

A BPMO Based Semantic Business Process Modelling Environment

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Abstract. The SUPER project presents a novel approach to BPM by using Semantic Web and Semantic Web Services. Existing processes can be augmented with semantic annotations, so that formal reasoning techniques can be applied for discovery, composition, mediation and execution of business processes. This paper introduces a modelling environment that supports the SUPER approach to Semantic BPM.

1 Introduction

The SUPER research project³ presents a novel approach to Business Process Management by using Semantic Web and Semantic Web Services. Existing business processes can be augmented with semantic annotations and constraints, so that reasoning techniques can be applied for discovery, composition, mediation and execution of business processes. This paper introduces a work in progress on creating a modelling environment that implements the SUPER approach to Semantic Business Process Management.

2 The SUPER Approach to Semantic BPM

Companies have already invested heavily in business process management. For example, they have documented their business processes and created extensive enterprise models. Today, companies are facing problems which can not be solved with current business process management technologies. Therefore, Hepp et al. [1] suggest using semantic technologies like ontologies, mediators, and reasoners.

In order to formally represent business process knowledge, SUPER defines a set of ontologies for business process modelling. The core of the SUPER ontology stack is comprised of five ontologies:

- an *Upper Process Ontology* (UPO), defining top-level concepts such as *task*, *goal* and *condition*

³ <http://www.ip-super.org>

- a *Business Process Modelling Ontology* (BPMO), extending the UPO into a full process ontology, providing abstractions over different business process modelling notations such as BPMN [2] and EPC [3]
- *sBPMN* [4], *sEPC* and *sBPEL* [5] – ontologised versions of subsets of the BPMN, EPC and WS-BPEL respectively. sBPEL is additionally enriched with extensions from the Web Services Modelling Ontology (WSMO) [6] for goal-oriented discovery, mediation and execution of services

The SUPER ontology stack provides the means for existing BPMN or EPC models to be ontologically “lifted”, i.e. semantically annotated with references to domain ontologies, references to WSMO goals and semantic constraints (in terms of formal pre-conditions, post-conditions, assumptions and effects).

3 A BPMO Based Modelling Environment

3.1 Requirements

The lifecycle of a “minimal” Semantic Business Process Modelling environment has already been outlined in [1]. In summary, the modelling environment should assist the end user in:

- semantic annotation of existing BPMN/EPC process models, i.e. adding references to ontology elements, WSMO goals and semantic constraints. In order to introduce the idea of semantic BPM, it is important to preserve company investments by re-using existing enterprise models. In addition, we don’t aim at introducing a new graphical notation but to base our work on what is already used today in industry. Therefore, the semantic modelling tool uses the BPMN notation.
- storing the semantic process models into a Semantic Business Process Library and querying of the library for discovery of existing semantic process models or fragments for reuse, which will decrease the effort and time required for modelling of new processes.
- translation of the semantic business process models represented into executable process models, i.e. a BPMO-to-sBPEL translation. BPMO presents the business user perspective over the business process models and is not sufficient for execution. The modelling environment incorporates a transformation service that will derive executable sBPEL models.

3.2 WSMO Studio

*WSMO Studio*⁴ [7] is an open source, Eclipse based Semantic Web Services modelling environment. With its support for modelling of WSMO elements used in BPMO, such as ontologies, goals and WSML logical expressions (for pre-conditions, post-conditions, assumptions and effects), *WSMO Studio* provides a

⁴ <http://www.wsmostudio.org>

good starting point for the BPMS based semantic business process modelling environment in SUPER. Furthermore, its open source licence (LGPL) and Eclipse based architecture, makes it easy for 3rd parties to integrate, customise and extend the provided functionality.

3.3 The BPMS Editor

The BPMS Editor extends *WSMO Studio* with functionality for adding BPMS semantic annotations to existing business process models and for creating new semantic models.

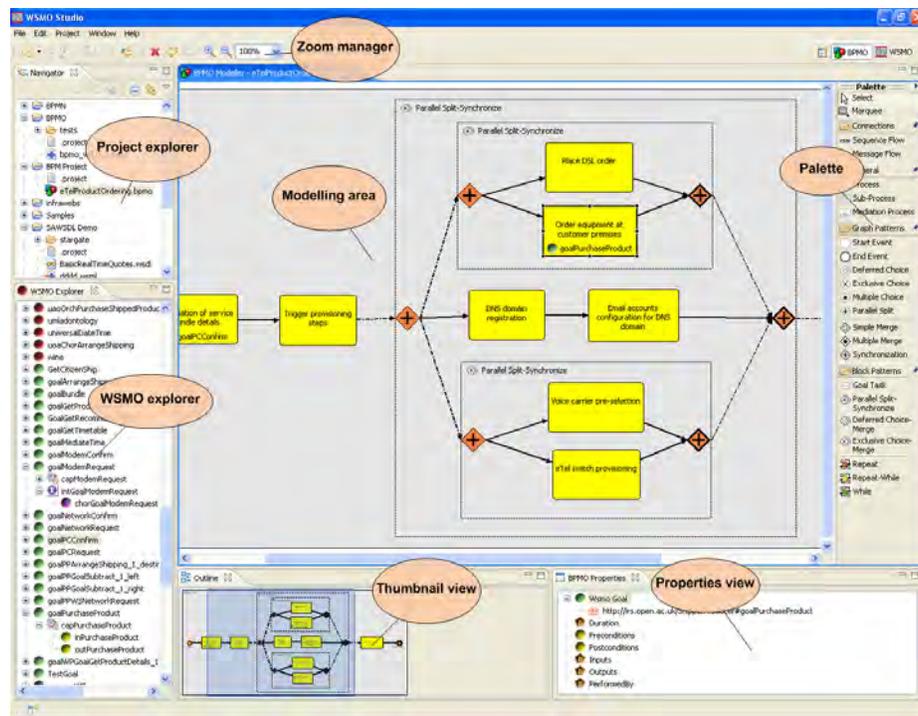


Fig. 1. WSMO Studio with a BPMS editor

The User Interface (Figure 1) is based on the BPMN graphical notation extended with BPMS specific modelling primitives (such as block patterns) and integrated with existing *WSMO Studio* functionality. This way, the end user can simply drag & drop existing semantic elements (e.g. WSMO goals, semantic constraints, concepts and instances from reference ontologies) into the relevant

element of the process model (process, activity, data flow elements) to produce the semantically annotated process model in BPMO.

The initial prototype of the BPMO editor is distributed under an open source LGPL licence⁵ and available for download at the *WSMO Studio* website.

4 Future Work

The first prototype of the BPMO modelling environment provides the basic functionality for enriching existing process models with semantic annotations, as well as creating new semantic process models from scratch.

Future versions of the prototype will focus on the integration with other components, being developed within the SUPER project, providing means for process validation, discovery, composition and mediation in order to deliver an integrated modelling environment that reduces the human effort required for the translation between the the business needs and IT capability levels.

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⁵ <http://www.opensource.org/licenses/lgpl-license.php>