International Journal for Innovation Education and Research

ONLINE ISSN: 2411-2933 PRINT - ISSN: 2411-3123

Comparative Analysis Between Native and Hybrid Mobile Applications

João Vitor Barros Assunção;Renan Phelipe Rodrigues Pantoja;Bruno Pereira Gonçalves;David Barbosa de Alencar;Jean Mark Lobo de Oliveira

Abstract

With the growth of technology in the mobile area, the app market has been bringing solutions to many problems and making life easier for many people, whether in the business, technology, administrative and many others. It is necessary to understand that to build an app, there are many technologies for different purposes, and developers need to know which one is best applied in every situation. Therefore, the objective of this research is to bring an analysis about the native and hybrid development, showing its main features and information regarding the usability and functionality of two existing applications, which were built within the standards of each tool, based on two features of ISO / IEC 25010: 2011 regarding Software Product Quality. An exploratory research was conducted to bring comparative data regarding applications, and based on the results obtained, it was observed that it is possible to develop similar applications in interface, quality and functionality, even if they are built with different technologies. As a result, native technology is often used to build more robust functionality-based applications that follow the interface standard of each platform, and hybrids are a lower-cost alternative, as well as fact that its source code is fully reusable for use on other platforms.

Keyword: Application; Mobile; Technology;

Published Date: 11/30/2019 **Page.133-145** **Vol 7 No 11 2019**

DOI: https://doi.org/10.31686/ijier.Vol7.Iss11.1864

Comparative Analysis Between Native and Hybrid Mobile Applications

João Vitor Barros Assunção
assuncao.jvitor@gmail.com
Centro Universitário Metropolitano de Manaus – FAMETRO

Renan Phelipe Rodrigues Pantoja
renanprpantoja@gmail.com
Centro Universitário Metropolitano de Manaus – FAMETRO

Bruno Pereira Gonçalves (Advisor)
golcalves.bruno@gmail.com
Centro Universitário Metropolitano de Manaus – FAMETRO

David Barbosa de Alencar
david002870@hotmail.com
Instituto de Tecnologia e Educação Galileo da Amazônia - ITEGAM

Jean Mark Lobo de Oliveira
jeanlobolive@gmail.com
Centro Universitário Metropolitano de Manaus - FAMETRO

Abstract

With the growth of technology in the mobile area, the app market has been bringing solutions to many problems and making life easier for many people, whether in the business, technology, administrative and many others. It is necessary to understand that to build an app, there are many technologies for different purposes, and developers need to know which one is best applied in every situation. Therefore, the objective of this research is to bring an analysis about the native and hybrid development, showing its main features and information regarding the usability and functionality of two existing applications, which were built within the standards of each tool, based on two features of ISO / IEC 25010: 2011 regarding Software Product Quality. An exploratory research was conducted to bring comparative data regarding applications, and based on the results obtained, it was observed that it is possible to develop similar applications in interface, quality and functionality, even if they are built with different technologies. As a result, native technology is often used to build more robust functionality-based applications that follow the interface standard of each platform, and hybrids are a lower-cost alternative, as well as fact that its source code is fully reusable for use on other platforms.

Keywords: Application; Mobile; Technology;

1. Introduction

The average Brazilian spends 200 minutes a day on mobile apps, according to a study published in Exame magazine [1], published by Abril. With the growing number of smartphones, app stores like Google Play, App Store and Microsoft Store have become showcases for users and a range of opportunities for developers to showcase their ideas through tools.

According to the Coworkers Technology Portal [2], apps are indispensable to people's lives, and make them increasingly simple in performing everyday tasks. 70% of users, distributed across smartphones and tablets, use apps for banking, and 96% use to upload media content. Another 73% like to buy products or services using a mobile application, ie a smartphone brings the solution to many tasks in the palm of your hand.

For a good application to work properly, nothing better than performing well, and 60% of users define it as a very important point when evaluating, according to the blog One Day Testing [3]. In addition to overall performance, another point to consider is load time in seconds, where 31% of users expect an application to load around 2 seconds on average. People want to perform their tasks quickly and satisfactorily, in every way.

An application can be developed using the various technologies on the market, and even mixing them together. Based on a blog post by the Total Cross framework [4], a solution that uses the Java programming language for multiplatform mobile applications, the conventional method for this development is usually done using the native language, for example, Java for Android, Objective-C and Swift for IOS platform. Native languages and technologies often need a specialist, and hybrid technologies often need

2. Methodology

The methodology applied in this study was based on bibliographic research [5], based on existing material, such as information sites of frameworks, books and technology portals focused on software development.

According to the information gathered, a descriptive research was conducted [5] to apply the ISO concept of Software Product Quality, native and hybrid technology.

For comparative analysis, an exploratory survey was conducted [5] between the Skype and Discord applications, which will be cited below, based on the Usability / Functionality characteristics of ISO / IEC 25010: 2011 - Software Product Quality. These two characteristics were chosen simply because they are directly linked to the eyes of end users, ie it is first taken into account how to use the functions of the applications and how aesthetic it is, whether it looks good or not.

3. Development

3.1 Theoretical References

3.1.1 Iso / Iec 25010: 2011 - Software Product Quality

According to ISO 25010 [9], for a software to be considered of quality it must obey 8 characteristics

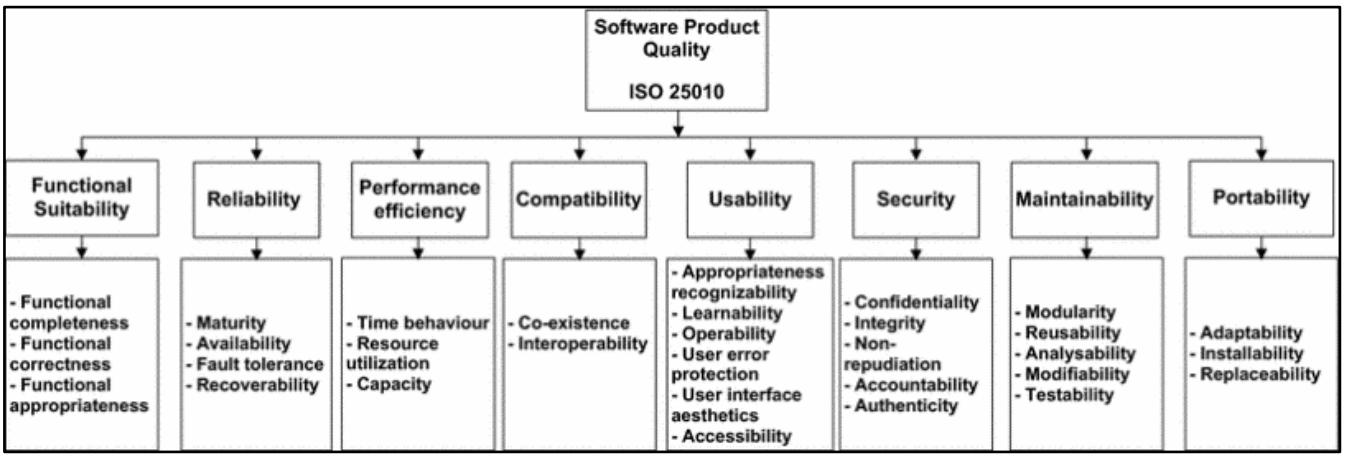

Figure 1: Software product quality characteristics. Source: [9].

According to ISO, the Functionality feature represents the degree to which a product or system provides functions that meet goals and needs when used under specific conditions. It is composed of the following sub-characteristics:

• functional completeness;
• Functional correction;
• Functional suitability.

Usability refers to the degree to which a product or system can be used by specific users to achieve specific goals regarding effectiveness, efficiency and satisfaction in a specific context of use. Its sub-characteristics are:

• Recognition of adequacy;
• learning ability;
• Operability;
• Protection against user errors;
• Aesthetics of the user interface;
• Accessibility.

3.1.2 Native Technologies

The use of native technologies is known for their great performance, a well-sought-after feature for building mobile business applications [6]. A native application has great integration with device features such as the use of cameras, GPS and other features without relying on external technologies such as Application Programming Interface (APIs).

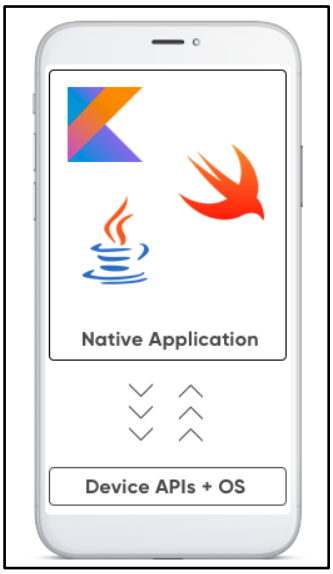

Figure 2: Example of native Android ecosystem.
Source: [7].

The tools used for the Android platform are:
• The Java language, which is well established in the market and still the preference of the vast majority of developers, is being replaced by Kotlin, which has become the official language of programming directly to Android.
• Regarding IDEs (Integrated Development Environment) we have large-scale use of Eclipse, a well-known tool, and Android Studio, created by giant Google and considered the official IDE for development.
For IOS development we have:
• Swift and Objective-C languages, which are considered platform favorites;
• The most commonly used IDEs are Intellij AppCode and Apple XCode.

3.1.3 Hybrid Technologies

Apps built with hybrid technologies can also be downloaded from the conventional stores on each platform, such as AppStore for IOS and Google Play for Android, and the use of device features like camera, GPS and more is also accessible, but not as easily. of the natives [8].
Basically, it is necessary to have extensive knowledge in web technology (HTML, CSS, JavaScript), and its execution is done in a browser in full-screen mode, called webview, and the user can not identify at the time of opening / execution.

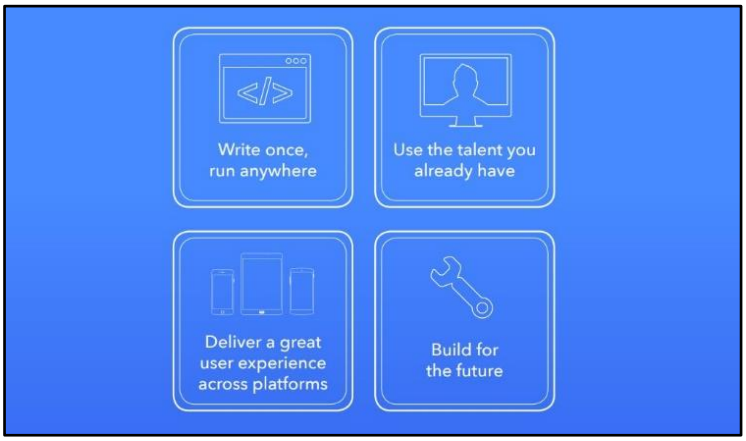

Figure 3: Principles of hybrid technology.
Source: [8].

For hybrids there are many tools, the most used are [7]:
• Cordova, an open-source framework that connects web technologies to devices;
• PhoneGap, which basically uses the concept of Webviews to build applications;
• Ionic, which is considered a SDK (Software Development Kit), and brings the novelty of customizing the application according to the chosen platform and a set of other tools, including for testing;
• React Native, which already brings a different concept from the others. This makes a mix of native code and hybrid tools. In the end, the application built by him does not become completely hybrid precisely because of this.

4. Results

For the comparative analysis, only two of the eight characteristics of ISO / IEC 25010 were taken into consideration, namely Usability and Functionality. We have selected the device Samsung Galaxy S8 containing the Android operating system in version 9.0, also known as Android Pie. The device has 4GB of RAM:

Figure 4: Samsung Galaxy S8.
Source: Authors (2019).

The selected applications were Skype, built with native technology and Discord, made using hybrid mobile technology React Native.

First of all, the RAM consumption between applications, opened only on the home screen without any active functionality, was measured, as shown in Figure 5:

Figure 5: RAM consumption between applications.
Source: Authors (2019).

The application login screens are different from the beginning, where Skype focuses on the Light theme and Discord uses the Dark theme by default, and on the other screens follow the same process, as shown in Figures 6 and 7:

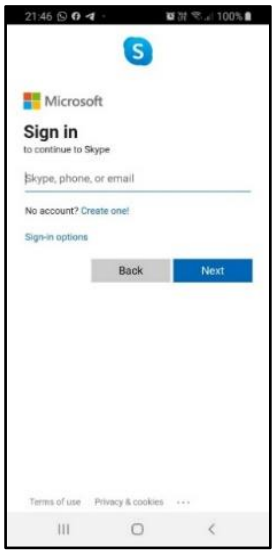

Figure 6: Skype login screen.
Source: Authors (2019).

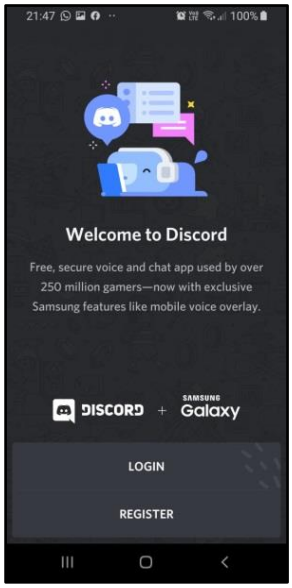

Figure 7: Discord Login Screen.
Source: Authors (2019).

According to figures 8 and 9, after the login screens, we have the following initial screens:

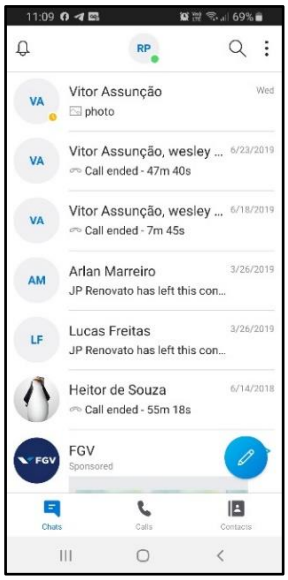

Figure 8: Skype home screen.
Source: Authors (2019).

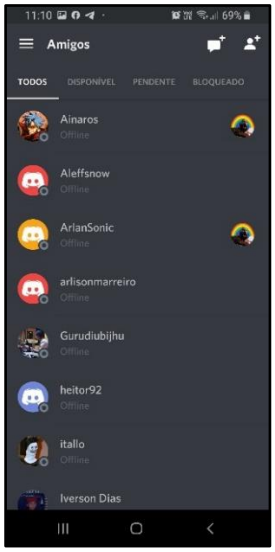

Figure 9: Discord home screen.
Source: Authors (2019).

According to the Attractiveness sub-feature of the Usability 250 ISO principle [9], it says that software must be able to be attractive to users, and must also follow the Apprehensibility process, which is the ability of the user to learn to use the software. application as easily as possible. With this, Skype offers the user right away its main features and functionality through the lower menu (Chat, Calls, Contacts). Discord follows a major interface principle of hybrid technology, where applications are very similar across platforms, making it different from Skype, which has one standard for mobile and one for desktop. The highlight and visual identity is that of the left side menu, which are the server creation features, including it is very similar to the Desktop application:

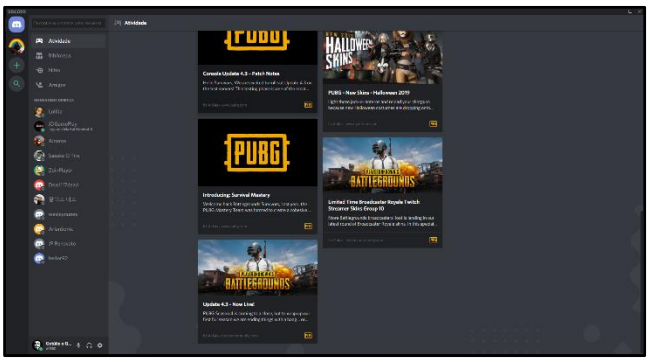

Figure 10: Discord Desktop Interface.
Source: Authors (2019).

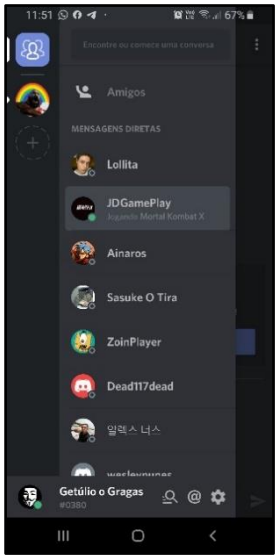

Figure 11: Side menu in the mobile app.
Source: Authors (2019).

For key voice and video calling features, in Skype just click on the desired contact and choose the desired call type in the upper right corner of the conversation, as shown in Figure 12:

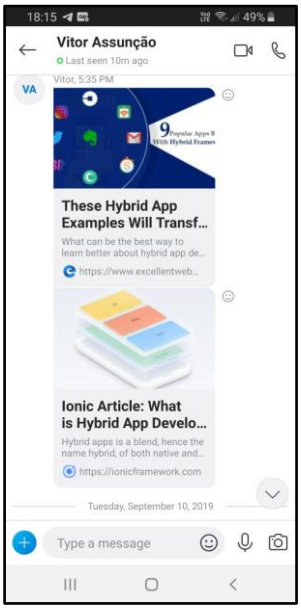

Figure 12: Chat with user on Skype.
Source: Authors (2019).

To have access to voice and video calling features in a private chat in Discord, you need to click on the three dot menu, as shown in Figure 13:

Figure 13: Chat with user in Discord.
Source: Authors (2019).

Discord communication servers are the main functionality and differential of the application. Skype only allows you to call a contact, and later you can invite more people to join:

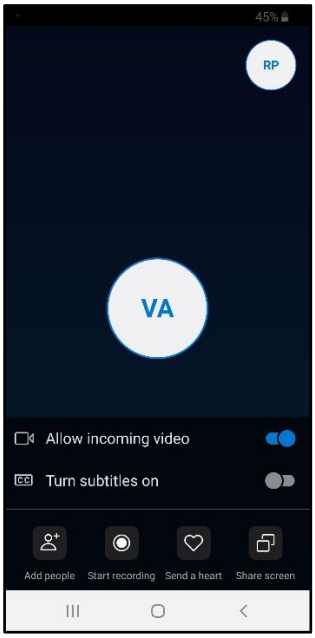

Figure 14: Invite people to the server.
Source: Authors (2019).

To create a new server, you must choose a name, an image, and choose the region:

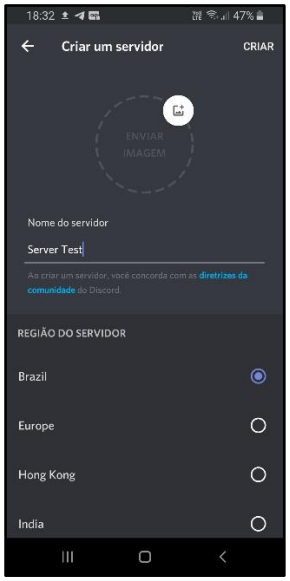

Figure 15: Creating a new server.
Source: Authors (2019).

After creation, the application offers the option to invite people to join the new server, or also the user can share the access link:

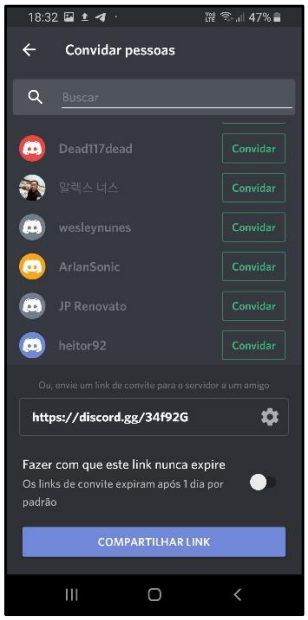

Figure 16: Invite people to the server.
Source: Authors (2019).

With this, the server is already created. You can use both voice and text channels:

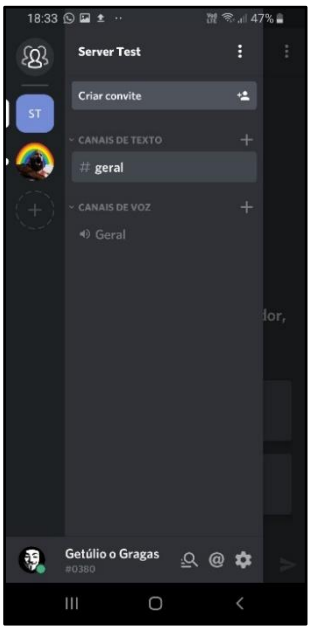

Figure 17: Server created with its respective channels.
Source: Authors (2019).

5. Discussions

The results found in the analysis refer to good examples of use of the technologies mentioned. The application development market is increasingly competitive due to the emergence of various tools that are competing against each other.

Both natives and hybrids came with the proposal to deliver the best mobile solutions to the market, where they have to some extent their strengths and weaknesses, such as native applications have a great integration with the features offered by the device (Camera, GPS), and hybrids offer a lower cost of developing and leveraging existing web technologies known among developers. As a result, both technologies, even when used together, can deliver great results.

6. Final Considerations

To build mobile applications, the market offers a large number of languages, technologies and tools, each of which has its own specific application. The research showed the structure of native and hybrid technology, comparing through interface analysis and functionality.

Native apps are great for more customer-specific solutions, have great integration with device features, and work well offline. Already hybrids are perfect in relation to development costs, good use of web technologies and are multiplatform, ie the source code is well reused.

This makes it possible to get native and hybrid applications with great functionality and good usability. The use of both development technologies is valid for the market, including even joint use, but it is necessary to identify not only the customer's needs, but also the resources available for project development.

7. References

[1] CONTEÚDO, ESTADÃO. Brasileiro gasta 200 minutos por dia em aplicativos. Exame, 2018. Disponível em: <https://exame.abril.com.br/tecnologia/brasileiro-gasta-200-minutos-por-dia-em-aplicativos-diz-estudo/>. Acesso em: 03 de setembro de 2019.

[2] RODRIGUES, M. Infográfico: qual a real importância dos aplicativos? Coworkers, 2015. Disponível em: https://coworkers.com.br/infografico-qual-a-real-importancia-dos-aplicativos/. Acesso em: 3 de setembro de 2019.

[3] VIEGAS, JÚLIO. 60% dos usuários de aplicativos mobile definem a performance como crítica! OneDayTesting, 2016. Disponível em: <https://blog.onedaytesting.com.br/usuarios-mobile-definem-a-performance-como-critica/>. Acesso em: 05 de setembro de 2019.

[4] Top 4 de linguagens de programação para desenvolvimento mobile. TotalCross, 2016. Disponível em: <https://blog.totalcross.com/pt/top-4-de-linguagens-de-programacao-para-desenvolvimento-mobile/>. Acesso em: 07 de setembro de 2019.

[5] SEVERINO, A. J. Metodologia do Trabalho Científico: 24. ed. São Paulo: Cortez, 2018.

[6] Lista da melhor pilha de tecnologia para desenvolvimento de aplicativos móveis. Appypie, 2018. Disponível em: <https://pt.appypie.com/lista-da-melhor-pilha-de-tecnologia-para-desenvolvimento-de-aplicativos-moveis>. Acesso em: 10 de setembro de 2019.

[7] LOZOVEI, JULIO. Aplicativos híbridos – vilões ou mocinhos? Medium, 2018. Disponível em: <https://medium.com/trainingcenter/aplicativos-h%C3%ADbridos-vil%C3%B5es-ou-mocinhos-b22276f523c0>. Acesso em: 11 de setembro de 2019.

[8] S.J., FÁBIO ROGÉRIO. Híbrido vs Nativo: Uma visão do time do Ionic. Fábio Rogério SJ, 2018. Disponível em: < https://fabiorogeriosj.com.br/2018/02/20/Hibrido-vs-Nativo-Uma-visao-do-time-do-Ionic/>. Acesso em: 10 de setembro de 2019.

[9]ISO 25000 Software Product Quality. ISO 25000, 2019. Disponível em: <https://iso25000.com/index.php/en/iso-25000-standards/iso-25010>. Acesso em: 11 de setembro de 2019.