Chapter V
Integrated Requirement and Solution Modeling:
An Approach Based on Enterprise Models

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ABSTRACT

This chapter discusses how an Enterprise Modeling approach, namely C3S3P[1], has been applied in an automotive supplier company. The chapter concentrates on the phases of the C3S3P development process such as Concept Study, Scaffolding, Scoping, and Requirements Modeling. The authors have also presented the concept of task pattern which has been used for capturing, documenting and sharing best practices concerning business processes in an organization. Within this application context they have analyzed their experiences concerning stakeholder participation and task pattern development. The authors have also described how they have derived four different categories of requirements from scenario descriptions for the task patterns and from modeling of the task patterns.

INTRODUCTION

Every information system (IS) engineering project needs to have a clear vision and purpose, and to know what kind of properties the developed product should possess. This usually is the focus of requirements engineering (RE) activities that are being performed in early stages of an IS development project. The main objective of this process is not only to put forward a number of features that the product should have, but also to connect them to the business needs of the customer organization in such a way that each product requirement is traceable to some business objective of the organization. This explicit connection between IS requirements and business goals helps avoiding unnecessary rework and increases the business value of the product. Moreover, in the process of eliciting and linking the business needs and IS requirements, the development team and the stakeholders usually have to tackle a number of "wicked" or "ill-structured" problems (Rittel & Webber, 1984) typically occurring in organizations.

Enterprise Modeling (EM) seeks to solve organizational design problems in, for instance, business process reengineering, strategy planning, enterprise integration, and information systems development (Bubenko & Kirikova, 1999). The EM process typically leads to an integrated and negotiated model describing different aspects (e.g. business goals, concepts, processes) of an enterprise. A number of EM approaches (c.f., for instance (Bubenko, Persson, & Stirna, 2001; Castro, Kolp, & Mylopoulos, 2001; F3-Consortium, 1994; Loucopoulos et al., 1997; van Lamsweerde, 2001; Yu & Mylopoulos, 1994)) have been suggested. To document the models and to support the EM processes computerized tools are used. They differ in complexity from simple, yet cost-effective, drawing tools such as Microsoft Visio and iGrafx FlowCharter to more advanced tools such as Aris (IDS Scheer) and METIS (Troux Technologies).

The participative approach to EM contributes to the quality of the requirement specification as well as increases the acceptance of decisions in the organizations, and is thus recommended by several EM approaches (c.f. for instance (Bubenko & Kirikova, 1999; Persson & Stirna, 2001; Stirna, Persson, & Sandkuhl, 2007)). The participative approach suggests that the modeling group consists of stakeholders and domain experts who build enterprise models following guidance given by a modeling facilitator. An alternative expert driven approach suggests interviews and questionnaires for fact gathering and then creation of an enterprise model in an analytical way.

EM and especially the participative way of working is highly useful in situations when the development team needs to capture and consolidate the user needs and then to propose an innovative solution to them. In such situations one of the main challenges is to establish traceability between the user needs, such as, for instance, goals, processes, and requirements, and the designed solutions to these needs in terms of tasks, methods, and tools. Furthermore, in such situation the user needs can be met in many different ways, which requires early stakeholder validation of the envisioned solution. A common example of such an application context is an innovative research and development (R&D) project aiming to develop new methods and tools. In this chapter we present an EU supported R&D project MAPPER (Model-based Adaptive Product and Process Engineering) that has successfully overcome these challenges. More specifically, the objective of this chapter is *to report how a specific EM approach, namely C3S3P², was applied in an automotive supplier company in order to elicit requirements for a reconfigurable IS to support collaborative engineering and flexible manufacturing processes*. More specifically, we will address the following questions:

- How were the stages of C3S3P followed to develop requirements and what where the