Chapter VIII
OntoFrame:
An Ontological Framework for Method Engineering

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ABSTRACT

A large number of strategies, approaches, meta models, techniques and procedures have been suggested to support method engineering (ME). Most of these artifacts, here called the ME artifacts, have been constructed, in an inductive manner, synthesizing ME practice and existing ISD methods without any theory-driven conceptual foundation. Also those ME artifacts which have some conceptual groundwork have been anchored on foundations that only partly cover ME. This chapter presents an ontological framework, called OntoFrame, which can be used as a coherent conceptual foundation for the construction, analysis and comparison of ME artifacts. Due to its largeness, the authors here describe its modular structure composed of multiple ontologies. For each ontology, they highlight its purpose, subdomains, and theoretical foundations. The authors also outline the approaches and process by which OntoFrame has been constructed and deploy OntoFrame to make a comparative analysis of existing conceptual artifacts.

INTRODUCTION

Method engineering (ME) means actions by which an information systems development (ISD) method is developed, and later customized and configured to fit the needs of an organization or an ISD project. ME is far from trivial in practice. In the first place, the ISD methods are abstract things with divergent semantic and pragmatic meanings. The former implies that conceptions of what the ISD methods should contain may vary substantially (Fitzgerald et al., 2002; Hirschheim et al., 1995; Iivari et al., 2001; Graham et al., 1997; Heym et al., 1992; Avison et al., 1995; Leppänen 2005). The latter suggests that views of roles, both technical and political, which the

ISD methods play in ISD may be quite different (Chang et al., 2002; Fitzgerald et al., 2002; Wastell, 1996). The existing methods also differ from one another in their fundamental assumptions and approaches (Fitzgerald et al., 2002; Iivari et al., 2001). Second, it is often difficult to characterize the target ISD situation in a way which makes it possible to conduct a proper selection from and a suitable adaptation in existing methods for an organization or a project (Aydin, 2007). Third, it is frequently unclear which kind of strategies (i.e. from "scratch", integration, adaptation) and processes should be applied at each stage of the engineering of an ISD method. Fourth, most of the method engineering (ME) situations suffer from the lack of time and other resources, causing demands for carrying out ME actions in a straightforward and efficient manner.

A large array of ME strategies and approaches (e.g. Kelly 2007; Kumar et al., 1992; Oie, 1995; Plihon et al., 1998; Ralyte et al., 2003; Rolland et al., 1996), meta models (e.g. Graham et al., 1997; Harmsen, 1997; Heym et al., 1992; Kelly et al., 1996; OMG, 2005; Prakash, 1999; Venable, 1993), ME techniques (e.g. Kinnunen et al., 1996; Kornyshova et al., 2007; Leppänen, 2000; Punter et al., 1996; Saeki, 2003) and ME procedures (e.g. Harmsen, 1997; Karlsson et al., 2004; Nuseibeh et al., 1996; Song, 1997) have been suggested to support method engineering. These *ME artifacts*, as we call them here, sustain, however, several kinds of shortcomings and deficiencies (Leppänen, 2005). One of the major limitations in them is the lack of a uniform and consistent conceptual foundation. Most of the ME artifacts have been derived, in an inductive manner, from ME practice and existing ISD methods without any theory-based conceptual ground. Also those ME artifacts that have a well-defined underpinning have been anchored on foundations that only partly cover the ME domain.

ME is a very multifaceted domain. It concerns not only ME activities, ME deliverables, ME tools, ME actors and organizational units, but, through its main outcome, an ISD method, also ISD activities, ISD deliverables, ISD actors, ISD tools, etc. Furthermore, ME involves indirectly, through information system (IS) models and their implementations, the IS contexts as well as those contexts that utilize information services provided by the ISs. Thus, in constructing an ME artifact it is necessary to anchor it on a coherent conceptualization that covers ME, ISD and IS, as well as the ISD and ME methods. In ontology engineering literature (e.g. Gruber, 1993) a specification of the conceptualization of a domain is commonly called an *ontology*. Hence, what we need here is a coherent set of ontologies which cover all the aforementioned sub-domains of ME.

The purpose of this chapter is to suggest an ontological framework, called OntoFrame, which serves as a coherent conceptual foundation for the construction, analysis and comparison of ME artifacts. OntoFrame is composed of multiple ontologies that together embrace all the sub-domains of ME. It has been constructed by searching for "universal" theoretic constructs in the literature (the *deductive* approach), by analyzing existing frameworks, reference models and meta models (the *inductive* approach), and by deriving more specific ontologies from generic ontologies above them in the framework (the *top-down* approach, Uschold et al., 1996). The construction work has been directed by the goals stated in terms of extensiveness, modularity, consistency, coherence, clarity, naturalness, generativeness, theory basis and applicability. The ontological framework is quite large, comprising 16 individual ontologies (Leppänen, 2005). Here, we are only able to describe its overall structure and outline the ontologies on a general level (Section 2). We also discuss the theoretical background and approaches followed in engineering it (Section 3). In addition, we demonstrate the applicability of OntoFrame by deploying it in a comparative analysis of relevant works (Section 4). The chapter ends with the discussion and conclusions (Section 5).

Related Content