

Entertainment Mobile Applications

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Abstract: This paper explores the impact and value of entertainment mobile applications over the market, how it supports different business affairs and covers most consumers age ranges. It focuses on investigations, reports and statistics from different sources regarding relation between the entertainment market and mobile applications designed for it. Besides the points mentioned previously it also applies a use case used during the research. Based on information provided from different resources and past two years impact of COVID-19 over the entire world, we can observe an increased interest into these types of applications. A lot of new products came live thanks to the increased demand of this market area. The entertainment world has changed since then and transformed from a simple content providing service to a solid solution that provides visualization emotions as well, new user experience, new market fragmentation, new researches in consumers demands and interest in integrating complex systems in order to deliver all mentioned previously. This includes as well support for different ages. Knowledge gathered around this market direction in association with mobile application trends, the statistics founded during the research are provided by private institutes and might not contain the latest exact information about it. Mobile applications represent a major sector in the world market that cover a bit number of consumers. Based on people's demand many business affairs were created, extended and increased their revenue. This represents an interesting area to explore new use cases for using modern mobile applications and analyze their impact over business.

Keywords: Engineering, Mobile Applications, Entertainment, Accessibility, In-App Purchase, Advertising, Large Scale Systems, Mobile Marketplace.

Introduction

Mobile development industry is gaining more and more interest in the last couple of years. People tend to spend more time with their mobile devices based on an activity basis, around 4 hours according to latest mobile consumer statistics [1], that means around 25% of their daily activity. This environment creates a powerful platform for engaging consumers. The entertainment market place is an interesting, complex and severe world. It was always based on the consumers interests. This area needs to be under permanent adjustment and in trend satisfying the existing user's needs. According to last year's reports, the global market transactions reached USD 91.3 Billion [2] only mobile applications in the entertainment category, that represents an impressive number. Mobile applications allow gain diversified audience based on different criteria like age, interest,

preferences, etc. Having a big audience with diversified requests was always hard task to maintain, at this point the mobile applications come and help the business owners with providing additional information for the data center and providing mobile capabilities to support people with disabilities or at old age.

Mobile Applications

Mobile Devices

This period is not considered anymore age of mobile phones and tablets, they are not anymore, the only part limiting the mobile world. They now are oriented for supporting the operating system.

The most popular mobile operating systems used over the entire world are Android [3] (developed by Google) & OSX [4] (developed by Apple).

Today a mobile device is considered the following as well:

- Smart TV’s
- Android TV [5]
- Apple TV [6]
- Wearables
- Wear OS [7]
- Watch OS [8]
- Cars
- Android Auto [9]
- CarPlay [10]
- custom devices
- devices that support Android OS [11]

Mobile Development Frameworks

Selecting a mobile development framework is an important key for creating an entertainment mobile application. It depends on many factors like development time, cost, maintenance and time to implement new features dominating the mobile market places. These frameworks can be classified in two major categories, native mobile development and hybrid mobile development.

Native mobile development frameworks are:

- Google Android Native Development [12]
- Apple iOS Native Development [13].

Hybrid mobile development frameworks have a lot more of ramification. The main scope of this approach is to use a single code base and achieve same results for both platforms Android and iOS. The main dominant hybrid frameworks in the mobile world at the moment are:

- React Native [14]
- Flutter [15]
- Xamarin [16]
- Ionic [17].

Each development platform has its advantages and disadvantages. These differences we can see in the following Table 1.

Selecting the type of mobile development framework represents an important decision that has to be done at the beginning of any development. On later stages when the product passed several cycles of development, it can be modified or changed completely.

<i>Criteria</i>	<i>Native Development</i>	<i>Hybrid Development</i>
Cost	High	Medium - High
Number of developers	One for each platform	At least one developer
Development time	Fast	Medium
Native mobile features	Complete adoption	Partially adoption
Performance	High	Medium
Maintenance	High	Medium
Product Complexity Support	High	Medium
Dependency on third-parties	None	Depends
Access to hardware capabilities	Available	Depends on third-party integrations

Table 1. Comparison between Native Development & Hybrid Development

Mobile Accessibility

Mobile Accessibility Guidelines are a set of technology agnostic best practices for mobile web content, hybrid and native apps.

Different type of guidelines is recommended or required to be used depending on the type of the project or country the targeting audience is located, due to the geographical compliance that needs to be met [18].

Mobile accessibility requires detailed knowledge that supports both the development of digitally accessible products and the remediation of inaccessible digital products.

Those accessibility features are:

Spoken feedback. The TalkBack function allows the user to interact with their device using touch and spoken feedback. The TalkBack tool describes each user action and provides spoken alerts and notifications.

Select to speak. Select to Speak limits the spoken

feedback function to only user-selected items on the screen, reading or describing them aloud.

Switch access. For users with limited mobility, Switch Access provides an alternative to the touchscreen. This enables the user to instead use a switch, keyboard, or mouse.

Voice commands. If using a touchscreen is difficult, the Voice Access app allows users to control their device using spoken commands. This feature can be used to open apps, navigate, and edit texts hands free. Voice Access is currently only available as a beta release in English only.

Braille display. The BrailleBack feature allows people to connect a refreshable braille display to an Android device via Bluetooth. BrailleBack can also be integrated with TalkBack for a combined speech and braille experience.

Display size and font size. These settings allow users to change the size that items are displayed on screen as well as the font size.

Magnification gestures. Allows temporary zooming or magnification of the screen.

Contrast and color options. This can be useful for people who are color-blind or have partial visual impairment to improve the legibility of text through inverting colors, or applying color correction. **Agile**

Captions. Users can turn on captions for their device as well as specify the language used and make style adjustments to the captions.

Methodologies for product development

There are many methodologies used for developing mobile features or apps from scratch for the entertainment market. All these techniques are unique and most usually matching the company profile, so from a definition they all are using hybrid approach, meaning taking what's working for them and for the end users. This approach is considered one of the best matches, because it helps to companies to grow.

If we talk specifically about the methodology, most of them cross with the Grounded Theory approach and Agile methodology. These two methodologies contain the basic principles that are used for developing the company's framework.

Grounded Theory

Grounded Theory is a methodology of interpretation that can be used in research targeting to build a theory or investigate a phenomenon in a new context. This method is considered as a unique technique, where the theories are obtained from data not from existing theory [19]. As the literature has mainly addressed the phenomenon of mobile application adoption from the user's points of need or view, and there is not an integrated final model considering the whole process of mobile application development.

Grounded Theory, is a theory derived from data which collected systematically during the research process and analyzed. In this approach, collecting and analyzing data and the theory, which eventually derived from data are in close contact with each other. Researcher, rather than beginning its study with pre-conceived idea, begins the work with a specific field of study, and allows the theory to emerge from the.

In addition, we use the Grounded Theory method to identify the factors affecting mobile application adoption, particularly in the field of entertainment. These factors obtain through the generation of codes and categories during the analysis process [20].

Agile represents an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches, issues, bugs etc. Instead of betting everything on a single rocket launch, an agile team delivers work in small, but consumable, increments. Requirements, plans, and results are evaluated continuously so teams have a natural mechanism for responding to change or adjustments quickly [21].

Whereas the traditional "waterfall" approach has one discipline contribute to the project, then "throw it over the wall" to the next contributor, agile calls for collaborative cross-functional teams. Open communication, collaboration, adaptation, and trust amongst team members are at the heart of agile. Although the project lead or product owner typically prioritizes the work to be delivered, the team takes the lead on deciding how the work will get done, self-

organizing around granular tasks and assignments. Agile isn't defined by a set of ceremonies or specific development techniques. Rather, agile is a group of methodologies that demonstrate a commitment to tight feedback cycles and continuous improvement.

Initially, according to Agile Manifesto [22], this methodology was developed by software craftsmanship's to help to deliver healthier software products on the coding stage. Later this approach was applied to the other layers and stages of software development life-cycle.

Data Analysis

Data analysis using Ground Theory as method commences with coding, entailing the converting content into codes after information are transcribed into textual content. Coding is fundamental analytic, that is the main step for identifying the similarities and differences within data to categorize and label the data. If we take the scope of mobile applications we can observe the following concepts, categories and main categories that we need to consider. They are mentioned in the following Table 2.

Concepts	Categories	Core Categories
Considering App income model in order to better adoption	App income model	App Marketing
The use of new methods of in-app advertising (push notifications)	App Advertising Methods	
Using virtual Marketing to introduce an App		

Launching Social pages and websites to promote an App		
Creating advertising campaigns to introduce an App		
Conducting initial tests to get feedback about Potential errors	Beta test	App support
The maintenance and upgrades because of app errors and bugs	App updates	
The maintenance and upgrades due to hardware changes such as screen sizes		
The maintenance and upgrades to add new features		
Mobile application marketplaces and other organizations assistance	App support	

Innovative and original Idea	New idea	App Idea
Scanning potential users and audience group to identify new requirements	User needs	
Avoiding versatility Apps	Specific idea	
Scanning successful Apps	Successful apps scanning	
Compliance with social norms and values	Cultural values	
Considering design standards such as the graphical user interface (GUI)	User interface	App design
Employing experienced design team and experts		
Low error and technical problem rate	Perfect performance	
Application security and accuracy		

The high degree of usability, ease of use, aesthetic appearance of the device and response time	User experience	
Bilateral interface in particular for entertainment and game apps	Interactive App	
Appropriate name and icon	App Icon and Name	

Categories extracted using Grounded Theory

Use Case

During the research on “Impact of mobile applications” was implemented a use case related to mobile applications in the entertainment. The scope of work for this was to develop an android application that will be installed on different custom devices, especially those that were mounted inside new cars. An example of the application running on the car you can see on Figure 1.

The application with all its content passed the entire development life cycle around 9 months and continues until today to be under maintenance. The application was strictly developed under required accessibility constraints and safe-security points (we were not allowed to let the driver play with the application while he was driving a car).



Table 2. Figure 1. Android Streaming app running on custom device.

Table 3.

Table 4. Even though this was a small niche that covered a part of the market, the analysis and statics showed us interesting stuff that need to be considered while developing such apps:

- The streaming server has to have elastic performance, we often saw on specific period of time when it reaches its peak
- Analytics provide a lot of information, not only regarding the preferences, but also the behavior of the user
- Adding accessibility considerable increased the number of audiences for the application
- From 100.000+ downloads, we had an average 1500-2000 active users
- When the server was on its performance peak, at that moment were over 10.000 active users

Recommendations

Developing a mobile application for any type of industry is not a cheap and easy task. In order to avoid many confusions on what a mobile application in health care needs to have, the product owner or stakeholders must decide and define the following points: Product Stage, Feature list, Time to market and Security.

A. Product Stage

Defining at what stage the current product is represents an important step, before diving into deep development or planning stage. Here needs to be defined at what stage the product is, whenever it's on proof-of-concept, most viable product or simple idea.

B. Feature list

Defining feature list on short-term, mid-term and long term is important for making the development plan and primordial in choosing the mobile development

framework. For example, if in the roadmap its planned to establish communication with custom devices or exploit the mobile device hardware capabilities, then would be more reasonable to go for native mobile development.

C. Time to market

Time to market represents an important aspect for every product. This is important moment that depends on what feature needs to be developed and kicked-off first.

D. Security

User information represents a sensitive data. In the digital world this data must be stored and used according to GDPR. These rules apply as well for the mobile applications, from the moment they share same information. The mobile applications as well represent a target for the attackers.

Conclusion

Every day we use at least one mobile app to make an action, for example a simple phone call. Mobile applications have become an inevitable part of our life style. With the growth of the performance of the mobile devices and integrations with the IoT segment, the mobile applications markets grow at an incredible speed. People get more comfortable to have everything under one ecosystem. They try to avoid any type of migration that could cause limitations or headaches. Mobile applications can be a perfect instrument to help the users to keep their ordinary lifestyle and continue to use their favorite entertainment stuff in any environment. If you have a chance to add a mobile application to your business affair, either it's related to entertainment or no, I would suggest to invest in it and not to forget about supporting its accessibility capabilities.

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