Discover. Join. **hint.**

Project Report

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MSc Creative Digital Media

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Declaration

The authors of this document certify that this report, which we no submit for examination for the award of MSc in Creative Digital Media, is entirely our own written work, except where otherwise accredited. This report has not been submitted in whole or in part for an award in any other Institute or University.

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Introduction

1.1 Purpose of the Report

This document is intended to give a detailed account of the research, development and testing of Hint, an iPhone app build as part of the MSc in Creative Digital Media by Brian Byrne and Gemma Gallagher.

1.2 Contents of the Report

This document can be broken down into 7 main sections:

User Needs Analysis:
This chapter defines and validates the need and outlines the potential users of Hint. The aims and objectives of the project are also defined and clearly described.

Background Research:
This Chapter will give a thorough analysis of competitors, technologies and other app which influenced our design requirements.

Project Requirements:
The design and functional requirements for the project are defined here. They are formed for the information gathered in the previous 2 chapters.

Design Methodology and Approach:
The design process is detailed in this chapter, giving an insight into the decisions made. This section informs the following section, Code Methodology and Approach.

Code Methodology and Approach:
The development of the code functionality is described in detail in this chapter. Both planning and implementation aspects are covered. This details the iterative process taken throughout the project.

Testing and Analysis:
A clear and detailed testing design and analysis will be discussed in this Chapter. The revisions made from these tests and conclusions made helped to inform the development process and aid us in evaluation the project as a whole.

Evaluation:
This section will give a full analysis and evaluation of the overall project, demonstrating critical and discursive thinking with strong directions for future work.

1.3 Intended Audience

This document is intended for college lecturers, examiners and any other interested parties, in either an educational or business capacity.

1.4 Definitions, Acronyms and Abbreviations

MVP - Minimun Viable Product

CSF - Critical Sucess Factors

MoSCoW - Definition of Musts, Coulds, Shoulds and Woulds

Build - A version of the app release with new and revised functionality.

Flinto - Online tool used for creating digital prototypes.

Blacknight - Hosting Server Used

Testflight - Method used to release builds to a small number of users.

2

User Needs Analysis

2.1 Introduction

This chapter will seek to define and describe the user as a persona through user analysis with surveys. We will derive typical user personas and scenarios from this information. This will lead to the aims and objectives of the project and the Critical Success Factors. We will identify the gap in the market and seek to find a solution to this problem. This Chapter is heavily intertwined with the next Chapter, Background Research.

2.2 Identifying the User Needs

This section will briefly outline the inspiration and concept of the app. It will discuss the user needs and summarise these before detailing the affordances of the chosen device, the iPhone 5s.

2.2.1 Concept Overview

There have been many iterations of the app concept throughout the development phase. The final concept outlined in the original requirements document was to create a social location app which would focus on trending areas around a city.

We initially focused on this issue as we found that there was a lack of quick and current information about what was happening around the city now. Most apps and websites focus on reviewing locations and venues with the information being out of date, with no idea given to the type of person made the review.

After conducting initial user research and surveys, which will be discussed in Section 2.4, it became clear that our target audience, defined in Section 2.2.3, reacted very positively to this idea. The competitor analysis, which will be discussed the Chapter 3 , revealed that our closest competitors give the users too many options and lots of information which is difficult to interpret. We aim to simplify this, minimising and compacting the information to provide just enough information to be beneficial to our target audience.

As a result of these findings, the final concept was defined.

Hint is a location-based app that gives real time information about locations and venues around you. It lets you know what places are busy, a simple demographic of those there and what the majority of people are there for. The hints are user driven, giving you the ability to browse and join hints or drop your own hint for others to discover.

2.2.2 Inspiration

The concept for hint is to aid people in the decision making process and to be used as a realtime guide on where to go and what to do in your city. Often decisions are made from people's past experiences or recommendations which can result in a small closed group of choices. The inspiration for this app was to open up the process to a community that could give realtime information about venues at that moment.

It started with the idea of waiting for a taxi to go on a night out with friends and trying to decide on a venue. There may be three or four places put forward by friends and the choice can go back and forth. If you could find out current information about venues it could help to make a more informed decision and open up alternative options. This then expanded due to comments from potential users. We realised a lot of unique events or spontaneous happenings go unnoticed, day and night. Our aim isn't to convince everyone to be out, just aid those who are looking for something to do, to find a place that might suit them, which they otherwise might not have known about.

2.2.3 User Needs

The user is someone of a younger generation where popularity and profile matter. They enjoy finding new places and have an active social life within the city. They are active on social media sites and regularly update, review and share what matters to them. Sharing content and information is second nature to our users who have grown accustomed to having realtime information at their fingertips.

Our target users fall the between the ages of 18 and 28. We have initially focused on the younger audience as within this 10 year age gap, there are a variety of personas depending on education level, profession, location, status and gender to name a few. Within this age group socialising is a huge part of daily life. "Consumers aged between 18-34 are defying

the recession to go out eating and drinking an average of 32 times per month" and is on the increase. (Christopher Thompson, 2012)

The lifestyle of our users is perhaps a more definitive aspect to focus on. As our app will show user generated hotspots, the majority of our users will live in urban areas, attend a college, or work in the city. Common places of interest to our users include the obvious pubs, clubs, cafe's and restaurants.

Within each type of location there are different influential factors involved. From our research, our users have concluded the 5 main defining factors of what interests them when it comes to deciding where to go; Where it is, what's happening there, popularity (and why its popular), demographic and where friends are. These 5 factors have different weightings depending on the social situation and time of day. Our aim is to give users the information that will be valuable to them in helping them to make an informed decision.

Common places of interest to our users include the obvious pubs, clubs, cafe's and restaurants. But in recent times there has been an increase in events such as open air cinemas, markets, street performances and exhibitions. (See Chapter 5.4.3 for Type and Category Design) These types of gatherings are hard to find out about due to their spontaneous nature. From asking our users how they find things to do around Dublin (See Section 2.4.2 - Q1), it was clear there was no platform that accumulated all current information to give the user information about the city's happenings.

The basic user needs can be summarised as:

- The user needs an app that gives a current reflection of the social scene around the city.
- The information given to be up to date and clearly visualised.
- Provide valuable information about each specific location/venue.
- The app needs to be intuitively designed with context of use in mind, whether on the go or casually browsing.

2.2.4 Device Affordances

The initial target device will be the iPhone 5s. Our app will be used while on the go and therefore must have the following features.

The iphone 5s has the following affordances, which can be used within the app:

- Wifi and 3g - To access the app on the app store and for everyday use of the app to gain server connection. Also increased accuracy of location services.
- Touch - Different types of touch create different on screen responses. This can be utilised in different ways to maximise the interactivity with minimum effort.
- Retina Display - This will enhance the quality of imagery and its appearance to the user.
- Notifications - This will give us the ability to interact with and benefit the user while the app is closed or suspended.
- Access to contacts - For potential friend connectivity.
- Access to GPS - The iPhone comes with a built-in GPS chip and the ability to also determine your location relative to WiFi hotspots.
- Local Storage - Ability to store information locally with Phonegap.

All team members and lecturers possess this device which is necessary for the development and testing stages.

2.4 Validating the Need

This section will document the data gathered from surveys and research and the results. Potential users were surveyed and we discussed our intitial idea, as outlined above, with users in our target age group. This section will detail our findings.

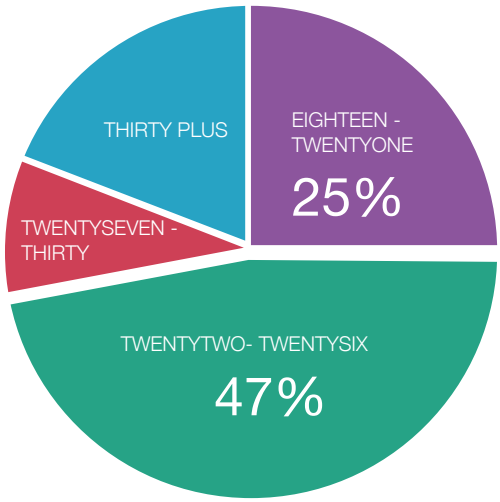
2.4.1 Survey

The survey was created to gather a general overview of data as this could reach a greater number of users than could be individually interviewed. This section will outline the content of the survey and provide the main results in chart form. It will be followed by a discussion of the main findings and how they impact the development of the app idea.

2.4.1.1 Survey Design and Aims

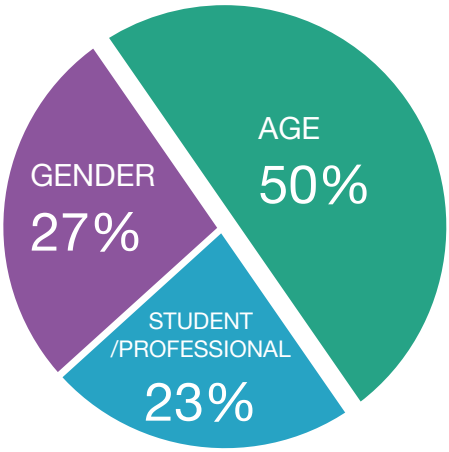
The aim of the survey was to reveal the level of interest and further opinions on the proposed app. To achieve this we hosted a survey online using Survey Monkey (surveymonkey.com) and shared this through Facebook. It consisted of a short introduction about the app idea and 10 short questions. 104 responses were received and the data on the following pages is a representation of the survey results.

2.4.1.2 Results

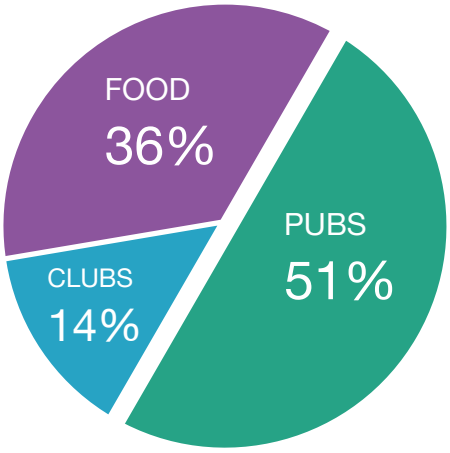


Q1. AGE?

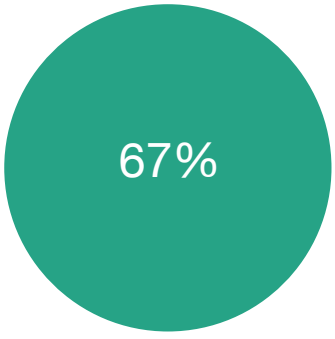
Q2. What information would you like to see regarding trending locations?



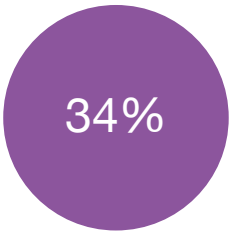
Q3. What type of venue would be of most interest to you?



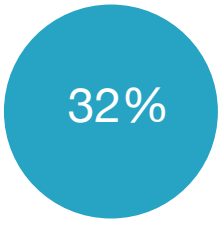
Q4. Select the option(s) that would be most suited to you?



Night out with friends to find a good club/pub or to try something new.

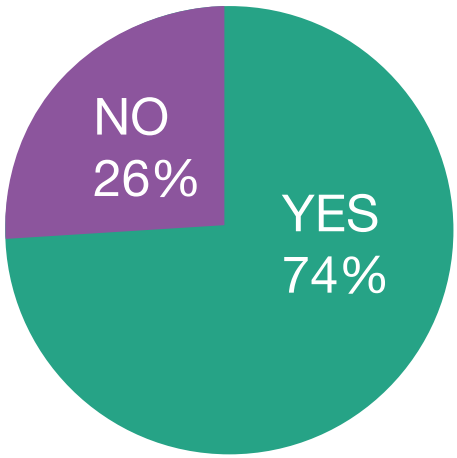


While away for a weekend in a new city with partner/friends.



Find a popular lunch/dinner destination.

Leaving college/work and want to find a nearby pub with atmosphere now.

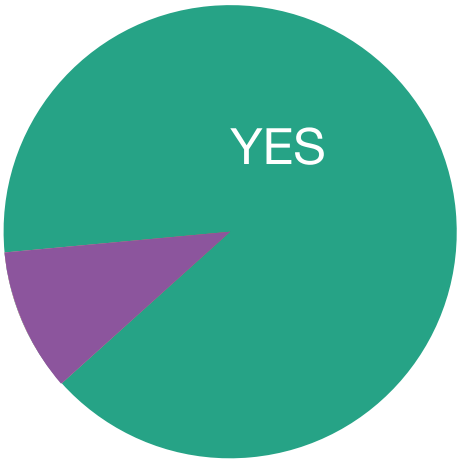


Q5.

When you reach a set venue, would you be happy for your location to be automatically added to the trend?

Q6.

Would you be interested in using this app?



Users Comments

"If food is served, what type, & price, locations for watching sports events"

"Maybe Ratings that people gave it if that's possible."

"Reason why it's trending ie. unreal chicken wings, great dj etc "

"Value for money"

"Type of place"

"Maybe friends on facebook?"

2.4.1.3 Analysis of Main Findings

The majority, at 72%, of survey respondents were between the ages of 18 and 26. As our app is aimed at younger users, this is a positive response and the results can be reviewed with this target user in mind.

The most popular venue type out of Pubs, Clubs and Food was Pubs occupying 51% of the users main interest, with Food (36%) at a close second. Alongside this, the most popular scenario (67%) from the 4 given was a “Night out with friends to find a good club/pub or to try something new”. No option was completely dismissed.

Half our respondents selected Age as the most important aspect they would like to see regarding a specific location, with the comments from this question proving to be extremely insightful. These responses opened us up to new ideas and issues we had not yet addressed.

Keeping in mind, this survey was carried out on the 28th February 2014 when the idea was still at its early stages. Some of the questions do not represent the full functionality of the app as this survey helped us shape and refine the idea as it developed. However the final question posed to our users, “Would you be interested in using this app?” returned an overwhelmingly positive response with 90 users saying “Yes” confirmed our basic proposal was of use to our target audience and worth pursuing. Out of the 14 users who replied “No”, 9 were over the age of 30.

2.4.2 Questions Posed to Potential Users

Following our initial survey results we amended our idea slightly to address the users need we had not already thought of. We realised we needed to ask more detailed questions in relation to our idea and what was most important to our potential users. The questions outlined below gave us most detailed data about the users specific needs compared to the survey above.

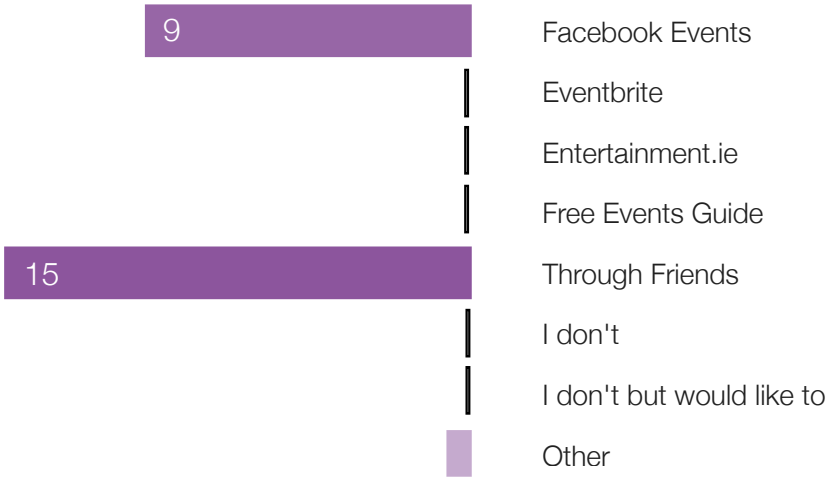
2.4.2.1 Survey Design and Aims

The aim of this survey study was to receive more detailed information about our user; how they currently find information on what's happening in their city and what they would like to be able to find out. After discussing the questions we presented them with an initial prototype on how the app would look and how the interactions might work.

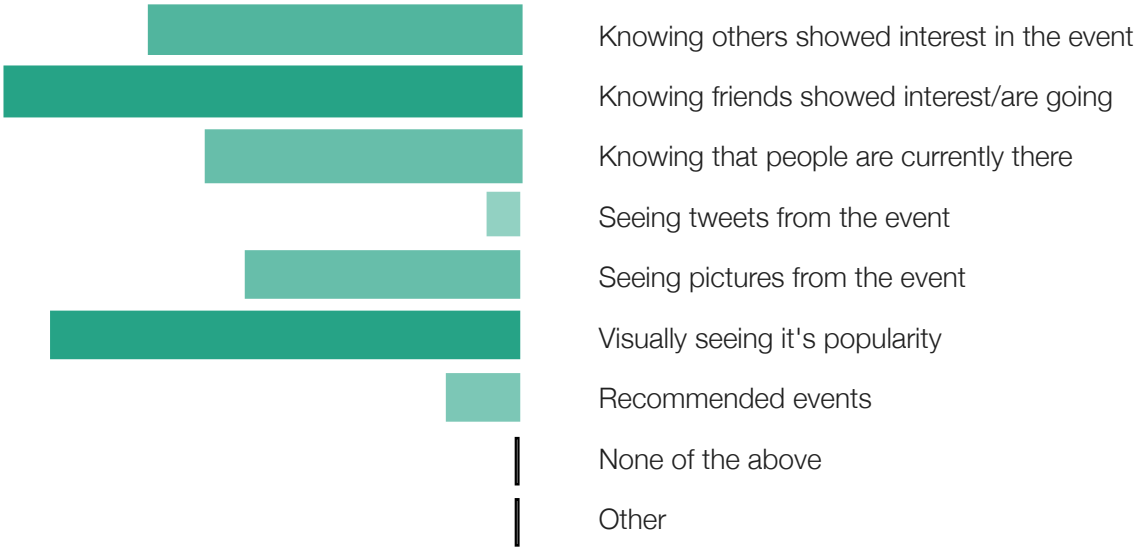
We approached 3 separate groups in the canteen at DIT Aungier Street as we found people were inclined to contribute more to the conversation in a group situation. The first group consisted of 6 girls aged between 20 and 23, the second was a group of 7 boys between the ages of 19 and 21, and the final group consisted of 5 girls and 2 boys aged between 18 and 22.

2.4.2.2 Results

Q1. How do you find things on around Dublin of interest to you?



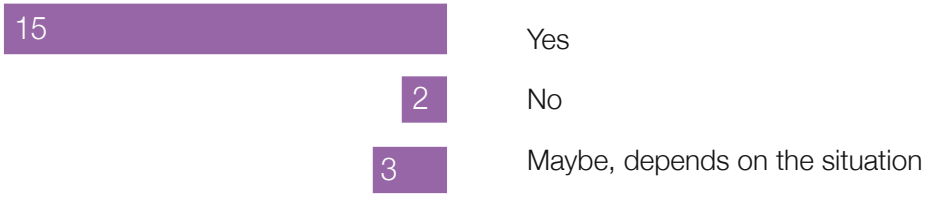
Q2. Which of the following features be of benefit to you?



Q3. How would you prefer to view this information?

Q4. Would you leave an anonymous tip for other users on what is happening at a location you found enjoyable?

*Asked after using prototype with check-in interaction.



Q5. What informarion would you like to see regarding events?

“ Pop up notifications

Cinema, Lunch Specials... Student deals for food Pub quizzes, Gigs

Limited time things

Student sales

Cinema pop ups, comedy festivals, arts fairs

Pub quiz

Pop up cinemas and exhibitions

Time, date, price, special offers

Pop up cinema kinda stuff, Price

Photos of past events, live tweet feed regarding the event ”

Q6. General Feedback from Prototype shown?

“ Like anonymous factor

Would not care if identity was shown to friend

On Facebook – like to see what friends are going.

If you couldn’t think of where to go would be very useful.

See promotions/offers?

Like to see where most people are going

Would be very useful if undecided between 2 places (Age)

Responded well to prototype – “looks cool”

Seeing the crowd would be very handy ”

2.4.2.3 Analysis of Main Findings

We received very useful information from this testing session as the participants were more open to conversation. We did not formally record the full conversations. We asked each individual the first 5 questions and extracted the useful comments or information given in response to the prototype, as shown above.

All participants were within our target age group and were split 55% Girls, 45% Boys. We started by asking where they currently found information about events or 'happenings' around the city. The only 2 answers ticked were 'Facebook events' and 'through friends'. This revealed that the area is certainly lacking in a space to share events or happenings. On facebook, you are only informed of events you have been invited to, therefore drastically reducing the amount you hear about.

The seconds question presented the users with a potential list of features, asking which features they would find most useful. It was not surprising that when presented with options most people selected multiple options. This however helped us get a feel for what was most important and what area we should focus on, keeping within our scope. The top answers were "knowing friends showed interest/are going" and "visually seeing its popularity".

Question 3 was purely visual, where our testers answered 50/50 between list and map view. The fourth question proved to be most insightful, as suggestions were made which we had not previously considered. There is an obvious lack in information about once off/pop up events, for students on a budget especially, as a this was mentioned in all 3 groups. Knowing if there was a deal on was also important to our potential users.

The response to prototype was very positive. The popularity element came across very strongly with users after seeing it on the device. Question 4 was asked after viewing this prototype, which had a very strong response, with 75% of users definitely willing to leave anonymous tips. They reacted very positively to the visual style and interactions also. On viewing the initial prototype for the app, users engagement increased, validating the fact that the UI design is a crucial aspect of the production process.

2.4.3 Validation of Results

The results from the previous 2 Sections had a huge impact on our initial concept. We were aware that the social location area is huge within the technology sector. As users have access to so much information on every aspect of life they have come accustomed to this way of living. With all the social location and reviews apps out there at the minute however, there are none that seek to provide real-time information about what users are up to now. This was validated in our surveys, as Facebook is the only place our testers go to find information on where to go, which does not give a real-time view of these events and venues.

We also want to differ from competitors (See Chapter 3) by reducing the information overload and providing a brief, yet persuasive overview of the city as a whole. We aim to do this by essentially defining the function and demographic of a location. Users were most interested in knowing the average age. In future we would look into a connection with other major websites and apps such as Facebook, yelp, trip advisor but this is far beyond the scope of the Masters Project.

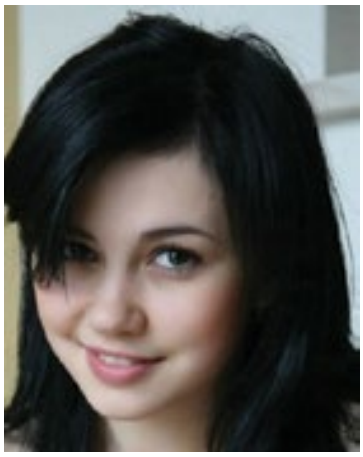
We are aware that friends have a huge impact on the process for deciding where to go. We would love to address this matter within our app but we are also aware that our coding skills might not be sufficient to complete this within the project time frame.

We gained valuable information from potential users of the app. They are very interested in the idea of crowd sourcing popular locations and venues, which they might otherwise not know about. How one will use the app can vary drastically between users, but as we will never be able to fully define this we will use the data gathered to aid us in creating typical personas and scenarios in the following section.

2.5 Personas and Scenarios

We were able to use what we learned from our surveys and research to further define our user and to create personas to reflect potential users of Hint. This let us create scenarios in which these personas might use the app for. Based on this we've refined it to 3 main users: Jane - the social student, Geoff - the young professional, and Laura - the Masters student.

2.5.1 Persona 1



JANE, 18

Jane is 18. She has just moved to Dublin from Galway and is now living on campus in UCD where she is a 1st year Physio student. She is loving the college life and is part of the freshers gaelic team and was also voted as Class Rep. She is friendly and outgoing and always up for a laugh. As part of her Class Rep duties she has to organise get togethers for her class to get to know each other. She finds this hard as she does not know Dublin very well.

2.5.1.1 Scenario 1

A group of girls from the freshers football team are meeting in Janes house on campus to celebrate Annie's birthday. They stay in Janes house for an hour until everyone arrives. They want to go for cocktails in town before heading to a club and as Jane is the natural organiser she's left with organising the taxis and deciding where to go. While sitting around and chatting, Jane keeps an eye on Hint and has filtered down her search to just bars and clubs for the night. She finds 2 popular cocktail bars. One has an average age of 19 and the other 23, which is slightly busier. While browsing she sees 3 clubs nearby so also adds these to her watch list so she can keep an eye on them for later. They are still all very quiet yet but she is aware the girls will not want to walk too far after the bar. The taxis are on the way so she asks the group to choose between the 2 bar options giving them the information. They decide to go to the 1st bar as they know they will get in as the other may have an age restriction over 21's. There are more clubs nearby this option for after also so it will save the walk in heels! The taxi drops them right to the door and when they get the realise the bar has great student deals on tonight. 5 of the girls have Hint on their iPhones and decide to join hint, adding 'deals' as their category to let others know. At 12 o'clock they decide to head for a club. 2 of the clubs Jane has been watchin have gotten very popular. They happen to be close by each other so they head in that direction. None of the girls have been to either before. On arriving at the 1st club, they are impressed by what they see so decide to go no further. Jane is automatically joined in on this venue along with 3 of the other girls who added it to their watch list also. They all enjoy the night!

2.5.2 Persona 2

Geoff is 25. He works for an Accountancy firm in Dublin City Center. He lives with 3 friends in Portobello and is in constant dialog with them over whatsapp or Facebook. They take it in turns to cook a sunday dinner for each other and Geoff would often try out different ingredients he picks up in markets around town. He socialises at least one night over the weekend and the occasional Thursday if there was a launch or exhibition on that he's interested in.

Geoff, 25

2.5.2.1 Scenario 2

Geoff is meeting his girlfriend Jen on Saturday afternoon to get some food for the Sunday dinner and have a stroll around town. He wants to find somewhere new to go. Before he leaves the house he opens Hint and searches for any markets that may be nearby. He is meeting Jen by the Central Bank and he can see on Hint that there is a Temple Bar Food Market just down the road. He adds the Hint to his watch list and heads in to meet Jen. Once he has met jen they walk down to the market and he is automatically added to the Hint. He buys loads of fresh veg for the sunday dinner he is putting together for his housemates. On the way home Geoff and Jen decide to stop into a small pub for a hot drink. A live band has just set up and start playing. The place is quiet but they are both very impressed by the band. Geoff drops a Hint at the location of the Bar. Jen joins in. They enjoy the atmosphere for an hour before heading home. By the time they are leaving 15 people have joined in on this hint and the place is much more lively.

2.5.3 Persona 3

Laura is 22. She is doing a Masters in History in Trinity and living at home in Drumcondra. Laura has 3 full days in college each week. She usually tries to spend the other 2 days in the library but finds herself easily distracted by the everyday hussle and bussle of town. Laura is not the most organised and so finds herself making last minute plans to meet old friends whenever she can find the time. She is always looking for new places to meet and enjoy time with her friends.

Laura, 22

2.5.3.1 Scenario 3

Its a monday, 2 weeks before christmas and Laura has spent the day in the library but desperately wants a break. Her friends Kate and Luke are in the library also, but are more focused on work than Laura as they have an important assignment due on Friday so Laura is having a hard time convincing them to leave for even an hour. She has been browsing through Hint on and off for the past hour and seeing areas getting busy around her has been driving her mad! Its now 8 o'clock and she spots a hint that has only started 10 minutes ago but 20 people have already joined in on it. Its called 'PopUp Cinema - Home Alone' and is located in Merrion Square. She tells Kate and Luke and has finally found something exciting enough to convince them to leave. They head straight down and arrive 10 minutes before its about to start. They enjoy the food stalls that have also set up beside it and all 3 join in on both Hints.

2.6 Aims and Objectives

This section defines and describes the aims and objectives for the project in terms of user needs. It attempts to show why potential users would use the app. It draws from all we have learned from surveys, testing and creating user scenarios from our personas. They are the key functionalities and experiences that our users identified as important to them.

A) Clear, minimal user interactions.
We aim to provide a quick and easy interface that will allow users to add and browse information about locations while on the go. The information will be presented in a clear and coherent manner to reflect the context of when and how it will be used.

B) Define a venue/ location
Provide sufficient options to allow a user to drop a Hint to describe what's happening. This process should be simple, creating a lightweight interaction between the user and the information provided.

C) Provide Useful Information
Our aim is to give users the information that will be valuable in helping them to make an informed decision on where to go or what to do. This will consist of location, popularity, average age, and time.

D) Realtime
We must deliver information to the user that is up to date on what is happening now. This will create an ever changing view of the city as each location marker will expire after a period of time, starting fresh each day.

E) Filter/Customise
Provide the ability to customize the map to suit the each users interests at the time making it unique to both their location and needs.

F) Privacy
We will provide a system that will allow user to post privately knowing that their location will not be available for others to see unless they wish to share it.

2.7 Critical Success Factors

The Critical Success Factors are the key functionalities that must be achieved to complete a functional and successful project. It is essential that these elements be achieved in order to meet our project goals. The Critical Success Factors are listed in the Table below.

REF	DESCRIPTION
CSF – 01	Obtain and utilise users current location
CSF – 02	Display User Generated Information
CSF – 03	Visualise on a Map/List
CSF – 04	Fully Functional Naviation and Easy to Use
CSF – 05	Function without Errors
CSF – 06	Login and Logout

2.8 Conclusion

This chapter analysed the needs of the user for this project. It began by identifying the user needs. This outlined the concept overview, summarised the anticipated user profile and their needs and described the affordances of the proposed device, the iPhone 5s. The user profile of a 'typical Hint user' has remained largely unchanged throughout the development process, but the development and research phase did narrow down the use cases attached to each user type, which was outlined in Section 2.5.

The identification of user needs allowed us to define the project requirements, both design and functional which will be outlined in Section 4 following the Background Research. These were validated in the above sections. This confirmed the user needs and allowed for the definition of the CSF (Critical Success Factors), which are the requirements of the app on order to satisfy the user. The user needs were refined considerably during this phase. While the original general app concept was received positively during user needs validation, comments from testers assisted in defining what was most important to them, aiding us in refining our app concept. The user needs validation led to the development of three user personas with sample scenarios. These helped us define the main use cases to focus on in the development stage. The following chapter will build on the information gathered in this section by detailing an analysis of background research undertaken.

3

Background Research

3.1 Introduction

To create a successful app, research needs to be carried out into the current app landscape. Through this the strengths and failings can be assessed to help find a unique way to present our solution. This section details the background research that was carried out. It will discuss and analyse Hint competitors, technologies employed and draw conclusions from our findings. It will outline the current state of the art.

Keeping in mind what our competitors have done and, more importantly, what they have done badly or omitted, a list of design requirements will be drawn up for this project, which will be outlined in Chapter 4.

3.2 Competitor Analysis

In this section a thorough examination of our competitors will be undertaken. The majority of social location based apps are ultimately more review based. They lack any real time feedback that could give a user up to date information about where to go or what to do. Hint aims to give this real time information, through venues defined by users showing location name, people joined, the type of venue and what's happening there. We want this information to help aid users in making a more informed decision on where to go with information that is current.

Our closest competitor was Swarmly, however during the development stage of the project a new app created for the Web Summit came to light called Hopr. Both of these apps will be reviewed and the findings will be discussed below. The competitors are broken down into the following sections; Brief Description, Positive Comments, Issues and Evaluation

3.2.1 Swarmly

“Swarmly helps you find your friends, see where people are hanging out - discover popular areas, events, bars, restaurants, venues and people nearby, right now. Find out where all the action is on a beautiful real-time, interactive map. Think of us as your social sat nav.” (iTunes AppStore).

3.2.1.1 Positive Comments

Swarmly are a startup from Glasgow who have received a lot of great feedback about their concept within the industry however they are having trouble finding users. They have made great improvements to their interface over the last few months however there is still room for improvement as their mission statement is not clearly reflected within the app. Initially, they had a basic but complete feature set, but throughout our development process they have been gradually getting more complex, only recently adding a friends feature which connects with facebook. However this feature still needs some refinement. The map based app makes navigation clear as it is centered on locations of interest to you.

3.2.1.2 Issues

- The uses of this app are very broad and therefore it has no real value so far. They have no clear target audience and the few ‘Swarms’ that are displayed are of no use. There is an overload of information with ‘stats’, ‘tags’, ‘buzz’, and ‘offers’ available for each swarm, leaving you confused.
- There are a lot of steps involved for the user to add themselves to a ‘swarm’ or create a ‘buzz’, which makes you reluctant to use it.
- Their use of the bee theme has negatively impacted the usability of the app making simple privacy setting and icons unclear in their meaning.
- The map visuals are very harsh, with blue, green and red used as a rating system.
- Swarmly also tracks the locations activity for 20 days, which dilutes the concept of finding places busy right now.

- It is hard to believe the information displayed about each buzz is accurate as any swams visibly while we have used the app have had an average age of either 65 or 45 which seems highly unlikely.
- The location privacy policy is not clearly defined. Small logos appear on the map which are what only can described as individual user locations. This is quite daunting as there is no way to know if your location is being shared.

3.2.1.3 Discussion & Evaluation

By analysing where Swarmlys downfalls are we aim to learn from this and not make the same mistakes. We aim to initially focus our app at a younger audience as (outlined in Section 2.2.3) and tailor its content and use to the need of these users. By limiting the amount of data the user has to enter and making it a very clear and quick process we would hope to attract more users.

By reducing the input options and scope of the check-ins we aim to retrieve more focused data, which can be easily visualised and interpreted by our users. We envisage showing only the immediate crowd at a location over a few hours and not extending it over days as in Swarmly, which is quite deceiving. We aim to manipulate the data correctly so as we cannot be accountable to any errors in information.

3.2.2 Hopr

“Using your mood, your chosen activity, your location and your friends’ locations, Hopr finds the perfect place for you. Hopr also allows you to record and share what you are up to with your friends.” (blog.websummit.net) Hopr was chosen as the official Night Summit App.

3.2.2.1 Positive Comments

This app was release in conjunction with the Web Summit in November. As it is still in it"s early days it is difficult to review in comprehensively. The main positive observations are outlined below.

- The apps selections and navigation process is very clear, with quick and easy interactions using one main header for navigation.
- The opening screen is quite engaging, browsing by list as default.
- Their use of icons as a quick reference is generally quite clear.
- The information is ordered by distance, customising the users experience.
- The use of 3 colours to differentiate between emotions is clear and simple.
- Their sharing process is in keeping with the navigation of the app so is immediately clear and intuitive.

3.2.2.2 Issues

As the app is relatively new, there are some major faults in usability.

- Browsing by map is very buggy with minimal control and responsiveness.
- They have not designed for empty sections or missing photos and therefore the layout can look quite bare when elements are missing.
- It is compulsory to log in with Facebook or twitter to be able to share your experience.
- The UI is clear but aesthetically quite busy and can be a bit messy.
- Information displayed can be quite dated if not updated regularly. It was noted that one users shared most of the content within the app to date.

3.2.2.3 Discussion & Evaluation

Similar to Swarmly, there is an initial overload of information. However the majority of this information is useful, unlike Swarmly. Some slight revisions to the UI could increase the app usability. When designing or app we will aim to display the information in a clear and concise way. As our app is also user dependent we must allow for empty sections, as failing to do so can be quite confusing. Where information is dynamically loaded, we will account for all possibilities and try to unify the display as much as possibly as the changing displays can be unsettling.

On a more positive note, we will take inspiration from their navigational flow and connection between list and maps views. Their use of icons is quite clear and serve as a quick reference. The 3 colours chosen for the emotions also provide users with an immediate knowledge of the atmosphere of the venue at a quick glance, which is very clear and useful. We will refer back to these aspects when designing our icons and colour schemes.

3.2.3 Conclusion

While undertaking this research into our closest competitors we gained valuable information that has helped us throughout the planning and development stages of the project. As our project runs for 6 months it helped us gauge a realistic scope for our app and how best to achieve our goals in a short space of time. We narrowed down our focus and used this knowledge to help up define the area we wanted to innovate in.

As Swarmly and Hopr are both user driven, we are aware that this will be a major hurdle if we decide to pursue our app after completing the Masters requirements.

3.3 State of the Art (SOTA)

Further research was conducted into apps that incorporate map based information, social categorisation and generally pleasing UI Interactions. This research will guide us through our own social categorisation process and aid in the display of information through a map based state.

APP NAME	INFLUENCE
Soundwave	Crowdsourcing and info representation
Findery	Visual Display and clarity
PinDrop	Light animations and pleasant UI
Spotsetter	Icon Categorisation
Rise Alarm	Enjoyable Interactions

3.3.1 Soundwave

Soundwave is a simple way to chat and share your music with friends. Create private groups to chat and share your music with friends and followers.

3.3.1.1 Positive Comments

Crowdsourcing music interest could be a heavy task but they have handled the information in a very clear way. You can follow or friend people and through this you can see all the different music being played. Throughout our research into this app they have evolved and changed the functionality of the app. Initially they had pulled the music from locations, from either nearest you or an area of choice and could be random users. They now pull music from time played and can only see from your friends. They have narrowed in on the solution they want to provide to users and this comes across through the overall feel of the app.

3.3.1.2 Discussion

Soundwavw are crowdsourcing music information and then representing this information and feedback in a clear and concise manner. There is a huge scope of possibilities available for an app like this but they kept a clear direction. We can take some inspiration from a process like this in that the social landscape is has many possible directions but we need to stick to our clear definition.

3.3.2 Findery

Findery is the treasure map of your life. From local lore to travel stories, learn more about your favorite places and the places that are next on your list, near or far. Leave notes around the world about the places you'll never forget and the places your friends shouldn't miss. Find new places through the experiences of others, their local tips, little-known facts, lost histories and hidden treasures.

3.3.2.1 Positive Comments

Findery has created a beautiful mix of exploration and storytelling. You can feel the authenticity of each note and that each location holds real significance to the person writing about them. This will influence its users to continue that standard of input. They have two clear use cases for viewing the notes. One is to view what is around you on the go, and is listed from your location. The other is to view a destination you may be traveling to. The two use cases are clearly separate this is understood through providing the option on opening.

3.3.2.2 Discussion

Findery separates its two viewing use cases clearly so the user know what state they currently in. All the functionality in hint will be driven from one man page so we need to clearly show the user where they are and direct them in an intuitive manner with visual cues.

3.3.3 Pindrop

Pin Drop is a location bookmarking utility. If you spot a place you want to remember and selectively share you can you Pin Drop to slowly build up your own collection of places and memories. When you drop a pin on a location you can tag it (group your pins), add a description, set privacy levels, add photos and set geo alert features.

3.3.3.1 Positive Comments

This app allows the users so much specification for each pin. A great tool for setting personal reminders of places visited around a city. It has a great overall feel and a lot of thought has been put into every journey the user may take through the app. They have incorporated small light animations as information boxes open and close and has great feedback when any function is selected.

3.3.3.2 Discussion

The light animations give this app a really finished and pleasurable feel. The feedback mentioned lets you the user understand every action completed. The drawback to this app is that it is very text heavy. Every input and information window is completely dominated with text. It could have taken more emphasis away from text and become more visual with icons or imagery.

3.3.4 Spotsetter

Spotsetter is a social search engine that makes personalized recommendations for places to visit and things to try. It pulls information from social media sites and review sites then displays this information to the user.

3.3.4.1 Positive Comments

This app handles a huge amount of data but it UX is kept very simple. They have developed an array of simple icons to display social categories, which are really easy to understand.

3.3.4.2 Discussion

Spotsetter has categorised their social locations in a way that is easy for the user to find what they are looking for. The use of icon representation has made for an enjoyable navigation and means that there is a nice balance of information being display through visuals and text. These are considerations that need to be made when developing hint

3.3.5 Rise Alarm Clock

“Rise is a simple alarm clock with a lot of smart features. With its refreshing and clever way to set time, Rise is one of the easiest alarm clocks you’ll ever use.”

3.3.5.1 Positive Comments

We reviewed Rise Alarm Clock as its simplicity and use of a gesture-based interface makes it stand out from your typical alarm clock and made it enjoyable to use. By cutting out the unnecessary features and stripping it down to the basics they developed a beautiful app. Their more advanced features were seamlessly incorporated without providing excessive navigation, which is what we aim to achieve in our design. The use of colour to aid the time differences is beautiful.

3.3.5.2 Conclusion

By studying the interactions and animations in Rise, we were able to get a feel the optimum speed and complexity desired. This app is very simple yet extremely enjoyable to use due to the paired back approach taken. We want to reflect the limited navigation options in our app, striping the functionality down to what is absolutely necessary.

3.3.6 Conclusion

From reviewing the above apps we have taken away a lot of valuable information.

Main points to consider:

- Only included features that are absolutely necessary.
- Feedback
- Social categorisation
- Display of information - visual and text based

As all the above apps are developed by huge team they had the ability to include any feature they wanted. However by limiting the features to what was necessary and displaying more complex features behind the scenes, the usability of the apps greatly increased.

Immediate feedback within social apps is a vital aspect to achieve to be successful. It will go unnoticed when an app has good feedback as every step is clear, but when there is no feedback the user feels lost. This will be taken into consideration when creating our user journeys as it is necessary want to give guidance to the user and reinforce any action used.

Social categorisation can be a broad area, especially if you don't fully understand what your users are looking for. We have seen it being used successfully (Spottsetter) within a few of the apps, some better than others. It seems that the depth and detail will bring the categories to life. The more the user can understand about a location or category the more they will be connected with it. Not just explaining 'the where' but 'the why' is important to the user.

The use of icons and imagery is so important when displaying information. Throughout these apps we have seen many different ways of displaying information to the user and a mixture of imagery or icons with text seems to work the best. The mixture between the two gives good balance and creates a hierarchy between the information displayed.

3.4 Social Categorisation Research

Our app will be focusing on the social landscape, pinpointing locations and providing insight and information for users to make decisions on where to go or what to do. For this reason social categories need to be defined with our app.

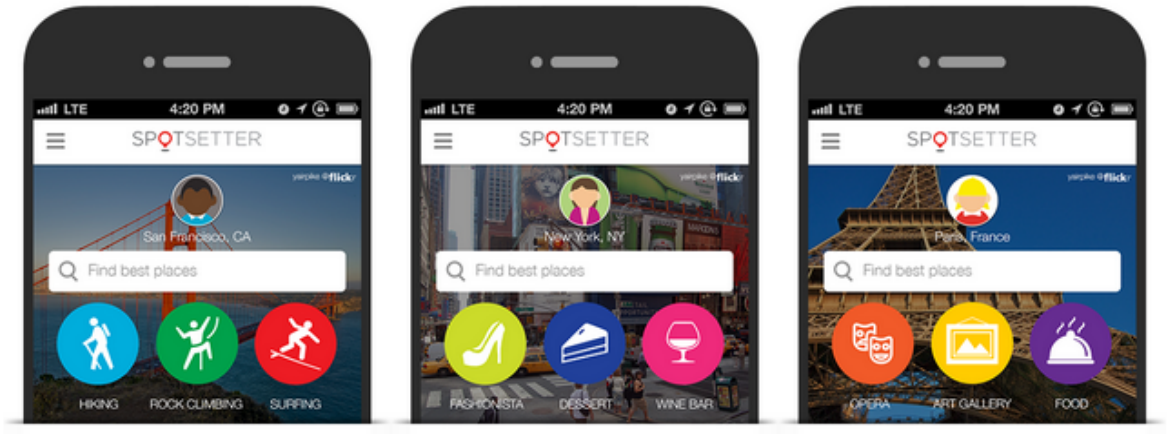


Figure 1: Screenshot from Spotsetter app outlined above depicting category icons.

It was found that most sites and books that reference social categories usually have broad headings with two sublevels of categorisation. This type of double reference gives that social category a more in depth title. An example of this could be arts and ballet or Food and Italian. With the age demographic for Hint ranging between 18-28, we will have to keep social categories current, responding to where the youth are currently socialising. But even with a close age demographic social hangouts can be completely different between groups. This can be due to age difference or professional stature and may need to be addressed within our app.

Time of day is a very important aspect to consider when describing what social categories would be appropriate. With day time social categories revolving around more relaxed social settings and evening/night categories adopting the more exciting.

The definition of categories will define how our app will be understood. Users will need to connect with whatever category structure employed as it will be used to read and describe all the locations within our app. By analysing websites and apps using this method we have gained valuable information and guidance.

3.5 Technologies

This section will give a brief overview of the various technologies involved within and associated with the project. They have been decided upon after researching effective technologies and methods available.

3.5.1 Platform

Hint is designed for the Apple iPhone 5s. The main specifications are as follows:

- 640 x 1136 pixel screen at ~326 ppi pixel density.
- Wifi
- Mobile data
- GPS

The app has been also tested and worked on the iPhone 5, 5c, 4 and 4s with slight design discrepancies arising when using the app on the smaller screen size.

The iPhone was chosen because of the difficulties of dealing with all the various screen sizes and varying performance levels of the vast array of Android devices. Also the iPhone is becoming increasingly popular with the 5s being a particularly popular model. All team members and lecturing staff own this model.

3.5.2 Software

The front end was developed using HTML, Javascript, JQuery, JQueryMobile and CSS. The back end was created using PHP, mySQL which was stored on a blacknight database. All data was returned in Json format. The hardware on the phone was accessed using Cordova which worked with XCode to package up the files into an IPA. On a daily basis we used Netbeans 8.0.1.

3.6.3 Distribution

For everyday usage, Chrome browser with Ripple was used which is a multi-platform mobile environment emulator that is custom-tailored to mobile HTML5 application development and testing. It also allowed us to view the application in any screen size and resolution while still allowing us to use existing tools to perform Javascript debugging.

When a quick build was required to check for bugs etc, Xcode/Cordova was used. Using this method a build could be easily transferred to the device.

For more advances and widespread distribution, Testflight was used. Testflight allows for mass distribution of beta versions of apps for developers to allow them to test on a large scale. It does require an apple developer account, however. This method was used when sending versions of our app to Supervisors, Lecturers and testers.

3.5.4 Promotion

Hint is promoted on various social media platforms.

Facebook: www.facebook.com/hintappteam?ref=bookmarks
Tumblr: www.get-the-hint.tumblr.com/
Website: www.hintapp.eu

These technologies are used to spread the word about Hint and attempt to build not just a following but a place to find willing testers. They are discussed in more detail in Section 7.2.

3.5.5 Research

Survey Monkey and Google forms were used throughout the project to undertake market research and target testers throughout the project via email and facebook, to gain feedback and comments from out potential users.

3.6 Conclusion

This section discussed the research that has been completed to help inform us on how best to create our app. The competitor's strengths and weakness have been assessed and will be used to define our functional and design requirements which will be outlined in the next Chapter. The current state of the art has been addressed and the research will allow us to make informed decisions when building the Hint app. It has given us a frame of reference when choosing what functionality to include. The technologies used have also been stated, which were chosen before beginning the development process.

4

Definition of Project Requirements

4.1 Introduction

This section gives a definition of the Design and Functional Requirements for Hint. They have been derived from critiquing what we learned from the previous two sections, User Needs Analysis and Background Research.

Based on feedback from users and research, the overview of the app requirements has gone through many iterations since the beginning of the project. This section will outline the final project requirements definition. It begins with a high level overview of the app, describing the standard functional requirement of the design. The main use cases, which have been derived from our personas and user scenarios in Section 2.5, will then be described followed by a breakdown of elements required. This section will conclude with a definition of the Minimum Viable Product specifications.

4.2 High Level Overview

This section will overview the basic functional requirements and user path through the app and is followed by a diagram to illustrate this overview. (Figure 2)

The user will open the app and swipe through a basic introduction about the app. They will then be required to Register/Login. On successfully doing so they will be presented with the main navigation screen displaying information about the Hints on both map and list. The user can select a Hint on the map or list to view more information about this Hint. Additional functionality accessible from this page are:

- The user can drop a new Hint.
- Join a Hint they are nearby or Watch a Hint for later so they can be joined automatically on arrival.
- Filter the map to suit their needs at that moment.
- View their personal profile.
- Logout

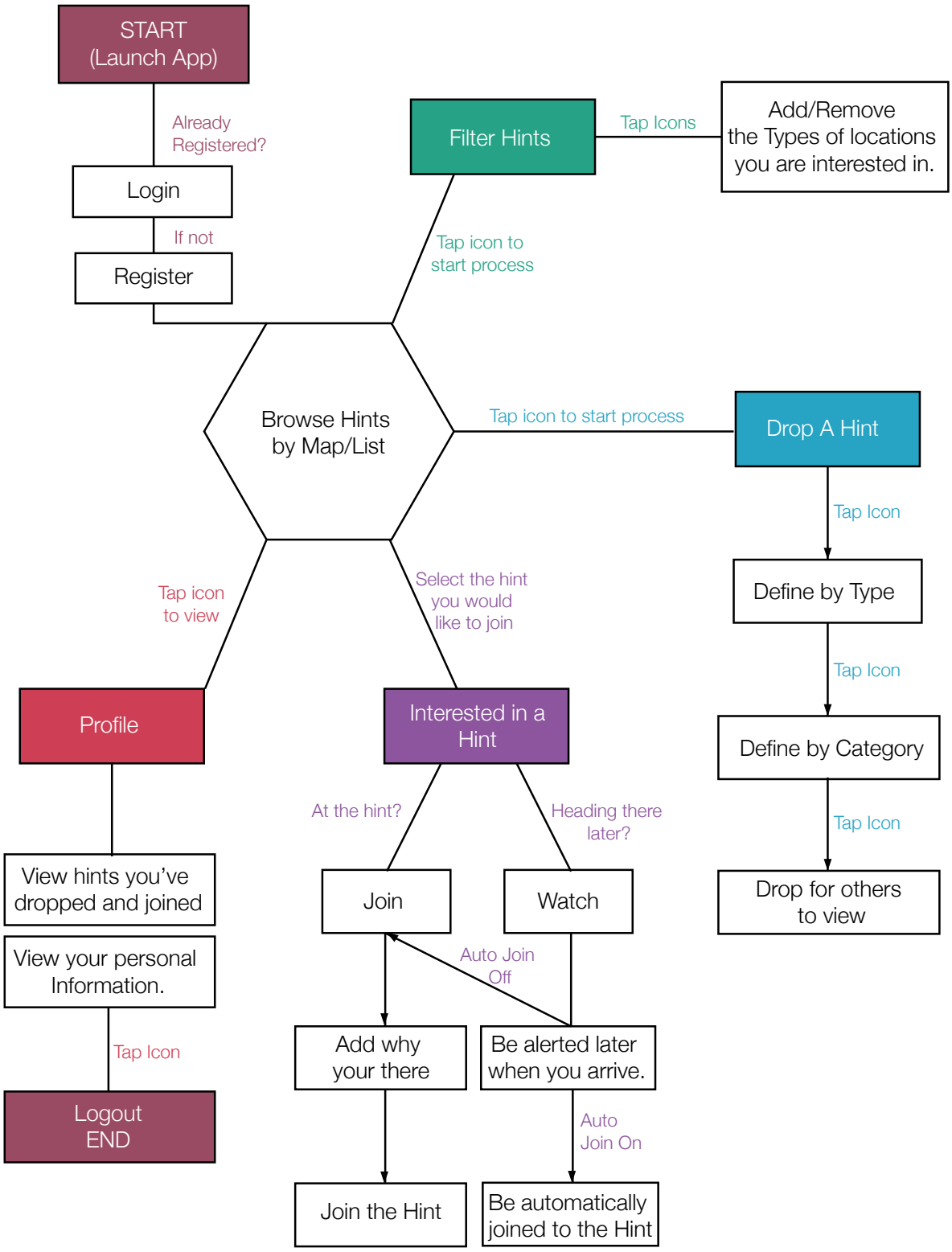


Figure 2: High level overview diagram outlining the main features and flow withing the app. The main features will be detailed in the sections below.

4.3 Design Overview

The design overview describes the use cases and basic system flow diagrams of the app. They are built around the needs of the three personas established in Section 2.5 of the previous Chapter. The 3 main use cases a user will undertake while using the app are outlined below. They are followed by alternative flows where necessary, which are the main additional uses that can be undertaken by a user.

All the following use cases are assuming the user has Registered and Logged In. See Table below for basic interactions and functionality.

STEP	USER ACTIVITY	SYSTEM RESPONSIBILITY
Launch App	Tap Icon to Launch App	Launch App and display Intro.
Introduction	Swipe through Intro Pages	Display each Intro Screen
Login/Register	User taps register if new to app. Otherwise uses credentials to Login.	Validate and save user details to database. Login User.

4.3.1 Use Case 1: Browsing

Scenario 1: Jane (See Section 2.5.1) browses the app before leaving for town with her friends. Her intention is to find a popular destination to go to with her friends.

STEP	USER ACTIVITY	SYSTEM RESPONSIBILITY
Launch App	Tap Icon to Launch App	Launch App and display Main Page.
Browse Hints on Page	Browse by Map/List	Display hints and corresponding Information.
Filter	Taps Filter Icon	Displays Filter Icons
Filter	Customises Map by choosing specific types.	Options saved to Local Storage
Browse	Taps screen to apply filters	Filters Map/List to only display filter options.
View Information about a Hint	Tap specific map marker	Display information card with relevant information

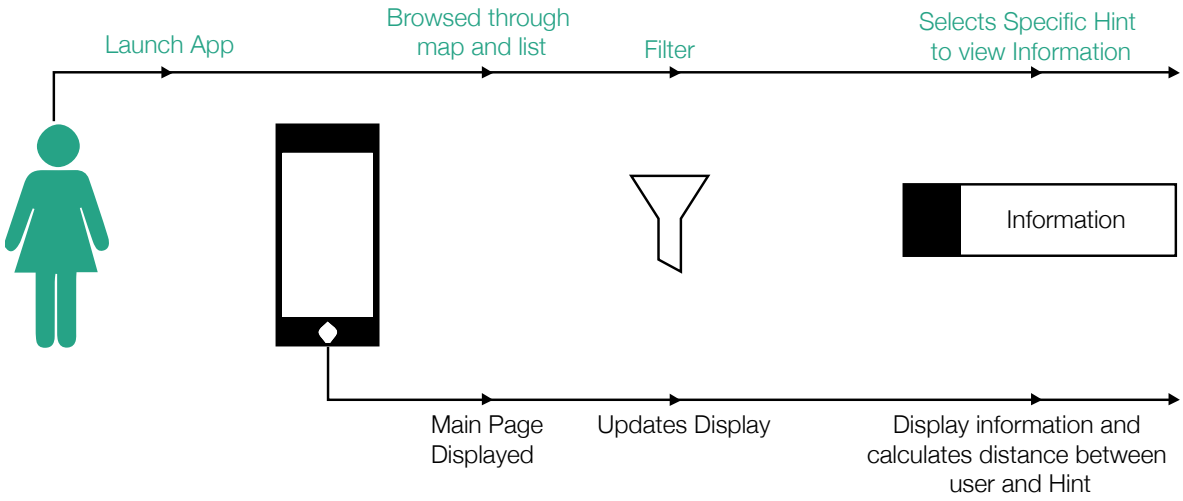


Figure 3: Users and system flow diagram for the Browsing use case, which includes filtering.

4.3.2 Use Case 2: Dropping a hint

Scenario 2: Geoff (See Section 2.5.2) drops a Hint to let people know about the live band playing in a small pub.

STEP	USER ACTIVITY	SYSTEM RESPONSIBILITY
Launch App	Tap Icon to Launch App	Launch App and display Main Page.
Drop a Hint	User Taps Icon	Displays venue Input and suggested Locations.
	User Inputs Location Name	Type Icons Appear
	User Selects desired Icon	Category Icons Appear
	User Selects desired Icon	Tick Appears
	User Drops Hint	Data gathered, validated and saved to database.
Views Hint	User selects Map marker	Displays information about selected Hint.

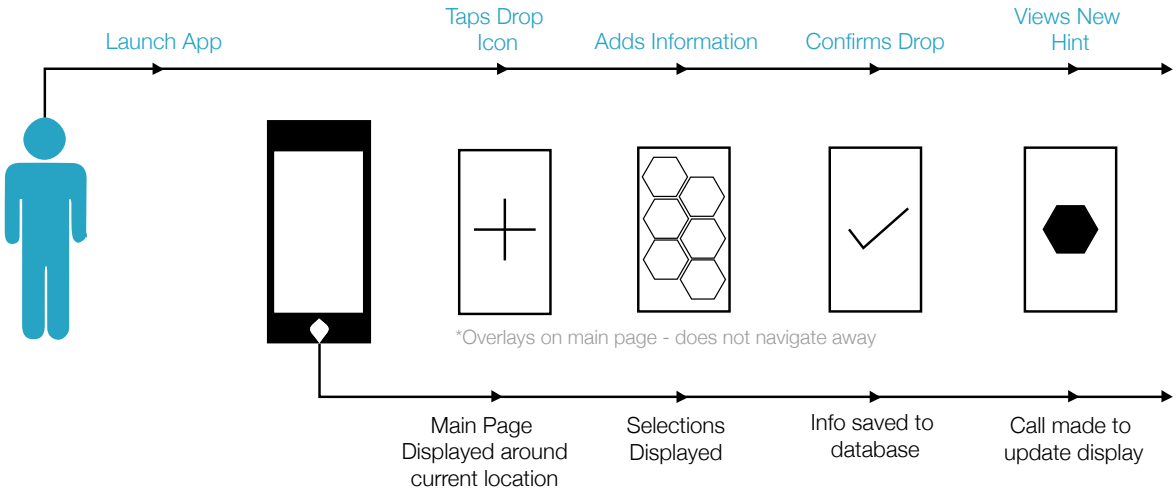


Figure 4: Users and system flow diagram for dropping a hint.

4.3.3 Use Case 3: Joining a hint

Scenario 3: Laura (See Section 2.5.3) and her 2 friends join in on the Hint for the Pop up cinema.

STEP	USER ACTIVITY	SYSTEM RESPONSIBILITY
Launch App	Tap Icon to Launch App	Launch App and display Main Page.
Selects Hint	Taps on specific Hint	Displays information about selected Hint.
Join Hint	Swipes left on Info Card	Checks distance from location - Displays Join Icon if at Location *SEE ALTERNATE USE CASE BELOW
	Taps on Join Icon	Displays category Icons
	User Taps desired Icon	Displays Tick Icon
	User Taps tick Icon	Data validated and saved to database.
Browse	User Views Icon Joined	Information updated. (Expired Hints removed)

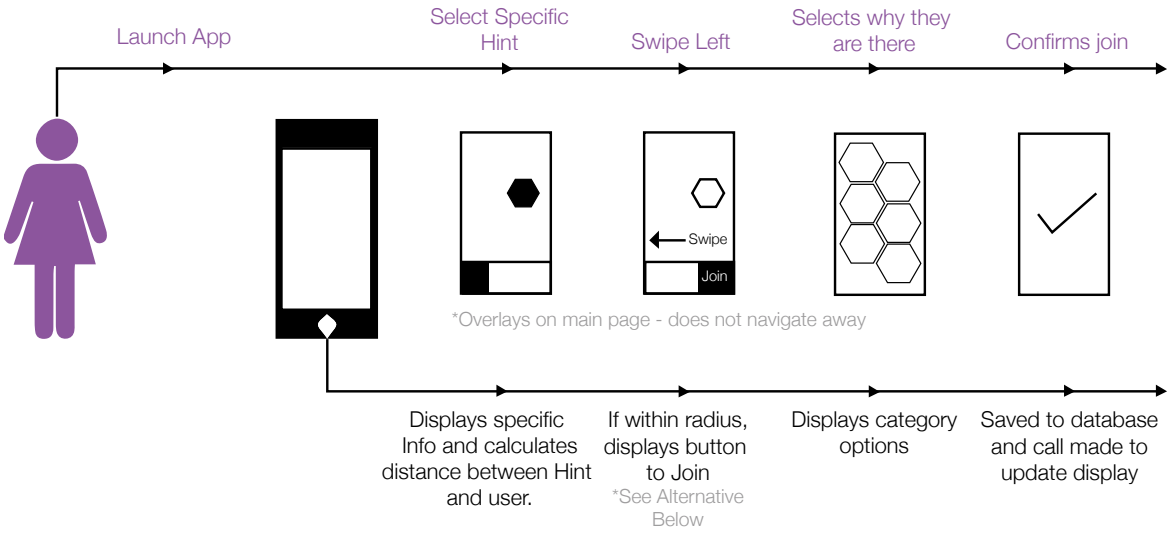


Figure 5: Users and system flow diagram for joining a hint

An alternative to joining is outlined below. This would occur when a user shows interest in a specific Hint by ‘watching’ it, but is not there yet. (As described in Scenario 1, Section 2.5.1)

STEP	USER ACTIVITY	SYSTEM RESPONSIBILITY
Watch Hint	Swipes left on Info Card	Checks distance from location - Displays Watch Icon
	Taps on Watch Icon	Hint saved to Watch List
View Watch List	Taps on Icon on Main Page	Watch list Displayed
	Keeps and eye on the Hint their interested in.	Ability to remove a hint from watch List
Close App	User closes/suspends app.	Background Location Updated initiated.
		Checks if user location is within a certain radius of any hints in the Watch List.
Join Hint	User arrives at hint location.	Notification sent to user. User joined to this Hint.

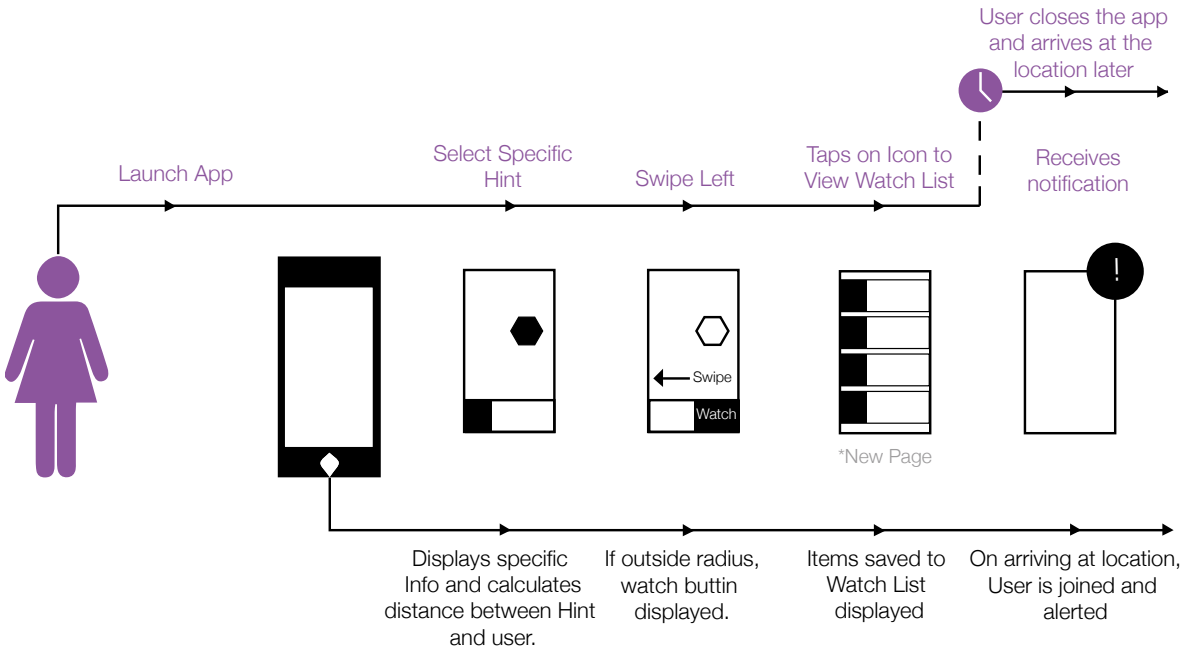


Figure 6: Users and system flow diagram for adding a hint to the watch list.

4.4 Functional Requirements

The functional requirements are the necessary features needed to fulfil the use case outlined above. These are summarised below.

NAME	DESCRIPTION
Register/Login	User details saved to database with ability to Login again
Logout	Ability to logout of App
View	Display user generated content on a map
View	Display user generated content in a list
Real time	Hints must be current with up to date information
Drop	Information saved to database appropriately
Join	Ability to join a hint and update user count and average age at that hint.
Filter	Customise Display depending on selected options.
Profile	View Hints Joined and Dropped.

The app must also be suitable for the target devices screen size and processing power, the iPhone 5s. Making the app suitable for other versions of the target device or other devices is entirely secondary to successfully implementing on the target device.

4.5 Design Asset Requirements

The asset requirements are the elements needed to create an app which which will fulfil the functional requirements as set out in the previous section. These are outlined in the table below.

NAME	DESCRIPTION
Type Icons	Icons to explain type of location
Category Icons	Icons to further define whats happening at the location
Navigation Icons	Clear and visually appealing

Map Marker Icons	Provide connection with venue type/popularity
Styled Map	Suit stype of app
Styled List	Provide a connection with corresponding Hints
Animations	Enhance usability
Feedback	Enhance usability
Placeholders	As info is user dependant, needed to fill empty sections
Introduction	Provide a brief introduction to what the app is about and its features

4.6 Suitability for target audience

From the research undertaken in Chapter 2 we defined our target users. From this, we have concluded that our app must:

- Be easy to use on the go.
- Be designed for those between the ages of 18 and 28.
- Have light interactions to aid its useability.

4.7 Minimum Viable Product (MVP) and MoSCoW

The minimum viable product is the the most pared down version of a product that can still be released. An MVP has three key characteristics:

- It has enough value that people are willing to use it initially
- It demonstrates enough future benefit to retain early adopters
- It provides a feedback loop to guide future development

(Cory Janssen, 2014)

The table in Figure below shows describes the MVP for this project. This does not include all functionality, but rather the basic functionality necessary to get a version deployed to users for testing prior to further development.

REF	DESCRIPTION
MVP - 01	Clear and Simple Navigation
MVP – 02	Ability to Drop a Hint with information stored to an external database
MVP – 03	Display Hints on a Map from information in database
MVP – 04	Access information about each Hint
MVP - 05	Retrieve Users Location

Additional functionalities, as detailed below, are desirable but not required for the MVP for the initial test builds, as it is possible to access the basic functionality of the app without these extras. After initial testing and feedback, the extra functionality as defined below as our ‘shoulds’, ‘coulds’ and ‘woulds’, will be added based on feedback.

REF	NAME
Must – 01	Create a Hint
Must – 02	Display Hints
Must - 03	User stays Anonymous
Should - 01	Join a Hint
Should - 02	Filter Hints by Type
Should - 03	Automatic Checkin on arrival
Could - 01	Notifications to alert auto checkin
Could - 02	Contextual Icon Change
Could - 03	Add friends to view their activity
Would - 01	Follow curators
Would - 02	Directions to Location

4.8 Conclusion

In this section we defined the product requirements for the project. It began by giving a high level overview of the functional requirements of the users journey through the app. This was followed by a use cases created from the real life scenarios, created from our research in Section 2.5, allowed us to define a list of functional and design asset requirements. The Minimum Viable Product was then defined with a outline of our MoSCoW in order of importance.

By defining the above before starting into the development phase, it allowed us to create a prioritised content and coding plan, and overall project schedule. By doing so, if a specific feature was taking too long we knew we would have to continue on and revisit it later so as to get the basic application features outlined in the Chapter completed.

The following 2 Chapters will detail the development process undertaken to complete these requirements.

5

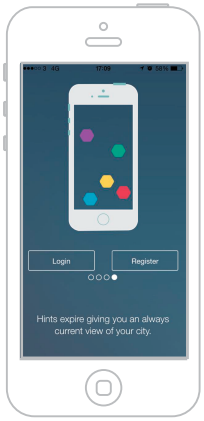
Design Methodology and Approach

5.1 Design introduction

In this section we will guide you through our design process and show you how our app was brought from prototype to final piece. A lean testing methodology was used throughout this process keeping our users central to each design decision. The goal was to build a simple and functional UI with thoughtful UX decisions that would address users needs.

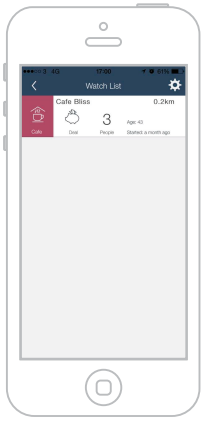
When creating this app the focus was to deliver a clean and clear way for users to view and input information on locations. This meant making considerations for large amounts of varying information. Where possible visual representations should be used with text kept as supplementary.

The diagram below outlines the content that will be discussed in this Section. It can be used as a guide as to where each section discussed is in relation to the app as a whole. The overall branding and visual direction for the app is first discussed. This is followed by the apps navigation and experience design. The visuals and graphics will then be detailed.



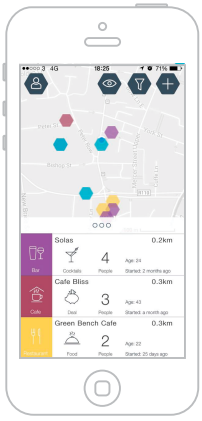
Intro Pages

Content Discussed:
Introduction
Login/Registration



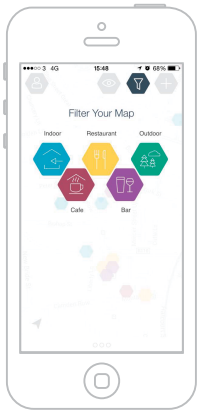
Watchlist Page

Content Discussed:
Watchlist function
Infocards
Auto-Join Setting
Placeholders



Map Page

Content Discussed:
Markers
Listview
Information Cards
Map Visual
Icons
Button Navigation/ Layout
Feedback

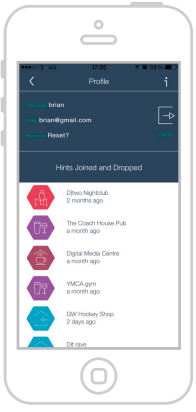


Filter Overlay

Content Discussed:
Filter Development
Animation

Drop Overlay

Content Discussed:
Drop Function
Icons
Colour
User Journey
Feedback



Profile Page

Content Discussed:
User Information
Hints Joined/Dropped
Feedback

Figure 7: Content to be discussed in relation to the final app displays.

5.2 Visual Identity

5.2.1 Branding

The branding was developed to be used throughout our marketing and app. This would tie all pieces of media together and give the app recognition amongst users. A visual signature needed to be created that users could relate to.

This signature came through the form of a hexagon. This shape is used throughout the natural and man-made world for space saving. It is one of the most economical shapes when pieced together as no space is wasted. This theory represents our need to utilise the mobile screen real estate as we navigate and display information. The initial need for the hexagon came about when we were designing the interaction for dropping a hint (described in detail below). By using primary and secondary icon types, the need for alternating route was immediately obvious. We felt this shape was most suitable for our needs as it's intertwining nature reflected this dynamic sequence and process. The hexagon is used throughout our branding and app.

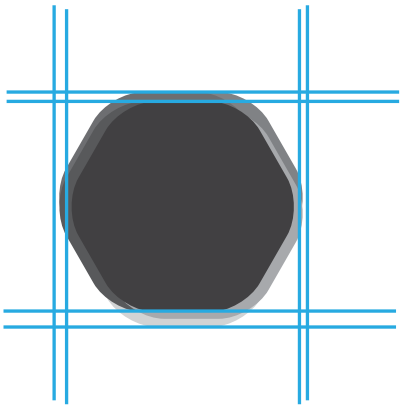
The user demographic outlined for hint ranges from 18 to 28, focusing on young, social media active users. A tone and style was used that would appeal to this generation of users and connect with them. This can be seen throughout our app in the form of placeholders, feedback and selection options.

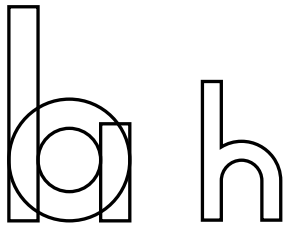
5.2.2 Logo

The hexagonal design mentioned above would be the main visual concept for our logo. It needed to be a striking shape that could be recognisable large or small, to fit both app icon and in app imagery. The logo concepts revolved around the representation of hints, with colour linking to location types. As the logo developed the colour became more of a subtlety and the strength of the hexagon came to the forefront (see colour scheme). The "h" within the logo was developed to have the same line weight throughout. The majority of fonts have varying line weights for crossbars on the letter h. This can weaken its impact when scaled down. The "h" was to be the focal point of the logo with an off center position. The font chosen for any supplementary text with the logo is Helvetica-Neue. It is a lightweight simple font that has a modern feel. It is used through the app as the font of choice.

Initial Concepts

Concept Development





Letter Construction

Final Branding

Fonts - light/medium

Helvetica-Neue

Helvetica-Neue

Hints Colour Swatch

Figure 8: Development of the App icon

5.2.3 Social Media and Website

Our brand identity was put across three major social media sites, facebook, Tumblr and a website was developed. Each social platform needed slight design tweaks so that the logo and brand would be represented properly. These platforms were created to communicate with our users and testers so they needed a strong visual connection to our brand.

5.2.4 Terminology

Hint app has specific terminology that can be used to describe the different actions or function used. This terminology can be seen within the app and it helps the users to know what action they are performing.

- A hint is the name given to the piece of information left on the map to be viewed.
- Drop a hint is the term used when adding a hint to the map
- To join a hint the user adds themselves to a specific hint they are currently at. They are added to the number in the hint
- Watch a hint is the term used when adding a hint to the watch list. It is then saved to watch at a later time.

5.3 App Design

5.3.1 Navigation

Hint is a social information app that revolves around mapped locations. Our initial requirements was used to form different concepts for page layouts. Paper prototypes were created to test these wireframes to understand how users might explore Hint's functionality. The paper prototypes allowed us to test users on a very basic interaction level (See Chapter 8, Section 8.2). They could not be swayed by colour or style, just pure concept of navigation.

From the initial paper prototype testing (see Chapter 8, Section 8.2), interactions were limited to a maximum of two pages deep. This was to keep users close to the main functions of the app and allow for faster flow. The wire frames were now digitised through prototyping

software which gave us the capability to guide users with graphic and styles (See Chapter 8, Section 8.6).

Further testing lead towards broadening the main page use case. The user could now switch between a list view and full map. The list view gave a quick, more expansive view of information, resulting in a faster browsing experience. While the full map gave a casual browsing experience, the user could pick and choose what to view. These will be discussed later in the List view and Information card section (5.3.6).

The drop hint and filter functions were both user selections that directly altered the map page landscape, for this reason they were designed as overlays on the map page. This would reinforce the connection between the function or action and the map itself. The drop hint and filter were both designed as overlays. This made for a quick navigation to and from these overlays. (See section 5.3.4 and 5.3.5 for more)

The Final navigation, as detail below, and shows the users journey through the application. More detail can be found in the following sections to do with internal navigation within each function.

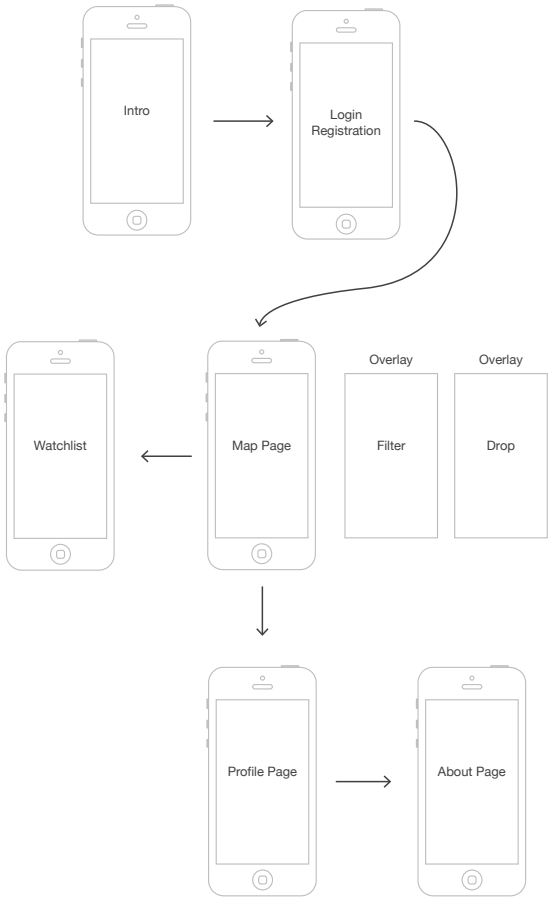


Figure 9: High Level Navigation Overview

5.3.2 Map

The map was the first piece of functionality employed in the navigation and we began our design process using this as the core page. From the outset the map was designed to be a backdrop, the main focus of the page was to be the markers. They represent the hint location and information so the map needed to be subtle enough to allow the markers to take the visual foreground.

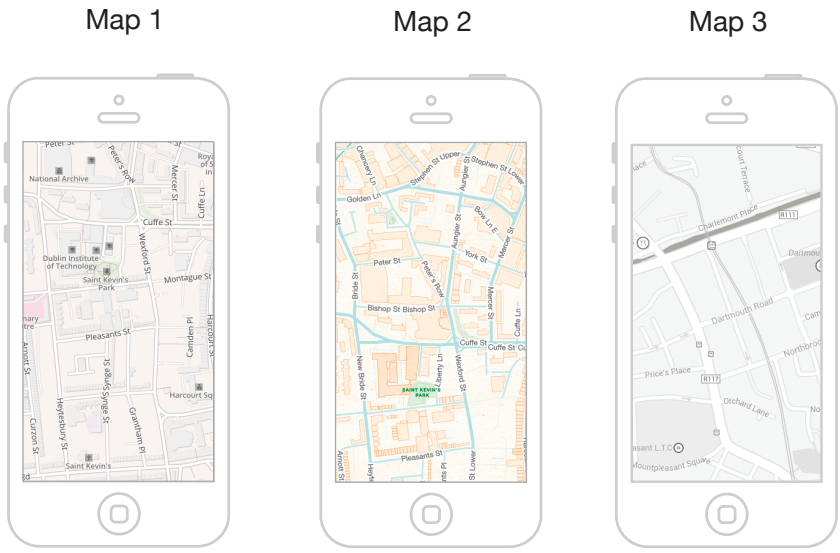


Figure 10: 3 of the possible map display themes.

The initial maps designed were based with warm greys and had some colour tones through them but after testing the colour were sidelined. A map was created using tones of grey to represent features on the map and the contrast in tone highlighted these feature. This Took many iteration to find the right balance. The contrast between these tones had to be enough to make the map functional but not so much so that they would detract from the information being displayed. Different contrasts were tested to see which users would respond best to.

The final solution (Map 3 in Figure 10 above) struck a good balance between shades and allowed the user to navigate the map and markers, zoom in and out with a clean aesthetic.

5.3.3 Button Layout

The button layout changed many times in the process to finding our final solution. This was due to changes to page layout and functionality. Developing through each build, our functionality was extended which would lead to layout reviews. This process was reinforced with testing prototypes (see Chapter 8, Section 8.3).

Through this testing we wanted to find the optimal position for the buttons functionality while not detracting from the active use areas on the map. The corner points of the screen were chosen as areas most familiar to the user for button layout.

Button Layout Designs

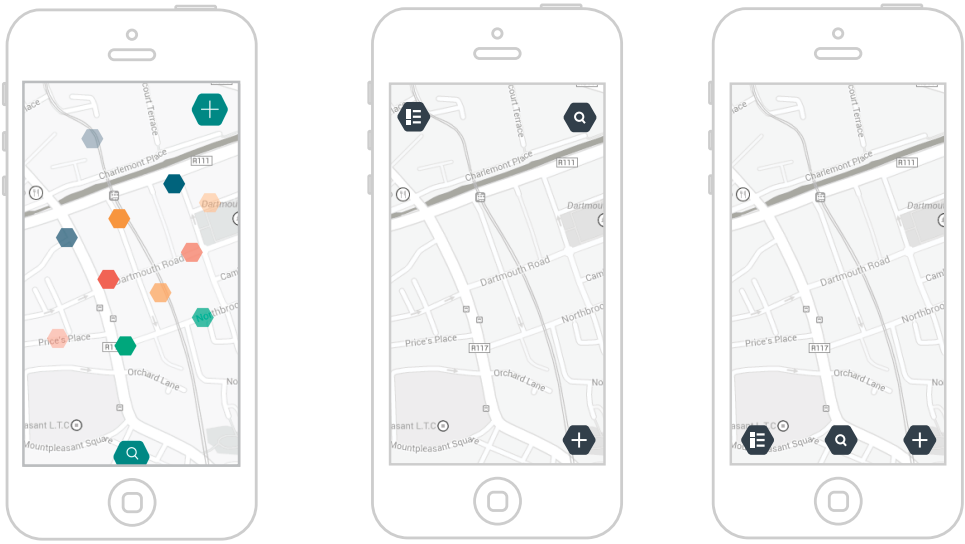


Figure 11: Development of Button configurations.

As changes were made to the possible ways of viewing hint information the buttons needed further consideration. With the implementation of a list view, which expanded from the bottom of the screen, the buttons needed to adapt to the screen space to stay in view. The current button layout was at the bottom and buttons would be hidden behind this list view. Two button layouts were tested for the list view, one with the buttons configured at the top of the screen and the other allowing the buttons to animate with the list view as it opened and closed. Users preferred the top layout as it was a simple solution that kept all the buttons in one area.

Once the buttons were placed, the order in which they appeared on the screen had to be arranged. They were given an hierarchy so that they would be ordered in a useful way to the user. In this top line, three buttons were placed to the users right and one on the left. This separation was to show the user that a significant difference between the button usage. The three buttons on the right are used to drop/ filter and watch hints, which directly relate to hints while the one on the left deals with the users profile. The final button layout creates a hub of active button at the top of the screen keeping the most map page interaction to that location.

Figure 12: Final Layout and placement on navigational buttons.

5.3.4 Drop a hint

The ‘drop’ is a lightweight interaction that was designed to be used on the go. It allows users to define the location they are currently at for others to view and join. Due to this function being used in social situations it was created as an easy and fast way for people to share where they are and what they’re up to.

A process was designed so that users could input information about their chosen venue in a minimum number of steps, and do so in a thoughtful and enjoyable way. Initially a series of button were developed for users to select and running through different input patterns. This process was about creating the users input journey to dropping a hint. These selections were designed to be visual representations with the use of icons.

Initial Drop Design

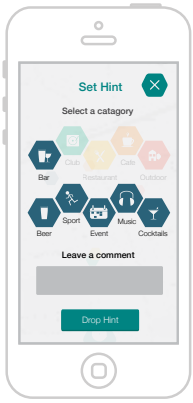


Figure 13: Inital Drop Design. Revisions made to simplify the display.

After testing the initial drop icon we explored the options offered to the user (see Chapter 8, Section 8.3). We wanted to provide a more in-depth set of selections, including naming a hint or location. Hints would have more weight in aiding a user's decision on where to go. This meant re structuring the selection landscape and making alterations for an input area. The user now selects the location they want to define, states what it is and what they are doing there.

Each piece of information shows, hides or animates for a reason. This is to guide the user through the process. They move and animated to guide the eye and save space. They show and hide to grab attention or be left unseen. The journey of the user through this process had to be quick and easy, we wanted to design a natural flow down the page. The final design begins at the top and finished at the bottom. Information is only shown as needed and then

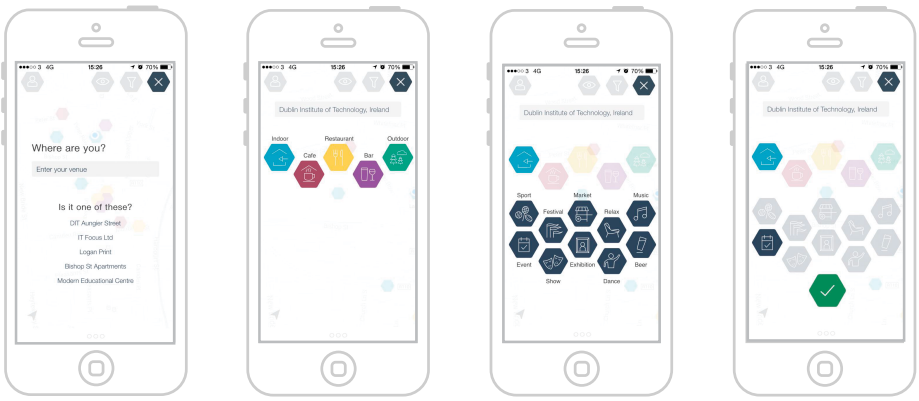


Figure 14: Final Drop Interaction.

when selections are made the past information fades.

5.3.5 Filter

The filter allows the user to select and deselect specific types of locations to give a more custom view while browsing. It is directly connected to the display of markers and information on the map and for this reason we wanted to keep the map visible while displaying this function.

The initial concept for the filters was to animate from the right hand side, with a gradient behind. The filter options would begin off screen and animate onscreen when the user selects the filters button. The button opacity showed the user the filter state; if the opacity was full it was on, if it was a 30% it was off. This feedback was triggered on touch. When a user selected a button it toggled between the two states.

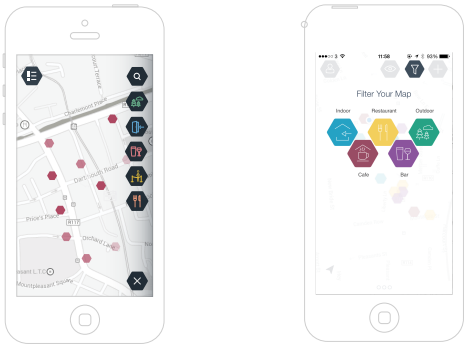


Figure 15: Initial filter option displayed on the left. Final version depicted on the right.

After testing further concepts (See Section 8.4.4) users selected a filter menu that had more weight on screen. The buttons would animate from the top of the screen to near the centre. The animation for each button was set at different times, so each one looked to be dropping individually. After the user had made their selections and exited the filter function, the button animated off-screen at the bottom. Again with different timing for each button, but the speed of animation was increased. This was to give the experience of the selections dropping away. The animation design was at the core of this interaction. We wanted the user to feel that the buttons were dropping on and off the screen. The colour design for these buttons adheres to the type of hint that the icon represents. This connection is made throughout the app so the user builds up a relationship between each icon and its colour.

5.3.6 Information Cards and List view

The design of the information cards and list view went through dramatic changes throughout this process. The information card is the area or card used to display a ‘hints’ information. It can be displayed on its own when the list view is hidden or as part of the list view. Each iteration of the information card was tested to determine the accuracy of information being displayed.

The information card design was a lean process that evolved with the exploration of information design. It displays the name of the location, distance of location, type of location, what the user is doing there, the amount of users joined, average age of joined users and the time it was started. This is a huge amount of information to display to the user so not only the size of the card but each piece for information had to be brought through many different iterations and tested.

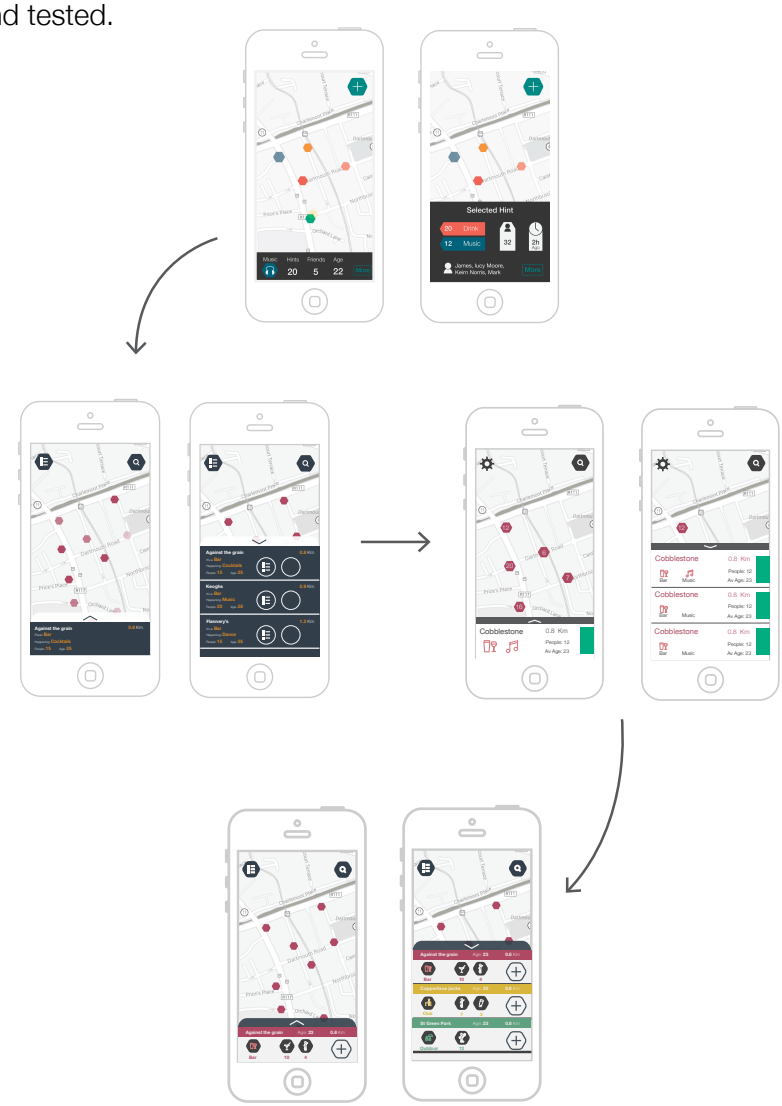


Figure 16: Development of List view display and Information Cards.

The evolution of the information card was about simplicity. The more simplistic the card the better the user could understand the information being put forward. The space between each piece of information is vital to it's legibility. The icon size was iterated through to find the best scale at which to display them. The weight and scale of the text was determined by the importance of the information it displayed. Most of the icon text was scaled down while the hint name and People joined took precedence. The mix between images and text broke the information apart and gave good balance to the card. Two different iteration of the slim card were developed and tested. The colour in card relates to the markers on the map helping the user to signify the type of hint they are viewing.

The list view was to built with the above information cards. The user has a choice to view the map with or without a list view. The list view gives the user a fast paced browse with more information at hand. While with the list view closed it's a more relaxed environment and lets the user casually browse hints with the information card appearing at the bottom of the screen. The two browsing types were the most sought after with the majority of users seeking the list view on opening.

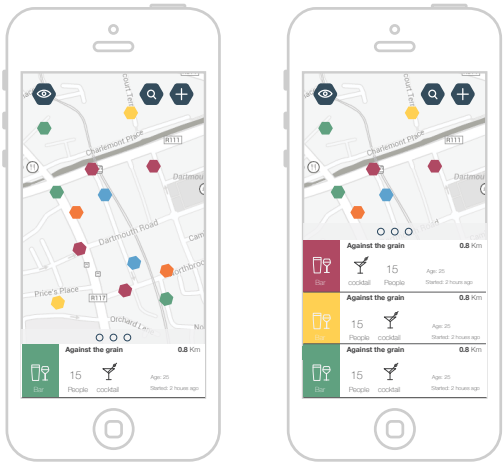


Figure 17: Final List view display and Information Cards.

5.3.7 Join

The join function allows users to add themselves to a hint they are currently at and is accessed through a left swipe motion on an information card. The join function was added to give each hint a more accurate representation as to what is happening at that location.

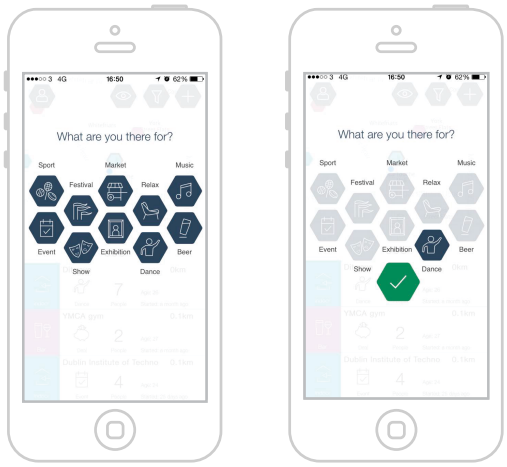


Figure 18: Information and input elements displayed on joining.

The join function was designed to be used while at a location or venue. It needed to be a quick and concise action so the user could continue with whatever activity they are currently at the location for. The same aesthetic as the Drop function was used to keep familiar interactions for the user. As the input selections were the same it made sense to follow the drop arrangement. Small changes were made to the placement to give a more central view but the button selections were kept. (See Figure 18 above)

Much like the drop functionality the selection buttons appear first giving the user a choice then when one is selected the okay appears to finish the process. This is to make sure that a selection is made while running through the process. It is a more user friendly approach to alerting users to select a option when they have not completed the task successfully.

5.3.8 Watch List

The watch list was developed as a result of the restrictions applied to joining hints. If a user is not actually at a hint and be allowed to join, it may give a false representation to the actual number of people at a hint. We needed some way of letting users store these hints until they arrive at the location and the watch list allowed these stored hints to be in one place.

The page itself is a blank canvas for the information cards to fill. Once a users selects to watch a hint it is stored in a list on the watch list page.

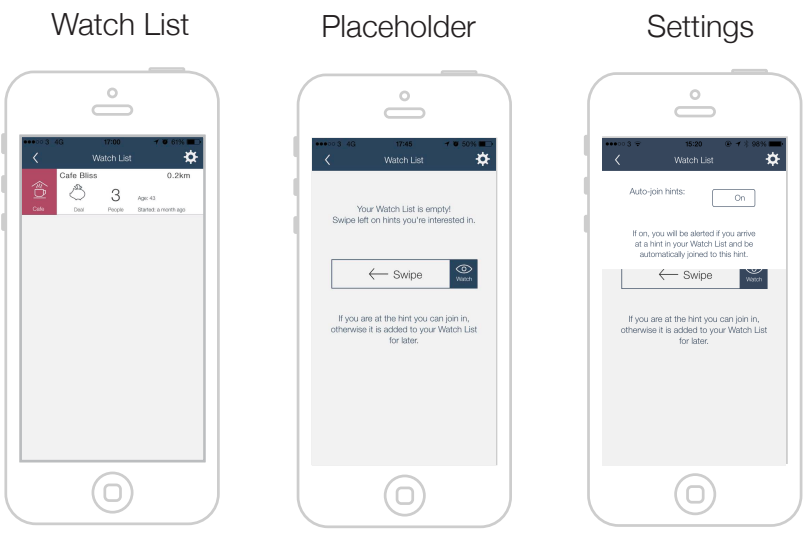


Figure 19: Differences in watch list depending on activity. Setting drop down depicted in the diagram on the right.

Users are automatically added to hints in the watch list if they are at that location. A setting was created that allows user to turn this off. It is placed at the top right hand side of the watch list and is a dropdown over this page.

5.3.9 Profile

The profile page was designed to allow users view their personal information, change password and view the hints they have dropped and joined. This page could be visually separated into two sections, users information and hints dropped/joined.

The user information was placed at the top of the page and grid system was used to keep space. The explanatory text was brought down in size and weight to put more emphasis on the users information. The logout button was placed to the right side of the page as a stand alone button, this was to signify its difference from the text on the left. The reset password sent emails to users that allowed them to change passwords. Feedback is given to alert users of this.

The hints dropped and joined shows users their personal activity on hint. It provides information through icons showing the type of hint with the name and time joined or dropped. This was created to allow users to keep track of their activity.

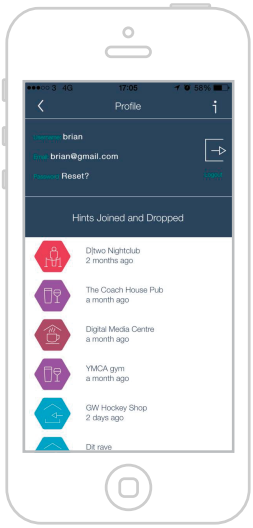


Figure 20: Profile Page displying the users information and activity.

5.3.10 Introduction Pages

The introduction is the face of our app. They were designed to meet user as the app opens and guide them through the functionality. This would familiarise the user with the app before they entered and set the tone.

The introductory pages were placed before login and registration so the user could view the features before being brought to any functionality. This was to prepare the user to help make sense of what they are viewing within the app. The use of scrolling pages allowed the user to go through the introduction pages at their own pace. The pages were animated to help grab attention and emphasis the text displayed.

As these pages give context to the app and its functions, time was spent ordering information, refining visuals and specifying meaning. The introduction animated the main functionality to bring emphasis to the information being displayed. This helped to hold the users attention.

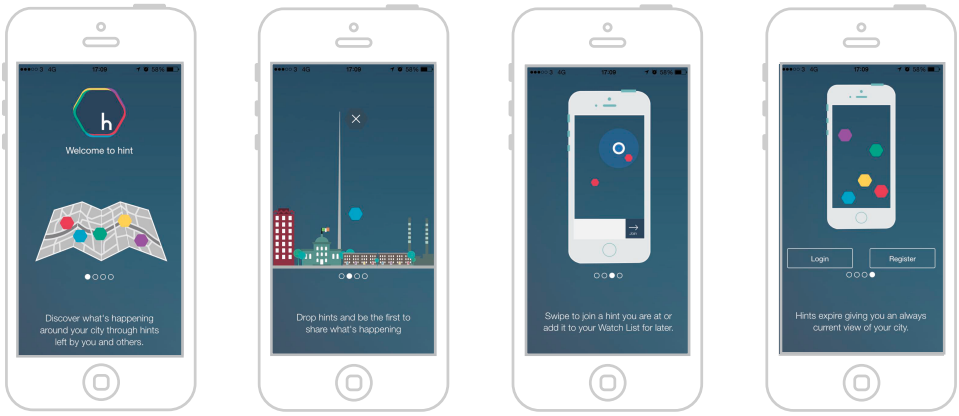


Figure 21: Information pages viewing on opeing the app initially.

5.3.11 Login, Registration andForget Password

The Login and registration pages are headed by the brand identity and as the logo and colour palette evolved so did the overall design of these pages. The main design concerns were with the input of information and how a user might navigate to and from the different form pages. Through each iteration the pages were clean with the logo and input fields guiding the user down the page. The final version was given a minimal aesthetic, excluding the input borders and keeping placeholder text to represent inputs.

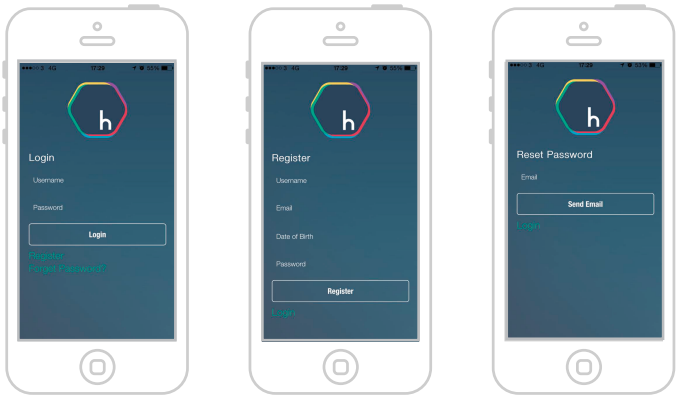


Figure 22: Login, registration and forget password pages.

To navigate between the forms the user can select the bottom buttons. These were represented with text and colour to signal a difference in interaction result. When moving from form page to form page the logo and form heading were in a fixed position. This gave a clean transition so the user eye didn't have to search for the starting input position.

5.3.12 Placeholders and Feedback

Placeholders and feedback are vital to users understanding the journey through the apps interface. They complete the experience giving information on the state of the task or process currently in progress. Without feedback the user feels lost or confused as to the actions being performed.

We use dropdown feedback throughout this app to signal the user when an action has been performed. This is a great way to let the user know that they have or haven't completed the desired task. This dropdown feedback is used to notify the user on the map page and comes from the top of the screen and last only 4 seconds. The reason for it being a dropdown is so that it gives the user a visual cue but doesn't disrupt the functionality of the app. The user can continue browsing hints while the feedback is given. It has been used to notify about joining and watching hints. It lets the user know if they have joined or watched a new hint but will also notify if they have already joined or watched that specific hint.

The Placeholders were designed to let the user know if something was empty. These could either prompt the user to perform an action through the placeholder itself or show them how they could go about it. These help the app to make sure its functions are being used to their full extent but also are failsafe's that if a part of the app isn't working properly the user can trigger something to happen.

On opening the app a placeholder was designed to allow the user to refresh the app if the users location isn't found. This can happen for numerous reasons and needed to be addressed so the user could continue to use the app. (See Figure 23 below) This placeholder gives the user the option to refresh with the push of a button or tells them how they might resolve the problem through settings.

The watch list had an informational placeholder created. This was designed to show the user the method to join or watch a hint. If a user navigates to the watch list page and hasn't watched a hint they will see the placeholder and may get a better understanding of how to perform the function.

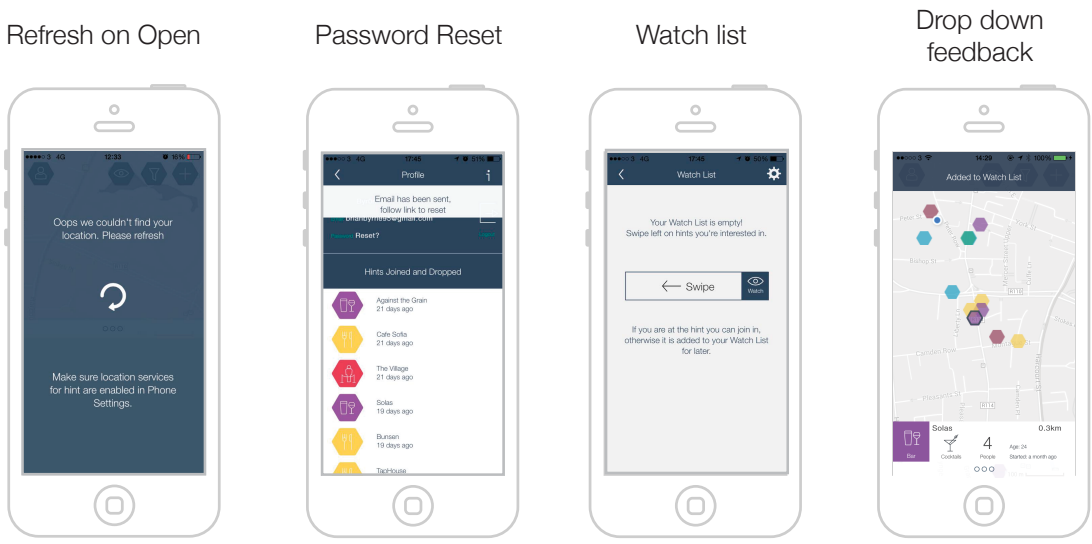


Figure 23: Variation in feedback and placeholers depending on action performed or visual que required.

5.4 App Visuals

5.4.1 Colour Palette

Creating a colour palette for this app involved linking colours and information to find meaning for the user. Information from the list view was connected to the map through colour so we needed contrast between each colour selected. Users would need to be able to identify each colour clearly. Different palettes were tested on maps and light and dark coloured backgrounds to see what would stand out most to the users. There needed to be contrast between the map and the coloured markers.

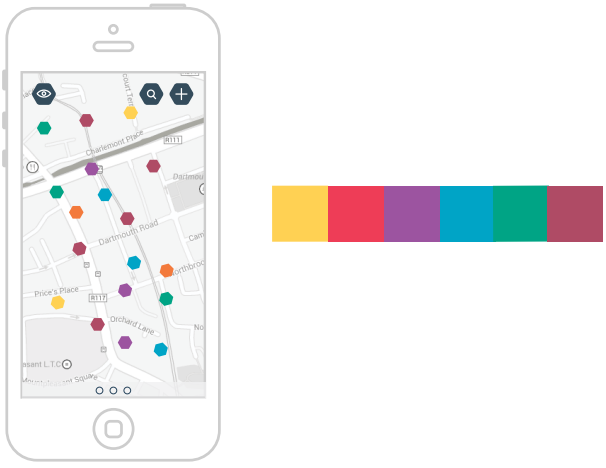


Figure 24: Colour palette used throughout the app. Visual connection between marker visuals and type of hint.

The types of information connected to colour were types of hint's, Restaurant, Bar, Cafe, Club, Indoor and Outdoor. These colours appear through the app and always represent the type they are connected with.

Figure 25: Primary icons

The defining colour used with the app is an dark ink blue. It was chosen for its deep colour in contrast to the other colour used. This would set it apart to be used for headers and navigation buttons.

5.4.2 Nav Buttons

The navigation buttons are represented using icons designed around the button meaning. There needs to be a strong link between these icons and the meaning as there would be no supplementary text to aid in understanding. They all needed to tie together coherently. As the project developed some of the functionality changed and this meant further development on the visual representation as the project evolved.

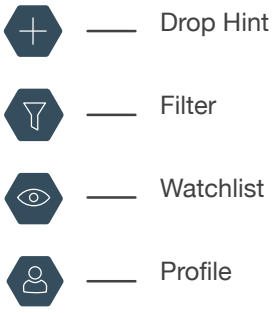


Figure 26: Navigation Icons

The button icons were line drawings in keeping with the rest of the app icons. Tests were conducted with different display methods on the map, both with and without button

backgrounds. (See Section 8.3) The hexagonal background gave the most contrast while having the look and feel of a button.

5.4.3 Icons (Used for Drop, Profile, Filter, Info Cards and list)

An array of icons were developed to represent both the type of hint location and also the function or reason for the person being there. They would be used for displaying information and selecting information. A small set of type icons were initially build to test styles that would run throughout our whole icon list. Clarity would be key to the success of these icons as text would be supplementary to them. Icon sets were built around strong metaphors to keep simple imagery. Our initial icons were heavy and bold (see figure 27 below) but as the project progressed the styles started to become lighter and cleaner.

Figure 27: Initial Icon Design.

The above icons were tested to evaluate clarity to users (See Chapter 8, Section). As with all icon representations some will be stronger than others. Weaker icons were iterated through to find more well resolved solutions that users could relate to. While developing the icons it became clear that there needed to be two separate icon descriptions. One to describe the type of place the hint is and the other to show what the user is doing there. Initially were using ‘Pub’, ‘Club’ and ‘Restaurant’ as the primary type, however we soon realised this was not the most efficient start. The final primary and secondary names (Outlined in Figure 29 below) were developed to give the user a better understanding of the hint they are viewing. It also allows the user to be more specific when dropping a hint.

Figure 28: Icon Revisions

The final icons was developed with 25 icons in total. These icons were used throughout the app so the scale of each needed to be similar. They needed to fit into grids whether in the information cards or on the drop hint buttons.

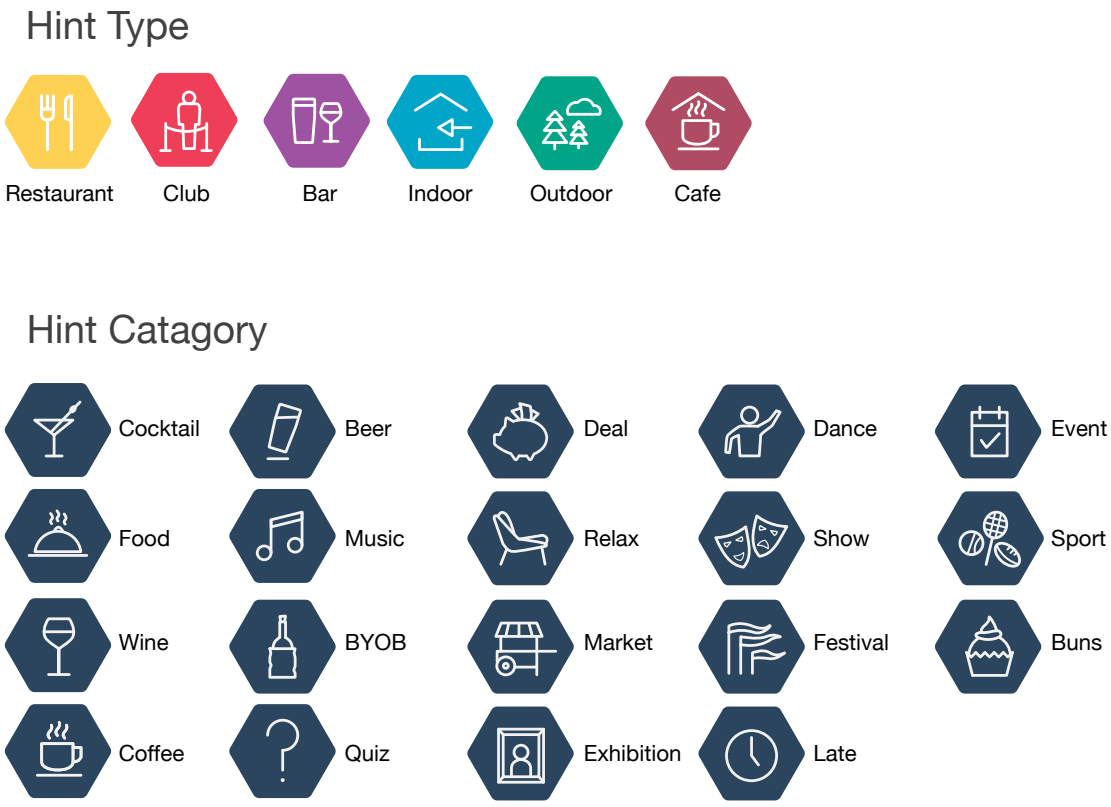


Figure 29: Primary and Secondary Icons used throughout the app.

5.4.4 Map Markers Visuals

Hexagonal makers were used to visualise hints on the map, in keeping with our visual identity. The markers were initially developed to display three pieces of information: location, type of venue and population at the location. This proved to be a tall ask as we struggled to find a balance between each piece of information.

Through testing we concluded that all three pieces of information were too visually interrupting. If location wasn't a factor the task would be much easier, however this was the most important for us. Many different iterations of markers were tested to determine the best solution for the information display, with three depicted in the diagram below. The map

became cluttered with a wash of different information. It became unclear what the markers were trying to display. Due to the amount of hints being left on the map we needed to restrict the information being displayed through the markers.

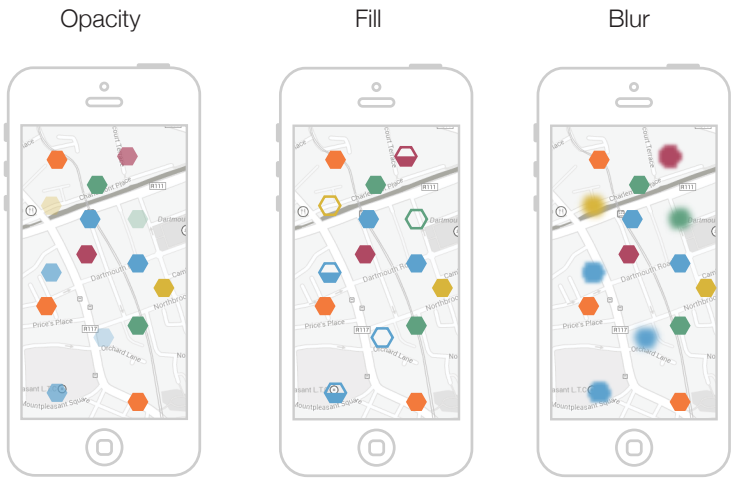


Figure 30: Marker Visual Options displaying popularity, type and location.

The markers were now displaying location and type. The type was represented with colour, which gave a connection between the markers on the map and the list view. The population, the piece of information left out of the markers, was visible through the information cards and this meant we could give a more accurate representation of the number. Overall the markers gave a clear indication of hint location and hint type.

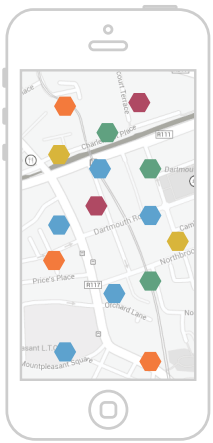


Figure 31: Final Marker Visuals.

5.5 Conclusion

This section outlines the iterative process taken when designing the user experience and interface for Hint. All graphics have been designed in keeping with our visual identity. This section was completed in conjunction with the following chapter on Code Methodology and Approach. It informed all the decisions made while developing the apps functionality and front-end design. We feel we have comprehensively covered all required aspects.

6

Code Methodology and Approach

6.1 Introduction

This process, because of our limited coding knowledge and experience, was a very steep learning curve. It was a very iterative process. We planned everything before implementation and the coding was heaving defined by the design requirements outlined in the previous chapter. As our skills developed we found ourselves going back and making changes and improvements along the way. By analysing similar apps, outlined in Chapter 3, it helped us define our requirements (See Section 4) to a level that we believed was achievable for us within the time constraints.

We initially planned the whole functionality, structure and design of the app but started building layer by layer, completing the core functionality before attempting our more complex goals. Once we had our MVP completed (See Section 4.7) we began testing on the device with our potential users.

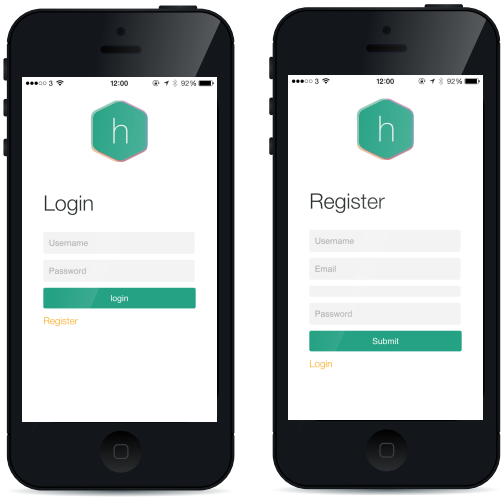
6.2 Overview of Agile Development Method

Outlined below are the core functional and design elements of each build corresponding to the 4 main Sprints. They can be used as a reference for the code detailed below. It shows the iterative approach taken in the development of the app.

6.2.1 Build 1

By the Sprint on the 5th of September we had achieved the following, as outlined in the table below. Figure 32 shows screen shots of how the front end looked at this time.

GENERAL	FUNCTIONALITY	FRONT END
Analyzed and adapted similar code examples	Save marker information to database. – 'Drop a hint'	Map display
Research into PHP and my SQL	Display markers from data-base	Marker colour depending on type
Designed database tables	Login and Registration	Jquery themeroller
Blacknight Hosting	Connection between users and hints	Sample menu system



Login Registration

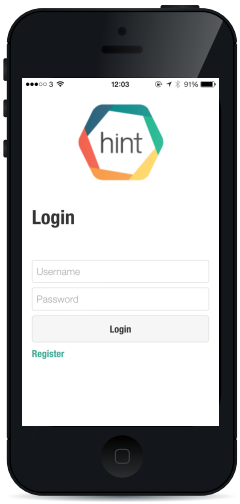
Map & Drop Sample Buttons Button Sequence Logout

Figure 32: Screenshots of the build reviewed at the September Sprint.

6.2.2 Build 2

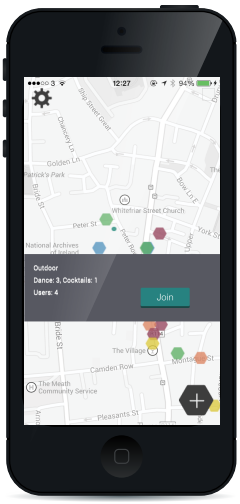
By the Sprint on the 13th of October the following was achieved, as outlined below in the Table. Figure 33 shows screen shots of how the front end looked at this time.

GENERAL	FUNCTIONALITY	FRONT END
Research into friends connection and phone contact structure.	Realtime Loading of Markers	Icon Visuals
Switched over to ios8 and Cordova 3.5	Contacts coming from phone book.	Infoboxes instead of google infowindows.
	Join Functionality	New animation and structure for dropping a hint
	Markers containing much more complex information.	
	Filter Functionality	



Login

Map and Markers

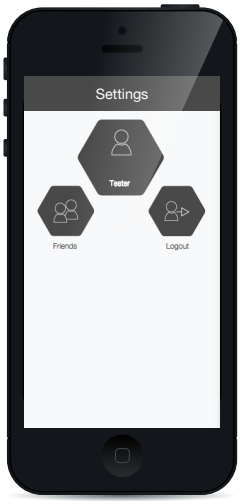


Info Window

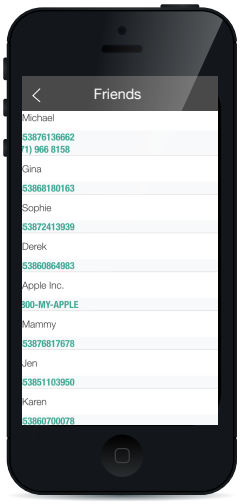
Filter Selections

Drop - Type Icons

Confirm Drop



Settings



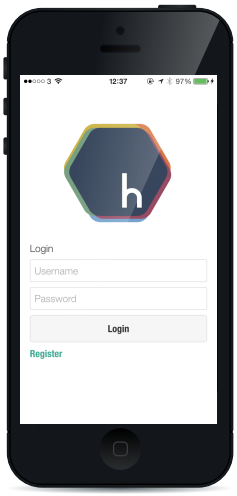
Contact List

Figure 33: Screenshots of the build reviewed at the October Sprint.

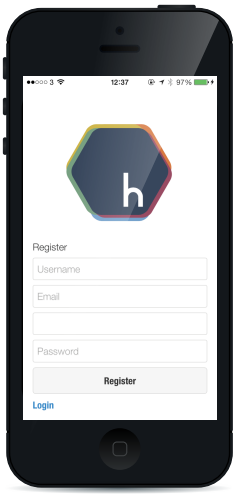
6.2.3 Build 3

By the Sprint on the 17th of November we had achieved the following, as outlined in the Table below. Figure 34 shows screen shots of how the front end looked at this time.

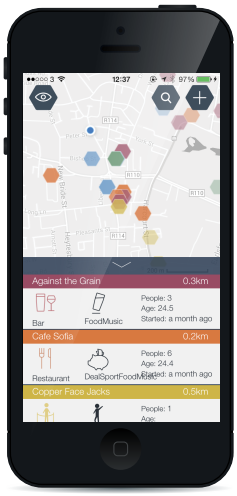
GENERAL	FUNCTIONALITY	FRONT END
Research into background locations.	List view implemented	Custom information cards implemented
	Filtering handled by local storage.	New Layout and Button visuals.
	Watch feature added	New filters design
	Background Location Up-dates	
	Notifications Implemented for development	
	Suggested locations added	
	Google Autocomplete for establishments	



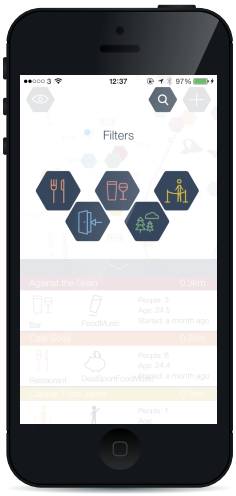
Login



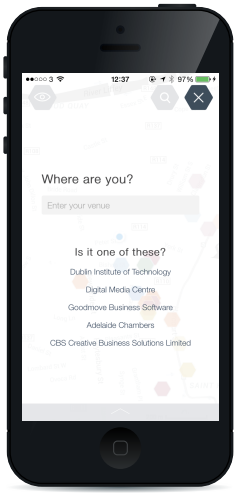
Registration



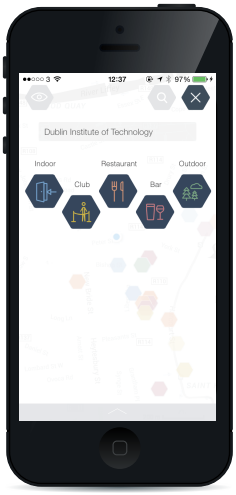
Map & List View



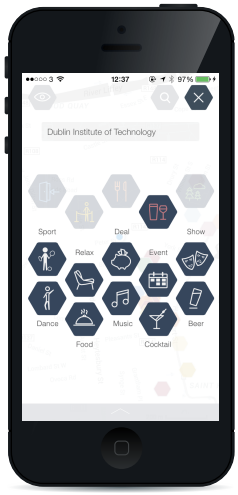
Filter Selections



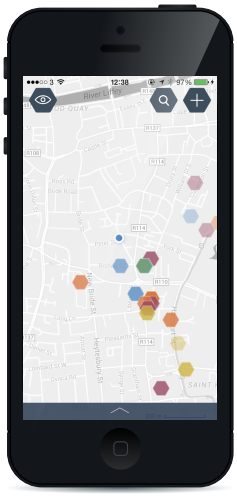
Drop - Location suggestions & autocomplete



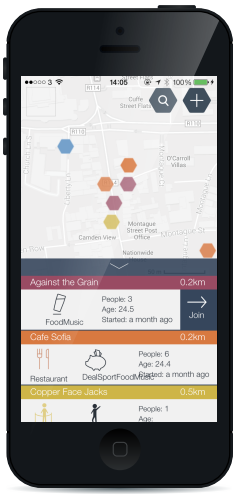
Type Selections



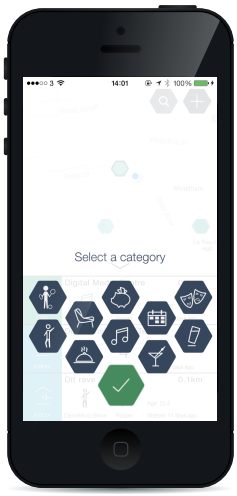
Category Selections



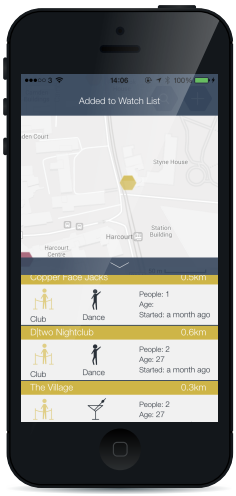
Map View & Markers



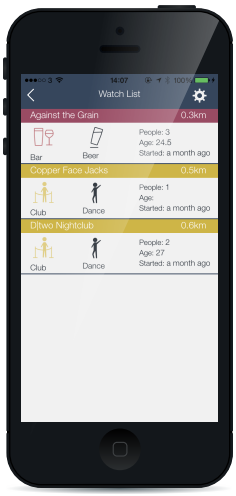
Swipe to Join



Add join category



Add hint to watchlist



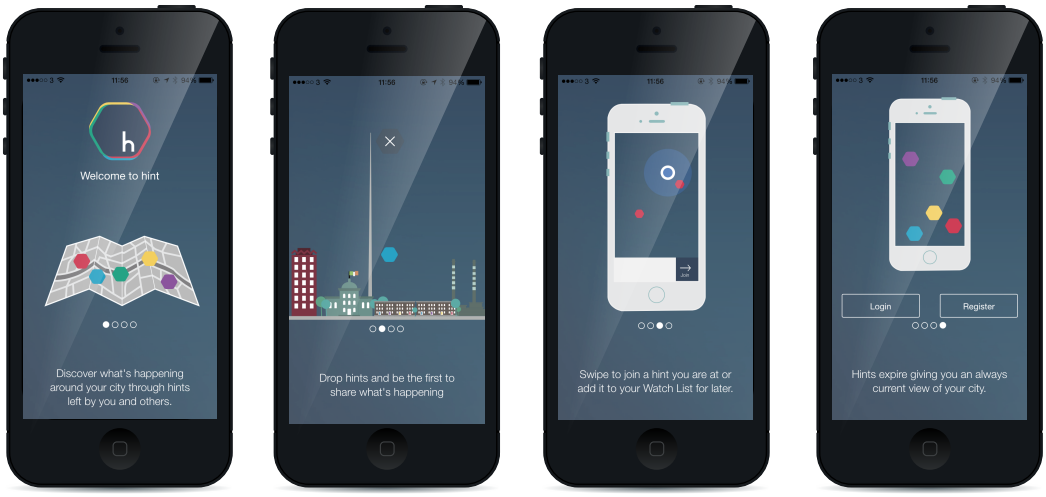
Watch List

Figure 34: Screenshots of the build reviewed at the November Sprint.

6.2.4 Build 4

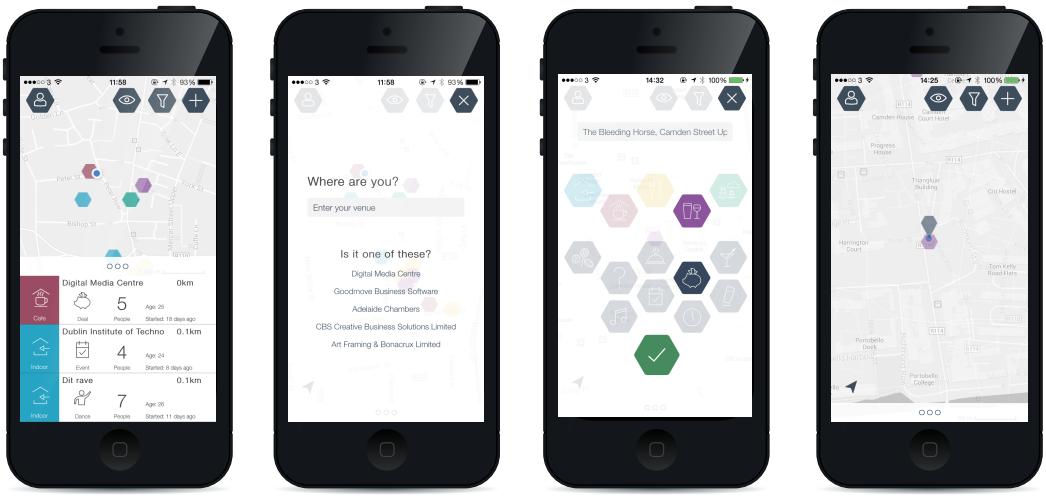
By the November Sprint and handing in the Final Artefact we had achieved the following (See Table below). Figure 35 shows screen shots of how the final app looked.

GENERAL	FUNCTIONALITY	FRONT END
Improvements made to code	Bugs fixed	Introduction Implemented
Testflight set up	Fallback fro if location can-not be found – option to refresh	Placeholders Added to allow for empty sections.
	Profile Page added	Custom feedback implemented
	Categories made unique to type.	New information card visuals



Introduction

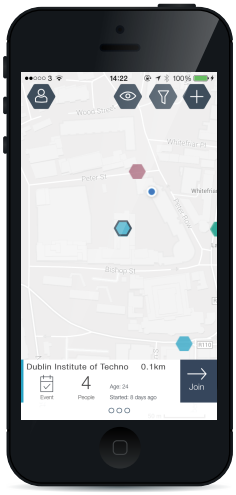
Login | Registration | Forget Password



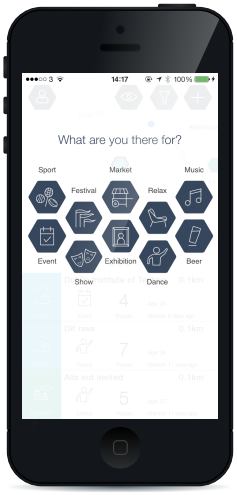
Browse Map & List | Drop a hint | Your Hint

Figure 35: Screenshots of the final build submitted. Continued on page 84.

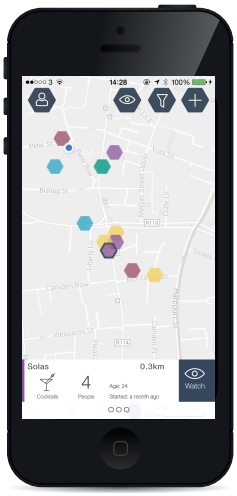
Filter Your Map

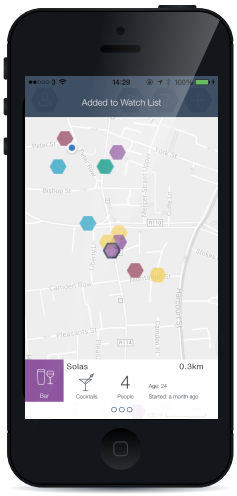


Join a Hint

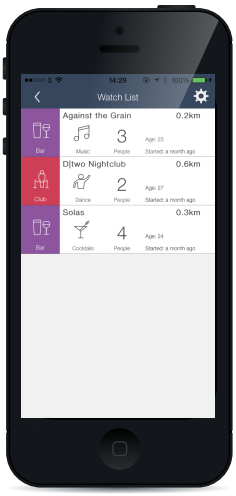


Map & List View

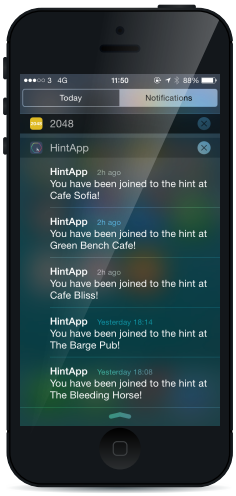




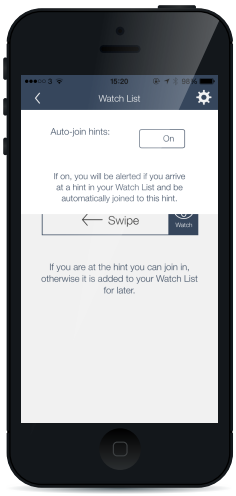
Watch a hint



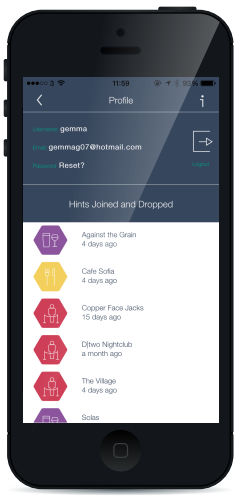
Watch List



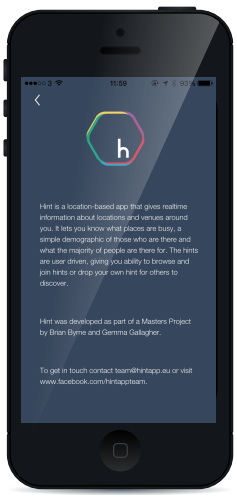
Notification when user arrives later.



Settings



Profile



About Hint

Figure 35: Continuation of Screenshots of the final build submitted.

6.3 Preparatory Work

Before diving into the code, there was a lot of planning, research and setup involved. These steps are outlined in detail below.

6.3.1 Development Platform

We chose to developed our app using HTML, Javascript, JQuery, JQueryMobile and CSS. We created the backend using PHP and mySQL which is stored on a blacknight database. All data is returned in Json format. The hardware on the phone is accessed using Cordova which works with XCode to package up the files into an IPA. On a daily basis we used Netbeans 8.0.1. as our text editor.

6.3.2 PhoneGap Installation, Setup and Updates

To bundle our web pages into a mobile app we use Phonegap which is a free and open source framework that allows you to create mobile apps using standardized web APIs for cross platform development. This is downloaded through the terminal and plugins can be added depending on the uses of your app. The plugins used are listed in the next section. During the production process, Apple released and new updated, ios 8, which in turn resulted in updates in the Phonegap framework. At this time, we updated to Cordova version 3.5, which involved a new download and plugin method.

6.3.3 Plugins Used

The plugins we required consisted of the following:
Cordova Device - to obtain the device type for the notification plugin.
Cordova Dialogs - to achieve native looking alerts and notifications in app.
Cordova Geolocation - to obtain the users location.
Cordova Splashscreen - to display a splash screen while waiting for the app to load.
Background Geolocation - to recieve updates on the users location while the app is closed.
Push Plugin - to receive Notifications while the app is closed.

6.3.4 Blacknight & Filezilla Setup

As our app was developed using HTML5, it is essentially a web page. Therefore we needed to obtain a domain name and hosting for this webpage. During the initial stages of development we used MAMP, the local host on the desktop to start development. By the July Sprint, we deployed the app onto the phone and it was obvious this was no longer a suitable working environment. We obtained the domain name hintapp.eu from Blacknight Solutions and bought Linux shared Minimus Hosting which hosted our database and email account.

6.3.5 Database Model

When designing our initial database model we accounted for all possible functionality, however as our knowledge progressed the model altered slightly. During the coding process we used tables for testing background location accuracy and notification device tokens. The final database model and connections are shown below in the diagram.

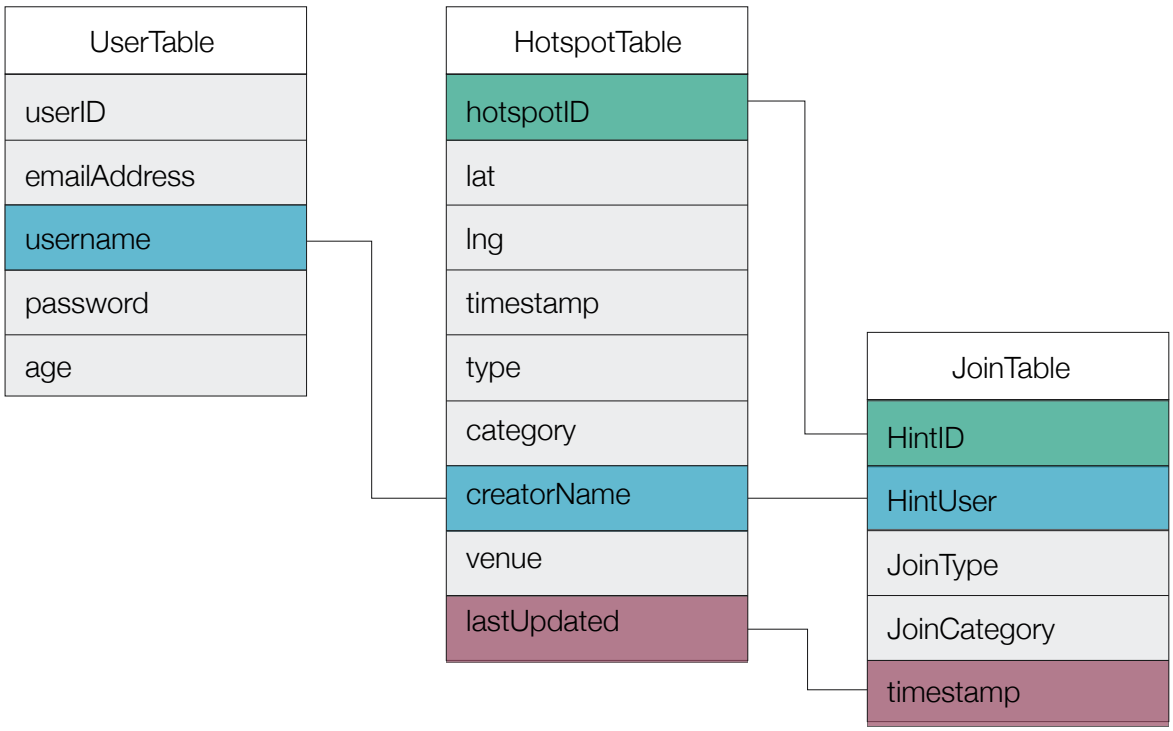


Figure 36: Datamodel and connection between tables.

6.3.6 Libraries Used

Underscore.js is a Javascript Library that provides many useful functional programming helpers without extending any built-in objects. We used it mainly for navigating and structuring data, arrays and objects.

Moments.js is a library for parsing, validating, manipulating, and formatting dates. We used it for formatting the time into our desired structure. We altered this library slightly to display our own time descriptions.

Slides.js was used to aid the Introduction.

Google Geometry, Google Places and Google clusterer was also used for calculating distances, place autocomplete, suggested locations nearby and map visuals respectively.

PHPMailer is a full-featured email creation and transfer class for PHP which we used for the forget password feature.

6.3.7 API Keys

Before using Google maps and advanced features we had to obtain and api key which would identify us as unique developers which is then connected to our app. This was done through google developers.

6.4 Coding Development and Approach

6.4.1 Introduction

Our coding process was certainly shaped by the fact that we did not have much prior experience with coding. At the beginning, the process was very slow with research talking up the majority of our time, even to complete the simplest of tasks. We initially started by using similar examples of code sourced from the internet to get to grips with the structure and functions used. As time went on, we gradually progressed and went back and made drastic improvements and alterations to our initial code.

The following sections outline the process involved in coding each section of major functionality within the app. The functionality is split into 2 main sections - Server Side code and Client side code with a slight overlap between some sections. Within each section, the progression of each function is briefly detailed, showing how we came to our final structure.

6.4.2 Server Side Functionality

The server side functionality refers to the processes performed behind the scenes to save, manage and obtain the information needed to be for the app to be functional.

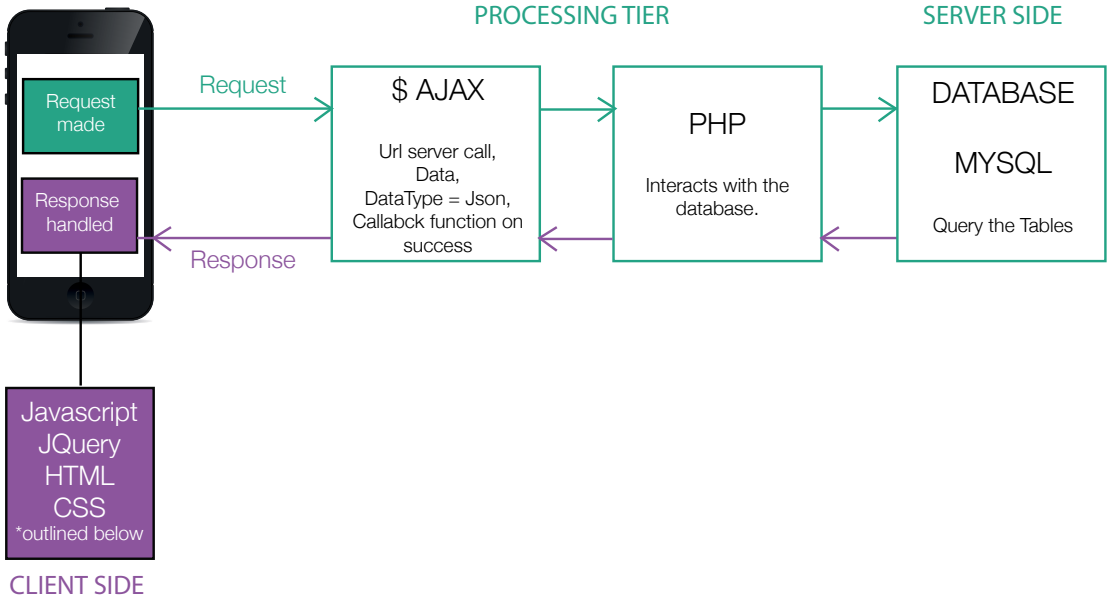


Figure 37: Digram outlining process involved in connecting to the server.

6.4.2.1 Login and Registration

We completed the user Login and Registration for the September Sprint Build, discussed in section 6.2.1 . Initially a lot of research went into this as we were not familiar with php and data types for mySQL Tables. We went through 2 iterations of this process before settling on the current version. The Table below shows the structure of the user Table.

UserID	emailAddress	Username	Password	Age
101	101@gmail.com	User101	$ 2y10n5WX	1990-01-01

USE CASE: REGISTRATION

USER ACTION	CODE INVOLVED	FILE	LINE
User opens app	On load – Check if user is logged in. If not, displays Login Screen.	User.js Index.html	7, 135 74
User enters details in Registration Form and submits.	Details validated. AJAX call to php.	User.js Registered.php	18, 26, 125, 152 All
	Cross check database to ensure no user has already registered with that username or email.		
	On Success – details saved in UserTable in database.		
	Username and email set in local storage.	Users.js	
	Map page displayed	Map_Init.js	6

USE CASE: LOGIN

USER ACTION	CODE INVOLVED	FILE	LINE
User opens app	On load – Check if user is logged in. If not, displays Login Screen.	User.js Index.html	7, 135 74
User enters details in Login Form	Details validated and sent to database via AJAX call to php. Username and email set in local storage.	User.js Registered.php	18, 26, 125, 152 All
	Map page displayed	Map_Init.js	6

Both the Login and Registration process consist of a html form with input elements. On successfully registering the user is logged in automatically from here, saving time and effort. The user remains logged in (on closing and pausing the app) until they manually logout. On doing so, the local storage data which contains their username, email and other information which will be discussed in a later section, is cleared and the app is reset to its initial state.

6.4.2.2 Dropping a Hint

The process of dropping a hint and adding characteristics to it was functional since the July Sprint. The structure has remained relatively similar, however it has greatly increased in complexity and design since then. (See Section 6.2 above). The client side functionality of this feature will be discussed below in Section 6.4.3.7. The Table below shows the structure of the Hotspot Table.

HotspotID	Lat	Lng	Timestamp	Type
201	53.3371	-6.26548	2014-11-12 15:00:00	Cafe

Category	CreatorName	Venue	LastUpdated
Coffee	User101	Café Java	2014-11-14 16:00:00

USE CASE: DROP A HINT

USER ACTION	CODE INVOLVED	FILE	LINE
Select Drop Hint	Div displayed with text box and suggested locations nearby.	Index.js DropHint.js Map_Init.js	192 21 232
Starts typing in Location	Google Autocomplete displayed drop down of establishments nearby depending on letters entered.	DropHint.js	73
Selects desired venue	Text box slides up and type Icons displayed.	DropHint.js	73
Selects type most suited	Category Icons appear depending on type selected.	DropHint.js	73

Selects suitable category.	Tick Button appears.	DropHint.js	73
Clicks the tick	AJAX call made to php and details validated.	Markers.js	410
	Check to make sure hint with same venue name does not exist.		
	On Success - Saved to Hotspot-Table.		
	Tick gradually fades as feedback Note drops down from top of screen to let the user know the hint has not been dropped. Marker bounces on location to signify where hint has been drop and allow for delay in calling speed.	Markers.js	410
	Call made to check if hint has been dropped/joined in last 10 seconds. Info Card updated with new information.	Markers.js Join_3.php	586
Views their Hint by clickin on marker created	Div appears with information about this hint.	Markers.js	214

6.4.2.3 Joining a Hint

The joining process was completed by the October Sprint and was implemented in this Build (Section 6.2.3) . By adding this functionality the information at our disposal became more complex and the structuring this data was going to have to change to include this information in the display. Previous to this, the markers only called information from the HotspotTable and the UserTable. (See Section 5.3.5) The table below shows the structure and format of the Join Table.

HintID	HintUser	JoinType	JoinCategory	Timestamp
201	User101	Café	Relax	2014-11-14 16:00:00

USER ACTION	CODE INVOLVED	FILE	LINE
User Swipes on desired info card.	If distance between user and location of hint is <15m display join button.		
Clicks Join Button	Categories displayed depending on type of Hint to be joined.		
Selects Category	Tick Button Displayed		
Selects Tick	AJAX call made to php and crosschecked to ensure user hasn't already joined this hint. On success, info saved to JoinTable.	Markers.js	499
	Call made to check if hint has been dropped/joined in last 10 seconds. Info Card updated with new information.	Markers.js	586

6.4.2.4 Formatting Data

All information being called from the database is returned in Json format. Initially this information was easily interpreted and formatted as it was only being called from one table and no connections had to be made. However as the apps functionality increased the information to be displayed became more complex.

We now had to join the User Table, Hotspot Table and Join Table in a coherent manner and order this by distance from the users location. We started by working out exactly what information was need from each table and then applying a structure in a way we could manage in Javascript. Applying this in PHP proved difficult. The first step was structuring the Query to Join the correct information form all tables. Once achieving this, the information then had to be formatted into associative arrays to handle the information regarding each hint separately. Figure 38 below outlines this process in detail.

This was a major milestone in the project as now we had all the data we need to manipulate and display as per our design.

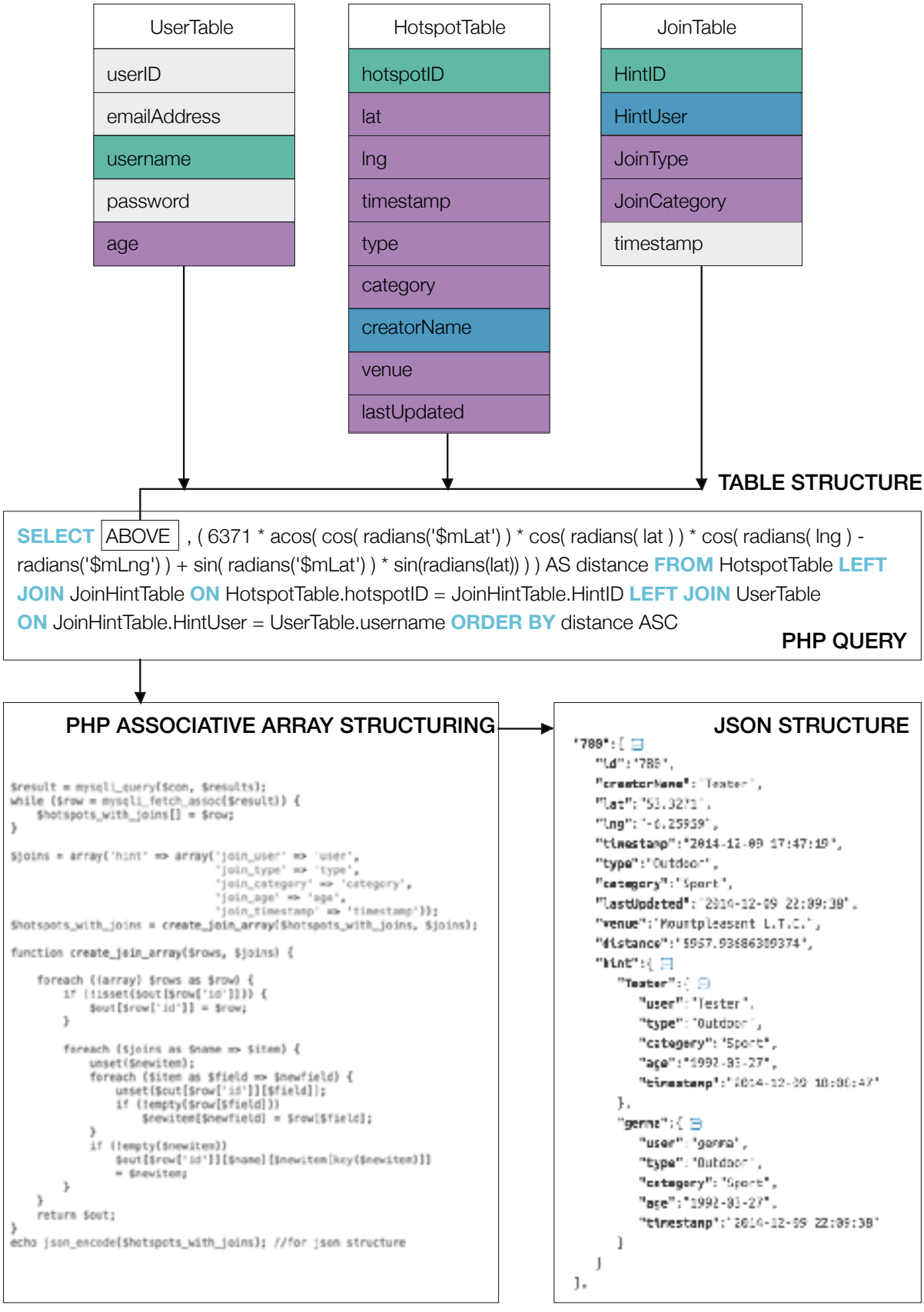


Figure 38: Process involed for the handling of data.

6.4.2.5 ‘Realtime’

To achieve a realtime feel for loading new and updated markers, a new Ajax call is made to only load markers where the timestamp/lastUpdated time was less than 10 seconds. This call is repeated on a 10 second interval within javascript. We are aware there may be better methods to execute this operation, however this was a satisfactory solution for the moment.

At this time, a query is also made to delete all Hints which have not been updated in the past 4 hours. This time frame was decided on from testing from out potential users. (See Section 8.9 in the Testing Chapter) All joined user attached to these Hints are also removed to keep the tables efficient.

6.4.2.6 Profile

To populate the users Profile page we have to call both the users email from the user table and also any hints that user was involved in.

USE CASE: PROFILE

USER ACTION	CODE INVOLVED	FILE	LINE
	On ‘pagebeforeshow’, User Info, Profile Info and update Profile Page functions called.	Users.js	291
	Username passed to php and email returned.	Users.js UserInfo.php	26
	Username passed to php and all hints the user is part of are returned.	Users.js Profile.php	42
	User information displayed.	Users.js	108
User clicks Logout	Local Storage Cleared. Page changed to Introduction	Users.js	241

6.4.2.7 Notifications

The process of using native ios notifications with a phonegap app proved to be more laborious than we had initially planned for. The documentation outlining this process was very poor. We found a tutorial (See Section 6.4.6) explaining the process step by step which was quite tedious and finicky. We encountered many problems while completing these steps as it is also connected to the ios Developer Account. It took many iterations of this process before finally successfully receiving notifications. A different set of Certificates and Keys were required when in the development phase and production phase (to be sent out via testflight/app store). The ck.pem is stored on the server along with the php files so as it can be accessed in conjunction with psuhNotification.php. The device token for each phone is unique and used to identify the device a notification should be sent to. Initially we were storing these to a table in the database on Login. As a user can logout and login again on a different device, these would have to be updated and reset, increasing the margin for error. As this process was not necessary anyway, we chose to store the device token in local storage so it would be cleared again on logging out with no extra precautions needed.

USE CASE: BACKGROUND LOCATION AND NOTIFICATIONS.

USER ACTION	CODE INVOLVED	FILE	LINE
User has hint added to the Watch List.	Specific hint saved to local storage and displayed in watch list.	Favourites.js	39
Suspends/ closes the app.	Background location updates start. Update accuracy and frequency occur depending on config settings	Watch Favourites.js	142
	Distance between location update and hints on the watch list are checked to see if in range.	Watch Favourites.js	93
	If so, Ajax call made to pass device token and venue name to php. ck.pem file required in PHP folder and on server.	Watch Favourites.js PushNotifications.php	167
	Notification sent to user from Hint App.		
	User joined to this hint.	Watch Favourites.js Join.php	185

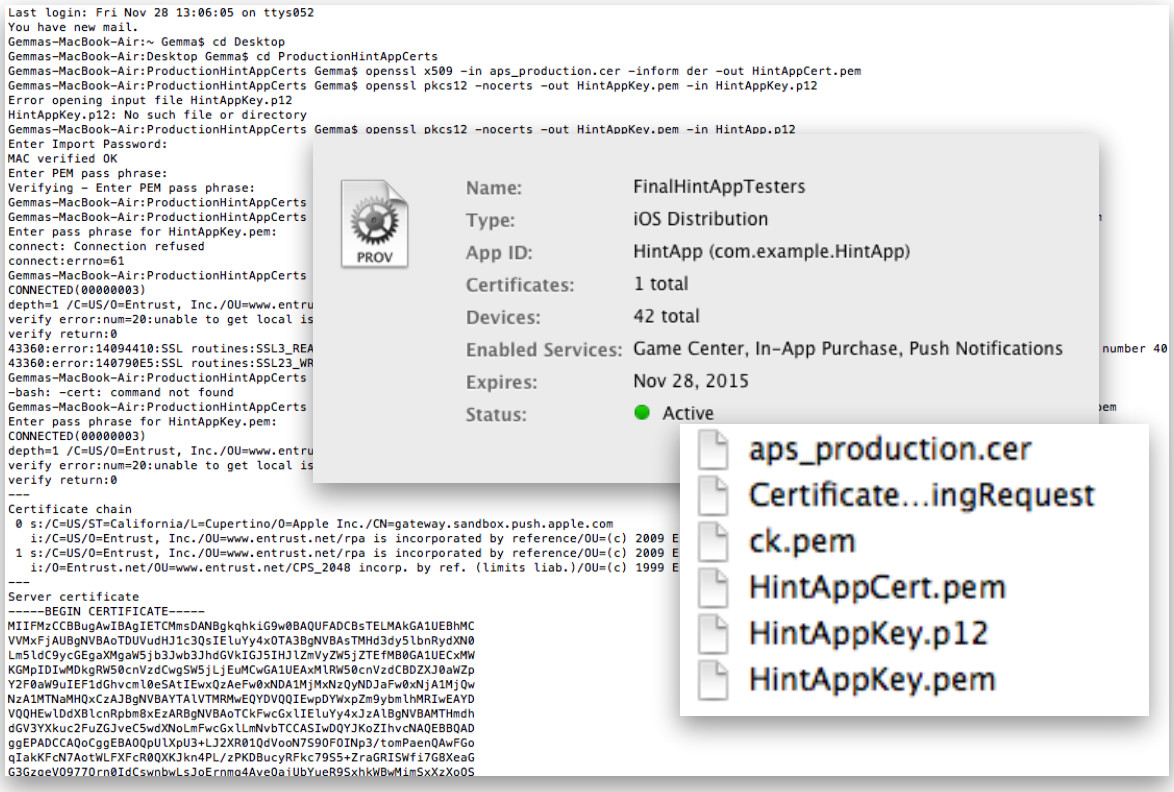


Figure 39: *Screenshots of process involved to successfully receive Notifications.*

6.4.3 Client Side Code and Front End Code

Client-side refers to operations that are performed by the client in a client–server relationship. The follwoing sections detail some of the main proccesses involved within the Hint App.

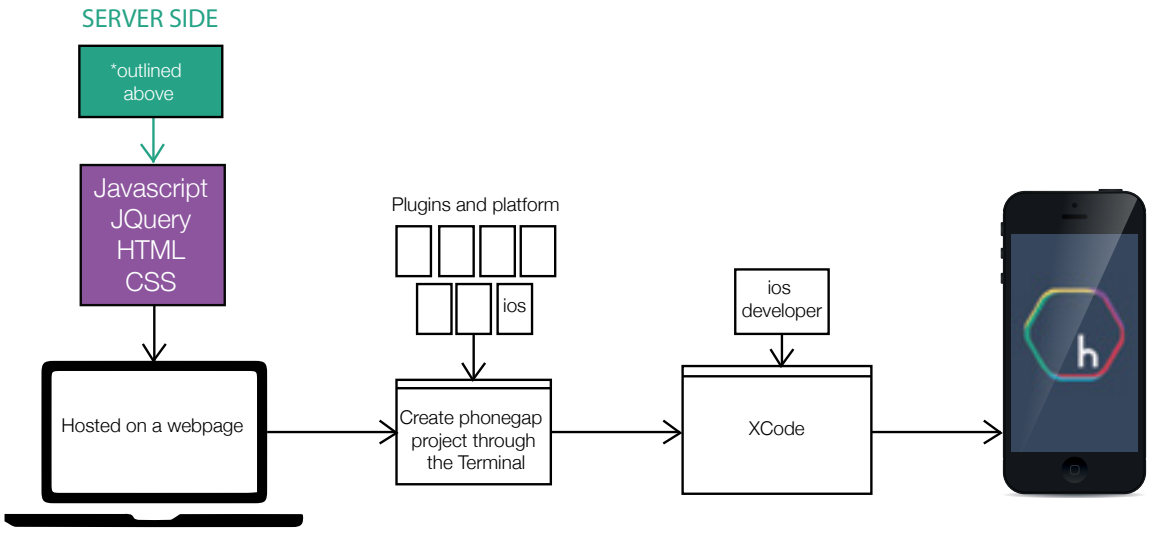


Figure 40: Diagram explaining the process involved in packaging the app.

6.4.3.1 Handling Data

Once again, as the complexity increased, this process of handling the data also did. All the data is manipulated and displayed on both the map and in the list view. As google maps does not have the functionality to manage the marker data, a global temporary array had to be created to store this information and manipulate it from here before passing it to the markers and info cards. This was also necessary to sort and handle the loading of new and updated markers, which will be discussed in the next Section.

For each ‘hints’ information returned as Json, the required information was extracted and sorted before being pushing into an array for later use. Navigating around this json response was initially very difficult. The main hint information could be easily extracted, with the joined information for each proving more difficult.

Here we calculated the average age of the users at the hint and also the maximum category

that had been selected on joining. We used functions from the underscore library to complete these tasks. (See Map_Init.js, function callMarkers(), Line 415). Marker Icons, Type and Category Images and Colour values were also passed to the create marker function to be used in the info cards. Figure 41 below shows the structure of the arrays used.

Json Response Structure Returned

Data sorted and manipulated - pushed to MarkerArray and passed into the Create Marker function.

▼ Object
- category: “Sport”
- countUsers: 3
- distance: “0.266789960721284”
- id: “780
- jAge: 25
- jCategory: ”Sport”
- ▼ point: hf
  - D: -6.25959
  - k: 35.3371
- time: “2 hours ago”
- timestamp: “2014-12-12 15:00:31”
- type: “Outdoor”
- venue: “Mountpleasant L.T.C”

Information from Google Marker function pushed into an array to allow for visual manipulation on the map for the filter function

▼ Object
- bgColor: “#28A386”
- catImg: “images/Sport.svg”
- category: “Sport”
- clickable: true
- countUsers: 3
- distance: “0.266789960721284”
- draggable: false
- icon: “HexMarkers/Green_Outdoor.png”
- id: “780”
- jAge: 25
- jCategory: “Sport”
- jCategoryNumber: 2
- ▼ position: hf
  - D: -6.25959
  - k: 35.3371
- ▼ scaledSize: W
- ▼ size: W
- time: “3 hours ago”
- timestamp: “2014-12-12 15:00:31”
- type: “Outdoor”
- typeImg: “images/Outdoor.svg”
- venue: “Mountpleasant L.T.C”
- visible: true

Figure 41: Snippet of code depicted difference between each array.

6.4.3.2 Map & Marker Display

USE CASE: MAP AND MARKER DISPLAY

USER ACTION	CODE INVOLVED	FILE	LINE
User logs in/opens app.	Users current location passed to php. Data called and ordered by distance. Structured into associative array. Data received, organized and passed to createMarker function.	Map_Init.js Markers.js	6 64
	Map created.	Map_Init.js	73
	Marker Cluster Initialised.	Map_Init.js	183
	Locations Nearby Requested.	Map_Init.js	233
	FilterMap function called to display filtered types.	Filter.js	106
	Watch Array checked. Watch List checked to ensure no hint present have expired.	Favourites.js	3, 16
	Function called to create Watch List.	Favourites.js	52
	List Created	Favourites.js	189
	Function Called to check time for context changes	Filter.js	138, 176

This function is called on opening the app and on resuming the app each time it has been paused. This ensures the information is up to date, the users distance has been updated and expired Hints are removed.

The markers are displayed depending on the type of venue. The functionality was implemented to allow for the markers to change opacity depending on the amount of people there aswell however, from testing we decided to only show one extra piece of information as popularity, type and location proved to be to confusing for the users.

A google clusterer plugin is used to handle the marker display on zooming out, which has been customised to display different size circles depending on how many hints are in the area covered.

6.4.3.3 List View

We implemented the List view after the October Sprint. Following suggestions made at this sprint we surveyed potential users to find out if this was a feature they would find useful. (See Section 8.6) We had to make slight revisions to the markerArray structure but as we had all the data necessary for this, it was more of a front-end challenge.

Implementing the list view was a slow process, as we hadn't displayed information in this way before. We didn't want to use any theme list view or a jquery mobile list view as we wouldn't be able to display our information in the manner we wanted to. Once the custom list view was populating we needed to add the scroll functionality. We looked at plugins that could handle this but we ended up using the Css scroll function. By adding an overflow: scroll and a webkit touch to the list view div this enabled the div to scroll within its confines.

The swipe function is used in the information cards and list cards to allow it display more information and conceal the join or watch button until the user needs it. An example can be seen in the javascript folder: favourites.js - lines 362- 368. We needed the information card to move off screen to the left to reveal the button. A swipe left and swipe right command is used to control this. Once the command is triggered it calls Css animations. The real trouble with this command is running through all eventualities. Many different commands had to be set to close the swipe depending on what the user chose to do.

6.4.3.4 Connecting List view and Markers

As both the map and list view were now fully functional, we needed to be able to connect the list view information cards and the markers on the map so the user would get feedback when one or the other is selected. When the user selects the list view card it changes shade slightly and the marker that it is pulling the information from is navigated to on the map, with a slight stroke added to it. Vice versa if the maker is selected we needed to be able to scroll the list view to find the connected information, depending on which Hint is selected.

We used each markers unique id to perform this action. By using a jquery .closest call we were able to find that maker and connect it with the information card selected in the list view. To get the list view to scroll to top we put that marker id into an element and used it to

find the position. These can be seen in javascript folder: marker.js - line 263 and 267. The animation in the scroll is set to slow to allow an easing of movement when a selection is made. This action took some time to figure out.

6.4.3.5 Context

The feature of changing icons depending on the time of day was not a core feature of our app and so was not implemented until after the November Sprint. This feature was not particularly hard to implement however it affected other functions such as dropping a hint, joining a hint and filtering which made the process more complex.

Figure 42: Contextual icon changes depending on time.

6.4.3.6 Filtering

USER ACTION	CODE INVOLVED	FILE	LINE
Selects Filter Icon	Filter options displayed	DropHint.js	975
Selects Specific Icon	Type selected is removed from filter array and opacity is dropped	Filter.js	76
	Markers of this type are removed from map and list		

To manipulate markers on a map the marker information also needed to be managed. (See Section 6.4.3.1) Once we realised this fact, the initial functionality of filtering the map was not difficult, however the handling of the options selected in local storage and how the initial options were decided on became more complex.

As phonegaps local storage functionality does not handle storing arrays, each time a type was added or removed from the filterArray (which held the users selected options) the serialised data needed to be parsed into an array of objects and then re serialised back into a string to be stored in local storage when the task was completed.

On opening the app for the first time, to avoid the map and list being empty all options were pushed into this array. We also needed to account for the change in time (ie. cafe or club would be displayed.) so a check must be performed when the app is reopened.

Having this functionality up and running, we had the ability to filter by any option we wanted as we had all the data at our disposal. By testing our users (Section 8.6.2, Q2) we found that the ability to filter by type was the most popular so we decided to stick to this one option.

The next challenge was to create a smooth transition onto the screen. The filter buttons were created to drop on screen at different intervals. This meant that they first had to be given specific position horizontally but also kept above the screen to make it appear that they were dropping down. Once the filter button is selected they are triggered to drop a different times. This gives the user time to register each button as they are dropping and once the user has finished they fall off screen. This animation was sped up from the initial drop as to speed up the flow to get back to the map page. It adds to the effect and feeling of the selections falling of screen.

Final Testing revealed that on first use, most users found the process of initially selecting the types you wanted to remove counter intuitive. This was a result of our coding method and will be discussed in more detail in the Evaluation, Section 9.3.2.1.

6.4.3.7 Dropping a hint

The back end functionality for dropping a Hint is described above in Section 5.4.2.2. As this process is one of the main functions of the app, the user experience was very important here. For this jquery actions were used to display the visuals once the user has made a selection. This can be seen even when selecting the drop menu button. The button itself rotates and becomes an “x” to represent exit.
From testing, we added the venue autocomplete feature when a user begins to type and

suggested locations nearby. These are powered by googles libraries. Initially every Hint dropped was located at the users current location. Once adding the above location features, there were often discrepancies between the location name and the actual location displayed. Therefore any venue chosen with the help of google autocomplete or suggested locations uses the latitude and longitude from google libraries instead. The user can still enter a unique name which will be placed at their current location.

Css animations were implemented to move items around the page to save on space. This can be seen when the user has selected to name their Hint location, the location name animates to the top of the page leaving space for more functionality to appear. The icon selections were dealt with using an active selection method. Using Jquery actions we called the active selection to have full opacity and unselected to drop opacity. This resulted in a visual selection being displayed to the user.

Once the Hint place type is selected eg. Indoor/Bar, the Hint categories are shown on screen. These are dynamically placed on screen. Depending on the type selected a different selection of categories will be displayed. Initially we just had a small number of categories but as this grew we needed to find a new way to display the categories. Once the Hint type is selected the categories related to it are then appended to pre arranged divs. The user can select through each type and the categories will update.

6.4.3.8 ‘Joining’ or ‘Watching’ a Hint

The user must be within a certain range of a Hint for them to join in on it, otherwise they are just showing interest in this hint for later. Therefore the distance between a user and a hint is calculated for each specific Hint using google maps geometry library. We used the familiar ios action of swiping left to display more options. Depending on the users distance the join or watch marker is displayed. On clicking this button the appropriate action is triggered.

On joining, the appropriate categories are displayed depending on the type of venue it is. Once selected the tick appears for the user to confirm their action. On clicking watch, the Hint is saved to local storage (Similar to the filter array described in section 6.4.3.6) where its uses will be discussed in the next section.

6.4.3.9 Watch List

The watch list was not a feature included in our initial requirements. It came to light when we were handling the Hints that users could not join immediately but showed interest in. These were added to a local storage array to be used in conjunction with the background location and notifications. We had the idea to make use of this instead of keeping it hidden. In our October/November survey we proposed this feature to our potential users and the response came back quite positive. (See Section 8.6, Q4). On final testing users thought it was very useful (See Section 8.9: Testflight Survey)

6.4.3.10 Background Locationing

(See Use Case Table in Section 6.4.2.7)

The initial plugin used for tracking background location depreciated with the new version of Cordova 3.5 for ios 8 so this needed to be changed at this point. There were some issues initially with the accuracy and frequency of location calls while the app was in background mode. (See GPS Test Results, Section 8.8.3) This was due to the fact that the watch position action was being called using a set Interval function which was influencing the calling rate for this function also. We carried out 2 further formal tests of the location accuracy which are discussed in detail in Section 8.8.

In the call to check for updates in background location, the locations are cross checked with the users location and if they are within a specified radius the user is alerted. As this call is automatic issues arose when we allowed for users to open the app manually and join and not be joined automatically. Multiple notifications were being send for each venue as they were not being removed for the local storage watch array. To overcome this issue potential users were tested to see what was most important to them (Results detailed in section 8.6.2).We asked users if they would like to be joined automatically on arrival, open the app and join manually, or have a setting to choose. The setting option was the most popular so we implemented this to allow the user to turn on or off notifications depending on whether they wanted to be automatically joined or manually join. The background updates are only triggered when there is an item in the watch list. The measure was taken to save on battery power when the plugin is not needed.

6.4.3.10 Introduction and Login screens

We used a slide.js plugin for the page slide interaction. Initially we had each background designed and the animations triggered on top, this proved problematic. It meant that each time a page was changed the animations and page transitions triggered at slightly different times. We resolved this by stating each background page to the slide.js and then putting the animated imagery in between each background image. this meant for smoother transitions and cleaner animations.

6.4.3.11 Feedback, placeholders & loading bar

We used a dropdown visual as feedback from joining, watching and to signal if you have already joined the Hint selected. This dropdown is from the top of the screen and is triggered by the the success echo from php in most cases. It is animated using jQuery slideDown and slideUp functionality. A delay was used between the two so the user could register the feedback. An example of this can be seen in javascript folder: Marker.js - line 518. Our password reset uses the same command. We also created a custom loading giff to suit our overall design aesthetic.

Placeholders were used to give users feedback if an area was empty or unresponsive. These placeholders can been in the watch list, list view and nearby locations. An example can be seen in the javascript folder: favourites.js - lines 413-420. We used an if else call that checks if the area has any content. If it doesn't it will display the placeholder. If the users current location cannot be found on opening the app a placeholder is displayed with additional functionality as the user can refresh the page from here. This can happen if the user has their location services turned off or they have insufficient internet so was therefore a necessary addition.

6.4.3.12 Privacy

As we were using background location services within our app we had to ensure our users privacy remained intact. No locations are saved to the database and a users location is only recorded at the specific location they choose to drop a hint. All functions for notifications for

auto joining are done within the app structure itself without involving a server side database. Passwords encrypted

6.4.3.13 Contacts/Friends

After the September Sprint, a week was spent researching and accessing the phone contacts to be used to find friends within the app. (See Section 5.2.2 above) We had researched and structured the steps involved to complete this process however each step was taking much longer than we could afford to give it. At this time we surveyed our users and asked what information they would find most useful and friends was lower down the list (See Section 8.6, Q1). Thus we decided to continue with other aspects of the app that were part of its core functionality. We will discuss this aspect more in our evaluation.

6.4.4 Revisions from Testing

As we conducted an iterative testing process throughout the development process changes and additions were made due to this. These are outlined below.

6.4.4.1 Forget Password Feature

USER ACTION	CODE INVOLVED	FILE	LINE
User forgets password and clicks on forget password	Forget password page displayed	Index.html	96
User enters email and presses send	Function called on click so get email entered and send to php.	Users.js	254
	Email sent using PHPMailer	ForgetPassword.php	All

We added this feature at the end of the project as some of our Testflight users had trouble remembering their passwords. Simple Mail Transfer Protocol (SMTP) is used for sending email as we had no access to the php.ini file as blacknight is shared hosting. We used the phpMailer Library for this.

6.4.4.2 Center map on location

From our final testing throughout December, users sometimes found navigating back to their current location quite laborious, and so we added the location arrow seen in google and Apple maps to return the users display to their current location.

6.4.4.3 Sorting Category Display

Issues were addressed relating to the category displayed in the info cards; Whether to display the original category chosen by the creator or the maximum category added by users. We sorted out the maximim category on loading and used this if greater than the original. We also addressed issues on empty category selections in the database, so when users automatically join the origional options selected are added, so as no category returns undefined.

6.4.4.4 Notifications including venue name

Our testflight users were unaware of what Hint they were being join to when getting a notification saying “You have been join to this Hint”. From this feedback, we added in the venue name to the notification message so this was very clear. They now state “You have been joined to the Hint at the Vene Name”.

6.4.4.6 Drop Hint Issues

Issues arose in the final stages regarding the Drop hint venues and locations. Any venue with a a special character was not being inputted into the database and so, the action was not successful. It took some time to find this issue. Other bugs were fixed to do with updating the location if the user entered a unique address, the use of the native keyboard to continue and categories specific to type.

6.4.4.7 Marker Svgs vs pngs

When testing other visuals for the map markers we were using svgs and paths to allow for more flexibility in design. While testing on the browser they worked perfectly, however, on the phone the locations were way off until you were zoomed in to the max. As it was decided

from testing we going to use simpler marker visuals, we returned to using pngs for the marker icons.

6.4.5 Functionality Not Included in Final Build

- More filter options. - Testing revealed they were not necessary. (Results outlined in Section 8.6, Q2)
- Option to order list by data other than distance. - Due to the map/list connection it was decided that this addition would be more confusing than beneficial.
- More complex Marker visuals - Initial testign reveal this would be useful to users, however once the complex marker visuals were implemented, they proved to be too confusing when displayed using dynamic data.

6.4.5.1 Turn off expiration

As discussed with our Supervisor, the functionality to remove expired Hints is not active in the Final artefact so as the examiners can view it in its intended form. As the app does not yet have sufficient users to keep it active, we felt this was best. The functionality can be viewed in the PHP folder: Join_3.php.

6.4.6 Main Sources Used

Formatting data: *http://stackoverflow.com/questions/13310142/create-php-multidimension-associative-array-from-mysql-linked-tables-select-quer*
http://jsonformatter.curiousconcept.com/

Notifications Workflow Example: *http://www.raywenderlich.com/32960/apple-push-notification-services-in-ios-6-tutorial-part-1*

6.6 Conclusion

This section details the methods used to develop the functionality of the app, both front end and back end. The process described was a very iterative one and the code was changed and altered accordingly to reflect this. All decisions made were informed by the design intentions, as described in the previous chapter, and user needs. Testing was carried out throughout this stage, and is referenced above where appropriate. The next chapter will discuss how we worked as a team during the project and how we used social media to help promote and inform our decisions throughout.

7

Production and Promotion

This Chapter outlines the production process in terms of teamwork, communication and content sharing. We will then discuss the social networks we used to promote Hint and give our users an insight into the development process.

7.1 Production Process

7.1.1 Introduction

In this chapter we will discuss the way in which we worked together to produce the final artefact. We will discuss the different organisational tools that were used to make sure we both knew what we had to do and what was left to be done. The methods in which we shared files will be explained and how we created an efficient workflow pipeline. The management of this project was one of our strengths. We spend the majority of our time working in college, which we found to be very suitable for our work approach.

7.1.2 Roles

On forming the group in February, we initially decided that Brian would be the Programmer and Gemma would be the Designer. Over the summer there roles were loosely adhered to as we felt we had done a significant amount of design work in the Concept Stage, we could afford to focus more on the getting to grips with the coding aspect as we were not as experienced in this area.

By September we discussed our individual progress and decided to officially switch roles. Gemma would still have an input in the design but would undertake the majority of the Coding, and Brian would take over the Design, while still completing the front end coding elements.

7.1.3 Communication

We worked together in the Creative Digital Media (CDM) Room, DIT Aungier St. for the majority of the project duration. Over the summer months we meet 3-4 days a week, with this increasing to 5 days from September to December. If we needed to communicate outside of

these hours we used Whatsapp, Facebook Messenger or email depending on the urgency of the matter to be discussed.

As we spent most of the time in the CDM Room in college we could easily discuss any matters that came up immediately. It also proved very useful for asking for each others opinions and for help. We therefore both had an input it the design and coding of the app.

In general, we discussed our progress and what need to be done for the week ahead every Monday and listed each team members tasks in the Development Log we kept on Google Drive. Initially we used Trello for keeping track of our To Do lists, however it was soon clear we favoured Google Drive as we could easily record each day in more detail. We also both kept personal notebooks also. Many of our tasks, coding in particular, took longer than they should as we had no experience prior to undertaking this project. Therefore Trellos additional features were not as beneficial for us.

After each Sprint, we discussed the comments and suggestions that were made and defined our objectives for the following Sprint at this point. We successfully met all the deadlines discussed with our Supervisor.

7.1.4 Content Sharing

Throughout the development process we used Google Drive as our main resource for sharing files. This was very beneficial as both team members could view and edit files simultaneously. We used Survey Monkey for our initial Surveys, but switched over to Google Drive Forms as the data gathered on survey monkey could not be copied. Aside from sharing code and assets, we could create whatever files we needed online where either party could edit which solved the issue of feedback and multiple uploads. We kept all files organised into folders for each Sprint with folders for General Documents and Testing also.

As our app is hosted on a web page, we created sub domain names in the later months so both members could access the current build. Every evening we would transfer any changes made to the front end over to the main build via usb to keep everything up to date. This meant we also had a backup of each build every day. We found this easier than using code

sharing resources like github as we were both working on different sections, they could be easily crossed over. Also, we could experiment with the code without needing to worry about 'breaking' it for the other team member.

7.1.5 Production Pipeline

Our production pipeline was a combination of what has been discussed so far in this section. We would decide on an overall task. This would then be broken down into sub sections which would be assigned to each team member. We would be in constant discussion throughout this phase, so if either member was experiencing issues we could review immediately. During the initial stages our tasks were quite separate and therefore there was not much overlap between files. As the development progressed the overlap became greater. During the final 2 months of the project when the major code feature were functional, we started to implement the design properly. This involved close collaboration as Gemma would retrieve all necessary data from the code structure, label it accordingly and pass it to Brian, where he would then apply the necessary styling to these elements.

A build could easily be deployed via xCode to each team member. After any significant changes we would run a build on each device. If any alterations or improvements needed to be made on either the design or the functionality, they would be discussed and altered.

This method, while quite simple, worked very well for us. We set out our project requirements 9 months before completing the project, and managed to implement all within the Masters time frame. During this time, we hoped to achieve more of our extra features as outlined in our MoSCoW in Section X, however we made a conscious decision half way through the project to set some features aside for future work as completing the app to a level were happy with was more important that adding extra features. This decision was also made at this time to reduce increasing stress levels.

7.1.6 Conclusion

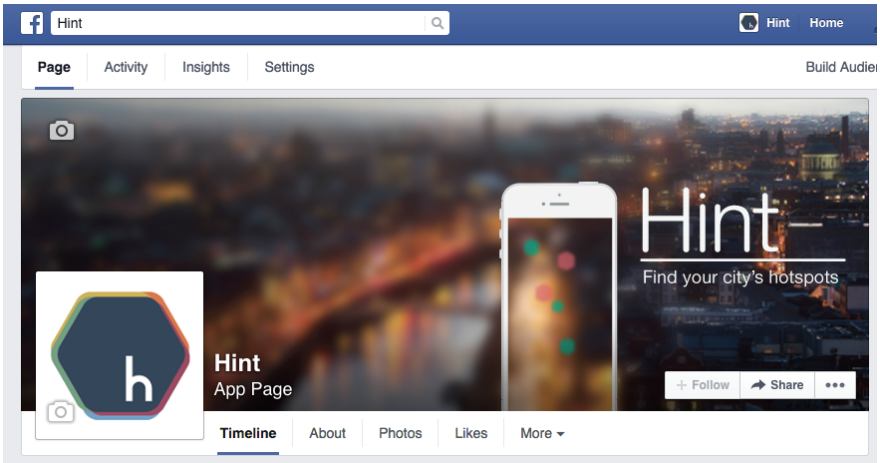
We feel the we worked very well together as a team. It helped that we has similar taste in design and tended to be on the same page for any decisions that were made so there was never any conflict when deciding on the best way to proceed. We were also not afraid to critique each other's work, which we feel was very important in making the app the best we could. We stayed in constant contact, which was hugely important so we knew what was being done and what needed to be done next.

7.2 Social media, Website and Promotion

This section will explore the main methods of communication between the Hint app team and potential users. We will utilise Facebook, Tumblr and our website to build awareness, gain user feedback and gather testers. We will analyse these platforms and discuss their impact on the project development.

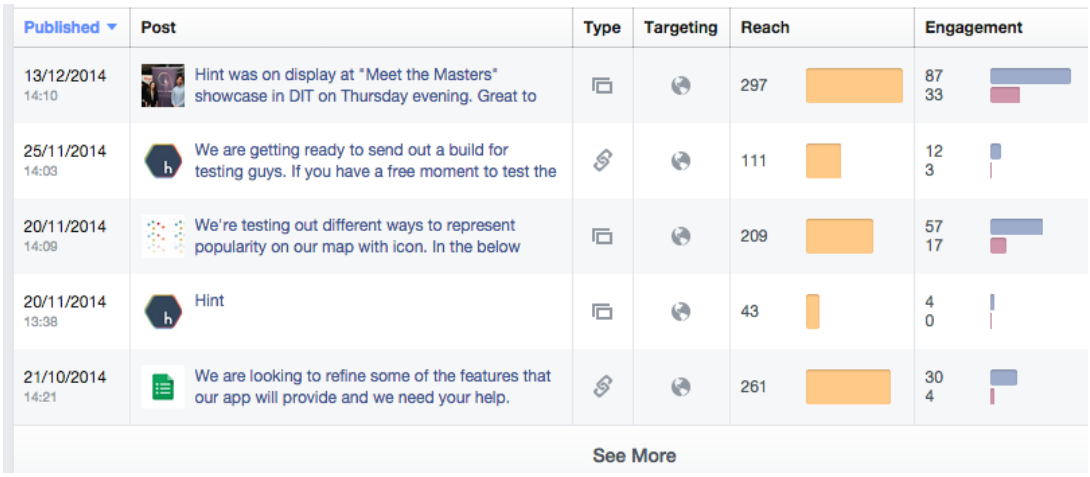
7.2.1 Facebook

www.facebook.com/hintappteam



The Facebook page was setup in July 2014 to communicate and engage with potential users. This would promote the hint and create awareness, facilitate casual testing and allow us to receive feedback. We accumulated 138 likes or fans from when the page was created until the end of January 2014. These fans were located in 10 different countries but the majority were based in Ireland. This was taken into account when discussions were held on the page.

Facebook refers to the reach that each post has which covers how many people have seen it, not just fans. This number can be larger than the fan number because friends of friends can see what they have interacted with. We received a high reach level with the majority of our posts with high engagement levels. This means that fans had either commented or liked the post. We often proposed questions to our fans to start discussions and the feedback and engagement would see a spike.



Published	Post	Type	Targeting	Reach	Engagement
13/12/2014 14:10	Hint was on display at "Meet the Masters" showcase in DIT on Thursday evening. Great to			297	87 33
25/11/2014 14:03	We are getting ready to send out a build for testing guys. If you have a free moment to test the			111	12 3
20/11/2014 14:09	We're testing out different ways to represent popularity on our map with icon. In the below			209	57 17
20/11/2014 13:38	Hint			43	4 0
21/10/2014 14:21	We are looking to refine some of the features that our app will provide and we need your help.			261	30 4

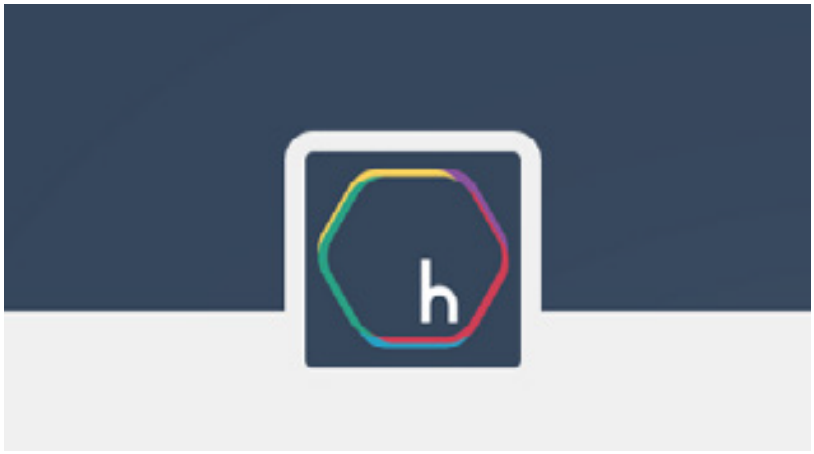
See More

Figure 43: Reach and engagement of Facebook posts.

Our page provide a good communication window between us and our users. We gathered some great feedback through adhoc testing and discussions. Users engaged on a more social level through this platform in comparison to one to one conversations. It promoted casual and relaxed environment that brought about creative discussions.

7.2.2 Tumblr

http://get-the-hint.tumblr.com/



The Tumblr blog began in July with the concept of updating the site with imagery and text to allow the more interested users follow our development process. This site has the ability to share creative content in a fast and attractive way, the term used is reblog. The emphasis was on visual updates to promote the design of the app.

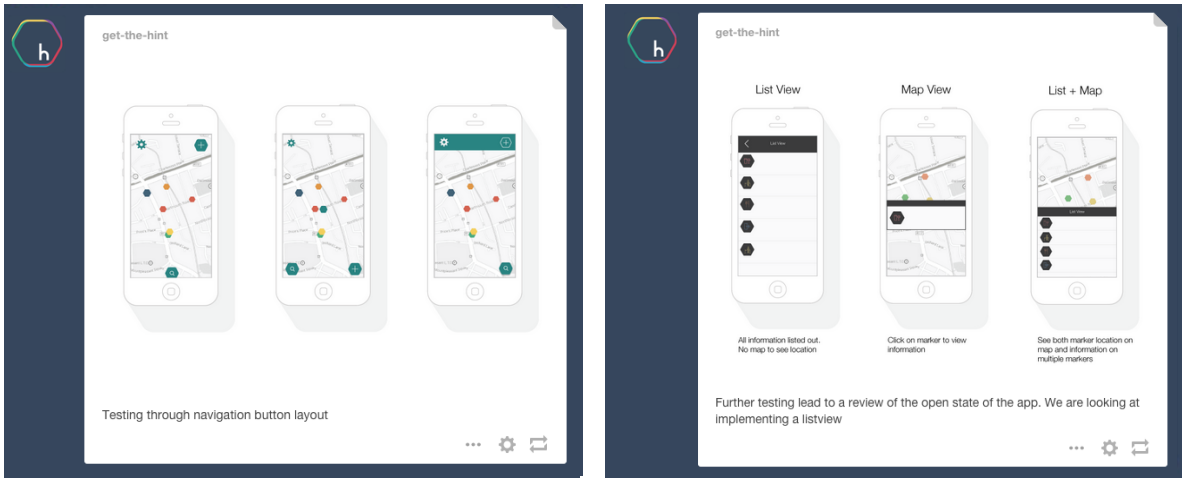
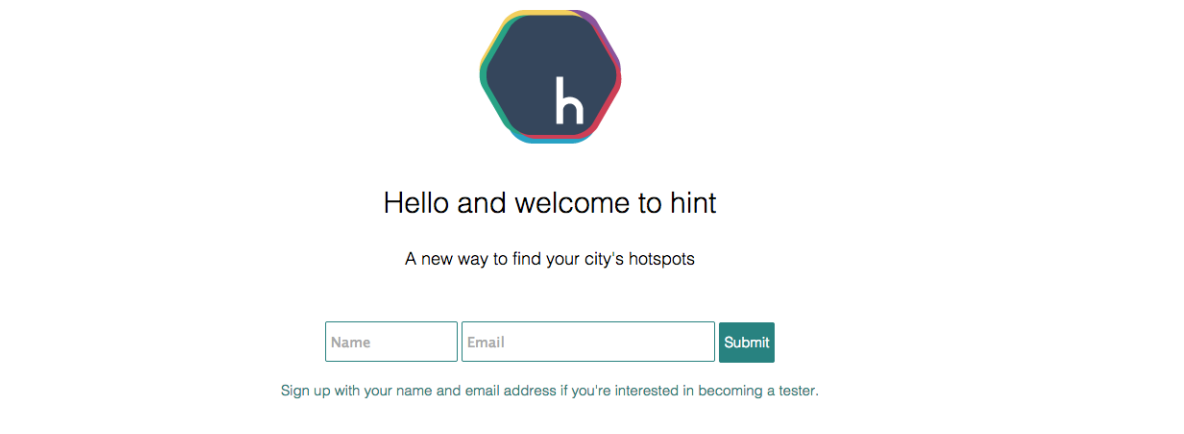


Figure 44: Screenshots from Tumblr.

Tumblr was maintained through the development process with imagery and noteworthy updates. It created a place where we could casually view designs on screen. This wasn't developed for interaction and was used more so to update users on our progression throughout the process.

7.2.3 Website

www.hintapp.eu



The website was used purely to gather testers. We sent out the url over facebook so interested users could sign up. They added their name and email address which is saved to the Contacts Table in the database. We contacted this table of users when we were ready to send out a testflight build. This process of users adding themselves was the most convenient way to address the tester pool.

name	email
Tara	agnewtara@gmail.com
gemma	gemmag07@hotmail.com
Stephen O'Hara	soh2ski@hotmail.com
Devin Finneran	devinfinneran94@gmail.com
stephanie	cogentireland@gmail.com
stephanie	sailingstephanie@yahoo.ca
Brian	brianbyrne95@gmail.com
Brian	briand6868@yahoo.ie
Sophie Gallagher	sophie.gallagher@ucdconnect.ie
Jack	jackconnolly87@gmail.com
Hannah moore	hannah.moore1@hotmail.com
Vivian	viv.vivas@me.com
Padraig Moran	padraig@hemph-moran.com
Tim cole	tim@wingit.ie
caroline	o_connellcaroline@hotmail.com
Conor Lyne	conor.lyne@gmail.com
Luke Moore	moore.luke94@gmail.com
Hsiang	hsiang307@gmail.com
Shane McShera	mcsheras@tcd.ie
sadhbh	sadhbhin@gmail.com
Eileen	eilo2u@hotmail.com
eileen	curran.eils@gmail.com
Michael Keane	mkeane92@yahoo.com
Sophie	sohare@hri.ie
Katie	katiegrehan@gmail.com
Tim	tim@timphelan.net
rob babos	robbabos@hotmail.com
Adam Deegan	deeganad@tcd.ie
Aisling Flynn	aislinguna.flynn@gmail.com
Sarah Moore	sarah.moore1@hotmail.com

Figure 45: Screenshot from Contacts Table of database showing all users who signed up via the website.

7.2.4 Promotion

Throughout the development of this app we have been promoting and building a following. Our app is based around users leaving hints for other to view. Without people using it there would be no information. Even for the for the purposes of testing we wanted as many users dropping hints as possible. We recruited users right up to our final phase of the project and will continue to do so. The app was promoted through social media platforms, college events and testing sessions. We designed and made a banner for an event held with Dit called “Meet the Masters. This was a showcase evening for us to promote our apps.

We created a video for online sue to promote the app. It is available on Vimeo and YouTube and is being shared via our various social media outlets. The video follows on from the design aesthetic of the app and summarises the key features of the app.

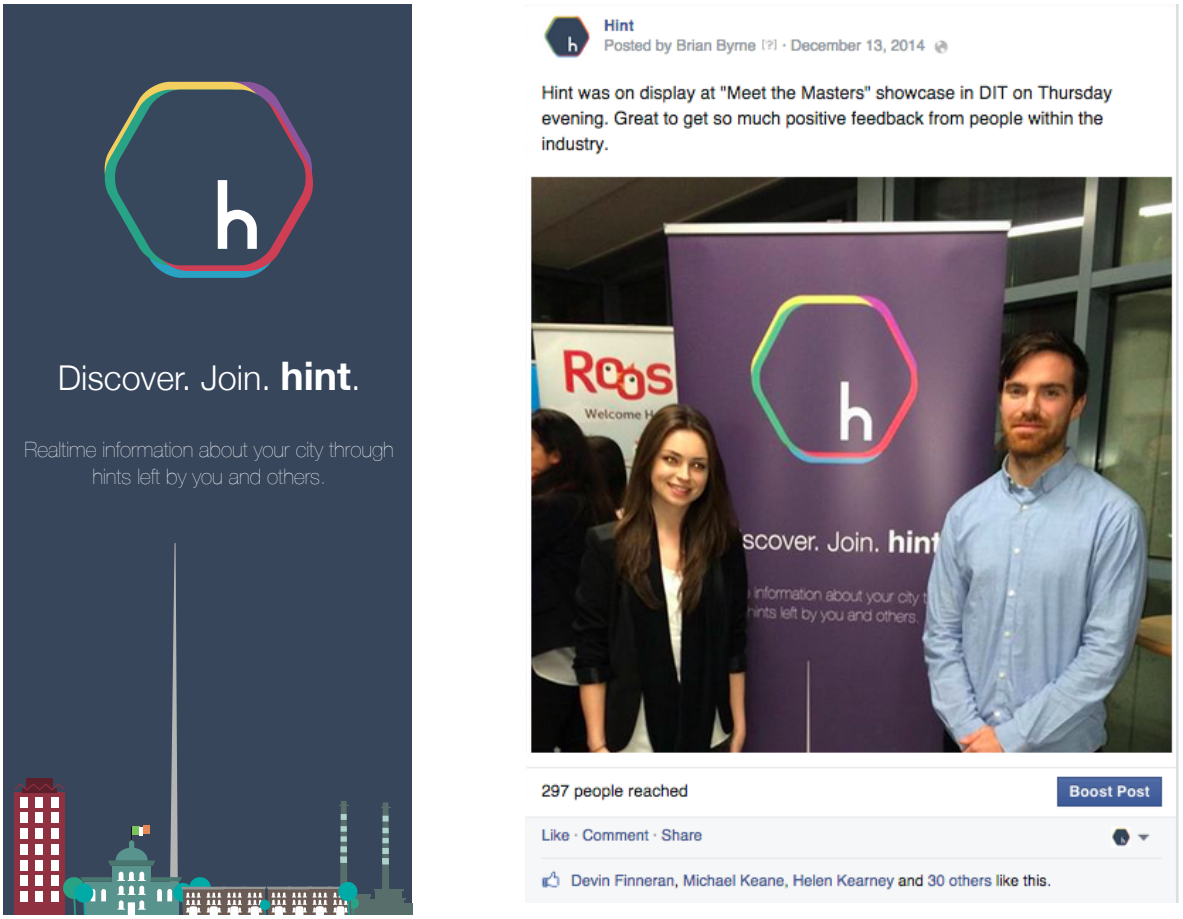


Figure 46: Banner created for 'Meet the Masters' and team image uploaded to facebook receiving 33 likes.

7.3 Conclusion

This section documented the communication methods used by the team to create the final project and how we quickly formed a pipeline by which both members could work independently off eachother. We have also given insight into how we promoted our app and interacted with potential users throughout the process to ensure that at all times our decisions were informed by our users.

8

Testing and Analysis

8.1 Introduction

Within this Chapter, methods and technologies used in the formal and informal testing of Hint will be discussed. Feedback from potential users was required at every stage of the process. This feedback included simple conversations with peers, online surveys, approaching fellow students in the canteen, social media outlets, Testflight builds and formal testing with potential users. While all of these methods are not quantitative, they are all useful and have helped inform our decisions throughout the project.

Each section below will discuss the test aims and design, visualise the main results and analyse the findings, detailing how they have influenced our development.

8.2 Paper Prototyping

8.2.1 Test Aims

Paper prototyping was the first informal testing carried out. The aim of this test was to see the users reaction to different concepts we had developed for the overall navigation through the Hint app. From this early testing, our aim was to understand what interactions people would expect to see for the layouts we had designed. Tester would feel comfortable critiquing these rough early sketch prototypes.

8.2.2 Test Design

Three different concepts layouts were developed for this test. Each layout had slight differences in interaction and experience. Different shapes and sizes for display windows, different button configurations and some small navigation differences were created. Each user was tested with the three paper prototypes and then asked them to choose their preferred experience. The prototype order was reconfigured for each test. These tests were conducted at desks with the test coordinator revealing the interfaces as the tester navigated through the paper prototype.

Paper Prototypes

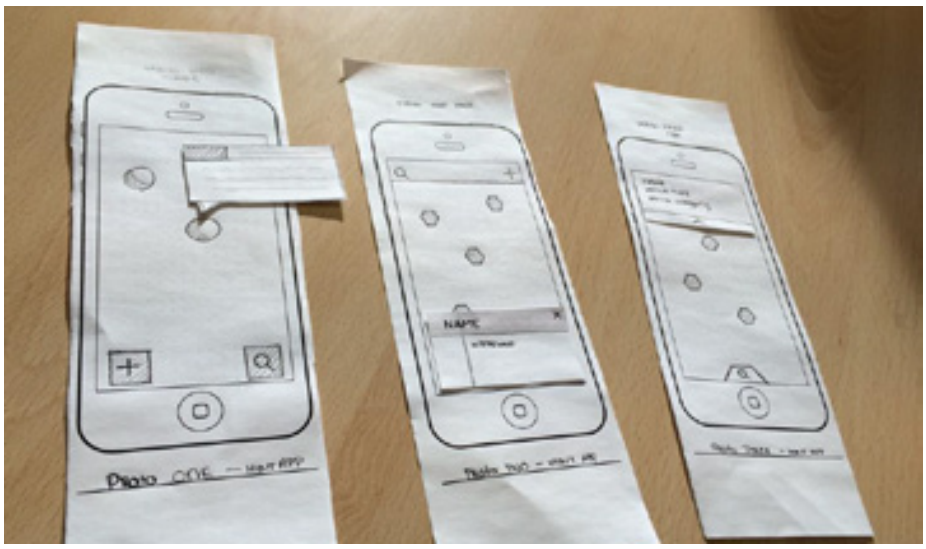
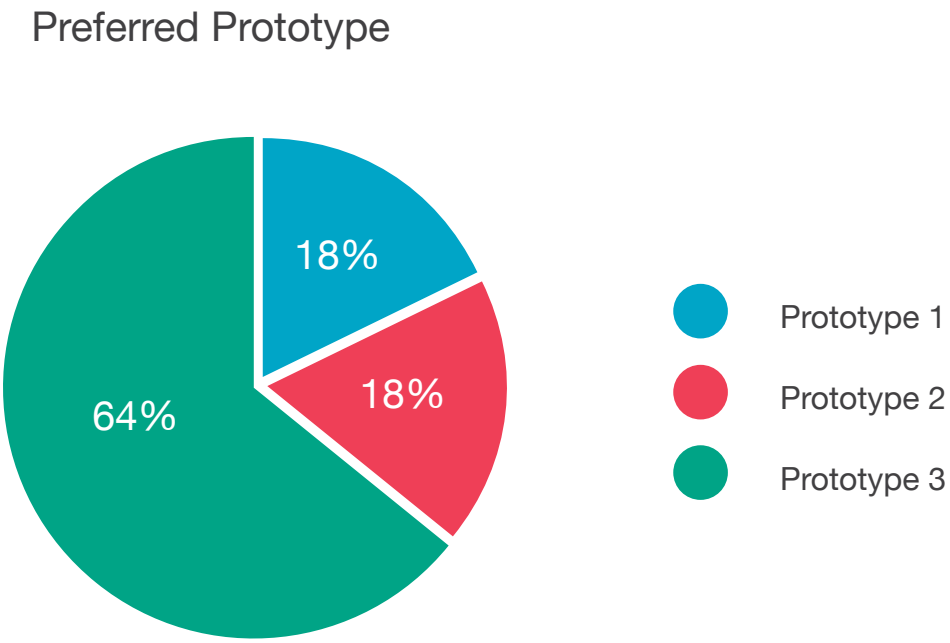


Figure 47: 3 Paper Prototypes tested.

8.2.3 Test Results

17 people tested this paper prototype during this session. The results came back that 3 people chose the first prototype, 3 the second and 11 people the third. These results were analysed and used to start the implementation of digital prototypes.



8.2.4 Test Analysis

The third prototype was the most successful. Its design was more appealing because of the simple navigation created. Users were only ever one button or page away from the main map page and as a result users found it easier to understand to understand. This simplicity was something we wanted to develop throughout our future digital prototypes. This test brought an understanding of how the user might interact certain UI elements like information popups or button layouts. It created awareness of the need to design for users expectation. Each user has a perceived experience for every interaction and we need to be able to account for and manage that.

8.3 Flinto Prototyping

8.3.1 Test Aims

Now that a basic concept of navigation was developed, the next step was to start developing digital content that the user could interact with. The following tests will now consider not only the navigation but also how the visual content should look. The visuals will need to aid the users understanding and give cues to functionality. A survey was filled out along with the Flinto prototype to attain more structured data.

8.3.2 Test Design

The flinto prototypes (Figure 48 below) were developed with the results from our early sketch models in mind. Our navigation concept was defined and different possibilities for the users journey around this navigation now needed to be explored. We created different button styles and configurations that tied in with the overall feel we wanted to get across to the user. Different sets of navigation button needed to be tested as some were more subtle than others. Different information windows were designed in which information would be displayed to the user and finally colour variations were also analysed.

Flinto Prototype Design

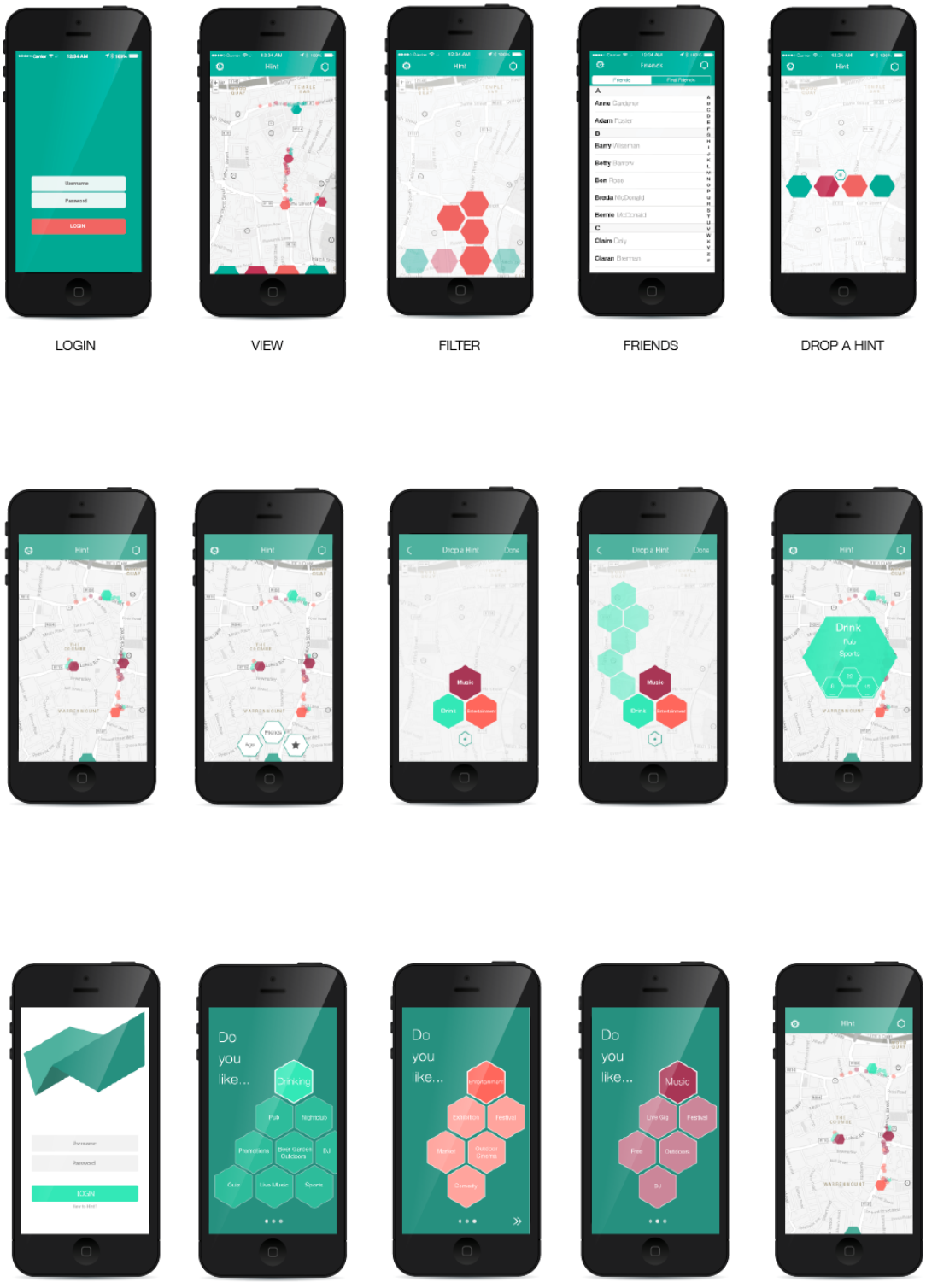


Figure 48: 3 Flintos created for testing purposes.

8.3.3 Test Results and Analysis

The results showed that users needed clean and clear directions when navigating through the interface. If buttons were too subtle the user may not notice or understand the meaning. Each piece of functionality needs to be clearly displayed and separated so the user can acknowledge it. Users responded well to the button navigation and colour scheme. Further development was needed on the Drop functionality as users expressed they didn't have enough choice currently. This outlines the need to broadening the range of categories selections. The testers could choose between various different information windows and they ultimately chose the small window. This is to be displayed over the map showing information about the hints.

8.4 Informal and Ad Hoc Testing

The following tests were informal and ad hoc tests to get feedback on design decisions for different pieces of functionality for the app. They were mainly A/B tests to see which designs would perform better with the users.

8.4.1 Icon Test: 28/9/14

8.4.1.1 Test Aims and Design

The aim of this test was to find the weak icons or the icons that didn't fit. The team wanted to see what naturally made sense to the tester and then build a set of icons that could be stand alone pieces of information. Supplementary text is given but they needed to be strong at a glance. After the first few iterations of our icon set we tested the initial batch. Users were asked to determine the meaning of the icons.

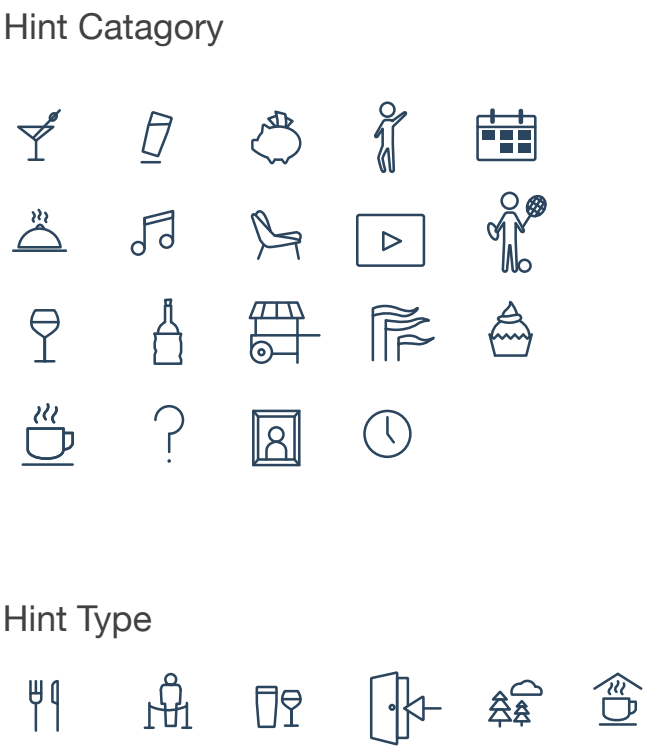


Figure 49: Icons tested.

8.4.1.2 Test Results and Analysis

From this test it was obvious which icons were weaker. These were then refined after this test. There were five in total that needed to be updated. It came back that some of the icons didn't aesthetically fit with the rest so adjustments needed to be made so that all icons all tied together.

Figure 50: Revisions made

8.4.2 Information Card Visuals: 10/10/14

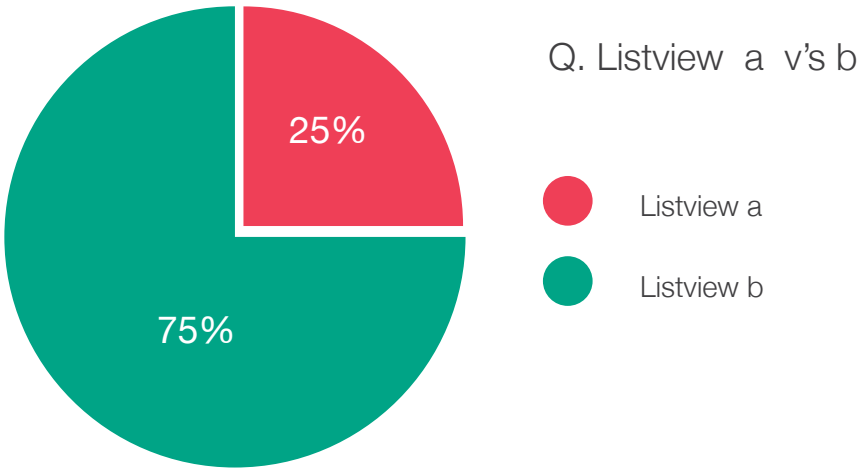
8.4.2.1 Test Aims and Design

Two different types of information cards were designed and developed which emphasised the information in two separate ways. The first information card (a) puts more emphasis on the hint venue while the second (b) draws attention to the type of place and what's happening there. This test was setup to ask users which one they would find more persuasive. This test was conducted in the canteen in DIT Aungier street.

Figure 51: List Displays tested.

8.4.2.2 Test Results and Analysis

24 people were tested and of the 24, 18 selected list view (b). The results show 75% of the testers found the list view (b) more persuasive in its design and information display than list view (a). This list view was then implemented in the next build and developed to handle the different kinds of information that may pass through. As all the text was dynamically displayed, this had to accounted for in the design with precautionary measures taken in the front end development.



8.4.3 Colour Swatch: 26/10/14

8.4.3.1 Test Aims and Design

Two colour swatches were developed. As these colour would be used to represent information used throughout the app they needed to be clearly defined. The aim of this test was to find a swatch which would stand out against the rest of our colour tones. An A/B test was created with two colour swatches and users were asked which one stood out more to them. This test was carried out in the canteen of DIT Aungier St with students attending the college.

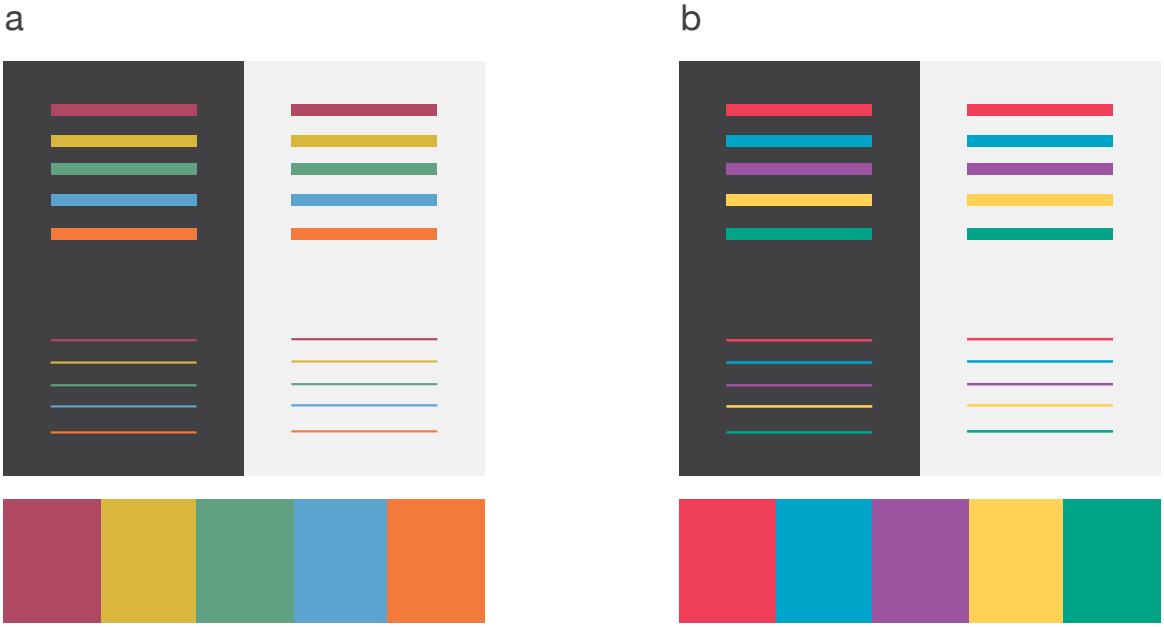
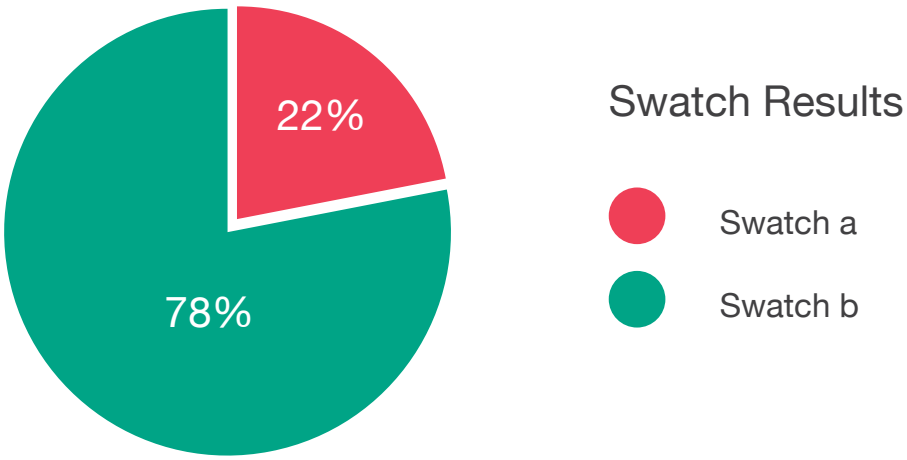


Figure 52: Colour swatches tested.

8.4.3.2 Test results and analysis

Out of 18 testers 14 preferred colour swatch B. This colour swatch was then implemented to represent the hint types for our app. Clear contrast between each colour was necessary. The background colours used within the app and this swatch provided that.



8.4.4 Filter Test: 26/10/14

8.4.4.1 Test Aims and Design

This test was designed to test the preference in usability between two different filter functions. The early filter feature navigates from the side of the page and the new filter drops onto the screen. These are two very different animations and we want to access which one users will have a better reaction towards. This test was conducted in the canteen in DIT Aungier Street and users were asked to interact with the filter menu.

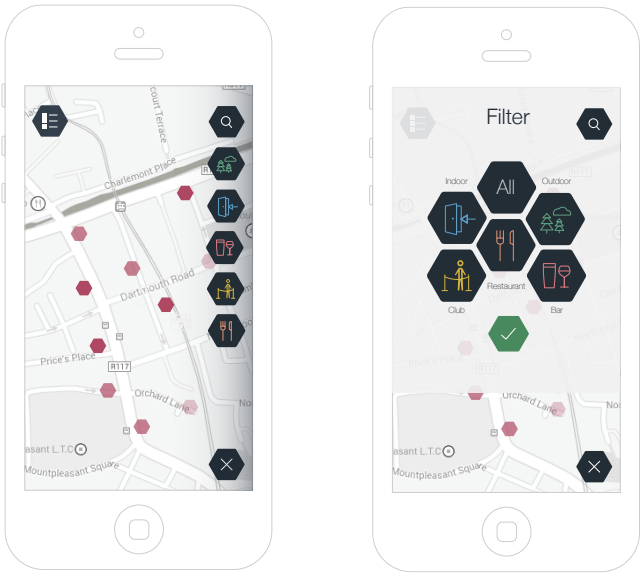
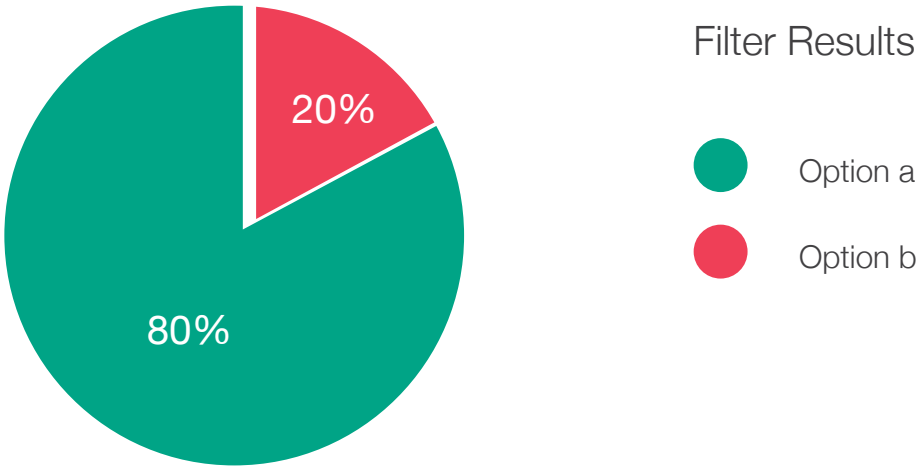


Figure 53: Initial FIlter Design Options

8.4.4.2 Test Results and Analysis

21 users were tested and 17 testers voted for filter option (b) with 4 testers choosing filter (a). The majority of testers prefered the overall feel of the second filter menu. The animations made it a better experience and the new larger button size made for an easier interaction. Some slight alterations were made to this filter option before being implemented in the next build.



8.4.5 List view Button: 28/11/14

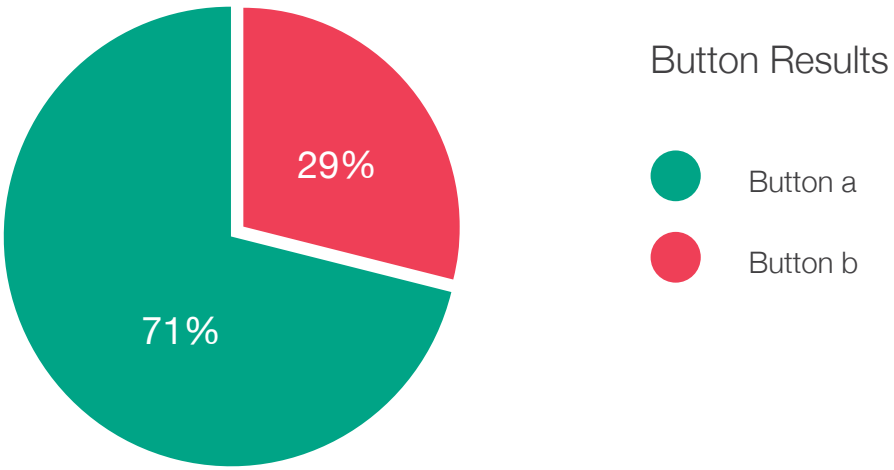
8.4.5.1 Test Aims and Design

This application is created for ios devices. The current device has a swipe up action for its hardware interface. The list view implemented to date was displayed and hidden from the bottom of the screen. This initial placement was as a result of previous user suggestions. A interaction was needed to handle this function other than a swipe. The aim of the following test was to see what visuals complemented a click function instead of a swipe. We created two different choices for this test and wanted to get initial reactions from users. It was conducted in the canteen of DIT Aungier St.

Figure 54: List Button Open/Close Options.

8.4.5.2 Test results and analysis

Out of 21 tester 15 found button (a) much clearer. The triple button configuration came back stronger as a click to the tester as this is the symbol apple use for ‘more info’. The arrow button prompted the users to swipe which was not desired. Button (a) design was implemented.



8.5 Testing Through Social Media

This section will discuss the use of social media for informal testing and feedback. It will outline the methods used to conduct informal testing and feedback. We will look at how the results and feedback impacted the design of the app.

While conducting research into categories and places of interest we wanted to get some insight from our facebook followers. We got back an interesting discussion between fans about where their hangouts are and why they go there. The following question was posed to our followers:

Figure 55: Feedback through social media

These discussions brought about the idea of not just stating what or where the hint venue is but what they may be doing there. It help reinforce the idea that what is happening at the venue is as important as what the place is.

Design questions were also shared relating to the map marker visuals. We were trying to display multiple pieces of information through our map and we wanted to know what was the most legible way of giving the users this information.

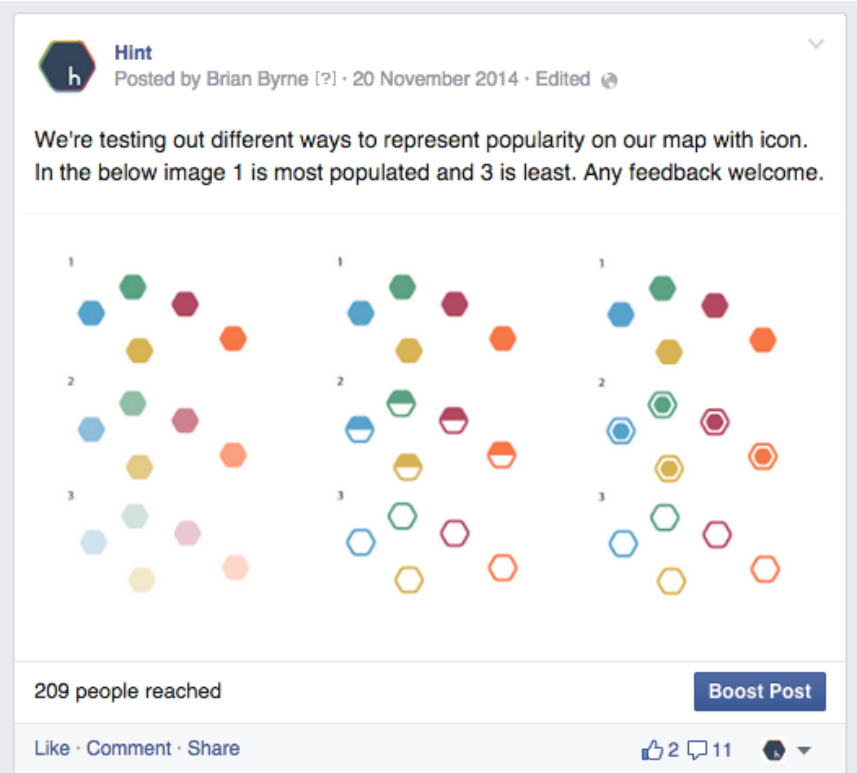


Figure 56: Feedback on marker visuals through social media

The results came back with the middle choice being most popular. It was the least disruptive choice among the three and was easy to understand. “The middle is the easiest to understand at first glance”, Facebook user, 20th Nov 2014. Once implementing this option, this aspect needed further testing. As the locations on the map were not as well laid out as the image shown, this option was no longer a valid solution. We admit there was an error in the design of this test. We learned from this when testing this aspect again.

Social media helped us to connect with users and testers in a fast and convenient way. The

structure of the platform allows of users to give feedback at the touch of a button and has a constant flow of testers or fan to call upon.

8.5.1 Obtaining Testers through Social Media (For Testflight)

Social media provided us with testers for our informal testing. Surveys, Testflight requests and Testflight surveys were sent via social media. A request was sent out through facebook looking for any volunteers to sign up for our Testflight build. They were lead to the Hint website to then sign up with their name and email. This is where the majority of our test pool came from.

8.6 Testing Survey: 21/10/14

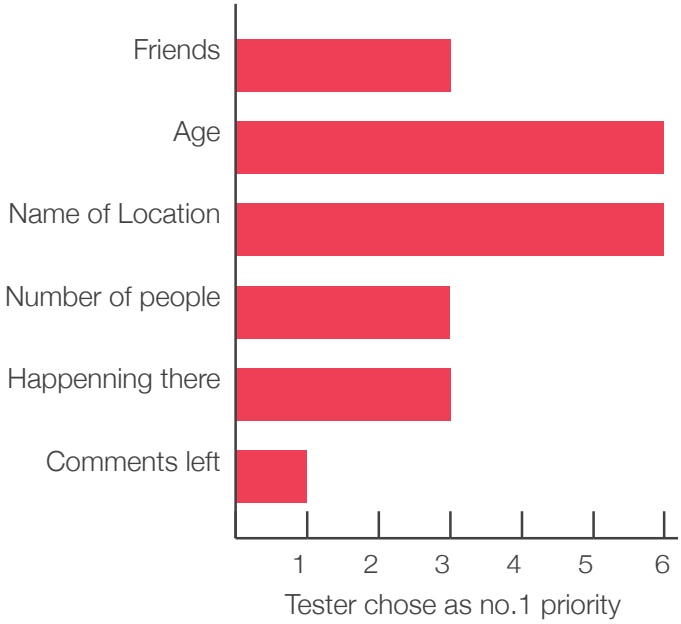
8.6.1 Test Aims and Design

This survey was created to refine some of the features in our app. Feedback was needed on new choices made and confirmation on other aspects which had been implemented. This survey was the first instance where we got feedback on the list view versus the open map view. Analysing the testers response was vital. This test was conducted in the canteen in DIT and was also send out through social media sites.

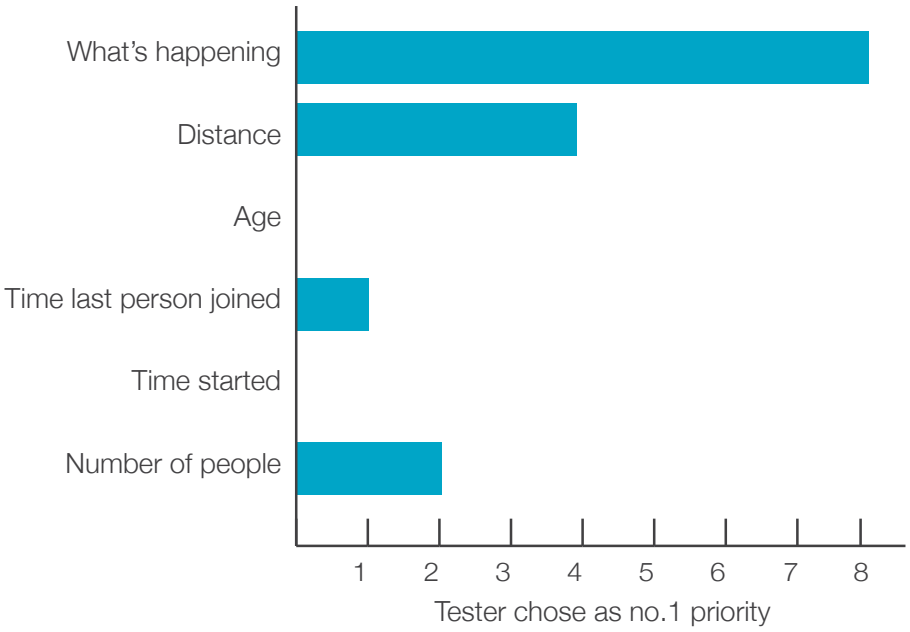
8.6.2 Test Results

The results below are a combination of all testers from the survey. In total 14 users participated in this survey.

Q1. The following list are possible features that you could view in a Hint. List them in order of importance?

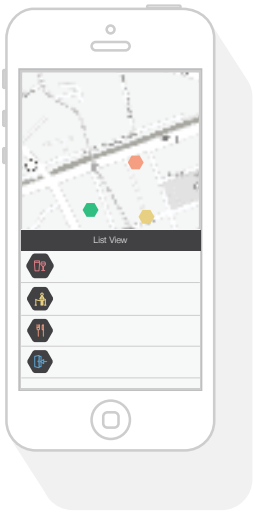


Q2. Below is a list of filter options. Users can filter hints for more specific viewing. Could you state the one you feel would be mose beneficial to you?



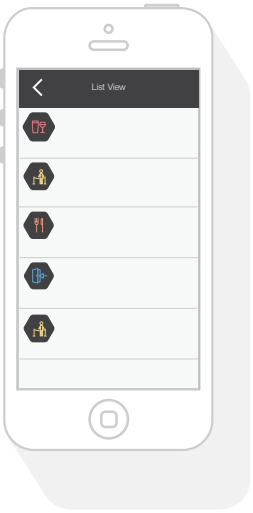
Q3. Which of the above screens would be your preferred option?

List + Map



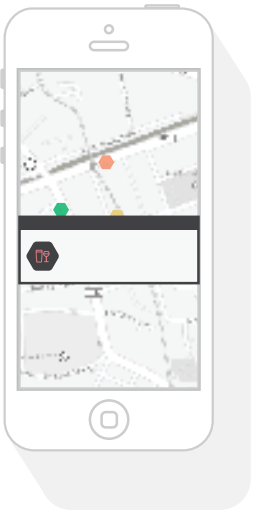
71%

List View



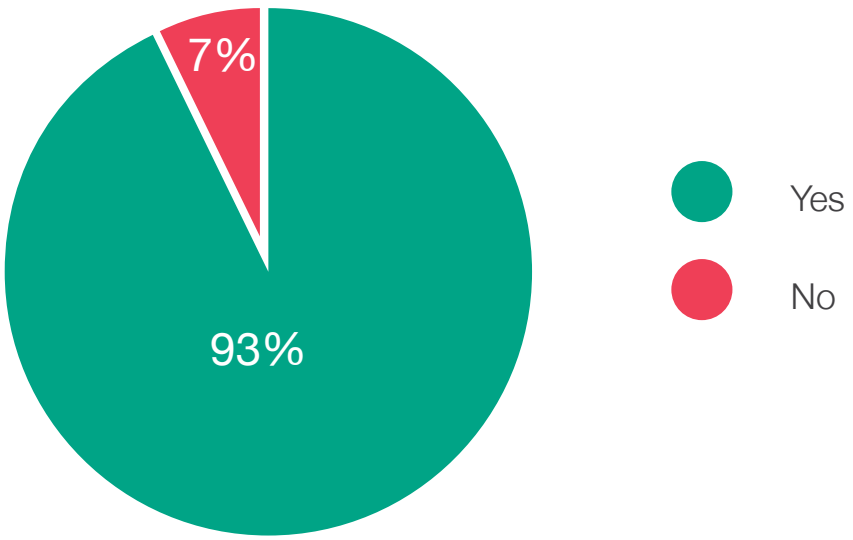
21%

Map View



8%

Q4. Would you like to view the hints you've shown interest in and be notified upon arrival?



8.6.3 Test Analysis

From reviewing the features results a hierarchy was defined. From this we know what information to put emphasis on, especially in terms of development. At this point in the development process we were considering started the coding for the friends feature. On receiving these results, it was decided that only on successfully implementing all other information, which performed higher in this question, only then would we attempt adding the friends functionality. It also influenced how we might order the information when displaying it in the info cards. It is important that some aspects take precedence over others when trying to present information to a user. If not the users tried to take in all the information at once. There is no visual harmony.

Confirmation was needed on the split list and map view display. 71% of testers opted for the split view. The map view was already functional. After this test the split screen was developed as the default view on opening the app.

Notifying users upon arrival could be an invasive feature. We wanted to know how testers would vote for having this feature. From our initial user needs survey (See Chapter 2, Section 2,4) the response very positive. The results from this test also showed the majority of testers would like to be notified when at a location. This will make for a more responsive app and will enhance the watch functionality.

8.7 Testing Survey: 12/11/14

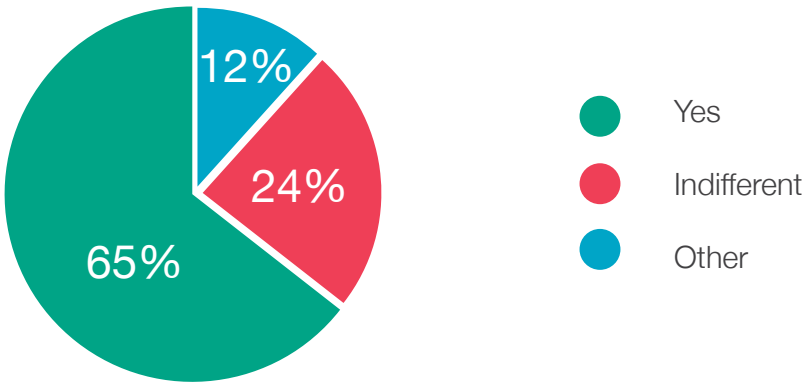
8.7.1 Test Aims and Design

This test was setup as our final informal test. It was design to give feedback and finalise features and designs. Users were asked to run through the app and answer questions in their own time through our survey. The survey consists of 13 questions to determine the success or failure of the different functions and designs. After analysing the findings, necessary alteration would be made. This survey and testing session was held in the canteen of DIT Aungier St. No testers had seen the app before.

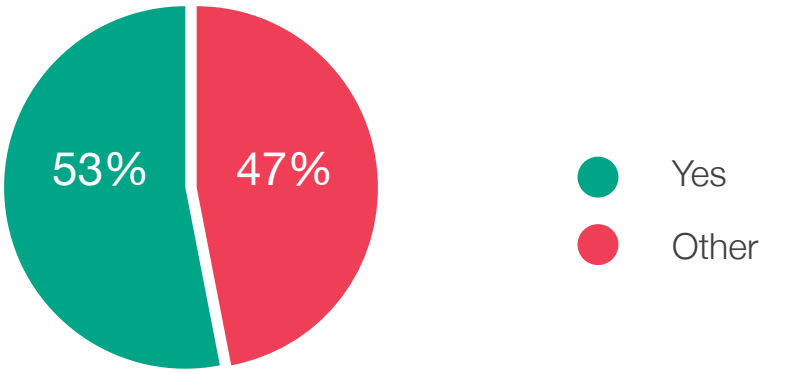
8.7.2 Test Results

The following charts display some of the results and findings from our survey. 17 testers took part who were all attendees of DIT college. The results were compiled in a Google spreadsheet and the results visualised below were gathered.

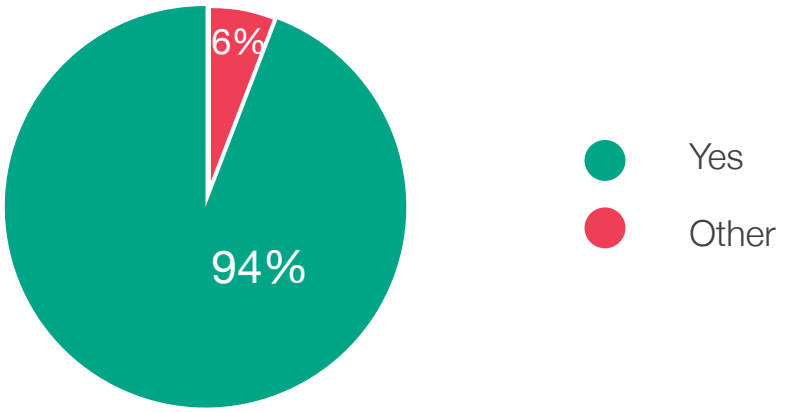
Q1. On opening the app, are you happy to see the list/map view as default?



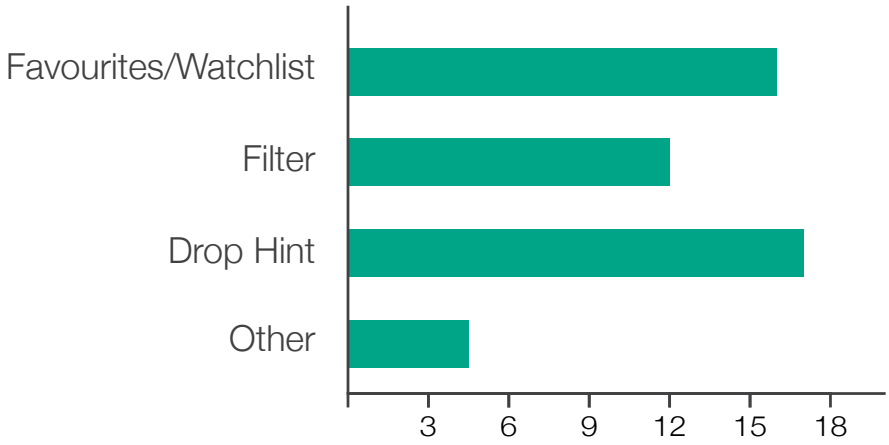
Q2. Do you feel the proportions of the list/map are correct?



Q3. Can you close the list successfully and with ease?

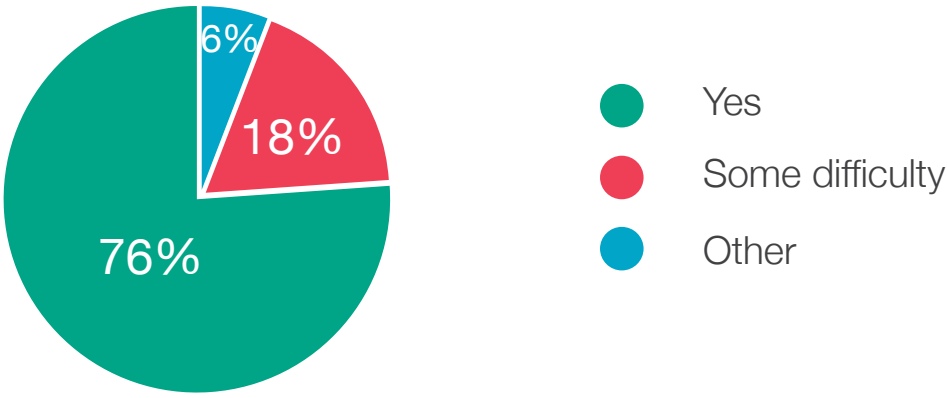


Q4. Can you understand the meaning of the Navigation icons?

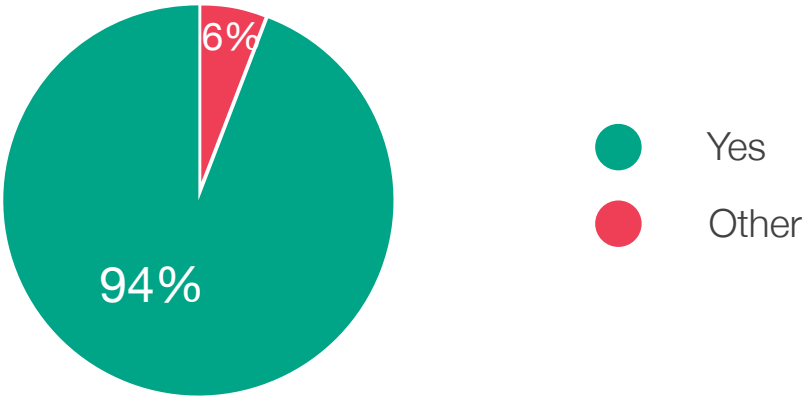


*At this time the filter icon was a search/magnifine glass and the watch list was a star. People quessed their meaning correctly but were unclear of the functions they performed. ie. thought the filter was a search feature and though the watcl list was favourite venues. For this reason we changed the watch icon to an ‘eye’ and the filter icon to the generic ‘filter’ icon.

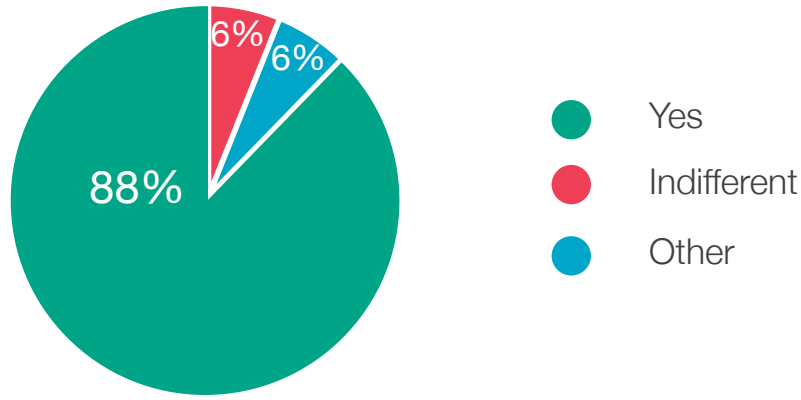
Q5. Do you understand all of the information about each Hint?



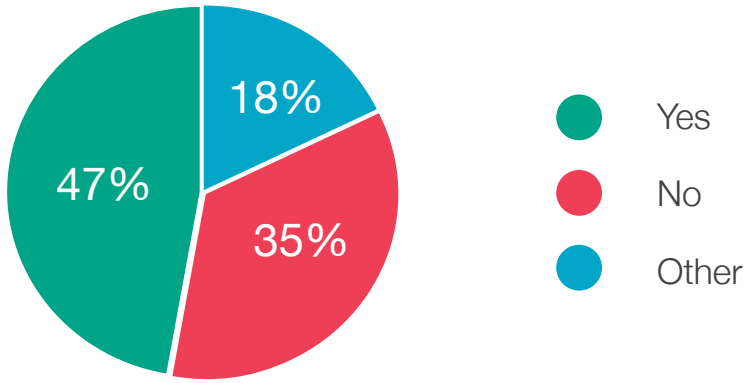
Q6. Would you know how to drop a hint?



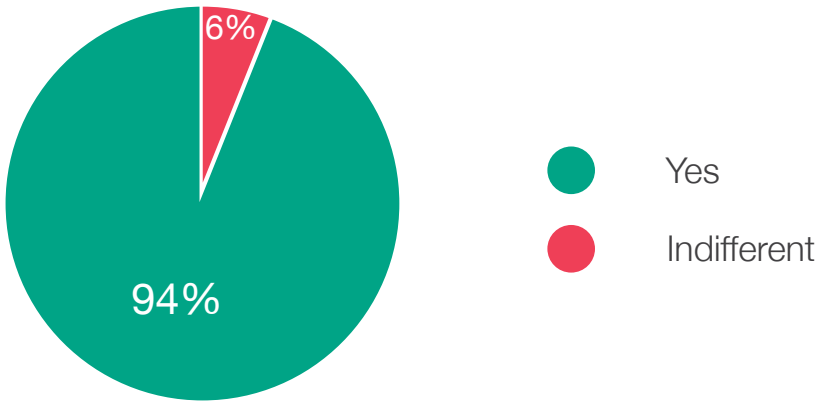
Q7. Would you like a list of suggested places nearby to select as well as the text input?



Q8. You are able to join hints. Would you know you can swipe to see the join button?



Q9. On joining a hint, would you like to add your own category to the hint?



8.7.3 Test Analysis

After analysing the results from the survey necessary changes were made to enhancing the overall experience of the app. The results were reviewed and the areas that needed addressing were pinpointed. The results also reinforced some of the design choices that were refined from the last survey.

Areas to address:

- Hint information
- Join/Watch Swipe
- List Proportions

While reviewing the results, it was observed that 18% had some difficulty in deciphering the hint information displayed in the information windows. While not a huge percentage this problem needed to be address. The team concluded that better separation could be used so that information could be distinguished in a cleaner and clearer way. The use of supplementary text was already being used but could be more pronounced. These changes were made for the test flight builds to conduct further user tests.

The join/watch swipe function wasn't as clear as it possibly could be. Only 46% came back with a positive response. As this is a major piece of functionality it needed to be absolutely clear how to accomplish this function. Two methods were implemented to reinforce this swipe gesture. The first being to explain the interaction during the introduction to the app. Animations would be used to show how the gesture worked. Inside the app, the area which should contain the watch list will be used to give a further explanation while empty. If a user selected the watch list and hadn't used the swipe gesture yet it would show them the procedure. This solution will be addressed in the Testflight survey and formal test.

47% of testers weren't happy with the proportions for the list and map view. 7 testers commented that they would like to see more of the map or have slimmer information cards. For this test 3 and a half cards were visible on screen. The list view itself came half way up the page. This feature was amended by bringing the size of the information cards down by 10 pixels and reducing the amount shown on the initial display to 3 cards. The list view would now come just up to half way giving the user a more functional work area on the map.

8.8 GPS and Notification Accuracy Tests

Many informal tests were carried out to test the accuracy of the in application, background location and notification accuracy. we could not possible record all these results as while these features were in development they happened on a daily basis. The tests detailed below were the formal tests carried out with specific routes and controlled conditions.

8.8.1 Test Aim

The following tests were carried out to test the accuracy of the background GPS location updates. The first 2 test were only to adjust the background location configuration settings. The last 2 tests included strategically placed hints added to the watch list to test and measure the optimum radius that should be given around a specific location for the user to successfully detect a hint and receive a notification. The difference is also shown between having wifi on and off.

8.8.2 Test Design

The following tests we carried out by the team members. The device used was an iPhone 5s and was send out to our devices via Testflight, therefore using the Production Notification Certificates. The test involved walking down a specified route allowing Hint access your location services ‘always’. Functionality was added within this build to save all background location updates to a table in the database so we could review the results afterwards. The first 2 formal tests were simply analysing the location accuracy and frequency. We altered the background plugin configuration settings and code after the first test. For the 3rd and 4th tests we added hints along the planned route to our watch list and recorded the location at which we were alerted. This test was completed simultaneously using 2 devices with the only difference being the distance allowed for between the user and the hints watched. This was to minimise the differences between the route which would alter the results. The 4 test conditions are summarised below:

Test 1: Background Location Accuracy (Wifi On)
Route: DIT Aungier St to Ranelagh Road

Test 2: Updated Background Location Accuracy (Wifi On)

Route: DIT Aungier St to Ranelagh Road

Test 3: Background Location radius triggering Notification Alerts.

Alert Radius: 10m

Route: DIT Aungier St to Nassau Street via Grafton St and St.Annes St.

Test 4: Updated Background Location radius triggering Notification Alerts.

Alert Radius: 20m

Route: DIT Aungier St to Nassau Street via Grafton St and St.Annes St.

8.8.3 Test 1 and Test 2 Results

Intended route

Background Location Updates

8.8.4 Test 1 and Test 2 Analysis

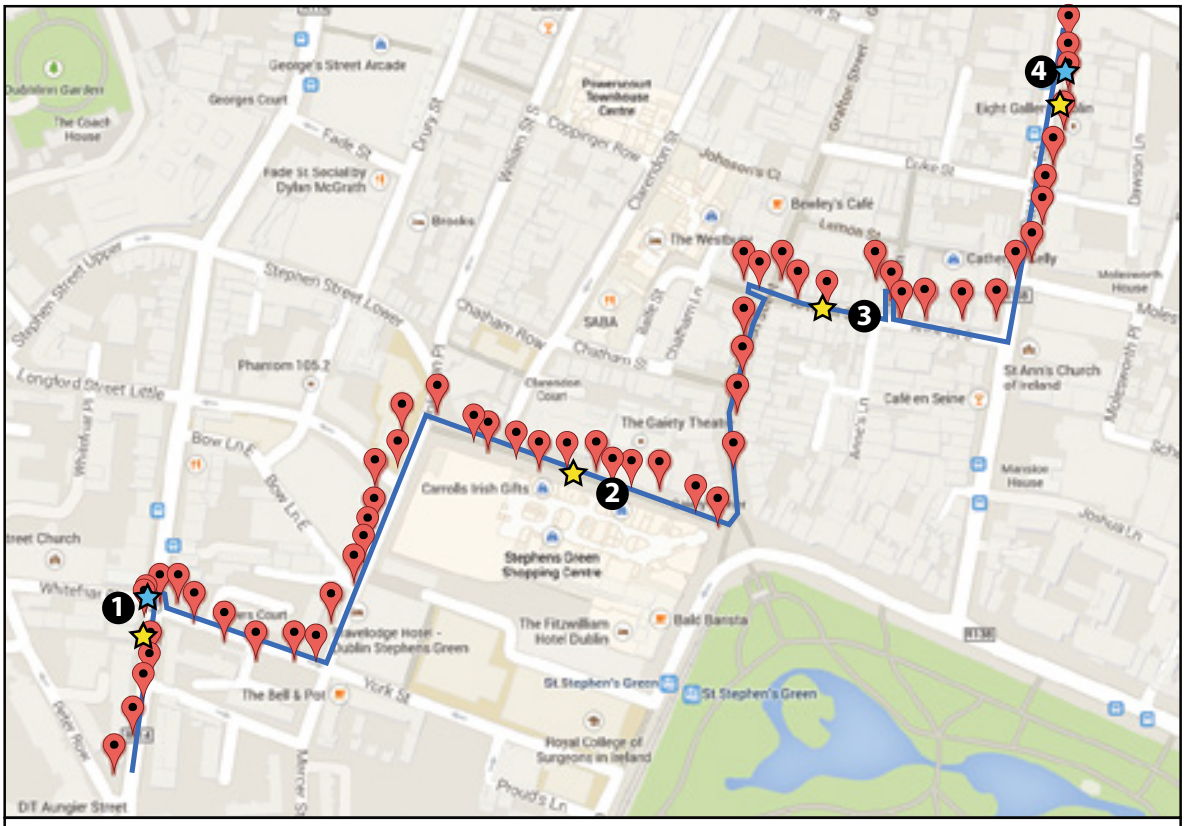
The results from the first test were initially quite worrying as the locations were extremely inaccurate and stopped half way along the route. As the reviews for the plugin we were using we could not fault this aspect. After revisiting the code, we addressed some obvious issues present which had been previously overlooked. A set interval function was calling the phonegap watch position function, which was interfering with the frequency of calls and obviously other aspects also. After this was fixed and the configuration of the callback function were altered (See WatchFavourites.js - line 142, See Figure 57) we performed Test 2, detailed below, along the same route with the same conditions.

```
bgGeo.configure(callbackFn, failureFn, {
    desiredAccuracy: 10,
    stationaryRadius: 20,
    distanceFilter: 30,
    activityType: 'AutomotiveNavigation',
    debug: false,
    stopOnTerminate: false
});
```

Figure 57: Snippit of code from background location function

The results from Test 2 were much more positive. The accuracy and frequency of the updates were working exactly how we envisaged. This was very encouraging for us to now start the notifications process.

8.8.5 Test 3 and Test 4 Results



1 The Bald Barista	Test 3 Alerts
2 Sinnotts Bar	Test 4 Alerts
3 Kehoe's Bar	Intended route
4 Lemon Crepe and Coffee	Background Location Updates

*As both devices travelled the exact same route, the results are shown on the same location map.

8.8.6 Test 3 and Test 4 Analysis

On the final 2 tests, the location updates were very accurate. The alerts received from Test 3 are indicated on the map by Blue Stars. The first alert was received at a slightly closer distance to the location itself. On passing the following 2 venues the hints passed were not picked up and therefore no alert was received. At the final venue, an alert was once again received right outside the venue.

Test 4 which had a slightly larger radius received all 4 alerts. The 2 alerts received at location 2 and 3 were obtained 6-7 meters before reaching the destination. The other 2 alerts at location 1 and 4 were more accurate and closer to the venue.

As a phonegap location plugin will never be as accurate as the native ios functionality, the results from test 4 were quite positive. Further observations on the notification accuracy will be recorded during the formal testing session, but for the artefact submission, the radius from Test 4 will be used as a slight inaccuracy is more favourable than missing alerts.

8.9 Testflight Survey

Interested users signed up to be testers through our website or followed the Testflight link via facebook. Overall we obtained 25 testers who downloaded the app onto their device and who could use it on a regular basis. From analysing our database it was evident just over half of these users did in fact Drop and Join hints on a regular basis when they were out and about. Aside from the survey, we gained valuable informal feedback from users getting in touch with us via facebook and whatsapp.

8.9.1 Test Aims

The aim of this survey was to get a overall feel of how these users used the app when they were on the own, To find out if they had any issues with any aspect of the app and also if any bugs had gone unnoticed by us. We also wanted to address the option of having a setting to choose whether the user wanted to be automatically joined or not along with the optimum expiration time for hints. As this was our final survey before submitting the artefact we would only had the time to address smaller issues, and not any suggestions for extra functionality.

8.9.2 Test Design

The survey was created on google drive. There was a total of 22 short checkbox questions and 4 questions where users could entered more detailed information. If the question expected a ‘yes’ or ‘no’ response we always added in a midway answer, ie. ‘sometimes’ or ‘indifferent’, along with an option to respond with ‘other’. We emailed it to all Testflight users

who had received builds. We sent it out a week before the submission with the second last build which still had a few minor bugs present. All responses were anonymous.

8.9.3 Results

Only 12 out of the 22 testers submitted their responses for this survey. As this survey was sent out twice electronically and on meeting testers, we kindly asked if they wouldn't mind completing it, there was no more we could do. The first 14 questions were user experience based. All responses were very positive.

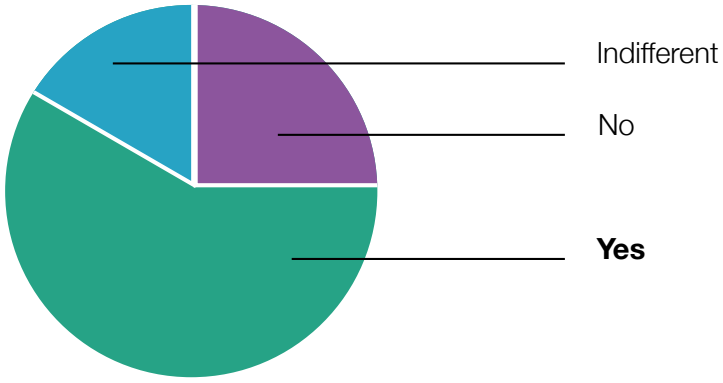
The first 3 questions referred to the introduction screens, registration process and home screen after logging in. The registration process received a 100% positive response. The same 2 testers thought the information presented on the introductions screens and home screen "could be clearer". As a result of this, we will further evaluate these 2 aspects in our Formal test trial.

The next 5 questions related to the map and list display. Once again, the majority of all responses were positive. Users found the connection between the list cards and map markers clear with all users understanding the colour connections and meaning. When the question "Would you prefer to see any other information represented on the map instead of venue type? " was posed to the users 3 responded with 'No', 7 users were Indifferent and 2 users would like something different displayed, with one suggesting "maybe how popular it is". This topic was tested in detail in previous tests and due to clarity, we settled on displaying the markers type. We considered having an option to change between display options but felt this might be too confusing but worth looking into more in the future.

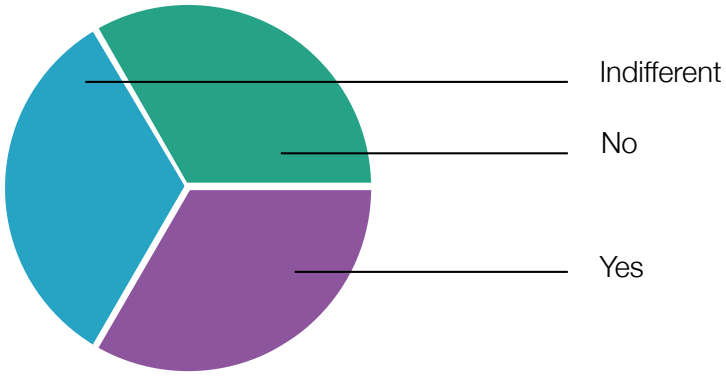
All users used the filter function and dropped a Hint. The drop a hint process was clear to every user with 92% of users always clear as to where their hint was dropped. When asked did they find the suggestion location useful there was a mixed response. 50% replied 'Yes', 42% indifferent and 1 user commenting "Sort of". As these are powered by google and can only be filtered down to establishments we may need to look into alternative options in the future.

The following questions relating to the Watching and Joining hints will be discussed in more detail. All but one user watched or joined a hint.

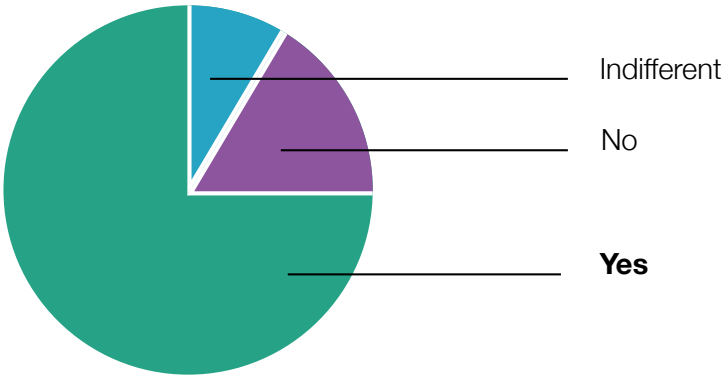
Q. Would you like to be automatically joined to this hint?



Q. Would you like the option to open the app and join manually?

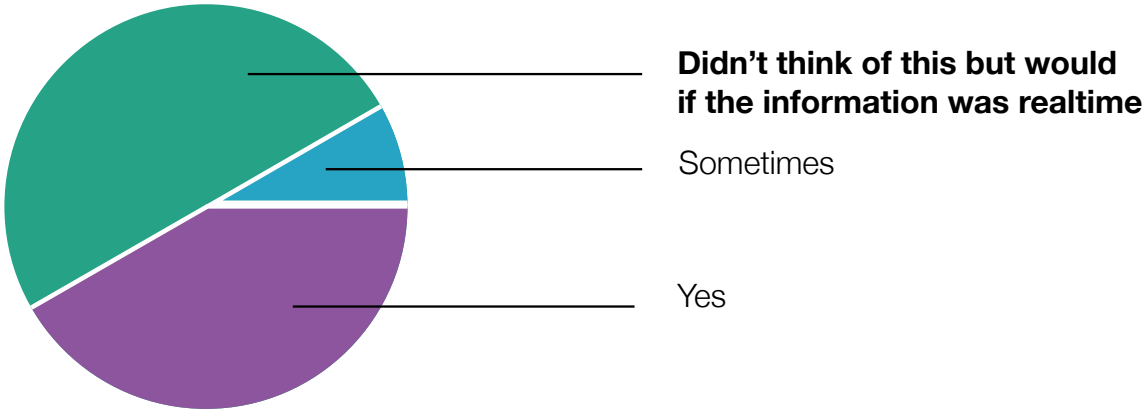


Q. Would you like the option to open the app and join manually?



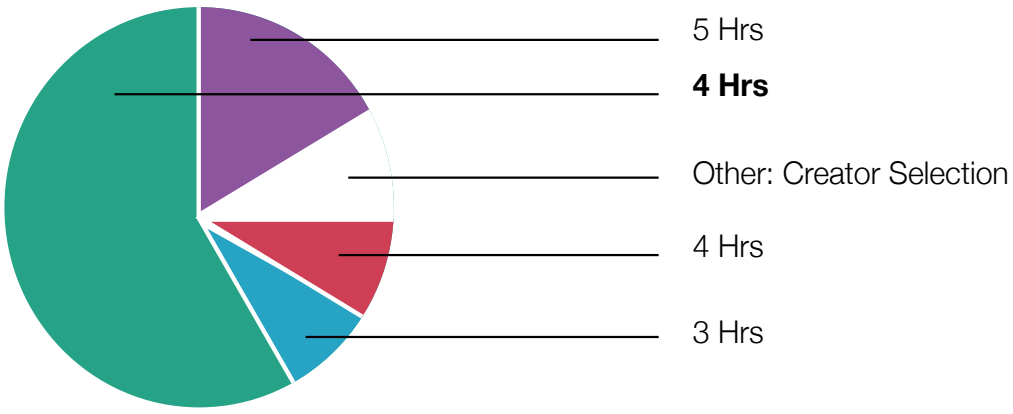
The responses from the were quite varied. More people would like to be automatically joined to a hint on their watch list than have to open the app and do it manually. After responding to these two questions, they were then asked if they would like to have a setting to decide whether they would like to be automatically joined and alerted or do everything all manually. 75% responded yes to say they would like this setting. From this result, a setting was added within the watch list page to allow for this.

Q. Would you use the watch list as a quick reference to watch hints you were interested in?



The final aim for the survey was to decide on the length of time hint should be left active for after the last person joined. The diagram below details the responses. As a result of this we decided to limit the time to 4 hours until further, more substantial testing can be carried out in the future.

Q. At the moment, none of the hints expire for testing purposes. When they will, how to you think would be an appropriate time to disappear after last active?

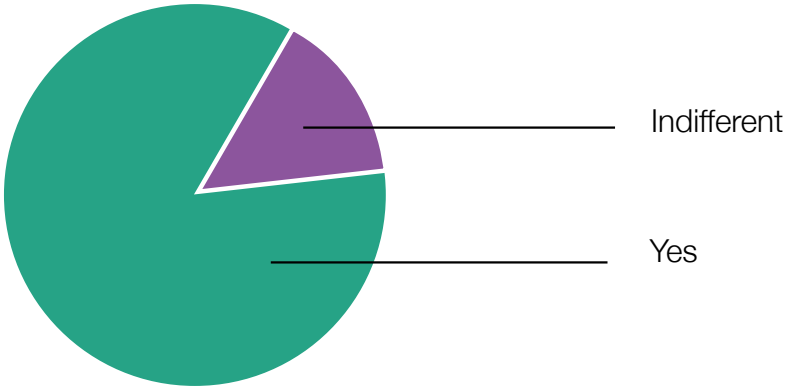


When asked “Is there any feature you feel is missing from the app?”, find responded variations of No with the remaining 7 responses as follows:

- Add Pictures or videos to the hints
- Show what friends are there
- Links to facebook pages or websites of the locations/venues
- More info about the venue or what’s goin on or who’s there. I didnt get enough information at presents
- What hints friends are attending
- Emm...seeing who is at the hints

After all the user experience and functionality questions were asked, the survey was concluded with the following question:

Q. If this app were widely used with realtime information, would you find it useful?



When asked what would you use it for most, the responses were as follows:

- Bars general area to go
- Pubs and clubs
- Pubs
- Finding out where to go out
- Nights out and party
- Maybe a culture night or festival or something
- Where to find good bars with people my age.
- Nights out or going for a meal
- Probably most likely for nights out and checking the age groups of people at particular pubs/clubs already

8.9.4 Analysis

As our app is user driven, we are aware that the information presented to these users was not up to date or useful in any way, which may affect the results. To achieve fully effective results we would have need hundreds of active users in the Dublin area, which was beyond the scope of this Masters Project.

The data received from this survey however still proved very useful. We added the Auto Join Setting as a result of the user responses and also decided on an initial time limit for the Hints. Responses from the user experience questions were all very positive with additional comments made such as “Looks nice, simple UI” and “Very user friendly”. The functionality implemented to date was well received however some 58% of users would like some more features. This wasn’t a surprising response and will be discussed in more detail in the next Chapter in Future Work. Some minor bugs were also highlighted which we addressed.

8.10 Formal Trial

This trial was completed after the final artefact was submitted, using this build.

8.10.1 User Trial Overview

The Hint user trail was conducted to determine the specific user response to the functionality and content provided by the social location app developed as part of a Master Project. A total of 20 participants took part in the trial, and all participants completed the trial fully. The trial focused on the main features and use cases of the app which included several location based tasks, which were evaluated as part of functionality testing. In addition, quantitative questions relating to the user experience of the application were asked, alongside post test NASA Task Load Index (TLX) tests to assess how much cognitive load the application places on the user.

Specific tests were carried out to obtain quantitative (functionality and TLX) and qualitative data (user experience). The combination of the data obtained thus provides a comprehensive picture of the performance of the application.

- Functionality Testing

After using the application, participants were asked a series of questions relating to the performance and functionality of the application. These included questions on the introduction and login feature, location accuracy, drop and watch feature, alongside the general operation of the app on the device.

• User Experience Testing
After using the application, each participant was asked to evaluate the experience by answering a short set of qualitative questions. Questions included ease and enjoyment of use, evaluation of the content and the inclusion of a 'friends' feature.

• NASA TLX Testing
After the user experience questions were completed, a brief TLX test was carried out. The smallest TLX test contains a series of 5 scales which were marked by the participant. These metrics allow the participant to express how much cognitive demand the app placed upon them, which is crucial to the analysis of both functionality and user experience results.

8.10.2 Aims and Test Design

The Hint user trial was designed around the typical situation a user might be using the app. We did not want to test it in a quiet, relaxed setting as this is not the typical user scenario of the application. Also, to test the location accuracy and drop and watch features, movement was necessary. We set out 3 different routes the user could follow, with specific venues specified. We decided on 3 different location as we were unable to recruit enough testers who had not already seen or used the app around DIT so we therefore set up 2 more similar routes near both of our houses. The test took approximately 20-25 minutes to complete, and utilises all main functional elements of the Hint App. The 20 testers were all within our target age group with a mix of professionals and students. No tester had even used the app before.

The full test can be seen in the appendix along will all consent signatures and unique test conditions.

8.10.3 Pre-Test Questions

Each participant was asked several pre test questions to determine general information about each user. The results of each question are listed below.

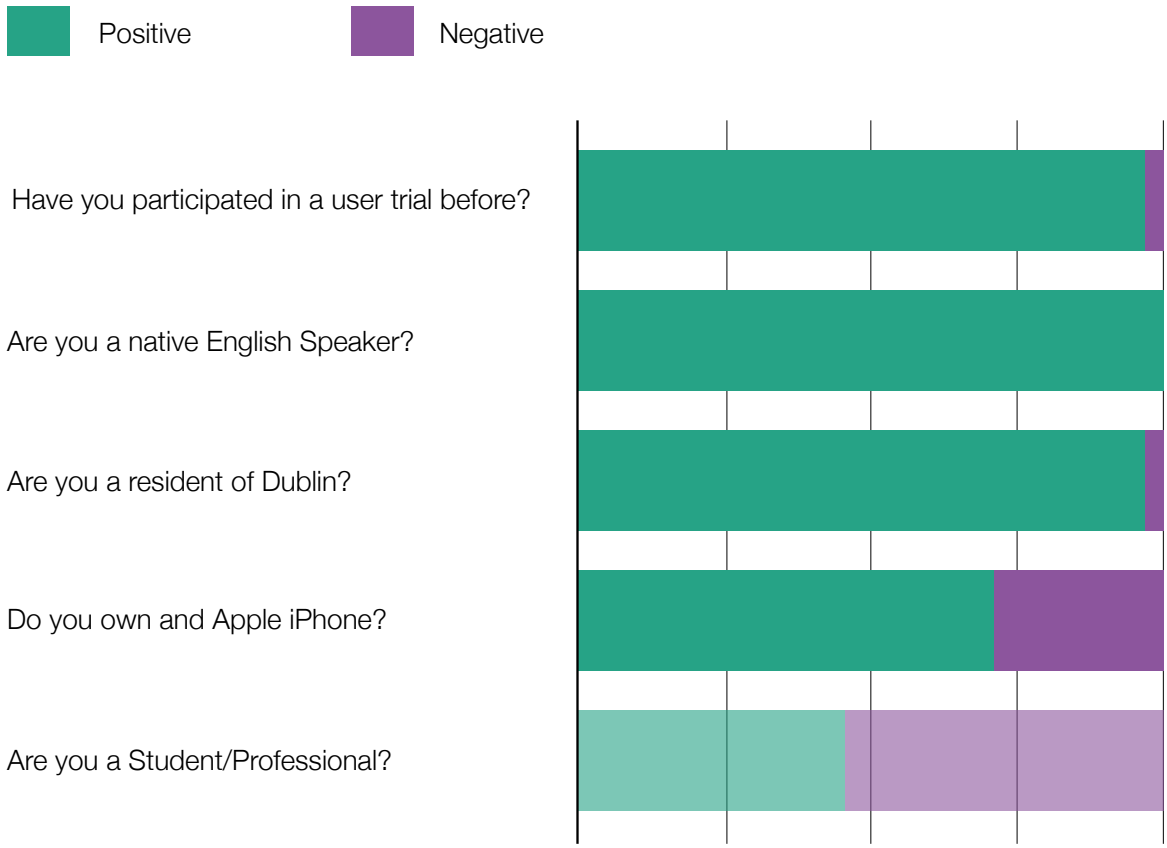


Figure 58: Pre test questions

Of the participants questioned, all were native English speakers and all but 1 were living in Dublin. 14 participants own iPhones. The age of testers ranged between 18 and 27, all within our target audience with with 55% professionals and 45% students.

8.10.4 Functionality Questions

Each participant was then asked a series of questions relating to the functionality of the app. These questions related to the main features of the app and also the location and notification accuracy. (Figure 59 below)

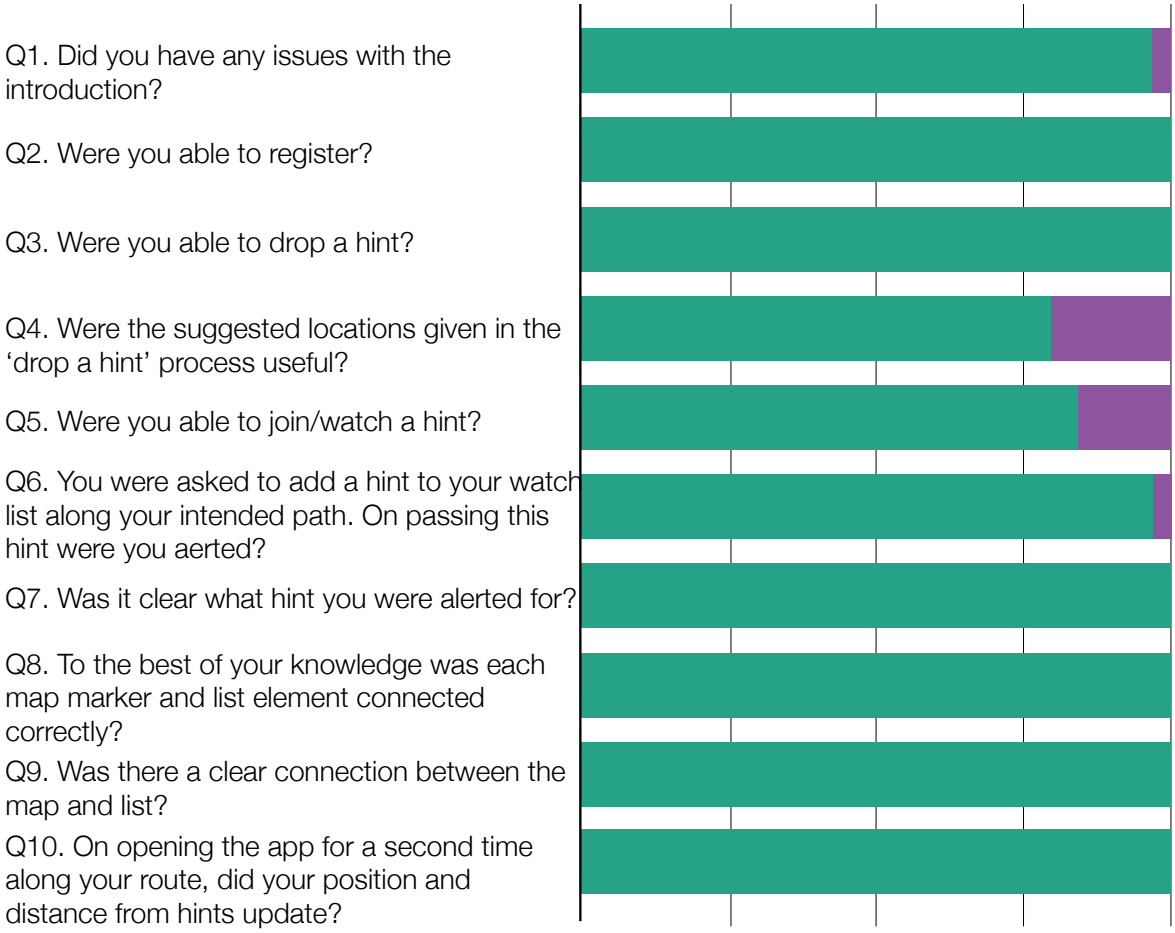


Figure 59: Functionality Questions and responses.

No participants had any major issues with any of the features within the app. They were all successfully able to register, drop a hint and browse the map and list with a clear connection. 2 users requested to see view the introduction again. This is currently not available but can be easily added in in future.

When asked if the suggested locations given in the drop hint were useful 4 testers responded negatively. As this is powered by google maps, we do not have the power to further refine this search. However, we will look into alternative libraries, such as foursquare or facebook, that could be used in future.

3 questions related to the watch/join functionality. 3 non iPhone owners had issues with the swipe to join or watch. This is a native ios interaction and therefore we will not be addressing this result in future. As this was a specific task to be completed before starting the walk, all 3 participants asked for help. When prompted, they had no further issues.

All but 1 user received an alert when passing the location they had previously added to their watch list. However 5 users recorded comments to the effect that they received the alert slightly before of after reaching the destination.

“About 10 meters before I got to it.”
“Just before I got there”
“Great Feature!”
“Yes but about 6 metres before I got there.”
“Just after I passed it”
“A bit before it - maybe 7 meters”

We had previously performed accuracy and performance tests to refine the background location updates and notification triggers. From these results it is clear this area needs some further refinement in relation to alert bounds.

8.10.5 User Experience Questions

Each participant was also asked a series of questions relating to the user experience of the app. These more qualitative questions focussed on the engagement of the application, with questions about a possible friends feature alongside the opportunity to make more general comments. (See figure 60 below)

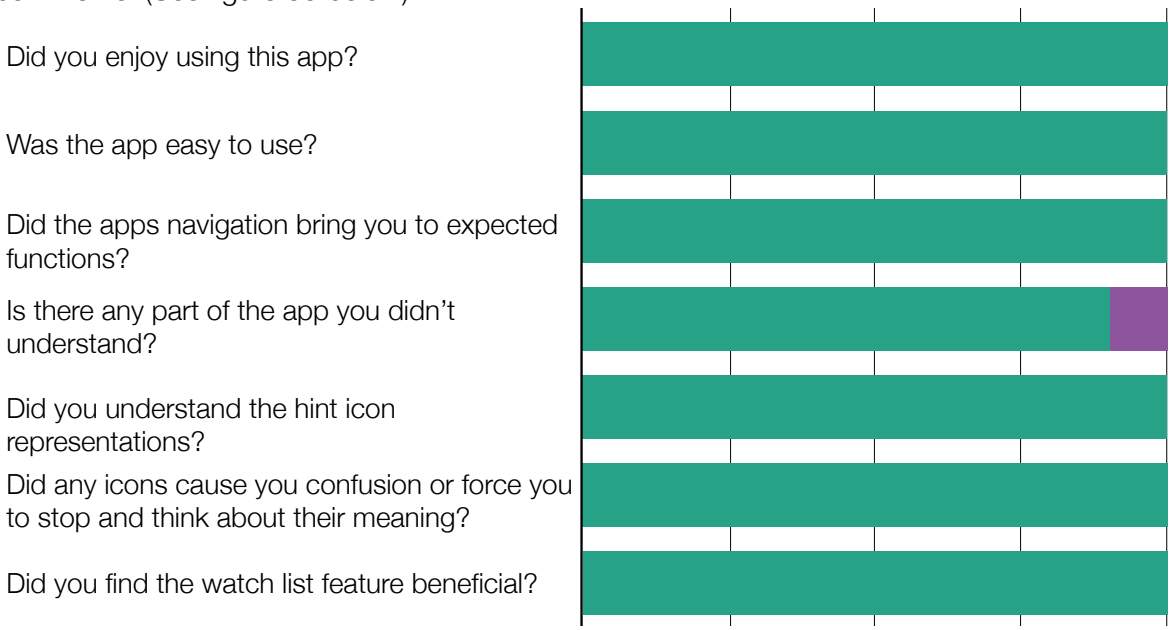


Figure 60: User Experience Questions and responses. Continued on page 155

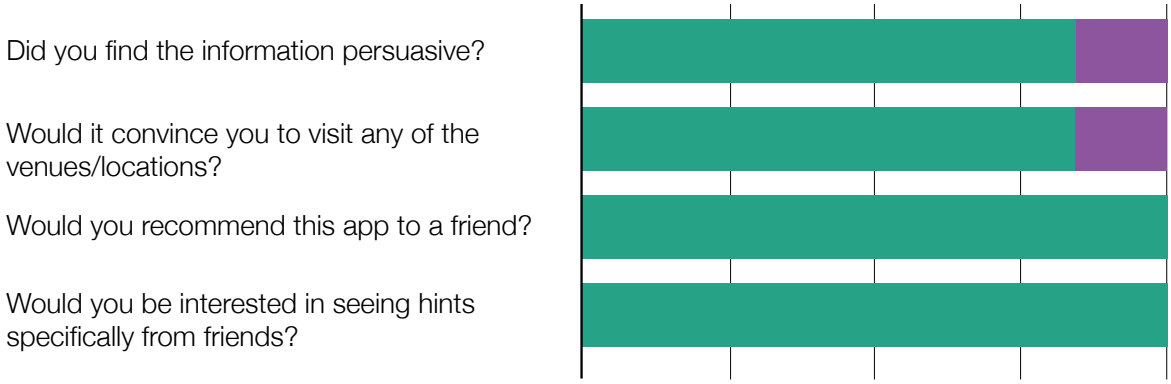


Figure 60: User Experience Questions and responses.

All participants found the application enjoyable and easy to use, and no one had any issues with the navigation. 1 user did not initially understand the watch feature commenting, “The watch took a while to figure out. The diagram in the empty watch list was helpful.” 3 users commented positively on the watch feature stating:

“Probably the best part as you get a notification when you get to the location to remind you to join.”
“Very Beneficial”
“Yes really liked this - no effort involved”

Question 8 and 9 referred to the information presented on the app. 85% of participants found the information to be persuasive with 80% stating that it would convince them to visit any of the venues/locations shown. The remaining testers who were all professionals felt they would need to see more information to convince them to go there.

“Need More info - comments to outline reasons to visit place (ie. positive/negative)”
“Photos/comments may be more persuasive”
“No, would need more info.”
“Like seeing the average age and stuff but would need more”

Leading on from this we asked the participants if the Would you be interested in seeing hints specifically from friends? All users responded with a yes with 3 comments
“Facebook friends not close friends”
“Would be very beneficial to see hints specifically from friends”

“Not really for close friend, but for acquaintances of fb friends”

We had discussed this feature initially in our user needs analysis but it was not part of our requirements as we felt it was too difficult for our skill set and beyond the scope of the masters project. This feature is definitely the top priority for future work and will be discussed further in the next Chapter.

The comments from final 3 questions asked “What didn’t you like about the app?”, “What did you like about the app?” and “Is there anything else you want to add?” proved possibly most useful to us.

The comments from “what did you like about the app?” were very reassuring:

“There’s not too many functions going on, you can either drop a hint when you’re at a location or save one for later.”
“like the idea of being able to see where to go “
“Very User Friendly and works very well.”
“It showed you events you wouldn’t usually see.”
“Quick and easy registration process.”
“Just being able to see some different things going on around town”
“Really nice to use and would help me choose where to go”
“Very clear. Showed you events you wouldn’t know were on”
“Knowing what was going on in each venue. Knowing the age category of the people there.
“Liked the colour schemes. Liked the simplicity of using it.”
“Colour scheme, Icons, general design”
“Like the filters and categories. Really nice general UI”
“Great before you would go on a night out to see where people are”
“Like how simple it is to navigate between everything”
“Looks really nice. Information is really clear”
“Great start made. Like the Watch feature”
“Would be really handy for college nights out.”
“Don’t know anywhere in Dublin yet so good for finding busy areas even. “
“Really nice to use”
“Nice to use”
“Like the UI and animations. Makes it fun to use!”

While the overall reaction to the functionality and user experience questions were very positive from the final comments it was clear users wanted to see more than what was available to them at the minute. Suggestions for images, comments, links to websites/tripadvisor/ facebook were all made numerous times. Comments about what users didn't like included:

"There's not really any incentive to drop a hint. If you weren't able to see popular places until you dropped a certain amount, then again might turn people off initially."
"That I couldn't see the intro again"
"It would be good to add several categories to a hint. eg. Beer and Music"
"The filter function was opposite to what I'd have expected but was easily figured out."
"Need more info on places"
"Could have more description about what is going on"
"I like imagery when deciding on new places to go. Especially if i haven't been there before"

8.10.6 Post Test TLX Results

After completing the tour and answering all test questions, a set of post-test NASA TLX tests were carried out to determine the load of the participant. The tests are useful in accessing the mental and physical load that a certain operation or task places on a participant and are a useful means of comparing how participants have performed relative to how well they thought they performed. (See Figure 61 below)

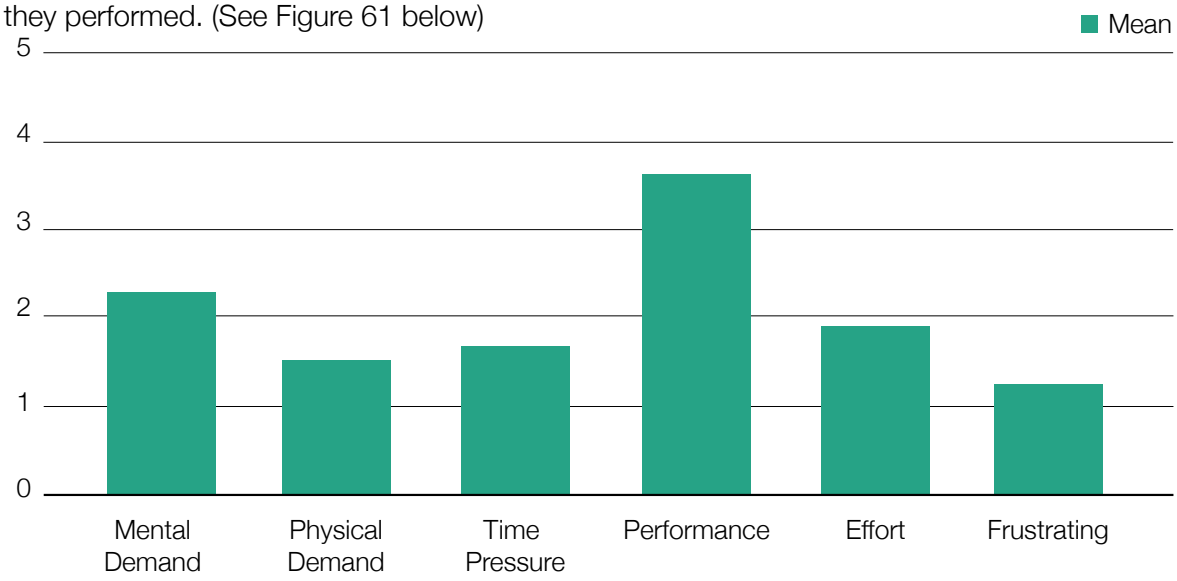


Figure 61: This table shows the mean and standard deviation (the square root of the variance) for each of the 6 TLX scales.

The overall results were low (as desired), with physical demand and frustration having values of 30% and 27% respectively, suggesting that the user experience results for enjoyment and ease of use (100%) were a fair reflection of the performance of the application. The effort score of 39%, though still low, can perhaps be attributed to the combination of walking on track and staying alert to listen for a notification. It is also interesting to consider the performance value of 72%, which indicates most users were happy with how they performed and obviously felt they hadn't any major issues.

8.10.7 Analysis

The overall reaction to the Hint app was very positive, and the technical elements of the application were all evaluated to function properly. In particular the watch feature (automatic joining on arrival with notifications) was found to be very beneficial to users. They also reacted very positively to the general UI of the app finding it very enjoyable to use. The concept of seeing friends at hints was strongly endorsed and will be the next feature we implement. Many additional features were suggested as users felt they would like to see more information about the hints. Further testing will have to be carried out to rate these in order of importance. Overall, participants reacted very positively to the app and validated both the technical and strategic directions taken to date.

8.11 Conclusion

In this section we have described our testing methods and have shown that we have been engaged in testing since the very start of the project. We have provided evidence that at each step if the development of this app we have not only generated feedback from online users and actual face to face users, but also used this information to influence, revise and improve our final artefact.

All the work, through both formal and informal testing, has been invaluable. Not only did users provide helpful feedback and inform our decisions but they also found bugs and issues that we would never have found ourselves. Throughout the development process, we subconsciously interacted with the app in a way which would never produce any bugs as we knew exactly what to press and when to press it. This process allowed us to build a more robust and user centred app than we ever could have without their help.

9

Evaluation

9.1 Introduction

In this section we will evaluate the overall project. We will assess how we worked together as a team as well as critically analysing the work that we have produced.

We are now accountable for the aims and objectives we set out at the start of the project, as outlined in Section 2.6. Using these criteria we will prove that we have created the application that we set out to develop. While we have exceeded our own expectations, we are well aware that there are still areas in the app which we could improve on and functionality we would like to add to increase its value to our users.

9.2 Analysis

In this section we will discuss the strengths and weaknesses of the artefact we have produced. We will analyse the user needs and project requirements to show that we have succeeded in completing our own brief. Where possible we will show that we have exceeded our minimum viable product and fulfilled our critical success factors. Where there are areas that we can improve on, we will discuss how this may be possible. These aspects will be proven by user validation.

9.2.1 User Needs

In Chapter 2 of this document we identified our user. Through surveys, informal discussions and research we defined our aims and objectives and critical success factors. In the following sections we will discuss the finished application in regards to the criteria that were set.

9.2.1.1 Aims and Objectives

These are factors by which users would deem our app successful. They are features that were determined through user surveys and discussions. We will put forward arguments, backed up by testing results outline in the previous Chapter, to why we believe they have been fulfilled.

A. Clear, minimal user interactions.

From user feedback outlined in the previous Chapter, no users had any major issues with the navigation and responded very well to all interactions. During our formal testing, users had to use the app while on the go (ie. not in a relaxed, quiet environment) and experienced no issues. Comments were made on how it was a very well designed, user friendly app.

B. Define a venue/location

When asked, users thought there was sufficient amount of icons presented to define the type of location they might use the app for. No icons caused them any trouble. From testing we added the venue name feature to define the area more.

C. Provide useful information

Our testers found all the information provided to them very useful, with average age and popularity standing out as being very useful. We are confident in saying all information is accurate and fully dynamic, updating to reflect users actions. However on a whole, when users were asked if they would like see more, they responded yes, with friends being a main priority. We were aware of this throughout but ability and time were major constraints. We will discuss this aspect further later in this chapter in future work.

D. Realtime

We are confident in saying all information in updated in realtime, with a maximum of a 10 second delay. Hint have the ability to expire, and the app designed to manage these expired Hints. The current time is also reflected in the changing on Icons. (ie. Cafe to Club)

E. Filter/Customise

The map is centered around each users location with Hints displayed in order of distance, therefore providing an immediate personal feel. The additional feature of filtering by what you interests at the moment is also fully functional. Additional filter options were available

to our users, however, when asked no option performed as well as ‘type’ so we felt it was unnecessary to include any more for the sake of it.

F. Privacy

The users identity remains completely private at all times. At no stage is their background location tracked or recorded.

9.2.1.2 Critical Success Factors

These are the factors we outlined in Section 2.7 which must be completed to a high standard so as our app can be used successfully by potential users.

CSF - 01. Obtain and Utilise Users Current Location

On opening and resuming the app, the users current location is obtained. The Hints are organised around this location, displaying those closest to the user on the map and ordering the list by closest distance to the user.

The only reason this may not work successfully is id the users location services are turned off or if there is not sufficient internet to obtain this information. Both of these aspects are beyond our control and may happen in world class apps. For this reason we are satisfied with how we completed this task as we have provided a back up in the event of this happening.

CSF - 02. Display User Generated Information

All Information attached to hints is user generated. You must login with a registered account to drop or join any hints. The information submitted on registration is validated so to the best of our knowledge it is correct. The information displayed includes a location/Venue name entered by the user, the amount of people who have used the Hint app to show they are there, the type icon the creator entered for the venue, the maximum category icon entered by all users, the time the hint was created and the distance it is away from the specific user.

CSF - 03. Visualise on a Map/List

The information obtained is dynamically displayed on both a Map and in a List view. These 2 displays are connected enriching the users experience and clarity for browsing.

CSF - 04. Fully Functional Navigation and Easy to Use

Our tester have concluded that the app is easy to use, with all iphone users having no issues with any aspect of the apps navigation or interactions.

CSF - 05. Function without errors

To the best of our knowledge the app currently runs without any known errors. If used in areas with low wifi/3g, limited access to the external server may cause problems when loading the information. We have designed for all possible errors we could envisage but will admit there might be some faults we did not encounter ourselves and could therefore not address.

CSF - 06. Login and Logout

The Login and Logout functionality is fully functional. The users details are securely stored in a database with passwords encrypted. As we use local storage to locally save the users details while logged in, these details are successfully cleared on logging out and the app is reset.

9.2.1.3 Minimum Viable Product

The iterative approach taken during development has been documented thoroughly in Chapter 5 and 6. What has not been documented is whether during this process we fulfilled our minimum viable product. We will discuss this below with reference to the initial requirements outlined in Section 4.7.

MVP - 01 - Clear and Simple Navigation

Care was taken to ensure the user never felt lost within the app and the icons represented brought then to the expected function. This aspect was iteratively tested and validated in out final formal test with 100% positivity. (See Section 8.10.5)

MVP - 02 - Ability to drop a hint with the information stored to an external database

A basic version of this functionality was the first aspect completed. We started testing this functionality and interaction from the start. By the end of project, so many improvements were made to this feature when compared to the first iteration, it was unrecognisable. We can say with confidence that all information is stored safely in the database and from our final test, results showed 100% of users were clear and happy with this process. The only aspect to be revisited is perhaps using an alternative library for the location suggestion (As discussed in Section 8.10.4). We may also expand on the features within this process in the future.

MVP - 03 - Display Hints on a Map from Information in the database

All information display is dynamically loaded from the database in realtime. This aspect was implemented at the beginning of the project in conjunction with the ‘drop’ functionality. Improvements were made throughout the development process also.

MVP - 04 - Access Information about each hint.

Information about each can be viewed by clicking on a map marker to display a single information card or by scrolling through the list. Both options were included to allow for differences in user preference. All information displayed is accurate and manipulated correctly to the best of our knowledge.

MVP - 05 - Retrieve Users Location

The users location is retrieved on opening the app and resuming. The accuracy of this

depends on the level wifi/gps/3g signal. Their are not constantly tracked. If permission is granted, location updates are processed by the phone to cross check with hints in the watch list. No locations are stored to the database or can be accessed by a third party and therefore the user is not being tracked.
In addition to our MVP we have also completed a number of additional features that were outlined in our MoSCoW (See Section 4.7) or which users expressed interest in throughout the development of Hint.

- List to keep an eye on hint your most interested in or plan on attending.
- Automatic Join feature with Notifications.
- Contextual Icon Change.
- Connected Display between list and map.

For these reasons we believe we have fulfilled our designs and functionality requirements and exceeded our minimum viable product. That being said, there is still many improvements that can be made and additions that will increase the apps value. These will be discussed in Section 9.4.

9.3 Development Critique

We will evaluate the work completed to date, critiquing the areas we feel improvements could be made. Both Code and Design aspects will be discussed below.

9.3.1 Code Critique

On starting the project, we were very novice coders. As a result, many features implemented in the early stages needed to be completely changed down the line. If we were to start this process again now, we would do a lot of things differently, however we are proud of what we have achieved.

We refined all areas we could within the time frame. The areas which need further refinement are listed below.

9.3.1.1. Launching the App

On opening the app when a user login is detected, occasionally the initial introduction screen flashes for a second before continuing to the main Map/List page. This is a fault within the jQuery mobile structure. At the later stages of the project, we implemented a second splash screen to 'cover up' this issue. We did not include this in the final submission build as we could not test it comprehensively and did not want any unknown bugs to appear as a result. We will look into this fault in future.

9.3.1.2 Delay in updating the map when filter options are selected/de-selected.

Occasionally there is a delay in updating the map when using the filter feature. The map needs to be triggered by a touch movement or zoom to complete the process. We could not figure out why this occurred as the list updates immediately so it is not connected to the response speed.

9.3.1.3 Json responce by distance

The main json response returned with all hint information is ordered by distance with a unique distance from the user calculated for each hint. This can be viewed in the console response. However when implementing this in the list, the order is reverted to the original order in the database. We could find no explanation for this and as a result, used an underscore function to complete this design decision successful.

9.3.1.4 Background Location and Notifications

As the app was not natively developed, we needed to use plugins to achieve certain functionality. Some of these can cause a strain on the phones battery life. We tried to counteract this as much as possible by only activating the background updates when necessary (ie. items in the watch list. We saw huge improvements in battery life as a result. Unfortunately this aspect was out of our control due to the technologies used.

The accuracy when receiving auto join notifications is a matter, which needs further addressing. At the moment a user is joined to a hint on their watch list once their enter the location bounds of this venue. We are aware that this might not necessarily mean they are attending, but as we are not claiming to define exact numbers this is a satisfactory solution for the moment but will be addressed in future.

9.3.1.5 Notification Plugin

Towards the end of the project, it came to our attention that the plugin we use for accessing native ios notifications is only compatible with devices using ios 8 and higher. As we were not aware of this fact, nothing could be done at this late stage.

9.3.1.6 Google Autocomplete Feature

Initially we developed this feature in a separate file so as to ensure it was working before adding external factors. Ideally, on typing the initial letter, locations beginning with this letter are displayed, with the closest to you being the first on the list. This was fully functional when connected to the map. It could not be attached to the map for design reasons, and so on implementing this in our app, the list ordering was not functional. This is the only reason we could see which could be affecting this. From our final testing, some users didn't find the suggested locations helpful with "some odd ones in there". This feature is also powered by Google and will be revisited in future.

9.3.2 Design Critique

We are very happy with the overall design and feel of the app. Users commented on how easy and enjoyable it was to use, reacting positively to the colour scheme and overall interactions. As it is developed using jQuery we were initially worried this default style may be hard to override. We feel we customised it as much as possible and are very proud of how our design our were implemented.

After our final test, it was concluded that users still wanted to view more information. We may be quilty of allowing our design intentions for a quick and simple UI and input process to

overshadow earlier comments from users, who suggested adding comments to the hints for more information. We did not ignore these users, but after some discussion we decided to continue on and address this aspect in future. We regret this decision now

We will address the aspects in which we feel we could improve on below.

9.3.2.1 Filter Selection Process

While our users found the process of filtering an enjoyable task, initially most selected the options they wanted instead of the options they did not want. Most noticed before exiting the feature that initially you select an icon to turn that type off due to the change in opacity. We agreed that this is in fact counter intuitive, but we had not noticed this until we tested users.

This fault was a product of the coding structure, but was due to an oversight made in the design process. It was too late to fix this as it affected more than just the filter display. We will revise this feature immediately.

9.3.2.2 Marker Visuals

It was our goal initially to display more complex information through the map markers. We designed dozens of options which all came across very clear when tested but as soon as they were implemented on the map using dynamic locations, the clarity was lost in a mess of information. From our background research (Chapter 3) we concluded that we wanted to display the information in a clear and concise way as this was the downfall of so many other location based apps. It was decided from testing, to settle with just showing type and location of the hints, which connected the list nicely. While we would have loved to achieve a visually pleasing solution, we have not yet but will continue to work on this aspect.

9.3.2.3 Completion of tasks

On looking back over the design process in conjunction with the coding development, we could have completed our design and testing of UI earlier in the process. This would have allowed us to create mockups in HTML and Css with dummy data that would be ready to implement once the code caught up to that level. This may have allowed time for more

functionality to be implemented later in the process.

9.3.3 Team Dynamic

The team worked very well together. We had worked together before and both members knew they could trust the other's work ethic. Both members were flexible, committed and followed through on their work.

If we were guilty of anything it was not fully finishing a feature or aspect before moving onto the next task. This may have proved beneficial in some cases where the functionality was beyond our scope but there were definitely areas that could have been completed in a quicker more efficient manner. This meant that during the final stages of the project we were fixing small issues, which should have been addressed and completed at the time of initial implementation.

9.4 Future Work

As discussed in Section 9.2 there are many improvements and additions that can be made to Hint. In this section we will elaborate on some these changes and discuss what additional features are required and why. Where possible we will backup the reasons for these additions and improvements with feedback from users.

9.4.1 App Store Submission

The first thing we will do on finishing is submit Hint to the App Store as is. Many of our competitors (See section 3.2.1) released basic versions of their apps initially and added more complex functionality later. We will analyse how the users will use the app, in it's current state, in a real life situation and without an previous knowledge or guidance as to what the app is about.

During this time we made all necessary functional and design revisions as outlined in Section 9.2.

9.4.2 Concept Expansion

From an early stage in the process we have been asking users for feedback on functionality, user experience and what they wanted to see. The surveys undertaken when defining the users needs were very broad, with users wanting ‘everything’. The possible features had to be refined for the purpose of the project (See Chapter 4) to reflect the project time limit and abilities. We feel we prioritised these correctly with users responding positively when asked was the information shown persuasive. However from this Final Testing, outlined in Section 8.10, it was clear users still wanted to see more information. Suggestions were made to have the ability to add multiple categories, comments, images, links and weather. While the multiple category feature can and will be implemented immediately, further testing will be required to determine a hierarchy in this list.

9.4.3 Friends Functionality

As stated in Chapter 6, Section 6.4.3.13, we attempted to connect with friends by accessing the users contacts within the phone. We achieved this however it took much longer than expected and this was only touching the surface of the functionality required. We decided to continue with other core features after prioritising this from user feedback (See test results in Section 8.6.2, Q1). In our final test (Section 8.10.5) we asked users if they would be interested in seeing hints specifically from friends. All users responded yes with some comments made to the extent of personally information shared. Prior to implementing this feature we will research and test whether to do this by connecting with facebook or restrict it to close friends in contacts. When asked in previous discussion a mixed response was recorded.

Expanding on this, we would aim to attract curators ie. people/organisations than are well known socially, eg. the happenings, le cool etc. Knowing these people showed interest in a location would be very beneficial and bring the app to a while new level.

9.4.4 Context Expansion

The feature of context awareness already exists within the app at a simple level. We would envisage expanding on this to provide a more unique and personal journey for the user. eg. By changing more type selections and also analysing the users surroundings.

9.4.5 Commercialisation

There are a few options to explore for commercialisation in relation Hint. We have not yet discussed in depth how want to pursue the project.

We will continue to marker and promote the app and monitor its success on release onto the App Store.

A likely scenario is using blend as a template. The core of blend is a way in which to display information about locations. All imagery can be easily switched and the context awareness can be expanded. There is no reason why we couldn't approach smaller social gatherings, events or once off festivals (eg. Culture Night, Arts Festivals, Dublin International Film Festival) to use our app as a framework and tailor it to the needs of each specific event. No extra functionality would be needed to do so. They would gain vital information about their events through the data collected from users 'showing interest' and 'joining' specific aspects of the event.

9.5 Conclusion

In this section we have evaluated Hint on its merits and limitations. We have highlighted areas where we have fulfilled the user needs and exceeded the requirements of our MVP. We have also shown areas where we believe the app can be improved on. We have discussed features to be implemented on completion of the project and possible commercialisation options.

Overall we are very proud of what we have achieved and look forward to the release of Hint on the app store.

10

Conclusion

10.1 Conclusion

To conclude, this report detailed the creation and process of Hint. The document was divided into 7 main chapters. These chapters include User Needs Analysis, Background Research, Project Requirements, Design Methodology and Approach, Code Methodology and Approach, Testing and Analysis and the Evaluation.

The user needs analysis section covered the aims and objectives of the project with were evaluated in the final section. User personas and scenarios were outlined in this section, along with validation surveys, which informed the Project Requirements. The background research section gave an in depth analysis of fellow competitors and technologies. Following on from these 2 chapter the design and functional requirements for the project were outlined which included and MVP.

In Chapter 5 and 6 the methodology and approach was discussed. These included a comprehensive and concise documentation of the design and development processes involved in creating the final submitted artefact. There was demonstrable evidence of taking an iterative approach to the process based on feedback from testing. This testing was discussed in Chapter 8. Within this Chapter, evidence was detailed showing that the testing was carried out thoroughly, with critical analysis and discussion of results. The evaluation chapter gave a full analysis and evaluation of the overall project. This chapter demonstrated critical and expansive thinking with strong directions for future work.

The project proved to be very rewarding and satisfying to work on. We both learned a huge amount and are extremely proud of the finished artefact.

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Appendix 1

A 1.1 TestFlifght Survey Questions : See Section 8.9 for analysis

Testflight Feedback

Thank you all for downloading our app and taking part in our testing process, we really appreciate it. Your feedback is very important to use and we would love if you could fill out this quick survey. Thanks again.

* Required

After going through the Introduction, was it clear what the app was about? *

- ○ Yes
- ○ Not really
- ○ No
- ○ Other: [ ]

Did you find the registration process ok? *

- ○ Yes
- ○ Indifferent
- ○ No
- ○ Option 4

Once logged in, was it clear what information you were presented with? *

- ○ Yes
- ○ Could be clearer
- ○ No

When browsing via the map, was it clear what each marker referred to? *

- [ ] Yes
- [ ] Sometimes
- [ ] No
- [ ] Other:

Did you understand that the different colour markers represented the different types of hints? *

- ( ) Yes
- ( ) No
- ( ) Other:

Would you prefer to see any other information represented on the map instead of venue type? *

(If yes please specify)

- ( ) Yes
- ( ) Indifferent
- ( ) No
- ( ) Other:

On zooming out, did you understand that the grey circles showed the amount of hints in that area? *

- ( ) Yes
- ( ) No
- ( ) Other:

Did you use the filter option? *

- ( ) Yes
- ( ) No

Did you have any issues navigating through the app?

- ( ) Yes
- ( ) Sometimes
- ( ) No
- ( ) Other:

Was the process of dropping a hint clear to you? *

- ( ) Yes
- ( ) Indifferent
- ( ) No

Did you find the place suggestions useful? *

- ○ Yes
- ○ Indifferent
- ○ No
- ○ Other: _____

Do you think there was enough icons to choose from in the drop hint? *

(If no, please specify)

- ○ Yes
- ○ Indifferent
- ○ No
- ○ Other: _____

Was it clear where your hint was dropped? *

- ○ Yes
- ○ Sometimes
- ○ No
- ○ Other: _____

Did you Join or Watch any hints? *

- ○ Yes
- ○ No
- ○ I didn't know how to
- ○ Other: _____

Were you aware that if you come into the location of a hint in your watch list you will be alerted? *

- ○ Yes
- ○ No
- ○ Other: _____

Would you like to be automatically joined to this hint? *

- ○ Yes
- ○ Indifferent
- ○ No
- ○ Other: _____

Would you like the option to open the app and join manually? *

- Yes
- Indifferent
- No
- Other:

Would you like a setting to choose whether you will be joined automatically or whether you have the option to manually join? *

- Yes
- Indifferent
- No
- Other:

Would you use the watch list as a quick reference to watch the hints you were interested in?

- Yes
- Didn't think of this but would if the info was realtime.
- Sometimes
- No
- Other:

At the moment, none of the hints expire for testing purposes. When they will, how long do you think would be an acceptable time to disappear after last active? *

(last active means either the time they were dropped or if people joined in the time the last person joined.)

- 1 hour
- 2 hours
- 3 hours
- 4 hours
- 5 hours
- 6 hours
- 7 hours
- 8 hours +
- Other:

Is there any feature you feel is missing from the app? *

(We want to know so we can improve it in the future...)

If this app were to be wiely used with realtime information, would you find it useful? *

- Yes
- Indifferent
- No

If yes, what would you use it for most?

If you have any other comments about our app, positive or negative, we would really appreciate hearing what your think.

Did you notice any functional issues/bugs on the latest build?

Submit

100%: You made

Never submit passwords through Google Forms.

Appendix 2

A 2.1: Formal Test Design

Hint App User Trial

Prepared by: Brian Byrne and Gemma Gallagher

02 December 2014

Participant Entry Form

You have been asked to be a participant in a user trial, which is part of a Masters Project undertaken in Dublin Institute of Technology (DIT). The Hint App team will ask you questions for research purposes and the collected data and findings will appear in our Final Project Report. As well as this, the team may ask your permission to use images or video of you carrying out the task for dissemination purposes relating to the project. If you are asked, the content will be shown to you in advance for your approval.

I hereby give my consent to the Hint App team to use any data supplied by me on the accompanying form for research purposes and possible further publications:

Signature: **Date:**

1		
2		
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24		

Pre-Test Questions

The following short questions may be of relevance to the results of the trial. You can choose whether or not you answer any/all of them.

Question (tick as appropriate)	**Yes**	**No**
Have you participated in a user trial before?		
Are you a native English speaker?		
Are you a resident of Dublin?		
Do you own an Apple iPhone		
What age are you?		
Are you a student?		
Are you a professional?		

Overview

Outline

Thank you for taking part in the Hint App User Trial. You will be asked to participate in a short trial using the Hint app and iPhone provided. At the end of the trial, you will be asked some short questions about your experience.

About the Trial

Hint is location-based app that gives realtime information about locations and venues around you. It lets you know what places are busy, a simple demographic of those there and what the majority of people are there for. The hints (points on the map) are user driven, giving you ability to browse and join hints or drop your own hint for others to discover.

You will be asked to browse through the app and then walk down the street as directed. We will ask you to complete a few tasks before starting and throughout the trial.

When I hand you the device, open it and register with your details. Take some time to familiarise yourself with the app. Then complete the following:

1. Drop a hint at “the location specified” and add the type and category you feel is most fitting.
2. Browse using the list/map and add a hint to your watch List. You can choose any hint you like as long as it is on the route between where you are now and our final destination.

On completion of the above, close the app if you wish and you may start walking towards our final destination. At any stage throughout your walk, you may open the app.

3. On arriving at the location you added to your watch List (completed in Question 2), join this hint.

Thank you for assisting us in our trial.

Functionality Questions

The following short questions relate to your use of the application, please answer yes or no and comment where you think necessary.

Questions	**Yes**	**No**	**Comments**
Did you have any issues with the introduction?			
Were you able to register?			
Were you able to drop a hint?			
Were the suggested locations given in the ‘drop a hint’ process useful?			
Were you able to join/watch a hint?			
You were asked to add a hint to your watch list along your intended path. On passing this hint were you alerted?			
Was it clear what hint you were alerted for?			
To the best of your knowledge, was each map marker and list element connected correctly.			
Was there a clear connection between the list and map?			
On opening the app for a second time along your route, did your position and distance from hints update?			

User Experience Questions

The following short questions relate to your use of the application, please answer yes or no and comment where you think necessary.

Questions	**Yes**	**No**	**Comments**
Did you enjoy using this app?			
Was the app easy to use?			
Did the apps navigation bring you to expected functions?			
Is there any part of the app you didn't understand?			
Did you understand the hint icon representations?			
Did any icons cause you confusion or force you to stop and think about their meaning?			
Did you find the watch list feature beneficial?			
Did you find the information persuasive?			
Would it convince you to visit any of the venues locations?			
Which of the pieces of info about a venue/location might cause you to visit a venue?			
Would you recommend this app to a friend?			
Would you be interested in seeing hints specifically from friends?			

Question	Comments
What didn't you like about the app?	
What did you like about the app?	
Is there anything else you want to add?	

Post-Test Questions

Please mark a point on each scale.

How much **Mental Demand** did you experience during the trial?

Low - 1	2	3	4	High - 5

How much **Physical Demand** did you experience during the trial?

Low - 1	2	3	4	High - 5

How much **Time Pressure** did you experience during the trial?

Low - 1	2	3	4	High - 5

How well do you think you **Performed** during the trial?

Low - 1	2	3	4	High - 5

How much **Effort** did it take to do the trial?

Low - 1	2	3	4	High - 5

How **Frustrating** did you find the trial?

Low - 1	2	3	4	High - 5

For Each Tester Record:

Tester	Location	Weather Conditions	Time of Day
1			
2			
3			
4			
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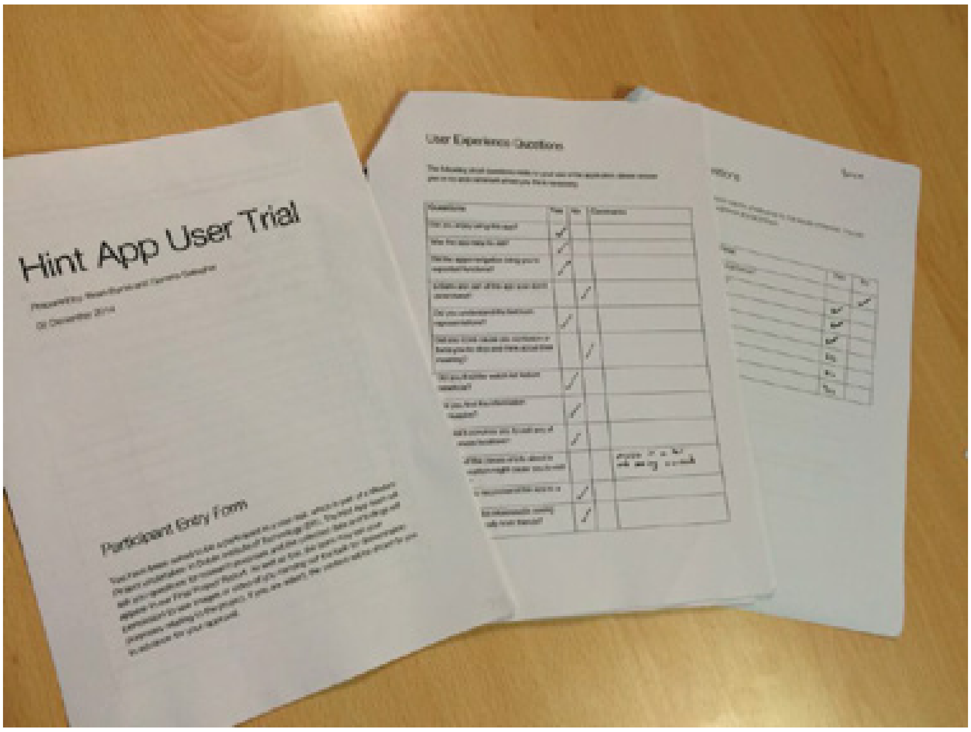
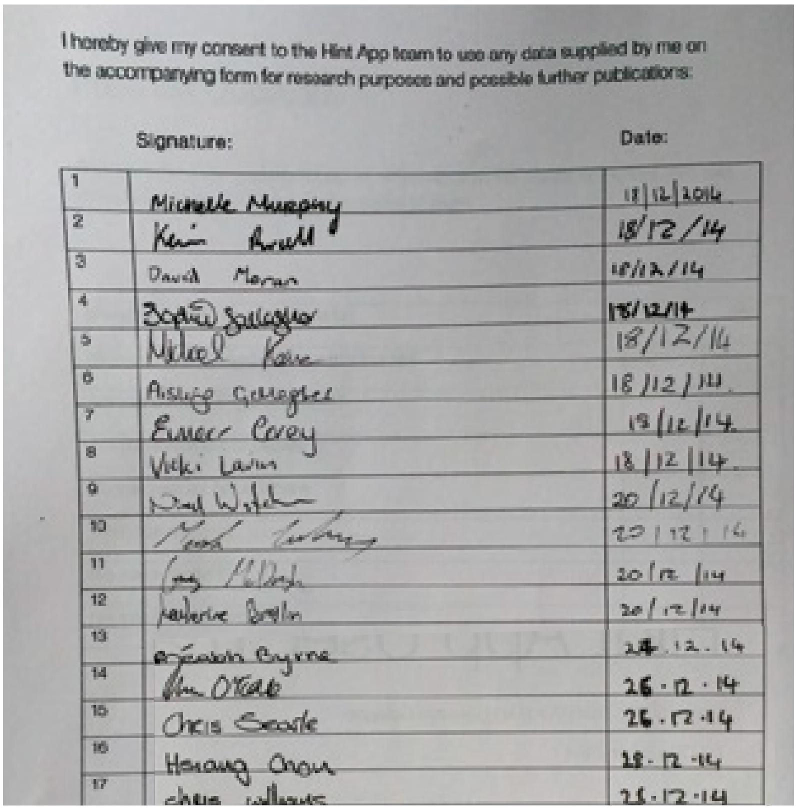
18			
19			
20			

A 2.2: Formal Test Records:

Hint User Trial Surveys



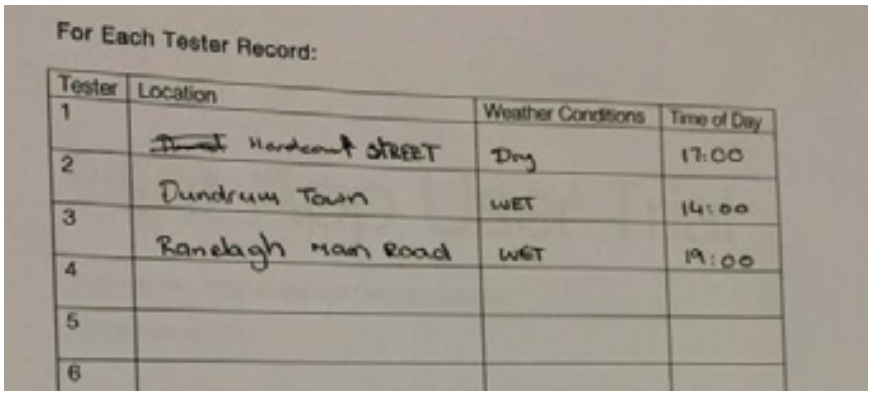
Signatures of Participants



I hereby give my consent to the Hint App team to use any data supplied by me on the accompanying form for research purposes and possible further publications:

	Signature:	Date:
1	Michelle Murphy	18/12/2014
2	Kevin Powell	18/12/14
3	David Moran	18/12/14
4	Sophie Gallagher	18/12/14
5	Michael Kane	18/12/14
6	Aisling Gallagher	18/12/14
7	Emer Corey	18/12/14
8	Vicki Lavin	18/12/14
9	Neil Walsh	20/12/14
10	Mark Tohey	20/12/14
11	Greg McDonagh	20/12/14
12	Katherine Breslin	20/12/14
13	... Byrne	24.12.14
14	... O'Kane	26.12.14
15	Chris Searle	26.12.14
16	Hoang Chau	28.12.14
17	chris williams	28.12.14

Testing Locations

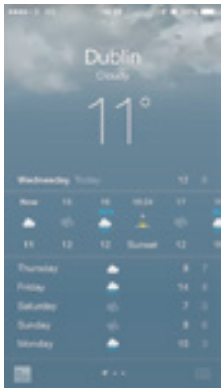


For Each Tester Record:

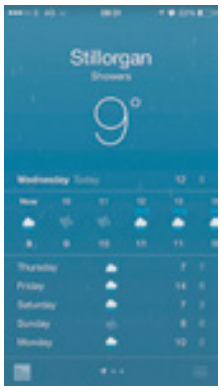
Tester	Location	Weather Conditions	Time of Day
1	~~[illegible]~~ Hardcout STREET	Dry	17:00
2	Dundrum Town	WET	14:00
3	Ranelagh main Road	WET	19:00
4			
5			
6			

Weather Conditions

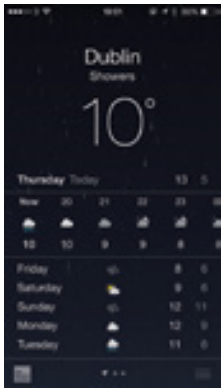
Hardcout St



Dundrum



Ranelagh



A 2.3: Formal Test Results:

FORMAL TRIAL RESPONSES

File Edit View Insert Format Data Tools Add-ons Help Last edit was 2 days ago

FORMAL TESTING

	Michelle		Maebh Byrne		Kevin		David		Sophie
TESTERS	1	1 Comments - Ranelagh 18/12	2	2 Comments -	3	3 Comments -	4	4 Comments	
PRE TEST QUESTIONS									
Have you participated in a user trial before?	No		No		No		No		No
Are you a native English speaker?	Yes		Yes		Yes		Yes		Yes
Are you a resident of Dublin?	Yes		Yes		No		Yes		Yes
Do you own an Apple iPhone	No		Yes		No		No		Yes
What age are you?	24		18		24		18		
Are you a student?	Yes		Yes		No		Yes		Yes
Are you a professional?			No		Yes		No		No
FUNCTIONALITY QUESTIONS									
Did you have any issues with the introduction?		Didn't really distinguish the difference between adding and joining a hint		Would like to be able to see it again once in the app					
Were you able to register?									
Were you able to drop a hint?									
Were the suggested locations given in the 'drop a hint' process useful?									
Were you able to join/watch a hint?		Unclear on swipe - not used to iphone		Didnt know to swipe					
You were asked to add a hint to your watch list along your intended path. On passing this hint were you alerted?		About 10 meters before I got to it		just before I got there		Great Feature!			
Was it clear what hint you were alerted for?									
To the best of your knowledge, was each map marker and list element connected correctly.									
Was there a clear connection between the list and map?						The list linked very well with the map.			
On opening the app for a second time along your route, did your position and distance from hints update?									
USER EXPERIENCE QUESTIONS									
Did you enjoy using this app?									
Was the app easy to use?		I wouldnt use very many apps		yes but into again					
Did the apps navigation bring you to expected functions?									
Is there any part of the app your don't understand?				swipe to join					
Did you understand the hint icon representations?									
Did any icons cause you confusion or force you to stop and think about their meaning?									
Did you find the watch list feature beneficial?		Probably the best part as you get a notification when you get to the location to remind you to join.							
Did you find the information persuasive?									
Would it convince you to visit any of the venues locations?		Yes, but would probably forget to join!							
Which of the pieces of info about a venue/location might cause you to visit a venue?		Good that you get an average demographic of those there.		the amount of people		Number of people there and ages of those present		Music in a bar and seeing a crowd.	
Would you recommend this app to a friend?									
Would you be interested in seeing hints specifically from friends?				facebook friends not close friends					
What didn't you like about the app?		Theres not really any incentive to drop a hint. If you weren't able to see popular places until you dropped a certain amount.				It would be good to add several categories to a			

J	K	L	M	N	O	P	Q	R	S	T	U	V	W
…phie		Matthew O'Toole		Chris Williams		Vicki		Michael		Emer		Aisling	
	5 Comments		6 Comments		7 Comments		8 Comments		9 - Comments		10 - Comments		11 - Comme…
…o		No		No		No		No		No		No	
…es		Yes		Yes		Yes		Yes		Yes		Yes	
…es		Yes		Yes		Yes		Yes		Yes		Yes	
…es		Yes		Yes		Yes		Yes		Yes		No	
20		26		27		24		22		26		24	
…es		No		No		No		Yes		No		No	
…o		Yes		Yes		Yes		No		Yes		Yes	
			yes but some odd ones in there						Didn't know I could add a venue not in the drop down selections				None I want…
							Didn't get an alert.						
	Very Accurate												
									No category for tourist attractions		Icons represented different categories well ie outdoor/indoor. Good use of colours.		
	Very Beneficial												
											Need more info		
											Need comments to outline reasons to visit place (ie. positive/negative)		Photos/comm… is may be m… persuasive
	What people are there for		reason people are there				Average Age		Knowing the age category of the customers		Busy/Not Busy		Number of People there
	Most definitely												
	Would be very beneficial to see finds specifically from friends.				Not really for close friend, but for acquaintances of fb friends								
	The filter function was opposite to what I'd have expected but was easily figured out		Would like to be able to see more about the place of find		Find a way to show the actual amount of people at the place		More about whats going on maybe		Doesn't give detail as to what kinds of food/drink is available		Need more info on places		Didn't know y… could click anywhere o… the screen t… get out of th… filter selectio…

X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
Hsiang Chou		Chris Searle		Tester 1		Tester 2		Tester 3		Tester 4		Tester 5	
	12 Comments		13 Comments		14 Comments		15 Comments		16 Comments		17 Comments		18 Comme
No		No		No		No		No		No		No	
Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Yes		Yes		No		Yes		Yes		Yes		No	
25		27		24		26		19		18		22	
No		No		No		No		Yes		Yes		Yes	
Yes		Yes		Yes		Yes		No		No		No	
			Didn't see them										
					Wasn't sure where to swipe								
					Yes but about 8 metres before I got there				Just after I passed it				A bit before maybe 7 m
					Really nice connection								Really clea
							Yes but would like to be able to add more than one category		Thought you could add more than 1				
					Yes really liked this - no effort involved								
							No, would need more info.						
	Number of people		The average age is good to know		Where's busy		The time it started		Average age and how many people		age		The distan away it is
					Definitely to get more people on it								
	Could have more description about what is going on		I like imagery when deciding on new places to go. Especially if I haven't been there before		Didn't understand some of the ios parts - eg swipe left		Would like to be able to add more than one category. Give more info		Would like to see who's there		Filters were the opposite to what I thought		Was alerte before I go the venue, could be m accurate