Chapter XI

Using DEMO and ORM in Concert:
A Case Study

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ABSTRACT

The Demo Engineering Methodology for Organizations (DEMO) enables business processes of organizations to be modeled at a conceptual level, independent of how the processes are implemented. DEMO focuses on the communication acts that take place between human actors in the organization. The Object-Role Modeling (ORM) approach enables business information to be modeled conceptually, in terms of fact types as well as the business rules that constrain how the fact types may be populated for any given state of the information system and how derived facts may be inferred from other facts. ORM also includes procedures to map conceptual data models to physical database schemas. Both DEMO and ORM treat fact types as fundamental, and require that their models be expressible in natural language sentences. This suggests that the approaches may be synthesized in a natural way, resulting in a more powerful method for business modeling. This chapter discusses an exploratory case study in which both methods were used in concert, and identifies some lessons learned.

INTRODUCTION

Demo Engineering Methodology for Organizations (DEMO) is a method for organization engineering, an emerging discipline concerning the design and implementation of organizations (Dietz, 1994, 1999, 2003a, 2003b; Van Reijswoud, Mulder & Dietz, 1999). Traditional organization science is based on a teleological system definition, which is concerned with the function and the behavior of a system in its environment. The corresponding dominant paradigm for studying organizations is the IPO-paradigm (Input-Process-Output). The matching model type is the black-box-model. Organization engineering is based on an ontological system definition, which is concerned with the construction and operation of a
system. Its dominant paradigm for studying organizations is the PSI-paradigm (Performance in Social Interaction). The matching model type is the white-box-model.

Organization science and organization engineering are complementary fields. The former is particularly useful for managing organizations (strategic, tactic and operational management), while the latter is especially useful for changing organizations (redesign/re-engineering of business processes, forming networks of organizations, etc.).

The PSI-paradigm states that an organization consists of people who, while communicating, enter into and comply with commitments (social interaction) about the things they bring about in reality (performance). This reality therefore is to a large extent an inter-subjective reality. Put differently, in their social interaction people engage in obligations about actions to take, and reach agreement about the results of those actions. The PSI-paradigm is made more specific and operational in DEMO as described later. DEMO belongs to a group of modeling approaches that are all based on the Language/Action Perspective (e.g., Goldkuhl, 1996; Medina-Mora, Winograd, Flores & Flores, 1992). Van Reijswoud and Dietz (1999) provide a detailed description of DEMO.

Object-Role Modeling (ORM) is a fact-oriented approach for modeling information at a conceptual level. An overview of ORM is given in Halpin (1998a), and a detailed treatment in Halpin (2001a). ORM includes a family of closely related variants, including Natural Information Analysis Method (NIAM) (Wintraecken, 1990), Natural Object Relationship Method (NORM) (De Troyer & Meersman, 1995), Predicator Set Model (PSM) (ter Hofstede, Proper & van der Weide, 1993), and Fully Communication Oriented Information Modeling (FCO-IM) (Bakema, Zwart & van der Lek, 1994). Unlike Entity-Relationship (ER) modeling (Chen, 1976) and the class diagram technique of the Unified Modeling Language (UML) (OMG UML RTF, 2003), ORM makes no use of attributes as a base construct, instead expressing all fact types as relationships. This attribute-free approach leads to greater semantic stability in conceptual models and conceptual queries (Bloesch & Halpin, 1997; Halpin, 1998b) and enables ORM fact structures to be directly verbalized and populated using natural language sentences.

ORM supports mixfix predicates of any arity (unary, binary, ternary, etc.), so its constraints and derivation rules can also be directly verbalized in sentential form. For details on business fact and rule verbalization in ORM, see the series of articles initiated by Halpin (2003). Moreover, ORM’s graphic constraint notation is far more expressive than that of UML class diagrams or industrial ER versions. ORM is now supported by a number of modeling tools, which can automatically transform ORM schemas into physical database schemas (e.g., see Halpin, Evans, Hallock & MacLean, 2003). For such reasons, ORM is being increasingly used for conceptual analysis of information, as well as ontology specification (Spyxs, Meersman & Jarrar, 2002), and is currently being considered as a candidate for a standard business rule modeling language within the Object Management Group.

Both DEMO and ORM treat fact types as fundamental, and require that their models be expressible in natural language sentences. This suggests that the approaches may be synthesized in a natural way, resulting in a more powerful method for business modeling. This chapter discusses the first attempts to explore the feasibility of this synthesis, and identifies some lessons learned, using a running example of a library application to illustrate the main ideas.

The following section summarizes the essential concepts and model types underlying the DEMO approach, and discusses how the library application is modeled using DEMO. Next, the chapter explains the main concepts and notations of ORM, and shows how the
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