Chapter XVI

Improvement of Software Engineering Processes by Analyzing Knowledge Intensive Activities

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ABSTRACT

The knowledge modeling and description language (KMDL®) analyzes knowledge-intensive business processes which lead towards improvements. After modeling the business processes, knowledge and process potentials in daily business tasks in knowledge generation and handling can be unleashed. The following contribution presents the current state of specification of KMDL®. A real-life example in software engineering is used to explain the advantages of this approach.

INTRODUCTION

Software development is a knowledge-intensive business process. Until now, no adequate methods were available to improve knowledge management in software engineering by appropriate models, analyses and concepts. It seems useful to base on more than ten years of experience in the modeling and analysis of information processing tasks applying methods like event-driven process chains and to establish a new modeling paradigm focused on knowledge creation, flow and usage. Its application in the area of software engineering is described in the following contribution.
The main focus of the contribution refers to two principal objects: First, knowledge-intensive business processes in software engineering can be identified and improved using an adequate modeling language. Second, the specification of the knowledge modeling and description language (KMDL®) is used to model an exemplary software engineering processes. The modeling language is used to describe knowledge-intensive business processes, tacit and explicit knowledge, knowledge and information flows.

**QUESTIONS AND PROBLEMS OF KNOWLEDGE MANAGEMENT IN SOFTWARE ENGINEERING**

The dynamic behavior of the actual business environment will gain speed and complexity. The market for software products will transform very quickly and the pressure due to competition is expected to increase massively. Specially small and medium-sized enterprises have to cope with the high pressure in the software engineering sector consisting in the rivalry between themselves and major players (Groff & Jones, 2003). Therefore, methods and applications are needed to identify potentials in daily business processes (Hamel & Prahalad, 1990). The knowledge and use of these potentials can be a decisive competitive advantage. The management and processing of organizational knowledge are increasingly being viewed as critical to organizational success (Inkpen & Dinur, 1998).

The contribution is based on the central thesis:

*The productivity of software engineering will be increased using appropriate knowledge management applications. This can strengthen the competitiveness of software developing companies especially regarding future turbulences.*

Software engineering processes have to be improved in a way that relevant information and knowledge has to reach the appropriate employee at the right time. If so, employees reduce unnecessary search time for information and knowledge, therefore tasks can be completed faster. Another way to increase the productivity of software engineering is a constant documentation and optimization of recurring sub-processes and to reuse these as patterns in other projects. Knowledge management activities in software engineering can only be effective if they are implemented and applied consequently throughout the company. Even the greatest strategies will be unsuccessful without the support of employees. Staff members have to deal with knowledge management and its advantages have to be made clear.

In the following sections, the central thesis will be discussed, applying it to a real-life example of software engineering in small and medium-sized enterprises. German software engineering firms were analyzed within the research projects M-WISE\(^1\) and IOSE-W\(^2\) within the German federal government software engineering research initiative. The interdisciplinary organized projects aim to promote knowledge management in software engineering. Existing methods and applications to model knowledge-intensive business processes were improved and a new specification of a modeling language in software engineering was developed and tested in multiple real-life environments.

**Modeling of Software Engineering Processes with the Knowledge Modeling and Description Language (KMDL®)**

In the following section, the knowledge modeling and description language (KMDL®) is introduced. KMDL® is currently under development at the University of Potsdam in Germany. The
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