User Experience Specification through Quality Attributes

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HAL Id: hal-01597037

https://hal.inria.fr/hal-01597037

Submitted on 28 Sep 2017

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Abstract. The concept of user experience includes different facets which have still not reached a consensus. On the other hand, the ISO/IEC 25010:2011 standard shows a structured quality model which permits us to obtain quality systems and software. The main aim is the specification of user experience based on the facets which are implicitly considered in the standard.

1 Introduction

Recently, the User eXperience concept (UX) has become more used than usability in the Human Computer Interaction (HCI) discipline and SQUARE (Systems and Software Quality Requirements and Evaluation) [1] is the standard that defines the system quality or the software quality. Nevertheless, HCI practitioners still have not come to an agreement about defining UX. Also, the standard attributes which researchers use for analyzing the UX in a specific interactive system do not exist.

For these reasons, the main aim of this research is the specification of UX based on the facets that the ISO/IEC 2010:2011 considers according to its attributes.

2 User experience

The ISO DIS 9241-210:2008 [2] standard provides one of the most distinguished definitions for UX. But the following five definitions are also used considerably [3] [4] [5] [6] y [7], which were collected by E. L Law et al. in [8].

Despite the fact that the definitions presented are valid in specific contexts, they do not include aspects which should be considered when evaluating UX. In some definitions such as in [8] and [7], the interaction context is not so clear. In [3], the main topic is concerned in company aspects. Other definitions do not refer to facets such as accessibility [4], cross-cultural [5] or adaptability [6]. So, we propose the next definition of UX which covers these aspects: *"User experience deals with all facts, internal as well as external facts of the user and interactive systems, which causes any feeling in the user who uses the interactive system in a specific context of use."*

2.1 Facets and concepts involved in the user experience definition

The facets considered in UX are still not agreed on in the scientific community or in any type of organization for standardization. Related works in this area are [9] [4]. In addition, there is other concepts which can form the UX: accessibility [10], emotional [11], communicability [12], cross-cultural [13], plasticity [14], playability [15] and dependability [16], among others. Thus, one or another facet is used according to the author and their needs in the design or evaluation process.

Our goal is not choosing the specific facets, but it is preparing the most complete set of UX facets which allows us to carry out this project.

The other goal is to determine the meaning of the most used words in the UX area. According to Oxford's dictionary (http://oxforddictionaries.com/): **Property**: an attribute, quality, or characteristic of something. **Facet**: a particular aspect or feature of something. **Dimension**: a measurable extent of a particular kind, such as length, breadth, depth, or height. **Feature**: a distinctive attribute or aspect of something. **Category**: a class or division of people or things regarded as having particular shared characteristics. **Attribute**: a quality or feature regarded as a characteristic or inherent part of someone or something.

We are going to use these terms: *Facet* for determining all UX components; *attributes* for all features, subfeatures and attributes in the standard, and, finally, we will use *dimension* for measurable quality attributes considered in ISO 2502n.

3 User experience and ISO standard

The facets which are implicitly considered in the standard are specified in Table 1.

Table 1. UX facets considered in every ISO attribute.

		ISO/IEC 25010 : 2011	UX facets
4.1 Quality in use		**4.1.1 Effectiveness**	Usability, Playability, Useful
		4.1.2 Efficiency	Usability, Playability
	4.1.3 Satisfaction	4.1.3.1 Usefulness	Useful
		4.1.3.2 Trust	Emotional, Playability, Desirable
		4.1.3.3 Pleasure	Emotional, Playability, Desirable
		4.1.3.4 Comfort	Emotional, Playability, Desirable
	4.1.4 Freedom for risk	4.1.4.1 Economic risk mitigation	Dependability
		4.1.4.2 Health and safety risk mitigation	Dependability
		4.1.4.3 Environmental risk mitigation	Dependability
	4.1.5 Context coverage	4.1.5.1 Context completeness	Usability
		4.1.5.2 Flexibility	Usability and Accessibility

4.2 Product quality	ISO/IEC 25010 : 2011		UX facets
	4.2.1 Functional suitability	4.2.1.1 Functional completeness	Useful
		4.2.1.2 Functional correctness	Accessibility, Playability
		4.2.1.3 Functional appropriateness	Accessibility, Playability
	4.2.2 Performance efficiency	4.2.2.1 Time behavior	Usability
		4.2.2.2 Resource utilization	Dependability, Accessibility
		4.2.2.3 Capacity	Dependability
	4.2.3 Compatibility	4.2.3.1 Co-existence	Plasticity
		4.2.3.1 Interoperability	Accessibility, Plasticity
	4.2.4 Usability	4.2.4.1 Appropriateness recognizability	Usability, Findable
		4.2.4.2 Learnability	Usability, Playability
		4.2.4.3 Operability	Usability
		4.2.4.4 User error protection	Usability, Playability
		4.2.4.5 User interface aesthetics	Usability, Playability
		4.2.4.6 Accessibility	Accessibility
	4.2.5 Reliability	4.2.5.1 Maturity	Dependability
		4.2.5.2 Availability	Dependability, Accessibility
		4.2.5.3 Fault tolerance	Dependability
		4.2.5.4 Recoverability	Dependability
	4.2.6 Security	4.2.6.1 Confidentiality	Dependability
		4.2.6.2 Integrity	Dependability
		4.2.6.3 Non-repudiation	Dependability
		4.2.6.4 Accountability	Dependability
		4.2.6.5 Authenticity	Dependability
	4.2.7 Maintainability	4.2.7.1 Modularity	Dependability
		4.2.7.2 Reusability	Dependability
		4.2.7.3 Analyzability	Dependability
		4.2.7.4 Modifiability	Dependability, Accessibility
		4.2.7.5 Testability	Dependability
	4.2.8 Portability	4.2.8.1 Adaptability	Accessibility, Plasticity
		4.2.8.2 Installability	Plasticity
		4.2.8.3 Replaceability	Plasticity

4 Conclusions

The first topic that we want to highlight is that there are attributes which are considered in more than one UX facet. So, the non-isolation of UX facets is validated.

In addition, all standard attributes are considered by some UX facets; in fact it causes a direct relation between both facets and standard attributes.

In Table 2 we can see the amount of attributes which we detected in each facet.

Table 2. Amount of considered attributes in each UX facet.

UX facets	Amount of attributes	UX facets	Amount of attributes
Dependability	19	Emotional	3
Usability	10	Desirable	3
Playability	10	Useful	3
Accessibility	9	Findable	1
Plasticity	5		

Despite the results of this research and as UX experts, we believe that two more facets are needed in the design or evaluation process and when other facets are applied. Both these facets could be worked in a transverse and they are called communicability [12] and cross-cultural [13]. So, we can differentiate two types of facets. The parallel facets (dependability, usability, playability, plasticity, accessibility, emotional, desirable, findable and useful) are those which can be applied in an interactive system in an individual way. And transverse facets are those which could be applied at the same time as when another facet is applied.

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