Documenting Models and their Relations with Semantic Wikis

Michael Fellmann, Oliver Thomas, Thorsten Dollmann

Institute for Information Systems (IWi) at the
German Research Center for Artificial Intelligence (DFKI),
Campus D3 2, Stuhlsatzenhausweg 3, 66123 Saarbruecken, Germany
(michael.fellmann|oliver.thomas|thorsten.dollmann)@iwi.dfki.de

Abstract

The unified documentation of models and their relations which vary greatly in regard to the description view, the abstraction level, the language used and the purpose for which they have been built is challenging. The knowledge about the relations which exist between models created with a diverse set of tools is usually not captured in a systematic way and hence cannot be searched and reused across different projects and stakeholders. Therefore we suggest semantic wikis for the collection of this knowledge.

The Problem of Managing Model Relations

The current situation in process management can be characterized by language pluralism. Although with BPMN a de facto standard is emerging, not all economically relevant facts can be described with BPMN. In general, languages used to construct models from a business perspective (e.g. EPC, UML Activity Diagram, IDEF3) differ from those used to construct executable models (e.g. BPMN, BPEL, XL and XPDL) for example in regard to the extent to which exceptions and failures can be represented. Moreover, different models on different levels of abstraction from information technology are created (Lippe et al. 2005, p. 9). Although present modeling tools allow to capture some limited relationships between models e.g. in the form of hierarchical decompositions, complex semantic relations spanning multiple modeling tools and repositories are not captured sufficiently, although this demand has already been identified in literature (Lippe et al. 2005; Boudjlida et al. 2005). Therefore a uniform documentation of the models and their relations is usually not practiced. The result of this is that the knowledge around the various semantic model relations such as “is derived from”, “details” or “implements” is only implicitly contained in the mental models of individual employees of an organization. Moreover, it is not amenable to machine processing. This causes manifold disadvantages; one of them is for example that the analysis and search of dependencies between models is not possible.

Semantic wikis provide a potential solution to this problem. In general, semantic wikis extend wiki systems for collaborative content management with semantic technologies aiming at enhanced navigation, search and retrieval possibilities (Krötzsch et al. 2007, p. 1). Semantic wikis therefore provide the possibility of representing model relationships in an explicit and formal way by using concepts of a formal model such as an ontology.

Research Questions

• Identifying relevant features of semantic wikis: The most basic question is which of the features semantic wikis provide are required for the task of managing model relationships. We already identified some areas of functionality such as model management, model documentation, browsing and search as well as collaboration.

• Metadata structure for managing model relationships: A metadata structure for managing model relationships is required to structure the semantic data for representing model relationships in a semantic wiki.

• Provision of wiki-features: Another research question is whether wiki functionality is to be integrated in traditional modeling tools or wikis should be extended with modeling functionality.

In the following we describe our research regarding the first two research questions by introducing a comparison framework for semantic wikis as well as a metadata structure. The third question will be addressed in the future.

Comparison Framework

A comparison framework for semantic wikis has to be introduced and applied to a selection of wiki engines to examine the suitability of semantic wikis to manage the documentation of models and to capture the relations between models in an explicit and machine processable representation. Here different criteria have been identified. In the area of the model management *model import* is an important criterion, i.e. how the representations of semi-formal models can be loaded into a wiki. In regard to model documentation, the support of the users by a *WYSIWYG editor* as well as means to restrict *access rights* are desirable. Semantic wikis allow to annotate a wiki page with a term or concept of a metadata structure and to anno-

tate links between wiki pages. A wiki may facilitate these semantic enrichments by providing *annotation support* e.g. in the form of auto-completion functionalities. Further criteria regarding the annotation are whether a metadata structure, e.g. in the form of an ontology, can be imported in order to facilitate the initial use of a semantic wiki (*import and/or export of metadata/ontologies*). In order to keep track of changes, a *versioning mechanism* for the wiki pages as well as the semantic metadata attributed to them is important.

In the area of browsing and search, the implementation of a feature for *faceted browsing* is relevant to accomplish an intuitive navigation. The *support of a query language* is useful for complex queries whereas *embedded queries* allow to leverage a query language "behind the scenes". In order to leverage the full potential of machine processable metadata which is collected about models in the semantic wiki, the use of an *inference machine* is an important criterion allowing new facts to be inferred. In addition to the criteria listed so far, changes on models are usually performed rather distributed by project teams at detail models and united afterwards to an improved construction. Therefore *collaboration functionalities* such as rating, tagging and discussion pages supporting the co-operation of the involved stakeholders are highly important.

Metadata Structure

We have developed a preliminary metadata structure in the form of an ontology to capture model relations (left part of fig. 1) as well as fundamental model attributes (right part of fig. 1). The ontology is based on literature in the field of modeling, especially reference modeling. The ontology is currently evaluated regarding its usefulness.

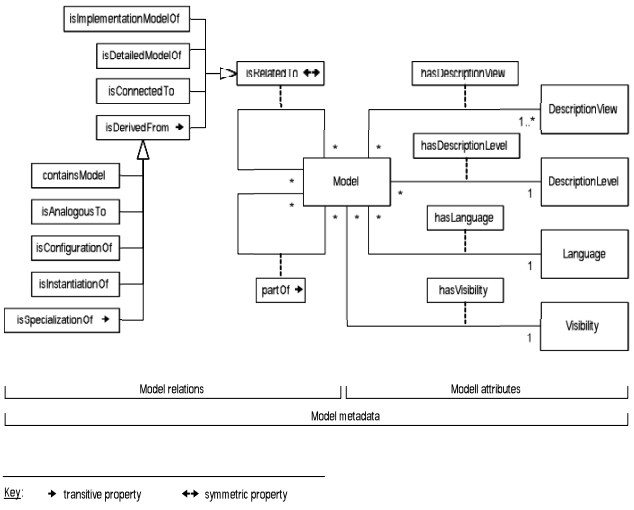

Fig. 1: Metadata ontology

Related Work

Approaches to modeling often deal with the question how specific models can be derived from existing models (vom Brocke and Buddendick 2006; Rosemann, van der Aalst 2007). However, in these works relations between models are regarded only fixed on one description level, i.e. if a reference model exists on the business level or on the implementation level, then also the model derived from this model is assigned to the respective level. These works accordingly lack the consideration of relations spanning various descriptions levels which is explicitly addressed by our approach.

The capturing of relations between models with technologies of the Semantic Web is described in regard to product models by Hahn (2005), in regard to reference models and the models derived from them by Hinkelmann, Thönssen and Probst (2005). These works focus in contrast to our approach mainly on the formalisation of the semantics of models on the level of language based-meta models or – in the context of annotation approaches – that of individual model elements.

Conclusion

A future integration of traditional modeling tools with semantic wikis seems to be exceedingly promising due to the potential of semantic wikis for improving the communication of the actors involved in business process management activities and for externalizing of implicit knowledge of relations between models mentioned above. The comparison framework of semantic wikis and the metadata structure should help to explore the usefulness of semantic wikis for managing model relationships.

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