

Mobile Application: Usability Evaluation Review

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Abstract

Mobile devices are evolving and becoming more complex with a variety of features and functionalities. Many applications that were originally deployed as desktop applications or web applications are now being ported to mobile devices. Due to this the usefulness of mobile devices has increased greatly in recent years allowing users to perform more tasks in a mobile context. This increase in usefulness makes it compulsory to evaluate the usability of mobile application and mobiles as well. Usability evaluation is an important step in software development in order to improve certain aspects of the system. However, it is often a challenge especially when it comes to evaluating applications running on mobile devices because of the restrictions posed by the device and the lack of supporting tools and software available to collect the necessary usability data.

I. Introduction

The usability of the mobile applications, however, remains a thorny issue. Usability testing of software applications developed for mobile devices is an emerging research area that faces a variety of challenges due to unique features of mobile devices, limited bandwidth, unreliability of wireless networks, as well as the changing context (environmental

factors). Traditional guidelines and methods used in usability testing of desktop applications may not be directly applicable to a mobile environment. Therefore, it is essential to develop and adopt appropriate research methodologies

that can evaluate the usability of mobile applications.

This paper aims to review previous studies and current techniques for usability evaluation through systematic literature review (SLR). In the next section, a review of several usability evaluation techniques will be presented and also various challenges that have to be considered while evaluating usability of mobile applications are highlighted. Finally, the conclusion will take place.

II. Related Study

Usability is a quality attribute that assesses how easy user interfaces are to use. The word "usability" also refers to methods for improving ease-of-use during the design process.

Usability is defined by 5 quality components:

- **Learnability:** How easy is it for users to accomplish basic tasks the first time they encounter the design?
- **Efficiency:** Once users have learned the design, how quickly can they perform tasks?
- **Memorability:** When users return to the design after a period of not using it, how easily can they reestablish proficiency?
- **Errors:** How many errors do users make, how severe are these errors, and how easily can they recover from the errors?
- **Satisfaction:** How pleasant is it to use the design?

There are many other important quality attributes. A key one is utility, which refers to the design's functionality: Does it do what users need?

Usability and utility are equally important and together determine whether something is useful: It matters little that something is easy if it's not what you want. It's also no good if the system can hypothetically do what you want, but you can't make it happen because the user interface is too difficult. To study a design's utility, you can use the same user research methods that improve usability.

- Definition: Utility = whether it provides the features you need.
- Definition: Usability = how easy & pleasant these features are to use.
- Definition: Useful = usability + utility.

Usability engineering is the discipline that provides structured methods for achieving usability in user interface design during product development. Usability evaluation is part of this process.

Usability Evaluation consists of following Steps :-

1. Specify usability evaluation goals.
2. Determine UI aspects to evaluate.
3. Identify target users.
4. Select usability metrics.
5. Select evaluation method(s).
6. Select tasks.
7. Design experiments.
8. Capture usability data.
9. Analyze and interpret usability data.
10. Critique UI to suggest improvements.
11. Iterate the process if necessary.
12. Present results.

R. Bernhaupt has classified following Usability Evaluation (UE) methods[6] :

- User testing (in the laboratory and the field)

- Inspection oriented methods (like heuristic evaluation and cognitive walkthrough)
- Self-reporting and inquiry oriented methods (like diaries and interviews)
- Analytical modeling (task model analysis and performance models)

Figure 1 - Summary of Methods used for UE

Ivory has also mentioned the same methods in his thesis along with techniques used in each class, summary of which is shown in Fig -1[3].

Challenges in Usability Evaluation of mobile Application :-

Unlike traditional testing, mobile application testing requires special test cases and techniques. The wide variety of mobile technologies, platforms, networks and devices presents a challenge when developing efficient strategies to test mobile software.

This section discusses the challenges that have to be considered while testing mobile applications in comparison with traditional application such as desktop application testing.

Variety of the Devices is available in market. That means we have devices with various screen resolutions, various screen sizes etc. And I can say number of devices available is directly proportional to efforts needs to be taken for test cycle i.e. the more the devices, more is the test cycles need to be performed on various devices and which increases cost. Using emulators is out of scope because it time consuming and it's always better to test application in actual environment i.e. on actual devices with limited resources. For e.g. testing of location based applications on emulators is a very tedious job.

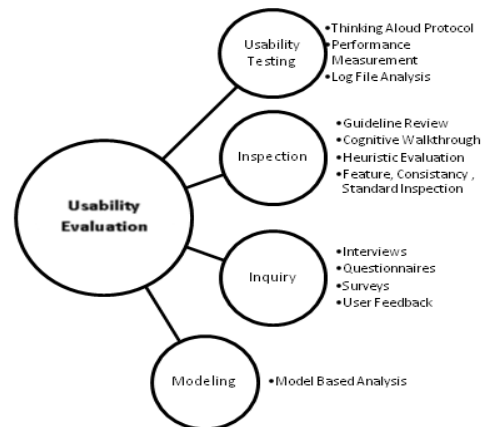
In this case, we generally target screen resolutions and screen sizes which can cover most of the devices. Sometimes it also depends on the devices used by targeted audience.

Different OS versions, like various screen sizes and screen resolutions this is also one of the major challenges faced in mobile app testing. It is observed that though a new OS version is launched in market, still there are customers who use its older versions hence test cycles with different mobile OS versions need to be carried out to support to maximum mobile app customers.

Here, testing application on different OS versions and device hardware combinations is necessary to launch a robust and compatible application. It includes testing Application to ensure that it should be backward as well as forward compatible. That's why it's one of the major challenges to test mobile application on different OS versions.

Frequent changes, Mobile apps continuously evolve based on reviews & feedbacks for delivering richer user experience or enhance functionalities causing frequent changes in application. These frequent changes are actually a nightmare in mobile application development for both developers and testers. Numbers of applications are launched into the market daily with new features and designs and to cope up with them more changes are proposed. And hence there is lot of rework for developers and testers.

It needs a better understanding and communication with client to resolve such critical phase in middle of application development where one has to face frequent changes. We have to decide and freeze the scope of new change requests and a border line to limit these unexpected changes mutually agreeing with client.



Automation is still a big question for mobile application testing. The reason mainly, as mentioned above, frequent changes in application causing frequent changes in test scripts.

Because of the multiple platform possibilities, the potential of retesting and regression testing is huge. For longer duration projects we can leverage automation. Smoke testing or regression testing can be automated up to a certain limit.

Meeting tight deadlines, mobile application delivery is pushing traditional delivery approaches to the breaking point. Teams are being asked to produce value in weeks instead of months or years. Test environments are expensive, difficult and time consuming to configure. In such a short span it's very difficult and time consuming to isolate defect root cause. Agile methodologies need fast iterations but testing delays are becoming a bottleneck.

It's sometimes not possible to buy more time for testing or bug fixing activities but a smart solution for this, that we follow is to report the issues while testing the application and getting them fixed parallel, side by side to testing from development team. It saves time remarkably and hence productivity increases. While developing mobile applications developer and tester need to work very closely to meet such tight deadline.

These are the major factors which affects mobile app testing. Careful selection of target devices, connectivity and tools can ensure a cost effective mobile testing process. Also, combining the

solutions to mobile specific aspects of application testing with traditional best practices and testing processes can effectively address the challenges of mobile application testing.

III. CONCLUSION

The mobile applications testing need additional test cases in the view of application usability. The usability test case are to be also included to answer following:

- The battery life: How good is a mobile device that supply power the application?
- The network connectivity: Minimally the application should not crash; ideally the user should not even notice a difference.
- The application Speed: Even with slower processors and network users expect desktop.
- The application navigation: With low attention need to be highly intuitive.
- Data storage: without large internal storage the application must be able run.
- Peripheral devices: Attached Peripheral does not affect the application.
- Background processes: The effect the processes running in the background should not affect the other the application.

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