Patient Health-Centred Social Network
Research Document

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Abstract

The purpose of this document is to record the research carried out to develop a social network app focused on patients who are looking to connect with people of similar health concerns. The application will allow users to exchange knowledge and experiences in a positive and privacy preserving atmosphere.

For this application to be developed, several technologies were researched and tested. This document will cover both the front-end and back-end technologies used and similar applications that were studied as a source of inspiration.

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1. Introduction

The goal for this project is to develop a social network app for people struggling from their mental and physical health. A social network is a social structure made up of individuals or organisations that share a relationship or common interest. The idea is to create a mobile application that will allow users to communicate their thoughts with like-minded people.

When I think about the topic of social media and mental health, both are often stigmatised and associated with negative connotations. With that in mind, it can be difficult to talk about your problems online. One of the main strategies in which we aim to understand other people's experiences is to "put ourselves in their shoes." This establishes a connection between past experience and the ability to empathise. On that note, my application will prove itself to be a valuable communication tool as it allows you to communicate with people who share the same experiences and interests.

Initially, the document will discuss what a social network is. Following that the characteristics of both the business idea and the target market will be evaluated in an effort to see if the the application can be succesful in the future. The project significance will also be discussed and will go further into the area of why the application is needed. Lastly, the potential technologies that the application will use, both frontend and backend will be addressed.

2. Social Network

A social network is a social structure made of individuals, such as a circle of friends, a group of work colleagues or a collection of people that share a common interest. Facebook, Instagram, and LinkedIn are all examples of social media platforms used by people all over the world as a means of communicating and reconnecting with old friends, family abroad and gaining business connections.

In recent times, the social networking craze has grown tremendously and has become a significantly important factor in mental and physical health awareness. It has become a safe space for people everywhere to share their stories and experiences, seek help and advice and become advocates for something they believe in.

3. Characteristics of the Business Idea

3.1. Lack of competition.

As it stands, there are several existing physical and mental health based apps available that provide users with information on varying health diagnoses, coping strategies and symptom monitoring. However, there are little to no established health-based apps that act primarily as a platform upon which those suffering from different health issues can connect and share advice. The lack of competition in this area may prove beneficial to this business model in ensuring this platform leads the way in creating safe, friendly spaces for people seeking advice and reassurance from those in similar positions.

3.2. Achievable

The production of this app requires little funding and therefore is a low-risk business model. The low cost involved in this app, allows for a quick and easy start-up, consequently making this a feasible business strategy. As producing a mobile app necessitates knowledge in the field, it is a relatively achievable business model if time is dedicated to learning the skill.

3.3 Customer driven

The intention of this app is to meet the needs of consumers who are seeking a trusted forum in which personal stories can be told and discussed with the promise of solutions and guidance offered. With the additional feature of keeping track of weight, symptoms and doctor's visits. All of these features are designed with the intention of accommodating the needs of the consumer to ensure they can track their health journey in a logical way.

3.4. Profitable

This app has the potential to be a profitable idea given the low development cost. There are several potential revenue streams that could be implemented, such as whether the app will run as a subscription-based service or a free alternative with a higher emphasis on using advertisements. Similar to Meta's Facebook app, money is not made through the posts or profile information of a user but rather the advertisements paid for by companies or individuals. In 2021, Meta's advertising revenue was 115 Billion [1]. There is room for sponsorship deals with health-related products or devices for common motor disabilities.

3.5. Market

The potential market for a health social networking app is considerable. Nearly 800 million people worldwide, or 11% of the global population, live with a mental health condition. Moreover, data shows that the COVID-19 pandemic has exacerbated mental health concerns and triggered declines in well-being, with a dramatic rise in the prevalence of problems such as depression, anxiety, post-traumatic stress symptoms, and stress. According to Statista, the global mobile health market size stood at 27.93 billion USD in 2018 and is projected to reach 246.82 billion USD by 2026, exhibiting a compound annual growth of 29.1% during the forecast period [2]. For consumers, a major benefit of mobile health applications is their convenience as they are easy to access and integrate into daily habits but also require very little effort to use. On top of this, one of the most popular online activities is the use of social networking sites. According to Kepios analysis, there are 4.55 billion social networking users around the world as of October 2021 [3]. This provides the project with a huge opportunity to rapidly grow a community. Almost everyone will suffer from mental or physical health during their lifetime, which is one of the many reasons why this application will prove to be a useful communication tool. A user can benefit from using this application by gaining knowledge about their mental or physical health condition and any possible solutions to improving their condition.

4. Target Market

4.1. Demographics

The demographic approach divides the market into segments based on factors including age, gender, income, occupation, education, and religion. However, it is unnecessary to

segment the market for each case as this application will be accessible to anyone with an Android or iOS mobile device. As Google's Android and Apple's iOS jointly possess over 99 per cent of the global market share, the application will be available to as many people as possible [4]. The age of a user for this application will greatly range with the minimum age being set to 13 as a general requirement. Nearly all social networking sites only allow users aged 13 and over. This age limit has been dictated by US law through the Children's Online Privacy Protection Act (COPPA) and is put in place to protect children by preventing those underage from creating profiles [5].

4.2. Location

As the company and application were created and developed by an English speaker, naturally, the application's main language will be English. However, this will not put a halt to the potential of the company's growth as English is the most widely spoken language in the world [6]. This automatically makes it a dominant language in the business world, as it allows companies to reach the largest number of potential customers. It is important to note that the addition of new languages goes against the low-cost business model as it is both costly and time-consuming to have your application translated by a professional.

The application is accessible to anyone with an internet connection, which is needed to both download and use the application. According to DataReportal, there are 4.95 billion people around the world with access to an internet connection as of January 2022. This number is continually rising, with DataReportal's most recent data revealing that 192 million new users gained access to an internet connection in the last year. When we take a deeper look into areas of eligible audiences, we find that 93.33% of internet users are using social networking sites [3]. These are important figures to consider when looking at the applications' scalability, due to the application needing to be ready to handle a potentially large number of users.

5. Project Significance

A survey was conducted to measure the significance of the project. The survey was conducted with two options as a response, yes and no, in an effort to get definite answers. Despite the survey being gathered from a small group in comparison to the number of potential users, an assumption can be made that the results would be similar from a larger group. The result of the survey are as follows.

Have you ever suffered from your mental health or physical health?

Answered: 26   Skipped: 0

11.54%(3)

88.46%(23)

■ Yes   ■ No
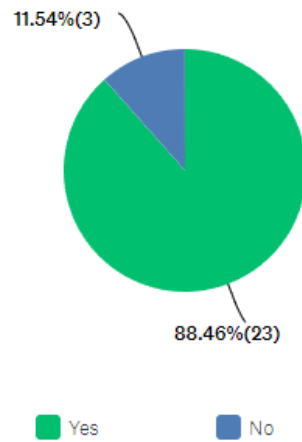
Figure 1. Survey Question One.

Have you ever looked online for answers to your mental or physical health problems?

Answered: 26   Skipped: 0

15.38%(4)

84.62%(22)

■ Yes   ■ No
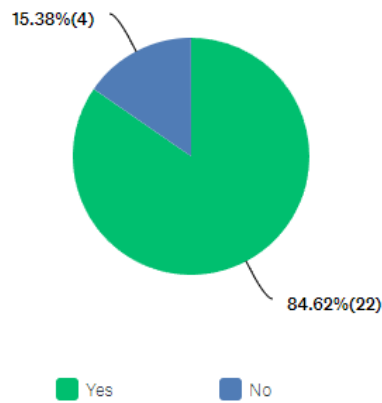
Figure 2. Survey Question Two.

Do you find online health forums helpful?

34.62%(9)

65.38%(17)

☐ Yes   ☐ No
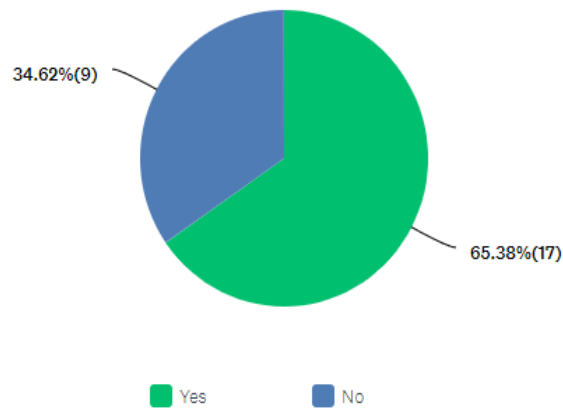
Figure 3. Survey Question Three.

Do you find reassurance in reading about other people facing similar issues?

23.08%(6)

76.92%(20)

☐ Yes   ☐ No

Figure 4. Survey Question Four.

Would you find a platform where people could share their stories and experiences in a safe way helpful to your recovery?

3.85%(1)

96.15%(25)

☐ Yes   ☐ No

Figure 5. Survey Question Five.

To summarise the results from the survey:
- 88.46% of respondents said they have suffered from mental or physical health problems.
- 84.62% of respondents said they have looked online for answers to their problems.
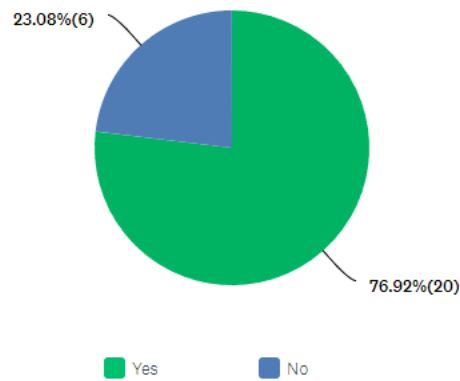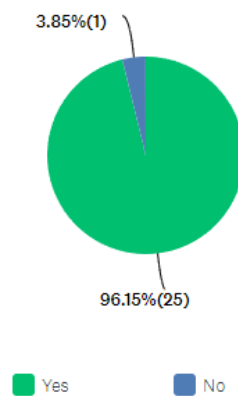- 65.38% of respondents said they have found online health forums helpful.
- 76.92% of respondents said they would find reassurance in reading about other people facing similar issues.
- 96.15% of respondents said they would find a health-centred social network platform beneficial.

Based on the results of the survey, there is an obvious need for this application. Especially in current times, the COVID-19 pandemic has been a challenging event for all with the main psychological impact to date being elevated rates of stress or anxiety. It's safe to say that almost everyone will suffer from their mental or physical health at some stage during their lifetime and 84.62% of respondents agreed to searching online for answers to their problems. However, it can be hard to find high-quality and reliable health information online. An excessive amount of time is wasted as users pass from website to website in search of such information. However, once it is found it can be very valuable as 76.92% of respondents said they found reassurance in reading about people facing similar issues. This application will provide a combination of reliable information and people with similar experiences. For this reason, 96.15% of respondents said they would find the platform beneficial.

6. Similar Applications

In this section, I will discuss some of the comparable applications that will compete with my application. This research is critical because it allows me to compare the features of my application to those of other applications on the market. The two main apps that feature similar aspects in relation to HealthSpace are HealthUnlocked and War on Cancer. For each application listed below, I will outline and compare the benefits each application provides to their users.
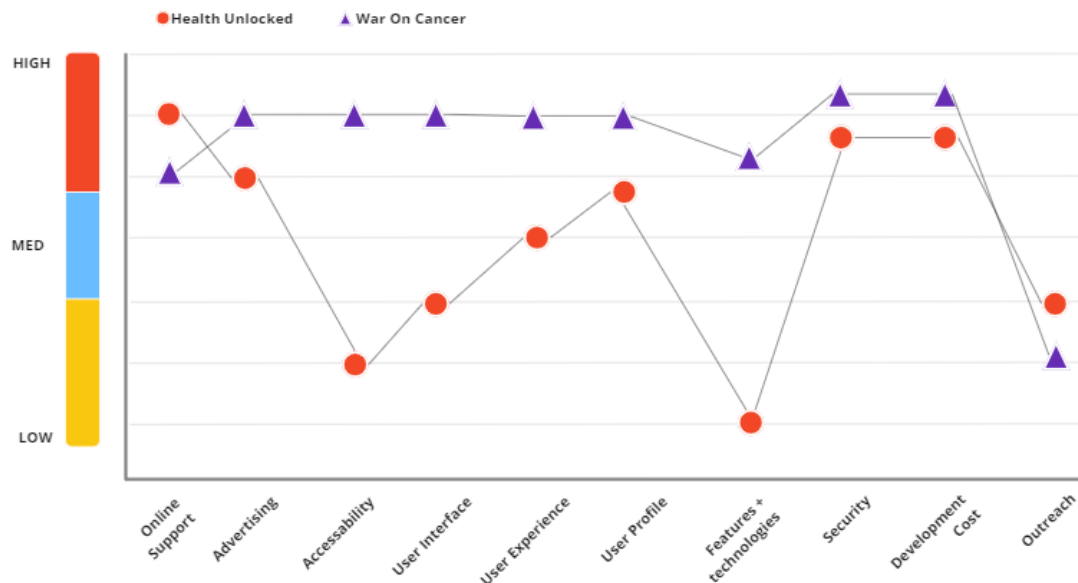
Figure 6. Competitors Value Curve.

6.1. HealthUnlocked.

HealthUnlocked provides a web-based social network service that provides tailored health-related content to users as well as access to online communities run in partnership with health and non-profit organisations. HealthUnlocked is solely a web-based application and is not available on either the iOS or Android app store. As a result, both the accessibility and outreach are given a lower value score as the potential to gain new users is limited. Not only that but they also have access to a lot fewer features in comparison to a mobile app. An inherent capability of mobile apps is the ability to send push notifications to users who have the app installed on their device, giving app publishers the ability to send messages to users directly. If you want to keep people coming back to your app, push notifications are essential. According to Jack Coleman, a marketing strategist, push notifications are essential and can increase your customer retention by 190% if executed correctly [7].

The power of UI design may be the difference between a successful and unsuccessful application. On first viewing of HealthUnlocked's website, it was evident that the website was making inadequate use of UI/UX design principles. For example, positioning the navigation bar at the top of the screen makes it harder for mobile users to make use of it. A bottom navigation bar is commonly used as it aligns with the "thumb rule of design [8]." It acts on the principle that most users scroll and navigate using their thumbs. Figure 7 showcases the most convenient reigions of the phone to use, therefore by moving the navigation bar to the bottom of the screen it would make easier for users to use, and less important elements can be positioned at the top of the screen.
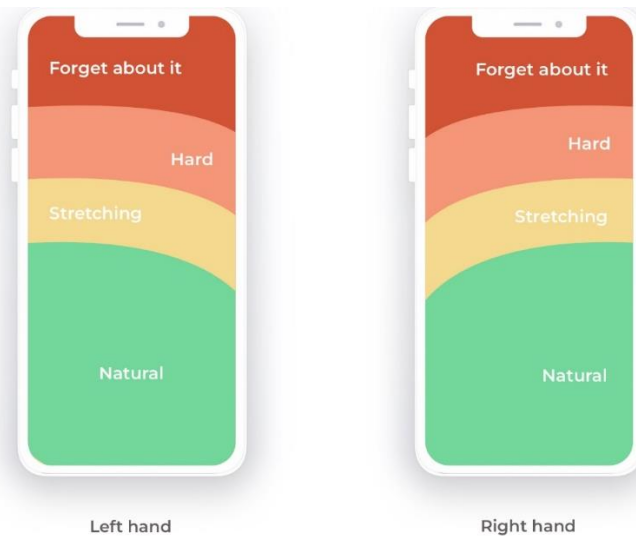
Figure 7. Thumb-zone mapping.

These inconsistencies increase the learning curve for a new visitor to the website and in turn, increases the time it takes for the user to complete their intended task. Poor use of these design principles increase the learning curve for a new user potentially causing the user to feel distressed. Without a stylistic touch, this older design appears clunky and underdeveloped, resulting in a poorer rating for both the user interface and the experience.

Figure 8. News Feed.   Figure 9. Messages Screen.

| Figure 10. Profile Screen. | Figure 11. Communities. |
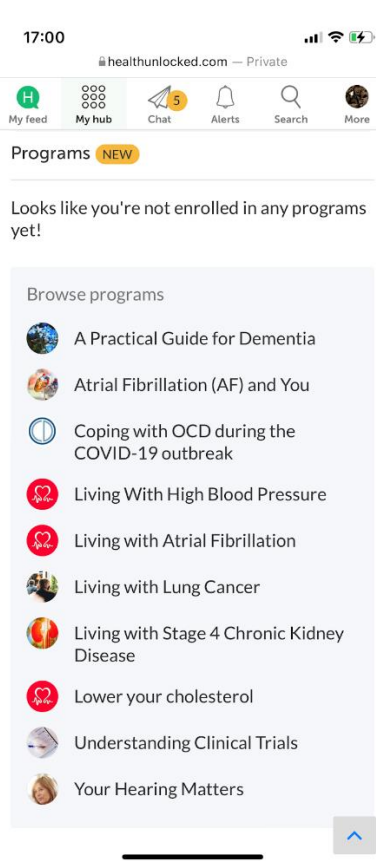
Despite the user interface receiving a low reating, the online support is readily available 24/7 showing the company holds online support as a high priority to retain users. This may be of more interest to users going through a difficult period of time.

6.2. War On Cancer.

Another competitor within the market is War on Cancer which is the largest free social networking app for those affected with cancer who wa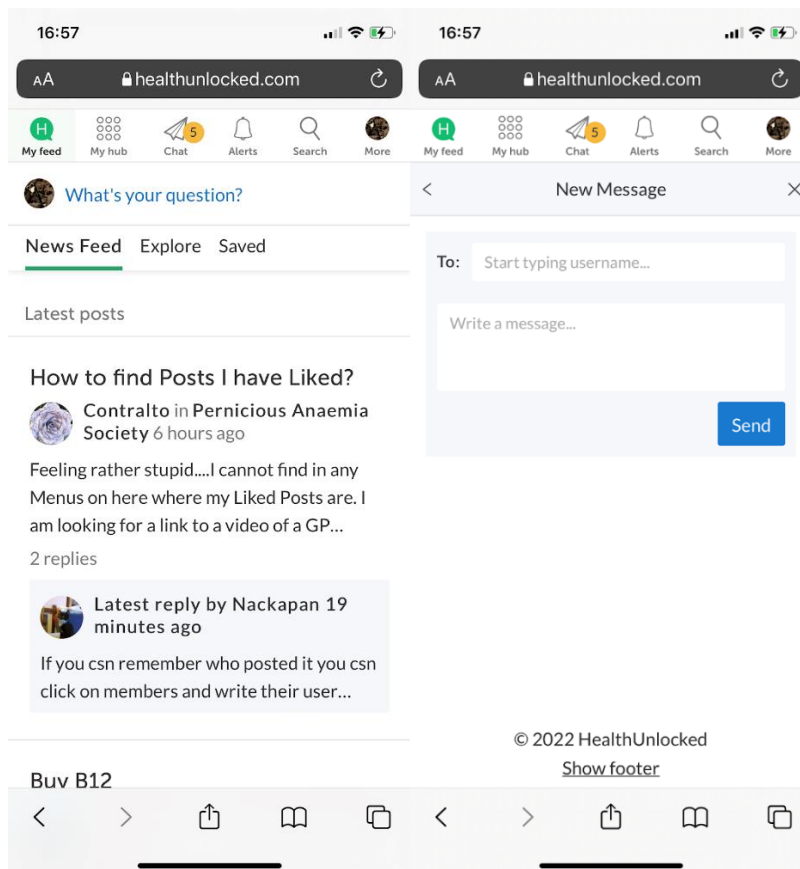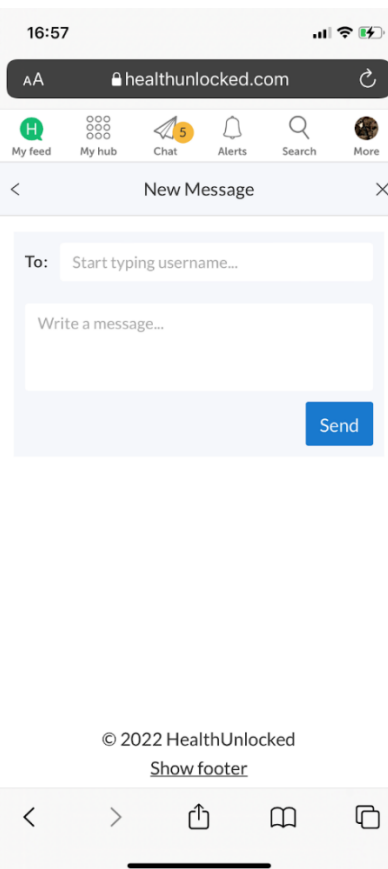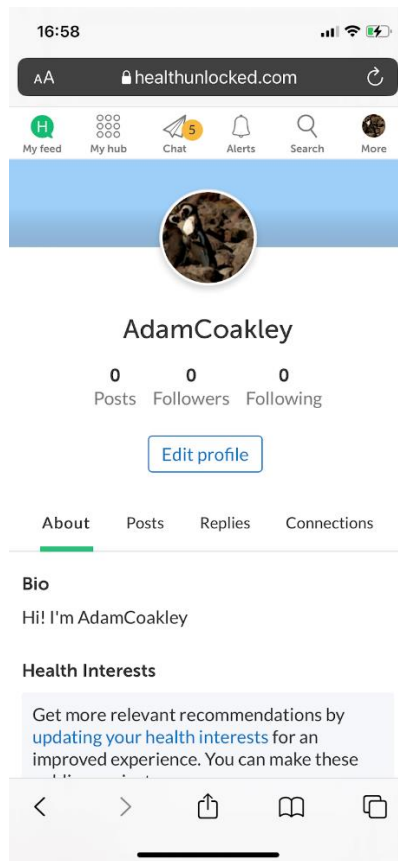nt to share their experience. The War on Cancer app can be easily found and downloaded from the app store giving it great accessibility. Worldwide, there were an estimated 17 million new cancer cases in 2018. As a result, their outreach is limited given that the app focuses purely on patients with cancer. However, Cancer Research UK predicts there will be 27.5 million new cases of cancer each year by 2040 [9].

This app deploys features such as the ability to participate in cancer research through health studies as well as the functionality to find suitable clinical trials to partake in. There is also a wealth of cancer-based knowledge from articles created by cancer specialists. The app has a high development cost given the company employs just over 30 people, of which includes frontend developers, software engineers and UI/UX designers. With this higher development cost there comes the benefit of allocating more money towards security which is a very important aspect of a business' product. The UI/UX of the product is modern and professional with a carefully curated look which adds to the overall experience of the user.
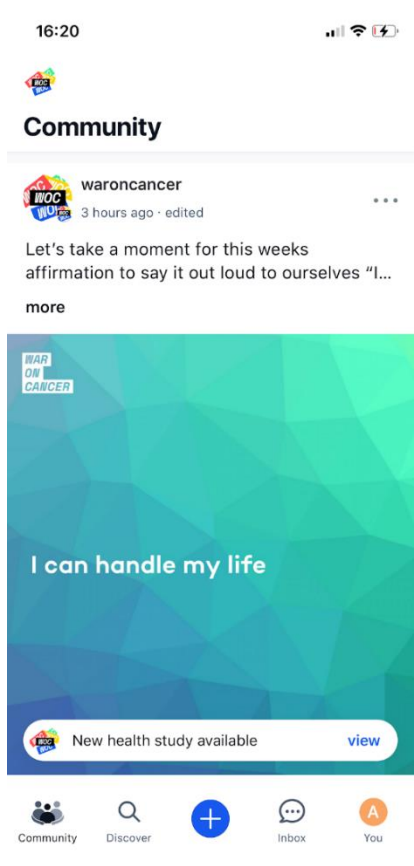
Figure 12. Timeline.
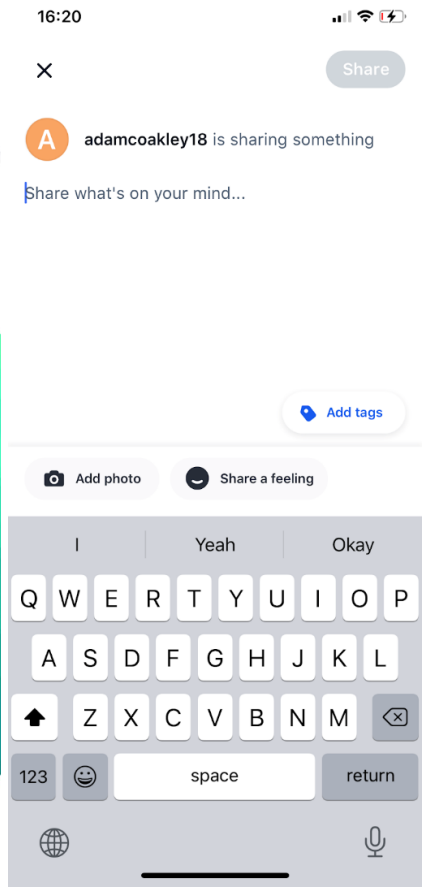
Figure 13. Create post.
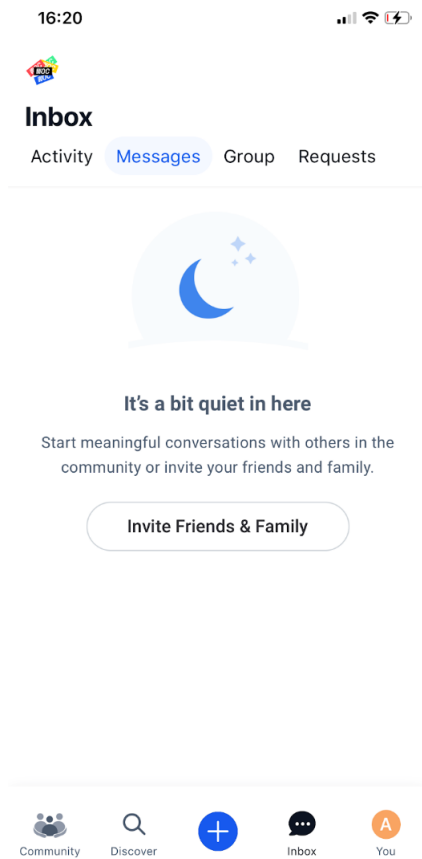
Figure 14. Messages Screen.   *Figure 15. Profile Screen.*
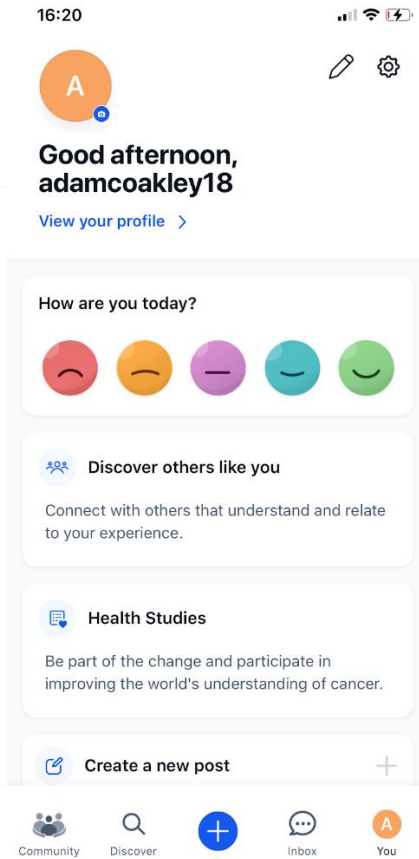
7. Platforms

A system as large as a modern operating system must be engineered carefully if it is to function properly. When we consider mobile application development, android and iOS control the market in relation to efficiency, customer satisfaction and popularity. As previously mentioned, Google's Android and Apple's iOS jointly possess over 99 percent of the global market share [3].

7.1. Android

Android is an open-source platform that is both an environment for software development and an operating system that runs on smartphones. Since it was the first open-source mobile operating system, Android generated much interest. Developers, open-source enthusiasts, and customers all over the world adopted it at an early stage.

Figure 6 below displays the main components of the android architecture. It is similar to the iOS architecture in that it is a layered stack of software. The Linux kernel is the bottom and most important layer. It provides feature such as security, process management, memory management, device management and multitasking. The next layer up from the bottom consists of a set of libraries. These libraries are written in C/C++ and cannot be accessed directly. It is at this level where a lot of the core power of the Android platform comes from. The following is a summary of some of the android libraries [10]:

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- The media library is responsible for playing and recording of various audio and video formats.
- Both the SGL and OpenGL libraries are used for 2D and 3D computing graphics.
- SQLite provides database support and FreeType provides font support.
- WebKit is an open-source browser engine that provides all the functionality to display web content.

The Android runtime is located on the same layer as the libraries layer and contains core libraries written in Java, as well as the Dalvik Virtual Machine (DVM). The DVM is responsible for running android applications. Java applications are converted to an executable .dex file which use memory more efficiently.

The application framework layer is above both the libraries and Android runtime layer. The application framework layer provides many services to applications in the form of Java classes. Developers can make use of these Java classes while developing their own applications.

The final layer is the applications layer and is the top-most layer of the Android operating system. This layer consists of both native and third-party applications. Each of these applications will be run within the Android run time with the help of the classes provided by the application framework [11].

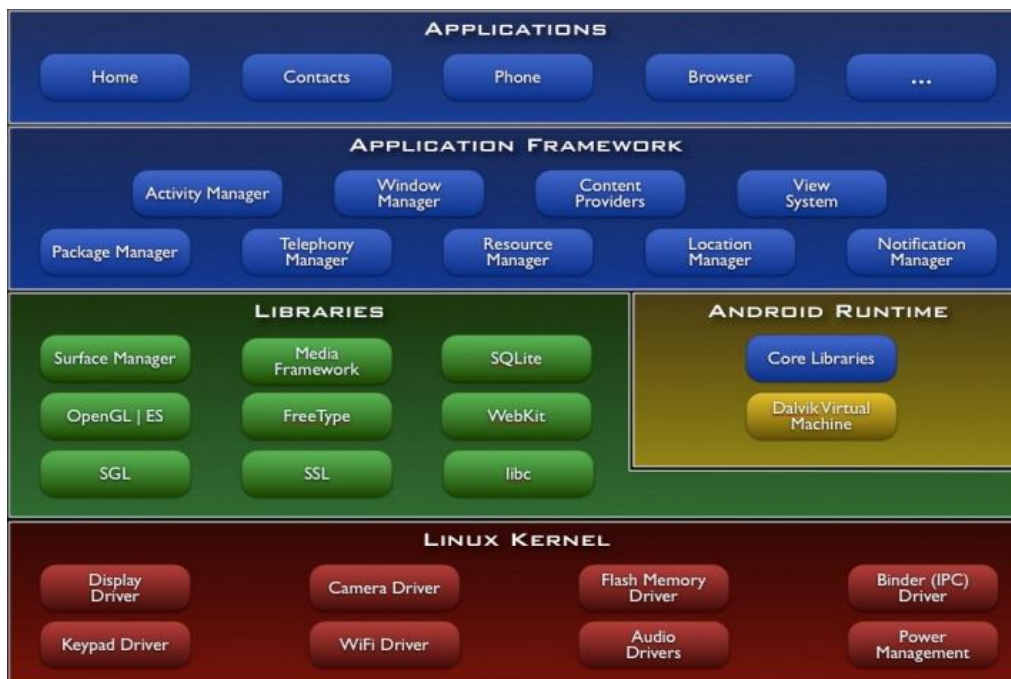Figure 16. Android Architecture.

7.2. iOS

The iOS operating system was developed by Apple Inc. for iPhones, iPads, and other Apple devices. The iOS operating system takes up a big percentage of the market share and is currently the second most popular mobile operating system after Android. The iOS architecture is layered and contains a variety of frameworks that can be integrated into your

applications. Figure 7 below displays the four main components of the iOS operating system.

Figure 17. iOS Architecture.

The Core OS layer is the bottom-most layer and sits directly on top of the device hardware. This important layer is in charge of managing memory—allocating and releasing memory once the application has finished with it, taking care of file system tasks, handling networking, and other operating system tasks [12].

The Core Services layer is above the Core OS layer and provides services used in the upper layers. It contains frameworks which provide a huge amount of functionality that make developing iOS applications easier. However, these functionalities have no influence on the iOS application's user interface. The frameworks found in this layer range from utilities for managing your internal data structures to high-level frameworks for speech recognition and accessing calendar data [13].

The Media layer is the third layer from the bottom and is above the Core Services layer. The Media layer plays a significant role by providing iOS devices with audio, animation, and graphics capabilities. Similarly, to the previous two layers, the Media layer consists of a number of frameworks that can be used when developing iOS applications. These frameworks provide the ability to render and animate 2D and 3D content, including text, and for playing, recording, and editing media [14].

The Cocoa Touch layer is the final layer, and it sits on top of the iOS stack. The Cocoa Touch layer is primarily written in Objective C, and it contains the frameworks that are most commonly used by iOS application developers. The Cocoa Touch layer is responsible for the appearance of applications and their responsiveness to user actions. It supports touch and motion events, including tap, swipe, pinch, and double tap.

8. Types of Mobile Applications

The mobile application industry has constantly been evolving and bringing in new types of applications to improve the customer experience. The earliest mobile apps were built with

the native capabilities of the platform on which they were deployed. Later, when the iPhone and Android were released, app developers had to develop separately for iOS and Android. This increased both the cost and the time constraint for companies who wished to develop an app for both operating systems. To solve this problem, cross-platform development was introduced to develop software that was compatible with multiple operating systems. Nowadays, there are three types of mobile applications: native, cross-platform and web applications.

8.1. Native Applications

Native mobile apps are those that are developed with a specific operating system in mind. An android application is programmed using Java or Kotlin, whereas an iOS application is programmed using Swift or Objective-C. Native applications can be downloaded from the iOS app store or Android's Google Play store. The main goal of creating native applications is to provide the best performance for a specific mobile platform. Most companies will invest in native mobile app development due to the number of advantages offered in comparison to its alternatives such as cross-platform and web applications.

The advantages of native applications are as follows:
- Native applications tend to be faster and showcase better functionality as a result of being developed for a specific platform.
- Developing an app natively allows you to take full advantage of the operating systems' features. Developers have direct access to the hardware of the device such as the camera, microphone, and GPS.
- Native applications are accessible without an internet connection.

The disadvantages of native applications are as follows:
- The overall cost involved in both the development and the maintenance is considerably higher. Especially if you develop the app for both Android and iOS, as a separate team will likely be needed for each platform.
- If you develop an app specific to one platform you will automatically lose a lot of customers due to the divide in the market share.
- It is difficult to have a native mobile app approved by the app store.

8.2. Cross-Platform Applications

Cross-platform development includes building a single mobile app to function on multiple operating systems, such as iOS and Android. It's almost essential that a mobile application can run on both operating systems due to the divide in the market share. Following the cross-platform approach, developers can create such apps with relatively low cost and at a faster rate. According to a survey with more than 30,000 respondents, Flutter, React-Native, Cordova, Ionic and Xamarin are the top five most used cross-platform mobile frameworks [15]. Depending on the framework you use, the process and the deliverables of the software can vary.

The advantages of cross-platform applications are as follows:
- As a result of supporting any platform, a cross-platform application will have a larger target audience.

- Cross-platform development reduces both the cost and the time as the goal is to develop a single app that can function across many platforms.
- Cross-platform applications are easier to maintain as you sync updates across all platforms.

The disadvantages of cross-platform applications are as follows:
- In comparison to a native application, cross-platform applications perform at a lower level in relation to speed and functionality.
- Cross-platform applications are unable to take advantage of the native-only features that provide a great user experience on native applications.

8.3. Web Applications

Mobile web applications are developed using standard web development technologies like HTML, CSS, and JavaScript. They are websites built with the intent to look good and function well on mobile devices. A web application runs inside the mobile devices' web browser such as Google Chrome and Safari, which means an internet connection is needed to access the app. However, in return you do not need to download and install the app onto your mobile device.

The advantages of web applications are as follows:
- Web applications are very easy to host, and they do not require the app store approval.
- There is a wide variety of options when it comes to technologies and languages used to develop a web application.
- Similar to a cross-platform application, a web application can run on any operating system as long as it has a browser.

The disadvantages of web applications are as follows:
- Web applications are typically less secure in comparison to native and cross-platform applications.
- Web applications rely on a stable Wi-Fi connection as they do not work offline.
- Web applications have poor discoverability as they cannot be found on the iOS app store or Android's Google Play store.

9. Technologies

A conclusion has been reached to develop a cross-platform application for both Android and iOS. The reason being a cross-platform application will target a larger audience as well as reducing the development time. The following piece will discuss the researched technologies, both front end and back end that are necessary to developing a successful cross-platform application.

9.1. Front-end technologies

The front-end of a mobile application is an interface that users interact with. Everything a user sees when navigating a mobile application, from fonts, colours, dropdown menus and sliders is a combination of front-end languages. According to a 2021 developer survey displayed by figure 8 below, the top five most popular cross-platform frameworks include

Flutter, React Native, Cordova, Ionic and Xamarin. These frameworks differ when it comes to their pre-built elements and available tools.

Cross-platform mobile frameworks used by software developers worldwide from 2019 to 2021
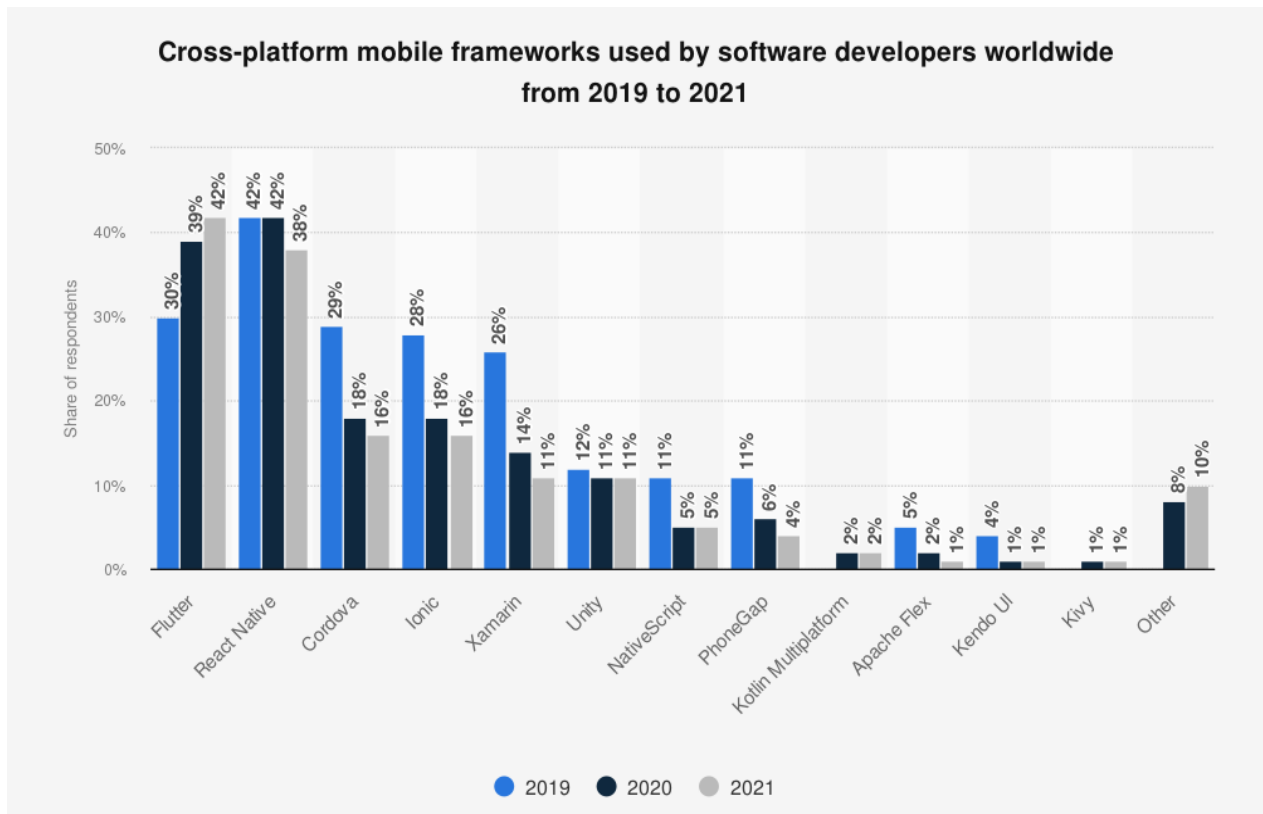
Figure 18. Most Used Mobile Cross-Platform Frameworks.

9.1.1. React Native

React Native is a cross-platform mobile framework that uses JavaScript as its base language. In 2015, React Native took the tech world by storm by offering a way to develop mobile applications for both iOS and Android. In React Native, a "view" is the basic building block of the user interface. A view is essentially a small rectangular element on the screen which can be used to display text, images, buttons or respond to user input. At run time, React Native creates the corresponding Android and iOS views for these components [16]. This process is displayed by figure 9 below. As a result, React Native applications look, feel, and perform like a native application
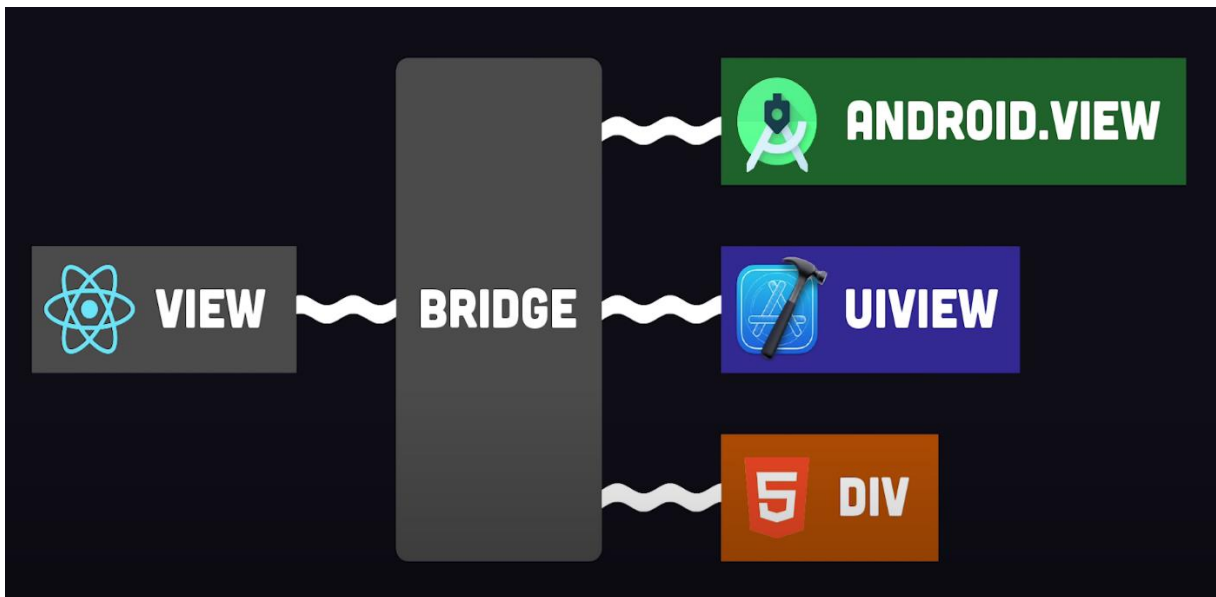
Figure 19. React Native's Bridge.

To summarise, React Native glues together both react and native components which results in one code base deployable to iOS and Android. However, in some cases you may want a different visual experience based on the underlying operating system. The React Native platform module detects the operating system in which the app is running. The platform module is demonstrated by figure 10 below. To begin with, the platform module is imported. The platform module has a "select" property which is capable of detecting the operating system. In this example, the background colour of the application differs depending on the choice of operating system.

```javascript
import { Platform, StyleSheet } from 'react-native';

const styles = StyleSheet.create({
  container: {
    flex: 1,
    ...Platform.select({
      ios: {
        backgroundColor: 'red'
      },
      android: {
        backgroundColor: 'green'
      },
      default: {
        // other platforms, web for example
        backgroundColor: 'blue'
      }
    })
  }
});
```

Figure 20. Platform Module Example [17].

Developers also use JavaScript to style their applications when using React Native. All of React Native's core components accept a prop named style. The syntax is very similar to how CSS works on the web, except names are written using camel casing and not separated using a hyphen. To conclude, the advantages and disadvantages of React Native will be discussed to decide whether or not it is a suitable framework for this project. The advantages are as follows.

Fast refresh
React Native supports fast refresh which means as a developer you can instantly see the changes you make to your code on either platform. This feature is very simple but also very beneficial. It provides real-time feedback and a great developer experience overall.

Code Reusability
React Native developers do not need to create separate code base for different operating systems. This, in addition to using pre-built components results in a huge saving in both development time and cost.

Community
React Native is an open-source JavaScript platform that allows developers to contribute to the framework's development. If any developer experiences a problem, they can turn to the community for support. You may also want to access the native features, like the device camera, push notifications and geolocation. These concerns are also handled by the community as there is open-source packages for almost everything. These packages can be imported or installed using npm.

JavaScript as its base language
According to a Stack Overflow survey with more than 83,000 respondents, roughly 65% of developers said that they use JavaScript. The ability to use a language a developer is familiar and proficient with is one of the main reasons why developers may opt to use React Native.
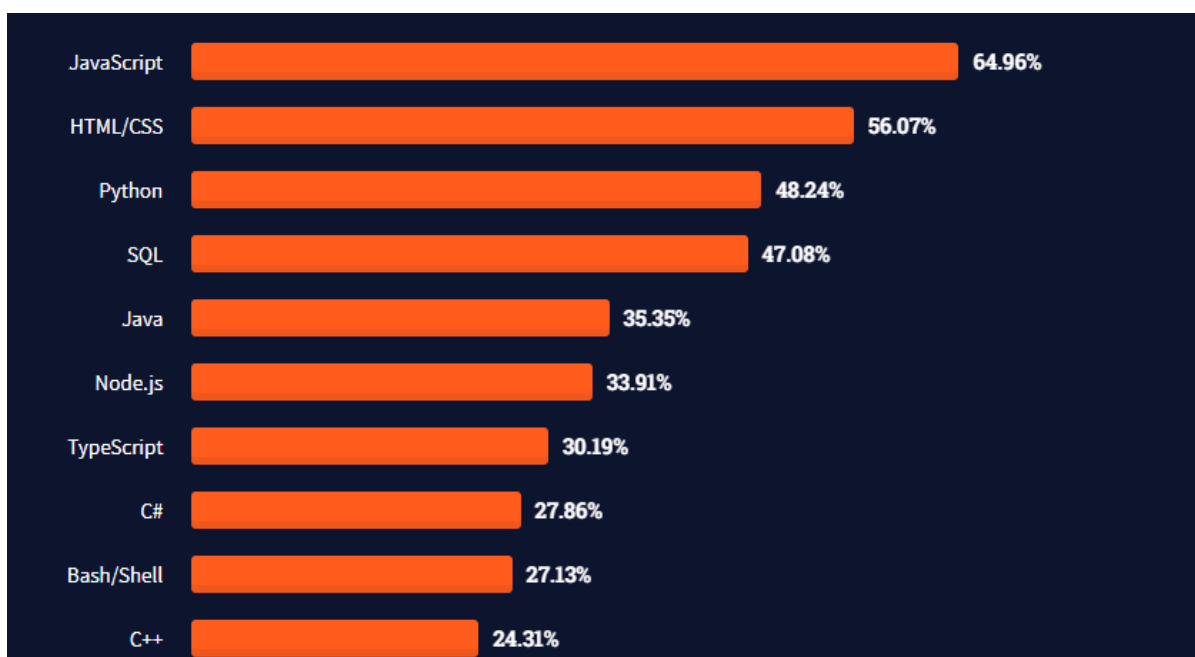

Figure 21. Most Used Programming Languages [18].

Despite being one of the most popular cross-platform frameworks since its release in 2015, React Native is not perfect. The disadvantages are as follows.

Performance
React Native is not able to use all the blessings and potential of a specific platform. On the other hand, native applications can really maximise functionalities and deliver the ultimate user experience as a result.

Custom modules
Many custom modules are already available, yet there may be a need for some specific components that you will be forced to build from scratch or improve upon an existing module to suit your own applications needs.

An understanding of Native Development
As previously mentioned, React Native bridges JavaScript with native mobile code. This means as a developer you need to have some knowledge of native mobile development. If not, you will have a hard time incorporating native code into a React Native codebase. As a result, the company may need some assistance from Android and iOS developers to guide them through the process. This will increase the cost of development.

9.1.2. Flutter

Flutter is a cross-platform mobile framework that was first introduced by Google in 2015 and released in May of 2017. Flutter has significantly improved in recent years, increasing its capabilities to include not only iOS and Android mobile development, but also web and desktop applications.

Flutter uses Dart, a general-purpose language that was designed to create fast applications on multiple platforms as its base language. It was also developed by Google and first appeared in 2011. Dart was introduced to be an alternative to JavaScript, but it did not receive a warm welcome by the web development community. However, after being adopted Flutter, Dart grew massively in popularity. According to GitHub, Dart was the fastest growing language between 2018 and 2019, with its usage up a massive 532% [19].

The Flutter framework is composed of two things:
- SDK – A collection of software development tools that compiles the Dart code to native code for both iOS and Android.
- Widgets – A collection of user interface components that can be customised to suit your own applications needs.

A Flutter application performs better than its closest competitor React Native. This is because a Flutter application does not require a bridge to communicate between the native modules. Instead, Flutter compiles Dart code to native code with the help of the Flutter SDK. This is demonstrated by Figure 12 below.
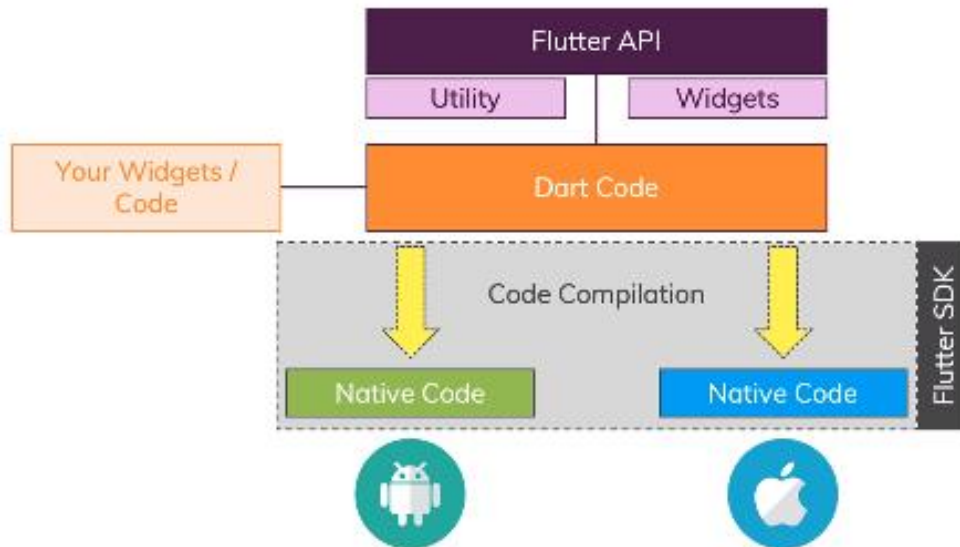
Figure 22. Process of Compiling Dart Code [20].

Almost everything in Flutter is a widget. As previously stated, widgets are components used to create the user interface of the application. Flutter does not have distinct controllers, views, or layouts like other frameworks. The widget is the only building block needed to develop any Flutter application. Figure 13 below displays the "Hello, World!" program using Flutter. As every programmer is familiar with this program, it is the best way to demonstrate the use of the widget component.

```dart
1 import 'package:flutter/material.dart';
2
3 void main() => runApp(MyApp());
4
5 class MyApp extends StatelessWidget {
6   @override
7   Widget build(BuildContext context) {
8     return MaterialApp(
9       title: 'Welcome to Flutter',
10      home: Scaffold(
11        appBar: AppBar(
12          title: const Text('Welcome to Flutter'),
13        ),
14        body: const Center(
15          child: Text('Hello World'),
16        ),
17      ),
18    );
19  }
20 }
```

Figure 23. Hello World Program using Flutter.

In Flutter there is two different types of widgets: a stateless and stateful widget. A stateless widget is a widget that never changes. Some examples of a stateless widget are text and icon widgets. On the other hand, stateful widgets are dynamic as they change their appearance when a user interacts with them. One example of a stateful widget is a checkbox. When the checkbox is ticked, this means the state of the widget has changed and the application redraws the appearance of the widget during run-time.

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The advantages of the Flutter framework are as follows.

Hot Reload
Flutter uses a feature called hot reload. Essentially, the Flutter framework picks up any changes to the code and updates the running app with the new code. This feature is very simple but also very beneficial. By providing real-time feedback it increases the productivity of the developer.

Dart's Type Safe Feature
The Dart language is type safe meaning a variable's value always matches a variable's type through a combination of runtime checking. It also provides null safety, which means that a variable's value cannot be null. The combination of both reduces the amount of run-time errors and increases the readability of the code.

Good Documentation
It seems like Google put just as much time into their documentation as they did to the Flutter framework itself. The documentation provides a programmer with a great place to start as it includes clear instructions and multiple examples to familiarise yourself with the basics. As Flutter is a relatively new Framework, it also has a section for programmers with prior mobile and web development experience. The comparison between the syntax speeds up the learning process for experienced programmers.

Open Source
The Flutter framework is entirely open source and free to use. Open-source software tends to be reviewed constantly and therefore bugs are often found and fixed at a faster rate.

Code Reusability
Flutter developers do not need to create separate code base both iOS and Android operating systems. This, in addition to using pre-built widgets results in a huge saving in both development time and cost.

The disadvantages of the Flutter framework are as follows.

Flutter is relatively new
Giving the strong backing Flutter has from Google, Flutter is likely to continue evolving and remain a relevant framework. However, as of now it currently lacks third-party libraries and features you may need for the development of your application in comparison to other established technologies.

Dart as a base language
Dart is an object-oriented programming language which can often be harder to learn in comparison to other types of programming languages. Dart is also a relatively new and unpopular language. This makes finding Dart programmers more of a challenge for companies.

9.2. Back-end Technologies

Backend development is the opposite of frontend development and is responsible for server-side application logic and integration of the ftontend development work. It includes storing and analysing data, as well as ensuring the application performs smoothly. There are multiple database management systems (DBMS) that use different methods to store and organise data. The data can be added, updated, deleted, or traversed using various standard algorithms and queries.

9.2.1 Firebase

Firebase is a platform developed by Google which provides tools to build both mobile and web applications. It is a cloud-hosted, NoSQL database that uses a document-model. The data is stored using the language JSON, this data can then be viewed using the user interface provided by the firebase website [22].

Figure 24. Firebase Data Storage.

The most popular services are Firebase Analytics, Firebase Cloud Messaging, Firebase Auth, Realtime Database, Firebase Storage and Firebase Hosting. All of these services provide something useful, for example, allowing you to monitor performance, view crash reports and manage to security of your app to name a few. The advantages of Firebase are as follows:

Cloud Firestore.
The first advantage of using Firebase is cloud firestore, which is a NoSQL database that enables developers to transfer data and store data for frontend and backends development seamlessly. Real time updates, flexible data models and quick data queries are all features of this cloud database.

Authentication.
Firebase Authentication is a Google Authentication functionality designed specifically for Firebase-based projects. It allows you to register users using custom credentials, emails, or any social account including but not limited to Google, Facebook and Apple.
The disadvantages of the Flutter framework are as follows.

Unpredictable Pricing.

Firebase comes with two versions: Spark plan and Blaze Plan. The Spark Plan is completely free and it is ideal for smaller projects. However, as HealthSpace is a social networking application it has the potential to be doing a lot of read and writes to the database. This will prove to be a problem as it may be necessary to upgrade to the Blaze plan. This plan is "pay as you go" and there is no option to put a maximum or cap on the potential price. For this reason, there is no way of knowing in advance how the rise in traffic will impact the running costs.

9.2.2 MySQL

The second backend technology that has been studied is MySQL, which was created in 1994 and is one of the most common and widely used relational database management systems. It has fully evolved since its origin and is typically used for data that can be easily categorised into tabular format. The advantages of using MySQL are as follows:

Flexible and easy to use.
You are allowed to alter the source code to match your own needs, and you are not required to pay anything in exchange for this degree of freedom. The installation is straightforward and shouldn't take more than 30 minutes.

High Performance.
MySQL provides very optimal speeds as a result of using a wide array of cluster servers. MySQL powers the most demanding web and e-commerce sites and with the release of MySQL 8.0 it is said to be up to two times faster.

Secure.
MySQL has plenty of features that makes it even more secure than Firebase. With it's Acces Privilege System and User Account Management, it has set the bar high for compeititors. It also handles password encryption by using its very own PASSWORD(string) function.

The disadvantages of using MySQL are as follows:

Not Designed to Scale.
MySQL is not designed to be scalable so if your application is expected to grow in size, it might be a good idea to consider the use of another database. MySQL was designed in a period when data could be kept small, neat and orderly. This is not the case for a social netowrking application.

10. Conclusion

This document carried out the research in preparation for developing a social networking application for people with similar health concerns. As mentioned within the characteristics of the business idea section, there is an opening in the market for HealthSpace. HealthSpace is targeting a niche market in the social media space and after analysing the similar applications, it is clear that is has more advantages than the current competitors.

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