoring**

[Full Paper](#)

Ahmad Taufiq AT Abdullah Thani 1, Origin Energy, Spring Mountain, QLD, Australia

3. **Modular image recognition on the edge and digital twin: A case study in accessibility auditing**

[Full Paper](#)

Nick Pickering 1, Tim Young 2, Thomas Carnahan 3, University of Waikato, Hamilton, Waikato, New Zealand, Smart Access, Hamilton, Waikato, New Zealand, Pollin8 Ltd, Cambridge, Waikato, New Zealand

4. **Pathway to Success - Digital Engineering in Defence**

[Paperless Presentations](#)

Asha Mathew 1, Capability Acquisition and Sustainment Group (CASG), Director, Directorate of Digital Transformation and Systems, Adelaide, SA, Australia

5. **The A to Z for Implementing a Digital Transformation on a Systems Project**

[Paperless Presentations](#)

Kerry Lunney 1, Stephane Bonnet 2, Thales Australia, Sydney, NSW, Australia Thales Avionics, Bordeaux, France

6. **Making requirements accessible, when you are tempted by spreadsheets but need an application.**

[Paperless Presentations](#)

Piotr PP Pytka 1, Andrew AP Pitsiakkos 1, KBR, Melbourne, VICTORIA, Australia

21180 Embracing AI in Digital Engineering: A Holistic Approach to Managing Work, Workforce and Workplace

Authors

Ren S King 1, Project Performance International, Lilydale, VIC, Australia

Provided Keywords

fuse, future of systems engineering, AI, MBSE

Natural Language Keywords

ai, approach, digital, embracing, engineering, holistic, managing, nan, work, workforce

Presentation format decision

Parallel Panel (60 minutes)

Stream submitted

D. Other

Stream proposed

C.5. Digital Transformations

Abstract

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20783 Practical Approach to Generation Site Using Digital Transformation Technology for Data Driven Monitoring

Authors

Ahmad Taufiq AT Abdullah Thani 1, Origin Energy, Spring Mountain, QLD, Australia

Provided Keywords

IIOT, Digital Transformation, Smart Grid, SCADA

Natural Language Keywords

data, digital, generation, look, monitoring, presentation, site, technologies, transformation, using

Presentation format decision

Full Paper -Presentation Preference

Stream submitted

C.5. Digital Transformations

Stream proposed

C.5. Digital Transformations

Abstract

The increase in available digital transformation technologies and applications has introduced new methods for intelligent asset monitoring and real-time data collection. This has led to digitalization in energy industries using Industrial Internet of Things (IIoT) which will improve intelligent asset monitoring through real-time models with more emphasis on communications, modern protocols, and Artificial intelligence (AI) as the underlying requirements.

Traditionally, generation sites have been slow adopters in implementing digital transformation technologies. This presentation will look at how a traditional generation site has attempted to use digital transformation technology for data driven monitoring.

The presentation will also look at how the generation site has addressed different issues associated with adopting digital transformation technologies, specifically evaluation criteria for IoT devices, interoperability and different architectures implemented on site.

The presentation will also show a completed end to end example of a practical install on a generation site.

20901 Modular image recognition on the edge and digital twin: A case study in accessibility auditing

Authors

Nick Pickering 1, Tim Young 2, Thomas Carnahan 3, University of Waikato, Hamilton, Waikato, New Zealand, Smart Access, Hamilton, Waikato, New Zealand, Pollin8 Ltd, Cambridge, Waikato, New Zealand

Provided Keywords

Digital Twin, Image Recognition, System of Systems, Smart Cities, Accessibility auditing

Natural Language Keywords

capability, capture, data, edge, high, human, image, modular, people, recognition

Presentation format decision

Full Paper - Presentation Preference

Stream submitted

B.6. Systems of Systems Engineering Applications

Stream proposed

C.5. Digital Transformations

Abstract

Currently, disabled people and older people cannot plan a safe journey around our built environment and transport hubs. Smart Access has a solution based on accessibility audits covering 38 features. The solution, available online or via mobile, provides geospatial information that supports sound decision-making for commuters and council planners. The manual data capture of features empowers people with impairments to engage more in the community but is labour-intensive and not scalable.

Custom development of high-accuracy navigation and image recognition systems on the edge are not typically financially viable in many social and environmental applications. This is especially true in scenarios where system utilisation is low, supply chain costs for high availability are high and the recruitment and retention of a wide spectrum of human capability is challenging.

This paper undertakes the design, implementation and evaluation of modular edge units that can perform common high-accuracy navigation, sensor fused with image recognition on the edge, communicated over a common data standard into a reusable digital twin for affordability of research, development and operation. The results demonstrate the benefit of a modular Hardware As A Service (HaaS) and Software As A Service (SaaS) model to break down the traditional barriers associated with the adoption of industry 4.0 solutions, with the capability being leveraged across numerous applications ranging from traffic counting and on-truck recycling audits in smart cities, to autonomous ground vehicles, human-assisted robotic harvesting and fruit condition monitoring in horticulture.

Future work will focus on expanding the data capture to enhance the reliability of neural network artificial intelligence models for existing use case validation, expand use cases across other domains and perform System of Systems modelling to validate the financial viability, incorporating the life cycle cost associated with human capability, spares holding, availability and utilisation to optimise emergent properties.

21289 Pathway to Success - Digital Engineering in Defence

Authors

Asha Mathew 1, Capability Acquisition and Sustainment Group (CASG), Director, Directorate of Digital Transformation and Systems, Adelaide, SA, Australia

Provided Keywords

Digital Transformation, Digital Engineering, Defence, Digital Engineering Strategy

Natural Language Keywords

approach, digital, mission, pathway, placeholder, potential, simulate, software, solution, subsystem

Presentation format decision

Paperless - Presentation or Poster

Stream submitted

C.5. Digital Transformations

Stream proposed

C.5. Digital Transformations

Abstract

Placeholder for a potential talk on the "mission computing subsystem of the Block 2 Boxer, with its DDS approach, and how they simulate their digital solution in their software development environment".

20723 The A to Z for Implementing a Digital Transformation on a Systems Project

Authors

Kerry Lunney 1, Stephane Bonnet 2, Thales Australia, Sydney, NSW, Australia Thales Avionics, Bordeaux, France

Provided Keywords

digital transformation, digital engineering, agile, systems thinking, capability

Natural Language Keywords

context, digital, dt, enterprise, guidance, guide, industry, participants, practices, se

Presentation format decision

Paperless-Presentation or Poster

Stream submitted

C.5. Digital Transformations

Stream proposed

C.5. Digital Transformations

Abstract

Overview -Digital Transformations (DT) continue to change our products, systems, services, and the way we work. Will we be ready for this future? To tackle the challenges we will present the "A to Z" guide for DT, including the digitalisation of SE practices.

Context -In a global context, we will be moving towards model-based approaches, knowledge sharing will be exponentially increasing, digital technologies such as AI, autonomy and digital twinning will be incorporated into the various engineering disciplines as they better evolve to adjust to a dynamic world with increasing complexity. Collaborations and interactions will be paramount, largely through the management of the digital thread, enabled through the tools and environments of the digital ecosystem. To do this, the enterprise workforce will need to be diverse, agile, efficient, possibly distributed, and more strongly recognise knowledge as an asset. This level of transformation can be confusing, difficult to identify and even harder to implement.

Purpose -To navigate a DT, guidance is required from behaviour adoption, technology evolutions, to new/ tailored practices and tools, balancing the need to change with the constraints of the enterprise. This guidance must be tailorable to apply to different system projects.

Approach -A combination of workshops, and industry experience across multiple domains and countries with real life examples are used to illustrate this topic. Many of the guidance points will resonate with participants whether in industry, academia or government, as we all undertake a DT at some level in our enterprises.

Insights -The takeaways for participants are 1) understanding of what is involved in a DT; 2) A to Z guide on DT, that is completely tailorable, to add to an engineer's toolkit; 3) mapping examples of the guide to 30 common SE practices.

21209 Making requirements accessible, when you are tempted by spreadsheets but need an application.

Authors

Piotr PP Pytka 1, Andrew AP Pitsiakkos 1, KBR, Melbourne, VICTORIA, Australia

Provided Keywords

Requirements Management Application, Verification and Validation automation, API based communication, Requirements Data Exchange Methodologies

Natural Language Keywords

application, data, discipline, engineers, management, requirements, spreadsheets, systems, time, using

Presentation format decision

Paperless - Presentation or Poster

Stream submitted

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Stream proposed

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Abstract

Systems Engineers devote significant time to requirements management, which can detract attention from the valuable activity of requirements analysis. The issue stems from repetitive data exchange activity which requires systems engineers familiar with using requirements management tools such as IBMs DOORS NG to produce exports of requirements into excel for discipline engineers to action. This often results in reporting of stale data, and misinformation when managing requirements using spreadsheets.

In order to solve this problem KBR looked at ways of digitally transforming the way discipline engineers interact with requirements managed by systems engineers. Learning to use specialist requirements management tools can be time consuming and an entry barrier for discipline engineers deployed onto Projects.

We found that users were comfortable with the simplicity of spreadsheets but had no way of pushing verification and validation evidence directly into the database without knowing how to use the specialist tool.

KBR have taken the simplicity of spreadsheets to present pertinent requirements in a format familiar to discipline engineers using a dedicated web application as an exchange to push verification and validation evidence data directly into the requirements management tool. This is achieved using IBM DOORS NG RESTful application programming interface (API) which is based on the Open Services for Lifecycle Collaboration (OSLC) standards.

Integration proved to be quite challenging, not only in designing an intuitive user interface which streamlines efficiency and supports real time data interactions, but also how to make the application accessible by external users, as well as preserving user authoring permissions for historical audit purposes. The important lesson here is that digital transformation does not have to be complex, its the large volume simple repetitive tasks that we should be aiming to automate first, leveraging simple solutions for maximum gain, before embarking on elaborate complex automations.