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Chapter XIII

Some Applications of a Unified Foundational Ontology in Business Modeling

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Abstract

Foundational ontologies provide the basic concepts upon which any domain-specific ontology is built. This chapter presents a new foundational ontology, UFO, and shows how it can be used as a guideline in business modeling and for evaluating business modeling methods. UFO is derived from a synthesis of two other foundational ontologies, GFO/GOL and OntoClean/DOLCE. While their main areas of application are natural sciences and linguistics/cognitive engineering, respectively, the main purpose of UFO is to provide a foundation for conceptual modeling, including business modeling.

Introduction

A *foundational ontology*, sometimes also called "upper level ontology", defines a range of top-level domain-independent ontological categories, which form a general foundation for more elaborated domain-specific ontologies. A well-known example of a foundational ontology is the *Bunge-Wand-Weber (BWW)* ontology proposed by Wand and Weber in a series of articles (e.g., Wand & Weber, 1990, 1995) on the basis of the original metaphysical theory developed by Bunge (1977, 1979).

As has been shown in a large number of recent works (e.g., Green & Rosemann, 2000; Evermann & Wand, 2001; Guizzardi, Herre, & Wagner, 2002a, b; Opdahl & Henderson-Sellers, 2002), foundational ontologies can be used to evaluate conceptual modeling languages and to develop guidelines for their use. Business modeling can be viewed as the main application domain of conceptual modeling languages and methods. In the *model-driven architecture* approach of the Object Management Group (OMG), a business model is called a "computation-independent model" because it must not be expressed in terms of IT concepts, but solely in terms of business language. The business domain, since it contains so many different kinds of things, poses many challenges to foundational ontologies.

A unified foundational ontology represents a synthesis of a selection of foundational ontologies. Our main goal in making such a synthesis is to obtain a foundational ontology that is tailored towards applications in conceptual modeling. For this purpose we have to capture the ontological categories underlying natural language and human cognition that are also reflected in conceptual modeling languages such as ER diagrams or UML class diagrams. In Gangemi, Guarino, Masalo, Oltramari, and Schneider, (2002) this approach is called "descriptive ontology" as opposed to "prescriptive ontology", which claims to be "realistic" and robust against the state of the art in scientific knowledge.

For UFO 0.2, the second[1] (still experimental) version of our unified foundational ontology (UFO), we combine the following two ontologies: 1) the general formal ontology (GFO), which is underlying the general ontological language (GOL) developed by the OntoMed research group at the University of Leipzig, Germany; (see *www.ontomed.de* and Degen, Heller, Herre, & Smith, 2001); 2) the OntoClean ontology (Welty & Guarino, 2001) and the descriptive ontology for linguistic and cognitive engineering (DOLCE), developed by the ISTC-CNR-LOA research group in Italy, as part of WonderWeb Project (see *http://wonderweb.semanticweb.org/*).

Existing foundational ontologies, notably SUO, OntoClean-DOLCE, GFO-GOL, and even BWW, all have severe limitations in their ability to capture the basic concepts of conceptual modeling languages. For instance,

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