Chapter II

Ontological Analysis of KAOS Using Separation of References

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Abstract

Goal modeling is emerging as a central requirements engineering (RE) technique. Unfortunately, current goal-oriented languages are not interoperable with one another or with modeling languages that address other modeling perspectives. This problematic because the emerging generation of model-driven information systems is likely to depend on coordinated use of several modeling languages to represent different perspectives of the enterprise and its proposed information system. The chapter applies a structured approach to describe a well-known goal-oriented language, KAOS, by mapping it onto a philosophically grounded ontology. The structured approach facilitates language interoperability because when other languages are described using the same approach, they become mapped onto the same ontology. The approach thereby provides an intermediate language for comparison, consistency checking, update reflection, view synchronization and, eventually, model-to-model translation, both between goal-oriented languages and between different languages.

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Introduction

Goal-oriented modeling languages emerge as a promising path towards model driven technologies that can account for trust in the early development stages. For instance, goal-oriented languages are emphasized during requirements engineering (RE) to identify system vulnerabilities and design countermeasures (Liu, Yu, & Mylopoulos, 2003; van Lamsweerde, 2004; Giorgini et al., 2005), hence aiming at a trusted information system (IS) from very early development phases. Current trends towards model-driven IS development and agent-oriented IS makes it likely that the importance of goal modeling will continue to increase. One central, goal-oriented language is knowledge acquisition in automated specification (KAOS), described by Letier (2001) and van Lamsweerde (2003). In addition to the conventional what, it offers a multi-perspective approach to specifying the why, who, and when of enterprises and their IS. Like other modeling languages, KAOS does not support all aspects and phases of IS development equally well. For example, it offers strong support for representing, reasoning about, and specifying trust during analysis and specification, but it offers less support for tracing and realizing trust concerns during design and system generation. In addition, an intermediate language is needed to support integrated management of enterprise, IS, and problem domain models expressed in different languages.

This chapter presents a preliminary ontological analysis of KAOS using separation of reference introduced by Opdahl and Henderson-Sellers (2004, 2005a). The technique analyzes modeling languages by first breaking each construct down into its ontologically primitive parts and then mapping the parts onto a common ontology that elaborates the Bunge-Wand-Weber (BWW) representation model (Wand & Weber, 1993, 1995) and philosophical ontology presented by Bunge (1977, 1979). The aim is to facilitate comparison, consistency checking, update reflection, view synchronization, and eventually, model-to-model translation, both between goal-oriented languages and across language families. The current work is a part of a larger effort to establish an intermediate language that supports integrated use of enterprise models expressed in different languages. The approach used in this chapter is currently being applied to develop version two of the unified enterprise modeling language (UEML).

The chapter is structured as follows: The “Theory” section provides the theoretical research background. This third section is “Research Method.” “Results” are presented in the fourth section and discussed in the fifth section, “Discussion.” Finally, we conclude and give directions for future work in “Conclusion.”
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