Interfacing User Centric Design of Human Computer Interaction in Quality of Software

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Abstract: Improvising software engineering methods with growing and changing market demands is the need of hour. It always have been a great challenge and issue to get software quality in tandem with the today's market or user requirements which is ever changing and flexible. With this study we proposed a methodology in which software engineering will consider HCI, Human Computer Interaction, to its very core and further develop the product. Our study shows how HCI would prove to be a masterstroke for overcoming the current quality issues. Thus the product developed will be highly efficient and effective. Further we proved that how this user centric design will be efficient in future development of software and usability of human computer interaction has an important role to play in the future of the software engineering research and practice.

I.   INTRODUCTION

"Quality comprises all characteristics and significant of features and characteristics of a product or a service that bears on its ability to satisfy the given needs. A software product that bears on its ability to satisfy given needs: for example, conform to specifications.
Software quality is important for following:
a.   Making changes to improve software quality requires time and money to:
b.   Connect it to the real cause
c.   Fix the requirements, design, and code
d.   Test the fix for this problem

1.1 Software Process: A software process is a dynamic chain formed from a group of interrelated activities employed by a project or an organization to create software products and services in terms of user. Each process can be decomposed into its activities and each activity is characterized by its tasks [3] [13].

1.2 Software process model: It is one of the important topics to explore software process. Software process models often represent a networked sequence of activities, objects, transformations, and events that embody strategies for accomplishing software evolution. Such models can be used to develop more precise and formalized descriptions of software life cycle activities.

1.3 Process quality
        A quality process must meet the needs of its users to produce quality products efficiently. A quality process must contain following:
•   To produce a quality product consistently
•   To be usable and efficient
•   To be easy to learn and adapt to new circumstances

1.4 PSP
        The concept of personal software is a structured software development process which is used to increase the quality of software to support software engineers. This process is helpful for good communication between user and developer to increase their performance by pursuing their predicted and real development of code [6] [10].It is a software process that guides and supports the development of a software product. The PSP deals a prospect and framework for incorporating software engineering for the purpose of best practices into a process in smooth and reliable way.

1.5 Quality Measures

PSP data enable determining measures of product and process quality and the effectiveness of the process at removing defects.

- Percent appraisal cost of quality (COQ):
- Percent failure COQ:
- Cost of quality (COQ):
- Performance costs:
- Failure costs
- Appraisal costs:
- Prevention costs: the costs of devising and implementing measures to prevent failures
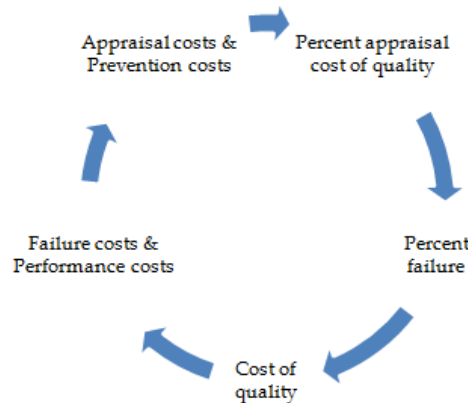
Figure 1: Quality Measure Cycle

1.6 The Challenges of Data Quality

- One data type is unstructured data, for example, documents, video, audio, etc.
- The second type is semi-structured data, including: software packages/modules, spreadsheets, and financial reports.
- The third is structured data. The quantity of unstructured data occupies more than 80% of the total amount of data in existence.

II. RELATED WORK

Human computer interaction and development of software are highly related to each other hence it can be said that ability of PSP deals to assess at the level of knowledge achievement and at the level of skill in today's knowledge to be applied. A quality requirement is taken as nonfunctional requirements in the early steps of software development, influence greatly the software system architecture. At the same time it can be observed that the quality requirements have to be "sensible" during the design process [15]

Some literature regarded web data as research objects and proposed individual data quality standards and quality measures to describe six evaluation criteria authority, accuracy, objectivity, currency, coverage/intended audience, and interaction/transaction features for web data [27]. There are four categories for the information quality of an individual website and a questionnaire to check the significance of each of these a new established information quality groups. Users can put attention towards the question that how web users determine the information quality of individual sites?

The studies of the same area focus on two phases: The first one a series of studies of web data quality and second one studies in particular areas for example biology, medicine, geophysics, telecommunications, scientific data, etc. Big data as an emerging technology, which is responsible to handle large volume of data , variety of data and velocity of large data that secures more and more attention at the same time lacks research results in establishing big data quality and assessment methods under multi-source, multi-modal environments [30].

Usability and user centric design of human computer interaction is able to answer that how to ensure quality of large volume and variety of large data and how to analyze and mine information and knowledge hidden behind the data become major issues for industry and academia. Due to the Poor data quality there will be leading to low data utilization efficiency and even bring serious decision-making mistakes [31]. Challenges faces by user due to the inefficient usability of data and proper analysis of poor quality data. The challenges faced by big data quality responsible to propose the establishment and hierarchical structure of a data quality

framework. Then, there is need to formulate a dynamic big data quality assessment process with a feedback mechanism, which has laid a good foundation for further study of the assessment model [32].

III. STATEMENT OF PROBLEM

▪ **The modification of client needs over time.** Those days are over where clients did not need any modification or changes in the software product delivered. User's request time to time to upgrade the functions of software process. Client modification need means provide a facility to modify any client code after the program or software has been executed.

▪ **The fast rate of modification in both hardware and software.** Due to the rapid growth of technology there is high   need in the modification of hardware and software for the interface unit to remain competitive in a global environment. Changing environment of new technologies to meet customer's needs and making changes to both process and technology to gain a competitive edge in the prime challenge in addition it can provide significant benefits to an organization.

▪ **The shortage of knowledge of client needs at the start: A**s seen from experience as a client, there is gap between a reliable process to identify and supply the quality software engineers and corresponding the top developers to planned programs. Both the engineers and the clients are struggling to quality projects.

▪ **The high expectations of customers, mainly with respect to adaptableness:** Customers are more willing than ever to customer service expectations these days and they want representative to contact them, rather than always having to initiate contact themselves. It is essential to be able a reliable way to measure satisfaction about setting expectations, meeting expectations or resetting expectations.

IV. HUMAN COMPUTER INTERACTION APPROACH FOR QUALITY OF SOFTWARE

▪ Quality of software is an observation or an assessment of data's fitness to support its purpose in a given context in software development. Concept of user centric design and usability is crucial part to ensure successful implementation of global software engineering to maintain the high credibility of software for better interaction between human and computer [17].

4.1 User-Centric Design Process (UCD)

      User centric design concept of human computer interaction is aimed to provide easiness towards user's interface. It is also called interface design process that emphases on usability goals, user characteristics, environment, tasks, and workflow. For analysis, design, and evaluation of mainstream hardware, software, and web interfaces the UCD monitors a sequence of well-defined methods and techniques [35]. UCD process is an iterative process, where design and evaluation steps are constructed in from the first stage of projects, through implementation. It focuses on following:

o Users behaviour
o observe, record,
o Analyse users' reactions and performance
o Iterative design
o Involvement of user in process

4.2 Usability

      Usability can be considered the one of the effective concept in the area of quality factor in the HCI domain - usable by humans' is appropriate to recall the taxonomy of computers in those days and the purposes for which they were used. Usability is an extremely difficult quality factor to define. The main reason for this is the vast variety of users with their different needs. Some will be novices while others will be experts and a quality product will support them all [16] [20].

• Usability as an outcome: applications, websites those are usable
• Usability as a process: a methodology or approach (usually called "user-centered design")
• Usability as a set of techniques: usability testing, contextual inquiry, heuristic evaluation – there are many techniques whose aim is to improve usability
• Usability as a philosophy: where improved usability is a value that motivates the way in which products are developed

Usability is the process of identifying users' needs to ensure a product can achieve precise goals effectively and efficiently, which results in overall satisfaction and success.

**Usability=Quality attributes that accesses how easy user interfaces are to use**

User can be able to evaluate usability as method which improves the usefulness of project during design phase.

Usability= Methods for improving the usefulness during design phase

Usability is a combination of many factors and theories, but all can be targeted to achieve the goals below:

- Intuitive Design and/or user interface
- Ease of learning
- Efficiency of use
- Memorability
- Error prevention
- User Satisfaction

Here it can easily be observed that usability does not only mean to make process easy in addition usability is an integral part of software development with respect to user interface and user satisfaction.
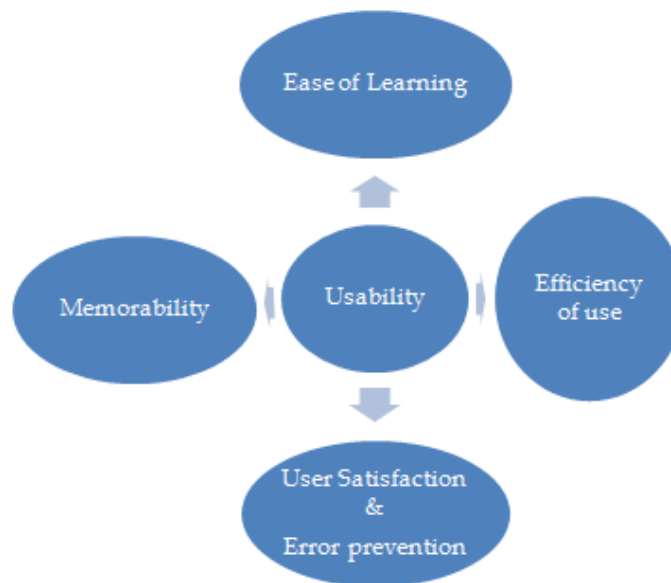
Figure 2: Usability Role

Usability is not only helpful in efficiency of use or in error prevention but at the same time it's responsible for overall user satisfaction. Figure 2 briefly explores role of usability in the designing of a software module.

Figure three put sight towards various goals of usability which can be carried out during the software development. Before delivery of finished software project a user developer can find its effectiveness, usefulness, efficiency, accessibility, learnability and satisfaction of user.
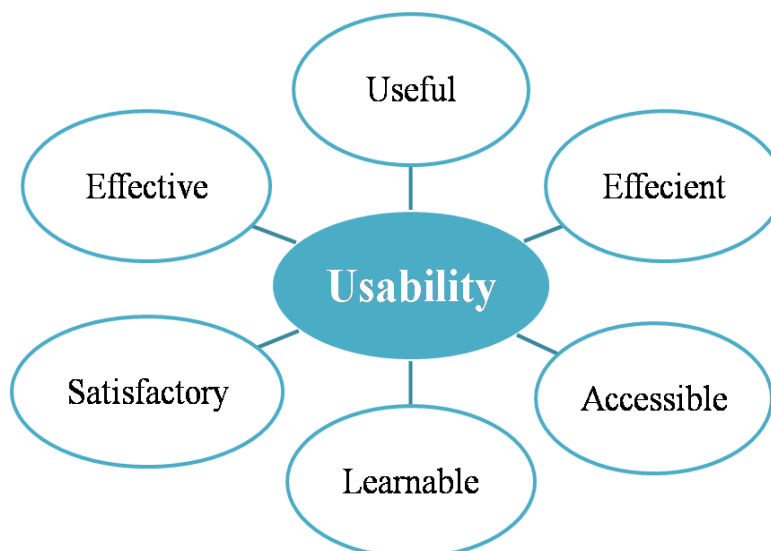
Figure 3: Usability Goals

V. RESULTS AND CONCLUSION

The study briefly illustrated an initial attempt to use an HCI design model together with SE issues. Our goal was to provide a common reference point for both HCI designers and software engineers to point out the quality currently existing issues. Now users are able to answer that what kind of design decisions are facilitated by presented approach, and what are the impacts (good and bad) in the HCI and SE processes effectively promotes collaboration between SE and HCI 21] [22].

This collaboration may be further propagated to other models, both in HCI and in SE to produce innovative and effective contributions of personal software process is an essential movement of users as society increasingly depends on software in most modern products services and automated processes. Hence we can say user centric design and usability of human computer interaction has an important role to play in the future of the software engineering research and practice.

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