IDEA GROUP PUBLISHING

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA ITB10286
Tel: 717/533-8845; Fax 717/533-8661; URL-http://www.idea-group.com

Chapter I

Analyzing and Comparing Ontologies with Meta-Models

Islay Davies, Queensland University of Technology, Australia

Peter Green, University of Queensland, Australia

Simon Milton, University of Melbourne, Australia

Michael Rosemann, Queensland University of Technology, Australia

ABSTRACT

High-level ontologies provide a model of reality and are of increasing popularity for the evaluation of modeling methods. Most of the common modeling methods have been studied using ontologies such as the BWW representation model and Chisholm's ontology. However, at this stage only limited guidance is provided for the selection and evaluation of the appropriate ontology. The aim of this chapter is to propose meta-models for analyzing, comparing, and engineering ontologies. It discusses a methodology using extracts of meta-models for two well-known ontologies that had been used previously in Systems Analysis and Design research. The approach provides a theoretical analysis technique for evaluating these ontologies according to their equivalence, depth of structure, and comprehensiveness of scope.

INTRODUCTION

Wand and Weber (2002) have speculated on a research agenda for information systems, as well as Systems Analysis and Design. Their objective is to motivate research that addresses the fundamental question, "How can we model the world better to facilitate our developing, implementing, using, and maintaining more valuable information systems?" Using a theoretical foundation based on ontology could facilitate many of the potential research areas that they identify. Ontology has influenced research in many application areas over the past decade: knowledge representation, natural language processing, knowledge management, enterprise systems, Systems Analysis and Design, and Web services. Ontologies have been extremely popular for the evaluation of modeling methods.

Given the important use and potential use of ontologies over the past 10 years, the principal question then becomes: Which ontologies do we use for which purposes? How do we compare and evaluate different ontologies for determining their strengths and weaknesses for the purpose required? The objective of this chapter is to demonstrate the usefulness of meta-models in supporting research opportunities in conceptual modeling that are influenced by ontologies. In particular, our aim is to show the importance of meta-models for selecting, comparing, and evaluating ontologies. In this way, researchers may gain some guidance on which ontology might be useful for their area of interest. A detailed discussion of dealing with semantic and structured diversity in representations is beyond the scope of this research.

We are motivated to perform this work for three reasons. First, we can provide practical guidance to researchers and practitioners alike on how to compare and evaluate ontologies. In this way, they will be better able to determine the ontology most applicable for their purposes. Second, we are extending the usefulness of meta-models from understanding individual modeling techniques like process modeling and workflows, to understanding and comparing the theoretical bases (ontologies) on which those techniques can be compared and evaluated. In this way, we are extending the work of Rosemann and Green (2002) where they demonstrated how, through comparing the meta-model of an ontology to that of a modeling technique like Architecture of Integrated Information Systems (ARIS), and using a pattern-matching process, they could evaluate the strengths and weaknesses of the process modeling technique. Finally, we are explaining, and demonstrating using a limited example, how ontologies and meta-models can be very useful in conducting research in many of the areas of conceptual modeling identified by Wand and Weber (2002).

Accordingly, the chapter unfolds in the following manner. The next section explains what ontology is and it exemplifies it in the form of the BWW representation model. Moreover, this section introduces the research framework for work in the information systems and conceptual modeling discipline