Model-Driven Architecture and IT Governance Ontology

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ABSTRACT

In this article a research vision which links the disciplines Model-Driven Architecture and IT Governance is presented. Model transformation and semantic mapping are enabling technologies for new, advanced solutions to address IT (Information Technology) Governance interoperability. In a prototype the generation of a model is shown based on an IT Governance domain.

Keywords: Efficient Applications, Inoperability, IT Governance, Model-Driven Architecture, Ontology

INTRODUCTION

Interoperability is one of the major challenges to be addressed in achieving efficient applications (Turner, Budgen, & Brereton, 2003). Today, the integration costs for enterprise applications in the context of IT Governance (ITG) are still extremely high, because of different regulatory requirements, processes, data organization and application interfaces that need to be reconciled, typically with manual intervention. A typical process in ITG comprises various tangled concerns such as the control flow, data processing, service invocations, event handling, human interactions and transactions. The entanglement of those concerns increases the complexity of process-driven ITG development and maintenance as the number of involved services and processes grow. In the area of interoperability the challenge is to get systems to ‘speak with each other’ in such a manner that the dialog is meaningful for the systems. It is important that the shared information is understood both syntactically and semantically, because misinterpreted (model) information in the context of ITG can cause unexpected, unwanted or even fatal errors.

This problem has been addressed independently by Model-Driven Architecture (MDA) and ontology-based approaches. The MDA proposed by the Object Management Group (OMG) uses platform-independent models as the context for identifying relations between different applications (Kleppe, Warmer, & Bast, 2003). Transformation is a central concept in MDA to address how to convert one model into another model of the same system, and further into executable code. MDA provides technologies to handle meta-models, constraints etc, which can be used for semantic enrichment and model transformation.

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In this article it is examined how the two different approaches, model-based and ontology-based are used to address semantic mapping in the context of ITG applications.

This article is structured as follows; description of the research approach, overview of Model-Driven Architecture and Ontology, development of the approach and requirements in the context of ITG, prototypical implementation of the approach and conclusions.

RESEARCH APPROACH

This research article employs the Design Science Research methodology. The mission of a Design Science is to develop knowledge to be used in the design and realization of artifacts (Cole, Purao, Rossi, & Sein, 2005; Hevner, March, Park, & Ram 2004; Van Aken, 1999). To distinguish between Design Science and ‘simple’ design, the artifact has to present an innovation of the existing scientific knowledge base by improving technical, social or informational resources (Hevner, 2007). An artifact is a product of technology research, e.g., a framework, a set of guidelines, a model, a language, or a method.

The following Table 1 shows the IT artifacts according to Hevner, March, Park, and Ram (2004) and Hevner (2007) used in the context of this research article.

Following Baskerville, Pries-Heje, and Venable (2009), the prototyping approach to Design Science Research involves an iterative sequence of specifying the problem and goals of a solution, a search for a satisfactory design, and construction of a satisfactory example. In this prototype the aspects model weaving from ITG were considered.

FOUNDATIONS

Model-Driven Architecture

Models have a causal connection to the modeled part of reality: they must form true or faithful representations so that queries of the model give reliable statements about reality, or manipulations of the model result in reliable adaptations of reality. A model is an external and explicit representation of a part of reality as seen by the people who wish to use that model to understand, change, manage, and control that part of reality (Pidd, 2000). Models represent part of the functionality, structure and/or behavior of a system, and they are defined in terms of formal meta-models. A meta-model includes the set of concepts needed to describe a domain at a certain level of abstraction, together with the relationships existing between them. Model transformations, commonly described as meta-model mappings, enable the (automatic) transformation and evolution of models into (1) other models, defined at any level of abstraction, or (2) any given textual format (e.g., code) (Mens & Van Gorp, 2006). A complete definition of a modeling language consists of the description of its syntax, including well-formedness rules.

Table 1. IT artifacts

<table>
<thead>
<tr>
<th>IT Artifact</th>
<th>Description</th>
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<tbody>
<tr>
<td>Language</td>
<td>Vocabulary as well as the amount of rules for the description of a domain</td>
</tr>
<tr>
<td>Method</td>
<td>Scheduled procedure for the fulfillment of a defined task</td>
</tr>
<tr>
<td>Model</td>
<td>Representation of a section of a domain on the basis of a language</td>
</tr>
<tr>
<td>Implementation</td>
<td>Realization of an IT Artifact in its usage environment</td>
</tr>
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