

The Danish Center for Digital Compliance (DICE)

Hugo A. López^{1,*}, Alexandra Andhov^{2,3,*}, Juanita Caballero-Villalobos¹, Olga Kokoulina², Jonas M. Lindner¹ and Julian Neuberger¹

¹DTU Compute, Technical University of Denmark, Richard Petersens Plads B.324, DK-2800 Kgs. Lyngby, Denmark

²Faculty of Law, University of Copenhagen, Karen Blixens Plads 16 DK-2300 Copenhagen S, Denmark

³Faculty of Law, University of Auckland, Sir Owen G Glenn Bldg 260, 12 Grafton Rd, Auckland, New Zealand

Abstract

Digital compliance refers to the alignment between computer-supported processes and laws and regulations. Compliance is difficult because it requires being able to express the intent and possible interpretations of laws as formal models, align models with the digital footprints of a process, and ensure such footprints do not generate violations. To perform compliance verification, we need a solid understanding of the legal text and the context of use. Moreover, given the continuous evolution of laws, we need to adjust computational techniques over time. Not surprisingly, most of this process is still being done manually, leading to a large latency in audits, and processes whose deployment does not bear guarantees to follow regulatory constraints. DICE aims at establishing the first centre in Denmark where law and computer science scholars work proactively in the creation of algorithmic techniques to design and develop solutions for digital compliance. From 2024 until 2026, the centre uncovers fundamental possibilities and limits of algorithmic views within compliance, identifies areas where digital compliance solutions are plausible, and defines a roadmap for the development of algorithmic compliance solutions that are valuable for particular areas.

Keywords

Compliance Management Frameworks, Process Traceability, Process Mining, DCR graphs

1. Introduction

Regulatory compliance is one of the major drivers behind the adoption of Process Mining (PM) in industry [1], yet there is still a large gap between regulations and the artifacts used in PM. Four key factors limit the adoption of PM for compliance: first, laws must be converted into inputs required for PM techniques. Previous works use logical languages or process models rather than laws (see [2] for an overview), and there is no traceability back to the laws. Second, PM techniques work over structured data (e.g., event logs), which constitute only a small part of the information in organizations compared to more than 80% of information that resides as unstructured (e.g., textual) data [3]. Even with the emergence of Natural Language Processing (NLP) models trained with legal documents [4], their accuracy is still very low in compliance-related tasks, such as knowledge extraction and semantic reasoning [5, 6]. Third, PM and computational compliance techniques are typically computationally expensive [7] and verify the alignment between a process and a single policy at a time. This contrasts with the legal practice: a case needs to be compliant against multiple (interrelated) laws [8], and in coherence with legal precedents. Finally, there is a non-trivial interpretative factor: some decisions must be made only by humans, which may lead to multiple interpretations and non-deterministic outcomes. This contrasts with the intention of formalizing policies as mathematical properties with a single, formal semantics.

Objectives. The Villum Synergy Project “Interdisciplinary Center for DIgital Compliance (DICE)” combines expertise from human, legal, socio, and technical sciences and aims at establishing methods,

International Conference on Advanced Information Systems Engineering (CAISE) 2026: Research Project Exhibition

*PI’s and corresponding authors. Other authors in alphabetical order.

✉ hulo@dtu.dk (H. A. López); alexandra.andhov@auckland.ac.nz (A. Andhov); jcavi@dtu.dk (J. Caballero-Villalobos); olga.kokoulina@jur.ku.dk (O. Kokoulina); jtone@dtu.dk (J. Neuberger)

🆔 0000-0001-5162-7936 (H. A. López); 0000-0002-9088-1512 (A. Andhov); 0000-0002-4915-0961 (J. Caballero-Villalobos); 0000-0002-9421-8566 (O. Kokoulina); 0009-0007-5688-3681 (J. M. Lindner); 0009-0008-4244-7659 (J. Neuberger)



© 2026 Copyright for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

techniques, and tools that will help legal specialists in the assessment and safeguarding of compliance with digital processes, as well as their maintenance when laws or processes change. In its inception phase, the project has focused on two pillars: on the one hand, **computational aspects of laws**, including logics, NLP, and symbolic AI techniques in the verification of laws and business processes. On the other hand, **legal aspects of compliance** focus on aspects of legal writing and reasoning, legal design, digitalisation of rules and case law, case-based reasoning, and the automatic enforceability of rules and obligations. These two pillars lay the foundation for interdisciplinary work that can transcend them to include information systems concerns (e.g., how organizations can adopt compliance technologies) and human-computer interaction (e.g., what factors influence the understandability of compliance frameworks). With a team grounded in legal and computer science research, we reviewed how the technological views on compliance verification add value to legal practice and prompt us to redefine our requirements and design practices to address the needs and limitations arising from real-world practices in legal and compliance work.

Thus, the project objectives include (1) uncovering fundamental limits of algorithmic views within compliance from a legal perspective, (2) identifying areas within which affordances of digital compliance solutions are plausible, and (3) materializing compliance frameworks from conceptual works into enactable techniques with computational support, that can be validated by legal specialists. The project started in March 2024 and is expected to end at the end of 2026.

Paper overview. In Section 2 we summarize the results from the legal interpretation of compliance, and in Section 3 we summarize the current results on information systems engineering. We report our current efforts in Section 4, and we conclude in Section 5.

2. Challenges on Technology Understanding of Compliance from a Legal Perspective

The legal research within DICE has centered on exploring how regulatory compliance is understood and rationalized both in legal practice and computational contexts. This included a review of existing literature and projects on computational compliance and decision support, with a particular focus on the types of approaches developed and the actual extent of interdisciplinary engagement in the field [9]. It also involved identifying a compliance-intensive legal domain, or rather, examples of specific subsections thereof, suitable for digitalisation and for use as a baseline. This includes the development of a methodological account of how ambiguity in legal texts should be addressed at the governance level, in particular through mechanisms that make interpretative choices explicit, traceable, and explainable.

Compliance can be viewed and understood differently depending on the disciplinary viewpoint from which it is approached. While, at its core, compliance in a narrow sense may be understood as the elicitation, communication, and translation of regulatory requirements into behavior, there is a growing recognition that this process of giving effect to regulatory requirements does not occur in a vacuum. Broadly conceived, compliance reflects an ongoing interaction between rules and behavior, where the former guides conduct, and the latter mediates their actual application and ultimately defines their effectiveness. The challenge of the interdisciplinary endeavor is in capturing this core translation work without disregarding, and while preserving as far as possible, the social context in which it takes place. Essentially, it calls for a shift from viewing compliance as either a purely legal or technical problem towards understanding it as a socio-technical system, in which legal norms, organizational practices, and human decision-making are interdependent and embedded within technological infrastructures. In this setting, compliance aligns more closely with the broader notion of an interaction between rules and behavior, but viewed through technological interpretation, embedded in organizational and automated processes, and subject to monitoring and verification through technical means. This technological mediation entails scoping of relevant legal knowledge, tackling the inherently interpretative nature of legal norms, and dealing with the questions of transparency and accountability in automated systems. Identifying applicable rules requires not only discerning relevant legal sources, as reflected in rule-based

and case-based reasoning forms, but also determining their jurisdictional and temporal applicability and understanding their inter-dependencies. The process is not a straightforward extraction of ready-available rules, but rather one of structuring and delimiting a knowledge base that is both legally accurate and operationally meaningful. Lawyers are accustomed to constructing and presenting their knowledge as an interpretation of a regulatory framework in a way that could be justified and supported by legal arguments. In this process, the identification of appropriate sources and assessment of their relevance are often implicit and strongly shaped by context. The work on eliciting regulatory requirements in the DICE project has therefore been an opportunity to render this process into an iterative and collaborative endeavor focused on making explicit what is typically implied in legal reasoning: the selection of legal sources and the articulation of their interconnections. At a further level, technological mediation must also grapple with the actual meaning and scope of constituent terms, which, at first glance, may appear easily quantifiable and determinable. For instance, the notion of the “arrival” in a passenger compensation regulatory framework may initially seem capable of being established solely through operational data and internal airport system logs. However, according to the court’s clarifications, the notion of the “arrival”, for the purposes of compensation, should be understood from the perspective of the passenger, namely, as the moment at which passengers are permitted to leave the aircraft. This challenge of meaning-making becomes even more pronounced in relation to what was referred to by some as “open-textured” legal terms, such as, for example, “reasonable”, “timely”, or “proportional”, which are not readily quantifiable altogether. Here, the issue of disambiguation is not merely a semantic exercise, but one that engages with broader schools of legal interpretation.

In this context, transparency and explainability become ever-more important qualities of the process of automating compliance, since, from a legal perspective, it is a prerequisite to be able to trace and scrutinize the reasoning underpinning a given interpretation. Collaborative work on goal models prompted discussions on how the intended meaning of regulatory requirements and their interpretation may differ across various stakeholders. By focusing on objectives and approaching the interpretation from distinct perspectives, the process enabled the articulation and comparison of alternative interpretations, supported by different arguments from competing viewpoints. This, in turn, supported disambiguation, to a certain degree, not by eliminating ambiguity but by structuring it, namely by making interpretative assumptions explicit and comparable.

3. Shifting towards a Socio-Technical Perspective of Compliance Management

The technological stack of DICE combines formal modelling of laws, computational support for alignment with business processes, and natural language processing techniques for specification mining. We will comment on these contributions below.

The role of models in compliance. Over more than three decades, process and formal models have played a central role in enabling rigorous and scalable compliance in business process management by providing precise, analyzable representations of both operational behavior and regulatory requirements [10]. A systematic literature review mapped the diverse formal models used in compliance research, their contribution to the BPM lifecycle, and the maturity of formal regulatory compliance technologies. The SLR highlights the diversity of formal models used (e.g., Petri nets, temporal & deontic logics, and declarative languages) and the prevalence of compliance checking at a design phase, employing techniques such as model checking and compliance-by-design implementations. However, the SLR also emphasizes existing limitations: most frameworks remain conceptual, do not provide traceability of the specifications against regulations, struggle to accommodate legal change, do not consider runtime and after-the-fact violations, and often overlook the role of domain experts such as legal professionals. These insights were used as desiderata for the set of techniques developed at DICE.

The project selected the Dynamic Condition Response (DCR) Graphs [11] as its underlying formal process representation. Being a declarative formalization, DCR graphs map well concepts like prohibi-

tions, permissions, and obligations that are typical in normative texts [12]. Moreover, to the best of our knowledge, DCR is the only declarative process modelling language that has been proven useful in digitalization efforts over the years [13], enabling us to establish a dialogue regarding the use of these technologies with academics and industry players alike.

Constructing Normative Process Models. A normative model is a conceptual model representing norms in an interorganizational setting, and it can include a) Specifications of the compliance laws in rigor [12], or b) Descriptions of the procedures to be performed in the legal praxis [14]. Compared to process mining, normative models describe models as they expect to be performed in an organization, not only those activities logged in an information system. The main source for authoring normative models is not an event log, but a collection of documents, including interviews with domain experts, regulations in place, standard operating procedures, and other documents. Eliciting knowledge contained in such sources is a time-intensive task; for example, creating a normative process model requires 60% of the time allotted to a new BPM project [15]. Advances in knowledge retrieval help address this issue and facilitate elicitation, and recently neural Large Language Model (LLM)-based methods are becoming increasingly popular [16] to solve this task. DICE successfully translated these advances to the elicitation of normative process models formalized in DCR Graphs from process descriptions [17]. Naturally, reliance on LLM-based techniques brings concerns about privacy, sustainability, and trust, which prompted new lines of research. The project, therefore, investigated distilling LLMs into smaller machine learning models through the use of conceptual models [18]. At the same time, the project shed light on the difficulty of fully-automated solutions: even in simple documents, specifications in natural language contain multiple sources of ambiguity [19]. Especially in law, these ambiguities are present in the specifications *by design* [20], meaning that more than one formal representation can fit the textual description, calling for further steps of human-in-the-loop controls. Another challenge observed was that the extraction of specifications required multiple textual sources and modalities, including tables, diagrams, and pictures [21]. Our current efforts are focused on adding ecological validity to the extraction of models from laws by increasing the level of complexity with greater text lengths, discretionary or ambiguous statements, and stylistic features present in legal texts.

Conceptual harmonization via goal and process modelling. A fundamental aspect of a successful compliance initiative is reducing the semantic gap between legal specialists (who know the law but not all parts of the process), and process experts (who know the process but are not trained in law) [22]. Thus, a methodology to harmonize legal and process concepts becomes necessary. This gap is a non-trivial elicitation task, as legal requirements are typically expressed at a high level of abstraction and admit multiple interpretations [23], and process models are intended to have a single, unequivocal execution semantics. In practice, this requires iterative negotiation between domain specialists and modelers mediated by conceptual models. Goal models [24] play this role by structuring objectives, intentions, and quality concerns. Goal models, thus, allow the refinement of high-level goals into subgoals and activities, with different forms of contribution. In DICE, we pursue the alignment between Goal and Business Process models in [25], where processes are deemed compliant if the tasks executed provide sufficient guarantees to infer the satisfaction of a set of high-level goals. This alignment enables the evaluation of executions beyond control-flow deviations by assessing their contribution to stakeholder objectives. Therefore, establish a common ground -conceptual agreement- in the meaning of core aspects for both legal and process specialists. In contrast to existing formal approaches for compliance checking [10] and goal-oriented requirements engineering approaches that seek to align executable behavior with goals [26], our approach integrates both perspectives. The proposed framework [27] supports both declarative and imperative process notations, renders explicit ambiguous interpretations of goals, and goes beyond binary classifications, identifying process executions where compliance changes dynamically from satisfied to violated. These contributions have been implemented in the Kogi tool ¹ [28]. Our current efforts include the application of the framework in conformance checking.

¹<https://kogi.compute.dtu.dk/>

Human-Centric Declarative Process Mining. We conceive the use of declarative process models as a key enabler for auditing technologies, and process mining becomes a key factor. Pragmatic qualities in process models can only be validated via direct interaction with domain specialists, whose mental models diverge from the formal representations in process models. To this end, DICE has developed several open-source packages for declarative process mining based on DCR graphs: An open-source library intended for data and process scientists [29], an online framework for learning declarative process mining [30], a multi-perspective conformance checking tool [31], and a 3D simulator of DCR graphs [32]. Our contributions could be framed in two streams: robust and expressive declarative process mining tools, and the interpretability of declarative process models. On the former, we extended the existing conformance checking tools to cover compliance policies capturing multiple perspectives (organizational constraints, time, and data) as well as refined notions of *potentially violating traces*, that is, those that have temporal-data violations but ended in a compliant state [31]. On the latter, the focus on reducing the cognitive load required to interpret declarative process models required us to explore aspects of understandability. They include defining novel notations with improved semantic transparency [33], incorporating layout algorithms and principles of Gestalt psychology in the visualization of conformance checking results, and even removing the process representations in favor of domain-specific representations [34]. The premise is that the understanding of the process may go beyond the understanding of the formal notation, and that representations must fit the mental model of their intended audience. Finally, the project made an effort to integrate users trained in BPMN models, as this notation is the standard in the industry. In [35], we present encoding algorithms that permit a conversion between BPMN models and DCR graphs. The resulting models exhibit the inherent complexity of imperative process models and can ease their re-engineering using a declarative mindset.

4. Current Activities and Expected Results

With the project entering its final year, we have created a common understanding of the legal and computer science positions for compliance. Our expectations have shifted from fully-automatable tools for extraction, compliance checking, and change management to the development of interactive tools that can support legal and auditing fields. Our current activities are centered on the development of neuro-symbolic approaches for compliance management, the verification of declarative process models, and the validation of compliance frameworks with users. We will expand on each aspect.

Validating Normative Models. Normative Models are valuable for compliance only if they are able to express the behaviors intended by laws. To ensure the faithfulness of a model, it is important to address its syntactic, semantic, and pragmatic qualities [36]. While syntactic qualities can be ensured by the creation of modelling tools (e.g., [37]), they do not cover semantic aspects such as deadlocks or livelocks. These aspects can easily be induced by the improper modelling by non-process experts, or by automatic elicitation of models using LLMs [17]. While some notions of semantic qualities for declarative process models exist [38], they do not translate immediately to DCR, whose models may allow for infinite behavior. To bridge this gap, we are currently investigating the application of model-checking techniques for DCR processes. Semantic qualities can be expressed as correctness (i.e., *soundness*) properties of a DCR graph, which can be expressed as formulae in Computational Tree Logic [39]. Such an encoding would enable the verification of semantic properties of DCR graphs using industry-accepted model-checking tools [40]. Pragmatic quality refers to whether the process is “fit for purpose” and easy to understand in a real-world setting [41]. Normative processes *purpose* involves being able to reason about the interplay of permissions, obligations, and defeasible conditions present in laws. Therefore, DICE is currently investigating formal deontic interpretation of DCR graphs into standard deontic logic [42], and its associated model checking techniques [43]. The resulting framework will allow for validation of compliance models through logical language used in legal informatics [44, 45], bridging the gap between declarative process models and standard logics used in legal reasoning.

Neuro-symbolic approaches for compliance. Supporting legal and auditing experts with automation requires trustworthy, faithful, and privacy-aware information systems. Thus, DICE adopted a vision of a neuro-symbolic pipeline that provides continuous support throughout the lifecycle of conformance checking [31]. For model elicitation, this needs evaluating the performance of different local (private) LLMs [17], granting independence from cloud providers when processing internal and sensitive data. Further, LLMs can potentially be replaced with more efficient techniques [18], to enable model elicitation on consumer-grade hardware or in the browser. Here, it is crucial to understand the linguistic challenges of legal text during model elicitation and to restrict LLM outputs to ensure sound conceptual models through the use of symbolic model checkers. We currently investigate different explanation strategies that can simplify the outputs of conformance checking tailored to our legal audience. For instance, an auditor might be satisfied with a collection of violating traces, while a citizen needs a textual explanation of where, when, and how their data influenced the outcome of the process.

Validation of computational techniques in legal environments. The evaluation of the technical approaches should not be limited to technical performance alone. They should also assess whether and to what extent they meet core legal expectations regarding transparency and explainability. The key question is whether they allow the reasoning underlying a given interpretation to be traced and justified, operationalised transparently, and revised. Ultimately, the aim is to move beyond mere formal compliance and box-ticking towards an affordable, substantive form of compliance that is both auditable and understandable for lawyers. Through this project, DICE has benefited from a close interaction with lawyers and industry participants to refine the set of requirements, and, in some cases, as part of the evaluation cohorts (e.g., [27]). In the final phase of the project, we intend to test the tools and methodologies developed with an external set of stakeholders, including junior and senior legal practitioners, technology providers, and the public sector. These evaluations will serve to both calibrate the maturity of the offers built in the project and to elicit novel requirements for follow-up research. We already envision certain challenges: a. NLP techniques may reduce the cost of elicitation and change management, but they may struggle with identifying the proper identification of a legal requirement for a specific case, b. Goal and process models may facilitate traceability of requirements into processes, but they may not be able to help in cases where competing goals are in place (something common in risk-management settings). Finally, c. Declarative models delineate the compliant space, allowing only executions that are fully compliant. How can one support case workers with recommendations of *compliant and optimal* executions?

5. Conclusions

This paper summarizes the work performed by the Danish Center for Digital Compliance, an interdisciplinary initiative to create a common understanding of the compliance space from Legal, Computer Science, and Information Systems disciplines. The inter-disciplinary collaboration during the project allowed us to uncover multiple limitations of existing technological views of compliance, shifting the focus from full-automation solutions to decision support systems for compliance practitioners. While models, NLP, and other techniques can reduce the workload, it is still a legal practitioner the most qualified person to identify the proper interpretation of a law for a set of cases. Future work will focus on identifying complexity measures for law and their influence on specification mining, as well as further support for interfaces amenable to interpretation by the legal practitioner.

Acknowledgments

This work has been supported by the grant “Center for Digital Compliance (DICE)” (VIL57420) from VILLUM FONDEN.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

References

- [1] T. Grisold, J. Mendling, M. Otto, J. vom Brocke, Adoption, use and management of process mining in practice, *Business Process Management Journal* 27 (2021) 369–387.
- [2] M. Hashmi, G. Governatori, Norms modeling constructs of business process compliance management frameworks: a conceptual evaluation, *Artificial Intelligence and Law* 26 (2018) 251–305.
- [3] V. B. Kobayashi, S. T. Mol, H. A. Berkers, G. Kismihók, D. N. Den Hartog, Text mining in organizational research, *Organizational research methods* 21 (2018) 733–765.
- [4] I. Chalkidis, M. Fergadiotis, P. Malakasiotis, N. Aletras, I. Androutsopoulos, Legal-bert: The muppets straight out of law school, in: *EMNLP Findings*, 2020, pp. 2898–2904.
- [5] N. Schrack, R. Cui, H. A. López, D. Hershcovich, Can amr assist legal and logical reasoning?, in: *Findings of the Association for Computational Linguistics: EMNLP 2022*, 2022, pp. 1555–1568.
- [6] H. A. López, Challenges in legal process discovery, in: *CEUR Workshop Proceedings*, volume 2952, 2021, pp. 26–38.
- [7] S. Colombo Tosatto, G. Governatori, N. van Beest, Checking regulatory compliance: Will we live to see it?, in: *BPM*, Springer, 2019, pp. 119–138.
- [8] S. Debois, H. A. López, T. Slaats, A. A. Andaloussi, T. T. Hildebrandt, Chain of events: modular process models for the law, in: *iFM*, Springer, 2020, pp. 368–386.
- [9] O. Kokoulina, A. Andhov, When Compliance Diverges: Legal Interpretations and Tech Understandings, Hart Publishing, 2025, pp. 109–132.
- [10] H. A. López, T. T. Hildebrandt, Three decades of formal methods in business process compliance: a systematic literature review, *arXiv preprint arXiv:2410.10906* (2024).
- [11] T. T. Hildebrandt, R. R. Mukkamala, Declarative event-based workflow as distributed dynamic condition response graphs, *arXiv preprint arXiv:1110.4161* (2011).
- [12] H. A. López, S. Debois, T. Slaats, T. T. Hildebrandt, Business process compliance using reference models of law, in: *FASE*, Springer, 2020, pp. 378–399.
- [13] P. Keramidis, T. T. Hildebrandt, On the business value of declarative business process management, in: *HICSS, Hawaii International Conference on System Sciences (HICSS)*, 2026, pp. 5631–5640.
- [14] V. Caponecchia, B. D’Agostino, S. S. Ahrabi, G. Comandè, D. Licari, A. Vandin, Process mining for legal courts: Visualising, analysing and comparing italian divorce proceedings, *CLSR* 59 (2025) 106210.
- [15] J. Herbst, D. Karagiannis, An inductive approach to the acquisition and adaptation of workflow models, in: *IJCAI*, 1999, pp. 52–57.
- [16] J. Neuberger, L. Ackermann, H. van der Aa, S. Jablonski, A universal prompting strategy for extracting process model information from natural language text using large language models, in: *ER*, 2024, pp. 38–55.
- [17] J. Lindner, H. A. López, Discovering declarative processes in textual descriptions using large language models, in: *ICPM Workshops*, 2025.
- [18] J. Neuberger, I. Khrop, H. A. López, Enabling small language models for text-to-process extraction: Balancing accuracy and efficiency through distant supervision, in: *Accepted at CAiSE*, 2026.
- [19] H. A. López, B. Feng, J. Lindner, M. Franceschetti, A. Abbad-Andaloussi, Ambiguity detection in business process descriptions: An evidence and an automated approach, in: *BPM*, Springer, 2025, pp. 379–396.
- [20] M. Franceschetti, R. Seiger, H. A. López, A. Burattin, L. García-Bañuelos, B. Weber, A characterisation of ambiguity in bpm, in: *ER*, Springer, 2023, pp. 277–295.
- [21] D. Grathwol, H. van der Aa, H. A. López, Automating pathway extraction from clinical guidelines: a conceptual model, datasets and initial experiments, in: *CoopIS*, Springer, 2024, pp. 296–312.

- [22] A. Abbad Andaloussi, J. Buch-Loretsen, H. A. López, T. Slaats, B. Weber, Exploring the modeling of declarative processes using a hybrid approach, in: ER, Springer, 2019, pp. 162–170.
- [23] N. Adams, A. Augusto, M. Davern, M. L. Rosa, Addressing the contemporary challenges of business process compliance, BISE (2025).
- [24] P. Giorgini, J. Mylopoulos, E. Nicchiarelli, R. Sebastiani, Formal reasoning techniques for goal models, LNCS 2800 (2003). doi:10.1007/978-3-540-39733-5_1.
- [25] J. Caballero-Villalobos, A. Burattin, H. A. López, High-level requirements-driven business process compliance, in: BPM Forum, volume 564 of *LNBIP*, Springer, Cham, 2026, pp. 23–39.
- [26] M. Ghasemi, D. Amyot, From event logs to goals: a systematic literature review of goal-oriented process mining, Requirements Engineering 25 (2020). doi:10.1007/s00766-018-00308-3.
- [27] J. Caballero-Villalobos, H. Baumeister, E. Paja, O. Kokoulina, H. A. López, Aligning processes with high-level requirements: Goal-model-based compliance checking (extended version), 2026. Accepted for publication, Elsevier Information and Software Technology Journal.
- [28] J. C. Villalobos, H. A. López, Kogi: A tool for assessing high-level business process compliance, in: BPM, 2025, pp. 216–223.
- [29] S. V. Hermansen, R. Jónsson, J. L. Kjeldsen, T. Slaats, V. P. Cosma, H. A. López, Dcr4py: A pm4py library extension for declarative process mining in python, in: ICPM, CEUR-WS, 2024.
- [30] A. K. Christfort, H. A. López, Dcr-js: An online environment for declarative process mining, in: BPM, volume 4032, 2025, pp. 256–263.
- [31] K. Varvoutas, J. Neuberger, H. A. López, A neuro-symbolic framework for compliance management with declarative models, in: Compliance in the Era of Artificial Intelligence, 2026.
- [32] J. Caballero-Villalobos, S. J. Jensen, H. A. López, 3DCR: A Tool for Immersive Process Mining, in: Proceedings of the 6th International Conference on Process Mining, CEUR-WS, 2024.
- [33] A. Abbad-Andaloussi, D. M. T. Trinh, B. Weber, H. A. López, On the relationship between semantic transparency and cognitive load: Does context matter in process models?, in: NeuroIS Retreat, Springer, 2025, pp. 193–203.
- [34] S. J. Jensen, H. A. López, Towards immersive environments for declarative process models, in: BPM, Springer, 2024, pp. 214–231.
- [35] Y. Zhou, H. A. López, A compositional approach to mapping bpmn to dcr for cross-paradigm process modeling, in: FormaliSE '26, volume To appear, 2026.
- [36] M. Reichert, B. Weber, Enabling flexibility in process-aware information systems: challenges, methods, technologies, volume 54, Springer, 2012.
- [37] L. K. Tamo, A. Abbad-Andaloussi, D. M. T. Trinh, H. A. López, An open-source modeling editor for declarative process models, in: CoopIS, volume 3552, CEUR-WS, 2023, pp. 21–25.
- [38] C. Di Ciccio, M. Montali, Declarative process specifications: reasoning, discovery, monitoring, in: Process mining handbook, Springer, 2022, pp. 108–152.
- [39] E. M. Clarke, E. A. Emerson, Design and synthesis of synchronization skeletons using branching time temporal logic, in: Workshop on logic of programs, Springer, 1981, pp. 52–71.
- [40] R. Cavada, A. Cimatti, M. Dorigatti, A. Griggio, A. Mariotti, A. Micheli, S. Mover, M. Roveri, S. Tonetta, The nuxmv symbolic model checker, in: CAV, volume 8559 of LNCS, Springer, 2014, pp. 334–342.
- [41] M. Dumas, M. La Rosa, J. Mendling, H. A. Reijers, et al., Fundamentals of business process management, volume 1, Springer, 2013.
- [42] P. McNamara, Deontic logic, in: Handbook of the History of Logic, volume 7, Elsevier, 2006, pp. 197–288.
- [43] J. M. Lindner, Exploring the model checking problem of dcr graphs, 2026. Technical University of Denmark.
- [44] P. F. Castro, T. Maibaum, An ought-to-do deontic logic for reasoning about fault-tolerance: the diarrhetic philosophers, in: SEFM 2007, 2007, pp. 151–160. doi:10.1109/SEFM.2007.7.
- [45] G. Governatori, Law, logic and business processes, in: 2010 Third International Workshop on Requirements Engineering and Law, IEEE, 2010, pp. 1–10.