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Chapter VII

Ontology-Driven Method Engineering for Information Systems Development[1]

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Abstract

Information systems development has to deal with evolving technologies and changing environments. Therefore, the engineering of methods as the problem of creating suitable instruments for new situations is critical to information systems development. The failure of IS development projects shows that method engineering is an open field. The question is if and how research on ontology can contribute to overcome the current situation. We show, based on linguistic and philosophical findings, how ontology can be used as linchpin in method engineering. We found that the language critique approach of Kamlah and Lorenzen (1984) provides the means to

create ontologies by linguistic actions and that ontologies are always related to language communities sharing the knowledge of using a common language in communication processes. We present an ontology-driven engineering method for information systems development. Our method helps to create required language constructs to handle new situations. The ontology-driven engineering method is demonstrated using an elaborate example case.

Introduction

An ongoing discussion on the business value of IT (Hitt & Brynjolfsson, 1996; Im, Dow, & Grover, 2001; Mukhopadhyay, Kekre, & Kalathur, 1995; Subramani & Walden, 2001; Tam, 1998), the role of IT in creating competitive advantage (Johnston & Vitale, 1988), and the perception that IT has changed from a simple administrative support tool to the vital backbone of an organization (Henderson & Venkatraman, 1999; Li & Chen, 2001; Venkatraman, 1994) clearly indicate that the role and impact of IT in contemporary organizations has changed significantly. In order to cope with the increased pressure on IT (Mukhopadhyay et al., 1995) as a result of these developments, the implementation of business solutions needs, more than ever to be effective, that is to meet business requirements exactly. Moreover, it needs to be increasingly efficient, requiring shorter development cycles, increased quality, and lower development costs.

However, even if information systems research and practice have reached an advanced stage, there are still serious concerns about the effectiveness and efficiency of IT projects. Keil states that a significant number of IT projects will ultimately escalate and fail, if they have not reached their objectives within predefined time restrictions and allocated resources (Keil, 1995). Empirical results from Keil, Mann, and Rai suggest that 30 to 40 percent of all IT projects are subject to project escalation (Keil et al., 2000). Even if, in this survey, not all projects that exhibited some degree of escalation failed, we can assume that the frequency of IT project failure rates will be not significantly below the statistical average escalation rate, because escalation is not the only reason for project failure.

Obtaining an exact frequency of IT project escalation rates is very difficult. The Standish Group's *Extreme Chaos* research report revealed that only 28 percent of several thousand software development projects were completed on budget, on time, and with all features and functions originally specified (Standish Group International, 2001). Twenty-three percent were never implemented or canceled before the development was completed, 49 percent were completed and operational, but over budget, behind schedule, and with fewer functions and