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Preface

Acknowledgements

2

A Compliance Management Framework for Business Process Models (Awad (2010))

Companies develop process models to explicitly describe their business operations. In the same time, business operations, business processes, must adhere to various types of compliance requirements. **Regulations**, e.g., Sarbanes Oxley Act of 2002, internal policies, best practices are just a few sources of compliance requirements. In some cases, non-adherence to compliance requirements makes the organization subject to legal punishment. In other cases, non-adherence to compliance leads to loss of competitive advantage and thus loss of market share. Unlike the classical domain-independent behavioral correctness of business processes, compliance requirements are domain-specific. Moreover, compliance requirements change over time. New requirements might appear due to change in laws and adoption of new policies. Compliance requirements are offered or enforced by different entities that have different objectives behind these requirements. Finally, compliance requirements might affect different aspects of business processes, e.g., control flow and data flow. As a result, it is infeasible to hard-code compliance checks in tools. Rather, a repeatable process of modeling compliance rules and checking them against business processes automatically is needed. This thesis provides a formal approach to support process design-time compliance checking. Using visual patterns, it is possible to model compliance requirements concerning control flow, data flow and conditional flow rules. Each pattern is mapped into a temporal logic formula. The thesis addresses the problem of consistency checking among various compliance requirements, as they might stem from divergent sources. Also, the thesis contributes to automatically check compliance requirements against process models using model checking. We show that extra domain knowledge, other than expressed in compliance rules, is needed to reach correct decisions. In case of violations, we are able to provide a useful feedback to the user. The feedback is in the form of parts of the process model whose execution causes the violation. In some cases, our approach is capable of providing automated remedy of the violation.

Keywords: No keywords available

3

RegelSpraak: A CNL for Executable Tax Rules Specification (Corsius et al. (2021))

RegelSpraak is a CNL developed at the Dutch Tax Administration (DTA) over the last decade. Keeping up with frequently changing tax rules poses a formidable challenge to the DTA IT department. RegelSpraak is a central asset in ongoing efforts of the DTA to attune their tax IT systems to automatic execution of tax law. RegelSpraak now is part of the operational process of rule specification and execution. In this practice-oriented paper, we present the history of RegelSpraak, its properties and the context of its use, emphasizing its double functionality as a language readable by non-technical tax experts but also directly interpretable in a software generating setup.

Keywords: CNL

4

Business Process Compliance Management: An Integrated Proactive Approach (Elgammal et al. (2014))

Today's enterprises demand a high degree of compliance of business processes to meet regulations, such as Sarbanes-Oxley and Basel I-III. To ensure continuous guaranteed compliance, compliance management should be considered during all phases of the business process lifecycle; from the analysis and design to deployment, monitoring and evaluation. This paper introduces an integrated business process compliance management framework that incorporates design-time verification and runtime monitoring approaches. The nutshell of the approach is the Compliance Request Language (CRL), which is a high-level pattern-based language for the abstract specification of compliance requirements. From CRL expressions, formal compliance rules can be automatically generated, thereby eliminating the need for business and compliance experts to learn and use complex low-level formal languages. Formalized compliance rules enable automated approaches to be used for the static verification and dynamic monitoring of business processes. An integrated prototypical tool-suite is developed as a proof-of-concept to help validating the applicability of the approaches, and validated by experiment with two real-life case studies.

Keywords: No keywords available

5

The Influence of Directive Explanations on Users' Business Process Compliance Performance (Hadasch, Maedche, and Gregor (2016))

Purpose – In organizations, individual user's compliance with business processes is important from a regulatory and efficiency point of view. The restriction of users' choices by implementing a restrictive information system is a typical approach in many organizations. However, restrictions and mandated compliance may affect employees' performance negatively. Especially when users need a certain degree of flexibility in completing their work activity. The purpose of this paper is to introduce the concept of directive explanations (DEs). DEs provide context-dependent feedback to users, but do not force users to comply.

Keywords: No keywords available

6

Norms Modeling Constructs of Business Process Compliance Management Frameworks: A Conceptual Evaluation (Hashmi and Governatori (2017))

The effectiveness of a compliance management framework (CMF) can be guaranteed only if the framework is based on sound conceptual and formal foundations. In particular, the formal language used in the CMF is able to expressively represent the specifications of normative requirements (hereafter, norms) that impose constraints on various activities of a business process. However, if the language used lacks expressiveness and the modelling constructs proposed in the CMF are not able to properly represent different types of norms, it can significantly impede the reliability of the compliance results produced by the CMF. This paper investigates whether existing CMFs are able to provide reasoning and modeling support for various types of normative requirements by evaluating the conceptual foundations of the modeling constructs that existing CMFs use to represent a specific type of norm. The evaluation results portray somewhat a bleak picture of the state-of-the-affairs when it comes to represent norms as none of the existing CMFs is able to provide a comprehensive reasoning and modeling support. Also, it points to the shortcomings of the CMFs and emphasises exigent need of new modeling languages with sound theoretical and formal foundations for representing legal norms.

Keywords: Business Processes, Compliance, Compliance Management Frameworks, Modelling Constructs, Modelling Languages, Norms

7

Are We Done with Business Process Compliance: State of the Art and Challenges Ahead (Hashmi et al. (2018))

Literature on business process compliance (BPC) has predominantly focused on the alignment of the regulatory rules with the design, verification and validation of business processes. Previously surveys on BPC have been conducted with specific context in mind; however, the literature on BPC management research is largely sparse and does not accumulate a detailed understanding on existing literature and related issues faced by the domain. This survey provides a holistic view of the literature on existing BPC management approaches, and categories them based on different compliance management strategies in the context of formulated research questions. A systematic literature approach is used where search terms pertaining keywords were used to identify literature related to the research questions from scholarly databases. From initially 183 papers, we selected 79 papers related to the themes of this survey published between 2000–2015. The survey results reveal that mostly compliance management approaches center around three distinct categories namely: design-time (28%), run-time (32%) and auditing (10%). Also, organisational and internal control based compliance management frameworks (21%) and hybrid approaches make (9%) of the surveyed approaches. Furthermore, open research challenges and gaps are identified and discussed with respect to the compliance problem.

Keywords: Business process compliance, Business processes, Compliance Management Frameworks, Normative requirements, Norms compliance

8

Improved Compliance by BPM-Driven Workflow Automation (Holzmüller-Laue et al. (2014))

Using methods and technologies of business process management (BPM) for the laboratory automation has important benefits (i.e., the agility of high-level automation processes, rapid interdisciplinary prototyping and implementation of laboratory tasks and procedures, and efficient real-time process documentation). A principal goal of the model-driven development is the improved transparency of processes and the alignment of process diagrams and technical code. First experiences of using the business process model and notation (BPMN) show that easy-to-read graphical process models can achieve and provide standardization of laboratory workflows. The model-based development allows one to change processes quickly and an easy adaption to changing requirements. The process models are able to host work procedures and their scheduling in compliance with predefined guidelines and policies. Finally, the process-controlled documentation of complex workflow results addresses modern laboratory needs of quality assurance. BPMN 2.0 as an automation language to control every kind of activity or subprocess is directed to complete workflows in end-to-end relationships. BPMN is applicable as a system-independent and cross-disciplinary graphical language to document all methods in laboratories (i.e., screening procedures or analytical processes). That means, with the BPM standard, a communication method of sharing process knowledge of laboratories is also available.

Keywords: BPMN, end-to-end workflow, laboratory automation, model-based application development, systems integration

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A Knowledge-Intensive Adaptive Business Process Management Framework (Kir and Erdogan (2021))

Business process management has been the driving force of optimization and operational efficiency for companies until now, but the digitalization era we have been experiencing requires businesses to be agile and responsive as well. In order to be a part of this digital transformation, delivering new levels of automation-fueled agility through digitalization of BPM itself is required. However, the automation of BPM cannot be achieved by solely focusing on process space and classical planning techniques. It requires a holistic approach that also captures the social aspects of the business environment, such as corporate strategies, organization policies, negotiations, and cooperation. For this purpose, we combine BPM, knowledge-intensive systems and intelligent agent technologies, and yield one consolidated intelligent business process management framework, namely agileBPM, that governs the entire BPM life-cycle. Accordingly, agileBPM proposes a modeling methodology to semantically capture the business interests, enterprise environment and process space in accordance with the agent-oriented software engineering paradigm. The proposed agent-based process execution environment provides cognitive capabilities (such as goal-driven planning, norm compliance, knowledge-driven actions, and dynamic cooperation) on top of the developed business models to support knowledge workers' multi-criteria decision making tasks. The context awareness and exception handling capabilities of the proposed approach have been presented with experimental studies. Through comparative evaluations, it is shown that agileBPM is the most comprehensive knowledge-intensive process management solution.

Keywords: Agent-based business process management, Agile business process management, Business process management, Knowledge-intensive processes, Process adaptation, Process modeling and execution

10

Comparative Analysis of Business Process Modelling Tools for Compliance Management Support (Koncevics et al. (2017))

The paper presents results of the comparative analysis of business process modelling tools for supporting automated compliance management in organisations. By **compliance** in the paper we mean compliance to legislation, **regulations** of municipalities, external regulatory requirements and also internal organisational policies. The goal of the research is (1) to identify main attributes of business process modelling tools relevant in compliance management, and (2) to use the identified attributes for analysis of the tools to better understand the scope of their capability to support compliance management. The attributes of the tools have been derived from the related research. The analysis of the tools has been performed by installing each tool and evaluating it against a set of the identified attributes. The obtained results are useful in choosing the tools for compliance management in general and for open source solutions to develop new compliance management tools in particular.

Keywords: Business process compliance, compliance management, compliance management tools, open source business process modelling tools

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Compliance Monitoring in Business Processes: Functionalities, Application, and Tool-Support (Ly et al. (2015))

In recent years, monitoring the compliance of business processes with relevant regula- tions, constraints, and rules during runtime has evolved as major concern in literature and practice. Monitoring not only refers to continuously observing possible compliance violations, but also includes the ability to provide fine-grained feedback and to predict possible compliance violations in the future. The body of literature on business process compliance is large and approaches specifically addressing process monitoring are hard to identify. Moreover, proper means for the systematic comparison of these approaches are missing. Hence, it is unclear which approaches are suitable for particular scenarios. The goal of this paper is to define a framework for Compliance Monitoring Functionalities (CMF) that enables the systematic comparison of existing and new approaches for monitoring compliance rules over business processes during runtime. To define the scope of the framework, at first, related areas are identified and discussed. The CMFs are harvested based on a systematic literature review and five selected case studies. The appropriateness of the selection of CMFs is demonstrated in two ways: (a) a systematic comparison with pattern-based compliance approaches and (b) a classification of existing compliance monitoring approaches using the CMFs. Moreover, the application of the CMFs is showcased using three existing tools that are applied to two realistic data sets. Overall, the CMF framework provides powerful means to position existing and future compliance monitoring approaches.

Keywords: Business process compliance, Compliance monitoring, Operational support

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Blockchains for Business Process Management-Challenges and Opportunities (Mendling et al. (2018))

Blockchain technology promises a sizable potential for executing inter-organizational business processes without requiring a central party serving as a single point of trust (and failure). This paper analyzes its impact on business process management (BPM). We structure the discussion using two BPM frameworks, namely the six BPM core capabilities and the BPM lifecycle. This paper provides research directions for investigating the application of blockchain technology to BPM.

Keywords: Top100

13

Supporting Domain Experts to Select and Configure Precise Compliance Rules (Ramezani, Fahland, and van der Aalst (2013))

Compliance specifications concisely describe selected aspects of what a business operation should adhere to. To enable automated techniques for compliance checking, it is important that these requirements are specified correctly and precisely, describing exactly the behavior intended. Although there are rigorous mathematical formalisms for representing compliance rules, these are often perceived to be difficult to use for business users. Regardless of notation, however, there are often subtle but important details in compliance requirements that need to be considered. The main challenge in compliance checking is to bridge the gap between informal description and a precise specification of all requirements. In this paper, we present an approach which aims to facilitate creating and understanding formal compliance requirements by providing configurable templates that capture these details as options for commonly-required compliance requirements. These options are configured interactively with end-users, using question trees and natural language. The approach is implemented in the Process Mining Toolkit ProM.

Keywords: auditing, compliance checking, compliance specification, configurable compliance rules, question tree

14

BPM Perspectives to Support ICSs: Exploiting the Integration of Formal Verifications into Investment Service Provision Processes (Raucci et al. (2020))

Purpose This paper investigates the criteria for a selective integration, in the multidisciplinary business process management (BPM) areas, between information technologies tools and the company's internal control systems (ICSs) aimed at directing organizational behaviours. Adopting a process-based perspective, the authors propose a formal methodology to increase ICSs aims, related to the segregation of duties (SoDs) models, efficiently and effectively. Design/methodology/approach The authors examine the applicability of formal verifications to validate a banking process of providing investment services, which is mapped through the workflow management system. To mitigate the state explosion problem of formal methods, the authors propose an efficient methodology that has been proved on the SoDs models in the bank ICSs, as a case study. Findings The authors' investigations suggest that in the BPM domain, the banking ICSs aims can benefit from the aforesaid methodologies, originating from the formal methods area, to increase the reliability and correctness in the design, modelling and implementation of the SoDs models. Originality/value The proposed methodology is quite general and can be efficiently applied to large-scale systems in different business contexts or areas of the BPM. Its application to the bank's SoD prevents or detects significant weaknesses, operational risks, excessive risk appetite and other undesirable behaviours in the investment services provision processes. This guarantees that the investment ordered/offered is "suitable and appropriate'' with the client's risk profile, especially non-professional, required by the MiFID II Directive.

Keywords: Banking Processes, Business Process Management, Formal Methods, Internal Control Systems, Investment Services, Segregation of Duties

15

Spreadsheets for Business Process Management: Using Process Mining to Deal with `Events'' Rather than`Numbers''? (Van Der Aalst (2018))

Purpose – Process mining provides a generic collection of techniques to turn event data into valuable insights, improvement ideas, predictions, and recommendations. This paper uses spreadsheets as a metaphor to introduce process mining as an essential tool for data scientists and business analysts. The purpose of this paper is to illustrate that process mining can do with events what spreadsheets can do with numbers.

Keywords: No keywords available

16

Product-Based Workflow Support (Vanderfeesten, Reijers, and Van Der Aalst (2011))

Despite the industrial need for the improvement of information-intensive business processes, few scientifically grounded approaches exist to support such initiatives. In this paper, we propose a new approach that builds on concepts that are part of a product-oriented view on process optimization. Essentially, this approach allows end users to flexibly decide on the best possible way to create an informational product within the limits that are imposed by regulations and logical dependencies. We argue that this provides various benefits in comparison to earlier work. To support the end user in making sensible decisions, we describe two alternative approaches to provide her with recommendations to this end. We formalize these alternatives and discuss their relative strengths and weaknesses. The feasibility of the overall approach, which we refer to as Product-Based Workflow Support, is demonstrated by a workflow system realized using ProM and DECLARE.

Keywords: Business Process Modelling, Product Data Model, Workflow Management

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Blockchain-Based Business Process Management (BPM) Framework for Service Composition in Industry 4.0 (Viriyasitavat (2020))

Business process management (BPM) aims to optimize business processes to achieve better system performance such as higher profit, quicker response, and better services. BPM systems in Industry 4.0 are required to digitize and automate business process workflows and support the transparent interoperations of service vendors. The critical bottleneck to advance BPM systems is the evaluation, verification, and transformation of trustworthiness and digitized assets. Most of BPM systems rely heavily on domain experts or third parties to deal with trustworthiness. In this paper, an automated BPM solution is investigated to select and compose services in open business environment, Blockchain technology (BCT) is explored and proposed to transfer and verify the trustiness of businesses and partners, and a BPM framework is developed to illustrate how BCT can be integrated to support prompt, reliable, and cost-effective evaluation and transferring of Quality of Services in the workflow composition and management.

Keywords: Block-chain technology (BCT), Business process management (BPM), Industry 4.0, Internet of Things (IoT), Quality of Service (QoS), Service selection and composition, Smart contracts, Trustworthiness

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Blockchain-as-a-Service for Business Process Management: Survey and Challenges (Viriyasitavat et al. (2023))

Blockchain technology (BCT) has brought a paradigm shift to Business Process Management (BPM). BCT provides a trusted decentralized infrastructure to secure data and process executions using distributed ledgers and smart contract to manage complex business processes. Numerous efforts have been made to exploit BCT in supporting dynamic and trusted collaborations of business processes. This paper aims to understand recent BCT development for its BPM applications and identify the limitations and challenges for further development via a systematic literature review (SLR). It is found that numerous works have reported using BCT as technical solutions to fulfill some traditional BPM functions. This paper is distinguished from existing works, especially several relevant surveys in the sense that (1) the impact of using BCT in BPM is thoroughly explored to identify new constraints and challenges explicitly brought by blockchains; (2) the requirements for Business Process Compliance (BPC) are firstly analyzed in detail. Note that BPC is to assure the adherence of business processes to pre-defined policies, standards, specifications, regulations, and laws when business processes are executed. To fill the gaps of BCT applications in these two aspects, Blockchain-as-aService (BCaaS) is adopted in business process architecture, and the trends of BCT developments are identified accordingly.

Keywords: No keywords available

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Recognizing and Splitting Conditional Sentences for Automation of Business Processes Management (Vo et al. (2021))

Business Process Management (BPM) is the discipline which is responsible for management of discovering, analyzing, redesigning, monitoring, and controlling business processes. One of the most crucial tasks of BPM is discovering and modelling business processes from text documents. In this paper, we present our system that resolves an end-to-end problem consisting of 1) recognizing conditional sentences from technical documents, 2) finding boundaries to extract conditional and resultant clauses from each conditional sentence, and 3) categorizing resultant clause as Action or Consequence which later helps to generate new steps in our business process model automatically. We created a new dataset and three models solve this problem. Our best model achieved very promising results of 83.82, 87.84, and 85.75 for Precision, Recall, and F1, respectively, for extracting Condition, Action, and Consequence clauses using Exact Match metric.

Keywords: Computer Science - Computation and Language

20

Evaluation of Compliance Rule Languages for Modelling Regulatory Compliance Requirements (Zasada et al. (2023))

Compliance in business processes has become a fundamental requirement given the constant rise in regulatory requirements and competitive pressures that have emerged in recent decades. While in other areas of business process modelling and execution, considerable progress towards automation has been made (e.g., process discovery, executable process models), the interpretation and implementation of compliance requirements is still a highly complex task requiring human effort and time. To increase the level of "mechanization'' when implementing regulations in business processes, compliance research seeks to formalize compliance requirements. Formal representations of compliance requirements should, then, be leveraged to design correct process models and, ideally, would also serve for the automated detection of violations. To formally specify compliance requirements, however, multiple process perspectives, such as control flow, data, time and resources, have to be considered. This leads to the challenge of representing such complex constraints which affect different process perspectives. To this end, current approaches in business process compliance make use of a varied set of languages. However, every approach has been devised based on different assumptions and motivating scenarios. In addition, these languages and their presentation usually abstract from real-world requirements which often would imply introducing a substantial amount of domain knowledge and interpretation, thus hampering the evaluation of their expressiveness. This is a serious problem, since comparisons of different formal languages based on real-world compliance requirements are lacking, meaning that users of such languages are not able to make informed decisions about which language to choose. To close this gap and to establish a uniform evaluation basis, we introduce a running example for evaluating the expressiveness and complexity of compliance rule languages. For language selection, we conducted a literature review. Next, we briefly introduce and demonstrate the languages' grammars and vocabularies based on the representation of a number of legal requirements. In doing so, we pay attention to semantic subtleties which we evaluate by adopting a normative classification framework which differentiates between different deontic assignments. Finally, on top of that, we apply Halstead's well-known metrics for calculating the relevant characteristics of the different languages in our comparison, such as the volume, difficulty and effort for each language. With this, we are finally able to better understand the lexical complexity of the languages in relation to their expressiveness. In sum, we provide a systematic comparison of different compliance rule languages based on real-world compliance requirements which may inform future users and developers of these languages. Finally, we advocate for a more user-aware development of compliance languages which should consider a trade off between expressiveness, complexity and usability.

Keywords: business processes, compliance rules modelling, conceptual modelling, expressiveness, language complexity, regulatory compliance

21

Comparing Textual Descriptions to Process Models – The Automatic Detection of Inconsistencies (van der Aa, Leopold, and Reijers (2017))

Many organizations maintain textual process descriptions alongside graphical process models. The purpose is to make process information accessible to various stakeholders, including those who are not familiar with reading and interpreting the complex execution logic of process models. Despite this merit, there is a clear risk that model and text become misaligned when changes are not applied to both descriptions consistently. For organizations with hundreds of different processes, the effort required to identify and clear up such conflicts is considerable. To support organizations in keeping their process descriptions consistent, we present an approach to automatically identify inconsistencies between a process model and a corresponding textual description. Our approach detects cases where the two process representations describe activities in different orders and detect process model activities not contained in the textual description. A quantitative evaluation with 53 real-life model-text pairs demonstrates that our approach accurately identifies inconsistencies between model and text.

Keywords: Business process management, Business process modeling, Compliance checking, Inconsistency detection, Matching, Natural language processing

Awad, Ahmed Mahmoud Hany Aly. 2010. "A Compliance Management Framework for Business Process Models." PhD thesis, University of Potsdam.

Corsius, Mischa, Stijn Hoppenbrouwers, Mariette Lokin, Elian Baars, Gertrude Sangers-Van Cappellen, and Ilona Wilmont. 2021. "RegelSpraak: A CNL for Executable Tax Rules Specification." In *Proceedings of the Seventh International Workshop on Controlled Natural Language (CNL 2020/21)*.

Elgammal, A, S Sebahi, O Turetken, MS Hacid, MP Papazoglou, and WJ van den Heuvel. 2014. "Business Process Compliance Management: An Integrated Proactive Approach." In *CRAFTING GLOBAL COMPETITIVE ECONOMIES: 2020 VISION STRATEGIC PLANNING & SMART IMPLEMENTATION, VOLS I-IV*, edited by KS Soliman, 764–81.

Hadasch, Frank, Alexander Maedche, and Shirley Gregor. 2016. "The Influence of Directive Explanations on Users' Business Process Compliance Performance." *Business Process Management Journal* 22 (3): 458–83. https://doi.org/10.1108/BPMJ-05-2015-0067.

Hashmi, Mustafa, and Guido Governatori. 2017. "Norms Modeling Constructs of Business Process Compliance Management Frameworks: A Conceptual Evaluation." *Artificial Intelligence and Law* 26 (September): 251–305. https://doi.org/10.1007/s10506-017-9215-8.

Hashmi, Mustafa, Guido Governatori, Ho-Pun Lam, and Moe Thandar Wynn. 2018. "Are We Done with Business Process Compliance: State of the Art and Challenges Ahead." *Knowl Inf Syst* 57 (1): 79–133. https://doi.org/10.1007/s10115-017-1142-1.

Holzmüller-Laue, Silke, Bernd Göde, Heidi Fleischer, and Kerstin Thurow. 2014. "Improved Compliance by BPM-Driven Workflow Automation." *SLAS Technology* 19 (6): 528–45. https://doi.org/10.1177/2211068214549626.

Kir, Huseyin, and Nadia Erdogan. 2021. "A Knowledge-Intensive Adaptive Business Process Management Framework." *Information Systems* 95 (January): 101639. https://doi.org/10.1016/j.is.2020.101639.

Koncevics, Rolands, Ludmila Penicina, Andrejs Gaidukovs, Maris Dargis, Rita Burbo, and Ainars Auzins. 2017. "Comparative Analysis of Business Process Modelling Tools for Compliance Management Support." *Appl. Comput. Syst.* 21 (1): 22–27. https://doi.org/10.1515/ACSS-2017-0003.

Ly, Linh Thao, Fabrizio Maria Maggi, Marco Montali, Stefanie Rinderle-Ma, and Wil MP Van Der Aalst. 2015. "Compliance Monitoring in Business Processes: Functionalities, Application, and Tool-Support." *Information Systems*, 2.309, 54: 209–34.

Mendling, Jan, Ingo Weber, Wil Van Der Aalst, Jan Vom Brocke, Cristina Cabanillas, Florian Daniel, Søren Debois, Claudio Di Ciccio, Marlon Dumas, and Schahram Dustdar. 2018. "Blockchains for Business Process Management-Challenges and Opportunities." *ACM Transactions on Management Information Systems (TMIS)* 9 (1): 1–16.

Ramezani, Elham, Dirk Fahland, and Wil M. P. van der Aalst. 2013. "Supporting Domain Experts to Select and Configure Precise Compliance Rules." In *Business Process Management Workshops - BPM 2013 International Workshops, Beijing, China, August 26, 2013, Revised Papers*, edited by Niels Lohmann, Minseok Song, and Petia Wohed, 171:498–512. Lecture Notes in Business Information Processing. Springer. https://doi.org/10.1007/978-3-319-06257-0/_39.

Raucci, Domenico, Antonella Santone, Francesco Mercaldo, and Tomasz Dyczkowski. 2020. "BPM Perspectives to Support ICSs: Exploiting the Integration of Formal Verifications into Investment Service Provision Processes." *Industrial Management & Data Systems* 120 (7): 1383–1400. https://doi.org/10.1108/IMDS-11-2019-0593.

van der Aa, Han, Henrik Leopold, and Hajo A. Reijers. 2017. "Comparing Textual Descriptions to Process Models – The Automatic Detection of Inconsistencies." *Information Systems* 64 (March): 447–60. https://doi.org/10.1016/j.is.2016.07.010.

Van Der Aalst, Wil. 2018. "Spreadsheets for Business Process Management: Using Process Mining to Deal with 'Events' Rather Than 'Numbers'?" *BPMJ* 24 (1): 105–27. https://doi.org/10.1108/BPMJ-10-2016-0190.

Vanderfeesten, Irene, Hajo A. Reijers, and Wil M. P. Van Der Aalst. 2011. "Product-Based Workflow Support." *Information Systems* 36 (2): 517–35. https://doi.org/10.1016/j.is.2010.09.008.

Viriyasitavat, Wattana. 2020. "Blockchain-Based Business Process Management (BPM) Framework for Service Composition in Industry 4.0." *Journal of Intelligent Manufacturing*.

Viriyasitavat, Wattana, Li Da Xu, Gaurav Dhiman, and Zhuming Bi. 2023. "Blockchain-as-a-Service for Business Process Management: Survey and Challenges." *IEEE Trans. Serv. Comput.* 16 (3): 2299–2314. https://doi.org/10.1109/TSC.2022.3199232.

Vo, Ngoc Phuoc An, Irene Manotas, Octavian Popescu, Algimantas Cerniauskas, and Vadim

Sheinin. 2021. "Recognizing and Splitting Conditional Sentences for Automation of Business Processes Management." arXiv. https://arxiv.org/abs/2104.00660.

Zasada, Andrea, Mustafa Hashmi, Michael Fellmann, and David Knuplesch. 2023. "Evaluation of Compliance Rule Languages for Modelling Regulatory Compliance Requirements." *Software* 2 (1): 71–120. https://doi.org/10.3390/software2010004.