

## Chapter 2.9

# Semantic Interoperability Enablement in E-Business Modeling

**Janina Fengel**

*University of Applied Sciences Darmstadt, Germany*

### **ABSTRACT**

Businesses all over the world are faced with the challenge of having to flexibly react to change and to dynamically work with varying business partners. For establishing electronic business, the underlying processes and subsequent IT-support need to be described clearly. For doing so, conceptual modeling has become an indispensable means. Models describe interrelated business objects and activities, expressed in a certain modeling language with elements labeled in natural language.

If the decision for the labels is not dominated by rules, models are semantically heterogeneous, not only concerning their modeling language, but more importantly, concerning their domain language, making their comparison or integration a non-trivial task. For its alleviation Semantic-Web technologies are applied. Transforming legacy models of different types into ontologies allows for reusing and connecting the domain facts modeled. Here, the novel method of semantic model referencing developed for this task is used, and this chapter will show how it can provide the basis for semantic integration.

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## INTRODUCTION

One of the core tasks in business management is the design and continuous improvement of business processing according to changing needs and expectations and the allocation of all necessary resources (Schreyögg, 2008). The increasing speed of globalization demands from enterprises of all sizes to adequately adapt in an ever quickening pace to changing business conditions and varying market requirements (Scheer, & Nüttgens, 2000). The motivation mostly arises from increasing cost pressure and intensifying competition as well as new legal regulations, the need to follow standards or for incorporating new innovative technologies (Österle, 2007). Therefore, it is mandatory to engineer business in an agile manner for ongoing optimization or reengineering (Scheer, Nüttgens, & Zimmermann, 1995; Hammer, & Champy, 2006). Continuous shaping and reshaping of business processes and the supporting or even enabling IT is a critical success factor for a business's competitiveness (Frank, 2004). In daily operation, businesses are faced with the challenge of having to dynamically work with varying business partners. Establishing business relationships does not only require strategic decisions, but also efforts in integrating the partners' business processes and subsequent information exchange. Enterprises need to be able to couple their business processes without huge preparation efforts.

The basis for designing and engineering e-business in enterprises and B2B-collaborations is their comprehensive correct description. For setting-up interactions in and between organizations, all applicable business processes need to be described clearly and in an unambiguous manner. Such descriptions are the basis for engineering and managing them as well as for optimization or integration purposes. Often, this is achieved through abstraction by means of conceptual models, in particular for describing the support by IT-systems (Frank, 1994; Scheer, 1996).

Consequently, managing all required models in a comprehensive and consistent manner is the prerequisite for engineering integrated process execution. One of the major tasks is the integration of existing, actively used models. Business process models frequently have to be matched for the purpose of reuse or integration (Hepp, & Roman, 2007). They do not only have to be matched for the purpose of integration or reuse in intra-organizational settings, e.g., when implementing ERP-systems, optimizing business processes or in cases of business-IT-alignment as well as process and application integrations due to reorganizations, but even more so inter-organizationally at the time of company mergers and acquisitions, the realization of supply chain management and the set-up of B2B-collaborations.

Unfortunately, in practice, process matching is frequently hindered, as models very often differ considerably not only syntactically, but mostly semantically (Pfeiffer, 2007). Semantic heterogeneity arises not only through the differences between the constructs of the various modeling languages chosen for building models, but also through the different ways in applying natural language for labeling the model elements, which is independent from the choice of the modeling language (Thomas, & Fellmann, 2007, p. 29). This observation holds true for models in general. In case no predefined domain vocabulary or rules for assigning labels to model elements are in place, terms are chosen individually on a case-by-case-basis. Therefore, as a result, models are often semantically heterogeneous concerning the domain language. Hence, a lot of models are semantically incompatible, especially when several modelers or decentralized teams are involved, as incoherent labeling leads to model mismatches (Hadar, & Soffer, 2006, p. 570). This is in particular the case in B2B-collaborations, where the models to be integrated originate from different independent sources. As a result, differing types of models and dissimilarly applied business terminology prevent direct automated business process inter-

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