Chapter V

Adaption of UML to Formalized Software Development Process Assessment and Modeling: Dedicated Metamodel and Case Study

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ABSTRACT

This chapter introduces a conceptual metamodel that enables the assessment and semiformal modeling of business processes in the domain of software engineering based on the UML metamodel. In addition to the definition of an appropriate process modeling method, a basis for performing empirical case studies and structured process assessments is provided by defining and structuring the relevant process entities (artifacts, roles, tools) and process elements, and their interdependencies on the metamodel level. Above all, some example models are presented that were developed by applying the introduced metamodel during an initial...
case study. The described metamodel allows the opportunity to create detailed organizational UML-based models that describe the relevant roles, workflows, artifacts, as well as the used tools and their interdependencies. Thus, it can facilitate a founded assessment, evaluation, and reengineering of organizational software development processes.

INTRODUCTION

Enterprise and business process modeling are very important activities that provide the well-founded basis for further assessment, reengineering, and support of existing processes. Besides that, well-structured and comparable qualitative process descriptions, developed with formalized and standardized modeling methods, enable the benchmarking of different process models across organizational boundaries. Also, in the specific domain of formal software engineering, business process modeling is considered to be an important discipline that provides the well-founded basis for software requirements analysis and management (Kroll & Kruchten, 2003). Since the UML is the de facto modeling standard for software and system modeling, it would be desirable to adapt the elaborate UML specification for process and business modeling as well.

This chapter introduces a UML-based metamodel that enables the analysis and formalized description of organizational and business processes in the domain of software engineering, and also facilitates their reengineering. This provides the opportunity to create detailed organizational UML-based models that describe the relevant roles, workflows, produced artifacts, as well as the used tools and their interdependencies. Therefore, the metamodel represents an innovative extension of the UML, and is a contribution to the areas of enterprise and organizational modeling with the UML.

The metamodel was developed as part of a joint research project between the Fraunhofer ISST (Berlin) and Potsdam University, aimed at the identification, semiformal description, and adaptation of typical open source software development (OSSD) processes and organizational mechanisms (Dietze, 2004). During the project, it was used successfully to empirically analyze software development processes based on comparative case studies, and to develop a generalized model of OSSD in a formalized representation.

The following will provide an overview of the metamodel, which itself was specified by using class diagrams of the UML. The used and referenced modeling elements are completely based on the UML metamodel (Object Management Group, 2002).

The metamodel is divided into two central parts. The first part describes and structures the software development process on the metamodel level, and is explained in section three after an introduction to background and motivation. The second part defines UML-based viewpoints and model elements that enable the formalized description of the software development process. These are explained in section four. The fifth section of this chapter subsequently introduces a first application of the metamodel to real-life software development processes. The last section of this chapter gives a summarizing conclusion.

BACKGROUND

This section provides a brief overview of basic modeling concepts, issues, and needs in the area process modeling, as well as metamodeling concepts in the software engineering domain.