

Clarification of Customers' "Demand" in Development Process

Shin'ichi Fukuzumi^(✉) and Yukiko Tanikawa

Knowledge Discovery Research Laboratories, NEC Corporation,
Kawasaki, Japan
s-fukuzumi@aj.jp.nec.com

Abstract. HCD is a method to give better UX to stakeholders and to provide system and product with high usability for users and stakeholders. When system and product with high usability could be developed, it is easy to verify their usability by usability test. However, it is difficult to check whether these products or system achieve that a user wants to really do it which required in UX white paper. To verify what is thing that users want to do, we discuss what is necessary for development process by analyzing how to take in customer needs to specification from the view point of software engineering and HCD. We propose a phase "acquisition of user demand" before "clarification of user needs" and "specification of user requirements" which are activities of HCD process.

It is important to clarify "demand" and to separate solving by requirements to system and besides that, and both customers' and developers' shall be recognize that to satisfy the customer' needs to the system is not same as to realize customers' "demand".

Keywords: HCD · SWE · Quality · Requirements · Development process

1 Introduction

In 2010, ISO9241-210 "Human-centred design for interactive system" which is an ergonomic related standard about human centered design was published [1], discussion related human centered design (HCD) and user experience (UX) which is newly defined in this standard becomes active in IT business field. This standard is put to practical use as an example which shape HCD concept. Figure 1 shows the relationship among each HCD activity. As shown in this figure, HCD has four activities. These are applied to each development process shown in Fig. 2. HCD is a method to give better UX to stakeholders and to provide system and product with high usability for users and stakeholders [2]. When system and product with high usability could be developed, it is easy to verify their usability by usability test [3]. However, it is difficult to check whether these products or system achieve that a user wants to really do it which required in UX white paper [4].

To verify what is thing that users want to do, we discuss what is necessary for development process by analyzing how to take in customer needs to specification from the view point of software engineering and HCD.

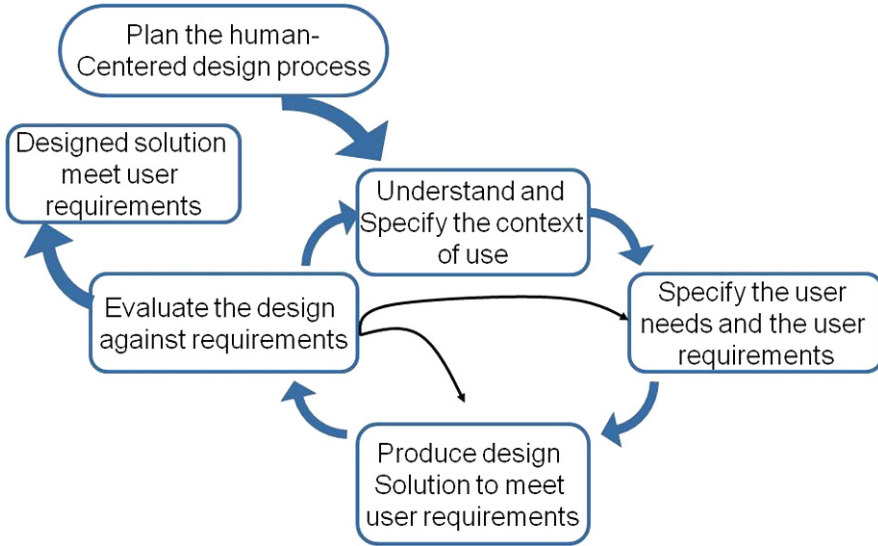


Fig. 1. The relationship among each HCD activity

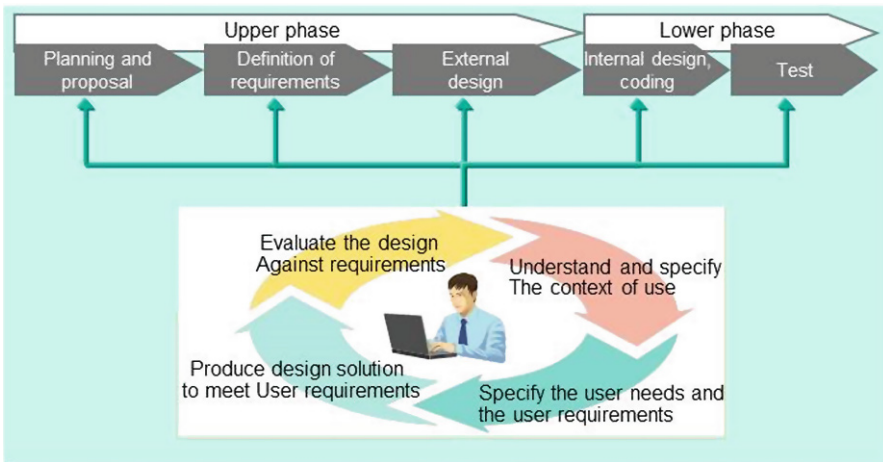


Fig. 2. The relationship among HCD activities and development process

2 Functional Requirements and Non-functional Requirements

Important factors for developing software are to consider what kinds of peculiar features of software for fulfill both explicit and implicit customer needs [5]. The peculiar features of software can be separate feature of functions and feature of quality (Fig. 3). The former is that software operation which transforms input to output, the latter is that

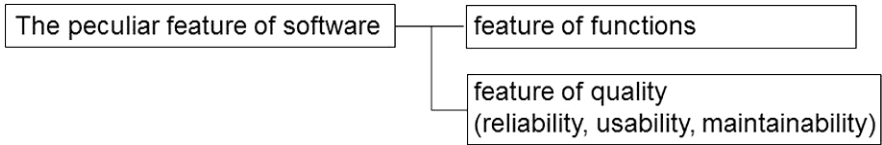


Fig. 3. The peculiar feature of software

extent which provides feature of functions to users suitably. The latter examples are reliability, usability, maintainability, and so on. In ISO/IEC25030, requirements of software products define functional requirements and non-functional requirements (quality requirements, administration requirements (e.g. price, delivery date)) [6]. The feature of quality in the peculiar feature of software describes above includes non-functional requirements. This means not only software development but also system development.

2.1 Requirements Items in Software Engineering

Generally, software, system and service are mainly development based on software engineering. After definition of requirements specification phase were prescribed as development process. It is easy to evaluate whether developed system satisfy their requirements or not because the relationship between development phase includes requirements specification, external design, internal design and function development and each test phases is clear shown in Fig. 4 [8].

Requirement definition in this defines needs related to function development as requirements describes below. Function requirements are that software operation which

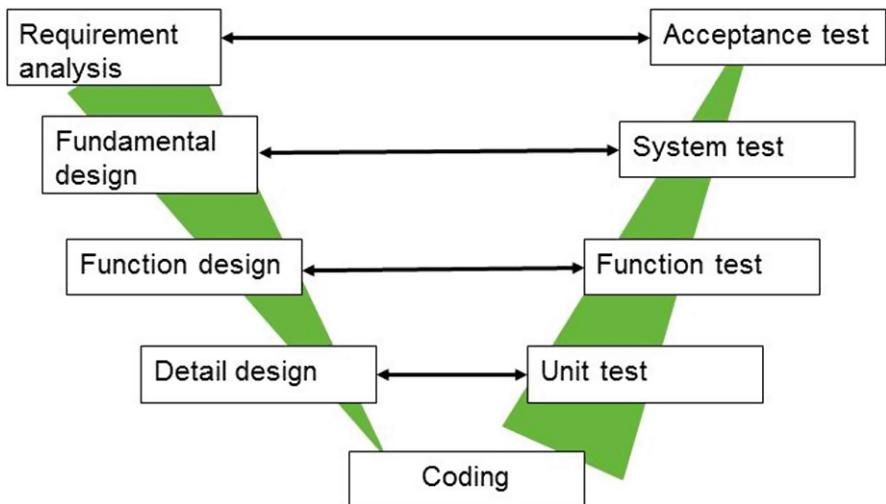


Fig. 4. V-model for development

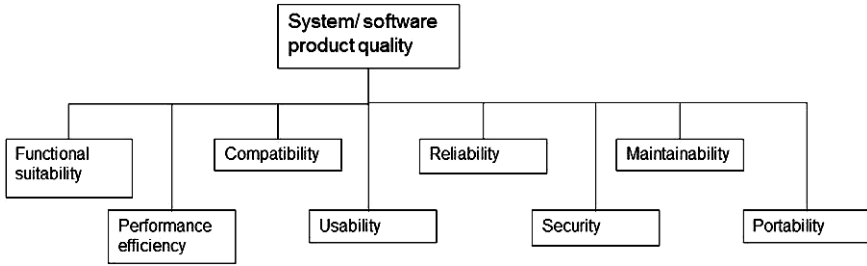


Fig. 5. Product quality model [9]

transforms input to output, it is easy to evaluate or judge whether functions can be realized or not. However, it is difficult to define non-functional requirements and quality requirements and determine requirement level. So, it is also difficult to evaluate or judge whether these requirements can be realized or not.

In software engineering, there is no process to define non-functional requirements which is “extent which provides feature of functions to users suitably” because development process defines after requirement definition phase.

For this issue, ISO/IECJTC1SC7 standardized schematization of quality. About products, quality divides into eight quality properties as shown in Fig. 5 (product quality), it is easy to take quality into requirements [9].

2.2 Requirements Items in HCD

However, development process in software engineering does not prescribe the way to build in policy or use of user and stakeholders as requirements. Currently, user needs analysis include quality is carried out in requirements specification phase, and product quality and quality in use are dealt with in this phase. To realize this analysis in upper phase, concept of HCD (human centered design) is applied. The concept of HCD prescribes to get context of use of system (if the system exists, the use of this system and if system is newly developed, imaginable usage) and to clarify users and stakeholders’ needs in more upper phase of development process. By these, it is easy for developers to define requirements specification in development process [1]. HCD defines activities from plan and proposal phase to evaluation phase in development process. In plan and proposal phase, a method how to clarify customer needs is studied [10].

In this, “Needs” is aims of system. This includes not only functional needs but also non-functional needs (e.g. how to use). Of course, it is necessary to develop system (software/service). However, especially the latter, it is difficult to define above needs as requirements and to evaluate and judge whether these requirements can be realized or not.

Recently, ISO/IEC 25010 in SQuaRE (System and software quality requirements and evaluation) defines quality model shown in Fig. 6 (Quality in use) and try to take quality into requirements. Moreover, ISO/IECJTCSC7 try to be able to measure these quality [11].

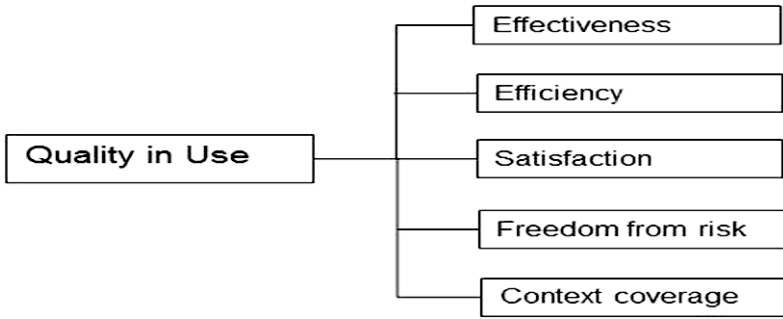


Fig. 6. Quality in use model [9]

3 International Standards Related Functional/Non-functional Requirements

There are some international standards about requirement definition, functional/non-functional requirement clarification, development process and quality property described in Sects. 1 and 2. Figure 7 shows the relationship among these standards (SQuaRE and HCD).

This figure shows that SWE quality standards are closely related to ergonomic related HCD standards. Especially, to standardize HCD four activities format in quality standard means that constitution of SQuaRE is conscious of not only development process but also lifecycle of product and system. ISO/IEC25063 “context of use description” in SQuaRE series [12] targets to be able to describe users’ usage of product and system, not mention “users want to do”. This describes in the next section.

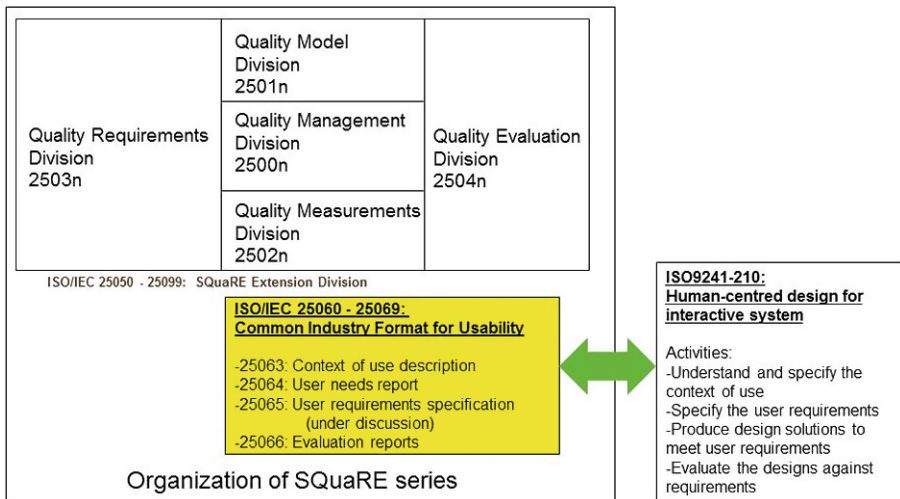


Fig. 7. Relationship among functional/non-functional requirements and HCD

4 “Demand”

For users and stakeholders, is the aim to use the system? In fact, it is important for them to realize what they want to do (“demand”). It is different whether system is necessary.

As described in Sect. 1, HCD is a method to provide better UX. UX white paper [4] shows that experience includes “before use”, “during use”, “after use” and “through total usage”. “Users want to do” can be verify through experience in each step (Fig. 8).

However, currently, to get what they want to do (“demand”) is not defined in not only development process but also HCD. Due to this, objectives (value) which users and stakeholders would like to realize cannot be understand by development fields though developers can get the view point of “use system”.

We propose a phase “acquisition of user demand” before “clarification of user needs” and “specification of user requirements” which are activities of HCD process.

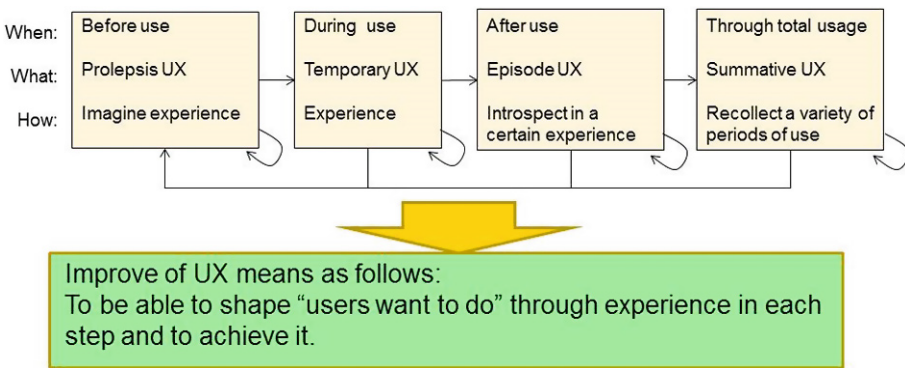


Fig. 8. UX step [4]

4.1 Example

For example, we consider problems and solutions of immigration in international airport. Main problems are considered to be “congestion reducing” and “judgment of safety, reassurance and accuracy”. In case of transforming these problems to items which would like to realize in system, target is “efficiency”, or “automation” about recognition function. Of course, if these functions are installed in the system, the time for recognition will be shortened. However, it is difficult for users themselves smoothly who do not use the immigration system daily to carry out a flow of a series of authentication a management government service was doing personally. Because of this, congestion is not reduced. Safe and accurate review and judgement will be carried out by automation, but it is difficult for users to feel “reassurance”. From this, to solve main problems shown firstly, it is necessary to realize not only efficiency and automation as functions of system but also items except system requirements, e.g. instruction of users to system terminals, navigation of operation, fundamental UI design, sense of security a staff can be called anytime.

4.2 Proposal

Thus, it is important to clarify "demand" and to separate solving by requirements to system and besides that, and both customers' and developers' shall be recognize that to satisfy the customer' needs to the system is not same as to realize customers' "demand" (Fig. 9).

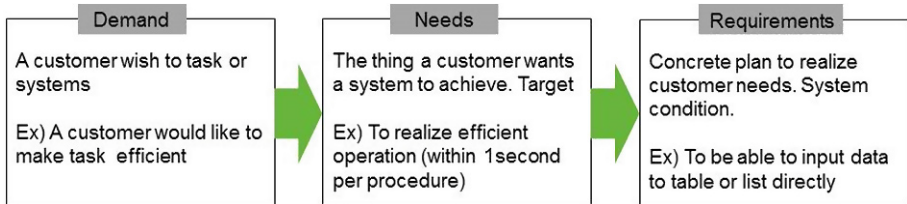


Fig. 9. Relationship among "demand", "needs" and "requirements"

5 Conclusion and Current Situation

This paper points out an important issue about getting users' demand in development process. Though SWE and HCD define the process about clarification of customer needs and user requirements definition, the process about users' demand does not define in development process. This paper proposes that this task shall be included in the process.

Currently, ISOTC159SC4WG28 jointly with ISO/IECJTC1SC7 discuss a HCD and quality related standard focused to user requirements (ISO CD25065). In this standard, "demand" is clearly positioned in development process.

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