The Formalization of the Business Process Modeling Goal: Extended Abstract*

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Abstract. While in general, the goal of modeling is a central notion in choice of a modeling technique, in the most of researches, which propose guidelines, techniques and methods for business process modeling language evaluation or/and selection, the business process modeling goal is not formalized and, respectively, not transparently taken into account. To overcome this gap, and to explicate and help to handle the business process modeling complexity, the approach to formalize the business process modeling goal and the supporting three dimensional business process modeling framework were developed.

Keywords: Business process modeling · business process language · business process modeling goal · business process modeling framework.

1 Introduction

Nowadays business process modeling application areas are rapidly expanding. As a result, enterprises are faced with a situation where the same business processes are modeled for different purposes. On the other hand, a number of studies indicate that particular business process modeling languages are more appropriate for certain business process modeling goals and less appropriate for other business process modeling goals. The question arises, how to find a modeling language that is suitable for a certain modeling goal. The selected modeling language must have modeling constructions to represent business process from a certain perspective, as well as make it possible to model a business process with a certain degree of precision and formalization according to the required level of abstraction.

Looking at different researches that propose guidelines, techniques and methods for business process modeling languages evaluation or/and selection, one can conclude that the business process modeling goal is not formalized and respectively is not transparently taken into account in selection of modeling languages. The modelers have to themselves decide what characteristics of the modeling language are more suitable for a particular modeling purpose, or the researchers offer a certain modeling language for certain modeling tasks without verification and evaluation of possible alternatives. For instance, there is a group of solutions, such as [1,2,3,4,5], that offer to estimate business process modeling language characteristics. However, it is not

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explained what characteristics of the modeling language are necessary for being suitable for a particular modeling purpose. Other researches offer to use particular business process modeling languages for certain modeling purposes (e.g., [6]). However, the choice of the modeling language is mostly based on the author's subjective opinion. Another category of solutions (e.g., [7,8,9,10]) offers to adapt business process model content to new modeling purpose, using various techniques, such as changing the level of granularity, reducing unnecessary details or generalizing the content of the model. Finally, there are solutions that provide transformations between different abstraction levels [11,12,13,14,15,16], for instance, the conceptual models are transformed to realization models according to Model Driven Approach (MDA) [17]. Each abstraction level is realized by certain modeling language, and the choice of this language is not clarified.

This paper takes the position that before deciding what modeling language to use, the business process modeling goal has to be well understood and formalized. Then the business process modeling language can be selected or developed according to the formalized business process modeling goal. The paper proposes the way how to formalize the business process modeling goal, specifying what parameters should have the desirable business process abstraction. As a result, business process modeling languages can be evaluated according to the values of the modeling goal parameters.

2 Formalizing Business Process Modeling Goal

A natural way to learn about the world around us is modeling. When we create models, the subject under the research is replaced by another mental or physical object, which is more convenient, safer, or cheaper to use than the original. According to such general explanation of the model, any kind of modeling requires the creation of the abstraction of the research object. In a general sense, abstraction is understood as highlighting of the important properties of the research object or phenomenon and ignoring unimportant properties or creating the general concepts or ideas from the set of objects or facts [18]. Abstraction facilitates understanding of complex things, replacing the real object with a simplified and generalized representation, e.g., the model of that object. There is a number of abstraction techniques, but analyzing the business process modeling language specifications and business process modeling framework documentations, it is possible to identify three most commonly used business process abstraction types:

- Filtration of the business process elements according to the certain modeling *perspective*. Real business process has an infinite set of different elements. When creating business process abstraction, a particular set of elements is selected, eliminating other elements. The unnecessary elements are filtered according to the defined criteria. In the case of the business process modeling, these criteria are often replaced by the concept of perspective.
- *Generalization* from the details about the business process execution according to the selected level of the uncertainty. Depending on the purpose of the modeling, the same business process can be modeled with different degrees of precision. The degree of precision (or uncertainty) of the business process modeling is selected

according to the level of generalization. In the lowest generalization levels the business process model includes the most details about the business process execution, in such a way minimizing the uncertainty and inaccuracy. In the highest generalization levels the model is created with coarser granularity and is less meaningful in content. This may be achieved, for example, by increasing the degree of uncertainty, abstracting from implementation details, dissembling the obvious things, ignoring the insignificant differences, and generalizing the similar behaviors.

- Reducing the complexity by "hiding" the part of the business process in the lower level of the *decomposition*. Every sub-process is a set of the business process activities that is "hidden" at the lower level of detail, thus, simplifying the understanding of the complex business process.

By analyzing several business process modeling language specifications (BPMN, DFD, IDEF0, EPC, UML AD, etc.) and business process modeling framework documentations [19,20,21,22,23], we have found that, in order to create the business process model for a particular goal, all three above-mentioned types of abstraction should be used. According to this statement, the business process modeling goal can be defined as follows:

"*The business process modeling goal is to create the business process abstraction from a certain perspective, at the appropriate levels of generalization and decomposition. The business process modeling goal is described by the expression* $M_{BP} = \{GL, DL, P\}$*, where* M_{BP} *is the business process modeling purpose, GL is the generalization level, DL is the decomposition level, and P is the modeling perspective."*

The parameters GL, DL, and P are reflected in the specific Business Process Modeling framework. This framework was developed by amalgamating business process modeling knowledge available in resources of IEEE, ACM, Elsevier, Springer, and other sources. The framework has three dimensions that are defined according to the modeling goal's parameters. Each framework dimension has appropriate "scale" of "values". In accordance with the Business Process Modeling Framework, a modeler chooses the perspective and the levels of generalization and decomposition. Next, it is necessary to evaluate the modeling language with the quantitative metrics, for identifying those languages that are most relevant to the modeling goal parameters. For instance, in order to evaluate to which extent the business process modeling language conforms to the desired perspective, it should be measured whether the modeling language offers syntactical constructions for all necessary business process elements. But, in order to evaluate the conformity to the required generalization level, the flexibility and multiplicity of the modeling language should be estimated. That is, for modeling at the highest generalization level, the modeling language should be the most flexible and provide only one syntactical construction for each business process element, however, it is not so, when modeling at lower generalization levels. The appropriate metrics and algorithms for evaluating how modeling languages conform to the selected values of the modeling goal parameters are out of the scope of this paper.

3 Conclusion

The paper proposes to formalize business process modeling goals according to the modeling perspective, the level of generalization, and the level of decomposition. The proposed solution uncovers complexity of business process modeling and is the first step towards development of a support system for evaluating conformity of the business process modeling languages according to particular modeling goals, as a result helping to handle the business process modeling complexity.

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