

Mobile Application Development: Issues and Challenges

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Abstract — Now-a-days the applicability of mobile application has increased exponentially. The dependence on the services delivered by mobile application has certain uncertainties accompanied with them. The acceptance of GUI, understandability of the services delivered, compatibility with varying Smartphone architecture, ease of navigation, aesthetics and flow of controls and menu, portability, security, reliability etc are the main challenges that need to be dealt with seriousness to remove any loopholes or vulnerabilities if present. In this review study some common challenges that could be barrier to the success of any web application if not addressed are highlighted.

Keywords: Mobile application, Mobile Application Development, Development challenges, security issues.

I. INTRODUCTION

The ubiquity of mobile devices and the dependence on mobile communication has left no individual from getting used to it. The growing demand and fame of mobile telephony has exponentially increased from past few decades and people are completely relying on it as a primary source for communication. As dependability on mobile communication increased there is a need to have well equipped and sophisticated system to monitor the challenging nature the mobile communication. Mobile communication is not only limited to setup voice connectivity with remote client or machines but can establish multimodal rather multimedia communication links wherein both data and voice are transmitted. Due to the growing infrastructure of mobile communication system the diversity in using mobile application have potentially increased to revolutionize the existing communication standards.

With the advent of massive surge in mobile communication the demand of applications run on mobile platform has proportionally increased. To cater the requirements of mobile users a specialized discipline, mobile application development got evolved. Mobile application development is purely aimed to develop software application run on mobile phones or mobility enabled devices. Mobile application developers develop software application typically called as mobile application for mobile devices to render the service for which it has been designed. The challenges like security, robustness, reliability, availability and usability remain concerns when it comes to development, deployment and dependence.

The development of mobile applications is openly challenging to produce quality applications with less vulnerability of failure. The increasing number of both mobile devices and potential applications are forcing developers to overcome different developmental and deployment obstacles through the use of sound practices. The dynamic and geographically varying location of mobility enabled devices and availability and manufacturing of new smart phone devices and makes the system more challenging to ensure quality of services attributes like security, robustness, reliability, availability and usability remain concerns when it comes to development, deployment and dependence. At the same time, this new picture also brings new development queries- including how to create simple yet effective application, how to secure the data, that is uploaded and downloaded.

As mobile applications are like other desktop based applications but the only difference is that they use mobile platform both hardware and software environment to deliver their services. The popularity of mobile based information dissemination as exploded like anything. All

the modern-day organizations ranging from very small to very large rather complex have switched from traditional desktop based publishing to mobile phone or Smartphone based information publication, availability and maintenance. Keep the constraints of mobile interface dimensions in consideration it is pretty challenging to cater and manage the information requirements of users plugged into a small screen. What to display as primary menu, how to display it. How to design navigation flow? How to design basic interface? How to increase accessibility and understandability of the content? How to maintain the performance attributes of application with varying hardware restrictions of handheld devices. In short there are lot many challenges to address to maintain and deliver motivational, trustworthy, reliable, robust and tether-less quality services among the bonafide users.

II. Mobile Application Development (MAD)

Mobile Application Development (MAD) is the process by which mobile based applications are developed for small handheld devices to deliver the services specified for them. Mobile application development can be said to be as a similar developmental strategy as implemented for the development for conventional software applications. But the reality is that both these applications that are conventional and mobile application have certain differences in certain aspects. The key characteristics and features that differentiate mobile applications from conventional desktop applications can be broadly grouped into 3 categories:

1. Hardware
2. Software and
3. Communication

To maintain peer-to-peer connection in mobile communication literature has glorified several challenges that need to be addressed to establish successful communication.

Leigh Williamson listed the unique challenges for Mobile Application Development such as form factors, user input technology, usability and user interaction design [1]. Wasserman et, al. identified issues related to Mobile Application Development based upon development Process, tools, user interface design, application portability, quality and security[2]. Similarly Dehlinger et al. in their study identified four main challenges for Mobile

Application Development engineering. They observed these challenges particularly when creating universal user interface, when enabling software reuse across mobile platforms, when designing context-aware mobile applications and while balancing agility and uncertainty in requirements [3]. Dye et al. studied that due to ubiquitous use and deployment of mobile application security concerns are growing and to address them has become a main concern[4]. Mobile Application Development has become the support of Mobile Communication System and with continuing increase in number of hardware and software; the number of challenges faced also increases. The increasing complexity of devices, the escalating market for applications and the growing edge of wireless networks all work together making Mobile Application Development an industry with great potential.

III. General challenges for mobile developers:

1. User experience: using a mobile device is different from working with a desktop or laptop. The smaller display and different styles of user interaction also have a major impact on interaction design for application development which in turn has a strong influence on application development. The mobile user interface is based around widgets, touch, physical motion and keyboards rather than familiar windows icons menus, pointer interface style. Over 50% of participants indicated that the smaller display, screen layouts and different styles of user interaction have a major impact in designing mobile application[7]. If an application needs to run on a Smartphone and must be usable by someone whose main task at the moment is not to deal with the application, the user interface quite obviously needs to be completely different from that of a desktop application. It needs to adapt a small screen, to input and output capabilities that are on hand limited compared to traditional computers out that on the other hand to comprise modalities not available in classical settings. The developer needs to make sure that the interaction is adapted to the current situation of the user e.g., switch between visual and acoustic output.

2. User interface: The best interfaces mobile application may borrow from traditional web application, but must often be redesigned to highlight the most commonly used functions and to make most effective use of the screen and the mobile user interface paradigm including both the user input and the associated motion and location information . Mobile developers find it challenging to make best possible use of limited screen space and user interface design takes a greater importance than ever.
3. User input technology: the input methods offered for mobile devices are intricate and require a certain level of proficiency. The physical difference for mobile applications is that the mechanism for user inputs is different. Mobile devices have pioneered the use of non keyboard “gestures” e.g., touch, shape and pinch as effective and popular methods of user input. Gestures must be planned for and supported for a satisfying mobile application user experience.
4. Data management: the main question that needs to be answered with respect to data management in mobile applications is what data to store on the mobile device, how to get it there and how to keep it synchronized with the data on central server. The underlying assumptions here are that mobile users will not constantly be connected to the central server but will need access to data nevertheless. Data thus need to be transferred to the mobile device and to be managed locally before being reintegrated with the original data source. In other words, a mobile device must have the capability to access data either through a web browser or through a native application. If data exists in a backend database the application should be designed in such a way that it keeps track of cost network connection time so that it can roll back to the last known data and synchronize as soon as connection is recovered back to update the data.
5. Portability: For most software systems, portability is considered an attractive quality. According to Mooney the biggest reason for this is there are very few documented approaches to portability strategies and problems, which

causes development teams to almost guess how they should design and implement their software to get the desired level of portability [5]. Another study have identified four questions in his study to address portability issue[6]:

- a) For what class (or classes) of environment should future portability be considered?
- b) What degree of portability is desired for various environments in these classes?
- c) What extra development costs, if any, are acceptable in order to achieve these portability goals?
- d) What reduction in the quality of implementation if any is acceptable to achieve the desired portability?

If these questions are considered and answered accurately the designer should be able to select a methodology which can help to produce the desired portability while still being cost effective.

6. Security: wireless transmission in mobile devices is vulnerable to attack by some unauthorized users as they download and upload data wirelessly, in potentially increase locations. About 30% of participants believed that mobile developers should not only integrate security capabilities but should also consider Encryption of sensitive data across open or unsecured networks[7]. It is the responsibility of mobile developer to preserve data, protect data and secure the mobile application from end-to end including software as well as data transmission and server.

IV. Non Functional Requirements:

There are number of non-functional requirements that play pivotal role ensuring mobile application to deliver services with acceptable levels of Quality of services (QoS) standards. The main and fundamental non-functional parameters for mobile applications are Reliability, quality, security etc. The mobile environment differs from traditional environments and this raises some new research questions such as:

1. Do mobile applications behave differently when connected to telephone network (3G,4G) than when using Wifi or Wimax connection?
2. Are there new techniques needed for assuring data integrity. Does loss of connectivity or battery power represents a risk to program or data integrity.
3. How does a developer create Mobile Application that will maximize battery life and resource usage?

V. Conclusion and future work:

The study raised certain objectives that need to plan with grave consensus to ensure development, deployment, usability, and maintenance of any web application to deliver its purpose in efficient and motivational manner. As the applicability of mobile applications has surged with unprecedented pace, dependence on them has equally increased. To ensure persistence and integrity in the system, mobile application developers should make their development agenda step ahead to incorporate these challenges to achieve better performance and acceptability when it comes to the challenges faced by the common clients. The main purpose of this study is to highlight the common issues faced by mobile application users so that these can be dealt to minimize their negative impact in mobile application usability as mobile applications are the new way of software development considering that sales of mobile devices are surpassing those of desktop computers. The developer should have to consider user

experience as well as time and cost constraints to make the best choice.

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