Business Modeling with Client–Oriented Requirements Strategy

María Carmen Leonardi
UNCPBA, Argentina

INTRODUCTION

Rational unified process (RUP) (Jacobson, Booch, & Rumbaugh, 1999) is an iterative, incremental and use case driven methodology. RUP starts the software development with the requirements capture stage, taking into account that *"the major challenge is that the customer, who we assume to be primarily a non-computer specialist, must be able to read and understand the result of requirements capture. To meet this challenge we must use the language of the customer to describe these results"* (Jacobson et al., 1999, p. 113). As requirements are originated from the system's context, RUP proposes the definition of it through a business model, more concretely, a *business use cases model* and a *business objects model*. There are several approaches to enhance this first stage of the RUP development. In this article, the author describes the most important proposals and briefly presents her strategy that defines a set of activities and heuristics to define a UML conceptual object model starting from stakeholder oriented requirements models. These models describe the overall context in which the software will be developed and operated, known as universe of discourse (Leite & Leonardi, 1998). The strategy enhances traceability (Pinheiro, 2000) between requirements and RUP models.

BACKGROUND: BUSINESS MODELING IN THE CONTEXT OF RUP

As mentioned earlier, RUP proposes a business model to define the organization without defining any explicit techniques or strategy to guide the construction of it. There are some works that present different proposals to enhance this stage, taking into account different starting points and perspectives. In this section, the author briefly describes the most important.

From the RUP/UML and business technology community, there are some proposals to model the organization. The work of Eriksson and Penker (2000) presents a combination of techniques to model the business with UML organization models representing processes, events, resources, goals, business rules and general mechanisms. The business architecture and its elements are represented from four different views: business view, business process, business structure and business behavior. They propose a set of UML business extensions to represent those concepts using the standard UML extension mechanisms. The authors propose three categories of business patterns to describe common modeling solutions during the business modeling: resource and rules patterns, process patterns and goals patterns. In Barros, Duddy, Lawley, Milosevic, Raymond, and Wood (2000), an interesting proposal is presented extending UML in order to define the organizational enterprise model for systems that will be implemented using distributed objects technology. This model is described in terms of processes, entities, lists and events of the business. Finally, in Marshall (1999), some key concepts of an enterprise and their components are modeling. Specifically, they define the purpose, processes, entities and organization of the enterprise with standard UML diagrams.

From the requirement community, one of the most important works is Santander and Castro (2002). This strategy allows the definition of use cases starting from the i* organizational model. This strategy captures organizational requirements to define how the system fulfills the organization goals, why it is necessary, what the possible alternatives are and what the implications to the involved parts are, all of them represented by the two i* models. The approach presents some guidelines to develop use cases from these models. This approach is a goal-based methodology useful for RUP software requirements definition phase since it generates use cases for the software system.

Although it is not directly related to RUP business modeling, one of the most important works in generating conceptual object-oriented specifications from natural language is the strategy presented in Juristo, Moreno, and López (2000). This strategy consists of analyzing natural language-based descriptions (expressing the problem to be solved) from a syntactic and semantic perspective in order to identify the key elements of the object-oriented conceptual model (modeling the problem in the computer). The proposal is a semi-formal model that lets

organizations systematically produce object-oriented models. It is based on two components: a mathematical component that defines formal rules to identify the elements of the object-oriented conceptual models from the natural language structures; and a method that guides the analyst in the development of such models, by means of the definition of a set of defined steps.

A CONSTRUCTION PROCESS OF THE RUP BUSINESS MODEL BASED ON STAKEHOLDER-ORIENTED REQUIREMENTS MODELS

During the early stages of development, when the interaction with the stakeholders is crucial, the use of natural language-oriented requirements engineering techniques seems necessary in order to enhance communication. These techniques are very useful to obtain a first specification of the universe of discourse that will be easily validated with the stakeholders and will be the basis for a development. Therefore, the necessity of integrating stakeholder-oriented requirements models and strategies to enhance the construction process of the business model keeping the RUP philosophy of using the customer language is highlighted. Stakeholder-oriented models are based on natural language, therefore the communication between engineers and stakeholders are facilitated. The author presents a strategy based on heuristics that guide the construction of the RUP starting from the stakeholders-oriented requirements models. Due to space reason, the author does not present the full strategy, which may be found in Leonardi (2003). The section is organized in three subsections: one to present the stakeholder-based models, the second presents the construction process and finally, in the third, its use is discussed.

Stakeholder-Oriented Requirements Models

The models presented in this section are well-known, used and accepted by the requirements engineering community (Leite et al., 1997; Leite & Leonardi, 1998). In this proposal, they are used as the first models to obtain a RUP business object model. The models are: language extended lexicon model, scenario model and business rules models.

- **Language Extended Lexicon:** The language extended lexicon (LEL) (Leite et al., 1997) is a structure that allows the representation of significant terms of the universe of discourse. The purpose of the lexicon is to help understand the vocabulary and its semantics, leaving the comprehension of the problem for a next step. It unifies the language allowing communication with the stakeholder. LEL is composed of a set of symbols with the following structure: *symbol name* " word or phrase and set of synonyms; *notions* defining the denotation of the symbol; and *behavioral responses* describing the symbol connotation. In the description of the symbols, two rules must be followed simultaneously: the "closure principle" that encourages the use of LEL symbols in other LEL symbols forming a graph, and the "minimum vocabulary principle" where the use of symbols external to the application language is minimized. LEL terms define objects, subjects, verbal phrase and states. Figure 1 shows the heuristics to define each type of symbol.
- **Scenario Model:** A scenario describes situations of the universe of discourse (Leite et al., 1997). A scenario uses natural language as its basic representation, and it is connected to LEL. Figure 2

Figure 1. Heuristics to represent LEL terms

Subject	Notions: who the subject is.
	Behavioral responses: register actions executed by the subject.
Object	Notions: define the object and identify other objects with which the former has a relationship.
	Behavioral responses: describe the actions that may be applied to this object.
Verb	Notions: describe who executes the action, when it happens, and procedures involved in the action.
	Behavioral responses: describe the constraints on the happening of an action, which are the actions triggered in the environment and new situations that appear as consequence.
State	Notions: what it means and the actions which triggered the state.
	Behavioral responses: describe situations and actions related to it.

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