

International Journal of Computer Science and Mobile Computing



A Monthly Journal of Computer Science and Information Technology

ISSN 2320-088X

IMPACT FACTOR: 6.017

IJCSMC, Vol. 6, Issue. 9, September 2017, pg.15 – 20

Mobile Application Development: All the Steps and Guidelines for Successful Creation of Mobile App: Case Study

Kishore Baktha

Student, Department of Information Technology, SSN College of Engineering, Chennai, India
kishorebaktha@gmail.com

Abstract— *Gone are the days when the mobile phone had to ring to capture our attention or the computer was the only device people used. The mobile application field has been rising at a tremendous rate with the drastic increase in the number of mobile apps in various mobile phones and tablets. Mobile apps are essential as they provide functionalities that can server useful purposes such as finding a location or booking movie tickets online. In today's fast paced world, mobile marketing is becoming very competitive. To ensure visibility of your app in such complex scenario, a specific approach needs to be followed to ensure a successful app development. In this paper, numerous factors that can play a significant role in successful app development are discussed with specific examples and explanation.*

Keywords— *Mobile Phone, Mobile Application development, Mobile apps, Mobile Marketing, Successful app*

I. INTRODUCTION

Mobile Application Development refers to the process of making application software for handheld devices such as mobile phones and Personal Digital Assistants. Through the usage of mobile apps, the user is provided with various features that will enable him to fulfill all his needs and much more. Apps should be interactive to the users. Apps can be downloaded from various platforms such as Google Play Store and iOS App Store. There are free apps as well as paid apps. Some apps can be used for free for a specific amount of time before subscribing for premium membership. For apps with a price, about 20%-30% goes to the distribution provider(Example-iTunes) and the rest to the producer of the app.

For developing apps, the constraints and features of mobile devices needs to be considered. For example, mobile devices have lower processing power, run on battery but have more features such as location detection. Wide range of screen sizes and hardware specifications also needs consideration. For developing apps, specialized integrated development environments such as **Android Studio** or **Eclipse** is required. The app is first tested using devices called emulators which is a software simulation of the actual hardware device and then finally field testing is performed [1]. Mobile user interface(UI) Design is another essential part in application development. The UI involves considerations of contexts, screen and user input and output mobility. The user manipulates the application via input and then the expected results are displayed via the output. There are mobile UI constraints such as limited screen size. Mobile UI is considered as front-end and they rely on back-ends to support access to enterprise systems. The back-end facilities include data routing, security and authorization and is provided by middleware components such as Mobile Backend as a service(MBaaS).

The paper begins by exploring challenges for mobile application development followed by various steps vital for the development of mobile app.

II. CHALLENGES CONCERNING MOBILE DEVELOPMENT

While developing a mobile application, the focus should be more on 'what not to do' rather than 'what to do'. Developers face several challenges while working on a new application. Few of them are listed below.

A. App Noticeability

Due to the increase in apps being developed, there is also a commensurate increase in competition in the mobile app market and there is a constant pressure to create apps which get noticed [2]. At the end of the day, you want people to download your product.

App Store Optimization(ASO) is a crucial step for unleashing promising app to the world. Just like search engine optimization, ASO involves using keywords and phrases to direct user to a product. The main aim is that you want your product to show up while searching for a term using search engines such as Google. You can look at the competitive apps in the term you are looking and then look at the items in ranking order that pop up while searching.

Icons and colors is another important aspect to be considered. The first thing that catches any user's attention is the icon being used. Try to enrich the appearance and make it more attractive to tempt the user to click on your application and explore it.

B. Screen Variability

Users have different hardware devices where the screen sizes vary to great extent. Designing only for the latest platform is a bad idea. Therefore, it is necessary to create an app which runs on as many different devices as possible [3]. Moreover, you need to be concerned about the OS as well- Windows, Android and iOS mainly. Each one has their own design patterns and UI.

For example, a Blackberry phone might have a small screen with a physical QWERTY keyboard, as on the Blackberry Curve or it might have a larger touchscreen and a virtual keyboard like the Blackberry Storm. The storm requires large buttons for touchscreen interaction while the curve will require smaller elements for navigation elements so that they'll fit on a smaller screen.

It is paramount to have a responsive design. It will give more flexibility and thus can be adjusted for different formats and screen sizes. To handle technical OS issues, having a comprehensive testing phase helps. Releasing beta version of app can also help handle the issue.

C. Performance vs Battery Life

App performance and consumption of battery is also an important consideration after design and interaction. The main challenge is to design an application that is bug-free and using minimum possible amount of battery. This is essential as mobile devices have limited processing as well as power as they run on energy derived from batteries. If your app consumes too much power, there are high chances of user eschewing the use of app and trying for similar app to save battery power. Performance is dealt with in the final part of the design phase. Moreover, different people perceive app performances differently. If there are lot of images, there might be flooding of the cache and it will disrupt the performance.

Performance is complicated by thousands of different devices all with different computing power [4]. The accomplishment of making an app run successfully in the targeted device is a great achievement on its own. Engaging the user to the app is an arduous task and any delay and slowness of app is one of major disasters in user engagement. It is believed the reason people uninstall the apps due to performance issues is around 52% and is second only to user interface design which tops at 58%.

III. PROPOSED SOLUTION

A. A GREAT IMAGINATION

Start by finding the problem in the workplace and solve it in a mobile-first way. This is the fundamental difference between a good app-that solves a problem and a great app-that solves a problem in mobile-first way. More often, the focus is on number of data collected rather than its availability on a mobile device. This will result in a data-centric app but not a user-centric app.

Next, the features of your app must be decided. The more features and benefits it provides, the more likely chances of users getting intimidated by the application and using it more frequently. Do not build a mobile app just to please the eye of the user. It must do something else it will become forgotten eventually.

Some of the key features that are required are-

- **Touch support**
Due to user-friendly experience and simplicity that touch screens provide, it is imperative that the mobile app must support touch screen rather than the conventional way of using keyboard/mouse. A mobile app must be intuitive and require minimum attention from the user.
- **Working offline**
Great apps must be able to work offline. The main feature of being mobile is that wireless data services aren't available in all locations. The app must be able to provide certain features in offline mode as well.
- **Responsive Design**
Responsive design greatly improves the user-experience. The ability of dynamically adjusting layout according to the screen dimensions is an essential feature. A brilliant design is by having the application provide the user-interface according to screen dimensions and generate optimized experience from a single code-base so that you don't have to worry about details.
- **Updates**
The app should provide updates to fix bugs and add more features to the app. In this dynamically changing world, latest problems and needs arises each day and your application should be proportional to the user needs to fulfill their satisfaction.
- **One Source**
It will unsophisticated and expensive to port the app to each target platform's native development environment. You will need to have a version for iOS, another for android and another for web browser and so on. The best approach is to have a single development environment that targets different platforms and varying screen sizes.

B. DESIGN OF APP

Design is a principal factor for success of an app. It is proportional to the usability of the app.

The UI design should catch the attention of the user. Multi-touch gestures for touch-enabled devices and include platform design standards can be enabled as well [5]. It creates an instant impact in the mind of the user. What an app looks like is the first aspect people look at before even downloading and testing the app. Creative Design is a sum of User Interface(UI) and User Experience(UX) [6].

Try to make the app look fun. This means inclusion of bright colors, cool textures, 3D effects and many more options. **Wunderlust** is a popular app which takes advantage of creative design elements while keeping overall interface clean and intuitive. Forgo simplicity to some extent to keep the users engaged. For example, **Brewski Me** is a popular drinking app and everything including the background color, textures, etc. catches the eye of the user.



Fig1.Snapshot of Brewski Me App

UX/UI must have-

- **Specific mobile-only functionality** – Make sure that the product will fulfill the user's mobile needs and functions. Also, the end experience should be commensurate to the function [7].
- **Design core features for target audience-** Design features by keeping the target audience in mind. For example, if it is shoppers, modules such as display of items and payment should be carefully implemented. Nevertheless, all features must be provided.
- **Use and Control of Multimedia-** Presence of multimedia such as image, audio and video enriches design. Also make sure user has control over the media and don't include many to avoid taking up lot of memory.

UX/UI must not have-

- **Confusion of Web UX for Mobile UX-** Web UX and mobile UX are several aspects. Simply scaling down UX features of web page is not the same as designing the app for mobile platform. This is because they run on different platform and different audiences.
- **Avoid Building of app to simply justify your ideas-** Don't get simply build the app to justify your ideas. Feedback, growth and change are essential factors in development cycle.

C. INTEGRATION OF APPROPRIATE ANALYTICS TOOL

It is necessary to have appropriate analytics tool to give a detailed picture of how many visitors use the application, how they ended up to the application and the possible ways of making them to keep coming back. Mobile analytics will help you calculate the number of downloads, the amount of money the application has brought you and even the most recent opinions of the app. Few of the basic metrics for mobile apps are-

- **Activation-** It refers to initial experience with your app
- **Acquisition-**It refers to channels the users came from
- **Retention-** It refers to number of users opening the app repeatedly after download
- **Referral-** It refers to users who share the app experience with friends, family and acquaintances and encourage them to download it
- **Revenue-** It refers to money generated from the application

Flurry is a popular mobile analytics tool for monitoring various kinds of statistics. App developers use it to track user data and it is very ubiquitous. The company collects approximately 3 terabytes of data every day. AppCircle Re-engagement is a kind of service provided by Flurry that increases the user-engagement after the download. Flurry keeps the new users active and brings back lapsed users with impressive results.

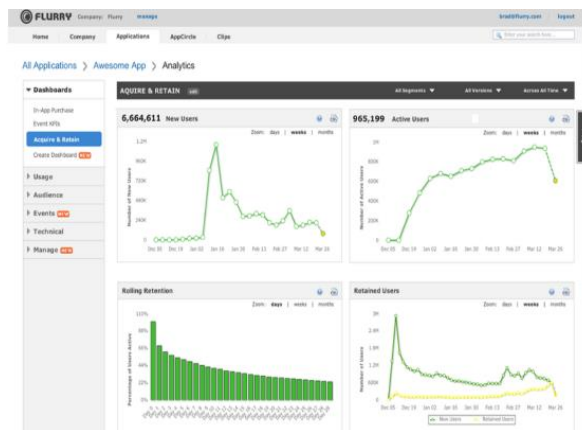


Fig2. Flurry Dashboard

D. DEVELOPING A PROTOTYPE

After deciding on the approach, a prototype must be developed. It is process of turning your idea into an application with some basic functionality. It gives the users to visualize and see the benefits that your app offers rather than just reading the descriptions of it. Prototype allows you to show and test the basic functions of the application using the least cost and time possible. It is like Minimum Viable Product(MVP) but you won't be able openly test your prototype intended market especially if you are designing for iOS, where Apple must review and approve your app before it can be circulated.

Mobile apps today are more difficult to make than websites and there is heavy competition. To have hope of success, phases must be gone through in professional manner starting from prototype to final product. Moreover, building a prototype and testing it will make you identify the flaws in your design and whether any improvements can be made to have a better design. Users can play with the application and give you valuable feedbacks before beginning development. It will save considerable amount of money and time as the flaws and improvements can be identified in the early stage itself rather than in the final stage of the application where making changes will be a tedious task.

There are several tools that are available for prototype creation. One such tool is **Balsamiq**. Simple interactive prototypes for demos and testing can be created. It will be enjoyable to those who love

sketching as it resembles a whiteboard sketching area. Obtain templates for iOS, Android and Blackberry functionality which will be very useful. It is basically a wireframe building application.

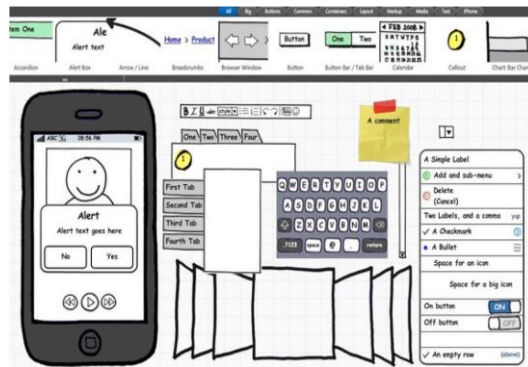


Fig3. Balsamiq snapshot

E. DEPLOY/RELEASE THE APP

It is imperative to plan properly before release of the app to the live and testing environments [8]. Some of the points to be considered by the application owner with regards to release of the app are-

- **Goals of First Release-**

The main goal of first release should be to optimize customer experience. There might be issues faced by the customer not involved in testing. Capture them using proper tools such as proper crash reporting or performance monitoring. Failing to do so will increase the customer acquisition charges as users will be reluctant to try your application again. Pay attention to metrics such as app load time, crash rates and UI latency.

- **Release approval-**

The mechanism of dealing with compiled code and mechanics of approval process is disparate to web-based peers. Though continuous integration is possible for builds of a new app, continuous deployment to end users is not possible due to the way in which the app store operates. Every app release is versioned so you need to pass the approval process for a new release. And finally, the mobile users may not upgrade to a latest version.

- **Geographic Launch Regions-**

Identify the scope or region targeting your application. Everything from design to testing strategy will be affected as hardware and software configurations vary from region to region. Proper plan must be in place to make sure specific devices and operating systems are supported. Service providers like Content Delivery Networks(CDNs) can help to test the app in proper constraints. More importantly most users focus only on localization regions but neglect internationalization. The user experience also needs to be altered to support the target regions.

- **Third party service providers-**

While concerning Software development kits(SDKs) and cloud services, there might be interdependencies between third party service providers and other teams within an organization [9]. A typical app might have minimum of 6 SDKs covering-analytics, monetization, performance, social media and marketing automation. Consider the dependencies and monitor service providers while figuring out if there is any backup plan in case any of these services fail. You will receive reports from disparate data sources about your application. Ensure API is available to extract data needed for proper reporting.

F. UPGRADE THE APP

Upgrade the app periodically to include new innovative features and improvements. A mobile app without upgrade loses its usability in the long run. Update of app focuses on 3 aspects-

- **Bug Fixes**

Apps need to be updated on a regular basis to fix the bugs of the existing application. No user would like to continue using an existing application with lots of bugs. To keep the user engaged and increase the usability of the application, updates with bugs fixed needs to be released more often.

- **Performance Improvement**

There are various aspects related to performance such as speed, memory and UI responsiveness of the application [10]. Memory is essential as the mobile devices have limited memory and users would not like the application to take up lot of space. UI responsiveness enables the users to perform desired tasks quickly rather than constantly wait for one long task.

- **New Features**

Introducing new features will greatly increase the scope and usage of your mobile app [11]. For example, if you're building a unit converter app, more number of country conversions in the application can be included. Also provide a feature for user to store conversions performed previously to save the wastage of time to perform the same conversions again.

IV. RESEARCH REFLECTIONS

The primary motive of this research is to list out all the challenges faced in mobile application development and the steps and guidelines for a successful mobile app. The key observations of this research are:

- The number of apps are growing at a rapid rate.
- The competition for successful app creation is high.
- There are various challenges faced by the developer in mobile app development.
- Steps need to be followed to ensure successful app development.
- Successful app development refers to more downloads, more users and less faulty bugs.

V. SUMMARY AND FUTURE WORK

Mobile apps have become an integral part of our daily life due to the various functionalities that they offer. Building a successful app which is devoid of bugs and more user-friendly is essential due to the rapid rise in number of apps. The developer should consider the challenges faced and try to overcome them by following the proper steps. Also, it is imperative for the developer to have an open-mind and should be well apprised about the current technologies, requirements and event in mobile application field. To build a successful, all the guidelines should be properly considered and followed appropriately to avoid the risk of losing users due to lamentable/falling apps [12]. Developing new and innovative apps will lead to a possibility of significant revenue. There are also few research observations made that could serve as a scope for future areas of research.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my institution (SSN College of Engineering) for providing me with network connectivity to do my research as well as offer me access to a variety of books to obtain valuable information.

REFERENCES

- [1] Mobile App, https://en.wikipedia.org/wiki/Mobile_app
- [2] Get App Noticed, <https://www.forbes.com/sites/karstenstrauss/2014/09/23/how-to-get-your-app-noticed-wisdom-from-app-annie/#316e98cd3675>
- [3] Ian Darwin, "Android Cookbook -Problems and Solutions for Android Developers", O'Reilly Media, May 2017
- [4] Performance of App, <https://www.safaribooksonline.com/library/view/high-performance-android/9781491913994/ch03.html>
- [5] Mobile App Design, <https://www.noupe.com/imho/the-importance-creative-design-for-mobile-app-user-experience.html>
- [6] Ryan Cohen, Tao Wang, "GUI Design for Android Apps", apress.open
- [7] UI and UX design, <http://colure.co/the-importance-of-ux-and-ui-in-mobile-app-design/>
- [8] Venkata N Inukollu, Divya D keshamoni, Taeghyun Kang and Manikanta Inukollu, "Factors Influencing Quality Of Mobile Apps: Role Of Mobile App Development Life Cycle", International Journal of Software Engineering & Applications(IJSEA), Vol.5, No.5, September 2014
- [9] Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi-2012
- [10] Prof. K.D. Tamhane, Mr. Wsim T. Khan, Mr. Sagar R. Tribhuvan, Mr. Akshay P. Burke, Mr. Sachin B. Take, "Mobile Learning Application", International Journal of Scientific and Research Publications, Volume 5, Issue 3 ,March 2015
- [11] Ryan Cohen, Tao Wang, "Android Application Development for the Intel Platform", apress.open
- [12] Zigurd Mednieks, Laird Dornin, G. Blake Meike and Masumi Nakamura, "Programming Android" ,O'Reilly