Special Issue on New Trends in Situational Method Engineering

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INTRODUCTION

Over the last two decades the discipline of Method Engineering (ME) has evolved from simple ad-hoc method construction to situational and domain-specific method engineering as a response to the increasing complexity and diversity of Information Systems Developments (ISD).

Nowadays, the evolution of enterprise software and information systems from complex and monolithic systems towards distributed, modular and service-oriented ones creates again a strong need to re-think the fundamentals of ISD methods and to re-align them with the new information and software systems engineering practice. The need for situation-specific, flexible, adaptable and agile ISD methods is undeniable. As a reaction to this need, the discipline of Situational Method Engineering (SME) aims to provide techniques and tools for “on the fly” method construction, configuration and tailoring according to the ISD project characteristics and requirements.

On the other hand, even though enterprises acknowledge that methods, well adapted to the enterprise needs and engineering situations, bring a real added value to their development projects, they are rather slow to adopt the approaches and techniques proposed by SME researchers. They argue that SME processes are time consuming and too expensive in terms of knowledge and resources needed to implement them in practice, and demand more simple SME approaches and tools, preferably available on-line, easy to implement and not requiring extensive knowledge in ME.

For that reason, new concepts and approaches are constantly emerging in the field. We can mention the notions of method as a service, method-oriented architecture and method family which aim to improve method knowledge sharing and reusability and to facilitate the composition and configuration of situation-specific methods.

The innovation in and promotion of the SME discipline and the application of its results in practice seem to be vital to the IFIP WG 8.1 Task Group on Method Engineering. In recognition of this, the 4th Working Conference on Situational Method Engineering was organized in Paris, France, April 2011 by this research group. The aim of this conference was to review the latest achievements and to identify the new trends in the field. This special issue comprises a selection of revised and extended papers from that conference. The selection of papers was based on their quality and also on the novelty of the contribution to the domain of SME.
A SHORT REVIEW OF SITUATIONAL METHOD ENGINEERING EVOLUTION

Introduced in early nineties by Kumar and Welke (1992) the idea of constructing methods “on the fly” according to the project situation and requirements rapidly evolved into a new research discipline named Situational Method Engineering – “the discipline to build project-specific methods, called situational methods, from parts of the existing methods, called methods fragments” (Brinkkemper, 1996). Since then, various approaches, techniques and tools are regularly proposed in the literature.

First of all, many publications are dedicated to the method knowledge formalization into reusable and situated method parts named method fragments (Harmsen, 1997; Brinkkemper et al., 1998; Firesmith & Henderson-Sellers, 2002), method chunks (Ralyté & Rolland, 2001b; Mirbel & Ralyté, 2006) and method components (Prakash, 1999; Wistrand & Karlsson, 2004) and their storage in method repositories (Saeki et al., 1993; Harmsen et al., 1994; Brinkkemper et al., 1998; Plihon et al., 1998) to facilitate their reuse in the new methods construction. Then, the construction of a project-specific method is enabled by applying various method assembly techniques (Harmsen, 1997; Brinkkemper et al., 1998; Punter & Lemmen, 1996; Saeki, 2003a; Ralyté & Rolland, 2001a) taking into account situational factors and project requirements (Harmsen et al., 1994; Van Slooten & Hodes, 1996; Mirbel, 2004; Mirbel & Ralyté, 2006). According to Ralyté et al., (2003), combination of different SME approaches is also possible thanks to their generic process model for SME. Other authors offer approaches dedicated to some particular situation or application domain, as for example to improve software process agility (Cossentino & Seidita, 2005; Qumer & Henderson-Sellers, 2007), to support agent-oriented development (Henderson-Sellers 2005a), governance, risk and compliance in IS development (Gericke et al., 2009) and even the game industry (van de Weerd et al., 2007). The increase of service-oriented software engineering is also a source of inspiration for SME researchers. We can mention the approaches dedicated to the service identification (Börner, 2001), social web-service engineering (Maamar et al., 2011), service design (Levina et al., 2011, Zdrakovic et al., 2011) and service composition (Cortes Cornax et al., 2011). Finally, in order to facilitate SME application in practice, many authors discuss potential automation of the SME process and define requirements and architectures for CAME (Computer-Aided Method Engineering) tools (Harmsen et al., 1994; Saeki, 2003b) or other related tools and architectures (Kelly et al., 1996; papers in this issue by Cervera et al. and Vlaanderen et al.).

While much research from both industry and academia has been devoted to the SME process and ISD methods, SME still faces a few limitations and difficulties, for example, the lack of unified definition of method fragment and therefore the incompatibility of method repositories (Henderson-Sellers at al., 2008; Iacovelli & Souveyet, 2011), the granularity of method fragments (Henderson-Sellers, 2011), the evaluation of assembled methods (McBride & Henderson-Sellers, 2011), and the applicability of SME in practice (Bajec et al., 2007a,b).

Recently, a service-oriented approach to SME was introduced in (Rolland, 2009; Guzélian & Cauvet, 2010) as a solution to overcome some of the SME limitations. Rolland (2009) has elaborated on the idea of applying the service-oriented approach notions to SME and has defined the underpinned concepts of Method as a Service (MaaS) and Method-Oriented Architecture (MOA). Despite of its novelty and vision, for the moment, this idea has been explored in only very limited way. Deneckère et al. (2008) have analyzed drawbacks of existing metamodels for method fragments representation and then, based on the MaaS idea, proposed a new metamodel
for method fragments, called method service. In (Iacovelli et al., 2008) the authors discuss the implementation of MaaS and the adaptation of SOA technology to MOA. A generic process model for method services composition is proposed in (Cauvet, 2010). The method family concept is introduced in (Rolland, 2009) as a means to capture method knowledge commonality and variability and to enable easy method line configuration according to the project requirements at hand.

An extensive review of the state of the art in SME can be found in (Henderson-Sellers & Ralyté, 2010).

ARTICLES IN THIS SPECIAL ISSUE

The first article in this special issue “Developing Semantically-Enabled Families of Method-Oriented Architectures” by Mohsen Asadi, Bardia Mohabbati, Dragan Gašević, Ebrahim Bagheri and Marek Hatala explore the fresh new SME concepts of Method-Oriented Architecture and method family. The authors propose an approach allowing a systematic modeling of method families and helping to automate the process of specialization of method families where each family specialization satisfies the requirements of a specific situation. The proposed approach combines principles from Method-Oriented Architectures, semantically-enabled Service-Oriented Architectures and Software Product Line Engineering. First, the authors explain how to adapt semantic web service technology to method engineering needs. In particular they consider how to describe semantic method components to become method services, which are then implemented as web services. Then, they propose to apply and integrate the main technique used in feature modeling and method services for managing variability in method engineering. Next, they use the semantic web for enabling the semantic discovery of method services for features. Finally, they demonstrate how method services for features can be discovered and retrieved by utilizing a standard query language.

Incremental method engineering approaches are emerging as potential solutions to improve method evolution and variability. The second and the third articles present approaches dealing with these issues.

The article by Inge van de Weerd, Dominique Mirandolle and Sjaak Brinkkemper, "Situational Fit in Incremental Method Engineering", deals with incremental method engineering as a means to improve the overall performance of a method by introducing new method fragments into the method during its adaptation. In order to ensure the suitability of selected methods, the authors consider the concept of situational fit to balance environmental characteristics, company characteristics, and information system development methods. The aim of this study is to deliver a proof of concept of how situational fit and incremental method engineering can be used as a selection mechanism for process improvement in software companies. The research discussed in this paper has been carried out in the domain of software product management with the aim to demonstrate how the adaptation of a method can lead to a higher maturity level of that method.

Kevin Vlaanderen, Inge van de Weerd and Sjaak Brinkkemper in their article "On the Design of a Knowledge Management System for Incremental Process Improvement in the Field of Software Product Management" report the findings from seven exploratory case studies on incremental process improvement. The lessons learned during these case studies are used to refine the design of the Online Method Engine.
Robert Winter in his article "Construction of Situational Information Systems Management Methods" takes a different perspective for SME application – the Information Systems Management (ISM) domain. The author proposes a generic approach, as an extension of SME concepts, which helps to understand the specificity of the ISM context and objectives and to derive a set of ISM tasks to be included into the required situation-specific ISM method. The approach is based on three steps. The first step consists in analyzing the existing ISM solutions and discovering design factors that allows to identify as-is solution clusters. Next, the specification of the to-be solution clusters and implied transition paths are derived from the as-is solutions. Three techniques, goal-oriented, survey and analysis of maturity models, are proposed for this purpose. The last step of the approach consists in deriving the activity modules whose composition supports relevant transition paths and therefore constitutes situated, context and goal specific ISM methods. The proposed approach is illustrated by applying it in the domain of Enterprise Architecture Management.

The last topic of this special issue considers that appropriate tools are more than necessary to enable new SME concepts and techniques in practice. The purpose of the article "A Model-Driven Approach for the Design and Implementation of Software Development Methods" by Mario Cervera, Manoli Albert, Victoria Torres, and Vicente Pelechano, is to provide a tool support for SME. Most of the CAME and meta-CASE environments presented in the literature are mainly focused on the method product perspective and pass over the process one. Besides, they generally cover only the method design phase but not the method enactment. To overcome these limitations, the authors of this article propose an approach which covers both phases – method design and method implementation. The article presents a framework that allows the method engineer to define a complete method that can be applied in a real software project and that also semi-automates the construction of tools that provide adequate support to this method. To successfully face the definition of this infrastructure, they advocate for the use of the Model-Driven Development (MDD) paradigm. The applicability of the approach is demonstrated by a CAME tool named MOSKitt4ME and developed for this purpose, and a case study from the Valencia Regional Ministry of Infrastructure, Territory and Environment.

CONCLUSION

This special issue provides some insight into an evolving field of research named Situational Method Engineering and highlights the new trends in this field. It includes five articles selected from the IFIP WG 8.1 Working Conference on Situational Method Engineering, revised and extended for this issue. We hope that you will enjoy reading this special issue.

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REFERENCES


Engineering Conference - ASWEC 2008 (pp. 479-488). IEEE Computer Society, Los Alamitos, CA, USA.


