Chapter VIII

A Quality Model for Requirements Management Tools

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Abstract

This chapter proposes the use of quality models to describe the quality of requirements management tools. We present the COSTUME (COmposite SofTware system qUality Model development) method aimed at building ISO/IEC 9126-1-compliant quality models, and then we apply it to the case of requirements management. We emphasize the need to use UML class diagrams to represent the knowledge about the domain prior to the quality model construction, and also use actor-based models to represent the dependencies of requirements management tools with their environment, and then comprehend better the implications of quality factors. We show the applicability of the quality model in a real experience of selection of a requirements management tool.
Introduction

The activities embraced by the requirements engineering discipline (Kotonya & Sommerville, 1998; Robertson & Robertson, 1999), such as the capture, analysis, validation, verification, and maintenance of software systems requirements, often turn out to be very complex to carry out, especially in the case of medium- and large-scale projects. Among other factors, their success depends on the following abilities:

1. The ability to deal with a large number of requirements that are related in many ways.
2. The ability to guarantee, to an acceptable extent, that the requirements are complete and consistent.
3. The ability to organize the requirements with respect to different criteria.
4. The ability to maintain and manage several versions of requirements during the process.

Requirements management tools (RMT) provide computer-based support to overcome the complexities that stem from those activities. RMTs provide functionalities to support the abilities mentioned above, such as requirements capture and classification, traceability, version management, and generation of a requirements document.

Many RMTs exist in the market nowadays (for example, Rational RequisitePro, Telelogic DOORS, Compuware Reconcile and IrQA from TCP Sistemas e Ingeniería, and so forth), usually available in the form of COTS (Commercial Off-The-Shelf) components. They differ among others in the requirements capture strategies that they offer, in the way in which they structure and relate requirements, and in the additional components and resources that they require to operate. As it is true in other COTS domains, selecting the most appropriate RMT for an organization or even for a particular project can be difficult. For this reason an organization selecting a RMT should be aiming at defining or using a framework in which RMTs could be evaluated with respect to its specific needs. This framework should embrace different kind of features that affect software evaluation, such as managerial, political, and quality factors, which are the focus of our work.

In this chapter we present a framework based on the use of quality models for describing the quality aspects of RMTs that will act as software evaluation criteria. In the ISO standard 14598-1, a quality model is defined as “the set of characteristics and related relationships that provides the base for specifying quality requirements and evaluating quality” (ISO, 1999). A widespread standard on quality models is the ISO/IEC 9126-1 (ISO, 2001). Quality models compliant with this standard present three different kinds of quality factors, namely characteristics, subcharacteristics, and attributes, organized as a hierarchy. The standard itself fixes a set of six characteristics (functionality, reliability, usability, efficiency, maintainability, and portability), decomposed into a first level of subcharacteristics (such as security, interoperability, maturity, and so forth). To complete a quality model applicable in a given COTS domain, it becomes necessary to further
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