

# **Overview of Systems Design and Development with Regards to the Involvement of User, HCI and Software Engineers**

**Saad Masood Butt**

Computer and Information Sciences Department,  
Universiti Teknologi PETRONAS, Tronoh, Perak,  
Malaysia

**Wan Fatimah Wan Ahmad**

Computer and Information Sciences Department,  
Universiti Teknologi PETRONAS, Tronoh, Perak,  
Malaysia

## **ABSTRACT**

Users' dissatisfaction on the software used will impact the efficiency. Moreover, the lack of knowledge of users' involvement in the development of the software will cause issues to the user's later on. In the case of human-computer Interaction (HCI), it has been suggested that a user's participation and HCI concern in the application growth life-cycle (SDLC) as an important procedure for a successful program execution. However, it is still not sure to what extent user participation is important and HCI problem have been settled by system professionals. The result which is mentioned in this paper and the review opinions from the experts' point of view are taken from analysis on the value of HCI in SDLC. The objectives of the analysis are to identify the condition of the users' contribution in SDLC and to identify the HCI elements that have been settled. Results show that many of the experts have engaged the customers in SDLC, but the majority only during the need research stage. The conclusions have also shown that HCI components on performance are well resolved. However, the non-functionality components such as social, environmental issues have not been highlighted by experts. This paper indicates with recommendations to further analyze the users' interest on the value of the users' contribution in the program development.

## **1. INTRODUCTION**

Users' disappointment on the software application used will impact the efficiency. The efficiency of a software application is calculated based on its functionality and users' encounter in using the application. Research shows that there are many debates on the usability of the software that makes the user disappointed [4, 8, 9]. Users' disappointment is suggested due to the refusal of the value of HCI consideration in system growth technique. In some case, the experts did include individual but only at chosen parts of software growth process. The value of HCI in the software development cannot be declined and the lack of knowledge on users' participation issue in software develop will later cause problems to the customers in using the program [12]. Particularly disappointment of the software use will impact office efficiency, public connection and overall well-being [13]. Among of the many development techniques, the software development life-cycle (SDLC) model is a generally approved approach to explain the procedures and issues involved in development [1]. In the development of information program (IS), the SDLC strategy concentrates on the program features [2], but lately the concern has modified to users' experience [3]. Dispute that HCI concern in SDLC is essential. However, it has not been given enough focus by experts. It was suggested that a new SDLC that focuses on human-centered

strategy is needed to compliment users' encounter. They recommend a new SDLC known as Human-Centered System Development Life Cycle [4].

Before HCI research were targeted on users' needs. The need of HCI was seen to be created from the users' viewpoint and not from a practitioner's viewpoint. The research on the value of HCI concern from a practitioner's viewpoint is still unusual in the software industry [5,6,7]. The purpose of this paper is to analyze the work out of HCI technique in the SDLC. The analysis specializes in identifying the situation of users' contribution in SDLC and assessing to what stage the HCI elements have been settled in SDLC.

## **2. LITERATURE REVIEW**

### **2.1 HCI Approaches**

The HCI strategy concentrates on human-machine relationships and partnerships. It describes what a program should do from a user's viewpoint. It views users' restrictions like physical, intellectual, successful and behavior. Moreover the effect that users' participation has on the program growth and utilization also needs to be regarded. HCI growth distinguishes between the users' obligations and the program obligations during users' connections with the program and how users can socialize with the program.

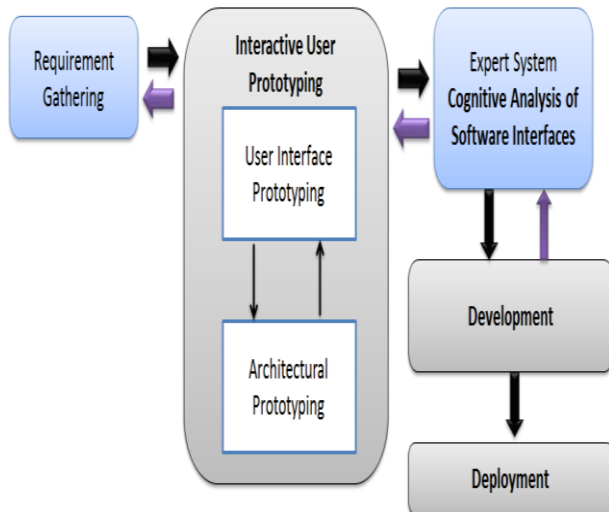
According to Hoffer et al. [1], the present SDLC strategy concentrates more on system features and information specifications to satisfy business needs. Incredibly, HCI is worried with how techniques can fit with users' needs, ways of life, and well-being. To create an information system that meets both business and personal needs, HCI concerns should be included in a particular strategy for IS development. Because of this, Zhang et al. [4] have recommended a strategy that views HCI concerns and has particular cases of assess items.

The information about HCI issues that is composed of four elements namely physical, intellectual, affective and behavior along with their example evaluate items. These HCI issues highlight on non-functionality specifications research of software development.

### **2.2 Role of HCI in SDLC**

Zhang et al. [4] dispute that HCI concern in SDLC is essential. However, this has not been emphasized by application experts. They dispute that a new SDLC with focus on human-centered strategy is required to compliment users' experience concern. To provide the human-centered strategy, they recommend a new SDLC known as Human-Centered System Growth Life Pattern (HCSDLC). Determine 1 features

the popular structure of HCSDLC. There are four stages to be regarded, namely venture choice and preparing, research, style, and execution as proven in Figure 1. This structure focuses on HCI concern which is different from the present SDLC regarded. The cooperation between SDLC and HCI viewpoint is required to make sure the program growth is a achievements. However, present SDLC issues too much on business needs (functionalist) rather than individual needs (physical and intellectual abilities, psychological needs, character and situational factors). The individual need has been much less regarded in SDLC. Thus, often took place a gap between fulfilling business needs as well as individual needs.



**Figure 1. Human-Centered System Development Life Cycle (HCSDLC)**

### 2.3 Users Frustrations

As defined by Lawson [4], Disappoint of user in software is “the occurrence of an obstacle that prevented the satisfaction of a need”. Latest reports on users’ disappointment feature the problem that took place behind the screen level [4] and the issues of using business sites [8]. These problems took place once the software is accomplished and sent to the customers [17]. Latest reports on users’ disappointment features the problem that took place behind the screen level and the issues of using business sites. These problems took place once the software is accomplished and sent to the customers.

Another research on users’ disappointment by Besserie et al. [10] has outlined the disappointment of computer-based perform knowledgeable by the customers during their everyday perform. The outcome from their research reveals that one -third to one-half of the time invested before side of the system is due to the problems to use the application which causes disappointment. Frustration considerably impacts the level of job fulfillment, office efficiency and public well-being.

### 3. METHODS

The primary analysis means for the information selection is set of questions and appointment. The set of questions is designed based on the HCI structure of HCSDLC [4] mentioned in the before area. The participants of the study are the end-users of College pupil Information System (iSIS) and practitioners from UTP, Malaysia.

An interview was taken among the end-users of iSIS program to analyze users’ disappointment on the program. This includes five instructors and five learners who are definitely using the program. A study on HCI consideration in SDLC was performed among 32 participants who are application developer and application growth experts such as IT professional, designer, web developer, application professional, IT official, and system analyst.

### 4. ANALYSIS

The research performed in this research is using the illustrative research. The SPSS edition 13.0 is used to evaluate the outcomes.

#### 4.1 User viewpoint Towards the System

The conclusions from the appointment show that the participants are not fulfilled with the use of the program. Participant decided that the writing and number is readable. However, the result reveals that 67% of the participants were puzzled with how the information of the program is structured. The efficiency of the program is inadequate and 89% of the participants mentioned that the mistake concept is not helpful when using the program. Respondents’ overall response towards the program was of dreadful, inflexible and not exciting. The conclusions recommend that the experts to improve the program design and efficiency. This recognizes and rectifies the value of users’ participation as to be considered during the entire program life-cycle as being suggested by Bryant [17].

#### 4.2 User Involvement

The outcomes display that 96.7% of the experts decided that the customers should be engaged in SDLC and 90.4% decided that users’ participation is very essential. Though most of the reacted mentioned that they have engaged the customers in SDLC, the discovering shows that in some levels, the users’ participation was very little. Only 16.13% of the experts have had engaged customers during the growth level. On the other hand, 77.42% of the specialist have had engaged customers during the need research level (77.42%). Further research on their understanding on users’ participation has proven that 80.7 % of the participants decided that the users’ deficit of specialized knowledge has restricted them from having relating to the customers particularly during the design and growth level. This finding indicates that there is a need for customers to provide themselves with sufficient understanding. This research has exposed an important problem over the possible deficit of users’ participation and on the value of users’ participation during the software life-cycle.

#### 4.3 HCI Considerations

The second significant discovering is regarding to what level has the HCI components been resolved in SDLC among experts. In this research, three groups of HCI components, which are suggested by Zhang et al [4], are used. These groups are functionality objective, buyer, and focus on individual model profile. The outcome has proven that the HCI components with regards to the functionality objectives have been well resolved except for “safe for use”. Table 2 reveals the specific outcome on HCI concern depending on functionality goals.

**Table 2. HCI Deliberation Based on Usability Goal**

HCI elements	%	Sum
Effective to use	74.19	23
Efficient to use	74.19	23
Safe to use	32.36	10
Easy to learn	64.52	20
Easy to remember how to use	51.61	16

The outcome reveals that practitioners' priority is on its performance and performance, but very much less issue with protection. The outcome on the HCI concern based on the users' experience objective is given in Table 3. As proven in Table 3, helpful (77.4%), fulfilling (67.7%) and friendly (51.6%) has been highly resolved by the experts. However, none of the specialist details fun (0%) and psychologically fulfilling (0%) components. This reveals that in common, the successful principles are not being well addressed.

**Table 3. Descriptive Statistics of Users' Experience**

HCI elements	%	Sum
Satisfying	67.7	21
Helpful	77.4	24
Fun	0	0
Friendly	51.6	16
Emotionally fulfilling	0	0
Entertaining	3.2	1

The result on the HCI consideration depending on the focus on individual style individual profile is shown in Table 4. Most of the experts prefer to identify their focus on individual style individual profile in system development depending on skill (67.7%), knowledge (61.3%) and job requirements (51.6%). There is very little percentage looking at the social background (9.7%) and sex issues (3.2%). It is obvious that focus on individual style individual profile was not highlighted in terms of these two groups.

**Table 4. Target User Model Profile**

HCI elements	%	Sum
Gender	3.2	1
Computer training	61.3	19
Experience with similar systems	67.7	21
Occupation	51.6	16
Cultural background	9.7	3

Due to this analysis shows that in real genuine world, the HCI issue in the SDLC are more focused on the efficiency requirements and very little on the non-functionality requirements such as the security, public and effective issues.

## 5. CONCLUSION

From the research, it reveals that the customer's discontentment with the system has impacted users' efficiency and public well-being. The outcome indicates that there are issues in the style such as information company and unhelpful mistake concept. Such style issues may have took place due to the proven fact that the customers were not being engaged in the whole application growth procedure. This can be validated by the outcome from the research on users' participation which reveals that the customers were only being engaged at the beginning on to be able to collect system need and at the later level of software development procedure as to confirm and confirm their need.

The outcomes have proven that all participants have had engaged customers in their SDLC. However, the users' participation is mainly targeted on the need research level, and only a few have had engaged customers in the style and growth level. The outcome also indicates that due to the users' lackof specialized understanding in SDLC may have described why users' participation is still little particularly during the style and growth level. The conclusions on HCI concern have exposed that the non-functional specifications such as social and successful concerns have not been given enough emphasis by experts. From these conclusions it is suggested to further examine the users' participation and its importance in the application growth.

## 6. REFERENCES

- [1] Hoffer, J.A., George, J.F., and Valacich, J.S. "Modern Systems Analysis and Design", (4th ed.), Upper Saddle River, NJ: Prentice Hall, 2005.
- [2] Hirschheim, R., and Klein, H.K. "Four Paradigms of Information Systems Development". Communication of the ACM, vol. 10, no. 32, pp. 1199-1216, 1989Ding, W. and Marchionini, G. 1997 A Study on Video Browsing Strategies. Technical Report. University of Maryland at College Park.
- [3] Zhang, P., Benbasat, I., Carey, J., Davis, F., Galletta, D., and Strong, D. "Human Computer Interaction Research in the MIS Discipline". Communication of the AIS, vol. 20, no. 9, pp. 334- 355, 2002
- [4] Zhang, P., Carey, J., Te'eni, D., and Tremaine, M. "Integrating Human-Computer Interaction Development into the Systems Development Life Cycle: A Methodology". Communications of the Association for Information Systems, vol. 15, pp. 512-543, 2005.
- [5] Thiam, K.C., and Siti, S.S. "Webuse: Website Usability Evaluation Tool". Malaysian Journal of Computer Science, vol. 16, no. 1, pp. 47-57, 2003.
- [6] Hisham, S., and Edwards, A.D. "Incorporating Culture in User-interface: A Case Study of Older Adults in Malaysia". Proceedings of the Eighteenth Conference on Hypertext and Hypermedia, pp.145-146, 2005.
- [7] Balakrishnan, V., and Paul, H.P. 2008. "A Study of the Effect of Thumb Sizes on Mobile Phone Texting Satisfaction". Journal of Usability Studies, vol.3, no. 3, pp. 118-128, 2008.
- [8] Patrick, J. R. "Future of the Internet. Keynote Speech". Americas Conference on Information Systems, 2003.

- [9] Tetard, F., Patokorpi. E & Kadyte. V. “User-Centered Design of Mobile. Services for Tourist: A Case Study on Student Work on Mobile Design”. Institute for Advanced Management Systems Research, TUCS, Abo Akademi University, Datacity, Finland, 2005.
- [10] Bessiere, L. J., Ceaparu, I., Robinson, J. and Shneiderman, B. “Help! I’m lost: user frustration in web Navigation”. *Journal of IT & Society*, vol.1, no. 3, pp18-26, 2003.
- [11] Vansderdonckt, J. and Harning, M.B. “Closing the Gaps: Software Engineering and Human- Computer Interaction”. *Interact 2003, Workshop*. <http://www.interact2003.org/workshops/ws9-description.html>, 2003
- [12] Singh, S. and Kotzé, P. “An Overview of Systems Design and Development Methodologies with Regard to the Involvement of Users and Other Stakeholders”. *Proceedings of SAICSIT Conference*, Pages 37 – 47, 2003
- [13] Klein j., Moon Y. and Picard R. W. “This computer respond to user frustration: Theory, Design and Results”, *Journal of Interacting with Computer*, vol. 14, pp. 119-140, 2002.
- [14] Lawson, R. “Frustration: The development of a scientific concept”. New York: MacMillan, 1965.
- [15] Scheirer, J., Fernand, R., Klein, J. and Picard, R. W. “Frustrating the User on Purpose: A Step Toward Building An Affective Computer”. *Journal of Interacting with Computers*, vol. 14, pp. 93-118, 2002.
- [16] Lazar, J. Jones, A. and Shneiderman, B. “Workplace User Frustration with Computers: An Exploratory Investigation of the Causes and Severity”. *Journal of Behaviour and Information Technology*, vol. 25, no.3, pp. 239-251, 2006.
- [17] Bryant, M. “Introduction to user involvement”, The Sainsbury Centre for Mental Health, 2001.