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The Wall: A mobile app to identify and store social events from a digital image using computer vision

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Abstract

Social events, promoted in print media using posters, flyers and banners often fail to attract an audience because we frequently forget the details of the event when we pass-by the promotion on the street. Smaller venues or artists often rely on low-cost, street-level marketing campaigns in areas of high foot traffic areas to develop interest in an event. These venues or artist are often without a budget for online marketing or have a target demographic outside the typical Social Media consumer which makes attracting an audience difficult.

This project aimed to solve the problem of storing and reminding the user of upcoming events, advertised in print media, by developing a mobile app to automatically identify and event information from an image taken by the user. The project is an N-tier system comprising: a front-end using AngularJS, Ionic and Cordova; a cloud Firebase database to store the user's registration and logon credentials; Google Vision API to automatically segment and identify event information and the Google Calendar API to store and remind the user of upcoming events. The project was managed using the Agile Development methodology Scrum. The challenge of this project was in developing a solution to automatically and reliably identify event information from print media which often contains a wide variety of layouts, orientations, font types, colours and contrast variations between the information and any graphics present. In addition, the solution needed to understand the semantics of the text relating to the event name and location. The development frameworks and APIs chosen were unfamiliar to the team but were used because of their technical suitability and their ongoing and increasing popularity in the industry.

Functional testing was based on a set of over 50 test images. Testing concluded that the solution retrieves date and time information consistently, however, more work is required to successfully segment and recognise event location and title. User Experience (UX) was measured in a cross-sectional survey of 75 participants. The results were positive and are discussed here.

Keywords: Mobile App – Computer Vision - Image Processing - Cloud Processing – N-Tier – Social Event Tracking - Calendar

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Chapter 1: Introduction

In the 21st century we are surrounded by many events that occur around us. Events ranging from activities like children's schools, school concerts, meetings with teachers, sport games but also events in our community, like Christmas markets, vintage markets, and concert of local bands. We also have large scale events featuring famous artists and celebrities; football and rugby teams; theatre events, comedies, ballet, and music of all genres. We are surrounded by activities but how can we remember to do things like arrange and co-ordinate our schedules to attend these events? How can we be first to buy tickets? How can we ensure we arrive on time to be in the front line of the performance for the athletes, bands, comedians and all that we enjoy.

This project is aims to create an application that solves the issues relating to an event and organising to one's schedule to attend the event. The application will allow us to photograph a poster, automatically detect and identify the relevant the information relevant to the event on the poster (i.e. time, location) and then all a reminder to our calendar. Furthermore, a user can not only photograph an event poster or advertisement, but they can also apply the same recognition to a screen shot or an image received via WhatsApp or some other source. The process of detection and calendar event generation makes it possible to view the scanned event in the calendar as a reminder. This will help a user to plan and organise their schedule. This application helps to solve at least one of the problems of forgetfulness and information overload in the busy day to day life of the average user. Improving the likelihood of a user attending an event may also provide a positive boost for smaller local events, that is, the type of events that are interesting enough to go to but not large enough (e.g. a Queen concert) to occupy our headspace and be automatically and regularly called to mind (e.g. "I can't wait, it's only another X days until the concert!").

This project will be realised using a combination of a front-end hybrid-native app running on the users mobile device, a backend service to process the submitted image and retrieve event specific information, a second backend service to take this information and add to the users calendar (e.g. a Google Calendar event). The development of the front-end UI will be designed so that the user navigates intuitively, quickly and efficiently to their goal. It will indicate at all stages what stage in the process the user is at. When developing this interface, we will consider users of all ages since

the event attending demographic is not normally limited to young adults, children or any one age range. We have decided to use common navigational iconography, page layouts, and status notifications found in popular Android and iOS apps to piggy-back on the user's in-built familiarity with the same.

The importance of developing a mobile app according to (Redbytes, 2019) is that "mobile apps make our lives easy, in a few seconds, we can purchase any item from food, clothes, medicines, pay bills and so on". This app "creates an interaction between customer - solutions - and business, helping millions of people all around the world, people can have instant access to information anywhere in just a few seconds". Mobile apps are designed for a very specific purpose. The typical app does not normally offer a wide suite of functions. It normally is created to allow the user access to a specific service, to solve a problem, or to save time and cost in our personal lives or in business.

A part of our proposal is to develop an application using an existing 3rd party, in our case, a machine learning (ML) service used to perform automatic image segmentation API. One reviewed source describes an API as "a set of functions and procedures allowing the creation of applications that access the features and data of an application or other services" (OPENVPN, 2019). Based on many networked 3rd party APIs allow the developer to access components that deliver functionality, or information, from a remote server of site (BBVA, 2018). The same source (BBVA, 2018) points out that robust, scalable and secure APIs help in terms of data transmission, storage, transformation and data mining. Relying on well-known, stable, and well-documented 3rd party APIs allow a business to grow faster and more consistently by producing software that is highly performant, richly featured, responsive, and at a price point which is attractive to potential customers.

1.1 Problem Area / Innovation Area

People of Dublin can connect and interact in a real way, offline, through social and cultural activities that are announced on posters placed on the walls of coffee shops and restaurants around the city. Publicity advertising or the announcement of events through posters has a high impact and reaches a mobile audience with a very high frequency in a 24-hour period which allows a high rate of participation in announced events.

This ultimately leads to a real social interaction that creates new, and reinforces existing, interpersonal relationships in society.

Simpson (2017) mentions that a person receives between 4,000 and 10,000 ads per day. With this high volume it is easy to overlook the events or activities that are really of interest. This can trigger a low index of social interaction. Puch (2013) pointed out that society is hyperconnected and a bombardment of information at each moment can cause one to suffer from short-term memory loss, that is to say that many of the announcements of normally interesting activities or events go unnoticed or unattended because they are forgotten until the end of the day.

In response to this problem our project proposes to develop an application that allows people to remember the activities they identified as important, during their day, leading them to a real connection with their social environment through participation at concerts, plays, fairs, and other forms of announced activities. The application which we intend to develop over the coming months will normally consist of a user scanning information from a poster announcing an event. This information will then be automatically segmented and recognised using machine learning to identify the event related information. From this process the app will automatically allow the user to add a Google calendar event and receive one or more reminders near the date of the event in question.

1.1.2 Marketing as context

Back in the seventeenth century after the invention of the printing press, traditional marketing is born, which becomes the main ally and great tool of commercial development at that time Johnson (2010). Over time, marketing has not only served to sell a product or service but also to promote all kinds of activities which eventually become a sale because you want to make people attend or participate in a certain event or activity.

Thanks to the advancement of "Information and Communication Technologies." ICT, has moved to a new style of marketing, the so-called 'digital'. In the decade of the '90s is when the banners of ads on the web begin to appear then at the end of this same decade with the appearance of search engines such as Google and Yahoo is that they start taking out ads and making sales transactions, already from 2000 and onwards with the emergence and growth of social networks such as Facebook, Instagram,

YouTube, among others is that the term Digital Marketing is positioned globally.

But even with all the evolution of the internet and the wide range of social networks, the announcement of posters and banners in public spaces continues to have an influence on the target audience of each sector, be it the one of services, sales, shows or cultural activities to be promoted in our city. In some cafes, restaurants or shops we still see the ad stuck on the walls just like in the 'old times'.

Image 1. Show poster advertising on a wall on the street.

Image 2. Show poster advertising in a coffee shop.

1.1.3 Social contribution

After an exhaustive analysis and search between the use of posters and marketing within it, we conclude that traditional marketing is still in force and that it is still a useful tool when selling or promoting a product or activity (in this case sociocultural activities). But and there is perhaps a disadvantage during our busy society, our "fleeting" and short-term memory, due to the multiple activities and the constant bombardment of publicity we receive daily.

In an article in Forbes Magazine, Jon Simpson mentions that a person receives between 4,000 and 10,000 ads per day! With this figure we can skip the events or activities that really matter to us as in our case it happened with a particular event that we wanted to attend, we saw the announcement in a cartel we took the photo to remember it when we arrived home or when we had "more time" to review the tickets and the schedule, but that photograph was archived in our cell phone gallery, hence the need to have a tool that identifies said activity and reminds us to attend the event of our interest and not forget what we thought was important during the day regarding sociocultural activities that allow us to interact outside our mobile device.

According to Codeluppi (2007) the role of advertising is to serve as a bridge between technology and the market as we show on (Figure 1). For our part, what we want is rather to invest or change that scheme a bit and use technology as a bridge between advertising and the market or target audience as (Figure 2) shows. All of this with the aim that people have a tool that reminds them of those activities that they identified as important throughout the day, and therefore in this way they can interact in the 'offline' world.
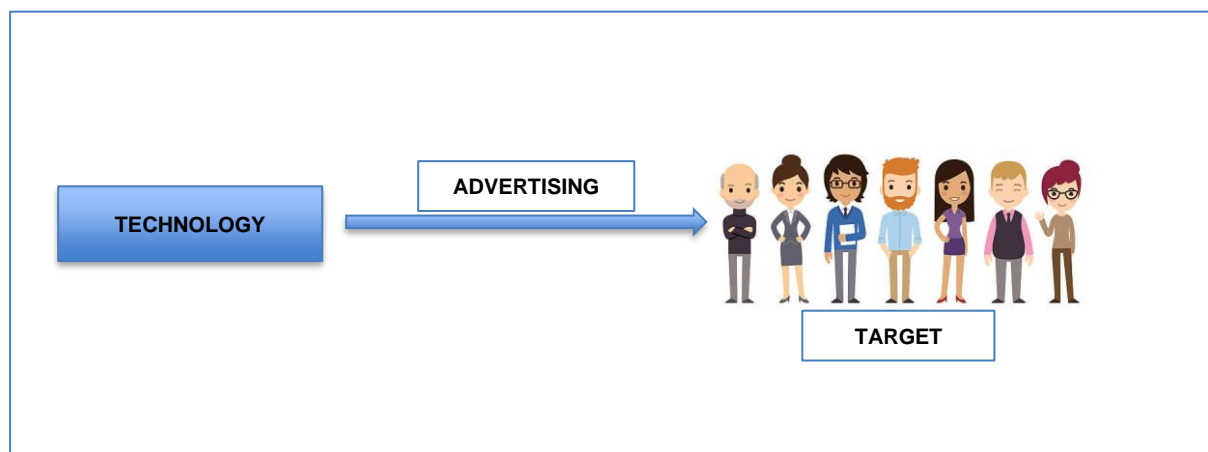

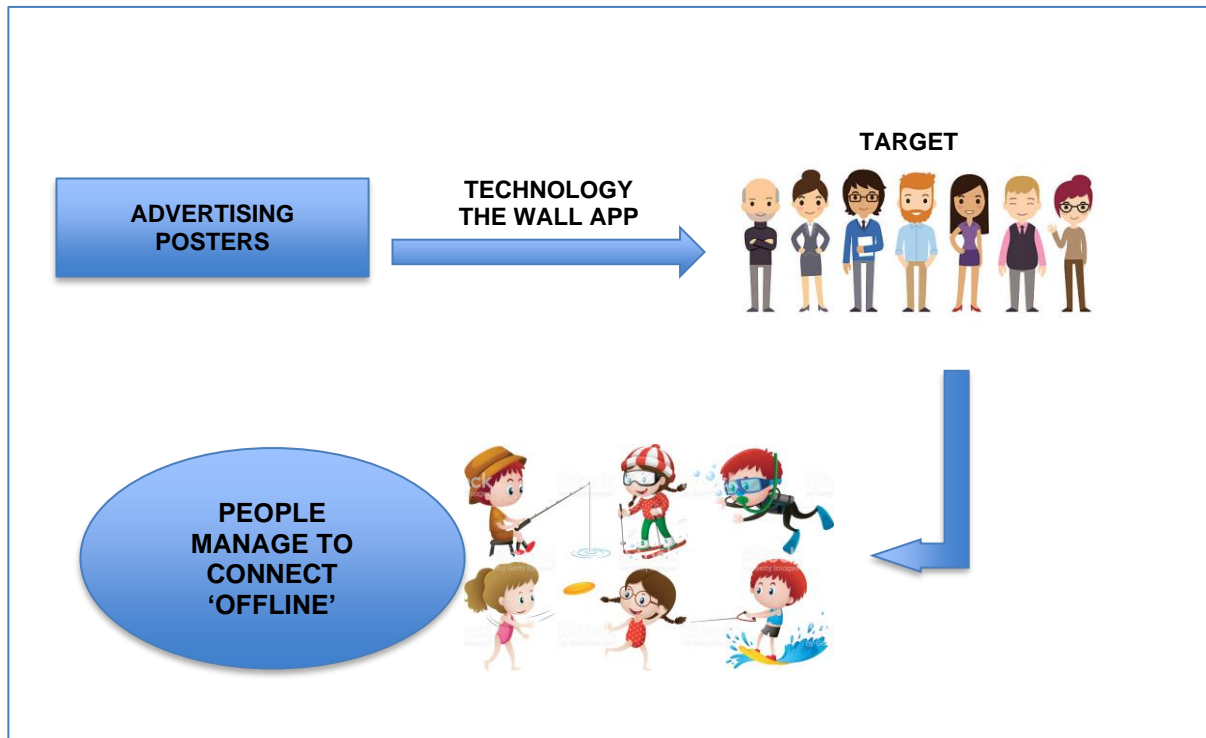*Figure 1. Technology as a bridge between the target and the advertising.*

Figure 2. Marketing Process.

1.2 Problem Solution

In today's busy time, we miss out on many of the important events in our day to day life. Increased stress, lifestyle, busy schedules all contribute to reduced attention span and forgetfulness. Some of the events we forget could turn out to be vital for our career growth or an appropriate change, but we miss out on them due to insufficient or inappropriate advertising methods. Many of the small-scale events are advertised on notice boards, billboards, leaflets etc. Most of the times they go unnoticed, or we might forget about them later due to our busy schedule even though originally, we would have wanted to go for the event. Our application could prove to be a solution for this problem. With the use of this application once we capture the image of the events we are interested in or get a screenshot or download information and later upload it into the application it will automatically get linked and stored in the google calendar and also give a reminder of the same. The application also has an option to capture the images through it which would automatically link it with the calendar. This would help in planning out one's schedule and prioritising. It also indirectly boosts the event traffic thus giving a positive outcome to the same.

1.3 Project Goals

Given all the previous research that were done to enclose the main goal of this project, the goal will be to automate the process of generating a calendar event from scanned event print media. A sub-component of this goal will be to efficiently and accurately identify the relevant event information on a submitted poster image.

According to Google, (Quora, 2019) the Google Lens is defined as "an AI-powered technology that uses your smartphone camera and deep machine learning to not only detect an object but understand what it detects and offer actions based on what it sees". The Google calendar API will be used to manage the identified and interesting events. The API allows users to display, create and modify calendar events as well as work with many other calendar-related objects, or access controls. Google (2019b) mentions that "a Cloud Vision API allows developers to easily integrate vision detection features within applications, including image labelling, face and landmark detection, optical character recognition (OCR), and tagging of explicit content". By merging Cloud Vision API, the Google calendar API, with an intuitive, minimalist, and familiar UI design this application will aim to integrate the required 3rd party APIs to deliver the functional requirements that we have identified. The UI will lead the user through a clear and simple set of steps which will also allow the user to add, modify and manage events that have already been added to the calendar. Before the application is deployed a strategy will be defined to optimise the apps positioning on the App Store. Rilind (2019) defines App Store Optimisation (ASO) as "encompassing the methods, techniques, and levers through which a mobile application can appear in the first positions of the results when a mobile user performs an application search" and includes "automatization of this task by using the new app tools".

1.4 Project Objectives

1.4.1 Main Objective

The App will be able to enable users to store, edit, delete, manage their own events by capture and translate a picture of any print media announcement. The system will allow users, to take a picture of any image with text, or poster that display any information of an upcoming event in order to read, process, and store the data as main function; the system will

have as a main core two APIs, they will help to extract the data from the picture after that the system will be able to store the new information in the calendar, specially design for the app, to keep track of them, also the user will have the option to manage, erase and delete any unwanted events. The system will display the user a list of all the events that previously were created and display to the user upcoming events depending on the notification preferences specified by the user within the app settings section.

1.4.2 Specific Objectives

- Adopt the Scrum agile development methodology to break-up the project into a set of well-described backlog tasks. To create sprints to group and define a set of sprint tasks to periodically deliver a minimum viable product (MVP). To adopt a "planning poker" technique to more accurately estimate the time to complete the tasks listed in each sprint. To assign sprint tasks to each team member and meet weekly in a 10 to 15-minute stand-up sprint meeting to identify tasks completed, tasks stalled, and barriers to progress.

- Prototype, refine, and develop a UI interface based on the functional requirements of the app. Ensure that the UX and UI is in line with clearly defined user personas for the application. The personas will be defined based on user research, focusing on understanding user behavior, wants, needs, pain points and motivations. The personas will be refined further through actual observation techniques and target market surveys.

- To research, develop a proof-of-concept, and finally implement services required by the application using the 3rd party APIs mentioned earlier in this document. These are the machine learning, Google authentication, Google Vision, and Google calendar APIs.

- Define coding standards including naming conventions, documentation standards and a mechanism to store and support collaborative development of the codebase for the application. This will most likely include the use of GitHub and GitPod.

- Identify and deploy a Continuous Integration (CI) system within GitHub to automatically run unit tests on all new code (and associated tests) stored in the repository. This will allow us to detect bug related

issues with the codebase and notify the teams members associated with developing the problematic components.

- Identify a set of target users and conduct user acceptance tests as soon as a minimum viable product is available in Semester 2. Obtain structured feedback from the target users, review and prioritize this feedback and use in the sprints from that point forward.

- Ensure that the application is clearly branded and attractive in terms of color schema, usability, functionality and follows best practice UI and UX design principles, including those of universal design.

- Research and define a strategy to accomplish App Store Optimization (ASO) prior to release of the application.

Chapter 2: Project Requirements

Creation of a mobile application: The Wall is a mobile application that used a computer vision to enable and identify information from a digital image and store social events of daily life. Offering the user the opportunity to jump in from an old-fashion way to record and memorize street events, to bring users the opportunity to use an App to manages and control information of their events in life.

2.1 Resource Requirements

People: 5
Project manager
Business Analyst
UX/UI
Frontend Developer
Backend Developer

2.2 Technologies:

HTML5 - Used to display data to the user on the browser, as it will be a web app application. All the visual structure will be based on that technology on MDN (2019b).

CSS3 - Used to stylise specific parts of the UI of the app, making it personalised on our own style using reference from MDN (2019a) and W3schools (2019). This will obviously include use of Bootstrap.

JavaScript – Used to make our application on the client-side using Angular. The client-side will communicate with the server-side functionality using ExpressJS to route incoming client information and CRUD related requests and responses to/from a NodeJS component. This component will allow authentication through Google OAuth, use of Google Calendar and use of either Google or IBMs machine learning API, which performs image segmentation related processing.

Firebase – This will most likely be the database used to store usage statistics and user's information, along with user preferences specified on the client-side including Google Gmail account username. Ideally, we would like to use a 3rd party service to host our application code, database functionality, and provide user analytics and security. We consider to use Firebase because this platform contributes to the growth of the app, all the data from a new user who decided register will be stored in Firebase that allows the synchronization and storage of the data, it also provides authentication services for the backed.

Framework

Ionic - Ionic is a JavaScript-based framework for the development of mobile applications. It is a Cross-platform that allows using languages such as HTML5, CSS, and JavaScript. We decided to use Ionic because enables the creation of a hybrid app, it is also an open source that allows a browser test it is also provide the ability to developing User Interface interaction.

Angular – Provides a variety of components to be used in the mobile app development. As it is a hybrid technology, we can deploy the app for both iOS and android devices. Angular will require us to learn and develop using TypeScript. The advantages of using Angular is that we can use HTML languages and to extend with other components, it also allows us to create dependency injection that helps to automatically write some basic structures.

Cordova - We used Cordova because recognize the same principles of the previous framework and the same languages like HTML5 CCS3 and JavaScript, and it brings a variety of plugin and libraries that contribute to

the development of web apps in Android and IOS.

APIS
Google Vision API
Google Calendar

IDEs
Visual Studio Code

Agile Tools
Scrumwise – http://www.scrumwise.com

Diagrams tools
Lucidchart - https://www.lucidchart.com/
Visual Paradigm - https://www.visual-paradigm.com/

Repository
Github - https://github.com/

2.3 Architecture

2.3.1 REST Architecture

At the beginning of this millennium, the launch of the 'new' REST (Representational State Transfer) system as a protocol for exchanging and manipulating data on Internet servers completely changed the development of software. Today, 20 years later, almost every company or application has a REST API for business creation.

According to Fielding (2000) who is considered the father of the HTTP specification and one of the international benchmarks in everything related to Network Architecture, "REST style is an abstraction of the architectural elements within a distributed hypermedia system. REST ignores the details of component implementation and protocol syntax in order to focus on the roles of components, the constraints upon their interaction with other components, and their interpretation of significant data elements. It encompasses the fundamental constraints upon components, connectors, and data that define the basis of the Web architecture, and thus the essence of its behaviour as a network-based application".

Therefore, we can say that REST is an architecture designed around representing real world objects as resources that can be passed to from a service. It makes use of HTTP as the way of transporting these resources between the service and any client that wants to talk to it.
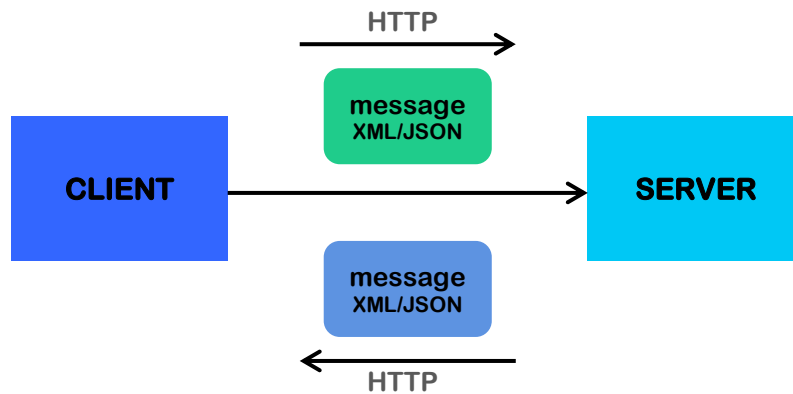

Figure 3. REST Architecture

In the (figure 3) that we elaborated and according to what was mentioned above and according to BBVA (2016) when they mentions that REST is any interface between systems (Server / Client) that uses HTTP to obtain data or generate operations on that data in all possible formats, like XML and JSON.

HTTP provides verbs, a human readable way to tell the service what you want to do with a resource. According to Chakray (2017) these methods to handle resources are:
- GET – query and read resources.
- POST – create resources.
- PUT – edit resources.
- DELETE – delete resources.
- PATCH – edit specific parts of a resource.

The main ones we will use are GET and POST. GET means, as expected, that we want to retrieve resources from a service. And POST means we want to send resources to a service (to be stored).

With REST the client is always the one to send the HTTP request. So, a client will do a POST to the server with resource A, and that resource will be created on the server. Later the client can do a GET, asking for resource A back and the server will return it then. Reason why a server would never send a POST request to a client.

Rescuing everything mentioned above, REST has pretty much become the default way that applications talk to their back end. The mobile app will have a HTTP client, and the server will define the REST API in something like a swagger document which lets the client know what API's are available on the service. REST will always have an API.

2.3.2 REST vs SOAP

For the development of web services there are two fundamental technologies which are SOAP and REST. Currently, it is being concluded that SOAP is too complicated, that is why REST-based Web Services are beginning to be used, which is ideal for displaying massive amounts of data.

Monus (2020) offers us a comparison we can see in (table 1) with the main differences between SOAP and REST.

	SOAP	REST
Meaning	Simple Object Access Protocol.	Representational State Transfer.
Design	Standardized protocol with pre-defined rules to follow.	Architectural style with loose guidelines and recommendations.
Approach	Function-driven (data available as services, e.g. "getUser").	Data-driven (data available as resources, e.g. "user").
Caching	API calls cannot be cached.	API calls can be cached.
Security	WS-Security with SSL support. Built-in ACID compliance.	Supports HTTPS and SSL.
Performance	Requires more bandwidth and computing power.	Requires fewer resources.
Message format	Only works with XML formats.	Plain text, HTML, JSON, YAML, and others.
Transfer Protocol(s)	http, SMTP, UDP, and others.	Only HTTP.
Recommended for	Enterprise apps, high-security apps, distributed environment,	Public APIs for web services, mobile services, social networks.

	financial services, payment gateways, telecommunication services.	
Advantages	High security, standardized, extensibility.	Scalability, better performance, browser-friendliness, flexibility.
Disadvantages	Poorer performance, more complexity, less flexibility.	Less security, not suitable for distributed environments.

Table 1. Main differences between REST and SOAP.

Chapter 3: Project scope

3.1 System requirements

According to (Wikipedia, 2011a), Functional requirements explain what has to be done by identifying the necessary task, action or activity that must be accomplished. Functional requirements analysis will be used as the top level functions for functional analysis. (Wikipedia, 2011a) Non-functional requirements are requirements that specify criteria that can be used to judge the operation of a system, rather than specific behaviours.

All requirements are identified during the initial stages of the development process. It is a specification of what must be implemented, how the system will behave. The use of scenarios is of great help for the identification of the requirements, as it provides a big picture of what the developer needs to implement based on the user needs. (Wikipedia, 2011a).

Functional:

Registers users in database (cloud free database)
Authenticate users
Update / Delete user status / profile
Access user device camera, photo gallery and calendar
Take photos
Send photo to the Google API
Add photo to device calendar / Google Calendar

Non-Functional:

Access to the internet
Available storage space in the device
Permission to access Google Calendar
Permission to access user's device camera

3.2 Machine Learning

Machine Learning (ML) is a type of Artificial Intelligence (AI). In Machine Learning the computers can learn and make decisions like the same way human brains do based on Robinson (2017). The technology is comprised of data consumption, algorithmic study, analytical model training, and building & predicting outcomes. ML has transformed the way most of the world's industries function, including financial, agriculture, real estate, science, manufacturing, shipping, healthcare, business, transportation, and commerce sectors.

Culbertson (2019) mentioned that Machine Learning technology can be applied for various functions that developers may want to provide, including facial recognition, fraud detection, language identification and translation, contextual awareness, financial service, video analysis, autonomous robot, machine & car operations, conversation and speech patterns, text analysis, semantics, and even drawing.

According to Rapid (2020) ML is become so popular in a small period of time because its reducing human effort and expense. In our application we need to store data from image so here we are planning to use existing ML service. Many companies like Google, Microsoft, IBM, etc. are providing ML API services. Some of the important and popular services are image detection and data extraction from an image. We could use images from our gallery, or we can use a camera to take a photo. Here we are going to use Google cloud vision API service provided by Google based on Nelson (2018).

3.2 Database

Database design is crucial to identify what type of data needs to be stored and how it should be. The database tables represent the entities of the system, which are the model classes in an object-oriented approach.

Cloud-Free Database:

Our database functions work in a database cloud computing platform, the database is a provided as-a-service. The advantages to use is that it offer scalability and high availability for the data, it will also make the software-stack transparent to the user, instead of consuming our data server we will use a cloud-free service provided by Google.

For the sign-in we will use the direct database provided from Facebook and Google, users will not storage their personal information in any server, all the data will be held by a 3rd party service on a cloud service.

The internal data for the calendar will storage in Google Calendar directly and each user has their own right to manage, delete, modify their own data. It will also have the possibility to store the data in his own device consuming his own personal device.

The idea is to give the power and the total right to the user to manage their owns data on the way that they prefer, we won't own the right for the data, each user will manage his own personal information in the way that they like it.

This will prevent that user lost their information or them information will share with external sources in terms of security. Users will have access to their data anywhere and anytime, online, and offline, under any circumstance, backup and restoring is provide from the cloud service.

One of our objectives using this type of database is to give the user full control of their data and its handling in the safest and most satisfactory way.

3.4 Development

3.4.1 App Design

Frontend

Sign in / Sign up page this will be the very first page the user will see when he/she opens the app.
They can either sign in if they already have an account or sign up to create an account using Google log in of Facebook log in.

Home Page – Menu

Once the user is logged in, he/she will see the home page, which displays the functionalities of the system, what the user can do. Events page this section shows the events that the user has in their profile.

View Profile

Here the user can see details about account, events.

Edit profile

Here the user can update details about account.

Backend

Database implementation

The implementation of the database is using a cloud free provided by Google and Firebase.

Login Session

Register

A user can register an account directly on the app, adding full name, email, password. The information will be stored in Firebase.

Google:

The integration of Google sign in allow user to use their own Google account, a user can use the same account that already uses with Gmail, Play, or other Google service. The advantage of using is that is a secure way to authenticate accounts on the system, also users can also be connecting automatically with their own Google Calendar.

Facebook:

We also integrated another way of sign in using a Facebook Account which allows an easy way to login, a user can automatically personalize their profile as it brings all the data from their Facebook account, like name, last

name, profile picture, etc. It also allows the potential of sharing information from the app.

The benefit of applying this way of sign in on the app is a user can create an account easily without creating a new account a new password, etc. From the development part, we can have access to user information, and a user can easily share the information from the app to different platforms.

3.4.2 API Connection

For this project, we are going to use Google Vision API for retrieving data from an image and using the text by the API to automatically create and then suggest the calendar event for the user.

The goal is to send a picture of an event, which contains text data about its location, date and time, to the google API. The API will read the file and send us back a JSON file, containing all the text read from that image. The app will then get that data and will identify what is the location, the date and the time of that event. If everything succeeds, the app will save the event onto the user calendar. (Google, 2019c).

Google Cloud Vision API

The Google cloud vision API will help developers to understand the content of an image by encapsulating powerful ML models in a simple way to use REST and RPC APIs. It quickly classifies image into many different categories, it will detect individual objects and faces within the images and also it will find and read printed words contained within the images. We can build metadata in our image catalogue, moderate offensive content, or enable new marketing scenarios through image sentiment analysis. Programmable Web (2016) highlight that the features provided by Google cloud vision API are label detection, explicit content detection, logo detection, landmark detection, optical character recognition, face detection, image attributes, web detection, integrated REST API.

This application programming interface uses machine learning models, the propose of the API is to read and images and recognize them in different categories, it also allows detection of text, handwritten, objects, faces, etc. Using the AutoML Vision simply scan an image and capture the information that we like. The benefit of using this API is that it allows us to deploy fast and with a high level of accuracy, to classify the information as

we prefer it works in real-time action based on local data, it also supports different edges devices. Another benefit of using Google vison in the app is that it uses OCR to detect text within images in more than 50 languages and various types of file types, also detect and classify the location on the image.

Google Calendar API

The integration of Google calendar through the app brings a view of the events that a person stored. The advantages of using are that Google calendar provides a repository for Android, it also provides a remote server for storing the information, users will be able to see their events through a Gmail account.

3.5 Software Engineering

Front-end and Back-end

To understand a little what the back-end is first it is good to know what the Front-end is and how these two are related to the proper performance of a mobile application.

The Front-end of an app is the part that the user sees and touches. It includes images, buttons, menus, transitions and other elements that form part of the application. These elements are unable to function on their own, and it is here when the back-end intervenes, giving life to everything mentioned above.

Murillo (2012) mentions Ignacio Barrera's words to get a better idea of the importance of Back-end, "The solid work of a well-built back-end is key for a good front-end experience. You can design the most beautifully crafted app; you can have the most innovative mobile business idea. But in the end, if the foundation of your app does not work, the application will be a failure, and your users will quickly uninstall it from their devices".
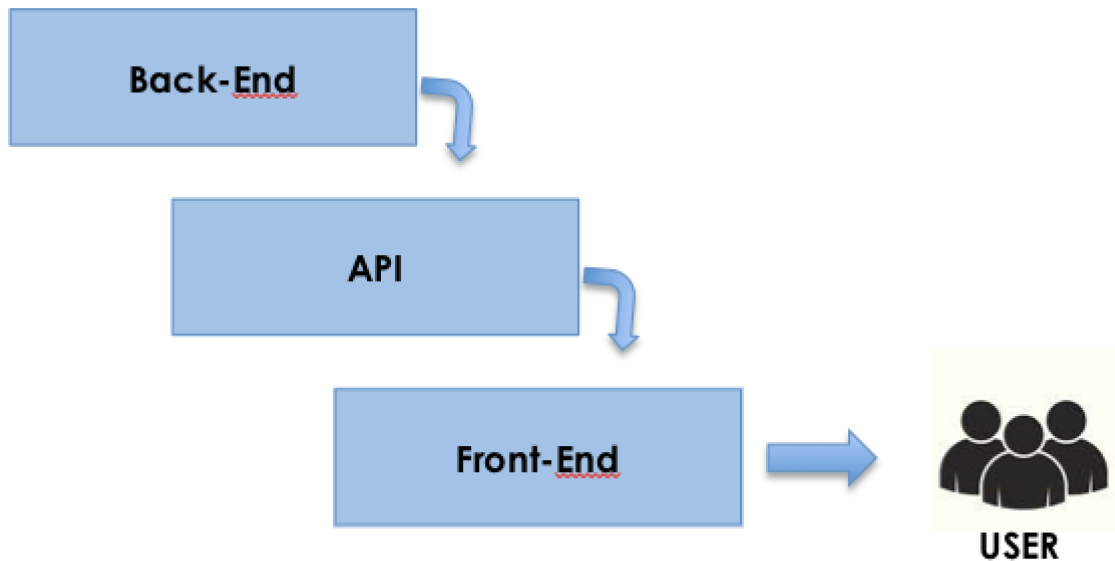
Figure 10. Back end and Front End.

Chapter 4: Project Management

4.1 Summary Gantt chart for research

Gantt Chart for Schedule:

This schedule shows the main activities per week for the first period of the development process of the project from October to December 2019.

Figure 11. Schedule Activities, Semester 1.

Gantt Chart Table Activities:

Gantt Chart of Activities assigned per person, that shows the start date and the end date with a description of the task. It also displays the duration

time and the percentages of the progress. From period of mid- September to December 2019.

Project Gantt Chart

ASSIGNED TO	START DATE	DUE DATE	DURATION	% DONE	DESCRIPTION	PRIORITY	SPRINT/MILESTONE
Contribution of all team	18/09/19	25/09/19	7	100%	Creating the team		Phase 1
Contribution of all team	25/09/19	28/09/19	3	100%	Brain Storm		Phase 1
Contribution of all team	25/09/19	02/10/19	7	100%	Developing Ideas for the project	Tecnologies	Phase 1
Raquel	02/10/19	06/10/19	4	100%	The first draft of the proposal		Phase 1
Maura	04/10/19	14/10/19	10	100%	Meeting with External	Identify problems	Phase 1
Maura/Ana/Raquel	09/10/19	11/10/19	2	100%	Meeting with Lectures: identify problems	(advantages and Disadvantage)	Phase 1
Maura	02/10/19	09/10/19	7	100%	Research events in life, importance, social contribution		Phase 1
Akhill/Eliezer	25/09/19	23/11/19	59	70%	How are we going to develop the back-end		Phase 2
Raquel/Ana	25/09/19	23/11/19	59	70%	How are we going to develop the Front-end		Phase 2
Contribution of all team	23/10/19	13/12/19	51	70%	Problem area, solution, goals, objectives, resources, scope, risk, schedule.		Phase 2
Eliezer / Ahkill	25/10/19	21/11/19	27	100%	Use Case Diagram		Phase 2
Eliezer / Ahkill	25/10/19	21/11/19	27	100%	Entity Relationship Diagram UML		Phase 2
Eliezer / Ahkill	25/10/19	21/11/19	27	100%	Class Diagram		Phase 2
Raquel	25/10/19	20/11/19	26	100%	State Diagram		Phase 2
Maura	25/10/19	20/11/19	26	100%	Sequence Diagram		Phase 2
Ana	25/10/19	20/11/19	26	90%	Wireframe		Phase 2
Ana	26/11/19	27/11/19	1	100%	Presentation Slices for introducction of the project		Phase 2
Contribution of all team	23/10/19	11/12/19	49	100%	Charter 1. Documentation		Phase 2
Contribution of all team	19/12/19	20/12/19	1	100%	Charter 1. Documentation, ready.		Phase 2

This Project will continue for Phase 3 and 4. From January to May 2020. For the final delivery, it will have all the 4 Phases of the process completed.

Figure 12. Gantt Chart, Semester 1.

4.2 Scrum Methodology

Below we describe in detail how the development process was during the second semester of the project which includes the Scrum methodology, for this phase we used Scrumwise tool.

The strategy was based on breaking down the project into a backlog of tasks so any new task/activity that takes time for a team member will be added to the backlog.

At the end of each sprint we will meet to review the last sprint which will include discussing any ways we can improve how we work, decide on the output for the next sprint, decide on the backlog items to be included in the next sprint, define how long each task will take in man-hours, assign the tasks for the next sprint to the team members, add any new items/functions/bugs/activities to the backlog.

Each sprint will (ideally) be the same time length of either 1 or 2 weeks. Having the same length sprints allows us to see how fast/slow we are working by allowing us to compare equal length sprints.

Each sprint will produce something that was can test/evaluate/review. Eventually, each sprint will produce something that we can show the "product owner".

It is important that each team member regularly updates the taskboard when a task changes from planning, in progress etc as this allows us all to see the progress of the project.

All messages and discussions about the project (features, bugs, ideas, other comments) should be posted in Scrumwise in the chat (for informal discussion) or the message board (for ideas, suggestions, bugs, requests).

The core idea is to create a backlog of tasks that is as accurate as we can make it (including functionality/bugs/requests, etc). We assign tasks as fairly as possible. We take as much care as possible to decide how long a task will take. This is the hardest part so, for some tasks, we might need to get an average value based on more than 1 member of the team.

The development was based on these main points:

- We complete the project in fixed length sprints.
- We regularly update the task board
- We meet every week to discuss what have we done, what are the issues, what have we to do next.
- Weekly meeting (except for sprint planning/review) should take no more than 30 minutes.

All non-trivial (planning, bugs, feature requests, issues) messages related to the project are sent through Scumwise - otherwise we have lots of messages over many different platforms, like Basecamp, WhatsApp.

Including Easter, we have about 9-10 weeks to complete the project. This should work out at about 5-6 sprints (where each is 2 weeks in length) in total. We will quickly get used to using this process and it will give us lots to talk about when we present our project at the end of the semester.

4.3 Definition of Backlog Item

BACKLOG ITEMS	
Scrum Management/Update:	This tag was created for tasks that relate to managing and updating Scrumwise. For tasks that relate to meeting as a group, or sub-group, and reviewing the plans for the next stage of the project. To assign work to members of the team.
Meeting:	This tag was used for tasks that relate to meeting as a group, or sub-group, and planning sprints, allocating tasks, and playing planning poker (to estimate the time needed for the tasks to be included in the next sprint).
Paper Prototype:	This tag was used for tasks that are related to creating the wireframe prototype which illustrates how the product will look, what functions will be available, and how menu transitions and notifications will appear.
Proof-of-Concept:	This tag was used for tasks that relate to writing small chunks of code, or single pages of a UI design in order to test if our approach is correct (i.e. have we chosen the correct technology).
Implementation:	This tag was created for tasks that relate to writing the source code or implementing any database or project resources for the project.
Documentation – Code:	This tag was for tasks that relate to writing documentation within the source code (e.g. for classes, methods, database scripts etc).
	This tag was created for tasks that relate to generating documentation for the project submission and presentation (e.g. creating Prezi/PowerPoint, rehearsing presentations, writing final reports etc.).

Documentation - Project & Presentation:	27
Deployment:	Tag for tasks that relate to deploy the app (or components of the app) to the internet. For example, when you deploy/upload your database to Firebase, or the NodeJS code to Heroku.
UX / UI Development:	Tag used for the research and development of usability and user experience.
Testing - Unit Tests:	This tag was created for tasks that relate to writing and running tests of individual units of source code (e.g. when we write a unit test to check if a specific method works).
Testing – Performance:	Tag for tasks that relate to writing and running tests of functions within the source code that may be complex, time-consuming, or use network or 3rd party API (e.g. a call to the machine learning API).
Testing - UI & UX:	This tag was created for tasks that relate to writing and running tests of the user-interface (e.g. how the user completes assigned tasks, navigates the interface, time for completion).
Design:	This tag was related to the process of the front-end design.
Debug and Error Fixing	This tag is for debugging and error handle on the app.

Table 2. Definition of Backlog Items.

4.4 Sprints Activities

To breakdown the development and creation of the app we used Scrumwise, each sprint was breakdown in different tasks for each member of the team. Below you can see a few examples (Figure 13, 14 and 15) of how the task was allocated for each member. For more information about the breakdown of the spring follow *Appendix – Sprints Activities.*
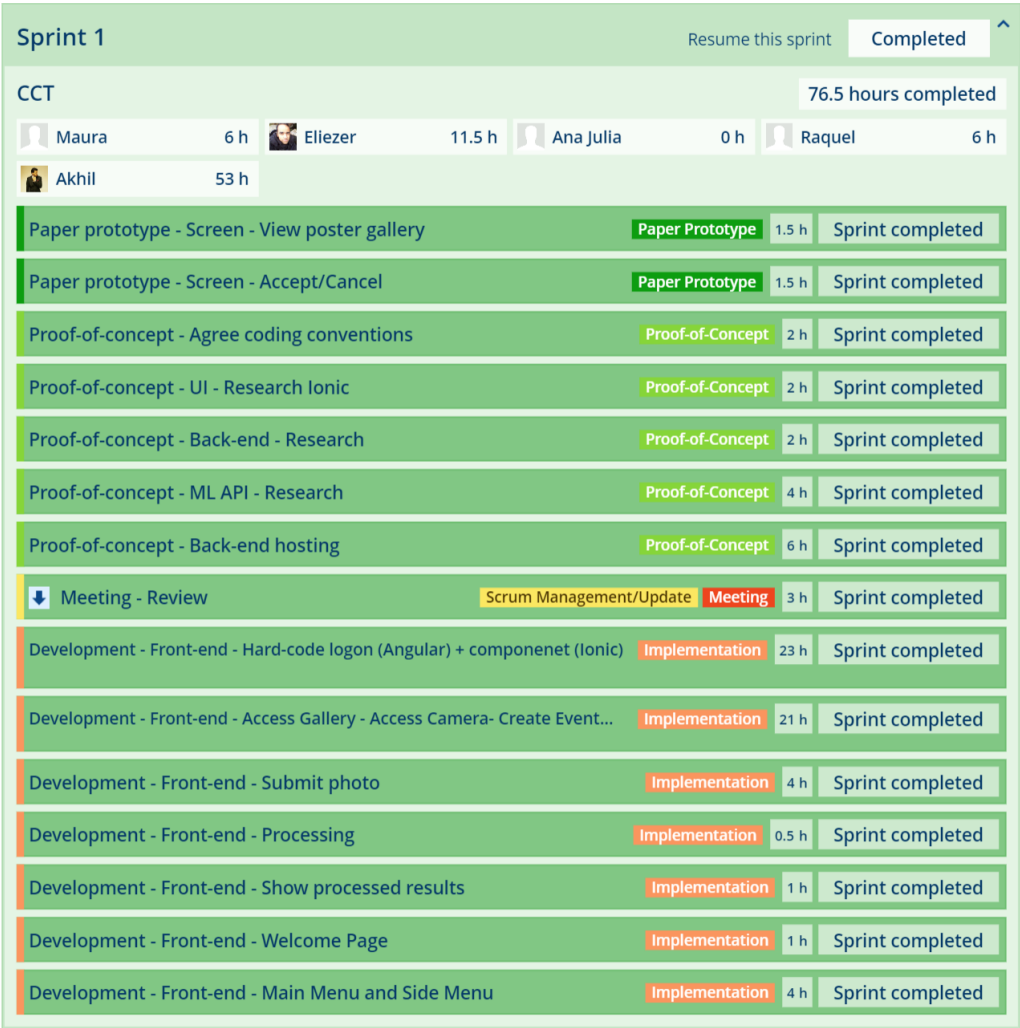
Figure 13. Sprints Activities, Sprint 1.
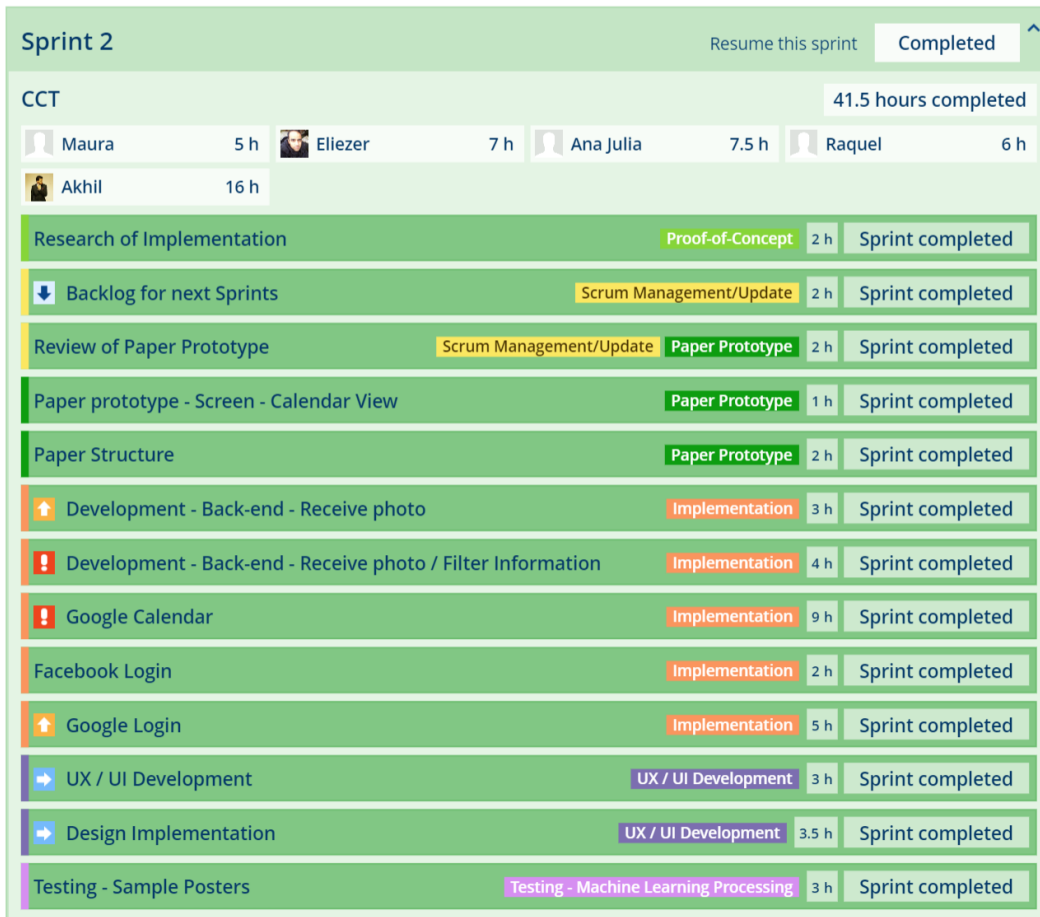
Figure 14. Sprints Activities, Sprint 2.
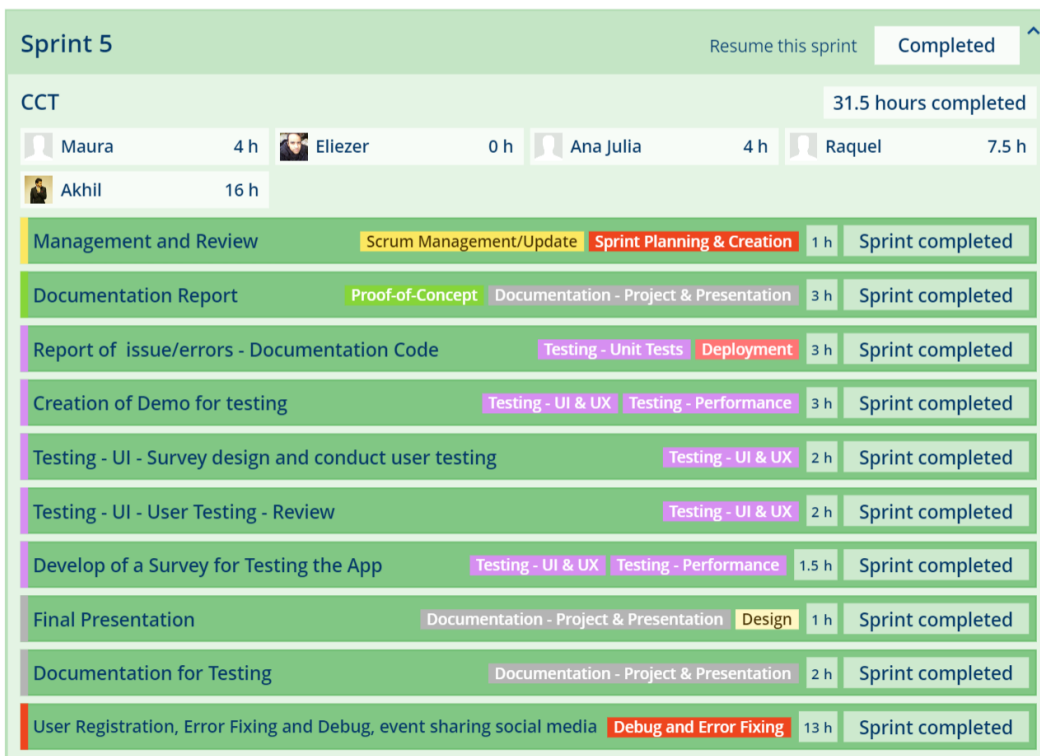
Figure 15. Sprints Activities, Sprint 5.

4.5 Chart Burndowns for Activities

Work hours
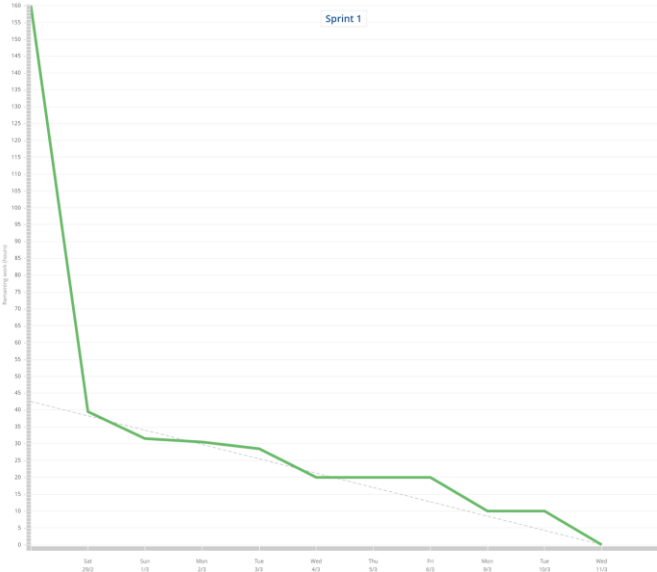
Weekdays
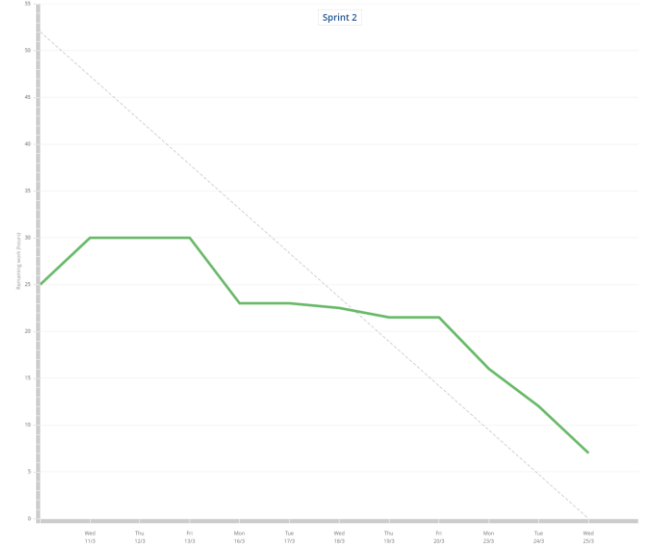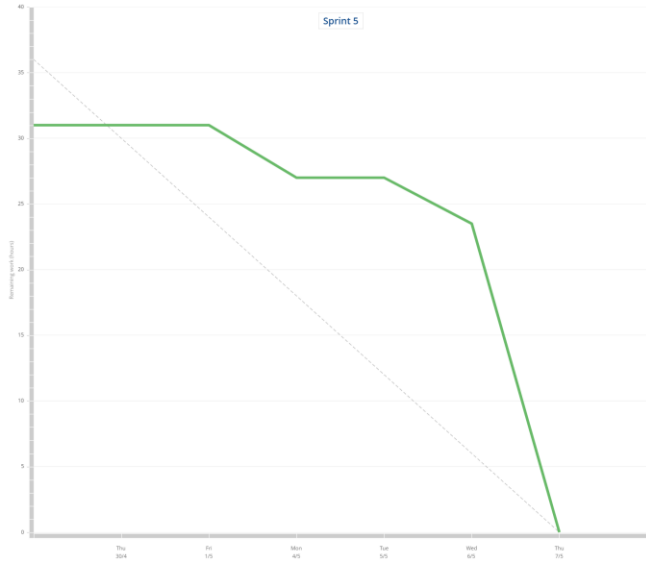
Figure 16. Chart Burndowns for Activities, for sprint 1, 2 and 5

Chapter 5: System Analysis and Design

5.1 Use Cases

According to Amblar, (2018) a use case is a written description of how users will perform tasks on your website. It outlines, from a user's point of view, a system's behaviour as it responds to a request. Each use case is represented as a sequence of simple steps, beginning with a user's goal and ending when that goal is fulfilled.

Use cases are used to identify the actors (users) of the system, and to demonstrate the interactions between the user and the system. This allows step by step consideration of the functionalities the software will perform based on the action taken by the user.

Use Case Diagram
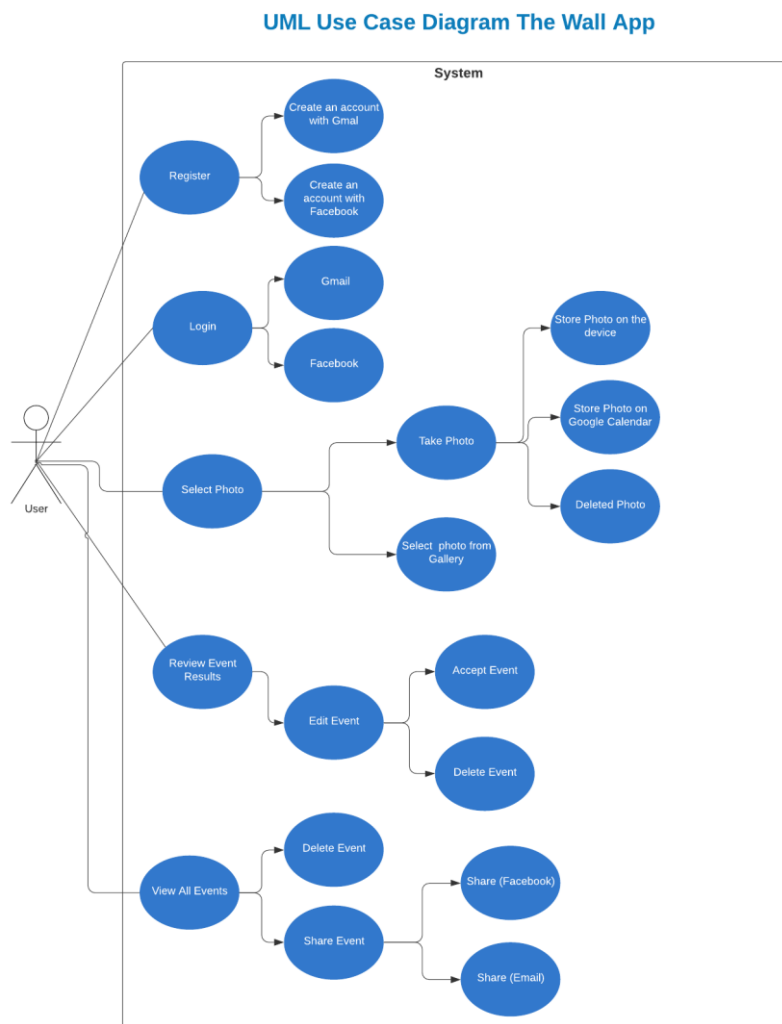
Figure 4. UML -Use case diagram.

5.2 User Stories

Amblar (2018) published an article which outlines that user stories are one of the primary developments artefacts for Scrum and Extreme Programming (XP) project teams. A user story is "a very high-level definition of a requirement, containing just enough information so that the developers can produce a reasonable estimate of the effort to implement it".

User stories are a very good way to identify the needs of the user, or any issues that they may encounter using the system. They provide a range of details that can be used to improve the user experience and prevent further problems.

5.3 Classes Diagram

According to Visual Paradigm (2019a), in software engineering, a class diagram in the Unified Modelling Language (UML) is "a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations or methods, and the relationships among objects".

Class diagrams describe a set of classes that represent the entities of the system and their attributes and behaviours, as well as the relationships between them. Class diagrams are very important for programmer and for the business team, as they can see what the functionalities of the project are.

User
- firstName: String
- lastName: String
- email: String
- password: String
- events [ ]: Event
+ getFirstName(): String
+ setFirstName(): void
+ getLastName(): String
+ setLastName(): void
+ getEmail(): String
+ setEmail(): void
+ getPassword(): String
+ setPassword(): void
+ getEvents(): String [ ]
+ setEvents(): vid

Event
- location: String
- date: Date
- time: DateTime
- photo: Image
+ getLocation(): String
+ setLocation(): void
+ getDate(): Date
+ setDate(): void
+ getTime(): DateTime
+ setTime(): vois
+ getPhoto(): Image
+ setPhoto(): void

Error
- event: Event
+ getEvent(): Event
+ setEvent(): void

Figure 4. Class Diagram the Wall Application.

5.4 Entity Relationship Diagram

This diagram shows the model and the relationship between actions, the entities workflow and the relation between each other.
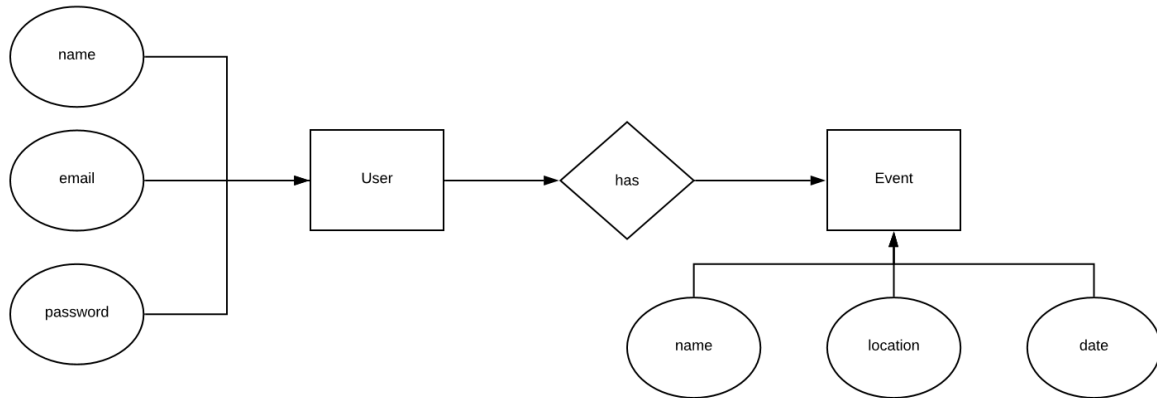
Figure 5. Entity Relationship Diagram.

5.5 State Diagram

According to Britton, (2004) a state diagram will help us describe the behaviour of our object in various use cases and in turn identify its attributes to refine the description of the behaviour of our application. State Diagram symbols are those shown in (figure 4).
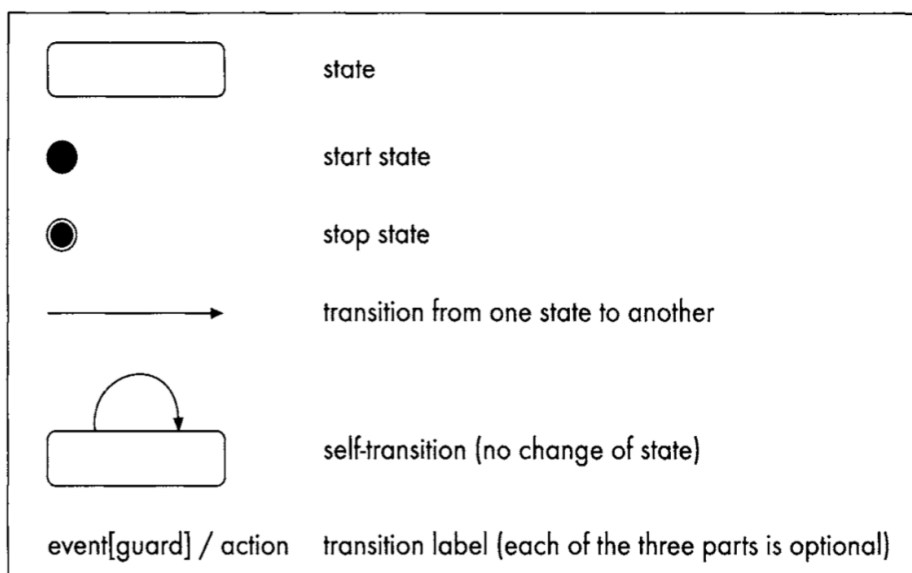
Figure 4: State Diagram Symbols

To draw a state diagram, we have classified the events that can occur and the different states in which an event reminder object can be based on an image or photograph as shown in (Table 2).

Events and states for objects of the Wall Application

Event	State
	Start state
User log in	Successful
User log in (Failed)	Stop state
Select picture/poster	Device storage
Take picture	Camera taken
Saving date of event	Saved in the calendar
Looking for upcoming event	Displayed event
Log Out	Stop state

Table 2. States for objects (events).

The interaction between the user and the system (Figure 5) consists of entering first through the registration or login, after the system identifies the user, the user can select the image or poster of the event that is stored on the computer or also You can use the computer camera to take the poster picture. Then the user will proceed to enter the event data in the application calendar, the system will save and process the information in the user database, finally the user will be able to access "their events" saved in the system calendar.
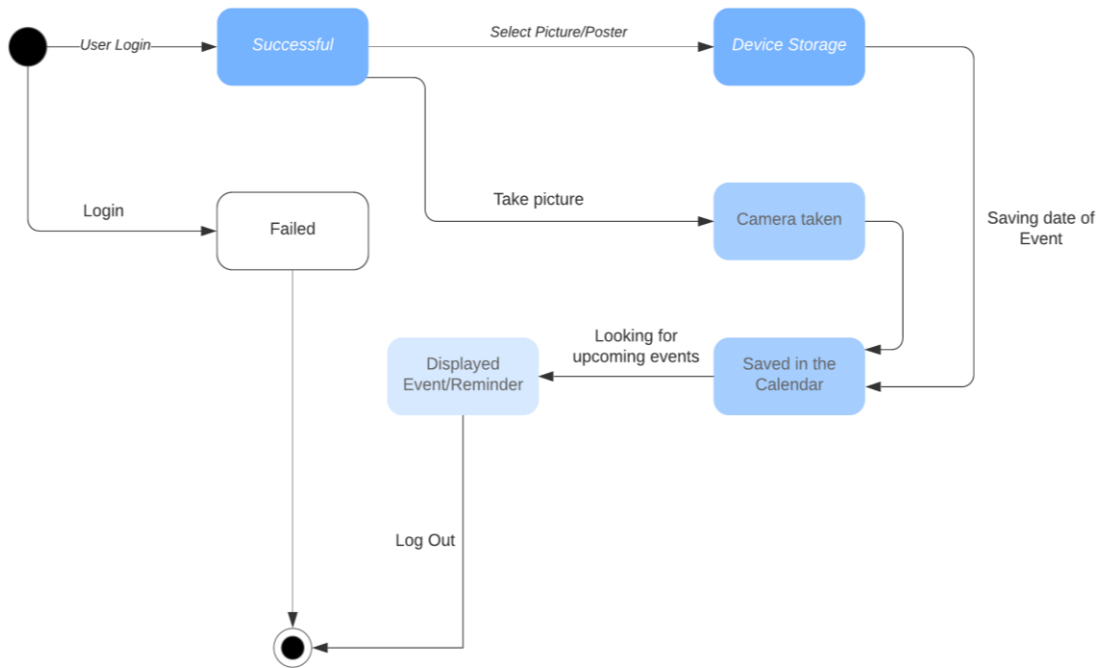
Figure 5. State Diagram The Wall application.

5.6 Class Responsibility Collaborator (CRC) Model.

This is a model that we use for design and object-oriented software, a group of cards as we can see in (Figure 5, 7 and 8). Those cards show Main Classes and the responsibility of each class and how the classes interact.

Class Name: **User**	
Responsibility	**Collaboration**
- Knows firstName - Knows lastName - Knows e-mail - Knows password - Knows events	Event

Figure 5. CRC – Class User.

Class Name: **Event**	
• Responsibility	**Collaboration**
• Knows location • Knows date • Knows time • Knows photo image	• Google Vision API

Figure 6. CRC – Class Event.

Class Name: **Error**	
Responsibility	**Collaboration**
• Knows event	• Event

Figure 7. CRC – Class Error.

5.7 Sequence Diagram

Visual Paradigm (2019b) mentioned that "Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focused and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when".

The sequence diagram specifies a more detailed analysis of the system, and it is used by developers during the implementation phase of the system. It has information about code structure, such as loops, if statements.

Sequence Diagram for The Wall Application:

The interaction between the user and the system consists of entering the first one through the registration or Login, after the system identifies the user, he can save the information of the event that is of interest, the system will save and process the information In the user database, you will finally create a "Reminder" to remind the user when the event date is close.

Use case 1:

The system will verify if the information is correct and will validate it so that the user can access the application.
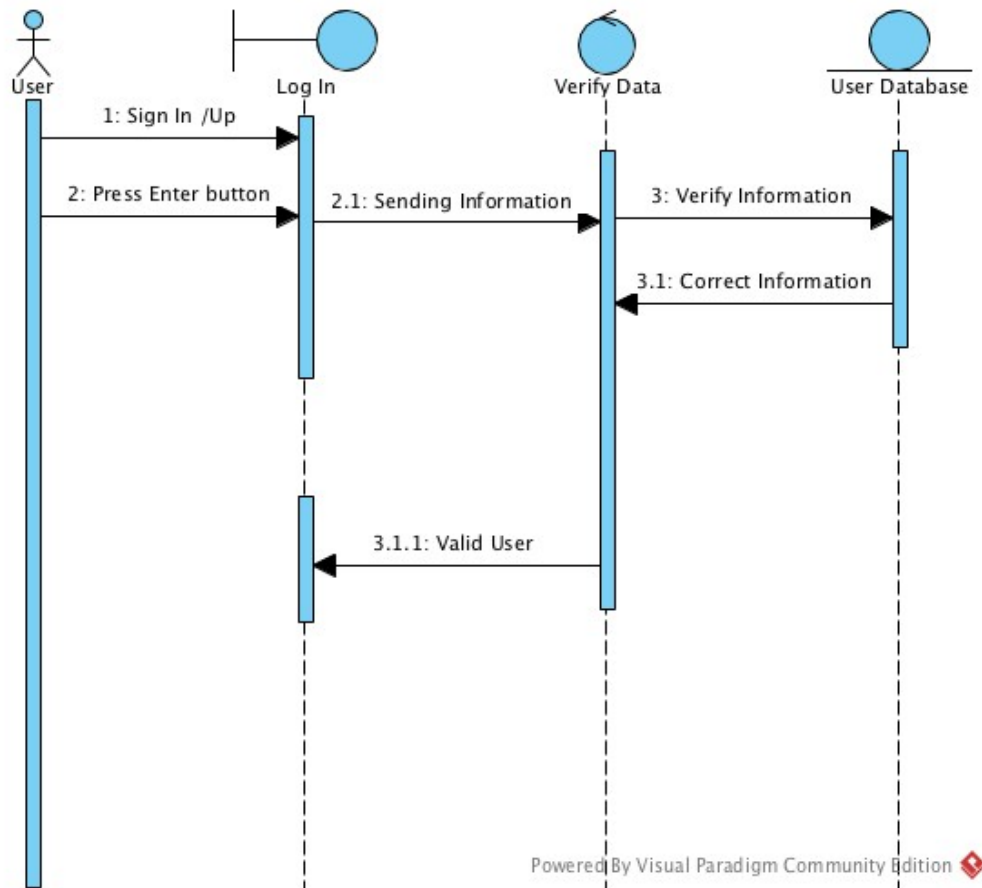
Figure 8. Sequence Diagram for The Wall Use case 1.

User case 2:

The user enters the system, sends the photograph of the event of interest, the system records and saves the information, creates the event and reminds the user.
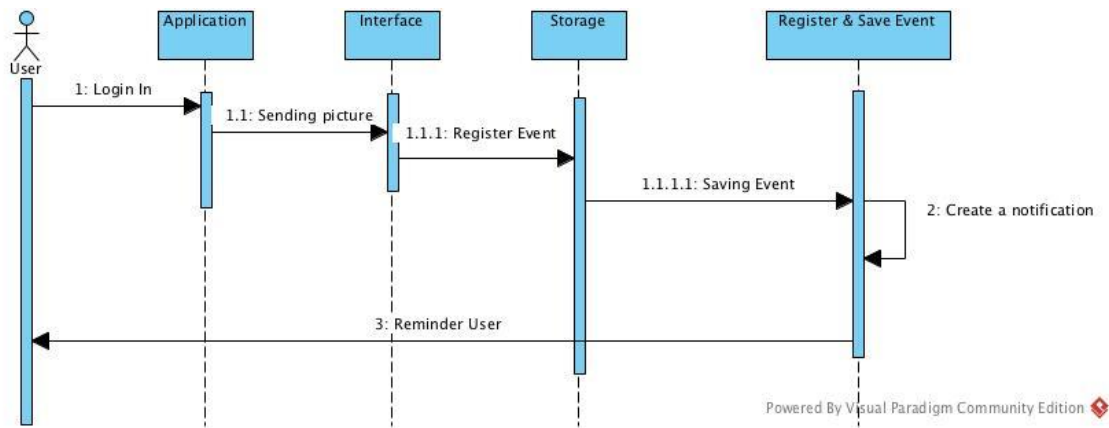
Figure 9. Sequence Diagram for The Wall Use case 2.

Chapter 6. Front-end Implementation

6.1 User Experience and User Interface

What is UX Design According (Wikipedia 2020) UX Design is the process of enhancing user satisfaction with a product by improving the usability, accessibility, and pleasure provided in the interaction between the user and the product, taking that information as a starting point, some sources were consult in order to compile relevant information to develop an accurate approach for The Wall app project, to accomplish as a main goal the proper use of centered user design, which resulted in a friendly user experience.

According Interaction design foundation (2020) User experience design, is the design process that teams, use to create products that provide meaningful and relevant experiences to users. This involves the design of the entire process of acquiring and integrating the product, including aspects of branding, design, usability and function. To carry on this process some trending software for UX/UI development were used, strategies and organizational tools were implement across the development to level up professionally the UX/UI outcome in this project, such as Adobe XD, Adobe Illustrator, Adobe Photoshop, roads maps, to track all the steps and outcomes of each of them. UX and UI Strategies at every stage were carefully carry on in this project that went from the conceptual idea of the app, through understanding requirements, create user personas, research about the new UX trends, create sketches meanwhile the first options were in the table, to be able to make sure what was the best option that meet the App expectations, till the final and clickable prototype, in order to deliver to the developer team a clean and friendly product to be implement, also

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to complete a good design approach, the project was support by fundamentals graphic design assets in regard of trendy applications solutions and Marketing material, to promote The Wall App, after deployment, also as a final result a marketing landing page will be created where the App will be promote. In that way a small brief of the project and the result will be display for marketing purposes.

About UX/UI Strategy: in order to make the app visually attractive and easy to navigate through the content a UX/UI case study was carry out for this project, follow the most important UX principles. A Feel and mood board was created in order to have a better understanding of the users. A research was develop about the crucial role to implement a strategy in terms of UX/UI for this project, given that there are another apps that do similar things, The Wall App will have as aim, to step out in front of the others, and one of the ways will be about how the customers will navigate and interact through the app.

UX/UI Roadmap: Product Plan (2020) point that a UX/UI roadmap is a high-level overview of the plans and goals relating to a product's user experience, user interface, and user research. roadmaps help to keep usability a top priority at every stage of development. During the development of the design process, user experience was the most relevant point to take in count, because due to poor experience using the app that could undermine users. In order to avoid a negative product experience a road map was developed to track each step carefully, to measure and be aware of pro and cons itself across the development process. One way to understand the user experience goals and objectives, main components, were incorporate in order to achieve a user-friendly application. As main benefits of using a road map are keep in mind as a priority the user experience at every stage to have clear what will be build.

As a consequence of a positive user experience is a significant factor in an application market success; to develop a road map some topics where take in count first a strategy and goals were establish, in order to achieve the main goal in terms of design, second the tools necessary to create the road map, and third one set the strategic areas, including User Experience and User Interface.

Plan a UX/UI system to follow by user experience principals such as *User Research* focuses on understanding user behaviors, needs, and

motivations through observation techniques, task analysis, and other feedback methodologies.

6.2 UX/UI Design process and development to use in The Wall App

According to Saddia Minhas (2018) UX planet, User experience design process is an iterative method that helps you continuously improve and polish your designs; the design process involves six stages, which are Understand, Research, Sketch, Design, Implement, Evaluate.

6.3 Stages of UX/UI Design
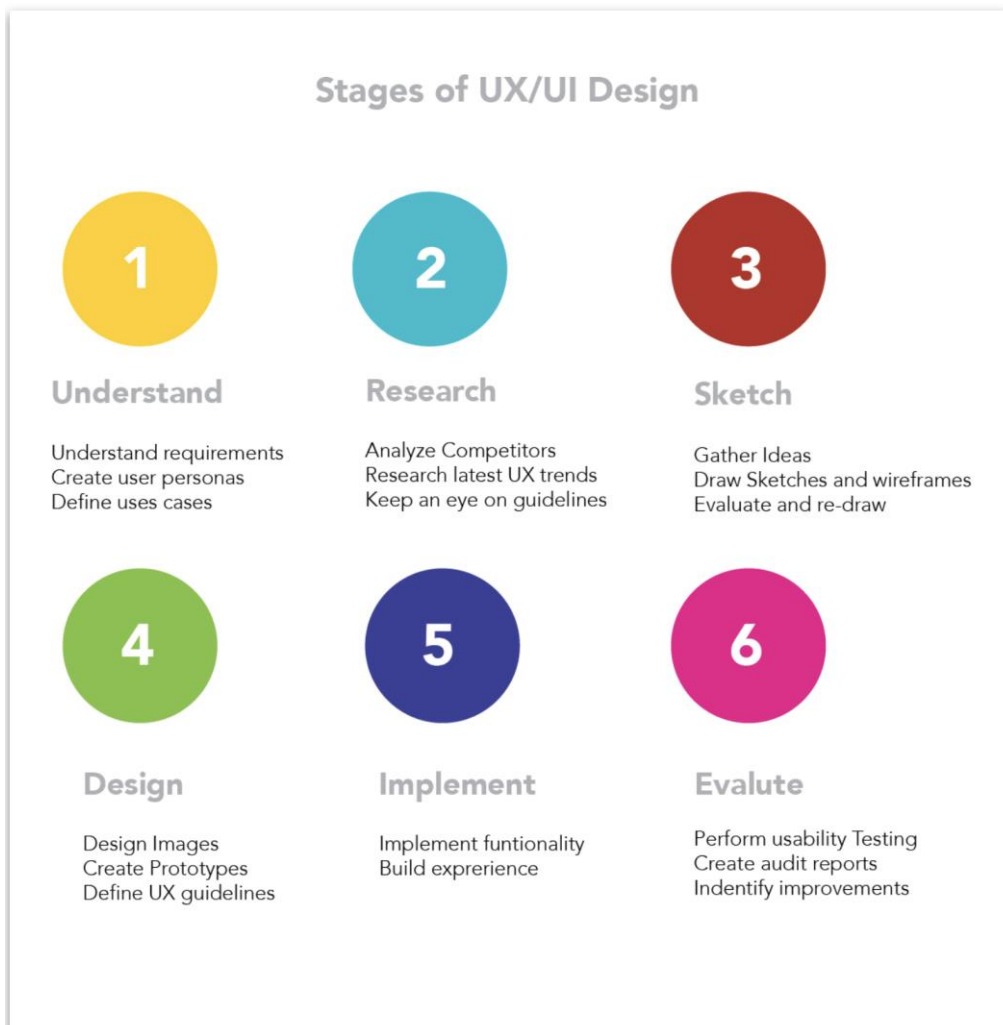
Figure 17. Stages of UX/UI Design.

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6.3.1 Understand - Understand requirements - Create user personas - Define use cases First of all, The Team (Wits) did a brainstorming to define how the actual App will be, working base on the requirements that one potential buyer of THE WALL APP. This insight was crucial to take some decisions to start. In this first phase, the primary thinking about how the app could looks, preliminary sketches were did on board, also who will be the regular user of the app, an idea of the screen flow, as a result a well form development of user personas and user cases for The Wall App.

1.USE CASE

Martha, 25 College student, every Friday Marta go out with her friends, as she visit many places in one night, she might see around the city posters or pick up flyers of any upcoming event that she would like to attend, Marta does not have the time or the willing to remember or keep that information with here; in order to keep track of all the events, any time that she needs she will be able to open the camera on her phone take a picture, The Wall App will extract the info, put it on her calendar and ready to go for next place, so she will receive a notification when the event due to happened.

Image 3. Use case 1.

2.USE CASE

Alan, 35 youth professional, every weekend Alan go out with his co-workers, they use to go out to the Arcade pub in Dublin, which has an special wall where they advertise the upcoming gigs around in town, to support local bands , Alan always is in a rush when they are living the place, so he just find easy to take pictures of the poster that are advertised on the wall, in order to keep track of all the events, any time that he needs, he just open the camera on his phone take a picture, The Wall App will extract the info, put it on his calendar and ready to go home, so he will receive a notification when the event due to happened.

Image 4. Use case 2.

3.USE CASE
Camil, 27 Youth worker, during the week she used to go for lunch with some friends, on her way back to the office, she walk into a shop and she spot a poster advertisement of a local band call catfish, she is about to pay so the time is limit, to be able to remember the ad, she just use The Wall App to add a new event on her calendar, she just open the camera on his phone take a picture, the app will extract the info, put it on his calendar and ready to go for lunch, so he will receive a notification when the event due to happen.
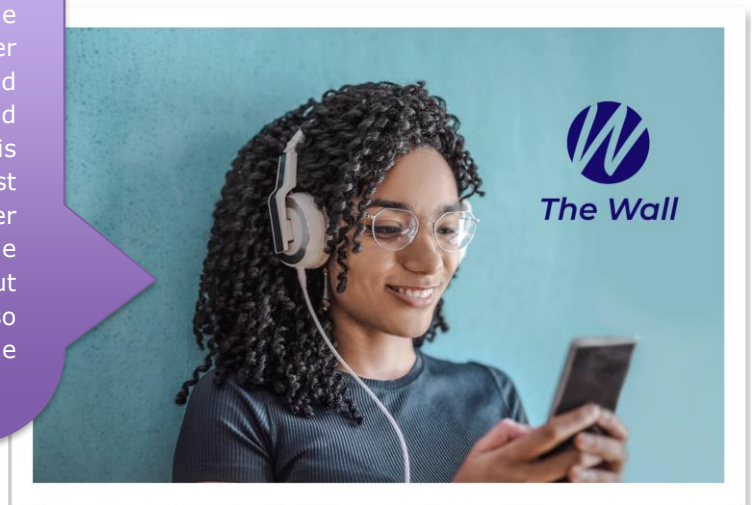
Image 5. Use case 3.

6.3.2 Research -Annalise competitors -Research latest UX trends -Keep an eye on guidelines. A research was conducted about similar Apps where events can be managed, also a research about another application that uses the same technologies that are going to be apply on this project, also color scheme that the App will have, also other elements regards the design were develop in this stage, a deep analysis of the layout of different applications was carry out in order to get the maximum potential, visually speaking of the App, given that the aim is to develop a UI interface that give the user clarity when doing each tasks and also high levels of usability in terms of user experience.

6.3.3 Sketch -Gather Ideas -Draw sketches and wireframes -Evaluate paper sketches were drew, white board flows and wireframes to share with the rest of the team, at the beginning , also just naïf sketches about the layout of the elements in the screen, some mock-ups were print at scale, in order to see how each element will appear on the screen, also a map content of one of the possible flow that the use will do, at the end the previous sketch were refine to avoid any loose detail of the wireframes.
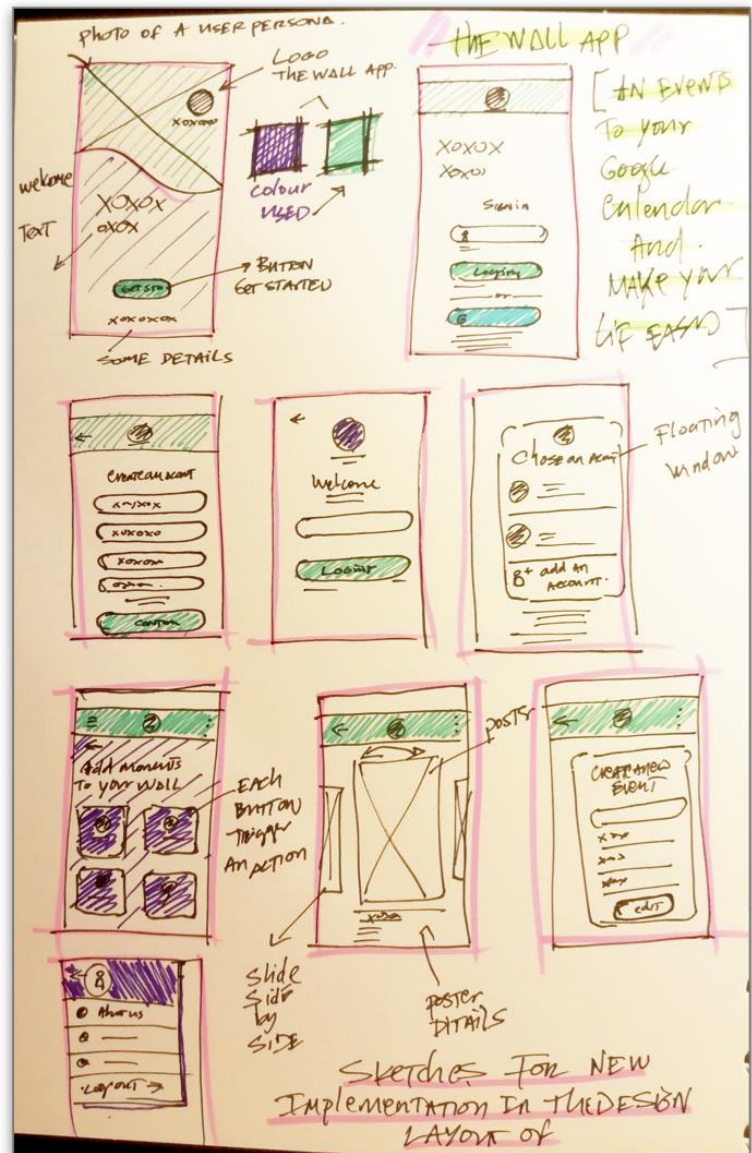
Image 6. Sketch, The Wall.

6.3.4 Design to carry this task after follow the first 3 parts of the strategy set up previously After decide what color schema used the color selected , was tested in the final wireframes to have an idea how will look on the final screens, after have the sketch finally decide, the next step will be proper the UI Design using an specific tool for that, in this cases Adobe XD for that, also after finish this step a clickable prototype will deliver to the developers team. To create an efficient UI design, the 5 fundamentals of UX designed were apply.

6.4 Five main fundamentals of UX Design for The Wall App

UX stands for User experience Interaction design foundation (2020) how people feel when they use a product or service, to ensure an efficient development process, there are 5 fundamental principles, that were apply to achieve one of the main goals of the project, which is a clean and friendly application, based on UX Planet (2020).

The first one to take in count is, **Easy Learning** the system in this case, the App, have to be easy to use, giving the sense to the user to feel that familiarity with the system, this particular one was apply mainly using normal conventions that are common elements, that are consistent in most of the screens of the App, as buttons, menus, submenus, an specific colour palette was used, in that way consistency, which is as well an important element to be consider when trying to achieve a good application of UX; As a consequence the user will have all the tools, to feel that confident while using the App.

The second one is **Efficiency**, once the user has learned how to use the application, the efficiency will be measure by the time spend doing every task; to achieve this, the App have a systematic navigation, in that way the steps to complete each task are easy to follow, furthermore the user will learn quickly the tasks within the App.

The third one is **Memorability**, if the user stop using the app for a while and then come back to use it, the user has to be able to remember easily, to apply that principle the App has been develop with an friendly layout in order to achieve it.

The four one to consider is the **Errors**, normally users make mistake while using the app, so as a consequence, the App has to be able, to anticipate the errors that the user might have in order to create a efficiently perform of the App.

The five one is **Satisfaction**, as a consequence of applying the previous four fundamentals, the design and functions of the App, the user will have a high chance to enjoying while using the App, always focusing of User Centred Design, which is based on the information extract from the main users of the App.

6.6 Front-End Design
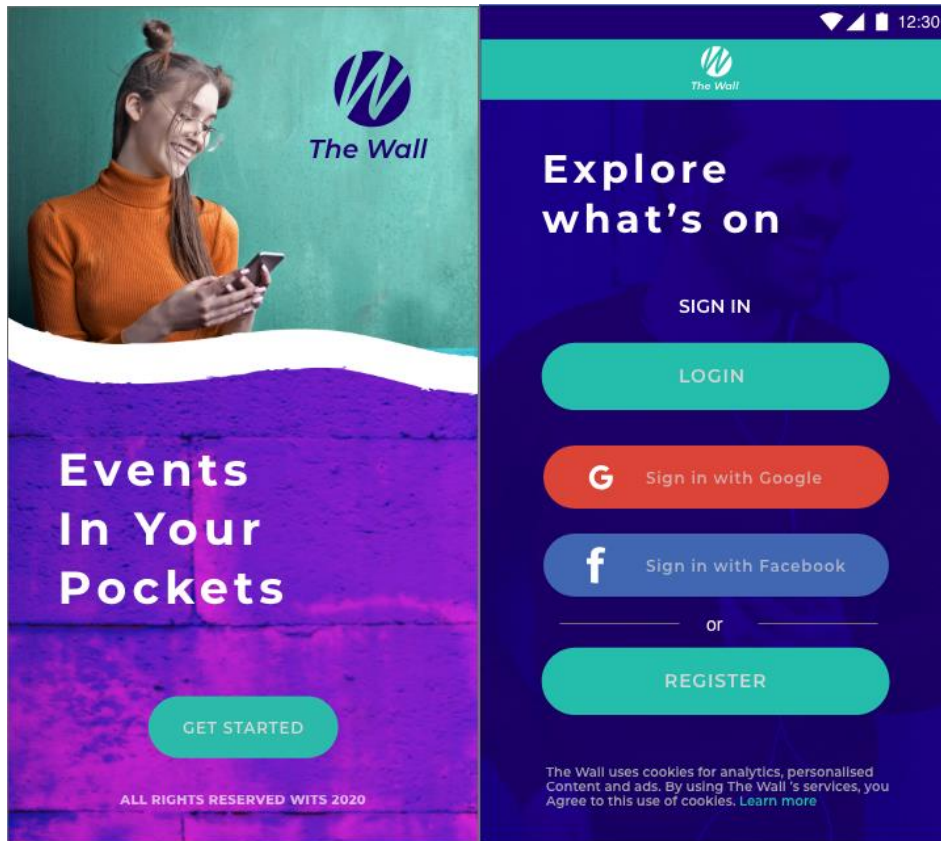
Image 6. Design of the main screens of the app.
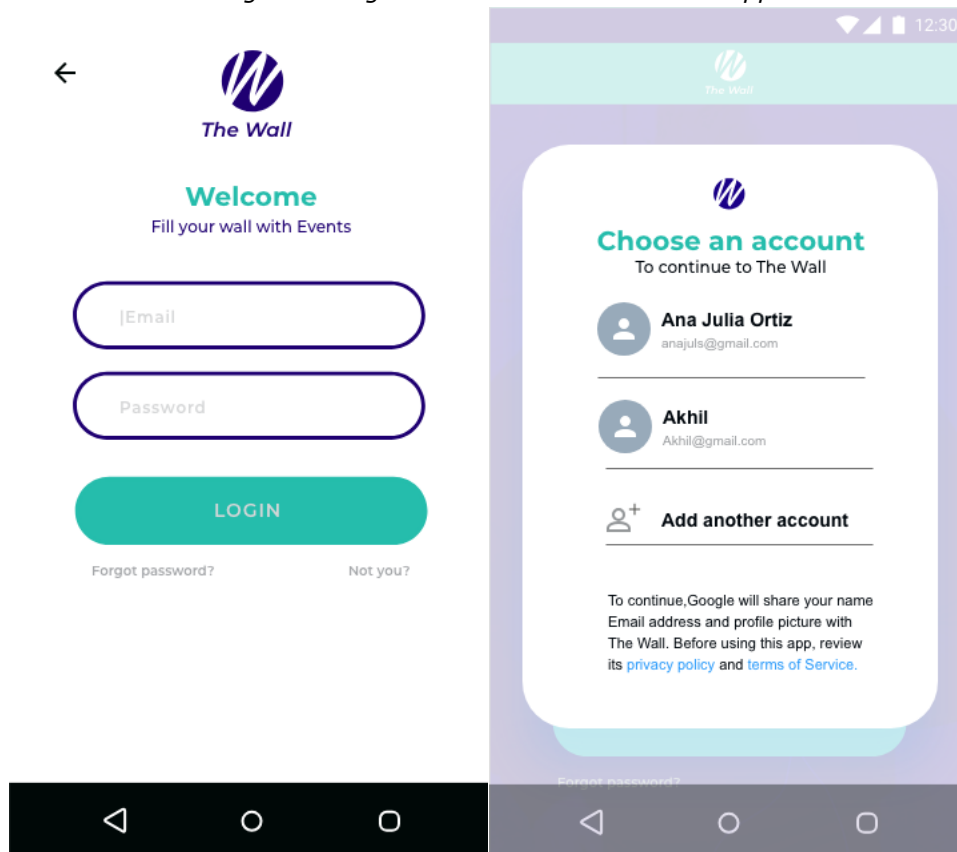
Image 8. Design of the login screens of the app.
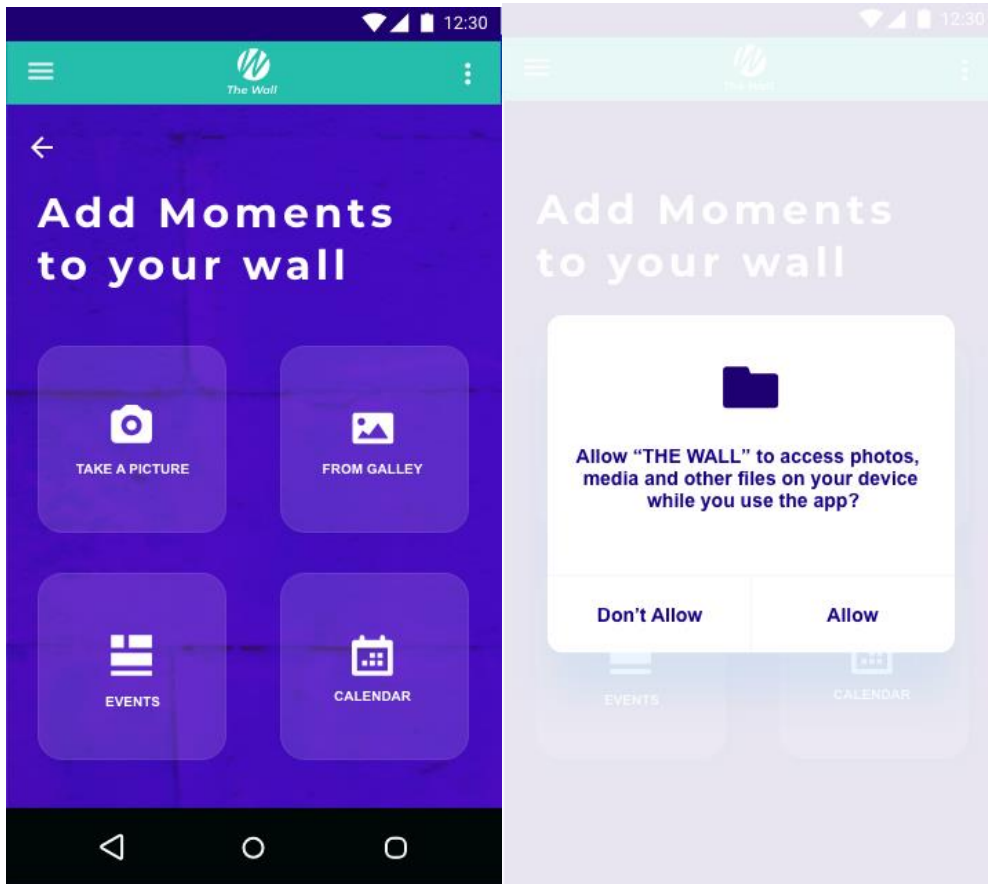
Image 9. Design of the home screen of the app and warning message.
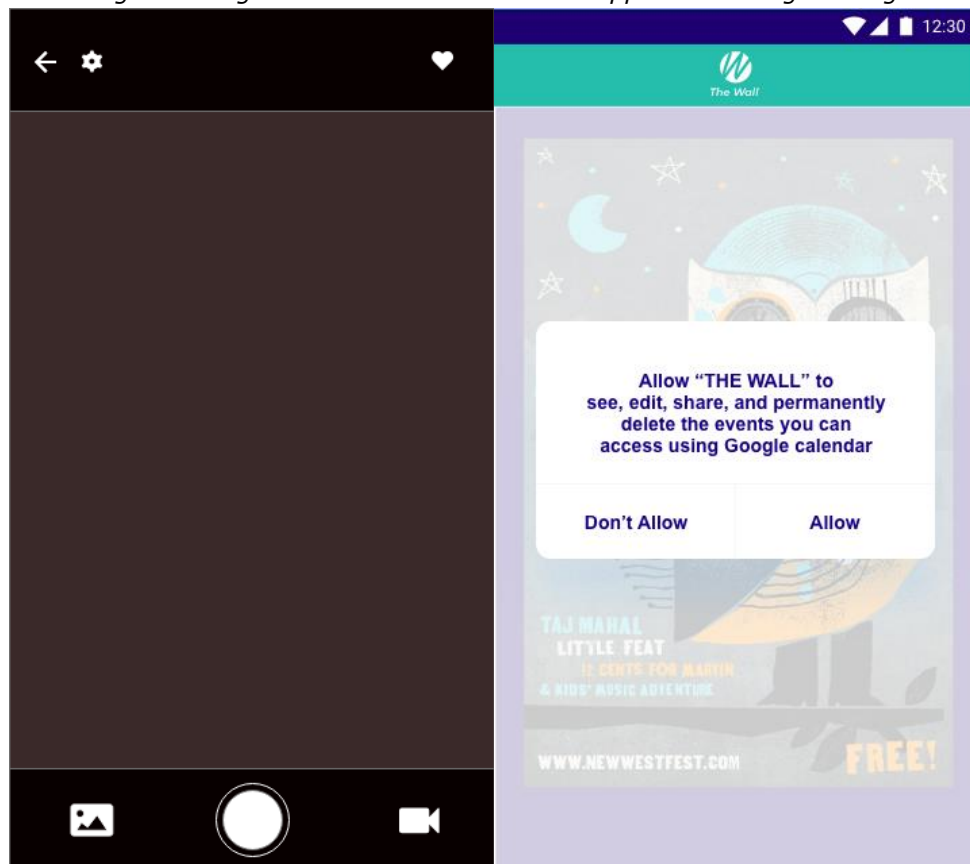
Image 10. Design of the camera screen and message of approval of the app.
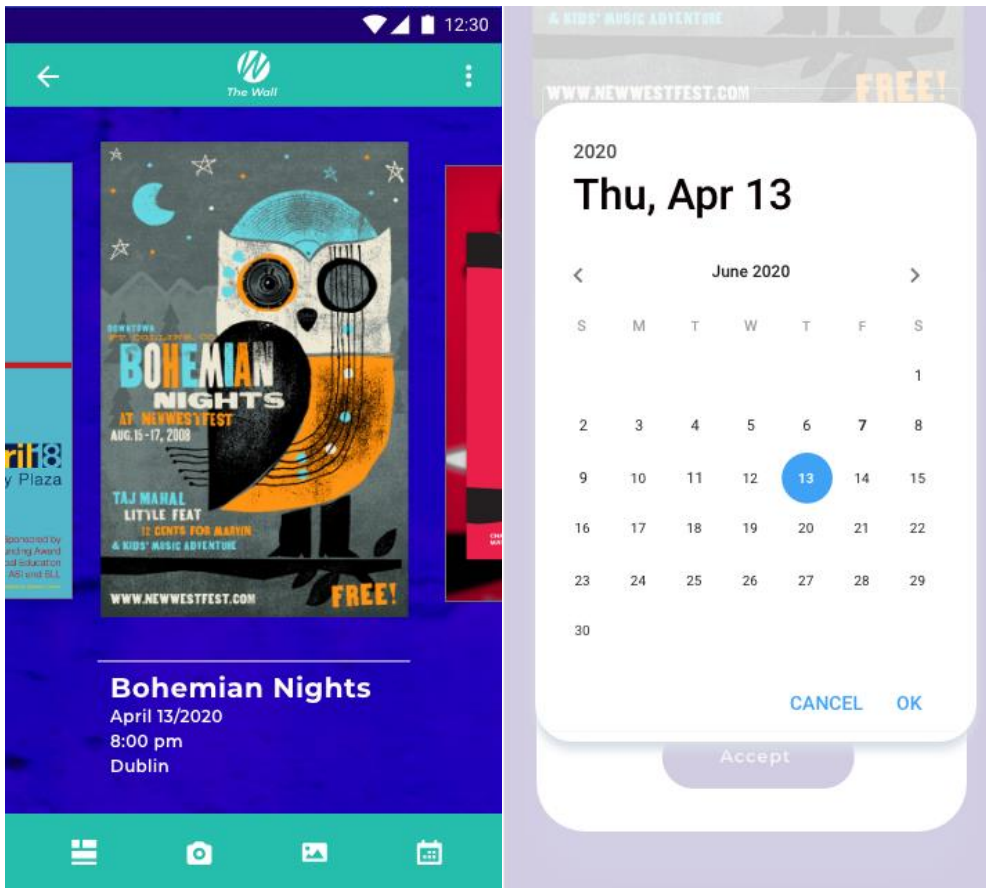
Image 11. Design of the display of posters and calendar for adding a new event of the app.
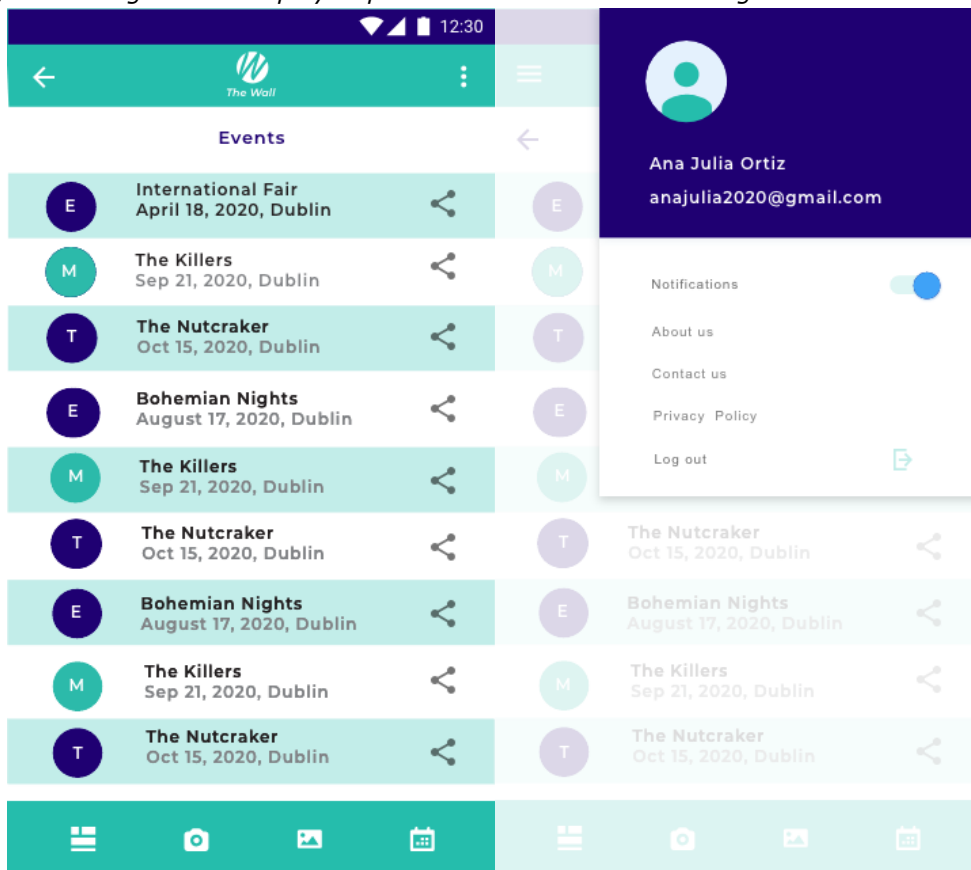
Image 12. Design display of posters information and user menu of the app.

Chapter 7. Software Testing

7.1 Unit Test

This is an example of a test that is provided by Android, this test was created to implement services from a third-party on the app. We implement the services of Google and Facebook for a user to sign-in. In this case, the test will run in the sign-in and the authentication for each service

On the code below we can see the implementation of Google and Facebook. Some plugins from Cordova was also applied for the test.

Class Name: capacitor.build.gradle under Android / App.

```
android {
  compileOptions {
      sourceCompatibility JavaVersion.VERSION_1_8
      targetCompatibility JavaVersion.VERSION_1_8
  }
}

apply from: "../capacitor-cordova-android-plugins/cordova.variables.gradle"
dependencies {

    implementation "com.android.support:customtabs:23.3.0"
    implementation "com.android.support:support-v4:27.+"
    implementation "com.facebook.android:facebook-android-sdk:5.13.0"
    implementation "com.google.android.gms:play-services-auth:15.0.1"
    implementation "com.google.android.gms:play-services-identity:15.0.1"
    implementation "com.android.support:support-v4:27.+"
}
apply from: "../../node_modules/cordova-plugin-
browsertab/src/android/BrowserTab.gradle"
apply from: "../../node_modules/cordova-plugin-
buildinfo/src/android/BuildInfo.gradle"

if (hasProperty('postBuildExtras')) {
  postBuildExtras()
}
```

Dependencies were also created to relies from one module to another module from the class: build.gradle

```
dependencies {
    implementation fileTree(include: ['*.jar'], dir: 'libs')
```

```
    implementation 'com.android.support:appcompat-v7:28.0.0'
    implementation project(':capacitor-android')
    testImplementation 'junit:junit:4.12'
    androidTestImplementation 'com.android.support.test:runner:1.0.2'
    androidTestImplementation 'com.android.support.test.espresso:espresso-
core:3.0.2'
    implementation project(':capacitor-cordova-android-plugins')
}
```

Also, and IF statement is declared on the class: <mark>build.gradle</mark> to handle any error.

```
apply from: 'capacitor.build.gradle'

try {
    def servicesJSON = file('google-services.json')
    if (servicesJSON.text) {
        apply plugin: 'com.google.gms.google-services'
    }
} catch(Exception e) {
    logger.warn("google-services.json not found, google-
services plugin not applied. Push Notifications won't work")
}
```

7.2 Machine Learning Test

7.2 1 Testing - Sample Posters

This is a collection of 35 poster images. The posters represent all the common poster layouts, font styles/sizes, colour/b&w, design, etc. In this sense, 35 of the images will be used for development and for initial testing.

The selection of the poster for testing Content:
A. Posters with a lot of information
B. Simple posters
C. Posters Black & White
D. Designs and various fonts
E. Poster without date

This test will be used to test whether the machine learning in Google Vision can distinguish between all the words, separate from the date, time, location, title, activity or any other information on the poster.

Results:

Below we show the result of the machine learning after taken the photo, in some cases, we can see that the machine learning does not recognize the date, or the month this will depend on the complexity of each poster, in some other example, we can see that cannot detect the location. In any of these cases the user will need to introduce the data manually, we offer the option on the app to edit and delete each of the fields, so the user can add the correct information. For more examples about this test, find the appendix "Testing - sample posters".
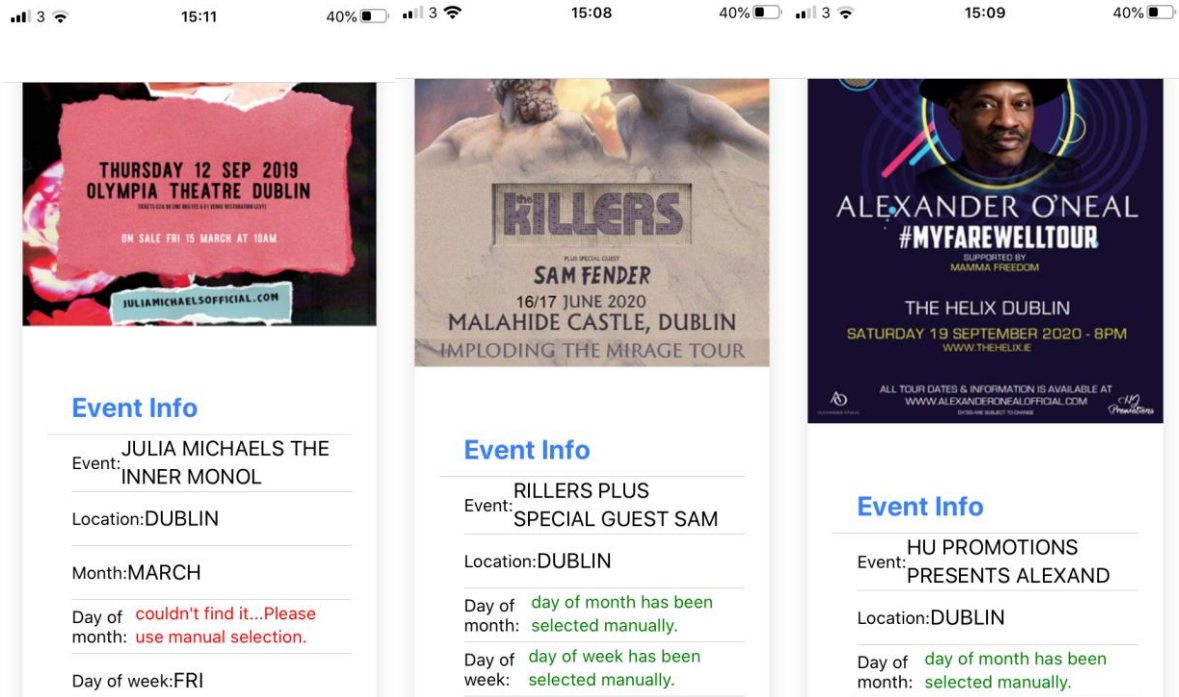
Image 13. Results from the machine learning after reading posters.
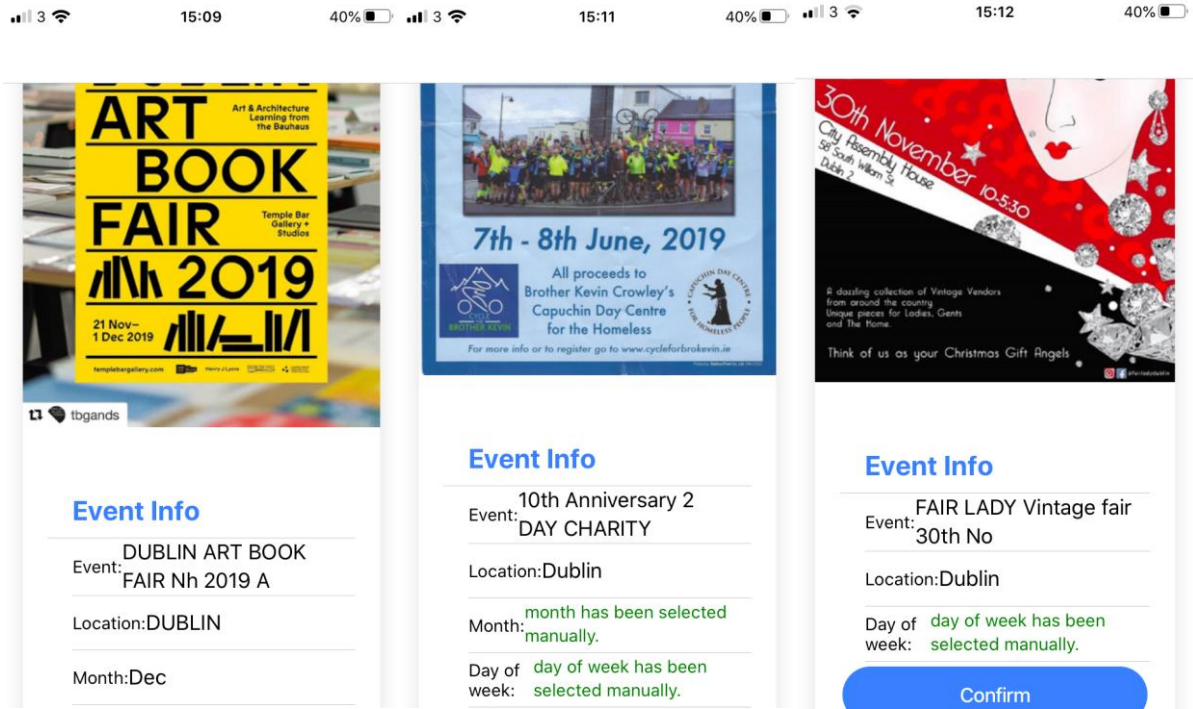
Image 14. Results from the machine learning after reading posters.
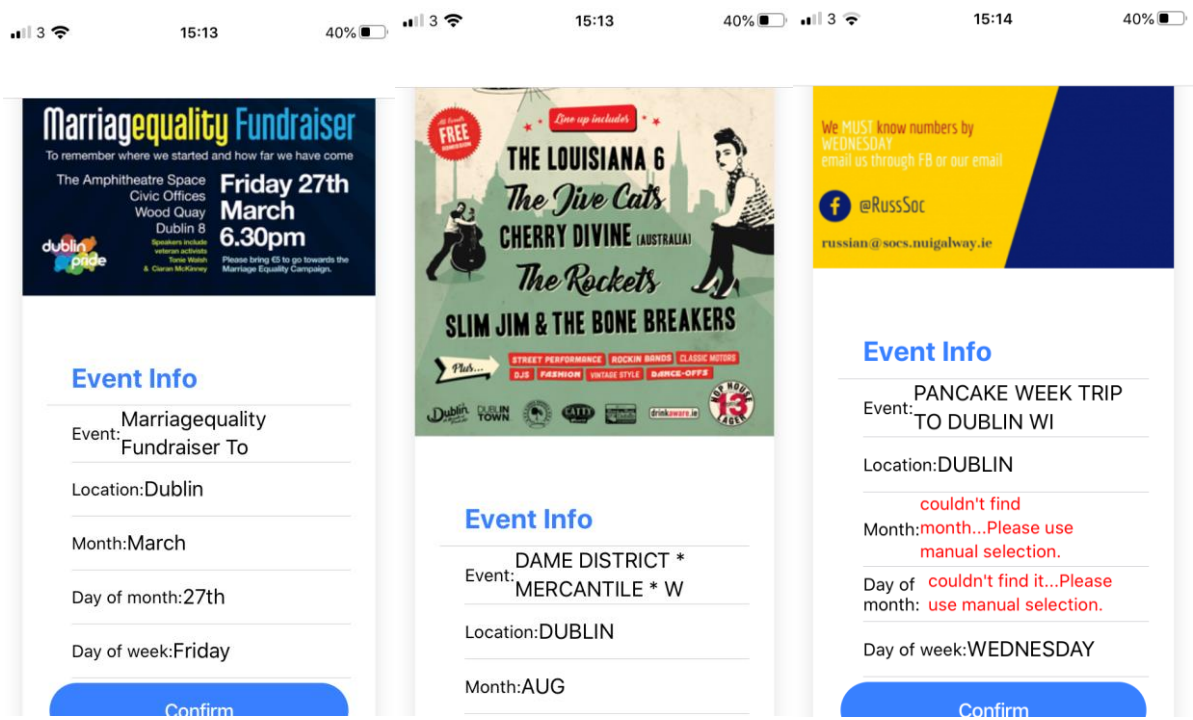
Image 15. Results from the machine learning after reading posters.
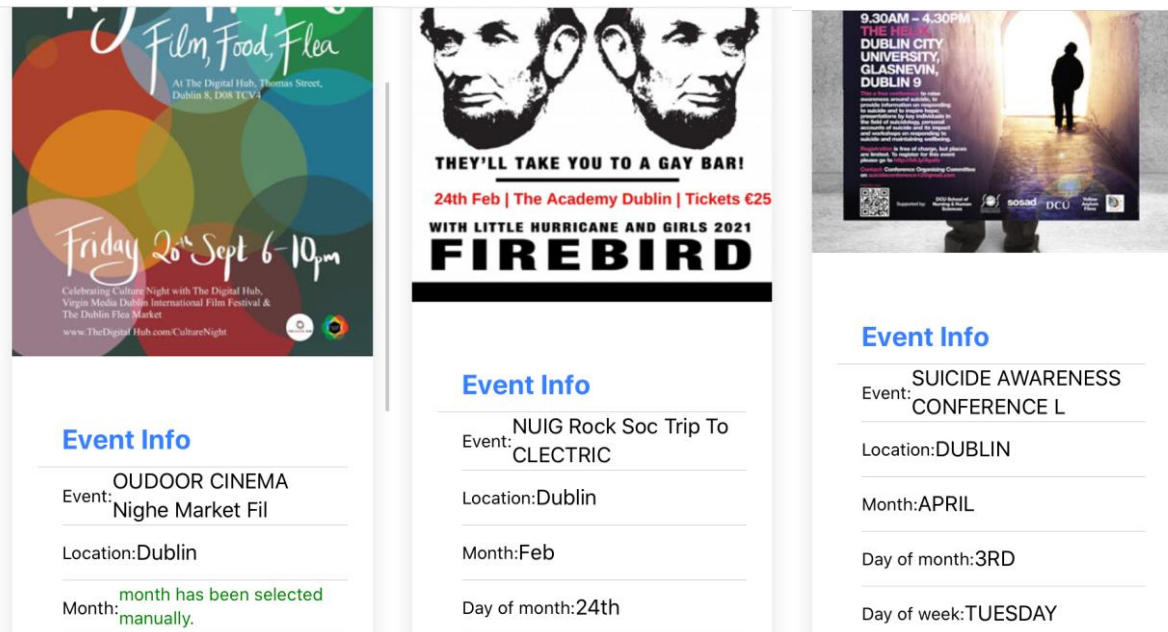
Image 16. Results from the machine learning after reading posters.

7.3 User Testing

According to Hotjar (2020) Usability testing is a method of testing the functionality of a website, app, or other digital product by observing real users as they attempt to complete tasks on it. The goal is to reveal areas of confusion and uncover opportunities to improve the overall user experience. Usability testing is done by real-life users, who are likely to reveal issues that people are familiar with application, and can no longer identify, when developing an application, some details might be forget, those details that need to be improved, will be reveal after carry on the testing; Bringing in new users to test our app, observing how real people are already using it are effective ways to determine whether your visitors, some of the main topics we will address will be:

- Understand how the app works and do not get 'lost' or confused.
- Can a user complete the main actions they need to?
- Do not encounter usability issues or bugs.
- Have a functional and efficient experience.
- Notice any other usability problems.

Usability testing determines if end-users can or cannot do what they need to do on an existing prototype. In this scenario, user testing comes

before product creation, while usability testing comes later. Others define user testing as any testing by users, an umbrella that would include usability testing but not allow the two terms to be used interchangeably. As can be seen in this opportunity a remote usability testing will be implemented, by using current prototype, also after the user test the prototype an small questionnaire will carry on, to follow how the user perceive the main app functions, also to check if the five usability fundamentals have been apply as expected. Some reason will be outline in order to establish strong orientation towards to carry on a remote usability test, across different platforms, to check the most relevant advantages.

Remote usability tests are done over the internet or by phone; in-person testing, as the name suggests, requires the test to be completed in the physical presence of a UX researcher/moderator. Compared to remote tests, in-person tests provide extra data points, since researchers can observe and analyse body language and facial expressions. However, in-person testing is usually expensive and time-consuming: we must find a suitable space, block out a specific date, and recruit (and pay) participants. Remote testing does not go as deep into a participant's reasoning, but it allows to test large numbers of people in different geographical areas using fewer resources.

Usability tests help to:

- Learn more about how users feel about the app. Its help to determine whether these platforms offer value, are effective at helping users complete tasks, and more.

- Expose how much users know the app, its help to learn whether users use the platform the way was intend them to or if they have found workarounds because the platform is not intuitive.

- Determine what issues users are encountering. Its help to better understanding of what frustrates users and what stops them from using your website or app more than they already do.

- Design better workflows that get users to a solution faster. Based on the insights, we will be able to make changes to the app that improve the user experience.

7.3.1 Objective of the usability testing

The main objective of the usability test, is to be aware if the workflow of the app is easy to follow and also if the user can complete task successfully and in a quick speed in order to check how efficient and accurate is the app, and how the task layout are addressed, to collect data of how usage patterns can be useful, for future update of the app.

The usability test should include an exercise component where users log onto the app and talk through what they are doing. As they navigate the system, observe their actions and ask thoughtful follow-up questions as to why they complete certain tasks the way they do. Their responses will give you deeper insights into how well users understand the app. But for this particular testing some details were consider into account such as, how easy to understand is the workflow, also whether these workflows are intuitive or whether users have come up with their own, or if there is any details to need to be check again.

This stage of usability testing is the heart of the research and yields the information that will be used to uncover bottlenecks, pain points, and opportunities. The goal with these usability test questions is to have feedback with the participants. The more at ease they are, the better the chances of them sharing their honest opinions.

7.4 Users Testing

Survey

According to Bhat (2020) the survey is a research method used to collect information data on a subject for social research. Therefore, this research technique is made up of a series of questions prepared under previous analysis and directed to a representative portion of people within a social group, which aims to find out the states of opinion, attitudes or behaviours of our group of study before a particular fact.

With the advancement of technology, data collection through personal survey or focus group has changed. Nowadays, it is much faster and cheaper to conduct an online survey using the internet as a means of dissemination, which has the following advantages:

- Accuracy, the honesty margin of people is higher because they do not have the pressure of someone in front of them asking them the questions.
- Easy and fast analysis of results.
- Greater reach.
- Positioning of the brand or idea, in the survey form we have already started selling our idea or brand, through the design, logo and colours that we show to our interviewees.

7.4.1 The Wall Survey

This report has been prepared with the information obtained through a survey, with a total of 19 questions, all of them mandatory and in a closed format with multiple options to select from. The objective of the survey is to know what percentage of people participate in social events and what channel they use to find out about events of their interest. In addition, and very important for us, we created a second part to analyse the reaction of the surveyed group after having tested and seen the prototype of our Mobile Application, this will help us to improve the functionality and development of the application of our project.

The survey was carried out in Dublin and a total of 75 people participated, of which 61% were men, 36% women and 3% did not want to specify their gender. The questions were sent through different channels such as email and social media in a Microsoft Form, which included the link of the video of the Mobile Application "The Wall" where people could see different types of sign in, how to take the photo from their own device or from their own gallery of, save the event in the calendar, share the event, among other main functionalities of the application.

7.4.2 Survey Results

Below we show the results of the survey according to their order of importance and relation to the general objective of the project we decided to divide in:

- **Interest in social events**
- **Usability and functionality of the application**
- **Design**

7.4.2.1 Interest in social events

Regarding the *question* nº *3* (see APENDIX). **Do you consider that you are into events of all kinds? For example, Social, Music, Sport, Cultural, Education, Meetups, etc.?** The results show that 76% of the respondents said Yes, and only 9% answered that they are Not interested in attending events. Here for example, we can see that most of the people surveyed might be interested in our application.
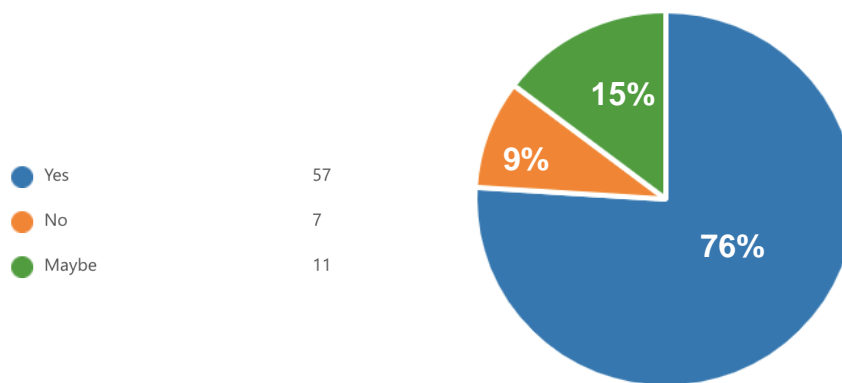
Figure 17. Result of the testing for question 3.

The *question* nº *7* (See APENDIX). **Would you use an app to automatically store and remind you of your upcoming events?** In this question, 55% stated that they would use an application that automatically reminds them and saves an event of their interest. However, the other 45% are divided between No and perhaps.
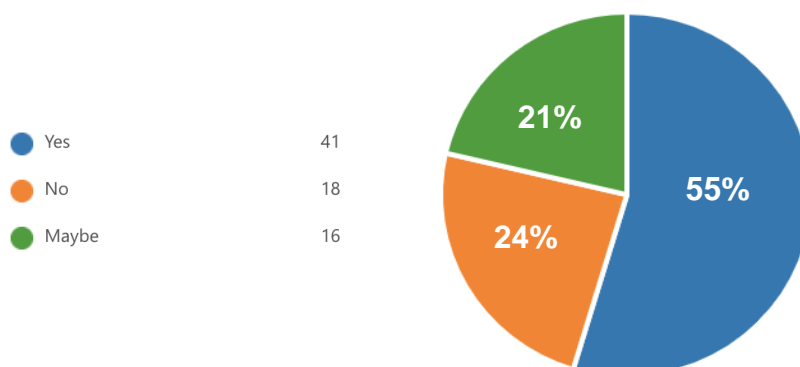
Figure 18. Result of the testing for question 7.

7.4.2.2 Usability and features of the application

In this question nº10 (see Appendix) more than one option could be chosen. Of the 75 participants who saw the application prototype working, 36% (42 times) selected that the most useful part of the App is how it adds the dates of the events of interest in the calendar and reminds them automatically.

What part of the App was most useful to you?		
	%	Nº
The way the app saves the information from the photos of the posters that I have in my gallery.	20%	23
How the app adds the dates of the events I'm interested in to my calendar and reminds me of them.	36%	42
Managing my events in the app and seeing which ones are closest and past.	27%	31
The easy way that I can share my events with friends.	17%	20
	100%	

Table 3. Breakdown of the result for question 10.

According to question nº11 (look at the Appendix) 64% of the surveyed people have selected that none of the functions of the application were of little use, this means that more than half of them found all the features useful.

What features of the application were less useful?		
	%	Nº
I find it difficult to save the event data manually	13%	10
I find it difficult to create a new account	2%	2
I find it confusing how events are displayed	7%	5
I find it less useful to take the image from the gallery	11%	8
None of them	64%	48
Other	2%	2
	100%	75

Table 4. Breakdown of the result for question 11.

In this question nº 16 (see the Appendix) Although the majority, 53% said that it is not necessary to add any extra function to the application, 23% thought that perhaps the function should be added to buy the ticket

directly to attend the event from the application. Comments or opinions from respondents are complete in the appendix.

Do you think there is any function missing in the app? If so, please input your feedback.		
	%	Nº
Yes	7%	5
No	53%	40
Maybe	23%	17
Other	17%	13
	100%	**75**

Table 5. Breakdown of the result for question 16.

7.4.2.3 Design

Question nº 13 (see the appendix) was also to select more than one option, in this case about the design of our application the opinion is divided between Trendy 34% and Fun 24%.

Rate the interface look and feel of the app.		
	%	Nº
Fun	24%	24
Energetic	18%	18
Trendy	34%	33
Familiar	18%	18
Unique	5%	5
	99%	

Table 6. Breakdown of the result for question 13.

The data from the survey shows that more than half of the respondents like the application and would use it. To view the entire survey please go to the appendix.

Chapter 8. Conclusions

8.1 Risk Analysis

The possible risks and threats to a project, whether internal or external, should be analysed from the beginning to prevent them from happening and affecting the development and success of the project.

In risk analysis according to (Bansal, 2019) there are two types of analysis, the qualitative and the quantitative. The first uses parameters such as high, medium or low, and because the term 'high, medium, low' is different for each person, this becomes a subjective analysis.

On the other hand, (Mendoza, 2015) mentions that quantitative risks analysis aims to assign a monetary value to the risks determined in the project, that is, it is more accurate to avoid any loss in terms of time and cost. However, both are very important when carrying out a project, any of these risk analysis methods will be used to obtain consistent, valid and comparable results.

In this sense, the working group of this project has chosen to perform the qualitative risk analysis, and in the table below we can see the possible risks of it.

Risk	Issue	Mitigation	Impact	Likelihood
1. Machine learning algorithm for image analysis and date extraction difficult to develop.	Faulty dates would lead to poor functioning	Assess available image analysis libraries (open source and paid) and test extensively.	High - bad reading = poor user experience.	Medium, nobody skilled on team with machine learning.
2. Low uptake of app in	App awareness is a struggle	During the development of the app,	High, without users, you	Medium, low participation

target market.	these days given the crowded market.	run a test landing page as a marketing boost for the idea outlining features and asking people for their emails if they are interested in testing a beta version. (*)	will be unable to develop a business model.	of people in the testing.
3. The information given by the API is not one hundred percent accurate.				

Table 7. Identification of risks.

Note: We can do what game companies commonly do, announce an application with some of the art work way in advance and run campaigns on Facebook, Twitter and Google to get people to come to a page and assess your app before it is launched.

8.1.2 Likelihood & Impact

Likelihood refers to the possibility or 'chance' of something happening, this measured in qualitative values such as low, medium or high. This probability is a risk assessment, in this case, subjective or with little objective measurement of the case. For example: There is a high probability that snow will fall on Christmas.

Impact in terms of the risk analysis, is what will determine how much it will affect the project negatively in case that happens. According to

(Incibe, 2017), the risk analysis table for the qualitative method is as shown below.

LIKELIHOOD	IMPACT		
	Low	Medium	High
Low	Very Low	Low	Medium
Medium	Low	Medium	High
High	Medium	High	Very High

Table 8. Risk Assessment Matrix.

In the table 9 we can see the impact and probability of project risks according to the risk Assessment Matrix table.

Table 9. Risk Assessment Matrix the Wall.

8.2 Conclusion

In today's life, even with the great advances in technological, we continue to see events published in print media. We see these events in small posters in our local coffee shop, in restaurants, in bars and shops. We see them in large formats on walls around the city, at bus stops, on buses and on trains. We see them everywhere around us. However, sometimes

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we do not see these events which could be of interest. Or we see them and forget the date, or the venue, or the cost of the ticket.

Our application proposes a solution on a single platform that allows you to store event information and remind you about upcoming events before the event happens. The application can remind you even before the pre-sales phase for event tickets so that you don't lose the best place to enjoy the moment that, in many cases, happens once a year, once every four years, or even once in a lifetime.

The challenge of this project was in developing a solution to automatically and reliably identify event information from print media that often contains a wide variety of layouts, orientations, font types, colours and contrast variations between the pertinent information and any graphics. This wide variety caused problems for our solution to automatically detect all the event information (date, time, location, title) from the source images. In addition, the solution needed to understand the semantics of the text relating to the event name and location. The Google Vision API was able to reliably segment the date and time information, however, more work is required to successfully segment and recognise event location and title.

The technologies chosen apart from basic HTML, CSS and JavaScript were unfamiliar to the team but were chosen because of their suitability for the aims of the project and their increasing popularity in industry. Using new frameworks (Angular), tools (Ionic, Cordova, Scrumwise) and 3rd party APIs (Google Vision API, Google Calendar API) allowed us to develop a practical understanding of, and experience with popular industry standard tools.

Scrum, and Scrumwise, greatly improved our ability to manage the project because it allowed us to transparently view in one place (the taskboard) how the work was progressing on a task by task basis. Scrum's concept of the sprint planning and task estimation allowed us to refine our task estimations over time and generally increase the likelihood of delivering on time. Many of our burndown charts show that work was completed effectively *behind* schedule but still on time. This is because most of us work, have families, or have other responsibilities during the week which meant that any given sprint wasn't always a slow regular progression but was instead characterised by working late in the evenings on fewer days of the week, or working only 2-3 days on the project at the end of the week. Also, tasks were often begun late in the evenings and only marked as

complete after midnight and so that tended to move the burndown curve towards the end of each week of each two week sprint.

Testing, in terms of unit testing, platform testing, and end-user acceptance testing is a weakness in this project. A deployable version of the mobile app was only available very late in the process and so it was not possibly to get as wide as audience for its testing as possible. The app is currently accepted by the Google Play Store and is listed on the store for download, which we are very happy with.

8.3 Recommendations and Future Work

In terms of recommendations we would like to recommend that students use a formal Agile development methodology in future (Scrum, XP, Kanban) with an online tool to support this methodology. BaseCamp is useful but does not include the same set of highly transparent, information dense and industry recognised concepts (e.g. burndown, burnup, sprint, taskboard) that something like Scrum has. We would also recommend learning about unit testing (preferably in a formal class) so that we would learn how about testing a larger application and that unit tests should be added at the start of the project to adopt a *test-driven development* methodology. We could then also use GitHub's Continuous Integration (CI) tools to build and test the project as it was developed. Having the system automatically apply unit tests and notify us of any fails because of code additions or refactoring would have been very useful. Next, we would suggest adding classes on the proper use of Git and any online repository so that students better understand how to push, merge, and manage their code using the industry tools (e.g. GitBash) available. Next, its important in any project to track bugs. Most online repositories have an Issue Tracker functionality but, again, we do not know why or if we should use this without formal instruction.

For future work we would like to continue to work on the project to address the existing problems and add new functions listed below:

- **Event Location & Title** - Increase the apps ability to recognise places and proper nouns to automatically add this information for the user to the event in their calendar. We could possibly achieve this using Google Places API to recognise addresses and Google Cloud Natural Language API to identify the titles of events.
- **QR Scanning** - Automatically detect and decode QR codes on the poster and test for the presence of event information.

- **Event Map** - Add the location of an event to a map option in the app. This would allow the user to have a visual representation in a map of where and when their next events would occur.
- **Community Functionality** - Allow users to share the events they add to create a community of users. This could allow people to find others within their area that have the same event interests

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Appendix

Sprint Activities
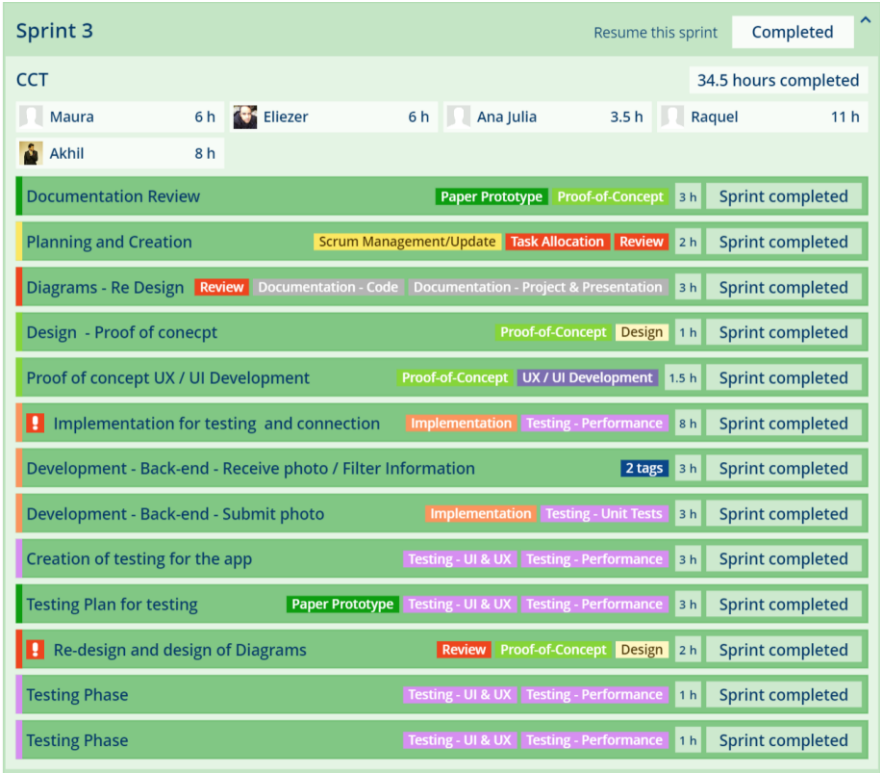
Figure 19. Sprints Activities, Sprint 3.
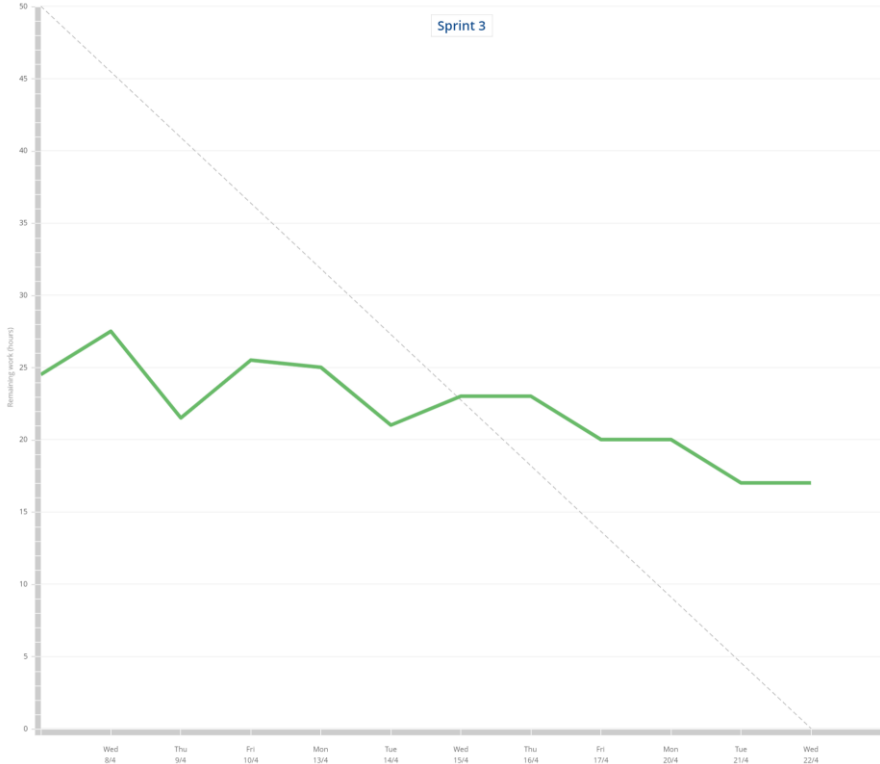
Figure 20. Chart Burndowns for Activity, for sprint 3

Figure 21. Sprints Activities, Sprint 4.
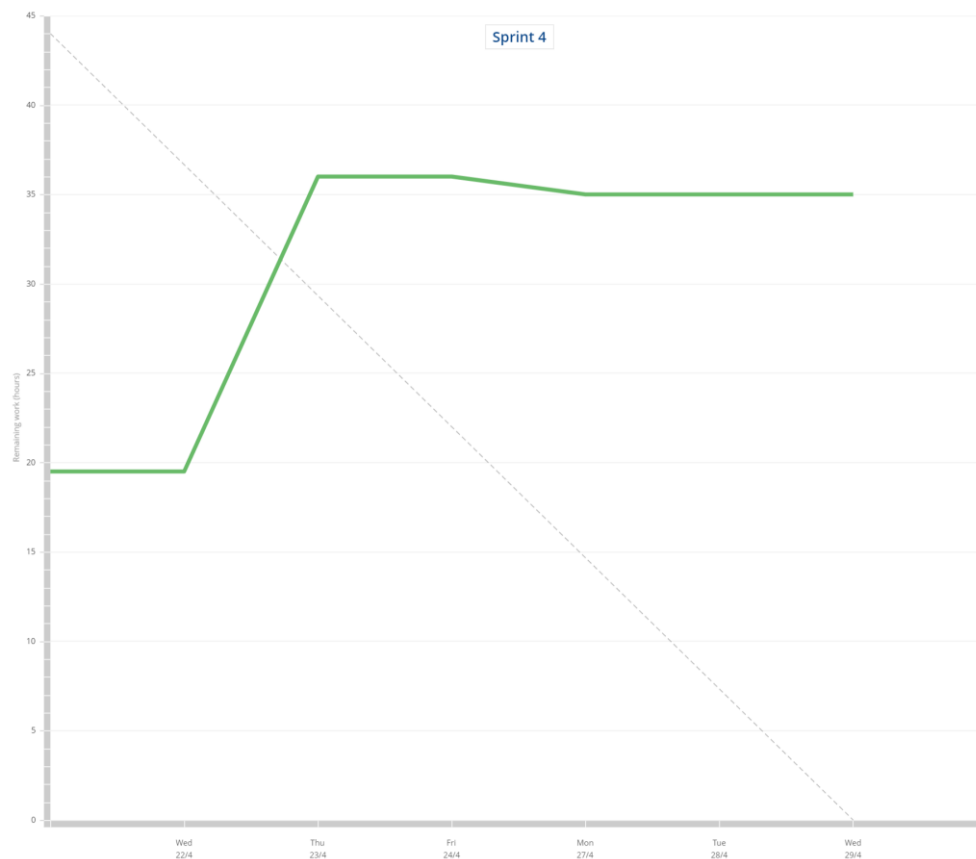
Figure 22. Chart Burndowns for Activity, for sprint 4.
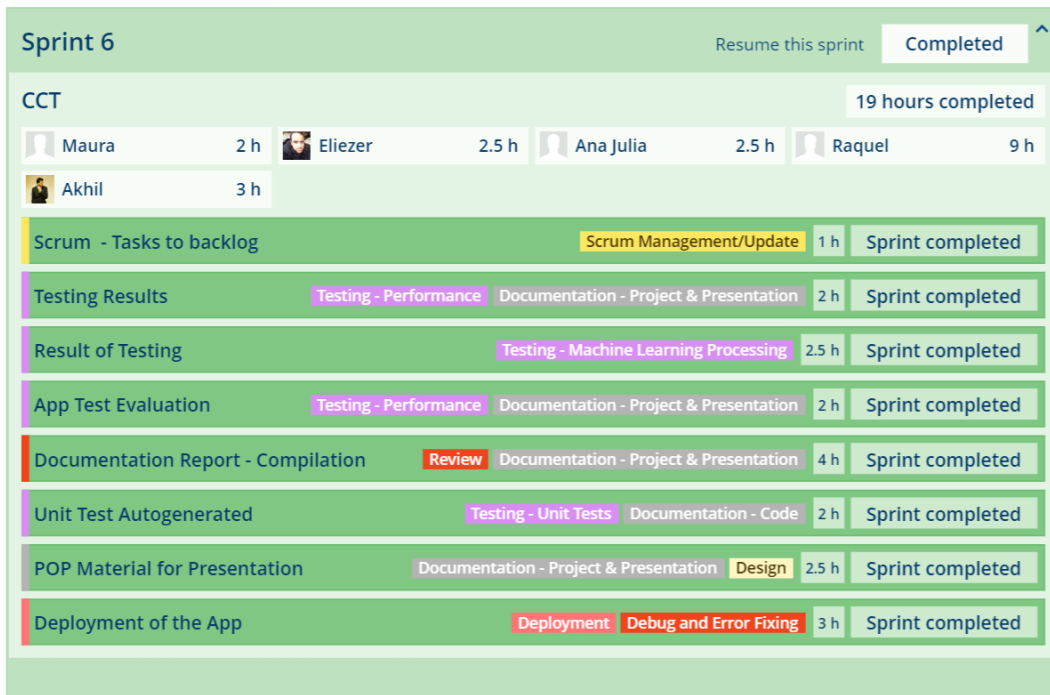
Figure 23. Sprints Activities, Sprint 6.
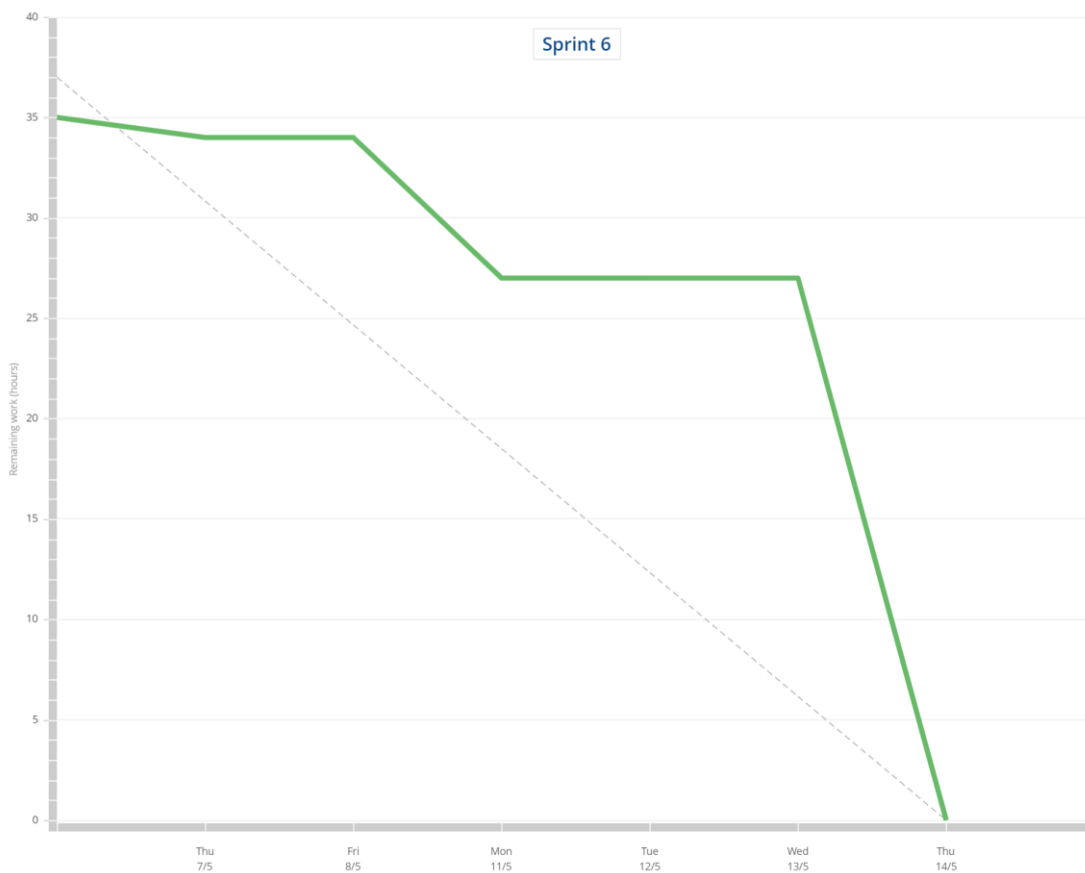
Figure 24. Chart Burndowns for Activity, for sprint 6.
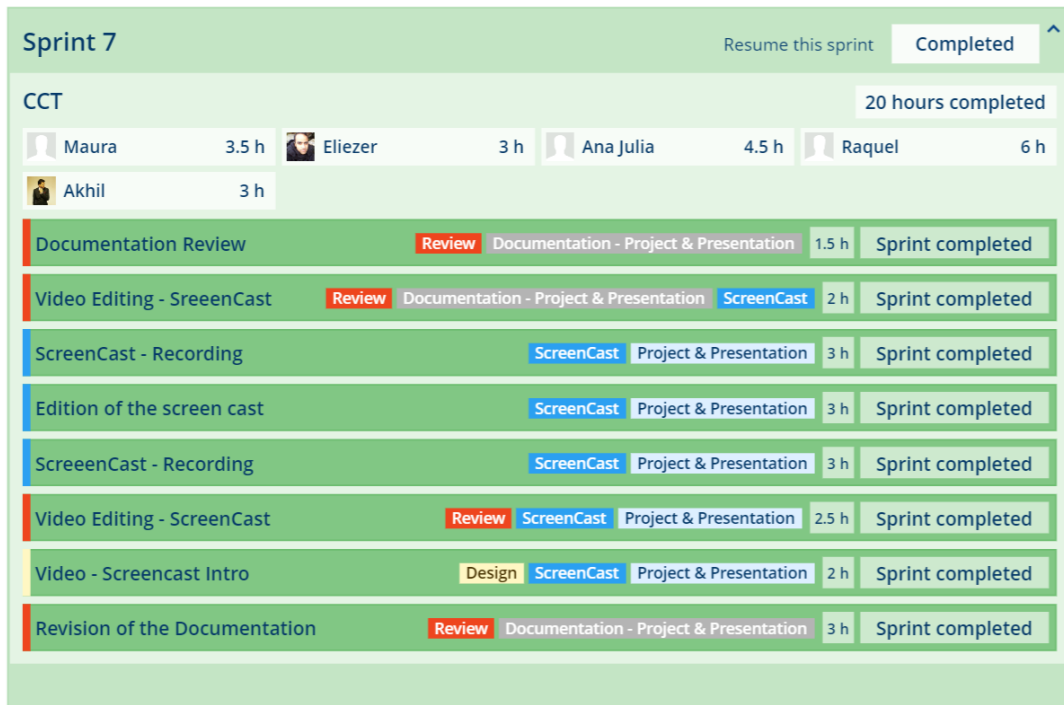
Figure 25. Sprints Activities, Sprint 7.
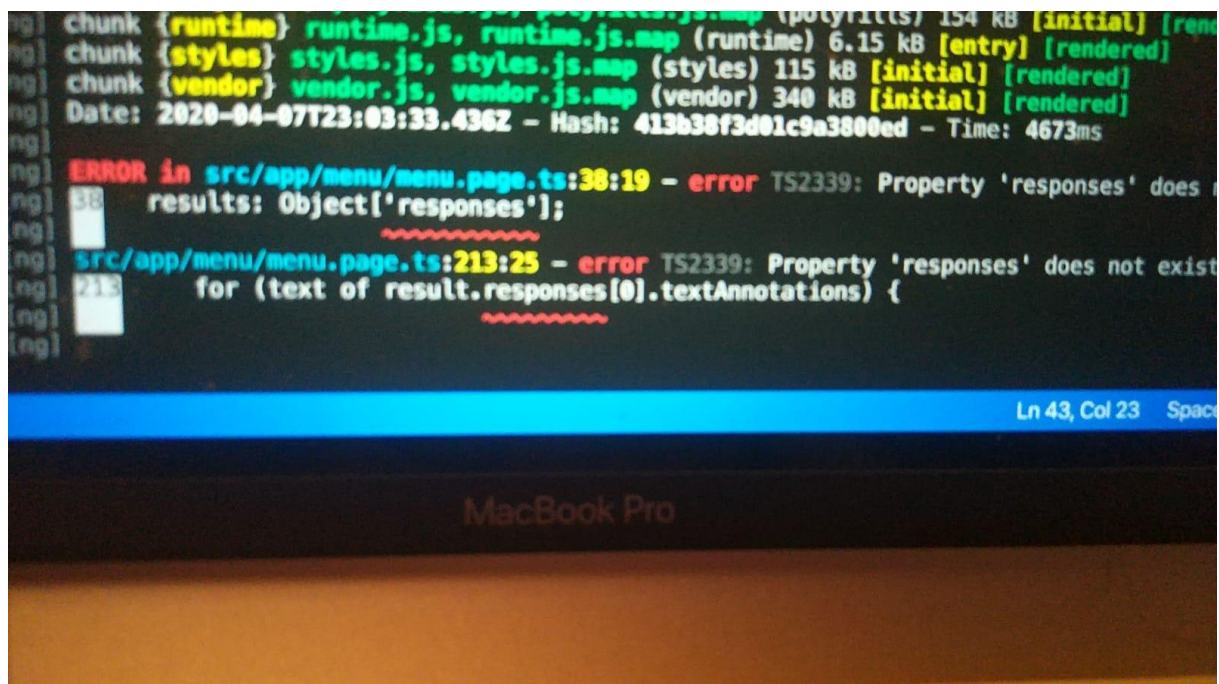
Figure 26. Chart Burndowns for Activity, for sprint 7.

Code Error Report

Some of the problems that we face were several errors that we must handle over the building process of the app.

One example of an error that we faced (see image nº 17) is that the response is not a member of objects. Object only exposes the functions and properties defined in the object; the compiler will only let access object's members.

Image 17. Code error handles 1.

Solution: Use **any.**

Result: any

Any can be anything, any has no interface. The compiler will let do whatever we want with the result. The compiler didn't know anything about its member so minimal type checking is done when assigning or accessing both to itself and its members.

Path: witsapp/src/app/menu/menu.page.ts

The error was inside the camera section.

A	second example is on the menu buttons that are not responding without showing any error messages. It's because the bottom **ion-tabs** was overlapping the menu screen, so it was effectively making a layer over the menu buttons. When we run the application, we are not touching the button because of the layer built over the menu by the ion-tabs. That is why it is not showing any errors.

<u>Solution:</u> wrap (separate) ion-tabs section with ion-toolbar.

```
<ion-toolbar>
     <ion-tabs></ion-tabs>
</ion-toolbar>
```
so basically, now the layer only inside ion-toolbar.

Path: witsapp/src/app/menu/menu.page.html

ion-tabs can find after ion-content
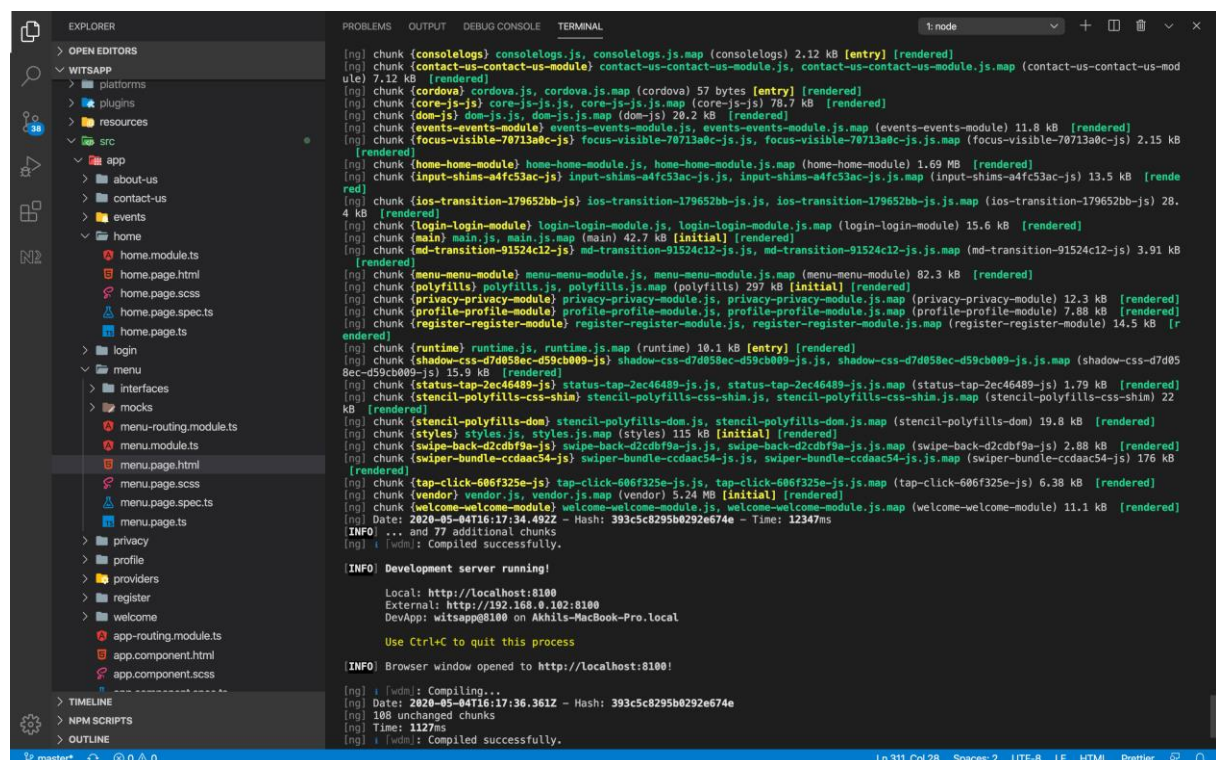
Image 18. Code error handles 2.

Debugging in Android Studio

Following is an example of a debug process in Android Studio.

Image 19. Code debugging.

Image 20. Code debugging.

```
 99 I/VideoCapabilities: Unsupported profile 4 for video/mp4v-
    es
100 W/cr_MediaCodecUtil: HW encoder for video/avc is not
    available on this device.
101 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 0
    0
102 D/EGL_emulation: eglCreateContext: 0xe7947200: maj 3 min 0
    rcv 3
103 D/EGL_emulation: eglMakeCurrent: 0xe7947200: ver 3 0 (
    tinfo 0xc7af95a0)
104 E/eglCodecCommon: glUtilsParamSize: unknow param
    0x000088ef
105     glUtilsParamSize: unknow param 0x000088ef
106 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 0
    0
107 E/eglCodecCommon: glUtilsParamSize: unknow param
    0x000088ef
108     glUtilsParamSize: unknow param 0x000088ef
109 D/eglCodecCommon: setVertexArrayObject: set vao to 2 (2) 0
    0
110 V/Capacitor/Plugin/Network: Notifying listeners for event
    networkStatusChange
111 D/Capacitor/Plugin/Network: No listeners found for event
    networkStatusChange
112 I/io.ionic.wits: Background young concurrent copying GC
    freed 9183(484KB) AllocSpace objects, 2(104KB) LOS objects
    , 16% free, 2853KB/3435KB, paused 5.127ms total 94.507ms
113 D/HostConnection: HostConnection::get() New Host
    Connection established 0xdc3cf570, tid 13725
114 D/HostConnection: HostComposition ext
    ANDROID_EMU_CHECKSUM_HELPER_v1 ANDROID_EMU_native_sync_v2
    ANDROID_EMU_native_sync_v3 ANDROID_EMU_native_sync_v4
    ANDROID_EMU_dma_v1 ANDROID_EMU_direct_mem
    ANDROID_EMU_host_composition_v1
    ANDROID_EMU_host_composition_v2
    ANDROID_EMU_YUV420_888_to_NV21 ANDROID_EMU_YUV_Cache
    ANDROID_EMU_async_unmap_buffer
    GL_OES_EGL_image_external_essl3 GL_OES_vertex_array_object
    GL_KHR_texture_compression_astc_ldr
    ANDROID_EMU_gles_max_version_3_0
115 W/OpenGLRenderer: Failed to choose config with
    EGL_SWAP_BEHAVIOR_PRESERVED, retrying without...
116 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 0
    0
117 D/EGL_emulation: eglCreateContext: 0xe78f9240: maj 3 min 0
    rcv 3
118 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
119 W/Gralloc3: mapper 3.x is not supported
120 D/HostConnection: createUnique: call
121 D/HostConnection: HostConnection::get() New Host
    Connection established 0xc76865f0, tid 13725
122 D/HostConnection: HostComposition ext
    ANDROID_EMU_CHECKSUM_HELPER_v1 ANDROID_EMU_native_sync_v2
    ANDROID_EMU_native_sync_v3 ANDROID_EMU_native_sync_v4
    ANDROID_EMU_dma_v1 ANDROID_EMU_direct_mem
    ANDROID_EMU_host_composition_v1
    ANDROID_EMU_host_composition_v2
    ANDROID_EMU_YUV420_888_to_NV21 ANDROID_EMU_YUV_Cache
    ANDROID_EMU_async_unmap_buffer
    GL_OES_EGL_image_external_essl3 GL_OES_vertex_array_object
    GL_KHR_texture_compression_astc_ldr
    ANDROID_EMU_gles_max_version_3_0
123 D/eglCodecCommon: allocate: Ask for block of size 0x1000
124     allocate: ioctl allocate returned offset 0x3ffffa000
    size 0x2000
125 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
126 E/eglCodecCommon: glUtilsParamSize: unknow param
    0x000088ef
127     glUtilsParamSize: unknow param 0x000088ef
128 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 0
    0
129 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    0
130 I/OpenGLRenderer: Davey! duration=831ms; Flags=1,
    IntendedVsync=13903121100880, Vsync=13903504434198,
    OldestInputEvent=9223372036854775807, NewestInputEvent=0,
    HandleInputStart=13903518027322, AnimationStart=
    13903518378322, PerformTraversalsStart=13903537654322,
    DrawStart=13903739838322, SyncQueued=13903784447322,
    SyncStart=13903787854322, IssueDrawCommandsStart=
    13903889472322, SwapBuffers=13903948273322, FrameCompleted
    =13903955797322, DequeueBufferDuration=111000,
    QueueBufferDuration=705000,
131 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
132 I/OpenGLRenderer: Davey! duration=950ms; Flags=1,
    IntendedVsync=13903121100880, Vsync=13903504434198,
    OldestInputEvent=9223372036854775807, NewestInputEvent=0,
    HandleInputStart=13903518027322, AnimationStart=
    13903518378322, PerformTraversalsStart=13903537654322,
    DrawStart=13904037063322, SyncQueued=13904040324322,
    SyncStart=13904075299322, IssueDrawCommandsStart=
    13904075389322, SwapBuffers=13904102712322, FrameCompleted
    =13904106382322, DequeueBufferDuration=110000,
    QueueBufferDuration=849000,
133 I/Choreographer: Skipped 43 frames!  The application may
    be doing too much work on its main thread.
134 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
```

Image 21. Code debugging.

```
134 tinfo 0xc88d5030)
135 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
136 I/OpenGLRenderer: Davey! duration=751ms; Flags=0,
    IntendedVsync=13903545797387, Vsync=13904262464025,
    OldestInputEvent=9223372036854775807, NewestInputEvent=0,
    HandleInputStart=13904265739322, AnimationStart=
    13904265964322, PerformTraversalsStart=13904269698322,
    DrawStart=13904271470322, SyncQueued=13904277105322,
    SyncStart=13904281112322, IssueDrawCommandsStart=
    13904282315322, SwapBuffers=13904296564322, FrameCompleted
    =13904301078322, DequeueBufferDuration=114000,
    QueueBufferDuration=415000,
137 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
138 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
139 D/Capacitor: Handling local request: http://localhost/
    runtime-es2015.js
140 D/Capacitor: Handling local request: http://localhost/
    polyfills-es2015.js
141 D/Capacitor: Handling local request: http://localhost/
    styles-es2015.js
142 D/Capacitor: Handling local request: http://localhost/
    vendor-es2015.js
143 D/Capacitor: Handling local request: http://localhost/main
    -es2015.js
144 V/Capacitor/Plugin: To native (Cordova plugin): callbackId
    : BuildInfo369851598, service: BuildInfo, action: init,
    actionArgs: []
145 I/Capacitor/Console: File: capacitor-runtime.js - Line
    2304 - Msg: onscript loading complete
146 I/io.ionic.wits: Background concurrent copying GC freed
    9686(639KB) AllocSpace objects, 5(316KB) LOS objects, 49%
    free, 3544KB/7088KB, paused 4.842ms total 300.428ms
147 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
148 D/BuildInfo: packageName    : "io.ionic.wits"
149     basePackageName: "io.ionic.wits"
150     displayName    : "witsapp"
151     name           : "witsapp"
152 D/BuildInfo: version        : "1.0"
153     versionCode    : 1
154     debug          : true
155     buildType      : "debug"
156     flavor         : ""
157     buildDate      : "2020-05-04T17:28:32+0100"
158     installDate    : "2020-04-11T22:03:54+0100"
159 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    6
160 V/Capacitor/Plugin: To native (Cordova plugin): callbackId
    : File369851599, service: File, action: requestAllPaths,
    actionArgs: []
161 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
162 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
163 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
164 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
165     setVertexArrayObject: set vao to 0 (0) 7 8
166 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
167     setVertexArrayObject: set vao to 0 (0) 7 8
168 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
169 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
170 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
171 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
172 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
173 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
174 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
175     setVertexArrayObject: set vao to 0 (0) 7 8
176 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
177 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
178 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
179 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
180 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
181     setVertexArrayObject: set vao to 0 (0) 7 8
182 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
183 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
184 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
185 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
186 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
```

Image 22. Code debugging.

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```
186  4
187 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
188 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
189 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
190 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
191 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
192 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
193 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
194 I/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 72492 - Msg: Angular is running in the
    development mode. Call enableProdMode() to enable the
    production mode.
195 D/Capacitor: Handling local request: http://localhost/
    common-es2015.js
196 D/Capacitor: Handling local request: http://localhost/5-
    es2015.js
197 D/Capacitor: Handling local request: http://localhost/
    welcome-welcome-module-es2015.js
198 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 0
    0
199 I/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 104700 - Msg: Ionic Native: deviceready event
    fired after 573 ms
200 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
201 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
202 W/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 105005 - Msg: Native: tried calling StatusBar.
    styleDefault, but the StatusBar plugin is not installed.
203 W/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 105017 - Msg: Install the StatusBar plugin: '
    ionic cordova plugin add cordova-plugin-statusbar'
204 W/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 105005 - Msg: Native: tried calling SplashScreen
    .hide, but the SplashScreen plugin is not installed.
205 W/Capacitor/Console: File: http://localhost/vendor-es2015.
    js - Line 105017 - Msg: Install the SplashScreen plugin: '
    ionic cordova plugin add cordova-plugin-splashscreen'
206 D/Capacitor: SplashScreen was automatically hidden after
    the launch timeout. You should call `SplashScreen.hide()`
    as soon as your web app is loaded (or increase the timeout
    ).Read more at https://capacitor.ionicframework.com/docs/

206 apis/splash-screen/#hiding-the-splash-screen
207 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
208 D/Capacitor: Handling local request: http://localhost/home
    -home-module-es2015.js
209 D/Capacitor: Handling local request: http://localhost/menu
    -menu-module-es2015.js
210 D/Capacitor: Handling local request: http://localhost/
    events-events-module-es2015.js
211 D/Capacitor: Handling local request: http://localhost/
    about-us-about-us-module-es2015.js
212 D/Capacitor: Handling local request: http://localhost/
    profile-profile-module-es2015.js
213 D/Capacitor: Handling local request: http://localhost/
    contact-us-contact-us-module-es2015.js
214 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
215 D/Capacitor: Handling local request: http://localhost/
    privacy-privacy-module-es2015.js
216 D/Capacitor: Handling local request: http://localhost/
    register-register-module-es2015.js
217 D/Capacitor: Handling local request: http://localhost/
    login-login-module-es2015.js
218 D/Capacitor: Handling local request: http://localhost/13-
    es2015.js
219 D/Capacitor: Handling local request: http://localhost/20-
    es2015.js
220 D/Capacitor: Handling local request: http://localhost/
    assets/images/logo-02.png
221 D/Capacitor: Handling local request: http://localhost/
    swipe-back-d2cdbf9a-js-es2015.js
222 D/Capacitor: Handling local request: http://localhost/svg/
    exit-outline.svg
223 D/Capacitor: Handling local request: http://localhost/53-
    es2015.js
224 D/Capacitor: Handling local request: http://localhost/
    cover_cover.png
225 E/eglCodecCommon: glUtilsParamSize: unknow param
    0x000088ef
226 I/chatty: uid=10134(io.ionic.wits) Chrome_InProcGp
    identical 2 lines
227 E/eglCodecCommon: glUtilsParamSize: unknow param
    0x000088ef
228 D/EGL_emulation: eglMakeCurrent: 0xe78f9240: ver 3 0 (
    tinfo 0xc88d5030)
229 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
230 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
231 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
```

Image 23. Code debugging.

```
231  4
232 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
233 W/Capacitor/Console: File: http://localhost/home-home-
    module-es2015.js - Line 41151 - Msg:
234     It looks like you're using the development build of
    the Firebase JS SDK.
235     When deploying Firebase apps to production, it is
    advisable to only import
236     the individual SDK components you intend to use.
237
238     For the module builds, these are available in the
    following manner
239     (replace <PACKAGE> with the name of a component - i.e
    . auth, database, etc):
240
241     CommonJS Modules:
242     const firebase = require('firebase/app');
243     require('firebase/<PACKAGE>');
244
245     ES Modules:
246     import firebase from 'firebase/app';
247     import 'firebase/<PACKAGE>';
248
249     Typescript:
250     import * as firebase from 'firebase/app';
251     import 'firebase/<PACKAGE>';
252 D/Capacitor: Handling local request: http://localhost/tap-
    click-606f325e-js-es2015.js
253 D/Capacitor: Handling local request: http://localhost/
    status-tap-2ec46489-js-es2015.js
254 V/Capacitor/Plugin: To native (Capacitor plugin):
    callbackId: 9403077, pluginId: App, methodName:
    addListener
255 D/Capacitor: Handling local request: http://localhost/
    focus-visible-70713a0c-js-es2015.js
256 V/Capacitor: callback: 9403077, pluginId: App, methodName
    : addListener, methodData: {"eventName":"backButton"}
257 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
258     setVertexArrayObject: set vao to 0 (0) 7 8
259 D/Capacitor: Handling local request: http://localhost/
    assets/icon/favicon.png
260 D/eglCodecCommon: setVertexArrayObject: set vao to 1 (1) 7
    4
261 D/eglCodecCommon: setVertexArrayObject: set vao to 0 (0) 7
    8
262
```

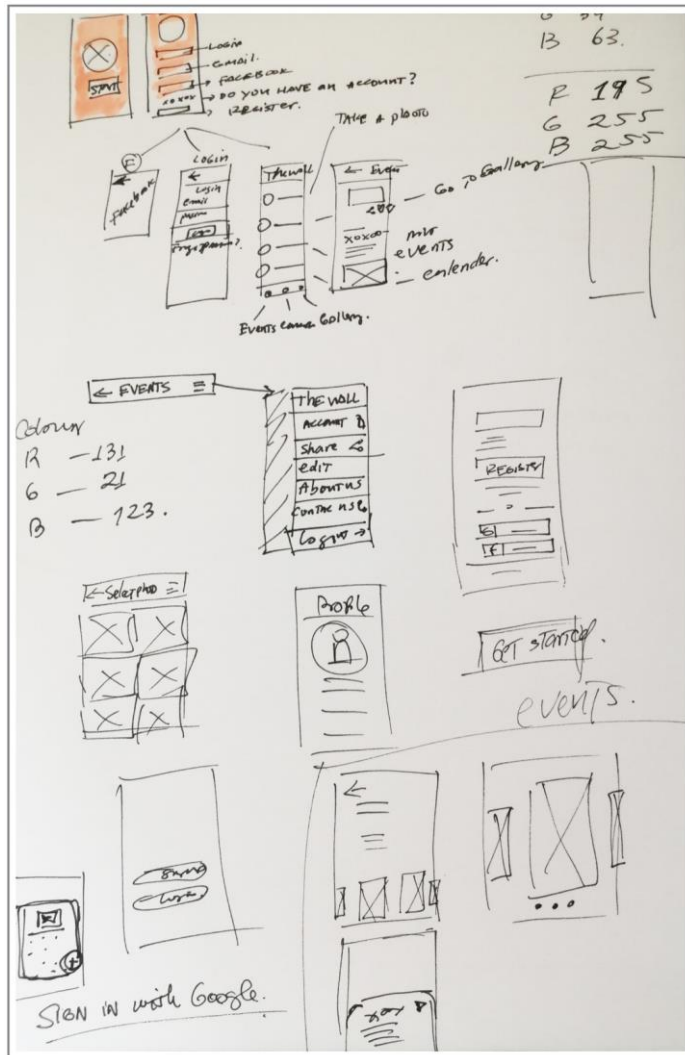*Image 24. Code debugging.*

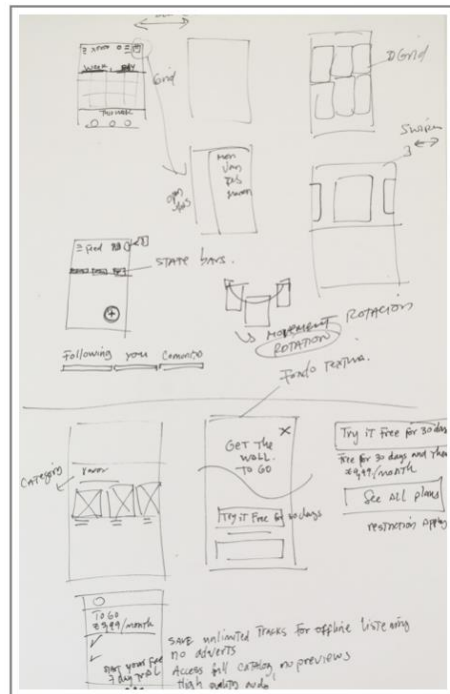# User Interface Initial Sketches

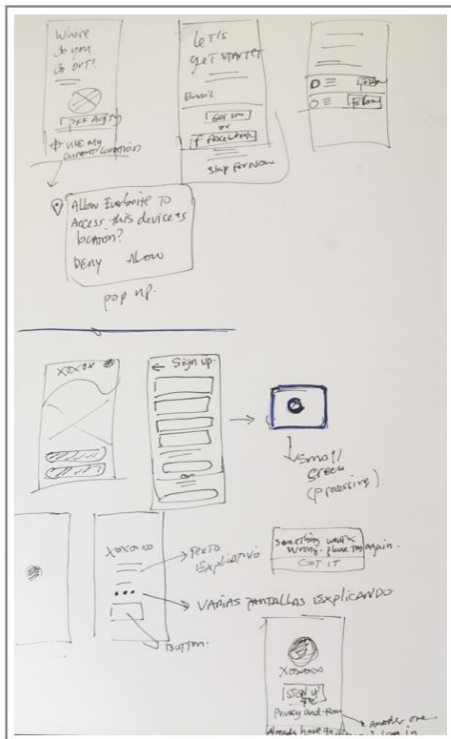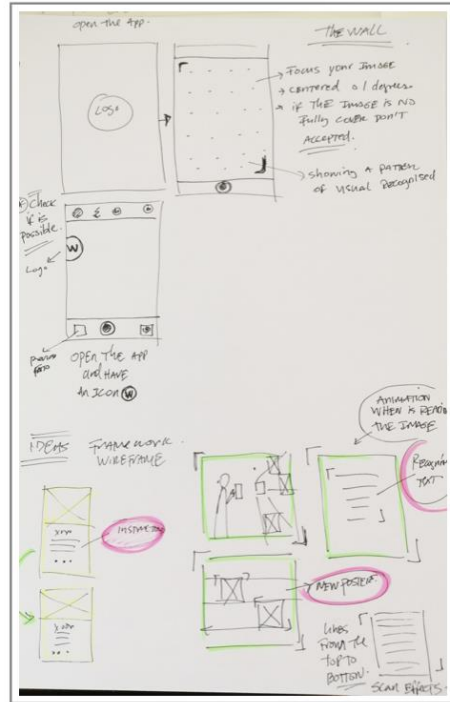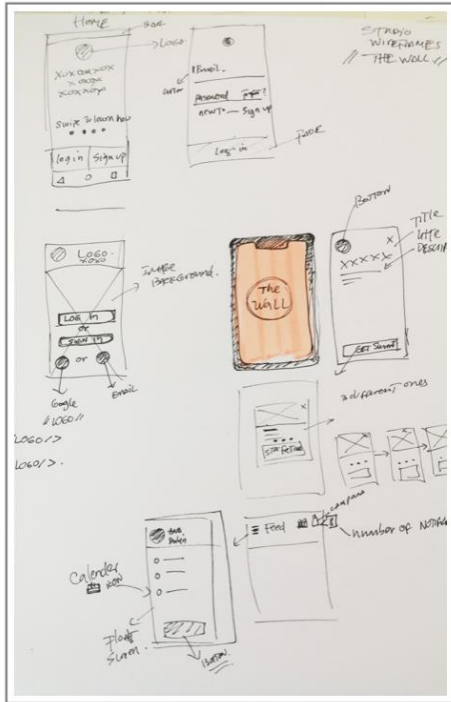*Image 25.* Sketches for the Wall app.

Image 26. Sketches for the Wall app.

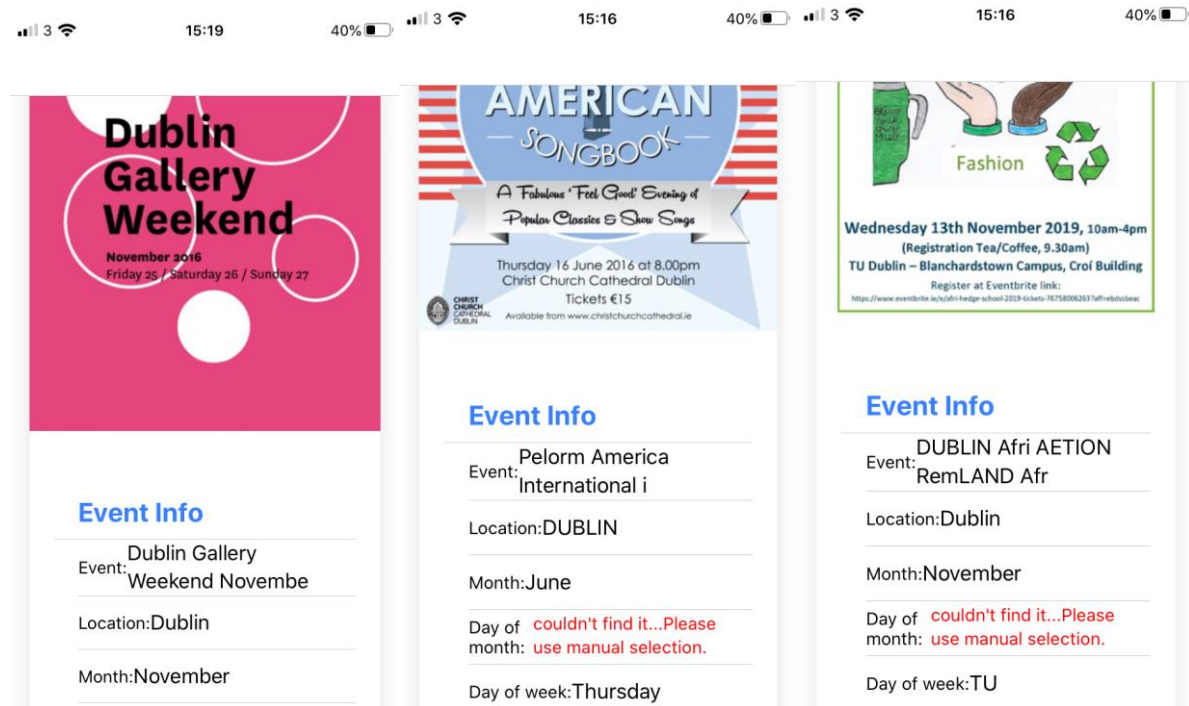# Testing - Posters Used & App Info Generated

Image 27. Results from the machine learning after reading posters.
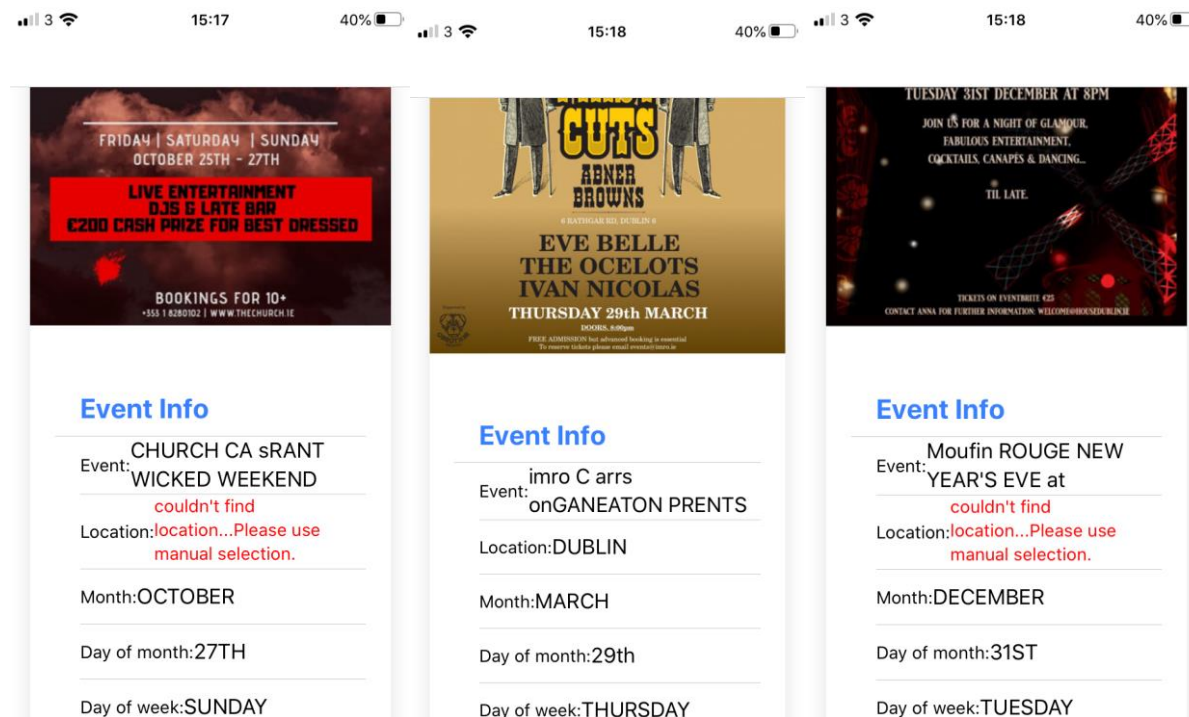

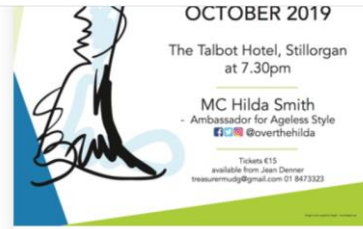*Image 28. Results from the machine learning after reading posters.*

Image 29. Results from the machine learning after reading posters.

Image 30. Results from the machine learning after reading posters.

Image 31. Results from the machine learning after reading posters.

Image 32. Results from the machine learning after reading posters.

Image 33. Results from the machine learning after reading posters.

Image 34. Results from the machine learning after reading posters.

Image 35. Results from the machine learning after reading posters.

Cross-Sectional User Survey - The Wall Mobile Application.

The Wall Mobile Application

75 Responses   11:40 Average time to complete   Closed Status

---

1. What is your age?

🔵 Under 17 years old	0
🟠 18-24 years old	2
🟢 25-34 years old	42
🔴 35-44 years old	25
🟣 45-54 years old	5
🟤 55-64 years old	1
🟣 65 years or older	0

---
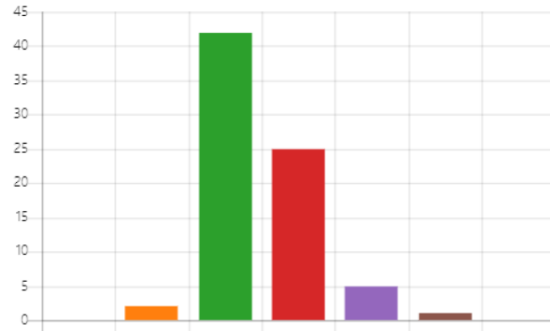
2. What is your gender?

🔵 Female	27
🟠 Male	46
🟢 Prefer not to say	2
🔴 Other	0

---

3. Do you consider that you are into events of all kinds? For example Social, Music, Sport, Cultural, Education, Meetups, etc.

🔵 Yes	57
🟠 No	7
🟢 Maybe	11

---

4. What is the reason why you won't attend an event?

🔵 I never have time to attend an...	3
🟠 I keep forgetting the date and...	1
🟢 I don't remember or record th...	1
🔴 Other	2

---

5. How often do you attend social events?

- once a month — 37
- 2 times a month — 21
- 3 times a month — 7
- 4 times a month — 7
- More than 5 times a month — 3

6. How do you typically find out about upcoming social events? (multiple selection)

- Posters on the street — 25
- Radio & TV — 13
- Internet — 46
- Social Media — 57
- Mobile Apps — 10
- Other — 8
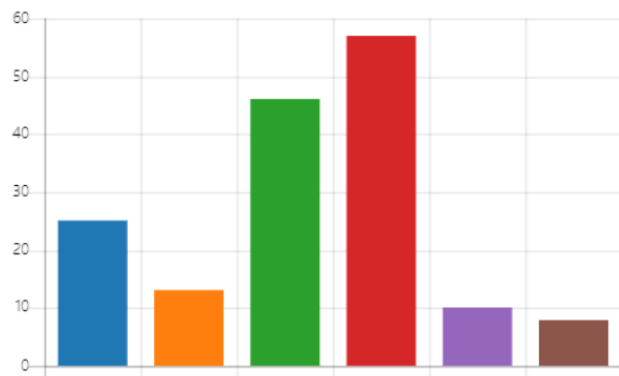
7. Would you use an app to automatically store and remind you of your upcoming events?

- Yes — 41
- No — 18
- Maybe — 16

8. How often would you use this kind of app?

- Every day — 4
- 2 -3 times a week — 24
- Once a week — 25
- Once a month — 13
- I don't think I would use this a... — 10

Image 37. Results of the survey for The Wall mobile application.

9. From the video, would you find the app intuitive and easy to use? (multiple selection)

- I would need someone to sho... 1
- I would need someone to sho... 4
- It would take me a few uses to... 30
- I would know exactly what to ... 34
- I feel like I've been using it all ... 6

10. What part of the app was most useful to you?

- The way the app saves the inf... 23
- How the app adds the dates o... 42
- Managing my events in the ap... 31
- The easy way that I can share ... 20

11. What features of the application were less useful?

- I find it difficult to save the ev... 10
- I find it difficult to create a ne... 2
- I find it confusing how events ... 5
- I find it less useful to take the i... 8
- None of them 48
- Other 2
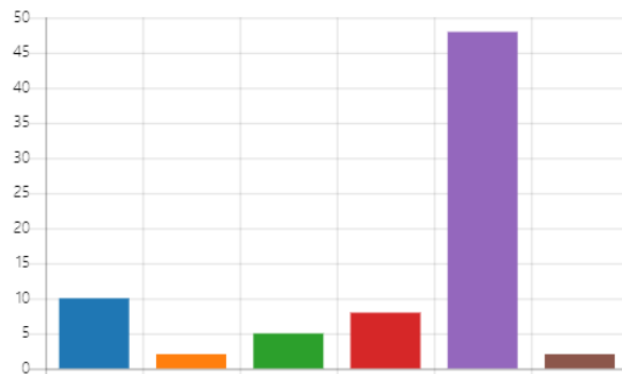
12. How do you find the navigation of the app?

- Easy 52
- Medium 23
- Difficult 0

Image 38. Results of the survey for The Wall mobile application.

13. Rate the interface look and feel of the app

🔵	Fun	24
🟠	Energetic	18
🟢	Trendy	33
🔴	Familiar	18
🟣	Unique	5

14. Do you find the main menu useful?

🔵	Yes	62
🟠	No	4
🟢	Maybe	9

15. Do you find it easy to go from one task (features, functions) to another?

🔵	Easy	58
🟠	Medium	17
🟢	Difficult	0

16. Do you think there is any function missing in the app? If so, please input your feedback.

🔵	Yes	5
🟠	No	40
🟢	Maybe	17
🔴	Other	13

17. Does the app meet your expectations?

🔵	Yes	52
🟠	No	1
🟢	Maybe	22

Image 39. Results of the survey for The Wall mobile application.

18. Would you share this app with your friends?

● Yes	49
● No	4
● Maybe	22

19. How would you rate the app?

75
Responses

★ ★ ★ ★ ☆

4.21 Average Rating

Image 40. Results of the survey for The Wall mobile application.

User Satisfaction Survey - Feedback

In the following table, we can see some of the feedback that users drop after seeing the app and its functionality.

Question 11. What features of the application were less useful?		
	%	Nº
Not sure what is new about this type of app!	1%	1
Not able to gauge by the video.	1%	1
	2%	**2**

Table 10. Breakdown of the result for question 11.

Question 16. Do you think there is any function missing in the app? If so, please input your feedback.		
	%	Nº
It would be useful if the app could identify the details of the event but also identify how to buy tickets	2%	1
Pay for tickets booking restaurants from the app	2%	2
No sure if I would ever feel the need to download the app.	1%	1
A method to order tickets, if and where applicable.	1%	1
Sales tickets reminder.	2%	2
It would be fun if we could have a list of the main events happening in town that we could add to the list of events we're attending with just a few clicks	1%	1

(the info about the event would be already pre-loaded).		
Maybe group events by type?	1%	1
Group events by type, can a repeating event be detected?	1%	1
Add events from social media or event web pages	2%	1
Link the event from social media post	2%	1
Automatic events pop up	2%	1
	17%	**13**

Table 11. Breakdown of the result for question 16.

Code Repository:

GitHub Repository
https://github.com/akhilchandran1/witsapp

The Wall web page:

The Wall Web Page
https://anajuls.github.io/thewallapp/

Screencast artifact/system in operation:

Artifact / System in operation
https://www.youtube.com/watch?v=VDgibzcATfk&feature=youtu.be

Evidence of Teamwork

Raquel Martini (2017096)

Role: Scrum Master, Team Lead, Testing, Documentation.

Individual contribution for this project: **Team Lead.**

This was my first experience as a project manager, coming from a graphic design background, I obviously had not led a software development team before. I was worried about the team finding a good idea, with a problem that was challenging but solvable, and that used technologies that we wanted to learn for our future careers and that we could learn. Once we settled on the project idea the next challenge was blending all the great ideas that the team members came up with for functionality into, again, something that we could deliver. Some choices included whether or not we would run the computer vision functionality on the mobile device or access a remote service, whether we would develop our own calendar functionality (front-end and back-end DB), and what authentication methods we would use to access the app. We decided on using Google Vision API and Google Calendar because, not only is it a reputable hosted security protected service, it is also going to offer new functionality for free over time that will help the product be competitive when its launched to the iOS or Google Play store.

On an interpersonal level, there was also the challenge of managing my peers, dealing with language difficulties, and also trying to agree on a workload for each person that was interesting, challenging to them, and that was doable with their work and family responsibilities back in the real world. Since we are all adults, I think it was probably easier to deliver the project because we were all more motivated than we might have been if we were younger undergraduates again. I think all team members could see the value of what we were making and how it would contribute to our degree grade.

Individual contribution for this project: **Scrum Master.**

My Scrum Master role in this project was to lead the team in developing the solution by managing the delivery of the project software and documentation across a series of Sprints using Scrum and also BaseCamp. This first involved identifying a development methodology to adopt. Although CCT suggested that we use BaseCamp I also researched

and read (Scrum by Jeff Southerland) about several methodologies online and found that Scrum was best for the project. I also wanted experience with using Scrum since, along with XP, it's one of the most popular agile methodologies rather than just a tool like BaseCamp.

I found a company, Scumwise that has an online Scrum tool and we adopted use of this tool in early January. I liked Scrum because the Taskboard and backlog offered a high degree of transparency and visibility on what needed to be done and what was progressing or stuck (with problems) at any given time. I liked that it divided the project into sprints because this meant that we would regularly have a "mini-product" to test and provide feedback to the team on. I liked that the planning poker concept that encouraged the team to better estimate how long each individual task would take. The weekly stand-up meetings were useful because it kept the team focused on what was done, what needed to be done, and where there were problems. Finally, having a single board where everyone's effort is shown is useful in encouraging people to work hard and maybe even compete a little to complete tasks. Having said all that our use of Scrum was not perfect because our task estimations were not always accurate since we haven't developed anything this large before, or developed in large team, or developed using new technologies (e.g. Angular, Firebase, Google Vision).

As the main tool to develop each task, we were suggested to use Basecamp from September, so we adopted it initially. BaseCamp, unlike Scrumwise, is more about communication (chat, message board, schedule) but it does not represent sprints, burndowns and taskboards and so does not capture progress as well as Scrumwise. In BaseCamp I can see the progress of the task, drop questions for the team related to concerns that we may have about every task and using this platform everyone is aware what each of us is contributing for each task. However, having used both I prefer Scrum for the reasons outlined.

In the second semester of the year, we adopted Scrum and broke down the project into a backlog of tasks so any new task/activity that takes time for a team member will be added to the backlog on Scrumwise. My first goal was to explain how Scrum would be of benefit to the team and to explain the processes involved (sprints, backlogs, task estimation, taskboards and burndowns). The team were very positive about adopting the process and even though it took 1-2 sprints to iron out the small problems (i.e. regularly updating their taskboard tasks, understanding how

to estimate a task, understanding that each sprint is a fixed time) we soon were using it to manage the project. I used tags and colour coding in Scrumwise to identify tasks by type (e.g. research front-end, testing, documentation, review phase) and small improvements like that helped to quickly convey the important elements in each sprint. Every week I was creating tasks and measuring the time for each team member, I tried to assign the task according to the skills of every team member and try to get the best of each of them.

In terms of my role of Team Lead I was lucky with the team in that we got along well together, each person could find a role that suited them, there was no one with very strong immovable opinions, and any conflicts on the direction of the product were easily resolved. Scrumwise also helped to improve the time management skills of all involved. Lastly, in this project I consciously stayed away from taking on a developer role because in the future I am more interested in working as either a Scrum Master or as a UX designer.

Individual contribution for this project: **Testing & Documentation.**

I defined the approach we would use to test. I'm not happy with the amount of unit testing that we did within the project but we had no instruction on testing during our time at CCT and so I had to figure it out as we developed that project. That is not an excuse it is just a statement explaining why we didn't understand how a project is normally tested, what tools are used, and when and how best to implement testing and Continuous Integration (using GitHub) in our solution. Having said that we used three different methods based on the reading I carried out in the area. The three were as follows:

1) **Unit Testing** using the test created by Ionic.

2) **Functional Testing** of the main key component of the app (i.e. the computer vision functionality provided by Google Vision).

3) **User Testing** where we test our app functionality and how users experience the UI and their perceptions of its functionality.

My actual contribution to these phases was limited to only to the User Testing where I prepared the survey questions to ask the test users. The survey was divided into 2 phases and every question was carefully written

and provided a range of sample answers for the user. In retrospect some of the question answers did not include a proper range of positive, neutral to negative response types and so may have biased that question. After we got the results from the user testing, I worked along with Maura to analyse the result before she then completed the last phase of the process of testing which was documenting the results.

Apart from my role as Team Lead and Scrum Master I also contributed to the preparation and content of all documents. In terms of this document, I contributed to the abstract, introduction, conclusions, summary and schedule of the project as well as contribute to and review all the documents that my teammates produced during this project. I used my background in graphic design to create diagrams, charts, tables, etc to better present the ideas through the document. Lastly, I contributed with the compilation of the documentation, structuring and editing of the screencast and in rendering the video for final delivery.

I really enjoyed this project. I discovered that the organised and friendly aspects of my personality were reasonably well suited to be the Team Lead and Scrum Master. I think to be a good team leader you need to be able to communicate well with people and to now how and when to enable their work and/or push them forward. Some people like to be led; some people get collapsed with too many choices; some people obsess about one feature and need to be helped to re-direct their attention. I liked managing those dynamics.

I want to thank the entire team for the great research work for this project, I can say that the team made an excellent contribution to the research part which helped to understand the challenges in developing the project, to structure the deliverables, and to develop a novel mobile app with a solid technical foundation. Research that began in October 2020 with conversations with a real-world stakeholder who thought that the idea had potential. Research that progressed through many hours of reading and synthesising information from online sources, texts and instructional online videos. Thank you all for your great contribution.

Eliezer Maia Barbosa (2018127)

Individual contribution for this project:

The group was divided in parts, and I have the role of developer. In the first stage of the project, we were all thinking about what we were going to develop, and we came up with the idea of building an event app.

Then, I did the resource requirements, checking what type of technologies we were going to use. We decided that it should be a mobile app, for this purpose, we choose to work with Ionic framework, after doing research about with mobile framework would suit us better to build this app.

As part of the project, we need to study how to work with those new technologies, because Ionic uses Angular, React.js or Vue.js, to create mobile app. We decided to use Angular, because it uses Typescript as its programming language, which is more like Java, the programming language we are being taught in college.

I also did research about what we should use for backend development, as Angular is focused on frontend only. For Java, there is Spring framework, which is very powerful and reliable, used for big companies. For security, Oauth was a good option as well, as it protects the user credentials. I also did the class diagram, user stories, use case, entity diagram and CRC card.

For development, I implemented the Google API request, making our app to communicate with it, getting the data from the API. The user takes a picture of a poster or choose it from device images gallery. The request, with the photo, is sent to google API. The app receives back a JSON response with all data extracted from the given image. I implemented a method that perform a loop through all data content, filtering it with content defined by me in the form or arrays.

The data we need is defined by event name, location, and date. Inside de loop, I can compare the entries found in the response with the ones that is defined internally in the app, for example: how to find a month: any string that contains a month, which is, in this case, an array containing all possible months formats, such as September, sep, sept etc. The same idea is applied for weekdays.

Then, after filtering the data, the user is presented with the results, which displays event name, location and date. The user can confirm, by making a manual input of the date, because it has to be in the date format, cannot be string. Once the user confirms it, the calendar is opened, showing the newly created event. The event is now stored in the user calendar, and he can access it anytime, by opening his device calendar.

I have searched about the technologies we will be using in order to develop our application. Also, the project scope has been delivered describing the steps we need to take to have our project done. Initial steps are the use case diagrams, class model diagrams and database diagram. With this data, we can start the next step, which is the implementation of the app. I also have the initial app working, connecting successfully with the Google API, which is one of our objectives for the app, which has increased my understanding about how hybrid platforms, such as Ionic, works.

Ana Julia Ortiz (2017102)

Individual contribution for this project:

Along the process of developing the project during this year, I was in charge to develop several tasks within the project, at the beginning I developed the project goal, the main and specific objectives; also as part of my collaboration I developed everything about UX/UI and Design in the project, where it's explain in detail all the steps to achieve a good UX/UI implementation, starting from a deep research about how the application can be develop in a easy way, in terms of methodology, users needs base on user centred design, and other relevant topics that have been mentioned.

To start with this process, a brainstorming was conducted with all the team members to determinate the main ideas, in regard of layout, colours, styles also how they user could navigate through the application in a intuitive way, after all details were collect, I did a research about other applications with similar features, I create a look and feel board, to establish the style of the app, after that some sketch were made, when the main structure was done, I start to develop the wireframe, after finish with the final version, I create a clickable prototype of the application, to be use for

the testing part, including some questions to ensure that the user perceive the app as was conceive in terms of design.

To double check if the UX/UI principles were well implemented, I developed a few questions with other two members of the team; also I develop a several marketing material as POP, to complement our project, in order to have a full proposal of the application on all kind of possible scenarios, in case we want to sell the app, such as business cards, posters, web ads, mockups, landing page, having an small description of the app, and the main screen to show how the app will looks and works. Additional to all that I produce an intro of a video for the screencast explaining the main functionalities of the prototype, and to finalise, I contributed with my team in the final presentation for the submission day.

In general all the project experience was really rewarding, because we did an excellent job together, we were able to blend our strengths and overcome our weakness in many different ways, from learn how to work in a team with all different personalities and skills, to complete the final product in this case The Wall App, with a high expectation about our work as a team, I really enjoy to work with them, also give me the opportunity to assure in what field I would like to work in a near future, in this case as a UX/UI Designer.

Akhill Chandran (2017219)

Individual contribution for this project:

In the beginning I was searching about the current issues. Then we found people are forgetting local events. So, we came up with a solution. Build a mobile application to store all the local events. I work with Raquel to prepare Introduction of how events change life. Then I prepared an innovative solution for this problem and help locals to promote events, and I work with Eliezer to prepare Use Case and Class Diagram. I collect the reference from my group members and add in a Harvard reference format. I researched about Machine learning, Machine Learning service providers and prepared a report about my findings.

We discussed about all our findings and decide to use Google Vision API for our project. I researched about the types of mobile applications and

difference, after a long research I came up with Ionic because we have a plan to develop in IOS and Android. In Ionic its easy because with a little change we will be able to use the same application in IOS and Android. Ionic applications are Hybrid applications so which will work in IOS, Android and windows. On the flip side we will be able to monitor the live changes that we are making. We can run it in developer mode. Which will allow us to open it in any mobile phone under the Wi-Fi (more than one in the same time is possible) and we can run in browse too. It's very easy when I compare with native applications like IOS and Android.

Ionic is so developer friendly. I go through all the advantages and disadvantages of Ionic and decide to use Ionic for our project. We split the work by allocating two people for development and three people for documentation and designing. My part is to develop the frontend and work with Eliezer in backend. These technologies were out of my knowledge, so I wanted to do a lot of research about Ionic framework and Google API.

I decide to use Angular and TypeScript in Ionic (HTML, CSS, Angular, TypeScript). In development. I did full frontend development and update the design provided by Ana (one of my ream member) in image format. Create all the pages and make connection. Implement login with Facebook, Gmail (I create a developer account in Firebase, Google and Facebook and create an application in this three of them) and create an option to register an account with email ID and password. I use firebase to implement this because I can keep the password encrypted. Add an option to login with registered email ID and Password, and an option for forgot password. The user will get an email in their registered email account with a link (URL) to add new password. The password only able to change through their email ID. Implement logout method, I added an option to access device camera and gallery. I also added a method to access google calendar.

I Created event page with dummy events, prepared a menu page with bottom tab and side menu, research a lot to fix all the errors. After that I collect the google vision implementation code from Eliezer and add to the Application and make it in working condition. Fixed all the errors. Implement an option to share events to social media, testing the application in XCode and Android studio. Debug the application in android studio and generate report. Install the application in my Android Phone and tested. Updated to the latest design. Prepare error report (Explaining about the most challenging two errors that I faced and the solution that take to solve it with reason).

Maura Carola Tangara (2017241)

Individual contribution for this project:

Although we all have a general understanding of The Wall project, for the success of our application development, we decided to divide the tasks. Initially, I was in charge of doing a search and analysis on the problem area, answering certain key questions such as: Why, who, what, how and where? Our application had to be developed, to base the development of it. So, I was assigned the search for concepts about the technologies we use, for example in terms of the back-end: the REST architecture which has become "the bridge", so to speak, that applications use to communicate with its back-end and fron-end (Server-Client). Also, I did an internet search on PaaS (Platform as a Service) in which we took Heroku, which is highly recommended for entrepreneurs because of its strong focus on solving the deployment of an application.

Following the line of search and analysis of concepts related to our project, I worked on the risk analysis that The Wall could have, be they internal or external, of the types of risks for which in this first phase, the development of the application, we could have, I have chosen to perform a qualitative risk analysis. On the other hand, I was also in charge of designing the sequence and state diagrams based on the UML (Unified Modeling Language) diagrams.

Finally, I was in charge of making a collection of 100 types of posters with different designs, types of events, dates and places, this for testing the application. And also, I collaborated in the elaboration of the questionnaire for the survey on our application, and I made a document with the interpretation of the results of the survey and the reason for it as support for our project.

Last but not least, I collaborated in the elaboration of the methodological structure of the project documentation, for which I coordinated a meeting via Zoom with the head of the College Library, Justin Smyth and part of the group, who gave us a broad vision of how the document should be, he showed us examples, which was very beneficial.

What I learned from this experience working with a team for this project?

The things that I learned with in this project, apart from putting into practice knowledge that was given to us during the three years of my degree, I think that the most important thing was teamwork and how to deal with differences in personality and culture. For this, the subject of project management was very important, the distribution of tasks and assignment of roles, for which I must highlight the work of each of my colleagues, but especially that of our Team Leader, who knew how to use tools such as Basecamp and Scrumwise for the phases of the work during the project.

Using Basecamp and Scrumwise helped us, at least personally, to fulfill the assigned tasks, since for each stage that our Manager assigned us, we had a deadline that these applications reminded us of. I must emphasize that we never had a problem or misunderstandings as a group, we all collaborated with what we could. And based on this work I discovered that I would like to venture into the Project Management and Technical Writting area.

The Wall