Representation of Situational Methods: Incorporating ISO/IEC 24744 into a Domain-Based Framework

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ABSTRACT

Method Engineering (ME) and Situational Method Engineering (SME) aim at providing effective solutions for building and supporting evolution of software and information systems development methods. For this purpose, method components are specified and composed into general-purpose development methods or situational methods, i.e., development methods that best fit the characteristics of a given project and its environment. Recently ISO/IEC 24744 has emerged for defining a metamodel and a notation for development methods. However, this standard lacks a systematic support for situational classification and maintenance. In this work, the authors suggest incorporating ISO/IEC 24744 metamodel into a domain-based framework, called Application-based Domain Modeling for Method Engineering (ADOM-ME), which supports specifying both general-purpose and situational methods in a single, simple, accessible, and scalable frame of reference. An exploratory study on the usability of ADOM-ME indicates that the approach can be utilized by information systems students that represent non-experienced method engineers and software developers.

Keywords: Development Methods, ISO/IEC 24744, Metamodeling, Method Engineering (ME), Methodology, Situational Method Engineering (SME)

INTRODUCTION

In the last decade, the need for effective, appropriate, and flexible development processes in information-based domains has increased. These domains are characterized by their intensive reliance on information management and processing, and include software, business, and systems engineering. The term ‘development method’ in these areas refers to (the specification of) the process to follow, the artifacts (or work products) to be used and generated, and the consideration of the people and the tools involved, during a development effort (Arthur & Verhoef, 1997; ISO, 2007).

Although development methods are one of the most significant key factors to the reduction of risks and the success of projects (Boehm, 1991), development methods usually cannot be used as they are and require different adaptations for supporting the specific needs of a given project properly (Domínguez & Zapata, 2007). For this purpose, method parts are analyzed and specified, rather than complete
Methods. These parts are differently termed by the various approaches, e.g., road maps (van Slooten & Brinkkemper, 1993), fragments (Harmsen et al., 1994), chunks (Rolland et al., 1998), patterns (Rolland et al., 2000), method components (Mirbel & Ralyté, 2006), and method services (Deneckere et al., 2008). Although having slightly different meanings, we refer in this work to all method parts as method components, following Mirbel’s and Ralyte’s observation that this is the most general term (Mirbel & Ralyté, 2006). Having method components analyzed and specified, they can be composed to general-purpose development methods (Brinkkemper, 1996) or to situational methods, i.e., development methods that best fit the characteristics of a given project and its environment, e.g., the organization in which the project is developed and the project’s client (Harmsen et al., 1994; Mirbel & Ralyté, 2006).

Representation of method components and development methods is important for documentation, usage, and maintenance purposes in regular and situational method engineering. Recently, ISO/IEC 24744 has emerged for proposing both a metamodel and a notation for representing different kinds of method components (Henderson-Sellers & Gonzalez-Perez, 2008; ISO, 2007; ISO, 2010). This standard provides concepts, symbols, and rules that are relevant for development in information-based domains. In particular, it refers to three modeling layers and its graphical notation includes four diagram types.

Although ISO/IEC 24744 is an extensive and recent standard, it lacks a systematic support for situational classification and maintenance. Such support is required for understanding the situations to which each method component is suitable and for creating “good” situational methods. Furthermore, the richness of the notation (more than 30 symbols and four types of diagrams) may cause problems in its utilization. To overcome these limitations, we suggest incorporating ISO/IEC 24744 metamodel to a comprehensive domain-based framework, called Application-based Domain Modeling for Method Engineering (ADOM-ME). This framework enables importing ISO/IEC 24744 as a domain (reference) model and guiding the creation of valid method components, their potential classification according to different situational characteristics, and their composition to both general-purpose and situational development methods. All these activities are done within the same frame of reference, supporting the creation of manageably scalable and consistent models.

ADOM-ME is partially introduced and exemplified in the work of Aharoni and Reinhartz-Berger (2008), whereas their work from 2011 (Aharoni & Reinhartz-Berger, 2011) focuses on the retrieval and composition capabilities of ADOM-ME. Here we concentrate on the representation capabilities of ADOM-ME and analyze how they can improve ISO/IEC 24744 expressiveness and supply support for creating situational methods. We further report on our exploratory study on ADOM-ME usability.

The rest of the paper is organized as follows. First, we provide the required background about method engineering and situational method engineering, including a brief review of the terminology and the relevant approaches. We further elaborate on ISO/IEC 24744 and its main limitations in terms of supporting situational methods representation. This is followed by a section that presents and exemplifies ADOM-ME, and a section that elaborates on the exploratory study on ADOM-ME usability. Finally, we summarize and refer to future research plans.

**METHOD ENGINEERING AND SITUATIONAL METHOD ENGINEERING**

**Terminology**

*Method components*, which are the building blocks of development methods, are in the basis of both method engineering (ME) and situational method engineering (SME). They can be adapted to particular development projects utilizing different strategies, the most notable of which are aggregation and specialization.
Towards Risk Based Effort Estimation: A Framework to Identify, Analyze, and Classify Risk for Early Identification at Requirement Engineering Phase
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