

Software Quality in Use

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Abstract

The quality of systems and software is roughly classified into the “product quality model” and the “quality in use model”. “Product quality model” provides the quality of a product such as its functions and performance characteristics. Usability and satisfaction felt when a product or a system is utilized is called the “quality in use”. These terms are stipulated by the international standard, ISO/IEC 25000 SQuaRE Series.

If no consideration is taken for the user despite that product functions and performance are wonderful, such functions and performance characteristics cannot be demonstrated, and as such the product would not be submitted as one with a fine quality.

In order to improve this “quality in use”, it is necessary to understand the usage of the product or system and develop it with an emphasis on the user experience. It is important to start by getting to know the user well, then design it to solve their problems, evaluate it, and then make further improvements, and then repeat this cycle as needed.

1 Preface

In the field of Digital transformation (DX), systems and software play a core role. Consequently, the importance of their quality is constantly increasing. A system or software with high quality is provided with factors to increase User experience (UX) such as usability, responsiveness, and performance. The business quality can be improved by rapidly gaining access to the required information and services so that the user can accomplish efficient operation. This paper introduces our efforts to improve the quality in use, which determines the ease of use of systems and software.

2 Software Quality

The software quality is related to the “product quality model” and the “quality in use model”. These models cover the mutually different sides of quality evaluation and management. These factors are defined in the International Standard, “ISO/IEC 25000 SQuaRE Series”. The “product quality model” is classified into eight sectors of the functional suitability, performance efficiency, compati-

bility, usability, reliability, security, maintainability, and the portability. These sectors are used as the criteria to identify whether the software is meeting the target design and performance requirements. On the other hand, the “quality in use model” is a model to evaluate the product quality under the practical utilizing conditions. This model is composed of five quality-based characteristics, i.e. effectiveness, efficiency, satisfaction, freedom from risk, and context coverage. This model is intended to evaluate the quality of a system or software such as its usability when the user utilizes the software. **Fig. 1** shows the evaluation of software product quality in the ISO/IEC 25000 SQuaRE Series.

We intend to actualize the practical effectiveness of value improvements for the developed products by applying the aforementioned quality-based characteristics to the check and evaluation items for in-house regulations. In particular, we consider that our activities for the improvement of quality in use must be focused on the enhancement of our concern from “things” to “matters” by taking user’s experience seriously from the starting phase of functionality-focused development.

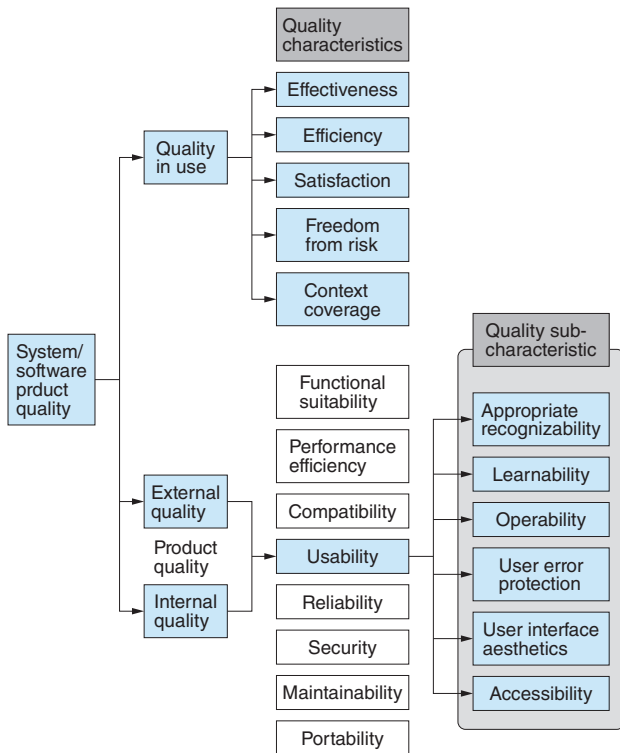


Fig. 1 Evaluation of Software Product Quality in ISO/IEC 25000 SQuaRE Series

Evaluation and relationship of quality characteristics are shown in terms of “product quality model” and “quality in use model”.

Regarding the “usability” out of the “product quality model”, there are six quality sub-characteristics of the appropriateness recognizability, learnability, operability, user error protection, user interface aesthetics, and accessibility. Since these factors are greatly relating to the “quality in use model”, it is necessary to take this relationship into consideration.

3 Quality in Use and Usability

The quality in use directly makes an impact on user’s satisfaction and productivity. To enhance the quality in use, it is indispensable to improve the usability. The usability is regarded as a scale to measure the usability of products and services. The usability level is evaluated by the grade of effectiveness, efficiency, and satisfaction for the user’s intention to attain the standing target under the specific conditions of use.

As a method to enhance the usability, the most effective approach is the “Human Centered Design (HCD)”. The HCD is a means to produce a new value for the things and matters by means of “user’s perspective” and “creation sharing”. Starting with

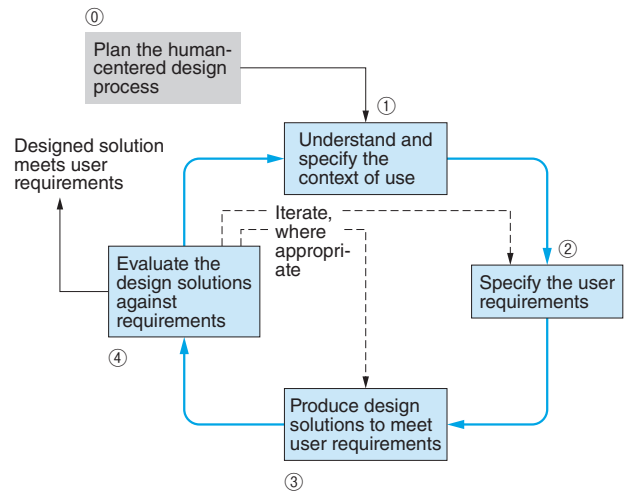


Fig. 2 HCD Cycle of ISO 9241-210 (JIS Z 8530)

Four basic processes of the HCD are shown. By repeating these four cycles, the quality in use can be enhanced.

exactly knowing the users who utilize the systems and software, their context of use is properly grasped and appropriate solutions are designed, evaluated, and improved. The target method is the repetition of these processes. Fig. 2 shows the HCD Cycle of the International Standard, ISO 9241-210 (JIS Z 8530).

The HCD has been developed through sufficient understanding of user’s requirements. Any useful feedback data are promptly adopted. Since affinities with agile software development are high when coping with variations flexibly, we are aggressively trying to adopt the HCD processes for the development of user-based systems in our product development fields.

4 Quality in Use Metrics

When adopting the characteristics of quality in use for in-house regulations, it is preferable to employ numerical data as much as possible for the standard evaluation items of the respective processes for development. From a viewpoint of users, the quality in use metrics is used for the quantitative evaluation of quality in use for systems and software. It can be used to set goals for improvement, identify problems, and make decisions to optimize performance. It is also important to continuously measure and monitor in order to increase customer satisfaction.

As a result of quality in use metrics setup, it can provide the following benefits.

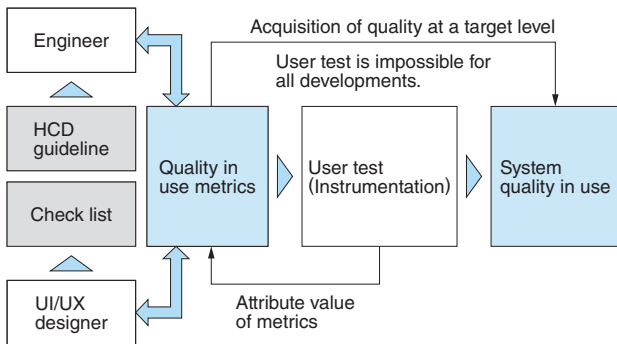


Fig. 3 Advantages of Quality in Use Metrics

Advantages are shown achieved by digitization of quality in use.

- (1) It is possible to encourage developers to design with specific goals in mind.
- (2) It is possible to grasp the progress of achievement in numerical terms.
- (3) It is possible to omit similar user tests.

Fig. 3 shows advantages of the quality in use metrics.

5 Postscript

In order to always maintain the quality in use of our products at a certain level or higher, it is necessary to reflect specific and effective HCD methods and requirements definition methods in the in-house regulations, such as clarifying the definition of quality goals, quality requirements, and formulating guidelines for the development team and related parties as a standard for quantitative quality evaluation.

Going forward, we will work on development from the user's perspective in order to contribute to improving the quality in use of the systems and software we develop.

- All product and company names mentioned in this paper are the trademarks and/or service marks of their respective owners.