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Current Trends and Challenges in User Experience Evaluation and System Development

Kalpna Sagar
University School of Information and Communication Technology
GGSIPU Sector-16
Delhi, India

Deepak Gupta
Maharaja Agrasen Institute of Technology
Delhi, India

***Abstract*— User experience is an evolving research area that belongs to conventional usability. Problems in the domain of usability can be supplemented in user experience because of its wider scope. Some related problems are definition, appropriate methods' selection, framework, modeling and reciprocity between system development and user experience evaluation. Supporting the legacy of a sequence of equivalent research studies, this special issue focuses on the creation of a platform for better understanding of contribution of evaluation feedback to the software development. Seven studies highlighting this special topic from various approaches and with different viewpoints are included in this special issue. Further, this special issue must be of concern to usability professionals, Human Computer Interaction's practitioners and researchers.**

***Index Terms*—usability; user experience; system development;**

I. INTRODUCTION

Supporting the legacy of a sequence of equivalent research activities [1-3] that bring closer the researchers from Human Computer Interaction (HCI) and Software Engineering backgrounds to explore the interplay between usability evaluation and software development, this special issue is inspired by few recent advancements to the issues related to well explored usability evaluation [4-5] as well as growing User Experience (UX) [6-8]. The shift of focus in the area of HCI from usability engineering to a much evolving scope of UX in which users' attitude, values, motivations, emotions, effective demographics, and interaction issues, attention over ease of use and learning are considered as much etc. [9]. Further, few challenges aroused by the recent emphasis of UX are specifically significant during software development (a) clarification of definition of UX; (b) choice of evaluation methods of UX (c) framework and modeling of UX (d) interplay between software development and UX evaluation response. The idea of UX is generally acknowledged as subjective, dynamic and context dependent [9]. But ISO 9241-210 has provided a formal definition of UX as "A person's perceptions and responses that result from the use and/or anticipated use of a product, system or service". This definition leads to ambiguity and must be improved. As opposed to usability, UX metrics need to be identified and defined. Both usability and UX measures must facilitate usability professionals and software developers to standardize highly competitive design affects and to choose most accurate design options. The interesting question is that whether these specific measures affect the designs and development. Framing users' experiences are remarkably significant for learning the processes of UX with results for not only design but also for complete software development. Moreover, a series of issues related to framework of UX must be resolved [10]. Researchers and practitioners have put their efforts to gather, integrate and classify UX evaluation methods [11]. It is imagined that classification of UX qualities that can assist for choosing UX methods and metrics, will move towards perfection from these continuous attempts and efforts of researchers. The Ist three challenges have remarkable impacts on the fourth challenge, that is very less explored.

II. GOAL OF THIS SPECIAL ISSUE

We comprehend the association between usability and UX as the former is engrossed by the latter. Actually, usability evaluation methods and measures are much more evolved [12]. But UX evaluation methods and metrics are still at growing phase [13]. It is feasible that reinforcing the consequences of UX evaluation back to software development to incorporate the required modifications may be more challenging than executing the same for usability evaluation. It can lead to various major challenges:

1. UX attributes are fuzzier in nature. From evaluation data, different kind of improvement suggestions can be inferred. For example, a child plays a game one day and finds it more exciting. But, on the other day, a child may get bored

of the same game. It entirely depends on child's mood. How will the evaluation response or feedback allow the developers to remove this usability problem?

2. Much of focus is given on conducting the usability evaluation during early phases of software development life cycle along with usage of prototypes, and enables feedback to be considered before it becomes very late [14]. Moreover, does this concept apply to UX evaluation too? Does it realizable to incorporate relevant responses with prototype? If answer is yes, then how can the developers draw any conclusions from these responses?

3. The impact of empirical feedback governs its worth. Existing literature and research [15] highlight a major fact that development team must be assured about importance of fixing and removing the usability problems. Does the UX evaluation feedback have less impact than usability feedback? If yes, does the impact of UX evaluation poorer than UE?

4. The importance of usability has been already acknowledged in software engineering community. Attempts and efforts have been made on describing the significance of usability for requirements elicitation, design and choosing the software components [16]. Does such significance applicable for UX, although UX evaluation metrics and methods are very different?

5. The transformation of observational data into ranking the usability problems is very poorly documented in existing literature. Very few analytical approaches are adopted by practitioners and researchers too [4]. Furthermore, adoption of these analytical approaches in UX research domain will be another major challenge.

A very narrow gap has been identified between HCI and SE [1] but this gap can be broadening again because of evolving concepts of UX.

The aim of this special issue is to bring closer the researchers and practitioners from HCI and SE backgrounds to recognize various challenges and feasible solutions to enhance the impact of UX evaluation during software development.

The significant contribution of this special issue to the domains of HCI and SE is to comprehend the state of the art regarding the interplay between UX evaluation and software development. Few studies are identified that explain how various UX evaluation responses or feedbacks e.g. visual and audio determine their impact and usefulness. Generally, visual data are employed in UX as compared to usability that is based upon the observations. But, contribution of this evaluation data in software redesign further leads to detailed exploration. Furthermore, some guidelines and methodologies are identified that focus on the integration of system design and UX evaluation during software development process. This special issue will promote the awareness for the requirement of detailed research studies on the above mentioned challenges..

III. CONTRIBUTION

Seven studies presenting various approaches and prospects that recognize the interplay between system development and UX evaluation are considered in this special issue. The aim of first study [10] is to comprehend different attitudes of researchers from HCI community for estimation of UX elements. The fundamental interest lies in identification of valid quantification of the conceptual elements. Though, this problem can be examined from philosophical point of view. Further, the pragmatic and empirical approaches have been adopted in conducting interviews and questionnaires with users having interest in UX [10]. Outcomes demonstrate that users hold varied views about the ease of estimating experiential qualities. Furthermore, [10] highlight another fact that it is critical to identify the weaknesses and strengths of various adopted approaches. The first study of this special issue examines the interplay issue at conceptual level whereas second study investigates from practical level. [17] has questioned about the gap between SE and HCI w.r.t usability whether it is been narrowed, while the significant efforts and attempts have taken more than a decade ago. Highlighting the issue of continual gap, [17] has performed an experimental study and their findings have confirmed that various companies have not put much of their focus on UX and usability practices. Inspired by the goal to lessen this gap, [17] have proposed cooperative method development approach which includes both practitioners and researchers in performing empirical research. The approach has proven very effective for inspiring the research practitioners about improvement of software development process in their organisation by considering UX and usability seriously. The third study [18] of this special issue represents an established questionnaire and elaborates how the selection of UX and usability attributes must be performed. The touch-screen digital thermometer is taken as an application and implemented as prototypes of the user interface. The adopted approach reverberates with few participants' views observed in first study that attributes like satisfaction, trust and enjoyment are quantifiable. Whereas various attributes e.g. perceived usability and subjective mental effort cannot be estimated with storyboards and sketches that are generally used to gather users' evaluation feedback. This inference belongs to the arguments on standardization of UX aspects [19]. Moreover, UX aspects [18, 20] are classified into various constructs e.g. behavioral intention and perceived ease of use. This classification may initiate recurrent debate on delineating UX from usability [21]. The fourth study [22] of this special issue has conducted semi structured interviews with UX researchers and practitioner to explore some questions in context of measurements of UX constructs. And the results have highlighted a major fact that design intended UX professionals seems to be sceptical for measuring the UX

constructs. In order to identify whether such attitude exist in HCI community, another UX Measurement Attitudes Survey is also conducted. Empirical evidence from this survey concludes the more positive attitude towards the measurement of UX constructs (as compared to interviews). Further, suggestions for improving the acceptance of UX constructs with interplay between system development and UX are provided. The study [22] examines that subjective accounts and objective measures of UX can assist in evolving this research area. The fifth study [23] of this special issue presents detailed understanding of researchers and practitioners' viewpoints on concepts of UX. The survey is conducted to know about how well the UX concepts are used across the world (mainly 35 nations are considered). The study results into an interesting fact that differences are identified due to different background and geographical location of the participants. The sixth study [24] of this special issue measures the UX of interactive products via questionnaires that helps in collection of more number of participants feedback. Questionnaire is designed in such a way that it can exclude the user groups if their needs are not met with the design of product and can consider targeted users if the experience from product is high. The seventh study [25] of this special issue presents an empirical study that is conducted to access the feasibility of Userbility technique. As, this technique is employed for evaluating usability and UX on five mobile applications. The study considers two aspects of UX i.e. experiences and expectations to enhance the experiences of the targeted users. The aim of this technique is to enhance the quality of mobile applications and to improve their acceptance by its targeted users. The results from [25] conclude that it is feasible to identify various usability problems faced by the subjects and to ascertain the various improvements in mobile applications by evaluating usability and UX through Userbility technique.

In demonstrating the methodology for organizing this special issue, the quantity of submissions considered significant to the topic of interplay between software development and UX evaluation has been identified very low. It infers that significant cases may be under development. We expect that further studies following this topic can be attainable and accessible in near future.

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