Chapter III

Ontological Analysis of Reference Models

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Abstract

Within the information systems field, reference models have been known for many years. A reference model is a conceptual framework and may be used as a blueprint for information systems development. Despite the relevance of reference model quality, little research has been undertaken on their systematical analysis and evaluation. In this chapter, we describe how reference models can be analyzed from an ontological point of view. Such an analysis consists of four steps: 1) developing a transformation mapping, 2) identifying ontological modeling deficiencies, 3) transforming the reference model, and 4) assessing the results. The usefulness of our method will be demonstrated by analyzing Scheer's reference model for production planning and control. Although our approach is based on sound theory, we argue that this approach is not inherently superior to other approaches of reference model analysis and evaluation.

Introduction

Within the information systems field, information modeling is a vital instrument to develop information systems (Frank, 1999; Mylopoulos, 1998; Scheer & Hars, 1992; Wand & Weber, 2002). However, the modeling process is often resource consuming and faulty. As a way to overcome this failures and to improve and accelerate the development of enterprise-specific models, the concept of reference modeling has been introduced (Mertins & Bernus, 1998; Mišic & Zhao, 2000; Scheer & Nüttgens, 2000).

We assume the empirical thesis that the effectiveness and efficiency of the application of a reference model is strongly determined by the quality of the model. However, the quality of a reference model comprises several aspects, for example from a user-oriented point of view, a reference model should be flexible and adaptable, so the fitness for its application is very high. From an enterprise-oriented point of view, the purchase and usage of a reference model should make the development of enterprise systems more efficient and so forth (Fettke & Loos, 2003b). In other words, there exist some trade-offs between different quality dimensions.

This research addresses the question of how the quality of reference models can be determined. The main objective of this chapter is to describe a method for analyzing reference models from an ontological point of view. Furthermore, we will show an application of this method by analyzing Scheer's reference model for production planning and control systems (PPC) (Scheer, 1994). Right at the beginning, we point out that an ontological analysis is not able to capture all quality characteristics of a reference model but some necessary characteristics. Further quality criteria are needed, for example, additional criteria may be derived from theories in the area of economic or cognitive psychology.

The research method of this study is construction-oriented: after analyzing the fragment of knowledge that is relevant for our research question, we construct a method for the analysis and evaluation of reference models. To justify this method, some application examples are presented. The main contributions of this chapter are a new method for analyzing and evaluating reference models. Furthermore, we elaborate on some quality aspects of Scheer's reference models.

The chapter unfolds as follows. After this introduction, the study's theoretical background is discussed. The third section introduces the method for the ontological analysis of reference models. Some examples of this method are explored in the following section. Finally, conclusions and limitations of this study are discussed. Also, we point to some further research directions.

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