Usability and Security Issues of the User Interface Design

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Summary
The usability of the interface depends on the design of the product. The differences between the phones and desktops are caused by changed demands by the customer like memory, screen size, lack of feedback, performance etc. Systems transfer sensitive data. There is important to secure the system for modern applications. The use of internet is quickly growing from years. Because of this fast travelling lifestyle, where they lets the user to attach with systems from everywhere. When user is ignoring the functionalities in the system then the system is not secure but, in other systems there exist some threats can harm the system. For example: when the user is not educated or have no knowledge to use the device then such system is not secure for such user. This paper points judgmentally through an audit of existing writing, the significance of exchange off or adjust amongst convenience and the security of the framework. For all kind of items, the UI is checked or estimated by utilizing the heuristics assessment, intellectual walkthrough, formal ease of use review, pluralistic walkthrough, highlights examination, consistency investigation, standard review and numerous more techniques. The creator played out the study to look at the ease of use for all the current telephones. As the outcome for the simplicity of client, two models are discover, client fulfillment and learnability. The survey results that UI in view of proposed structure is easier to understand than the board based UI.

Key words:
Interface design issues, usability of user interface, data security issues.

1. Introduction

From the most recent couple of years, UI configuration had turned into a developing theme as clients are doing centered on the application that is by and by planned. Presently, security issues are expanding with designers revising a portion of the projects, which have just been arranged [1]. While utilizing a particular framework, client is resembling to overlook every single other movement that may happen until the point when they are looking with one test or the other. A case, in a portion of the applications, which contains the highlights of mixed media, they take previews or chronicles of the client without others learning, in this way damaging into client's security [2].
The security of the UI emerge the inquiry that how the security of the interface is kept up?
This paper tries to figure the selection of security rehearses in UI. It reports to both UI and security issues together by examining about security instruments e.g. Firewall ensuring PC, this uses the security strategies for the site and uses the validation mechanisms in security of the user data. More spotlight is on ease of use in viewpoint coordinated on the accomplishment of particular client objectives in regards to nature [3]. The ease of use of the interface is the primary prerequisite for wellbeing of the interface. As Cranor and Buchler [4] clarified, ease of use and security are probably going to go "as an inseparable unit". An examination on the as of now existing strategy with inquire about inquiries endeavoring to discover a dependability between the ease of use and security, measures used to assess framework ease of use criteria concerning quality.
The main issue in the design is that the interface is not understandable for all the users, that's why when a person does not understand the interface then he is not able to use such software or system. The presence of computers into the home and offices during the 1970s has brought attention to the interaction between people and computer systems; and, thus, the field of Human-Computer Interaction (HCI) began to appear during the same period [2]. . This article provides the systematic review of the existing studies on designing the user interface. The development of the interface involves these following steps.

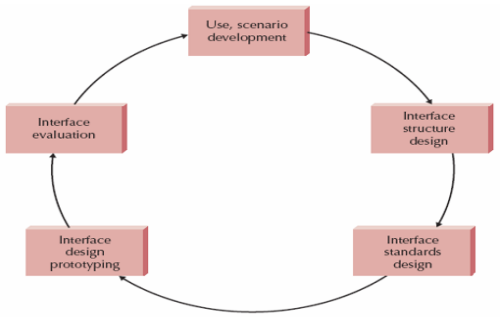

Fig. 1 Development of interfaces.

Mobile phones are small but works like the computer [1]. They are in different sizes and specifications. The only size of the mobile does not show the interface of the system. The user interface means the user and the computer both can interact with one other. Be that as it may, not at all like PCs, the screen size and determination limit cell phones in showing content [1].For case in utilizing the information

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gadgets, the PC and client both are pulled in with each other. The primary sorts of the UI are as following:

- Command line
- Graphical user interface (GUI)
- Menu driven interfaces

Command line is the boundary that helps the user to interact with the computer by the direct use of commands. But there is an issue that the commands cannot be changed, they are fixed and only understands the exact commands.

GUI is the interface that helps to interact, because this is friendly and easy to use. This includes the graphics, pictures and also attractive for all type of users. The command line is black and white interface.

Menu-driven interfaces are the interfaces which are also used in the mobile phones or tablets. This gives the menu to the user to select the option of their own choice. For example: ATM is also the menu driven interface. It has all the options on the screen and the user has its own choice to choose the option. Not only mobile phones, there are most of the devices that are now using the menu based interface.

Technology is becoming the vital part of our daily lives. In educational sectors, mobile phones are used in teaching and learning process [1]. For instance, mobile phones are used in many universities and colleges [1]. For adapting anyplace and whenever, has additionally presented the new kind of electronic learning known as versatile learning [1]. This learning is additionally called m-figuring out how to exploit cell phones. There are in excess of billion cell phone clients on the planet [2].

Exact values for mobile phone user interfaces does not exist, some applications are also available for desktop also. These issues include fixed screen, lack of feedback in physical mobile phones and computers are different in from each other. These are different interfaces for both, but most of the demands are common in both of them like Wi-Fi, Bluetooth, photo gallery, engine and many more. Computers are large in size and they are stationary, whereas mobile phones are small in size and they can be moved to anywhere while users are walking, travelling etc.

2. Literature Review

This examination investigates the current writing and modification of security rehearses in UID. There are two behaviors to handle this issue; in purpose of security viewpoint which incorporates anchoring the UI utilizing security apparatuses, for example, a firewall ensuring PC, utilizing security methodology for a site or giving validation gadgets, for example, passwords or PIN to monitor the client information. This dread with security hopes to concentrate more information passageway, for example, by utilizing validation or preventing malware from irritating the UI. Be that as it may, there is the ease of use recognition, which is depicted "as the productivity and fulfillment with which the expressed clients can accomplish the expressed objectives in the expressed condition" [3]. Security and protection were prior left to framework managers who are experts and could apply time to concentrate the utilization of complex UI, however now, these errands are dynamically left to the end-clients [5].

In UID, the ease of use of the interface is one of the fundamental objective that should be accomplished. In this manner, endeavors are to be done keeping in mind the end goal to recuperate the plan of the UI by coordination security with the ease of use guideline which had been characterized by Norman (1994). The security in UI has not been found much couple of studies have been done so as to recuperate the ease of use of UI and shield the clients [4]. The conduct of the clients towards an interface is something which are contemplated in Human Computer Interactions. I have chosen a few papers from 1994 to 2018. These papers have the discourse about the limits on which the outlines can be checked. This examination additionally incorporate the arrangement of these issues.

Usability

Ease of use building have a few strategies which reveals to us that how the frameworks are set up and afterward checked by utilizing exploratory techniques to accomplish effectiveness. To give answers for security, the standards of ease of use building are exceptionally helpful. Ease of use designing elucidates the data achieved based on hands-on contribution with extra interface. The significance of an ease of use approach is to make inquiries identified with the view of utilization, in the wake of undertaking the procedure specifically [8].

Security

Security designing isn't controlled to just anchor the product. It has the correct blend of arrangements and security exercises into the product outline. The word security building communicates a few exercises which can be founded on the distinctive phases of designing and the life-cycle. To blend the security into programming improvement process may appear not to be a simple undertaking and the assessment of security can be even seen all things considered [13]. In the advancement of programming, the fundamental advance is to examine the entire different strides in the improvement of programming. The means of security building include the recognizable proof of security prerequisites taken after by programming security outline choices. (1)

3. Related Work

Convenience isn't sufficient to assess those structures which are centered on security. Some past researchers have done particular systems to evaluate the trade off in comfort and security. The maker "Gunson" played out a test on telephone sparing cash to exhibit that the security is upheld to when there is a widened structure is incorporated. While finishing the test, 90% of customers adequately entered the passageway code when the check method are required for only a solitary advance. Regardless, when there are required the passage code with the secret number then the customer ended up overwhelmed and less individuals clears up the errand. Diminishing the security of a system to require just a single way access could be fairly risky yet in summon not to diminish the usability of the interface; it could be required [14].

Analyzes that had set up a tradeoff have all the earmarks of being incomprehensible [13]. A couple of strategies seem to list towards convenience or towards security without totally mixing them to develop a better strategy than report both in UI. Absence of capacity to start a tradeoff among convenience and security can impact the end-customers of the structure, who are the all-inclusive community for which the system is immediately expected to help. This is for the most part found in systems that the identity of the customers is basic. That is the reason such applications ask for the join.

4. Research Questions

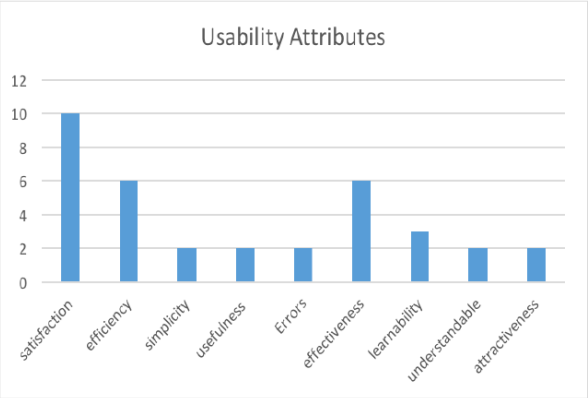
RQ1: What criteria is used to find out the usability of the user interface? [2]
RQ2: what is the connection between security criteria and usability criteria in influencing quality? [11]
RQ3: What methods are discussed to check or measure the user interface? [3]
RQ4: What criteria can be used to evaluate the usability of a quality?

RQ1: What criteria is used to find out the usability of the user interface? [2]

Usability is the core term of HCI. This is not a simple word. The usability was invented in 1980s to swap the term “user friendly” [2]. Usability is the vital part of the applications. If the user does not get the exact product of their own choice then, they move to find out another product [2]. This shows that usability is very vital for every product. The product or application is going to run on the mobile phone or on any computer. These attributes help to make the attractive and user friendly application. The author has collected eighteen research papers related to the usability attributes of the mobile phone. All these papers are discussed below.

Year	Usability attributes	Research
2010	Useful and also easy to use	A new UI is introduced in this paper. This makes the user of UGC service more easy and efficient.
2010	User distraction User mobility	This article helps to complete the gap of Mobile IT by providing clear guidelines for designing the mobile system. This research also tell that user interface is also important for the design of the system.
2010	Menu icons Text Color	This article tells about the items for designing the user interface. The research to make the appearance more attractive.
2011	Presentation Search time	This research is about the presentation of the design, interface of the system.
2011	Icon Characteristics	This research is about the icons that helps the interface to develop more user friendly atmosphere.
2012	Customer need Design feedback Satisfaction Efficiency	This research uses a questionnaire to check the usability and to check the success of the product.
2012	Screen size Color	This helps to understand the system and its design.
2013	Error Task Effectiveness	The article provides the usability comparison in Iran and Turkey.
2013	Efficiency Effectiveness Satisfaction Usefulness Simplicity Learnability Understandable	The objective of this study is the usability dimensions that should be considered when evaluating and designing mobile apps.
2013	Security	The paper provides the main connection between security and usability in mobile phones
2013	Satisfaction	This study is about the satisfaction of the user and the developer. This tells that the user is satisfied or not.
2013	Efficiency Satisfaction Learnability effectiveness Cognitive load	This study is about the learnability and satisfaction.
2014	Satisfaction Efficiency	This study is about the satisfaction and efficiency.
2015	Efficiency	This study is about the efficiency of the system.
2015	Satisfaction Learnability	This study is about the satisfaction and learnability.
2016	Visibility Navigation Interaction Simplicity	This study is about the satisfaction. The interface is ok or not for the user. This also check all the parameters to check the interface.
2016	Satisfaction User feeling	This research collect all the touch screen mobile phones and then check out the usability.

The usability features in the mobile phones were checked. In the above table the attributes are discussed. These attributes are then measured and the result deducted after such research is given below.



Satisfaction is highly mentioned among the studies at 10 times. Then the efficiency and effectiveness at 6 times. Next learnability was for 3 times. After that, simplicity, usefulness, errors, understandable and attractiveness were found for 2 times. The remaining terms came for once.

RQ2: what is the connection between security criteria and usability criteria in influencing quality? [11]

The correct ease of use and security criteria for the framework must be settled, surveyed and after that deliberate to choose the aggregate nature of the framework. Security and ease of use quality criteria can exclusively show properties which are not adjusted. For improvement, it is critical to think about the diverse quality criteria as similarly free factors. The quality criteria prior specified did not have anything to do with the quality measurements, yet accentuations on the nature of the framework as far as it being appropriate for the undertaking in a specific space [15]. The criteria for convenience and security can influence the nature of the framework created on the grounds that the quality criteria said directly affect any framework and point to critical viewpoints that a framework ought to consider while being produced.

A more powerful measurement can be conveyed upon supplementary research. Likewise, some quality criteria used to decide the nearness of security and convenience are reliant and require disparate evaluation strategy. Howbeit, the dependence displayed between particular criteria must be examined keeping in mind the end goal to enhance the measurement technique for each esteem.

As indicated by "Mihajlov", the security criteria of a framework depend on the quality models of security estimation which demonstrates diverse highlights. These highlights incorporate the accompanying: disclosure, mystery, protection, brittleness and wealth [10].

The parameters are given below in Table 1.

Table 1: Description of security parameters [10].

Security Criteria	Description
Revelation	Revealing of the authentication password is hinged on factors of system and its user
Secrecy	The authentication password certainty depends on system and human factors
Privacy	Protecting user's personal details from being compromised
Breakability	The weakness of systems authentication part of the system
Abundance	The quality of accessible authentication passwords

Check out the security of the interface. Interface is the very sensitive case of the software. These security parameters are easy to check out the security of the interface. I have discussed these security parameters one by one.

Revelation

Disclosure mirrors the course level of a confirmation secret word from a client and framework viewpoint. There are guaranteed manners by which the client may reveal his/her validation key. One of these routes is through consistent popups cautioning; out of counteractive action from such notices the client may consent to the arrival of certain data that is private [10].

Secrecy

The capacity to figure a secret key is affirmed to be a tremendous dread. To choose the request of organizing the validation being chosen aimlessly, it is imperative to detect these things: clearness, the absence of relationship with past words, notwithstanding dispersing, a similar appropriation over the entire words, and uniqueness, the inability to casually create a comparable request of words [10].

Privacy

Protection states to the quantity of held points of interest vital for the confirmation part of the framework [10]. A participated secret word can aggravate the classification of client and cause their character to be whipped. Characterizing who to trust with private data is an intense assignment which include the hazard also. Shockingly, clients are bad in danger estimation, especially where protection choices are concerned.

Breakability

This demonstrates the exertion made by the programmer that breaks the security utilizing his aptitudes. The programmer can be great or terrible however when the

validation is aggravated then we can't watch that what kind of programmer was there. Relies upon how the framework is fabricated, the assailant may utilize any of the accompanying four procedures to decide the client's vital: keylogging, savage power, research and lexicon [10].

Abundance

This point helps to measure the verification of the passwords. First part includes the existing one which are mostly used for most of the application or devices. The other one has the direct effect on the perception. This basically measures the quality and tells then how much strong password was applied [10].

RQ3: What are the methods to check or measure the user interface? [3]

In the second paper, the author "Nielsen" has discussed some methods to check or measure the interface. The evaluation means to check the interface and to find out the claws in the interface. Function of usability is to figure out the problems in a design. There are different inspections that offer to inspect that there are some specifications which are not implemented yet. The methods discussed by Nielsen are as following:

- Heuristics evaluation
- Cognitive walkthroughs
- Formal usability inspections
- Pluralistic walkthroughs
- Feature inspection
- Consistency inspection
- Standards inspection

Heuristics evaluation:
Experts assess the usability of an interface guided by usability principles.
Cognitive walkthroughs:
This is the detailed process that includes the complete problem solving process. This process is checked on every step to make sure that the interface or the complete software is 100% accurate. This is not necessary that every accurate software is always 100% accurate, but accurate software is always good or needed software on its aspects.
Formal usability inspections:
This evaluation includes the fixed rules to make the combination of heuristic evaluation and cognitive walkthroughs.
Pluralistic walkthroughs:
The word plural defines that this walkthrough is not for the single person. This type of walkthrough is the group discussion to inspect the usability. This also includes the meeting, group discussions on specific topic.
Consistency inspection:
There are some designers, they represent multiple projects to evaluate the interface.
Standards inspection:
They must have an expert for standard inspections, because only the expert can design the best interface.
Feature inspection:
This inspection includes the complete list of all the features to complete the task. If we are developing the software then first of all we have to list out the features of software. Then after gathering the features, we will make the prototype and after the verification of the prototype complete software is develop and also tested. This inspection includes the list of sequence of features, checks for long sequences, checking for features and also the points where this is important to settle the situation in the features.

RQ4: What criteria can be used to evaluate the usability of a quality?

When we are talking about the usability of the interface, this effects the performance of the system.
So to inspect the security, the specific terms or features are compulsory to be checked [8, 9]:

Table 2: Discussions of Usability and Security in different articles [10]

Article	Security	Usability	Emphasis	Objectives	Journal/ Conference
Bourimi, et al (2011)[12]	✓	✓	Security in social media	▪ To address privacy and security issues in multi-model user interfaces for social applications	Privacy, Security, Risk, and Trust (PASSAT)
Cranor, & Buchler, (2014)	✓	✓	Usability and Security Go Hand in Hand	▪ Introducing approaches taken by researchers to address usable security challenge	Security & Privacy, IEEE
Furnell, (2010)[19]		✓	Usability and complexity	▪ To examine usability and security as it affects the complexity of systems	Security and Privacy in Dynamic Environments
Ibrahim, et al., (2010)[21]	✓	✓	Assessing the Usability of End-User Security Software	▪ To reveal user's absence of security knowledge, which influence their decision-making process. ▪ To address for criteria for security measures	Trust, Privacy and Security in Digital Business
Mihajlov, M., Jerman-Blazic, B. and Josimovski, S. (2011)[15]		✓	Conceptual framework from usability perspective	▪ Framework for assessing stable security and security evaluation process by balancing quality metrics	Network and System Security (NSS), IEEE
Mihajlov, M., Blazic, B. J. & Josimovski, S., (2011)[10]	✓	✓	Usability and security evaluation	▪ Using Quantification approach to direct the evaluation process of authentication mechanisms	Computer Software and Applications Conference (COMPSAC), IEEE
Minami, et al., (2011)[13]	✓	✓	Trade-off between security and usability	▪ Addressing the balance between security and usability in systems ▪ Demonstrating through a case of computer scientists and care providers taking into consideration high security with better usability in systems	Consumer Communications and Networking Conference (CCNC), IEEE
Mockel, (2011)[11]	✓	✓	Integration of usability and security in e-banking systems	▪ Aligning of usability and security criteria to develop an evaluation framework specific to e-banking	Applications and the Internet (SAINT)
Weir, et al., (2009)[7]	✓	✓	Perception of security, convenience, and usability	▪ Comparing two-factor methods of e-banking authentication to illustrate the trade-off between usability and security	Computers & Security
Yoshimoto, et al., (2007)[22]		✓	Development and Evaluation User Interface for Security Scanner with Usability	▪ Using security scanners to develop an interface for users with high usability to evaluate the usability of user interface	Network-Based Information Systems

5. Conclusion

This review shows that usability in apps has been discussed from various points of view by many authors. Some studies provide guidelines for improving usability whilst others compare usability attributes amongst different apps. Usability has been discussed from numerous angles between 1994 and 2016 [3].This is confirmed that the usability and security, both of them cannot be discussed independently. But, when the user interface is designed then these factors are seem to be perfect for the software. This factor stops the developer from the adoption of the system whereas the user don't need to understand the security features

There are different methods to evaluate the interface.

- Heuristics evaluation
- Cognitive walkthroughs
- Formal usability inspections
- Pluralistic walkthroughs
- Feature inspection
- Consistency inspection
- Standards inspection

Any association which is putting away any sort of delicate information is required by lead to have an innovation based cautioning set up, a dedicated observing and audit technique, and a procedure to facilitate the breakdown. Security arrangements are a required measure in the present systems, generally, clients will be available to episodes.

6. Future Work

The yield of the product that truly furnishes the steadiness of both security and the UI, this will be of multitudinous advantage. A large portion of the work that is performed on the harmony amongst ease of use and security appears to concentrate more on the verification strategies yet it needs to go outside simply this piece of a framework to take into thought the combination into each piece of the UI plan.

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