Chapter 2
Software Quality Engineering: The Leverage for Gaining Maturity

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Abstract For users, a software product frequently corresponds to a black box that must effectively support their business processes. Consequently, what a stakeholder seeks is a software product that possesses both required functionality and required quality. Young, immature companies usually can only afford developing functionalities, while mature organizations can develop quality, as well. In this sense, the level of quality observed in a software product is an indicator of the level of maturity of its developer. One may even say that because functionalities are always in a product and quality only sometimes, quality is a more restrictive indicator. Having this in mind, in this chapter we present software quality engineering from both implementation and managerial perspectives, discuss aspects of functionality-quality conflict in the economic and business dimensions, and finally give a few practical observations and recommendations that might find merit in the real, software development lifecycle.

2.1 Quality of a Software Product as the Indicator of Maturity

For users, a software product frequently corresponds to a black box that must effectively support their business processes. In consequence, what a stakeholder seeks is a software product that possesses both required functionality and required quality. Young, immature companies usually can only afford developing functionalities, while mature organizations can develop quality too. In this sense the level of quality observed in a software product is an indicator of the level of maturity of its developer. In the following chapter we will discuss software quality engineering methods, processes and models as the leverage for gaining such maturity.

2.1.1 Quality and a Customer

What exactly constitutes the quality of a product is often the subject of a hot debate. For some it is “[the] degree to which a set of inherent characteristics fulfills requirements” (ISO/IEC 2000), while for others it can be synonymous with customer value, or even defect levels (Highsmith 2002). One of the most renowned
classifications of quality is a multi-perspective view proposed by Kitchenham and Pfleeger (Kitchenham, 1996):

- The transcendental perspective deals with the metaphysical aspect of quality
- The user perspective is concerned with the appropriateness of the product for a given context of use
- The manufacturing perspective represents quality as conformance to requirements
- The product perspective implies that quality can be appreciated by measuring the inherent characteristics of the product
- The value-based perspective recognizes different importance (or value) of quality to various stakeholders

A quite natural trend that is observed nowadays among IT customers is the desire to be properly served without the need to become proficient in information technology. A customer just wants to buy, learn how to use, and then simply use a software product to his satisfaction, just like with a car or a TV. This boils down to an extended responsibility on the part of a software supplier, who now has to be mature enough to know what the customer is able to express, as well as what the customer does not know that he knows. And then, when all questions are asked and answered, the supplier must continue on his way until the quality product is built and delivered to the satisfaction of the customer.

2.1.2 Quality and CMM/CMMI

The Capability Maturity Model (CMM) emerged in 1990 as a result of the research effort conducted by specialists from Software Engineering Institute (SEI) of Carnegie Mellon University (CMMI, 2002). Its next version, Capability Maturity Model Integration (CMMI®), known in the industry as a best practices model, is mostly used to “provide guidance for an organization to improve its processes and ability to manage development, acquisition, and maintenance of products and services.”

What, then, is the link between the maturity of an organization’s processes and quality of its products? First and foremost, it is non-automatic. The organization may have all best processes in place and be continuously certified ISO 9000 and still manufacture products that will not survive a day. If the level of maturity could be compared to the knowledge of a battlefield–the deeper that knowledge is, the higher the chances of victory are. But they are still only chances, not certainties.

2.1.3 Quality and SPICE

Software Process Improvement and Capability dEtermination (SPICE) is an international initiative to support the development of an International Standard for Software