Ontology-Based Process Modelling - Will we live to see it? (Extended Abstract)

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Abstract: In theory, ontology-based process modelling (OBPM) bares great potential to extend business process management. Many works have studied OBPM and are clear on the potential amenities, such as eliminating ambiguities or enabling advanced reasoning over company processes. However, despite this approval in academia, a widespread industry adoption is still nowhere to be seen. This can be mainly attributed to the fact, that it still requires high amounts of manual labour to initially create ontologies and annotations to process models. As long as these problems are not addressed, implementing OBPM seems unfeasible in practice. In this work, we therefore identify requirements needed for a successful implementation of OBPM and assess the current state of research w.r.t. these requirements. Our results indicate that the research progress for means to enable OBPM are still alarmingly low and there needs to be urgent work on extending existing approaches.

Keywords: Ontology-Based Process Modelling; Ontologies; Automated Annotations

1 Extended Abstract

In the scope of Business Process Management, *process models* have evolved as central artifacts for the design, enactment and analysis of company processes [We07]. Many modelling languages, such as BPMN[4], are available and have received widespread adaptation in practice. While these standards offer support for the *representation* of company processes, the actual *content* of the model is still the responsibility of the modeller. That is, process models are designed by human modellers, often times also in a collaborative and incremental manner. In this setting, modelling errors can occur frequently [Ri17, Fe15]. For example, humans might accidentally model a non-compliant sequence of activities. Also, as the activities are captured with natural-language descriptions (labels), different views or understandings of modellers can lead to terminological issues in the resulting models, e.g. ambiguities of the prescribed activities or duplicate elements that clutter the model.

To conquer such modelling problems, there is a broad consensus in academia that business process models should be extended with an additional conceptual layer, namely *ontologies* [Fe15]. Ontologies are engineering artifacts that can be used to formally conceptualize a domain of interest [CD17]. As shown in Figure 1, creating *ontology-based process models*

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by extending process models with ontologies would thus allow to define unambiguous semantics of process models and create a shared semantic understanding of business processes for humans and machines alike.

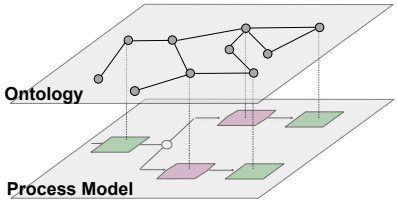

Fig. 1: Exemplary Ontology-Based Process Model.

Many works have discussed the potential benefits of OBPM, e.g. advanced compliance reasoning [Fe15, CD17]. Still, industry adoptions are sparse. Based on reports such as [Ri17], this can be mainly attributed to the problems in creating the ontology-based process models themselves. First, ontologies must initially be created. As this requires a high expertise in knowledge representation, this is currently still a difficult task for companies. Second, even given an ontology, the ontology has to be annotated to the process model. As finding the connections between ontology- and process model elements is a highly complex task, manual annotation can be seen as highly unfeasible in practice [Ri17]. Also, while there have been some approaches for (semi-) automated annotation, the lack of industry adoptions suggests that companies need more support in implementing OBPM.

In this report, we therefore investigate what methods and results are still missing to support companies in OBPM and leverage industry adoption. Here, our contributions are as follows: We identify requirements needed for successfully implementing and maintaining ontology-based process models for companies. Then, we identify the state-of-the-art on OBPM research based on a literature review and assess to which extent current results support the identified requirements. Last, based on the literature analysis, we identify current research gaps and propose a research agenda to guide future research and tool development.

References

[CD17] Corea, C.; Delfmann, P.: Detecting Compliance with Business Rules in Ontology-Based Process Modeling. In: Proceedings of the Int. Conference on Wirtschaftsinformatik, St. Gallen, Switzerland. pp. 226–240, 2017.

[Fe15] Fellmann, M.; Delfmann, P.; Koschmider, A.; Laue, R.; Leopold, H.; Schoknecht, A.: Semantic Technology in Business Process Modeling and Analysis. Part 1: Matching, Modeling Support, Correctness and Compliance. In: Emisa Forum 35. pp. 15–31, 2015.

[Ri17] Riehle, D.; Jannaber, D.; Delfmann, P.; Thomas, O.; Becker, J.: Automatically Annotating Business Process Models with Ontology Concepts at Design-Time. In: International Conference on Conceptual Modeling. Springer, pp. 177–186, 2017.

[We07] Weske, M.: Business Process Management Architectures. Springer, 2007.