A Framework for the Quality Evaluation of MDWE Methodologies and Information Technology Infrastructures

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ABSTRACT

Diverse development web methodologies currently exist in the field of Model-Driven Web Engineering (MDWE), each of which covers different Levels of Abstraction on Model-Driven Architecture (MDA): Computation Independent Model (CIM), Platform Independent Model (PIM), Platform Specific Model (PSM), and Code. Given the high number of methodologies available, it has become necessary to define objective evaluation tools to enable development teams to improve their methodological environment and help designers of web methodologies design new effective and efficient tools, processes and techniques. Since proposals are constantly evolving, the need may arise not only to evaluate the quality but also to find out how it can be improved. This paper presents an approach named QuEF (Quality Evaluation Framework) oriented towards evaluating through objectives measures, the quality of information technology infrastructure, mainly in MDWE methodology environments.

Keywords: Computer Science, Information Systems, Methodologies, Model-Driven Engineering, Model-Driven Web Engineering, Quality

INTRODUCTION

Model-Driven Engineering (MDE) (Schwinger et al., 2008) is a paradigm of software development which consists of the creation of models closer to a particular domain rather than concepts or a specific syntax. The domain environment specific to MDE for web engineering is called Model-Driven Web Engineering (MDWE) (Escalona & Aragón, 2008). The Object Management Group (OMG, 2010) has developed the standard Model-Driven Architecture (MDA)
which defines an architecture platform for proposals based on the Model-Driven paradigm. The concept of platform independence appears frequently in MDA. Models may have the quality of being independent from the characteristics of any technological platform. By applying this paradigm, the lifecycle of a software system is completely covered, from requirements capture to its own maintenance, through the generation of the code. MDA determines a minimum number of stages or levels of abstraction: Computing Independent Model (CIM), Platform Independent Model (PIM), Platform Specific Model (PSM), and Code. In recent years, growing interest in the internet has led to the generation of a high number of proposals which offer a frame of reference for the Web environment (Escalona & Aragón, 2008). On the other hand, there are a high number of approaches without standard consensus, a lack in the use of standards, and scarcity of both practical experience and tool support. In the face of this situation, an important need to assess the quality of existing methodologies arises. On the other hand, IT is the area of managing technology and spans wide variety of areas that include, but are not limited, to things such as processes, computer software, information systems, computer hardware, programming languages, and data constructs. In these lines, these MDWE approaches play a fundamental role in IT improvement services because they make easier the development of Web applications reducing costs and efforts. In short, each thing that renders data, information or perceived knowledge in any visual format whatsoever, via any multimedia distribution mechanism, is considered part of the domain space known as IT. The industry has provided the delivery of technology so that people can understand and use but many of the problems occur because of the complexity of technology and the rapid pace of change. In this paper, therefore, an environment for the quality analysis, control and evaluation of Model-Driven Web methodologies based on MDA is proposed although it could be extended to each other quality improvements in IT infrastructure, delivery and service support.

The paper is organized into the following sections. A global analysis of the situation is presented. We present the problem, motivation and goal, and lay the basis of a framework that allows us to evaluate the quality of different methodological proposals. Concepts such as MDWE methodology and framework are explained. The elements which define our approach, QuEF (Quality Evaluation Framework), are provided. Application of the proposed QuEF to NDT methodology is performed and finally, a set of conclusions, contributions and possible future work are given.

RELATED WORK

A great amount of work has been published in the area of MDWE, as have numerous studies related with MDWE approaches. Along this line, Schwinger et al. (2008) must be considered where a well-defined fine-grained catalogue of more than 30 evaluation criteria about approaches is defined. Some work related with quality evaluation and software metrics are considered in this section. In Cachero, Calero, and Marhuenda (2008), an approach is proposed to evaluate Web quality that provides all the elements which, according to the ISO/IEC 14598, are essential parts of a software quality evaluation. The idea of developing a MDE framework for evaluating quality has been applied in various studies of Mohagheghi and Dehlen (2008), where it is stated that the quality of models is affected by the quality of modeling languages, tools, modelling processes, the knowledge and experience of modellers, and the quality assurance techniques applied. In the literature there are numerous references to metrics, (García et al., 2007; Calero, Ruiz, & Piattini, 2005), according to which, software measurement integration could be achieved by adopting the MDA approach. To this end, an approach is described in Escalona and Koch (2004) for the management of measurement of software processes. As far as web metrics quality is concerned, in Ruiz and Piattini (2005) some important metrics proposed for web in-
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