International Journal of Advanced Smart Convergence Vol.9 No.3 227-231 (2020)
http://dx.doi.org/10.7236/IJASC.2020.9.3.227

IJASC 20-3-29

User Experience Validation Using the Honeycomb Model in the Requirements Development Stage

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Abstract

Recently, the importance of user experience (UX) has been rapidly increasing. Its utilization is emphasized for development of systems, products, and services. User experience is widely used across industries including services, products, processes, society, and culture. Therefore, if it is unsatisfactory, it is likely to have a direct negative impact on the corresponding system, product, or service. The failure to analyze user experience causes significant damage to the project, which may lead to its failure or redevelopment; it is hence necessary to prioritize the verification of UX in the earliest stages of development. The requirements development stage, which is a preceding stage, is an appropriate stage for the verification of user experience because the identification of user needs is completed and prototypes can be implemented. In this paper, we proposed a systematic requirements development stage; it adds user experience verification activities to the requirements development stage, using the Honeycomb model, which is a widely used tool for verifying the overall UX. User experience verification was added to the existing requirements development activities, which consisted of three steps: model definition and requirements placement, discussions between external and internal stakeholders, and review by internal stakeholders. By easily validating the user experience through this systematic requirements development stage, we expect to minimize the damage to the project due to the failure of the user experience analysis and increase the possibility of success.

Keywords: *User Experience (UX), User Experience Evaluation, Honeycomb Model, Software Requirements Development*

1. Introduction

Over the past decade, the importance of user experience (UX) has increased rapidly, and it is specified in recent product or service developments [1]. Donald Norman mentioned the value of experience as a key factor in achieving a person's satisfaction and driving the success of a product or service [2]. UX refers to the overall experience, such as perception, reaction, and behavior, that users feel and think while using a system, product, or service directly or indirectly. This began with human–computer interaction (HCI) research in computer science, and is now widely used not only in computer products but also in services, products, and

Manuscript Received: August. 12, 2020 / Revised: August. 18, 2020 / Accepted: August. 25, 2020
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processes throughout the industry as well as in society and culture [3, 4]. If users do not have a positive impression of the UX, they are likely to have a negative view of any system, product, or service [3, 5, 6].

If the UX is misjudged and proceeded with, it may eventually cause the system, product, or service to fail or require redevelopment; therefore, the process of verification of the UX should be prioritized at the earliest stage of development. Accordingly, verification of UX is most suitable in the requirements development stage, which precedes the software development stage [7, 8]. Once the requirements development stage is completed, user needs are identified through various methods, and requirements to be implemented in systems, products, and services are derived. It is also possible to create prototypes to verify the UX in detail based on these requirements. This can minimize the damage that may occur later and increase the project's chances of success.

In this study, a systematic requirements development stage is proposed in which UX verification activities are added to the existing requirements development activities by using the Honeycomb model, a tool that can verify the overall UX [9].

2. Proposed Method

Herein, we define the procedures and roles in the requirements development stage, in which UX verification activities are added to the existing requirements development activities. The proposed method consists of three steps: model definition and requirements placement, discussions between external and internal stakeholders, and review by internal stakeholders. Accordingly, their relationship with the existing requirements development activities in the requirements development stage is illustrated in Figure 1.

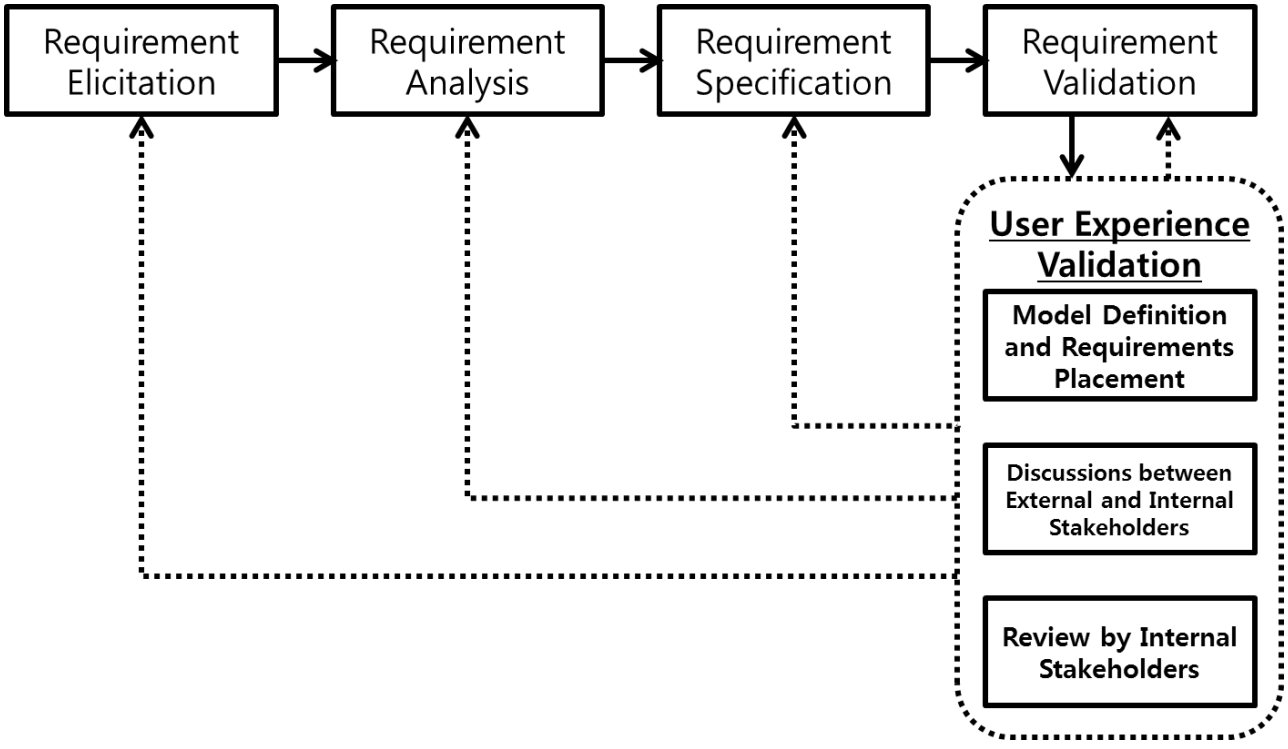

Figure 1. Overall process of the proposed method

UX verification activities complete and perform existing requirements development activities in the requirements development stage Moreover, the requirements that were determined as additional requirements development activities through UX verification activities move to the corresponding requirements elicitation, requirements analysis, requirements specification, requirements validation stages, and finally, through the requirements development stage. When these are completed, they proceed to the subsequent stages of software design and development.

2.1 Model Definition and Requirements Placement

The Honeycomb model comprises seven aspects of the UX: Useful, Usable, Desirable, Findable, Accessible, Credible, and Valuable. UX can be analyzed based on these seven attributes but it can also be analyzed by defining and adding the attributes of a new UX or by excluding some of these seven attributes. There are various reasons for redefining the Honeycomb model, such as business strategies, time and cost, and domain characteristics. Considering these reasons, it is possible to focus on and segment the attributes of a specific UX, or adjust the seven pre-defined attributes. The Honeycomb model is redefined and used by several existing studies for identification of UX. Figure 2 depicts an example of a redefined and used Honeycomb model [10]. Additionally, the Honeycomb model may also be redefined as required depending on the nature of the software project.

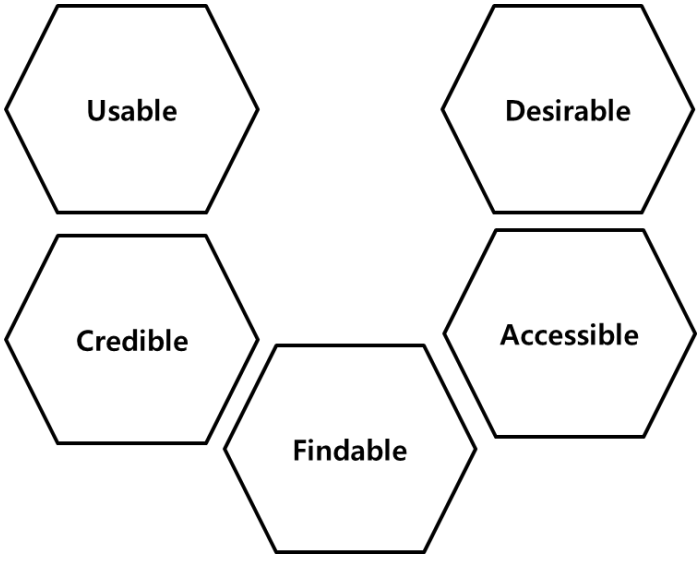

Figure 2. Example of a redefined and used honeycomb model

This places the final software requirements that have completed the requirements development stage either in the UX attributes of the general Honeycomb model or in its redefined version. The level of software requirements is determined and placed in consideration of the scale of the project. This places requirements that correspond to existing UX attributes and avoids those that do not correspond to existing UX attributes.

2.2 Discussions between External and Internal Stakeholders

The advantage of UX analysis based on the Honeycomb model is that anyone can visually verify the overall satisfaction level of the different parts of the UX. Further, external and internal stakeholders meet and carry out discussions based on the requirements placed in the UX attributes of the Honeycomb model. Even

if these stakeholders did not participate in the preceding requirements development stage and they do not have experience in UX analysis, it is possible to verify how current requirements affect the UX, and there can be sufficient discussion about the UX.

External and internal stakeholders analyze the UX based on the requirements placed in the UX attributes. If there are insufficient requirements in the UX attributes, more are added as deemed necessary in the software project. Moreover, external and internal stakeholders derive relevant requirements through discussion. On the other hand, if there are sufficient requirements in the UX attributes, external and internal stakeholders review whether there are unnecessary requirements. Furthermore, additional requirements are included as required if they are absent in those that are currently deployed.

2.3 Review by Internal Stakeholders

In the preceding stage, the UX required for the software project was determined through discussions between external and internal stakeholders. However because external and internal stakeholders have conducted this discussion with the aim of meeting the UX requirements, there may exist some requirements for which development is practically difficult. Therefore, these may need to be examined taking into account the nature of the UX owing to the limitations of time and cost. By examining and considering various conditions, the internal stakeholders finally derive those requirements that meet the UX attributes required in this software project. If the additional requirements derived in the preceding stage are not required to undergo processes such as requirements elicitation, requirements analysis, requirements specification, and requirements validation, these are set as the final requirements of this software project and are moved to the next stage, which is software design and development. Depending on the decision of internal stakeholders, this may be sent to one of the requirements development activities to be carried out for each requirement, and only after they complete the requirements development stage, they are set as the final requirements, after which they are moved to the next stage.

3. Conclusions

This study discussed the UX, which is rapidly gaining importance in the development of systems, products, and services. If the UX is verified in the earlier stages of development, the possible damage can be minimized. The systematic procedures and roles including UX verification activities have been defined in the requirements development stage where user needs can be identified and prototypes can be implemented. The Honeycomb model, which is the UX validation model, is organized in three stages: model definition and requirements placement, discussions between external and internal stakeholders, and review by internal stakeholders. It is expected that damage caused by the failure of UX analysis will be minimized and the possibility of success of the project will be increased through UX verification using this procedure.

As UX analysis must be used in complex methods rather than a single method to increase its accuracy, the future research plan is to study other UX analysis methods and find ways to combine them with this study.

Acknowledgements

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2020R1C1C1014611).

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