ISO/IEC 9126 Standard

Rohit Dhiman, Christian Sigel, Jörg Dörr
Dept. of Computer Science, Requirements Engineering

Introduction:

ISO/IEC 9126 is an international standard proposed to make sure the 'quality of all software-intensive products' including safety-critical systems where lives will be at jeopardy if software components fail to succeed. International Standard Organization (ISO) and the International Electrical Technical Commission (IEC) have developed the ISO/IEC 9126 Standards for Software Engineering – Product Quality to provide an all-inclusive specification and evaluation model for the quality of software products.

ISO/IEC 9126:

The ISO/IEC 9126 standard is divided into four main parts:

• **Part I. Software Engineering–Product quality "Quality model":** describes the quality model framework explaining the relationships between the different approaches to quality as well as identifying the quality characteristics and sub-characteristics of software products.

• **Part II. Software Engineering–Product quality–"External metrics":** describes the external metrics used to measure the characteristics and sub-characteristics identified in part 1.

• **Part III. Software Engineering–Product quality–"Internal metrics":** describe the internal metrics used to measure the characteristics and sub-characteristics identified in part 1.

• **Part IV. Software Engineering–Product quality– "Quality in use metrics":** identifies the metrics used to measure the effects of the combined quality characteristics for the user.

The first three parts above are concerned with describing and measuring the quality of the software product, while the fourth part evaluates the product from the user point of view. Furthermore, the **"Quality Model"** proposed in ISO/IEC 9126(Part-I) consists of two major parts: 1) Internal and External Quality Model and 2) Quality in-Use Model.

The first part 'internal and external quality model' determines the quality of a software product through six characteristics, which are namely: Functionality, Reliability, Usability, Efficiency, Maintainability and Portability. Each characteristic is subdivided into related sub-characteristics. Each subcharacteristic is further described by appropriate external and internal quality attributes that can be measured by specified metrics.

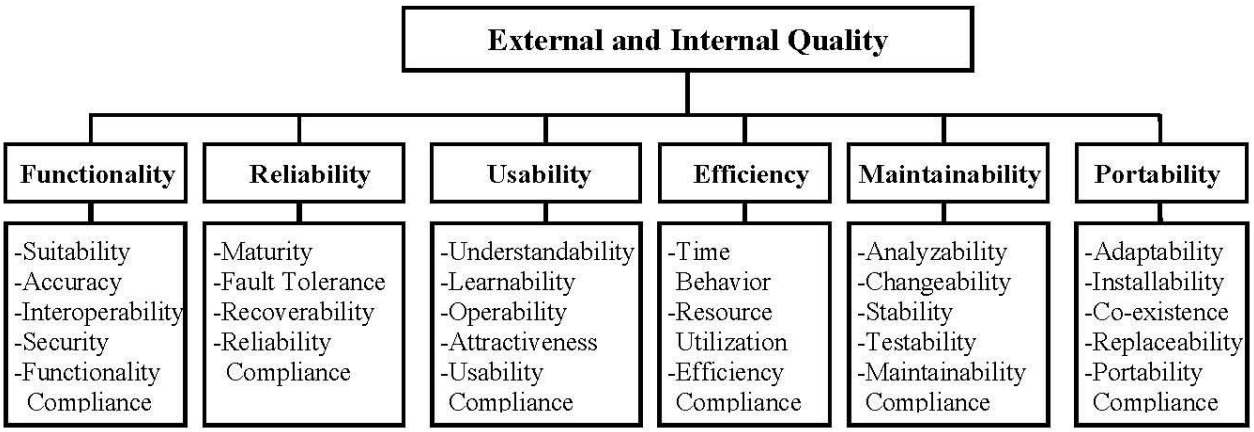

Fig. 1. ISO 9126 quality model for external and internal quality (characteristics and sub-characteristics).

The second part, 'quality in use' identifies four quality characteristics which are namely, Effectiveness, Productivity, Safety and Satisfaction, which ISO/IEC 9126 suggests are indicative of the user's view of quality based on the combined effect of the attributes specified in Part 1 of the standard. This necessitates identification of the users' quality requirements to specify the external and internal quality attributes of the product, and hence, the quality characteristics, sub-characteristics and related metrics.

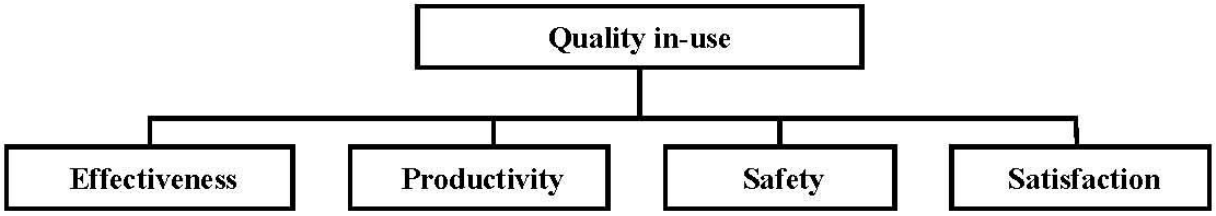

Fig. 2. ISO 9126 quality model for quality in-use (characteristics).

The ISO/IEC 9126 (Part 2) defines the external metrics used to measure the external characteristics of the quality model (Fig.1). The ISO/IEC 9126 (Part 3) deals with the internal metrics, which are used to measure the internal characteristics of the quality model (Fig.1). It measures the software itself, whereas the ISO/IEC 9126 (Part 2) provides external metrics to measure the behavior of a system, which runs the software. The ISO/IEC 9126 (Part 4) defines quality in use metrics used to measure the characteristics of the quality model (Fig.2).

Ideally the internal metrics are applied first, as they use static measures and don't need running software. In case of runnable software external metrics can be used. If software has evolved to a final product and is used in real conditions, quality in use metrics can be applied. The standards provide a set of metrics for several types of users (e.g.: developers, quality managers and maintainers) and supports them to specify requirements, measure software and review products. However the ISO/IEC 9126 (Part 2-4) are not meant to cover all internal metrics. It allows the user to change and discard metrics. It is also possible to define application-specific metrics. As the quality requirements of software depend on the category of the software and the needs of the customer, the ISO/IEC 9126 (Part 2-4) leave out concrete values for rated levels. In addition the standards provide several examples and formats.

References:

International Organization for Standardization:
http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_tc_browse.htm?commid=45086, 01-26-2011
Journal Paper: An Investigation of the Weaknesses of the ISO 9126 International Standard Volume: 1, Al-Qutaish
Journal Paper: The use and usefulness of the ISO/IEC 9126 quality standard , Al-Kilidar, H.; Cox, K.; Kitchenham, B.