

# Chapter 13

## Semantically Enhanced Business Process Modeling Notation

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### ABSTRACT

*Semantic Business Process Management (SBPM) bridges the gap between business and IT by taking advantage of the Semantic Web technologies. The foundation for SBPM is the detailed ontological description of enterprise models. These models encompass also business processes taking place in enterprises. Within this chapter, we show how the process-oriented knowledge may be captured for the needs of SBPM. For this reason, we describe semantically enhanced Business Process Modeling Notation (sBPMN) being a conceptualization of one of the main process modeling notations with the fast growing popularity among the tool vendors, namely BPMN. The sBPMN ontology is based on the BPMN specification and may be used as a serialization format by the BPMN modeling tools, thus, making creation of annotations invisible to users. In this chapter, we also present an example of a process model description.*

### INTRODUCTION

The growing interest in the Business Process Management (BPM) idea, results from a need to streamline business operations, increase business process efficiency and save costs. To ensure

availability of desired functionalities and quality level of performed activities, over the years, much research has been devoted to investigate and advance techniques and tools for BPM.

Nowadays, BPM is often combined with the Service Oriented Architecture (SOA) paradigm, as together these two approaches may offer many

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benefits. BPM focusing on business directions, goals and processes defines how organizational resources (including IT resources) are used in order to support fulfillment of business goals. SOA complements BPM by offering a flexible IT architecture that may be easily adapted to changing business requirements and helps to leverage IT investments through provision of reusable components.

Although combining BPM and SOA offers many benefits, various challenges still are to be addressed. One of them is limited support for automation of the BPM lifecycle. It is especially visible when it comes to the smooth and automated transition from one BPM phase to another. For instance, the automated transition from the modeling to the implementation phase is hardly possible due to an insufficient and non-technical description of a process provided by a business analyst who perceives a business process differently than an IT engineer. This is known as the semantic gap between the business and IT worlds (Dehnert and van der Aalst 2004).

Recently, researchers and practitioners turn their attention to the possibility of combining the BPM domain also with Semantic Web technologies (Hepp, Leymann et al. 2005; Brockmans, Ehrig et al. 2006; Wetzstein, Ma et al. 2007), thus, contributing to the creation of the Semantic Business Process Management (SBPM) approach. Semantic technologies and tools aiming at providing more explicit meaning of the information are considered to be able to help automating the BPM lifecycle and offer new functionalities to business experts. To implement the vision of SBPM, business process models as well as the enterprise context and existing IT infrastructure must be ontologically captured to enable machine reasoning. Thus, the ontologies i.e. formalized descriptions of entities with their properties and relations (Grueninger and Fox 1995), constitute a backbone of the SBPM concept. There are several open questions with regard to this issue: what should be the scope of this representation, what are the scenarios show-

ing advantage of its utilization, what tool support should be provided to facilitate business analysts' interactions with semantics.

Within this chapter we focus on the ontologised version of the Business Process Modeling Notation (BPMN). It was originally created by the BPMI group and has emerged as a standard notation for process modeling, gathering and combining experience from many other modeling notations e.g., UMLADs, IDEF, ebXML and EPCs (BPMN, 2006). BPMN aims at bridging the gap between the business process design and process implementation. It was to allow for the automatic translation from the graphical process diagram into the BPEL process representation (Arkin et al., 2005) that may be then executed using Web services technology. Although the goal of automatic translation is very appealing, the intention failed in practice for a number of reasons. One of them is that BPMN is a graph-oriented language and its mapping to the block-structured BPEL representation is challenging. In addition, BPMN allows designing not well-formed processes that cannot be translated directly into a set of the BPEL executable instructions (Ouyang, 2006).

Application of the ontologized version of BPMN i.e. sBPMN (Semantic Business Process Modeling Notation) intends to add meaning to each of the process elements and make them machine-readable. Thus, it will allow for reasoning on the process description. Once sBPMN is additionally enriched with Semantic Web services (SWS) extensions, it will be also possible to automatically assign Web service (or their compositions) to each task. Having Web services matched to tasks is only one step from generating a BPEL process representation that may be deployed on the execution engine.

The goal of this chapter is to provide an overview of the ontology stack to support SBPM with a special focus assigned to sBPMN being the ontology for process flow description. Therefore, the remaining of this chapter is structured as follows. Next section presents related work on SBPM

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