MDA Compatible Knowledge– Based
IS Engineering Approach

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Abstract. Enhancement of MDA process with Knowledge Base Subsystem is
aimed to reduce risk of project failures caused by inconsistent user requirements
caused by insufficient problem domain knowledge. The enhancement of IS
development environment with Enterprise Knowledge Base is discussed in this
article. The major parts of Knowledge Base Subsystem are Enterprise Meta-
Model, Enterprise Model and transformation algorithms.

Keywords: Enterprise Knowledge Based Information System Engineering,
Model Driven Architecture, Enterprise Model, Enterprise Meta-Model.

1 Introduction

The majority of IT project failures (about 68% [2]) are caused by inconsistent user
requirements and insufficient problem domain analysis. Although new methods of
information systems engineering (ISE) are being researched and developed, they are
empirical in nature: the project models repository of CASE system is composed on
the basis of enterprise problem domain. The problem domain knowledge acquisition
process relies heavily on the analyst and user; therefore it is not clear whether the
knowledge of the problem domain is adequate.

The expert plays a pivotal role in the problem domain knowledge acquisition
process, and few formalized methods of knowledge acquisition control are taken into
consideration. Currently, despite of existing tools and CASE systems, user
requirement analysis largely depends on the expertise of system analyst and the user.
The knowledge stored in repository of CASE tool is not verified through formalized
criteria, thus it is necessary to use advanced data capture techniques that ensure
iterative knowledge acquisition process during which missing or incorrect data
elements are obtained and fixed.

OMG provides Model Driven Architecture (MDA[4]) approach to information
systems engineering where MDA focuses on functional requirements and system
architecture not on technical details only. Model Driven Architecture allows long-
term flexibility of implementation, integration, maintenance, testing and simulation. It
means that enterprise modeling and user requirements engineering stages of information system engineering life cycle are not covered enough by MDA yet. There is lack of formalized problem domain knowledge management and user requirements acquisition techniques for composition and verification of MDA models. In order to solve this problem enhancement of MDA approach by the best practices [5], [6], [7] of Knowledge Base IS engineering (including Enterprise Knowledge repository) can be used. The proposed enhancement will intellectualize MDA models composition process by improving their consistency and decreasing the influence of the empirical information in composition process. Knowledge Base Subsystem will ensure MDA models verification against formal criteria defined by Control Theory [8]. It will reduce risk of project failures caused by inconsistent user requirements and insufficient problem domain knowledge verification.

2 Related Works

After an analysis of enterprise modeling standards including CEN EN 12204 [5], CEN EN 40003 (CIMOSA) [6], UEML [7] is performed the following usage shortcomings of mentioned standards to particular Information System’s Engineering steps (user requirements acquisition, analysis and specification) are defined:

- The content of enterprise models, presently used in CASE systems, is not verified according to formalized criteria. Although enterprise models are created on the basis of various notations (such as data flow diagrams, work flow models etc.), their composition is not verified by CASE systems with respect to defined enterprise domain characteristics such as relations among particular processes, functions, actors, flows and etc.

- One of the reasons why the composition of enterprise models (created in this way) is incomplete for the improvement of CASE methods are insufficient features of both empirical Enterprise Models and user requirement specifications.

In order to solve these problems a particular Enterprise Meta-Model [9] has been developed in Kaunas University of Technology, Department of Information Systems. Its internal structure is based on Control Theory and best practices of the above mentioned enterprise modeling standards.

Recently, several authors [9], [10] proposed EMM based Use Case models generation methods in order to decrease empirical nature of Information Systems Engineering process already. These methods are able to cover static aspects of particular MDA steps (creation of Computation and Platform Independent Models), though mentioned EMM is not MDA compatible enough to fully support MDA process yet.

3 Knowledge Base MDA Principles

Most of MDA related techniques [1] are based on empirically collected problem domain knowledge thus negative influences verification of user requirements specification against actual customer needs. In some cases, user requirements do not correspond to formal business process definition criteria, which have a negative