Chapter 5
Enriching the Model–Driven Architecture with Weakly Structured Information

Dima Panfilenko
DFKI (German Research Center for Artificial Intelligence), Germany

Christian Seel
University of Applied Sciences Landshut, Germany

Keith Phalp
Bournemouth University, UK

Sheridan Jeary
Bournemouth University, UK

ABSTRACT

Most Model-Driven-Architecture (MDA) approaches are focussed on Platform Independent Models (PIM) and Platform Specific Models (PSM) and the transformation between them. The more conceptual Computation Independent Models (CIM) or even unstructured information is often neglected, despite the importance of requirements modelling at the CIM-level and the impact this has on the entire software development process. Almost every change that is done within the software development lifecycle, including maintenance triggers, is based on unstructured information in the early stages which then affects the CIM level, e.g. a change in a business process or a change in law that requires a change of software. Therefore unstructured or weakly structured information has to be included in any maintenance processes.

In order to introduce unstructured or weakly structured information to the MDA, we propose to enhance the MDA-levels by a pre-CIM-level for unstructured information, extend the modelling capabilities on CIM-level, and establish links between the objects on different levels that allows traceability of requirements into code.

INTRODUCTION

Model-driven architecture (MDA) (OMG 2003) is becoming increasingly important in both the literature and in practice. However, most MDA approaches are focused on Platform Independent Models (PIM) and Platform Specific Models (PSM) and the transformation between them (Frankel 2003). The more conceptual Computation Independent Model (CIM) level or even the unstructured information which informs the models is often neglected (Mellor et. al. 2004); and this despite the importance of modelling of requirements at the CIM-level and the impact this has on the entire software development process. Almost every change that is done within a software development lifecycle including maintenance is based on unstructured information in the early stages which then affects the CIM level and is propagated to the PIM and PSM level beneath. There are various examples for unstructured or weakly structured information that influence the Model Driven Development (MDD), such as the change in a business process or a change of law like the introduction of the Sarbanes-Oxley-Act (SOX) (U.S. Government Printing Office 2002). This law can be regarded as unstructured information from a software engineering point of view, but it requires a change of many business processes at the CIM-level, which leads to changes and maintenance efforts in the derived software systems. The examples show how a change in law can trigger a software maintenance process. But if there is no relation between this unstructured information and the existing software, the entire software has to be regarded in order to find the places that need to be changed instead of concentrating directly on the parts of the software that require change.

Therefore, we propose to integrate weakly structured information into MDA and create a linkage between unstructured information and the CIM-level as the current top level of the MDA model stack (Kanyaru et. al. 2008). This leads to an extension of the MDA, which can be used to speed up maintenance and software development processes as the impact of weakly structured information on software is clearly defined, and shows transparently which change of weakly structured information leads to which part of the CIM-level model (Kanyaru et. al. 2008, Martin et. al. 2008).

In detail, this chapter proposes a way to deal with weakly structured information, an extended modelling language at the CIM-level and the means to describe the relation between them. The goal of our work is to keep track of changes that occur on a very high and abstract level and allow the stakeholder to visualise the effect of those changes. This will include finding related information on the CIM and PIM level immediately. This allows us to estimate and to achieve changes because of new requirements (which are usually a result of unstructured or weakly structured information) much better.

The pre-CIM level in MDA should keep the weakly structured information semi-formalised inside the software development lifecycle and visualised for the further use by business architects (Kanyaru et. al. 2008). Its role in getting the domain experts more involved in requirements modelling is vital for preserving the domain knowledge and thus aligning it with the software product throughout the various modelling levels of the software lifecycle.

For MDA's first level, CIM, we propose the specific CIM-modelling language called VIDE CIM Level Language ("VCLL") (VIDE 2007), which extends Business Process Modeling Notation (BPMN) (OMG 2006a) to give four integrated modelling views. The designed modelling language allows creation of business processes, relevant data, business rules, and organisational aspects. The VCLL focuses on the development of business applications and provides two entry points into MDA. First, our proposed modelling language can be used to describe the behaviour of one application (micro view). Second it can be used to orchestrate different applications (macro view). Furthermore, the VCLL provides a connec-

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