



Project Púca/IP33

Research Pack

Team WayPoint | HeriTech Explorer | WebElevate



Table of Contents

1. Introduction	<u>05</u>
Executive Summary	<u>05</u>
User / Audience	<u>06</u>
Team Feedback	<u>06</u>
IP Feedback	<u>06</u>
Meet the Team!	<u>06</u>
Proof of Concept (POC) for Treasure Hunt Game Application	<u>07</u>
Key Deliverables	<u>07</u>
2. Market Research	<u>08</u>
Business Value Proposition	<u>08</u>
The Market	<u>10</u>
Data Gathering Methods	<u>12</u>
Secondary Research	<u>12</u>
Key Statistics	<u>12</u>
Demographics	<u>12</u>
Primary Research	<u>13</u>
Primary User Group Goals Children to Pre-teens (6-14 years)	<u>15</u>
3. Competitor Analysis	<u>17</u>
General Tips on UX Competitor Analysis	<u>18</u>
Heuristic Evaluation	<u>19</u>
Applications Appraised	<u>20</u>
Heuristic Analysis Results	<u>23</u>
Gaming Statistics	<u>26</u>
4. User Research	<u>27</u>
Audience	<u>27</u>
User Value Proposition	<u>27</u>
Researching similar apps	<u>27</u>
Market Research	<u>27</u>
Introduction	<u>27</u>
User Interviews	<u>28</u>
Summary of Questionnaire Results Survey - 1	<u>28</u>
Children / Preteens	<u>28</u>
Summary of Questionnaire Results - Adults	<u>30</u>
User Requirements	<u>33</u>
Personas/Scenarios	<u>33</u>
Persona:	<u>33</u>
Scenario - November 3rd 2018	<u>34</u>
Ongoing Interview Research [November 2018]	<u>35</u>
Constraints to the Extent of our Data Gathering	<u>35</u>
Product Mockups	<u>36</u>
Technology Roadmap	<u>36</u>

Table of Contents

5. Research on Implementation Technologies	<u>37</u>
Solutions to poor GSM Coverage	<u>37</u>
1. What3Words	<u>38</u>
2. BlueTooth Beacons	<u>40</u>
What are bluetooth beacons?	<u>40</u>
Why are bluetooth beacons special?	<u>40</u>
What do bluetooth beacons actually do?	<u>41</u>
What is iBeacon and Eddystone?	<u>41</u>
Should I care about iBeacon and Eddystone?	<u>42</u>
What do I need to know about buying Bluetooth Beacons?	<u>42</u>
How do I find out more?	<u>42</u>
7. Conclusion	
Market & User Research	<u>43</u>
Design	<u>43</u>
Funding	<u>43</u>
Development	<u>43</u>

1. Introduction



This document is the fruit of our research into a treasure hunt App. designed to be used by children and young adults who wish to explore heritage sites. It was created by a team of students at the Digital Skills Academy Dublin as part of the Industry Project component of the BSc Degree in Digital Technology and Design.

We were known as Team 33, however, we branded ourselves as Team Waypoint, to reflect the type of project that we were working on.

Executive Summary

- The goal of our project was to produce a proof of concept (mockups, design and technology roadmap) and enough material to support presentation to potential investors for funding for the development of a Treasure Hunt App.
- We approached this project as primarily a research project, analysing the market, the competitors and user needs i.e. young adults, parents / guardians and heritage site owners i.e. the heritage officers of the local authorities based in Ireland's Ancient East
- We discussed with our mentor whether to follow the entrepreneurial route or the UXCD approach. He said that both routes are valid but the team decided to follow the UXCD approach based on the team skillset. Notwithstanding that decision and the limited time for completion of this project we did carry out some entrepreneurial analysis sufficient to validate that there is a market for an App such as this, with strong demand from users and heritage site owners and funding is available within the region known as Ireland's Ancient East.
- In executing a UXCD approach to this project we completed an heuristic analysis of competitor geolocation Apps. and interviewed potential App. users to ascertain their wants and needs.

1. Introduction

User / Audience

- Children to Pre-teens (6-14 years) and Adult Players
- Potential Investors + Business Stakeholders
- Tourist Bodies + Heritage Sites

Team Feedback

We truly enjoyed this project as it played to the mix of skills and personalities in our team. Stuart Elder was a most supportive IP and our mentor Peter Berends provided us with timely guidance and direction. This was a memorable worthwhile project - we could not be happier with the outcome.

IP Feedback

I am very happy with this result which has exceeded my expectations. It is great to see my ideas come to life - if I was doing this myself the project would have taken me two years to complete.

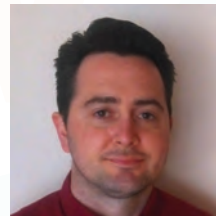
Meet our Team!



Stuart Elder
Industry Partner



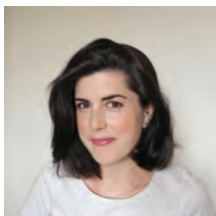
Mary Fahey
Lead Project
Manager



Barry Ferguson
Deputy PM



Sean Regan
Administrator



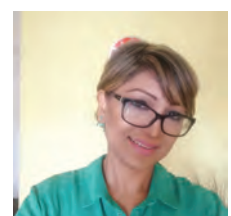
OrlaghMurphy
Designer



Sofia Coughlan
Designer



Emmet Coughlan
Developer



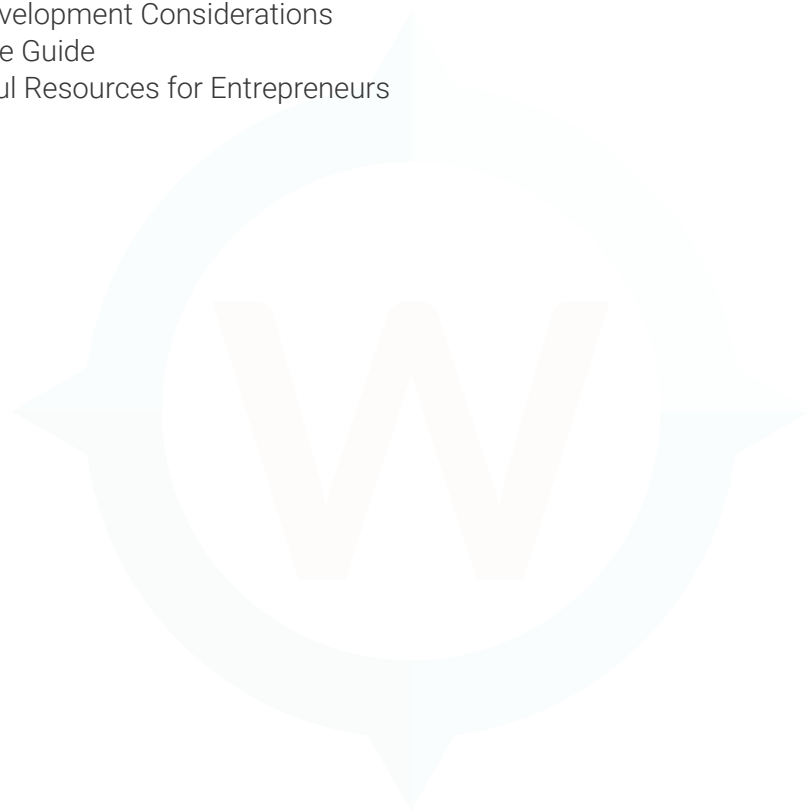
Dilruba Khan
Developer

1. Introduction

Proof of Concept (POC) for Treasure Hunt Game Application

Key Deliverables

- User Research
- UX Design & Development Considerations
- Foundation Style Guide
- Funding & Useful Resources for Entrepreneurs



2. Market Research

Business Value Proposition



Initial Market Targeting

This project achieves the business goals and is aligned with the objective of the IP, Stuart Elder, Director of Phoenix Heritage. The business goals can be summarised as follows.

The benefits of the Explorer App. is that it will keep the younger audiences entertained in a digital treasure hunt so that the parents / guardians can have a more enjoyable experience while visiting heritage sites.

The primary target customer is the parents and guardians that will download the App. for use on their own mobile telephone and as appropriate, the mobile telephones of their children.

The secondary target market is tourist bodies and those owners or managers of tourist / heritage sites who are willing to pay Phoenix Heritage a licencing fee to use the Explorer App. This will ensure that their site has a competitive advantage over other tourist / heritage sites that do not provide this service.

2. Market Research

Solutions Provided

The problem that this Explorer App. solves is that it provides a service that will engage and captivate the child's attention – for want of a better word it will act as an electronic teacher & child-minding service, that will somewhat liberate the parents / guardians to allow them more freedom to enjoy the heritage sites while their children are less dependent on them for entertainment.

What it does uniquely well is that it provides a new service that does not already exist in tourist / heritage sites. It will be

- (a) easy to download on Android devices
- (b) very simple to use
- (c) no payment required to use (as this will be covered by the licensing fee that the site manager / owner will pay to Phoenix Heritage).

The Explorer App. is distinctly better than the alternative passive transmission of information (audio/ video) on existing tourist apps - this unique solution offers an active engaging App. where children are encouraged to look and listen for clues to locate the hidden treasures stored on the heritage site.

Gain/Pain Ratio

The measuring of the potential customer adoption is demonstrated by the Gain/Pain ratio which measures the gain that the Explorer App. will deliver to the target market versus the pain of its development.

- Attracts new audience
- Competitive Advantage
- Enhanced heritage site reputation
- Quickly downloaded
- Easy to Use

- Other sites develop a Similar App.

- Cost and time to develop this App.



2. Market Research

Value Proposition

The Explorer App. offers game-changing benefits with minimal modifications to existing processes or environments. In other words, while the innovation is disruptive to the business of existing tourist / heritage site owners, it is non-disruptive to adopt by either the visitor or the site owner.

Phoenix Heritage's unique value proposition - Stuart Elder is a senior Archaeologist with over 20 years of professional consultancy experience, and fortunately a qualified Java and Android developer. This experience and depth of knowledge distinguishes this IP from all potential competitors.

The Market

In our first interview with our Stuart Elder of Phoenix Heritage, he proposed that the App. would be suitable for use along the less well-known sites that are marketed under the brand Ireland's Ancient East.

Our team carried out our own independent due diligence to evaluate the commercial potential for partnering with this brand and we agree with Stuart that it is most definitely a suitable research market for the following reasons-

- Market Size - Fáilte Ireland (National Tourism Development Authority) has invested €31 million in developing the brand with a €3.9 million investment in digital assets. Their domestic marketing campaigns are successful in that they are reaching 74% of adult audiences.
- Market Growth rate - Visitor numbers have increased by 13% in 2017 versus 2016 and revenue has increased by 14% in 2017 versus 2016
- Distribution Channels - Fáilte Ireland has established strategic partnerships with state agencies that own and manage sites of vital importance to tourism. These include: The Office of Public Works, Waterways Ireland, the National Parks and Wildlife Services and Coillte.



2. Market Research



Under the Ireland's Ancient East programme, €8.2 million has been committed to improving visitor experiences at the eight top OPW run attractions including Brú na Bóinne.

Other Ireland's Ancient East projects involving state agencies include Avondale Forest Park Experience in Wicklow and Wicklow Mountains National Park

- Market Trends – The Brand Goal is to make Ireland's Ancient East the most engaging , enjoyable and accessible cultural holiday experience in Europe . The priority for 2018 is to develop brilliant visitor experience and this Discovery App. is a perfect match.
- Key Success Factors - Ireland's Ancient East supports building on the capabilities of the industry and stakeholders and in 2017, over 4,500 front line staff received training on the brand, while 862 tourism trade bodies attended workshops delivered throughout the region. This shows commitment.



Within the brand Ireland's Ancient East ® we concluded, based on the treasures located there, that there are a multitude of heritage sites where hidden treasures are ripe for discovery using the Explorer App. for example -

- Explore heritage towns and Brú na Bóinne in Westmeath and Louth (Castles Churches, Historic & Heritage Museums)
- From round towers to castle turrets in Meath, Offaly and Westmeath (Castles, Historic & Heritage)
- Marvel at ancient monuments to prehistoric man in Limerick to Meath (Historic & Heritage Museums)
- Delve into Sacred Ireland and marvel at monastic brilliance Churches Historic & Heritage in Longford, Louth, Meath, Monaghan and Offaly
- Immerse yourself in the land of saints and scholars
- Churches Historic & Heritage from Longford to Kilkenny

2. Market Research



Data Gathering Methods

Secondary Research

The goal of secondary research is to analyze data that has already been published in order to identify competitors, establish benchmarks and identify target segments.

Key Statistics

Demographics

- The Pokémon GO user base revealed a 40 female / 60 male gender split (Perez, 2016)
- Smartphone usage behavior among children in Ireland (Zeeko Trend Report, 2018) 1
- More than 60% of primary school children use tablets and game consoles to access the internet; older students use mainly smartphone (more than 90%).
- The usage of smartphones increases throughout the school years (from primary to secondary) whilst the use of tablets decreases. A slightly higher percentage of girls use smartphones to access the internet from 6th Class.
- YouTube, SnapChat and MineCraft are favourite applications of primary school children
- Almost 70% declared to know more than their parents about online apps and gaming. 56% declared to know more than their parents about social media
- Younger children were more concerned about screen time than older children.

2. Market Research



Online Gameplay Stats

- 61% of parents have children who play games
- 43% of parents in the UK play games with their children
- The most common reason parents play games with children is to spend time with them
- A fifth of parents playing games with their children do so for the health/fitness and educational benefits.
- 6 in 10 children aged 10-15 have bought a game for themselves, compared to 5 in 10 children aged 6-9.



Primary Research

Market Research Primary Data

The following steps were taken in advance of activating our primary research:

- The team drafted an appropriate questionnaire designed to assist us to understand the user needs by engaging the target audience to consider the proposed Explorer app and to tell us about their mobile habits and usage.
- We drafted questions relevant to our identified audience, current use and access to mobile phones, favourite interactive games, attitudes to history, attitudes to visiting heritage sites.
- We sought and received written consent from the parent / guardian of any children that we interviewed.

2. Market Research



We created a short interactive questionnaire based both on:

- (a) the goals as set out in the initial brief and
- (b) from the information we received from Stuart Elder at our first meeting.

We used four methods to engage with our potential users :

- Digital Interactive Questionnaires
- Video link (Google Hangouts)
- Telephone
- Face to face.

A variety of techniques were used within our questionnaire ranging from closed “Yes/No” questions to more open multiple choice questions and finally open questions which allowed free text answers. While the open questions are more onerous for the interviewee they provided us with a rich source of information on which to base our user centred design.

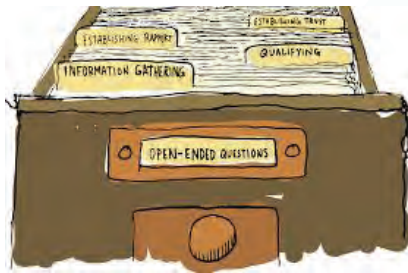
A typical online survey project can take anywhere from two days to four weeks to complete. The difference in time really depends on the research methodology and deliverables. Obviously, a larger study group reaching a specific population would take much longer to complete.

2. Market Research

Primary User Group Goals Children to Pre-teens (6-14 years)

Children want to:

- To have fun
- To avoid boredom
- To explore and move freely.
- To engage with heritage site in a fun way
- To play with friends or family



Adult Players

- To spend time with younger users (their children / children in their care)
- To get physical exercise and explore
- To have fun and be entertained
- To enhance their experience at heritage sites

Adult Enablers

- To ensure the safety of their children / children in their care
- To provide younger users with a positive learning experience
- To encourage younger users to be physically active
- To tackle boredom in younger users at Heritage Sites
- To encourage engagement in younger users with their environment
- To configure the app so that it is suitable for their child to use safely

2. Market Research

When the App is developed we envisage multiple entry points by the user as outlined hereunder:



3. Competitor Analysis

Geolocation Gaming Analysis

Apps Tested Include:-

- Ingress
- Pokemon Go
- Jurassic World Live
- Hacko
- Siter
- Temple Treasure Hunt
- Geocacher



Introduction

Getting to grips with the ins and outs of a UX competitor analysis can help Phoenix Heritage know their market, product and goals better. You will also understand the competition, get actionable insights and boost your brand. With an almost limitless number of competitors out there all vying for attention, the heat is on to understand exactly what you are doing right (or wrong) to create an effortless user experience and a product that people enjoy using.

There is a lot that goes into doing a thorough UX competitor analysis, but at its heart, a competitor analysis consists of two basic phases:

Knowing how to research properly and understand exactly the information you are looking for.
Synthesizing that information before acting on your findings.

A competitor analysis means knowing your product like the back of your hand and stacking that up against the competition out there. There are standard principles (aka heuristics) for user interface design which can be used when conducting a competitor analysis. These principles are a general guide and are not set in stone, so you are free to create your own set of standards. These can include anything from specific UI patterns to interaction models.

3. Competitor Analysis

General Tips on UX Competitor Analysis

1. Understand your goals

Why are you doing this competitor analysis? What do you hope to achieve? Will this research impact UX decisions? Your goals should ideally be as specific as possible and hopefully assessable so consider the issues you're trying to address with the competitor analysis. Keep your goals at the front of your mind when carrying out your analysis so you can always refer to them without losing sight.

2. 'Really' know your competition

It is a good idea to open a Google spreadsheet or chart and start creating a table of information.

Jaime Levy has a comprehensive outline for creating a competitive analysis matrix. A good number at the beginning stage is around 5-10 direct and indirect competitors, so you can easily maintain and track what your competition is doing.

Direct competition consists of those people and companies who are doing what you do already. You share the same customers (or better still, you want their customers to become yours) and they offer the same product or service that you do.

Indirect competition is composed of those who offer something similar to what you offer. Maybe it is not the first part of their product or service but the second or third.

The nature of business means that competition can pop up at any time, anywhere. Keep a note of your competitors as they arise, so you do not forget them.

3. Look for commonalities among competitors

When looking for commonalities, it is a good idea to write down the actions users can perform, as well as the user journey of competitor products, and see if they match with what you are offering. Things to consider:

- Design
- The tone and copy of the competitor
- Good and bad features - you can learn a lot from both
- User Reviews
- Wait/Load times
- Customer Service

Do not forget about the set of standards mentioned earlier which you can refer to. All of this can be put into your spreadsheet for reference.

4. Analyze and summarise

When analysing your UX research, create a small summary of what you have found out as well as what impact the information will have. This stage is perfect for identifying design opportunities because you understand your competitors' flaws (as well as your own).

Your analysis and summary can be used to convince team members, and stakeholders of any design changes you think would be beneficial or to argue for further innovation.

3. Competitor Analysis

Heuristic Evaluation

A heuristic evaluation can basically be defined as a review of the user interface, looking closely at user experience aspects. It helps to identify many kinds of user experience problems and is conducted against a set of design principles – also known as heuristics (hence the name!). Our team performed a competitor analysis of competitor apps under the headings Gameplay and Usability. Here is what we measured and the results of our team’s evaluation of the top competitor apps:

	Gameplay
GP1	The game provides clear goals or supports player-created goals
GP2	The player sees progress in the game
GP3	The player is rewarded and the rewards are meaningful
GP4	The player is in control
GP5	Challenge, strategy and pace are in balance (is it a fun game?!)
GP6	The first-time experience is encouraging
GP7	The game story supports the gameplay and is meaningful
GP8	There are no repetitive or boring tasks
GP9	The game supports different playing styles
GP10	The game is consistent
GP11	The player does not lose any hard-won possessions and can save regularly
	Score out of 33
	Result (%)

Ju	Competitor App Analysis*
	Usability
U1	Audio-visuals and graphics support the gameplay / story
U2	Screen layout is efficient and visually pleasing
U3	Device UI and game UI are used for their own purposes (do no conflict)
U4	Game status and information is provided
U5	Game terminology is clear and easily understood
U6	Navigation is consistent, logical and minimalist
U7	Control keys are consistent and follow standard conventions
U8	Game controls are convenient and flexible
U9	The game gives feedback on the player’s actions
U10	The player cannot make irreversible errors
U11	The player does not have to memorise things unnecessarily
U12	The game contains help
	Score out of 36
	Result (%)

3. Competitor Analysis

App Appraised	Sean	Barry	Mary	Ruba	Sofia	Emmet	Orlagh	Pass
Sighter								2
Geocaching								3
Turfhunt								2
Actionbound								2
Pokemon Go								3
Ingress								2
Jurassic World Alive								2
Wilder Wander								2
Field Trip								3

Pokemon Go

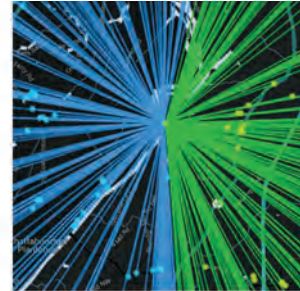


Jurassic World Alive



3. Competitor Analysis

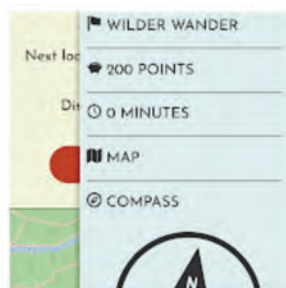
Ingress



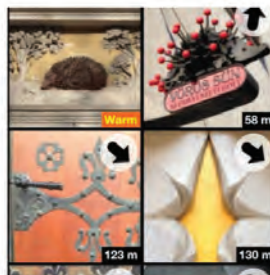
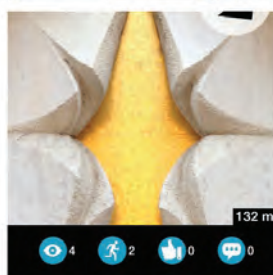
Geocache



Wilder Wander

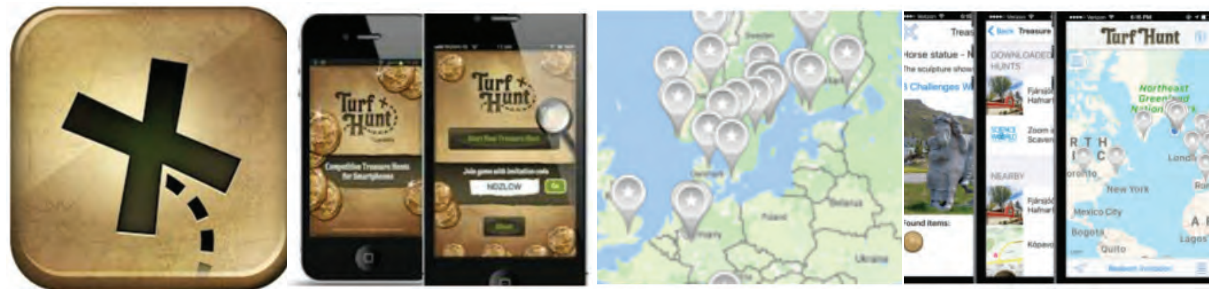


Sighter (Lakeland Treasures)



3. Competitor Analysis

Turfhunt



Actionbound

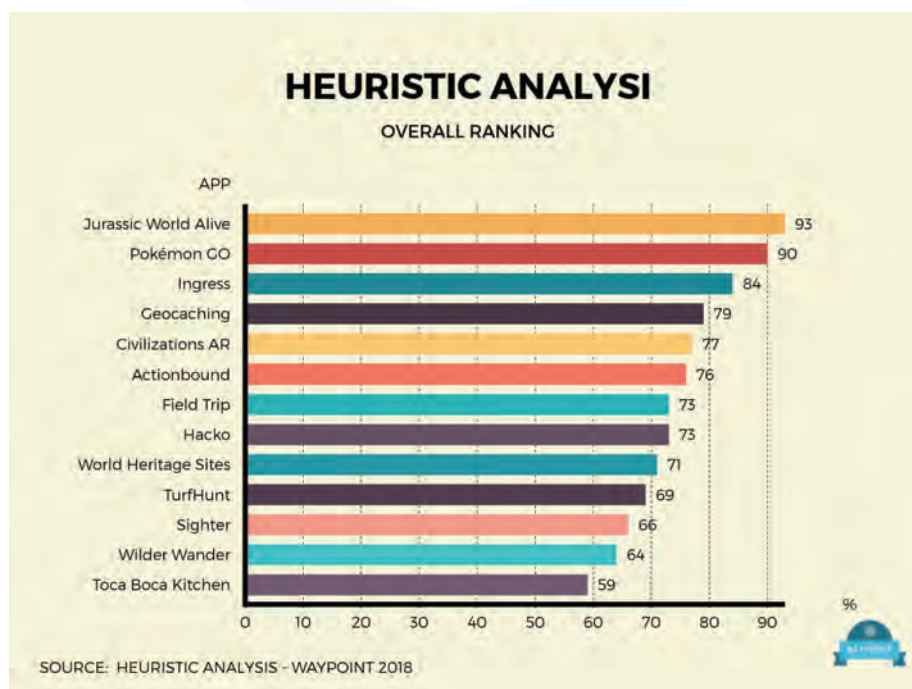
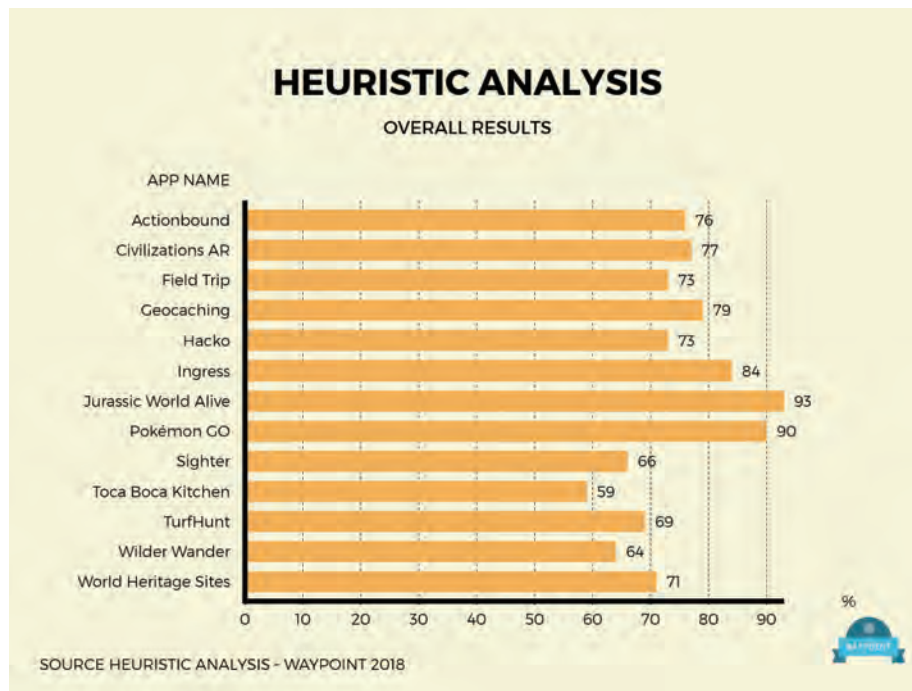


Field Trip



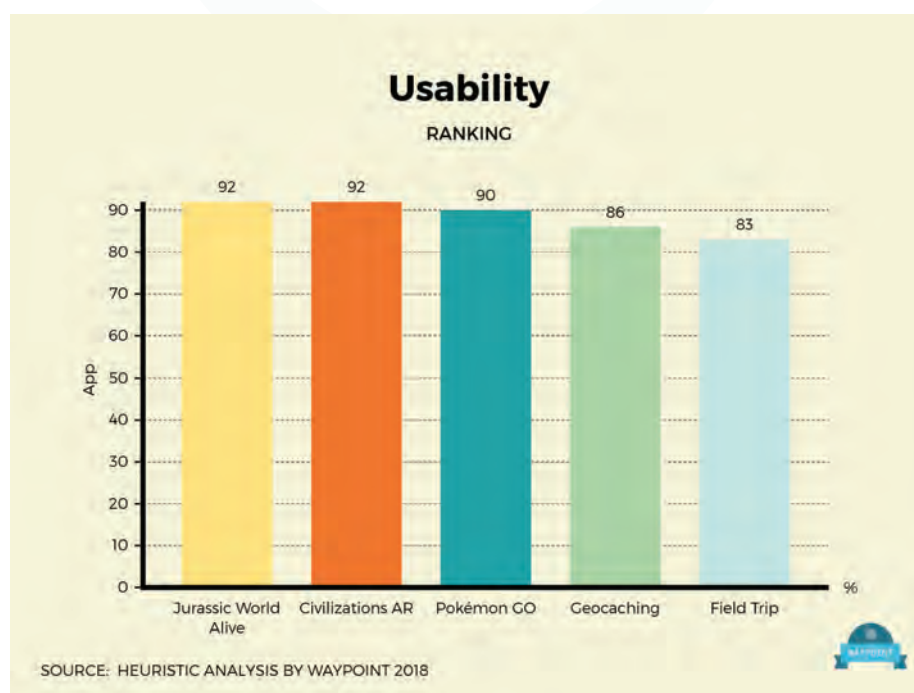
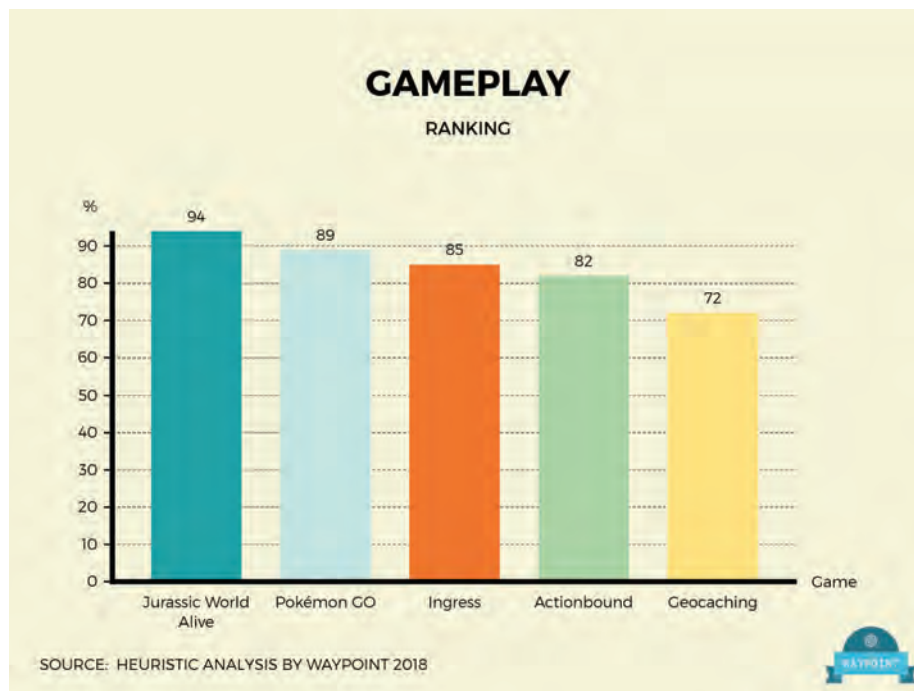
3. Competitor Analysis

Heuristic Analysis Results



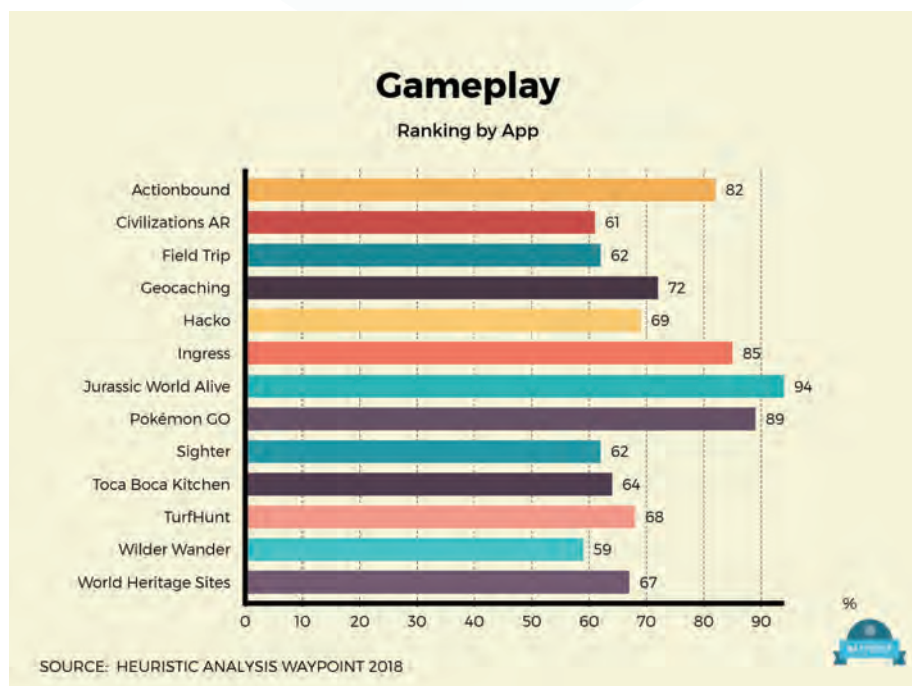
3. Competitor Analysis

Heuristic Analysis Results



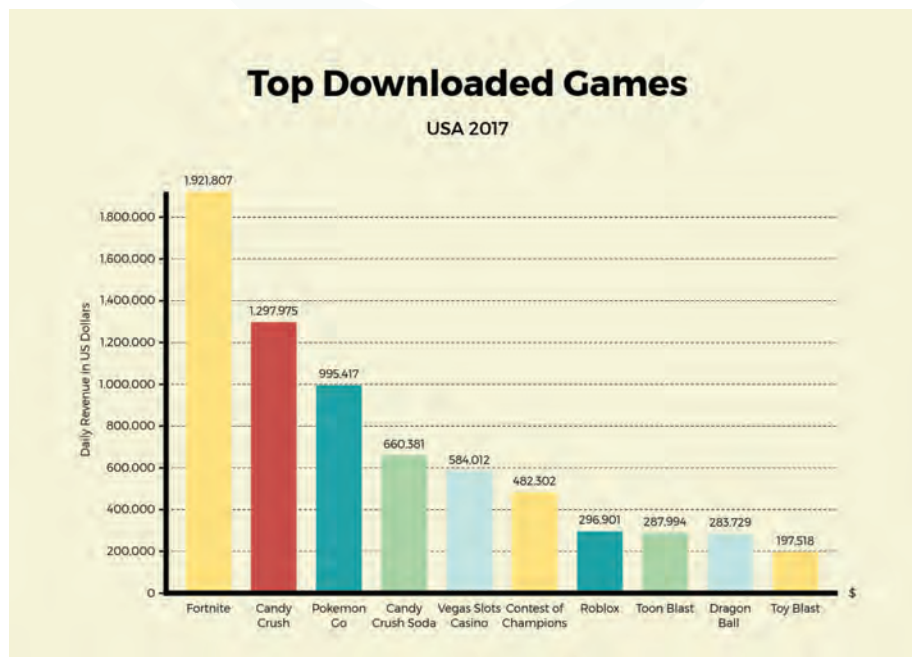
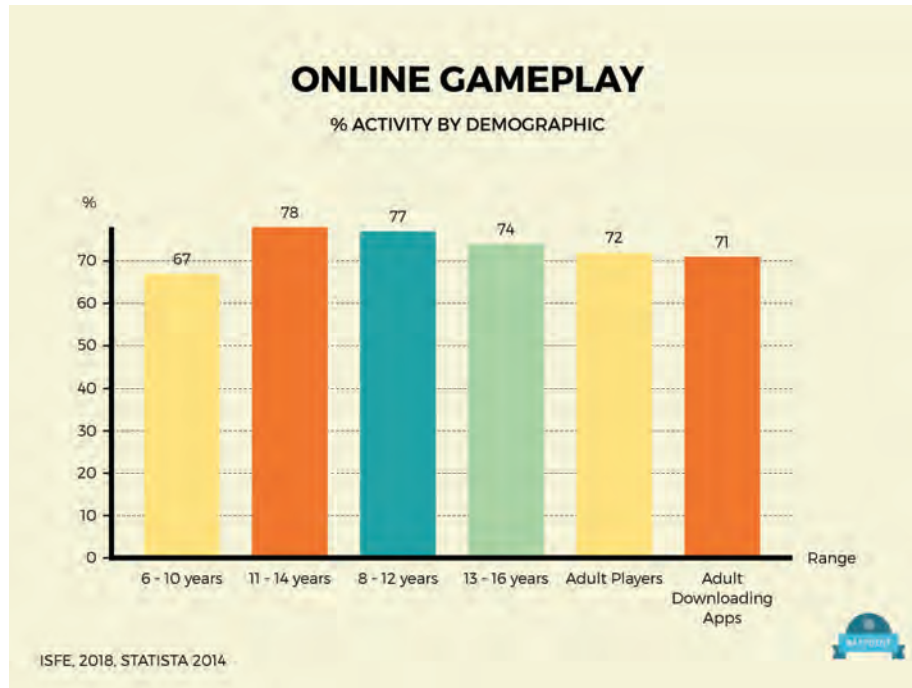
3. Competitor Analysis

Heuristic Analysis Results



3. Competitor Analysis

Gaming Stats



4. User Research

Audience

Through conversations with Stuart Elder, and brainstorming sessions, the team began by generating high-level user group definitions to help focus and direct our research. We gathered a range of relevant data and information (highlights below), which we discussed and analysed to gain insight on potential users and their motivations.

Following our first user questionnaire we correlated the research and developed two personas to bring our primary user group to life.



User Value Proposition

The Explorer hunt concept encourages users to explore heritage site and discover points of interest. It is aimed at younger users, and adults too, who want an alternative and fun way to engage with heritage sites. Using a hot and cold tracking feature, users hunt and collect points of interest as they explore heritage sites in Ireland.

Researching similar apps

This allowed us to identify the processes employed by these apps that encourage the user to physically move around an area or location.

Market Research:

This research helped identify Heritage Site locations where the terrain and makeup of the site would give the user the best opportunities to explore the site.

Introduction

Our User Research analysed children's perceived ideas of Heritage Sites so that we could identify their likes and dislikes about the locations. This allowed us to see which types of Heritage sites cater to their entertainment needs. For example, our initial research identified Dunamase Castle as suitable site to trial the App where children could enjoy the hilly terrain.



However when we interviewed the heritage officers of the local authorities in Ireland's Ancient East we learned that the Office of Public Works was not willing to provide funding for an App on that site because it was perceived as too dangerous for children. With this in mind, we pivoted to a child friendly site of Kilkenny Castle.

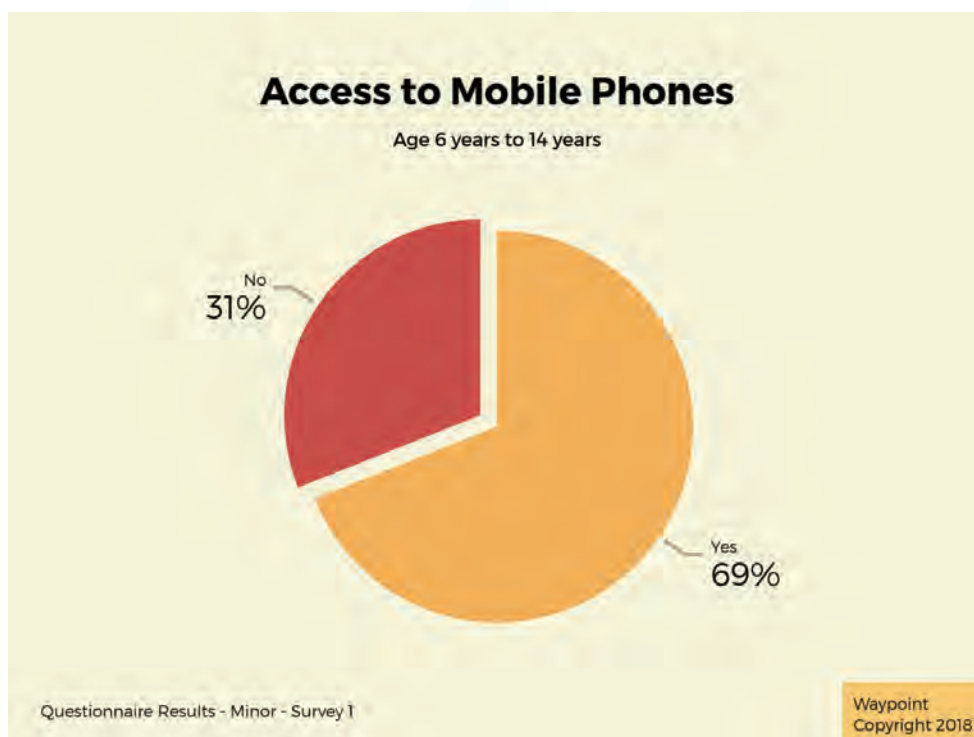
4. User Research

User Interviews

We conducted user interviews to establish an overall model of user needs, likes and dislikes that were designed to identify how different demographics have different requirements from an app.

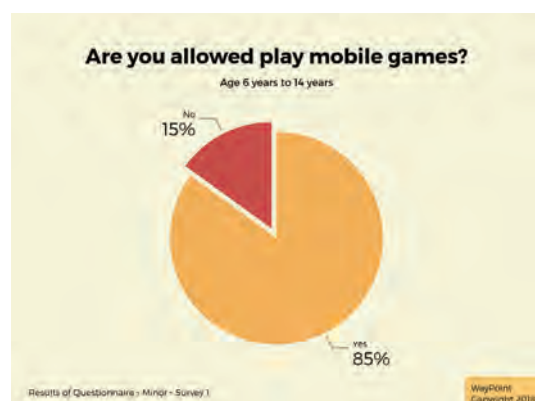
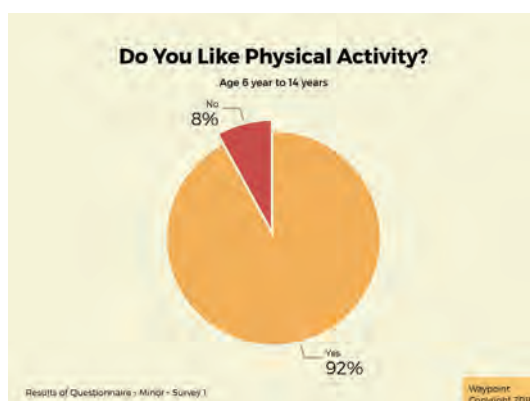
Summary of Questionnaire Results from Survey - 1

Children / Preteens



2. Access to mobile data? 20 (77%) of children do and 6 (23%) do not.

Both results above supports our decision to extend our research beyond mobile phones to include tablets, bluetooth receivers and GPS receivers

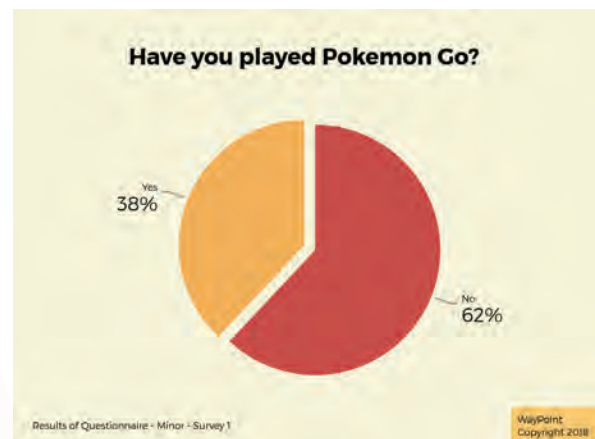
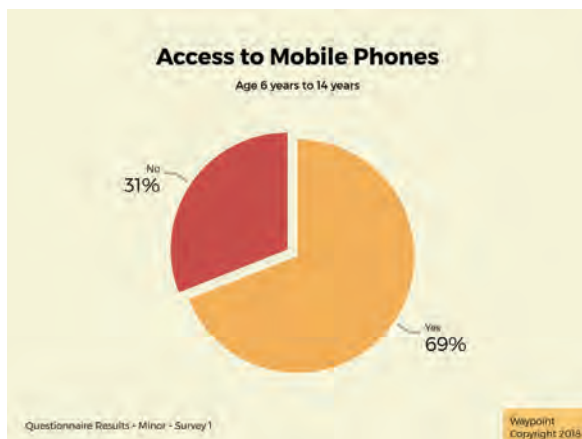


4. User Research

5. Favourite Mobile Games?

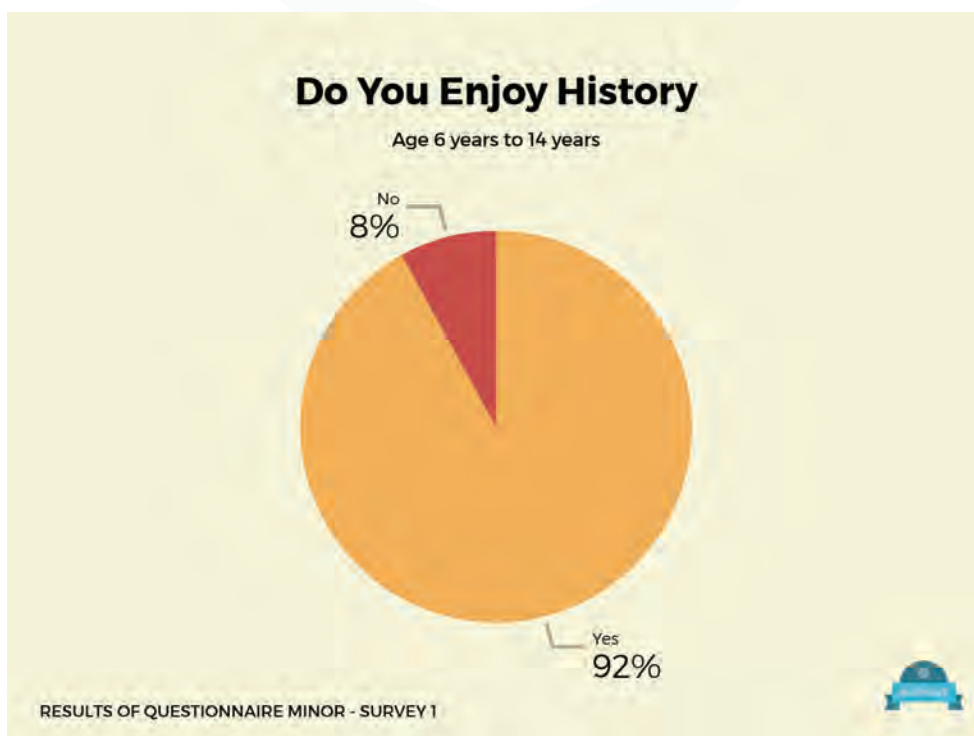
A wide range of answers - 33 games were listed by the children so there is no overall winner. 4 games received two votes - Pokémon, Subway, Surf, Clash of Clans and Candy Crew.

Plate 44 - Gallery of Fav Games



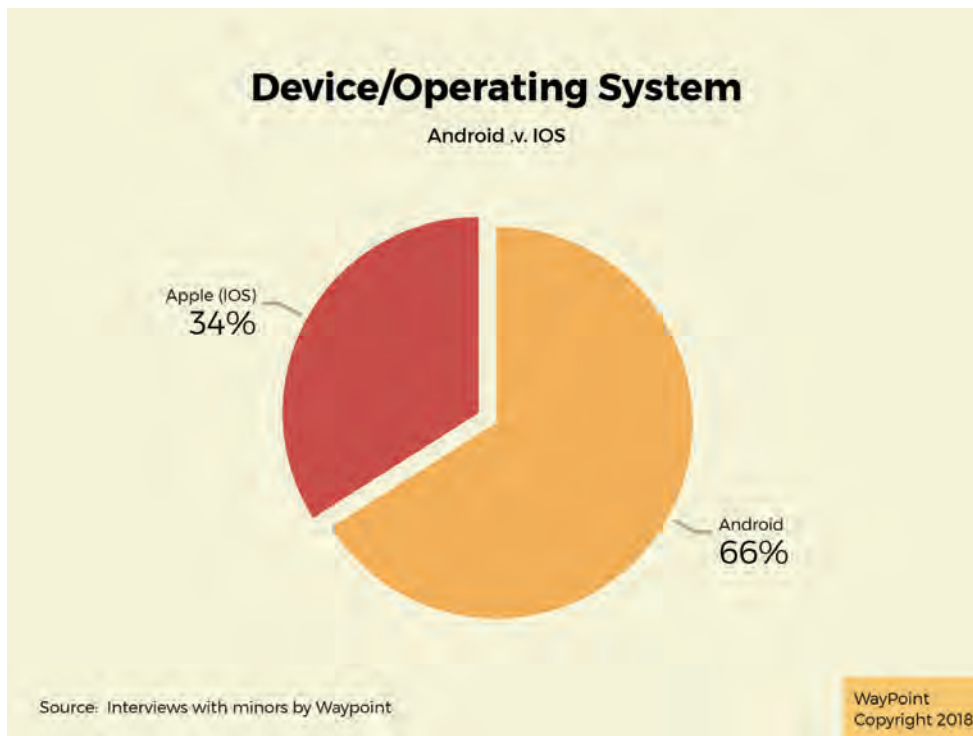
Among the reasons given why they did not play Pokémon were

- (a) I have to go outside to play it (do not want to be active, would rather play indoors)
- (b) Too many features (complexity)
- (c) Difficult to install



4. User Research

Summary of Questionnaire Results - Adults



1. Android Versus Apple iOS?

14% use Android, 66% 7 used APPLE iOS 33% In the Irish context this support the decision to develop first for Android

2. Usage of Pokémon?

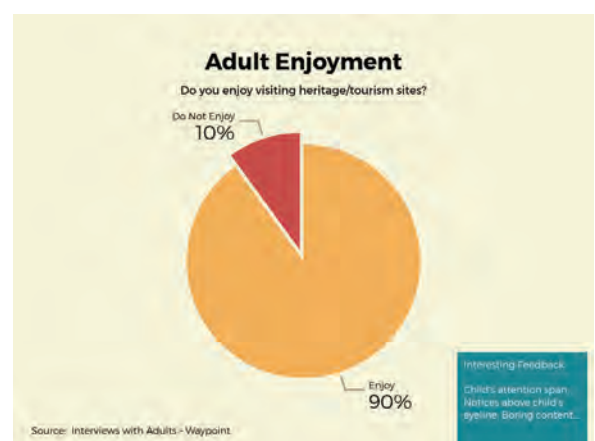
Only 24% (5 of 21) of the adults have played Pokémon Go.

This suggest that this Explorer App. would best be marketed on its own merits rather than for it's similarity to PokeMon

3. Enjoy visits to heritage / historical sites?

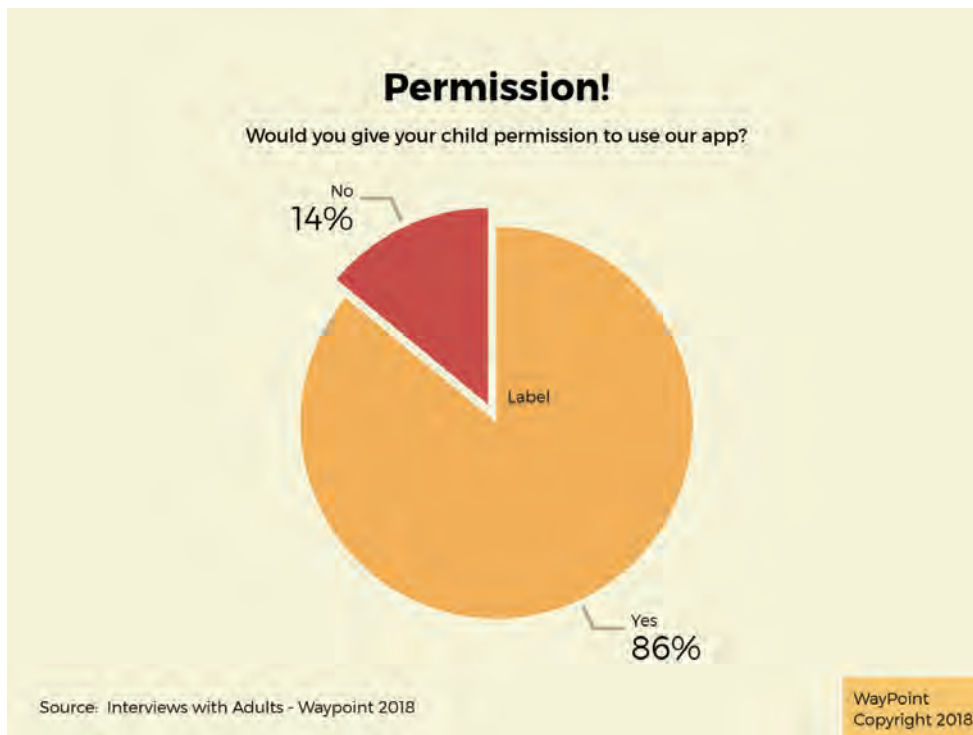
90% (19 of 21) do enjoy such visits but many expressed a reluctance to do so with children because of the child's attention span. Many of the notices and treasures are situated above the eye line of the child and are written for adults and children find it boring.

This suggests that the Explorer App. will meet a defined need.



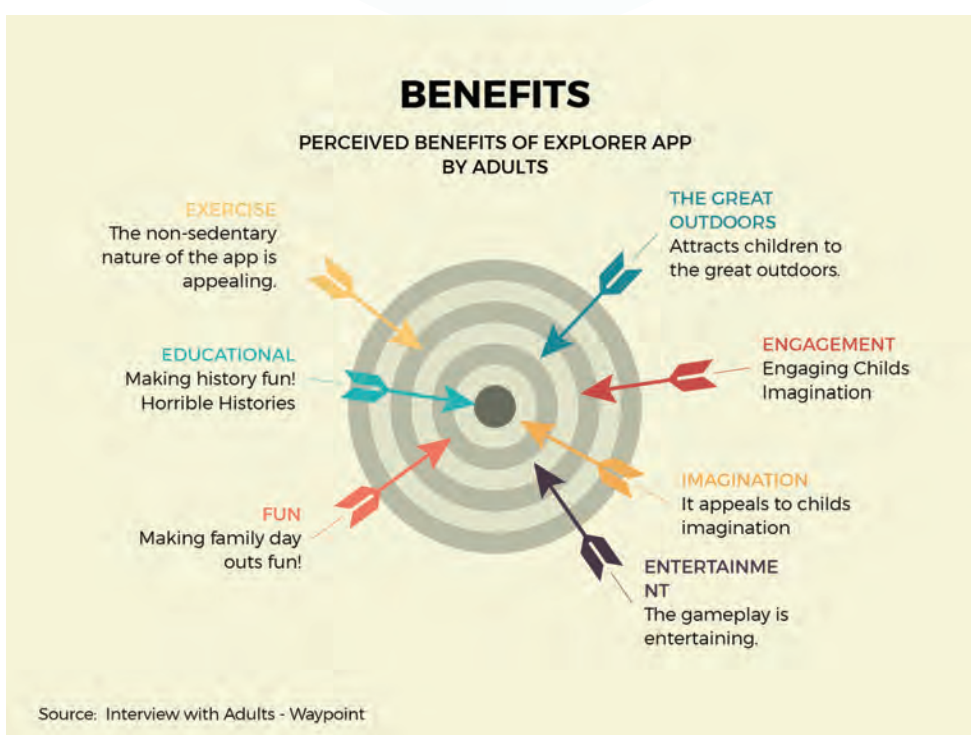
4. User Research

4. Allow child to use the App. ?



86% (19 of 21) of Adults would allow their child to use the Explorer App.

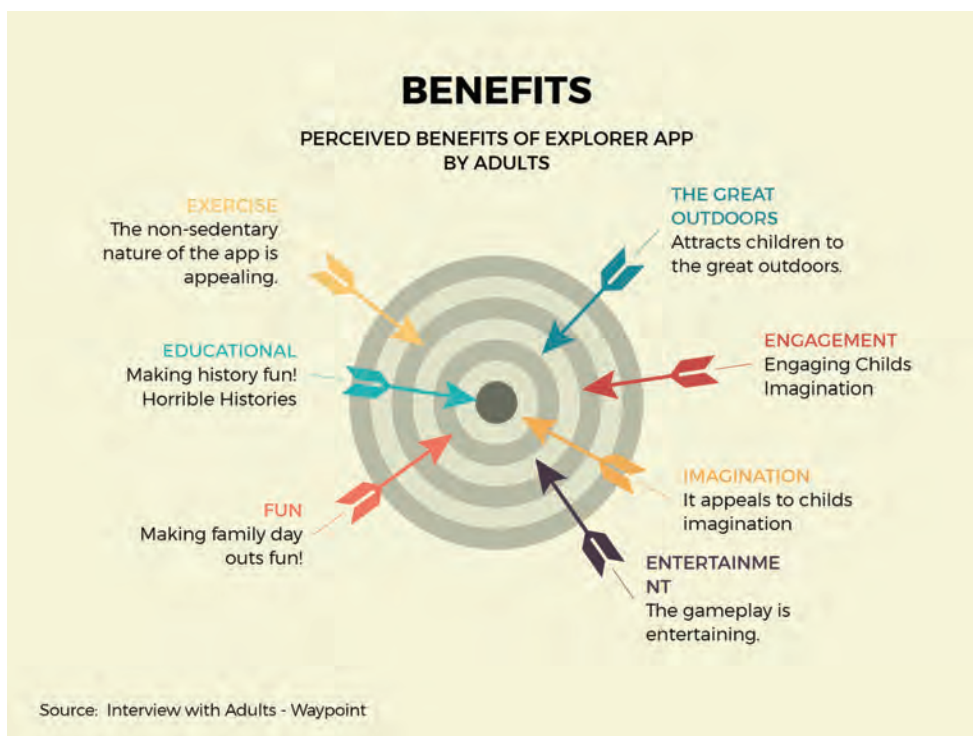
5. Benefits of the App.?



4. User Research

The adult respondents were consistent in their recognition of the benefits of using the App. – engaging the child's imagination, entertaining, providing exercise, fun. There was a suggestion that the official notices that are placed at the entrance to a park should refer to the App. as a visitor often forgets what there is to see once they leave the main entrance whereas the App. will keep the parent and child informed as they progress around the site.

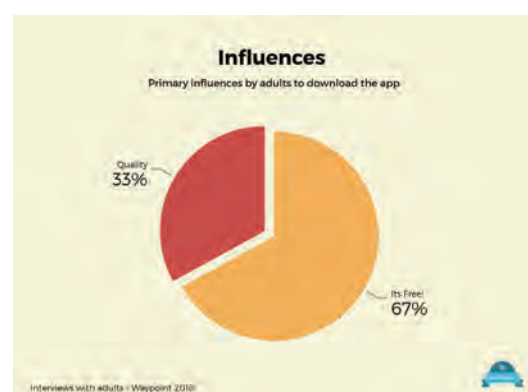
6. Concerns in using the App



The universal concern is that the adult wanted to keep the younger children in view, under control / supervision. This suggest ring fenced parkland that is safe. Parents may need to track the child's movement on their own mobile device, so it may not be possible for an adult and child to share a device.



This suggests that the child may have to use their own tablet offline or be provided with other dedicated devices that provide hot/cold (near/far) indicators as the child searches for the hidden treasure.



4. User Research

User Requirements

Personas/Scenarios

Persona

Denis J Coughlan

"I don't really like museums but I really like running around old ruins. In museums, I have to be very quiet and I can't touch anything. I prefer learning from real life!" - Denis (10)

- 10 year old from Terenure, Dublin.
- Lives with his mum and dad, sister Sienna (9) and their pet Labrador.
- Attends local primary school
- Travels outside Dublin regularly with family and their friends who also have children of a similar age.



Personality:

Extroverted. Social. Conscientious. Adventurous. Denis is social, he has lots of friends and is popular at school. He's extroverted and confident, always exploring and looking for adventure. Denis likes history and English at school, he has a vivid imagination and enjoys hearing stories about people of the past and they lived. He's a member of a local scouts group and he loves treasure hunts.

Pain points

- Finds structured learning boring at times, yet he is a very curious boy and loves exploring.
- Sometimes he tries to be like the grown ups when visiting heritage sites, but ends up losing focus and feeling bored and frustrated.
- On occasions when he would like to engage with the exhibits, he's told off for being loud.
- He doesn't know where he is allowed to go and where he isn't so he doesn't bother exploring.
- His parents are busy exploring and they do not have time to engage with him and explain in a way that is easily understood.
- He'd rather just play games on his phone, but he's not allowed.
- Ends up running around the heritage sites most of the time with his sister and/or friends.
- When they are back home, he doesn't feel like he's learned anything, or even been anywhere new.
- He has very little recollection of the places visited, but he remembers all the fun games they played with his friends.
- When asked about his weekend in school, there is very little he can tell his classmates about.

Needs & Goals

- Denis would like for the site seeing with his family to be fun.
- He'd love to explore freely and not to feel like he is in the way.
- He'd like to be independent and not constantly supervised.
- Denis would like to be more grown up, and able to discuss with his mum and dad what he learned.
- He'd like to be able to tell his friends all the fun facts and even include some in his school report.
- Denis's parents would like to channel his energy and enthusiasm into a more meaningful experience.

4. User Research

Scenario - November 3rd 2018

It is the last few days of holidays. The family has yet another trip planned. This is going to be the last one for few weeks, so that everyone can settle into the new school year. Denis really hopes that it is not going to be boring just like every other trip they've been on.

On the way there Denis and Sienna are playing a game of counting cars. Sienna won this time - there were 40 red cars on the way and only 38 silver ones! They arrive nearly 2 hours later and their family friends are already there.

This time they are meeting their mum's friend Anna and her family. They have two kids - Alanah is 8 years old and William is 6 years old. Denis doesn't know the kids that well and he hopes that they like the same games as he does. Soon enough it turns out that Alanah and William aren't very excited to be there themselves. All four kids are feeling down and also shy, they drag after their parents who are happily chatting trying to catch up.

When they arrive to the site, a surprise awaits them! There is a new app which Denis's mum has installed on his phone. His mum and Anna also have the app on their mobiles. All four children love gadgets and are instantly gathered all around their parents explaining how to use it. It turns out to be like a treasure hunt!

And it seems to be so easy to use! Denis, being the eldest of the group is following the instructions carefully, he is making sure he doesn't miss anything. He still cannot believe that he will be playing a game on his mobile 'instead' of exploring the boring site. The kids decide to form a team and call themselves 'Treasure Seekers'. They even give each other nicknames. Since Denis is the eldest and the only one who has a mobile, the only rule is to always stay together. Sounds easy.

Meanwhile, parents turn on the app on their phone. They now know exactly where their Treasure Seekers are. For a total peace of mind they fence off the area to ensure that they get alerted if the kids don't wander off. Now they can relax and explore the site without having to worry about the kids.

Denis and the Treasure Seekers run off. They cannot believe that no-one is telling them off, calling them or lecturing them! All they can think of is freedom! They chat excitedly as they go. Not much going on yet, so they check the map. The closest treasure seems to be quite near, it is next to the entrance to the castle. They decide to go that way. Suddenly, there is an alert. Everyone gathers to check out the app. The app indicates there is something close. The kids are really intrigued! 'What is it? Where is it?' - they all shout excitedly! They all start looking around trying to find the treasure and the app guides them.

Suddenly, Alanah sees something in the wall! It is a door! But it seems to be leading down the steps into the moat... They all run towards it. As they get near, the door appears on the screen. The app tells them a little story, it is called Sally Forth. The defenders could use it to sneak out and attack besiegers. Denis is really interested in this story, he is already imagining himself being a defender sneaking out, he'd love to find out more about the door and how they used to defend the castle. Their first treasure is collected!

The following week a teacher asked everyone to write a paper on the historical monuments in Ireland. Denis didn't even have to do this as he knew exactly what he was going to write about! He cannot wait to write his story, with himself being the main character defending the castle.

4. User Research

Ongoing Interview Research

Following our initial interviews with the child and adults above, and as more information became apparent in our research, we went back to the drawing board and redrafted the original questionnaire for the minor group. We decided to reach out to a larger sample and received permission to activate our survey in the following schools:

- Portumna Community College
- St Brendan's National School
- Coder Dojo - Various



The results of these surveys have not been completed by the time we went to print! Phoenix Heritage will receive a separate report once this survey is complete and analysed.

Constraints to the Extent of our Data Gathering

We have not conducted in depth interviews (IDIs) at this point in the project. A typical IDI market research project takes 3 to 5 weeks to complete.

The first week is reserved for project setup, meeting with the client, receiving the information needed to develop a screener for IDIs as well as an IDI guide. The next one or two weeks is for recruitment and conducting IDIs and the final week is reserved for reporting. These in depth interviews typically last 30 minutes to 45 minutes. The timeline will also depend on how hard the audience are to reach and how many IDIs are conducted.

We have not conducted focus groups , even the more shorter focus groups which are becoming popular these days, due to the lower cost, as a focus group project can take anything from 3 to 5 weeks to complete.

Conclusion in respect of Data Gathering

We highly recommend that further and more comprehensive user research is required for the future success of the app concept. We recommend that research be conducted by experienced Research Professionals and to include some of the following methods:

- online surveys
- in depth interviews
- contextual enquiries
- focus groups

4. User Research

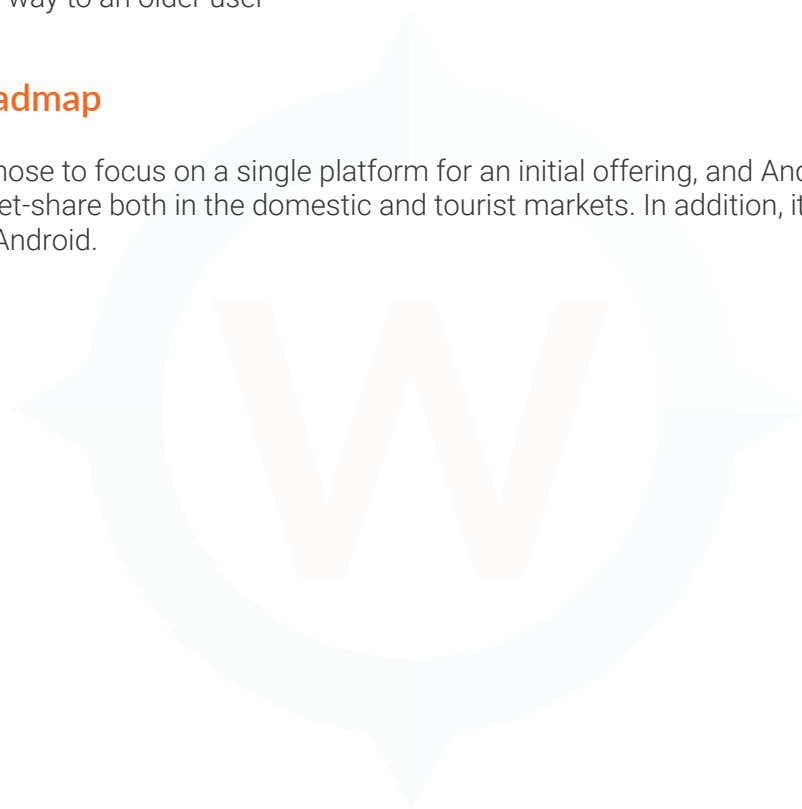
Product Mockups

The Mockup Development of the app allowed us and the IP to determine if the user interface presented the apps features in a way they could easily understand, thus allowing the interaction between user, application and Heritage location to work in unison.

Considering that the user may not be a full grown adult, the interface may need to address the issue of children having less developed fine motor skills than older users. Younger children may interact with the device in a different way to an older user

Technology Roadmap

Phoenix Heritage chose to focus on a single platform for an initial offering, and Android was chosen due to the healthy market-share both in the domestic and tourist markets. In addition, it is far easier to set up sales channels for Android.



5. Technology

Research on Implementation Technologies

Solutions to poor GSM Coverage



Weak GPS signal - The IP has confirmed that there are heritage sites that will have no connection or a weak intermittent poor connection to the cellular network. In addition our research shows that some children (mainly the younger age group) do not have access to mobile phones and even if they do, may not have access to mobile data while roaming.

Safety - Parents have concerns about safety and supervision of their children and may wish to use their own mobile device to track their children's movement. In those instances the younger children will not be able to borrow their parent's mobile device.

Fixed Poles, possibly using bluetooth beacon transmitters many of which have a range up to 100 metre range. Bluetooth / GPS receivers that can show if the child is near (hot) or far away (cold) from the PoI - at our last review meeting with the IP we discussed this and the IP suggested that he could acquire or manufacture such a bluetooth receiver.



We would also recommend that Phoenix Heritage poll heritage site managers/owners to ascertain if they have mobile cellular coverage and if they would be willing to rent out bluetooth / GPS receivers.

Among the possible solutions to weak signals or lack of GPS connection, according to our research are -

1. What3Words
2. Bluetooth Beacons
3. Pre-downloaded content for offline use on mobiles or tablets

5. Technology

1. What3Words

We updated our IP on our research into a company called What3Words that has divided the world into a grid of 3m x 3m squares and assigned each one a unique 3-word address instead of GPS coordinates. The following provides suggestions as to how a word game for children could be developed to unlock the GPS coordinates and reveal the location of a Point of Interest (PoI) on a map. Our IP has expressed an interest in the possibilities that our suggested word game presented.



What3Words is a really simple way to talk about location. It means anyone can accurately find any location and share it more quickly, easily and with less ambiguity than any other system.

Merrion Square Park has 10 Points of Interest (PoI)



The service can be used via the free mobile app or online map. It can also be built into any other app, platform or website, with just a few lines of code.

Rather than remembering GPS numbers for points of latitude and longitude any location can be described using three words.

What3Words website explains that it is already being used in Ireland by Meath Heritage. They have mapped over 3,000 monument and heritage sites across County Meath, from awe-inspiring castle ruins to the small, hidden tomb entrances.

Visitors can enter their desired attraction's 3 word address into the free what3words Android app & iOS app, Navmii driving app or Pocket Earth walking app, safe in the knowledge that they will arrive exactly where they intend. It even works offline with no data connection and it works with Google maps.

For example in our research for this project we mapped the points of interest in Merrion Square and displayed their location using What3words -

Each of these PoI can be viewed within the 3 metre by 3 metre grid created by What3Words to map the world using words that replace the GPS coordinates.

The words could be used to create a game for the children.

Challenge 1 - The words can be used as clues to find the POI

Challenge 2 – using a receiver (Bluetooth, GPS or cellphone) to indicate Near (hot) or far (cold).



5. Technology

An Example of how the word game would work are shown below using the Merrion Square example –



1. Oscar Wilde Memorial
Clean.Games.Crisis

CLUE 1 - When you get out of the bath you are **CLEXX**

2. Giants Garden
Twice.Monit.**Cowboy**

CLUE 2 – **CXXXXXX** and Indians

3. Eternal Flame Galaxy.Just.**Teeth**

CLUE 3 – The Dentist fixes your **TXXXX**

4.The Victims-
Onion.Sugars.Often

CLUE 4 – Crisps = Cheese & **OXXXX**

5. Technology

2. BlueTooth Beacons



BlueTooth Beacons can be positioned at points of interest and can broadcast information to a visitor.

Our IP has expressed an interest in this technology as he has used it before and believes that he could manufacture inexpensive bluetooth receivers that heritage site owners could provide to visitors that do not have GSM devices. It would also be useful in locations with poor mobile network coverage. Their range can vary, some have a signal that goes no more than a few meters, and others can reach a hundred meters plus. With Bluetooth 5, Bluetooth beacons will have transmission ranges of many hundreds of meters, exceeding the range of wifi in certain cases.

What are bluetooth beacons?

Bluetooth beacons are no more than small Bluetooth devices that broadcast a radio signal. At a basic level a Bluetooth beacon is no more than that. The signal they transmit is called an “advertisement” and follows standard Bluetooth protocols set out by the Bluetooth SIG. This makes them compatible with any other Bluetooth device. Their range can vary, some have a signal that goes no more than a few meters, and others can reach a hundred meters plus. With Bluetooth 5, Bluetooth beacons will have transmission ranges of many hundreds of meters, exceeding the range of wifi in certain cases.

Why are bluetooth beacons special?

With Bluetooth 4 (Bluetooth Low Energy) Bluetooth beacons have become very energy efficient. Many can last years on a coin cell battery. Importantly, smartphones that include Bluetooth 4 (essentially all of them these days) can read the advertisements from Bluetooth beacons and act on them. This means any particular Bluetooth beacon has potentially billions of compatible devices that can read its data.

5. Technology

What do bluetooth beacons actually do?

There are three things Bluetooth beacons do.

- **Physical Web:** Bluetooth beacons cause smartphones to do things. Generally, this thing is to cause a notification on your smartphone and then bring up a web page when you open your smartphone. This is called the “physical web”. That is, a web page has been presented to you because of a physical device, the Bluetooth beacon. This interaction is most commonly used for promotional purposes, where if you walk past a shop with a Bluetooth beacon you will get a notification on your smartphone which could contain a special offer or some other incentive for you to enter the shop. This is referred to as proximity marketing.
- **Telemetry:** Bluetooth beacons relay information to smartphones. The advertisement can include useful information that a smartphone app can present to the user. The size of the payload is small but is generally enough to pass information such as telemetric data, with temperature being a common example. Under Bluetooth 4, the payload was limited to a maximum of 31 bytes but a further 31 bytes in a scan response packet. With Bluetooth 4.2 the payload can be extended beyond this.
- **Proximity:** Bluetooth beacons can indicate how far away they are. This is not strictly a function of the Bluetooth beacon, since it is the smartphone that does the calculation based on radio strength. Examples of this type of beacon are key rings and indoor navigation devices.

What is iBeacon and Eddystone?

Eddystone and iBeacon are communication protocols, which sets out what the advertisement packet for that particular Bluetooth beacon needs to contain. iBeacon is the protocol for Apple iOS while Eddystone is the protocol for Android.

With iOS an iBeacon has slightly better integration on iPhones and iPads, but the advertisement packet is strictly controlled. For example, it is difficult to contain telemetry data in an iBeacon. An iBeacon does work with Android, just not as good as with an iOS device.

Eddystone is a similar standard developed specifically for Android and there is greater flexibility in the advertisement packet. For example, Eddystone does allow data from sensors to be included in the payload in what is referred to as Eddystone-TLM. Eddystone works with iOS but you don't get all the features on iOS than you get with an iBeacon.



5. Technology

Should I care about iBeacon and Eddystone?

Not particularly. However, if you want to develop your own apps for fun, then iBeacon is easier to integrate. Eddystone is slightly more difficult, but its flexibility can be more fun. Many advanced Bluetooth beacons do not use either Eddystone or iBeacon which allows them to include a lot of more useful data. This is particularly the case for sensor Bluetooth beacons used in commerce and industry.

What do I need to know about buying Bluetooth Beacons?

There are plenty of available (over several hundred at last count) and they are cheap. Some basic versions cost just a few dollars. A search on Alibaba will give you a good idea of what we mean. However, it's much like anything, you get what you pay for.

The key things to watch out for are: battery life, range, advertisement packet, quality of any sensor on board, whether it complies with local regulatory requirements. On the latter point, it is important to understand that cheap Bluetooth beacons from China are not licensed under radio regulations in Europe or the U.S. and are technically illegal.

How do I find out more?

There are many resources on the web to take you from a beginner to a master. However, a good place to begin is Wikipedia since it has plenty of unbiased resource links that can take you deep into the Bluetooth beacon technology.

Published 13 May 2017 Source

<https://www.bluemastro.com/ultimate-guide-bluetooth-beacons/>

6. Conclusion

Market & User Research

The problem that we are attempting to solve is to alleviate the boredom of children at heritage sites and create an enjoyable experience for the whole family. Our research confirmed that there is a need for an App. such as this and that demand is high

(a) it will make visits to heritage sites more interesting for children.

(b) lift the burden from parents of entertaining the children, thus making their own visit to heritage sites more enjoyable too.

(c) we independently validated that the IP's suggestion that the App. focus on Ireland's Ancient East region is a good choice based on market size, market growth rate, established distribution channels and brand goals.

(d) Our interviews with Heritage Officers at the Local Authorities within Ireland's Ancient East were supportive and interested in this concept.

Design

The next logical step we would vision for the design to examine the gameplay further and conduct more user research before making anymore visual design decisions.

The visual design going forward could be now based on the Puca theme we have alluded to in the Game Design Document.

Funding

From starting to running to growing, there are many opportunities for Phoenix Heritage to seek funding and supports. Our team have prepared a comprehensive list of funding and entrepreneurial supports, including incubation and innovation centres throughout Ireland. This will be shared to Stuart Elder as a separate document entitled Entrepreneurial Support & Funding Opportunities.

Development

The research this document covers provides a solid foundation for the design to be built upon. Critical questions about who the target audience are, the aims of the app, and the factors leading to a users engagement with an application are answered.

This allows for the design to be efficient, clean and focussed. The design decisions made are not arbitrary but based upon, and justified by, evidence. These design decisions are laid out in the accompanying Game Design Document.



Project Púca/IP33

Game Design Document

Team WayPoint | HeriTech Explorer | WebElevate



Table of Contents

1. Introduction	<u>05</u>
2. Game Overview	<u>06</u>
Genre	<u>06</u>
Primary Target Audience + End Users	<u>07</u>
Children to Pre-teens (6-14 years)	<u>07</u>
Secondary Target Audience	<u>07</u>
Game Flow	<u>08</u>
Task Flow	<u>08</u>
Use Case	<u>09</u>
Task Flow Diagram	<u>12</u>
State Transition Diagram	<u>13</u>
Look and Feel	<u>14</u>
Tone	<u>14</u>
Physical Scope	<u>14</u>
3. Gameplay	<u>15</u>
Gameplay Walkthrough	<u>15</u>
4. Non Technical Design	<u>27</u>
Story, Setting and Character	<u>27</u>
Setting	<u>27</u>
Story	<u>27</u>
Characters	<u>27</u>
Level/Environment design	<u>28</u>
Interface	<u>29</u>
Game Screen	<u>29</u>
Map Screen	<u>29</u>
Art	<u>30</u>
Sound and Music	<u>30</u>
5. Technology	<u>31</u>
Target Hardware	<u>31</u>
Technology - Design Tools	<u>31</u>
Technology used for Production of Wireframes/Prototype	<u>31</u>
Software Technologies used in Production of Reports	<u>31</u>
Technologies used for Style Guide and Mockups	<u>31</u>

Table of Contents Continued....

Technology - Implementation	31
Frontend	31
Option 1: Native Android application	31
Option 2: Unity Game Engine	32
Recommendation	32
Back End - Which Database Solution to Choose:	33
Option 1: SQLite Database	33
Option 2: Realm Database	33
Recommendation:	33
Implementation roadmap	34
1. Concept	34
2. Set environment	34
3. Create a Minimum Viable Product	34
4. POI generation	34
5. Content Generation	34
6. Map and Magic Compass	34
7. Configure Database for Added Media	35
8. Add Points of Interest from Geolocation API	35
9. Iterate Through Improvement Builds	35
Other Considerations	35
Multiplayer	35
Templating of Entities	35
Future Development	35
6. Appendix	36
Google Maps and Pubnub	36
Android geolocation Tutorial	36
Unity and Mapbox SDK	36
Link to Unity	36
Link to Mapbox SDK for Unity	36
Building location based games with Mapbox in Unity	36
Tutorial series on building a Pokémon Go clone in Unity using Mapbox	36

1. Introduction

This is a Game Design Document, produced by Team WayPoint, for Stuart Elder of HeriTech, as part of the WebElevate 6.0 program provided by the Digital Skills Academy. This project forms part of the Industry Partner Work Placement component of the program.

The proposal originally envisaged was :

"The idea is to create a Mobile Device Application (App) capable of using a series of geo-located Points of Interest (POI) around a visitor attraction (i.e. Heritage Site, etc.), to not only support the delivery of informational content, but to allow younger visitors to enjoy a 'scavenger hunt' game, whereby they must find as many or all of the POIs as possible. The location of the POIs will be given as clues, and the concept of 'Cold' for far away and Hot' for close, will be used. 'Getting warmer' means the gamer is moving in the right direction."

This document takes the format of a Game Design Document, a document used in the video game industry to provide clear guidelines for the development of a project. Advantages of having a Game Design Document include:

- Elimination of hype By defining substantial elements of the project specifically, scales back unrealistic aims and expectations.
- Clarity and certainty They create uniformity and a common frame of reference for the development team. Design has clear objectives to follow.
- Ease of drafting schedules and test plans by itemising the needed components and assets clearly it becomes easier to accurately form schedules and plans.

It was agreed that this form of document is best suited to describe the design and implementation of the project.

2. Game Overview

Game Concept

Pokemon Go meets Horrible Histories. The Player helps a ghost from the past find items the ghost has lost, by finding a series of Points of Interest.

On a Basic level the app randomly generates Points of Interest around a heritage site for players to collect. Location data is taken from the National Monuments Service Sites and Monuments Record (<https://data.gov.ie/dataset/national-monuments-service-archaeological-survey-of-ireland>). A player is given clues and hints to these locations, which once found, score points.

On a more bespoke level, it is planned that managed sites add localised media to defined, rather than random Points of Interest. Once found these locations are to display pictures, text or video, telling the story of the point of interest.

Using data from Google Maps the App should also guide families towards other amenities, such as cafés, museums and the like.

Feature Set

- Randomly Generated Points of Interest
- Real Time Location Tracking
- Collectable Rewards
- Added Media at chosen sites

Genre

Location based game.

A location based game (or location enabled game) is a type of pervasive game where gameplay progresses based on the players real world location. The player of the game physically travels to a real world location, tracked by their mobile device, which then checks the player location against the stored Points of Interest.

The game requires a means of determining player location, and a data set of Points of Interest to interact with.

The accompanying research document includes a heuristic analysis of a range of location based game examples.

Target Audience

The Target Audiences for this project have been established by conducting surveys of potential users, discussion with the industry partner, questioning Heritage Officers of the counties of Ireland's Ancient East, and interview with a Heritage Worker from Kilkenny Castle who specialises in entertaining children. The accompanying research document goes into detail, the findings are summarized below.

2. Game Overview

Primary Target Audience + End Users

Children to Pre-teens (6-14 years)

- To entertain and prevent boredom in younger users visiting heritage sites
- To inspire curiosity and encourage engagement with setting and history in general
- To provide distraction and respite for guardians / adults accompanying
- To encourage exercise, physical activity and exploration
- Considerations for this audience will significantly impact and inform all aspects of project to ensure a safe, rewarding and enjoyable experience

Adult Players

- To play and share experience with younger users
- To provide alternative entertainment at heritage sites
- To entertain and prevent boredom

Adult Enablers

It is expected that adults, as guardians, will be responsible for downloading (from Google's Play Store), installing, setting up and configuring the app for young children. As 'enablers' it is crucial that this audience is considered in terms of usability

It will be important to consider features that enablers may find useful or desirable and to address safety concerns and controls

Secondary Target Audience

Potential Investors + Business Stakeholders

The app is a subcomponent of a wide 'Explorer' application, which the Industry Partner aims to take to investors for funding and further development. Consideration must be given to the business requirements and concerns of potential investors and business stakeholders.

Development teams, who acquire the project at a future phase and will integrate with wider 'Explorer' ecosystem. For example: web developers, testers, SQA (Software Quality Assurance) manager etc.

Tourist Bodies + Heritage Sites

While there are no existing or proposed partnerships with the OPW or specific heritage sites at present, we will engage with them during research and discovery because we envisage that they will be future potential stakeholders.

2. Game Overview

Game Flow

Task Flow

Our primary persona is 10 year old Denis J Coughlan (See Research Doc). Understanding our persona's motivation was crucial in developing a User Flow that met the requirements and achieved his goals. We identified that Denis's primary motivation is to be entertained; avoid boredom and have fun when visiting Heritage sites. We focused on creating a flow where Denis would launch, play and complete a game session ('Play Game Flow'). The Users Flow focuses on the interactions and core app functions of launching, setting up and starting a geolocation based scavenger hunt.

Before the user plays the game, there are some configurable options:

- A safety feature where a parent or guardian's device can track a user's device
- User can join groups for competitive or cooperative play
- Defining a difficulty level to account for differences in user age.

During a game session (loop), players are given hints and guidance to the location of Points of Interest (POIs). Once found the player is rewarded by points, and virtual items to be determined at a later stage. At the basic level, generic points are created around a heritage site, but the full implementation envisages a more bespoke presentation of gameplay and media elements (pictures, text and videos about site) tailored to a specific site. It is hoped that this will add interest and value to sites ranging from an unattended ruin with little more than a GPS coordinate, all the way up to Heritage Towns.

Other considerations such as technical implementation (such as communication with mapping APIs, game implementation, graphical assets etc) are left out as they are considered to be outside the scope of user flow.

This User Flow is further detailed, defined and illustrated below with the following:

- Functional Module
- Written Use Case Specification
- Task Flow Diagram
- State Transition Diagram Functional

2. Game Overview

Functional Module FM-0001 - Play Game

Ref	Desc	Cross Ref
FM001	Select Monitored/Unmonitored	CSF-0001
FM002	Select Single/Group Game	CSF-0002
FM003	Select Difficulty (related to Age)	CSF-0001
FM004	Play Game	CSF-0002
FM005	Pause Game	CSF-0003
FM006	View Site Data (If available for Site)	CSF-0004
FM007	Exit and Save	CSF-0003

Use Case

Use Case ID:	UC-001		
Use Case Name:	Play Game		
Created By:	EB	Last Updated By:	SR
Date Created:	September 17th, 2018	Date Last Updated:	September 22nd, 2018

Actor:	App User
Description:	The application user wants to play a game at a Heritage site.
Preconditions:	Application must be running Mobile affordances confirmed/flagged (if sound disabled on device - flag) Device has data enabled to allow for location services
Postconditions:	Progress saved if option selected Engagement timestamp recorded
Priority:	1
Frequency of Use:	Daily

2. Game Overview

Play Game' Course of Events:

App. User	System
1. Select Play Game	2. Check for Location Services
4. Leave Default (Unmonitored)	3. Present Monitoring Option
6. Leave Default Option (Single Player)	5. Present menu of game options
8. Leave as Default (Easy Difficulty)	7. Present menu of difficulty levels
10. Find Points Of Interest	9. Present points of interest
13. Close App	11. End Game Loop
	12. Show Score, Rewards and Exit

Alternative Courses:

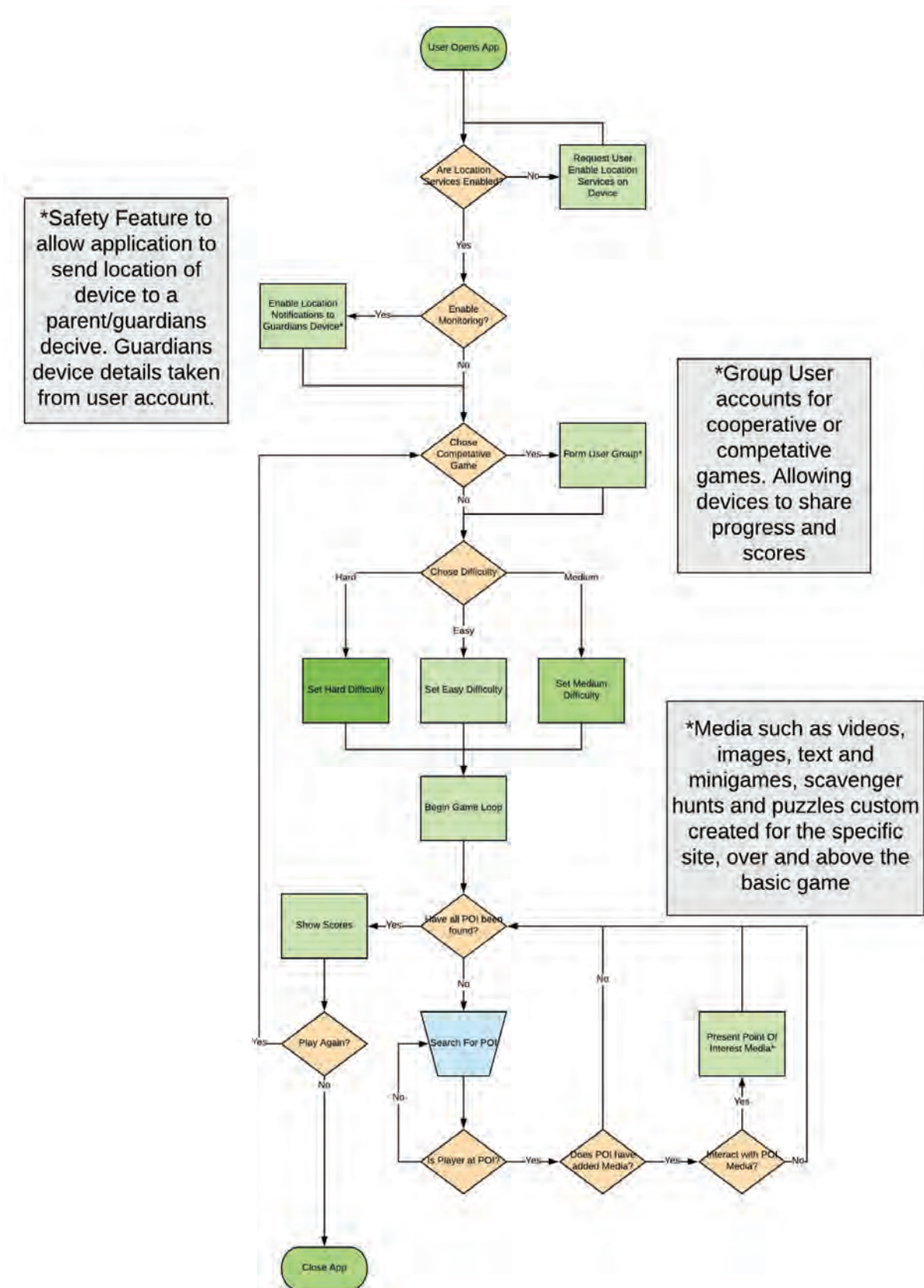
App. User	System
Interact With Site Specific POI	10a. Load Site Media
10b. Interact with Site Media	9. Present next Point of Interest
Pause Game	
10c. Pause game	10d. Show Pause Menu
10e. Return to Game (10)	
Quit Game	10d. Show Pause Menu
10c. Pause game	
10e. Quit Game	
Select Group Game	6b. Form Group of Players for competition
6. Select Group Game	7. Present menu of difficulty levels
6a. Wait for Group formation	
Set Difficulty	8a Adjust Game Difficulty
8. Select desired difficulty	

2. Game Overview

Exceptions:	On error & return to Select Play Game menu
Includes:	NA
Special Requirements:	Audio inclusion and splash screen on successful conclusion Mobile Data required for Location Services
Assumptions:	Application forms sub component of larger HeriTech 'Explorer' app User has an existing profile User has read and accepted safety notification
Notes and Issues:	

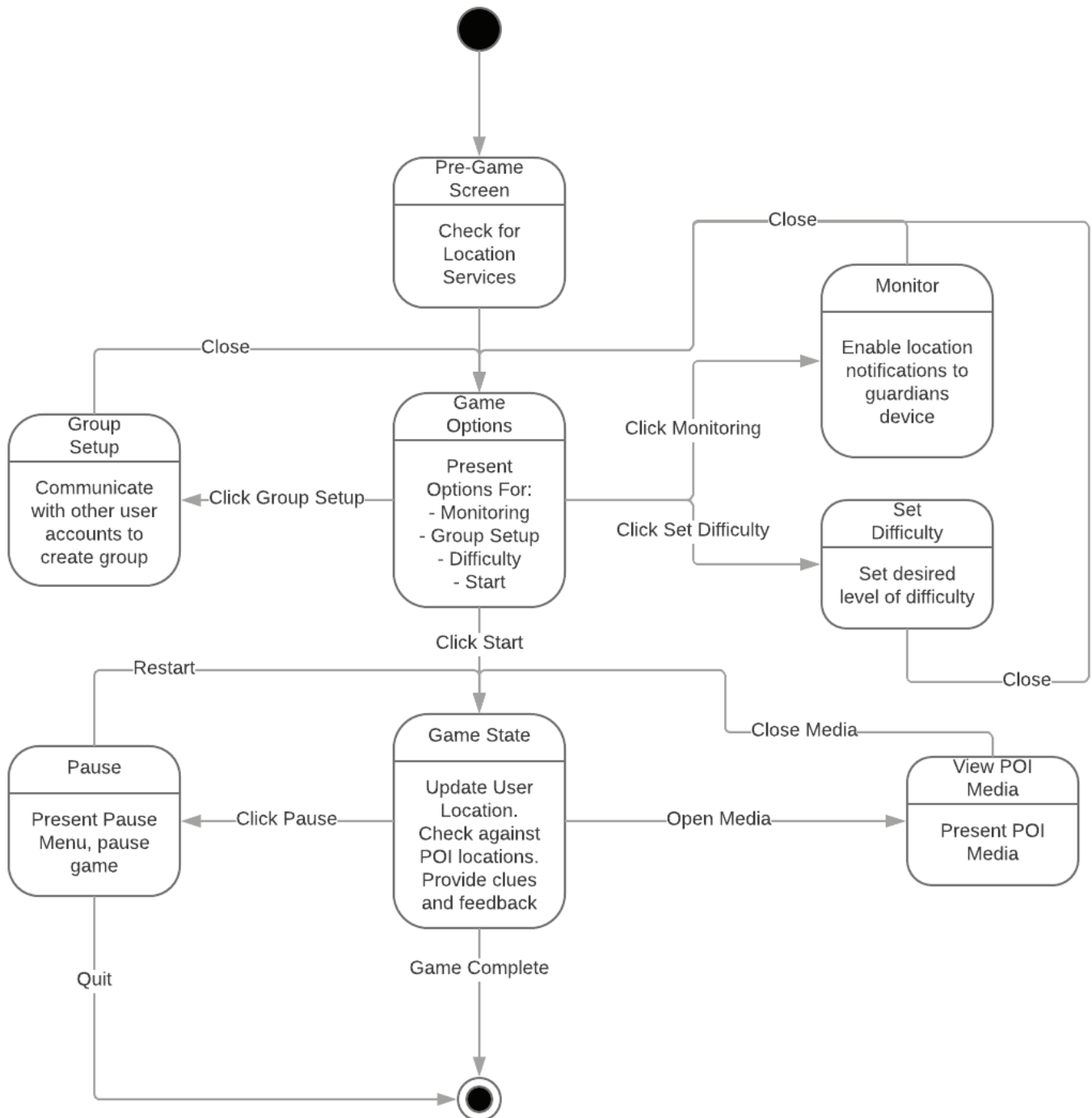
2. Game Overview

Task Flow Diagram



2. Game Overview

State Transition Diagram



2. Game Overview

Look and Feel

The game is primarily, but not exclusively aimed at children.

The colours chosen do not clash jarringly, are suitable for people with colour blindness, while remaining colourful and fun.

The chosen font scales well and is legible on all devices.

The icons are minimalist, clear and concise. Graphics used in wireframes are the same. The final implementation will no doubt use new graphics, however team Waypoint suggest the implementation team follow the same philosophy.

See accompanying Foundation Style Guide for more.

Tone

The focus on content and media should follow the style of the successful “Horrible Histories” series of books and TV show. Children are engaged by interesting events and stories more than dry lists of dates and facts.

For example the interview with Mr Moylan, a heritage guide from Kilkenny Castle pointed out the grave of the dog of the last owners, and the home of a woman accused of witchcraft as elements that engaged and entertained children.

Physical Scope

The game is envisaged taking place in one of three real world contexts

1. Managed Heritage Site (eg Kilkenny Castle)
2. Unmanaged Heritage Site (a ruin in a field a family might stumble across)
3. In a larger tourist setting, like a town or trail, with historic locations and other amenities useful to tourists (eg Waterford's Viking Triangle).

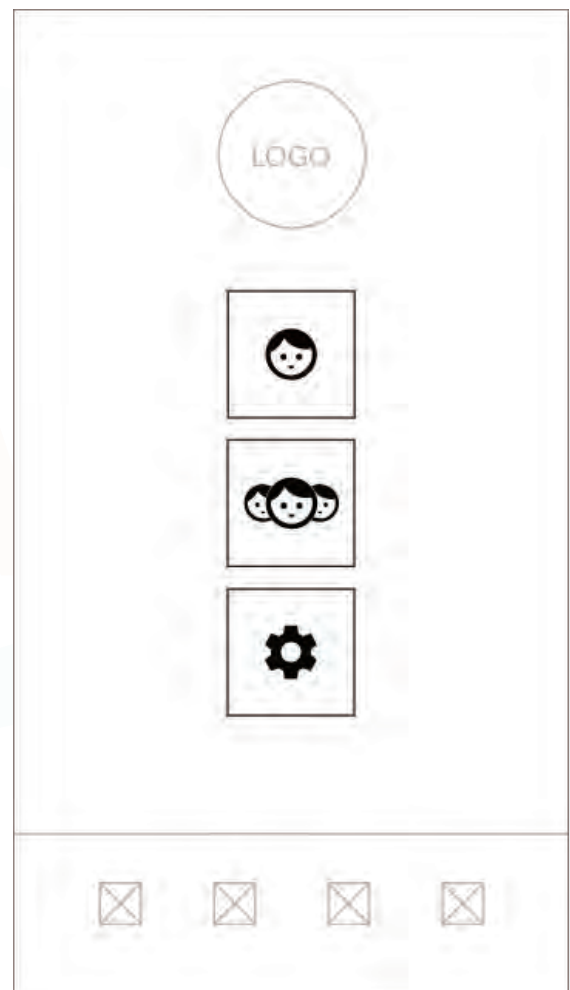
The physical scope can vary from a small number of generated Points of interest around a cromlech in a field, to an entire town of museums, heritage plaques, ruins and restaurants.

3. Gameplay

Gameplay Walkthrough



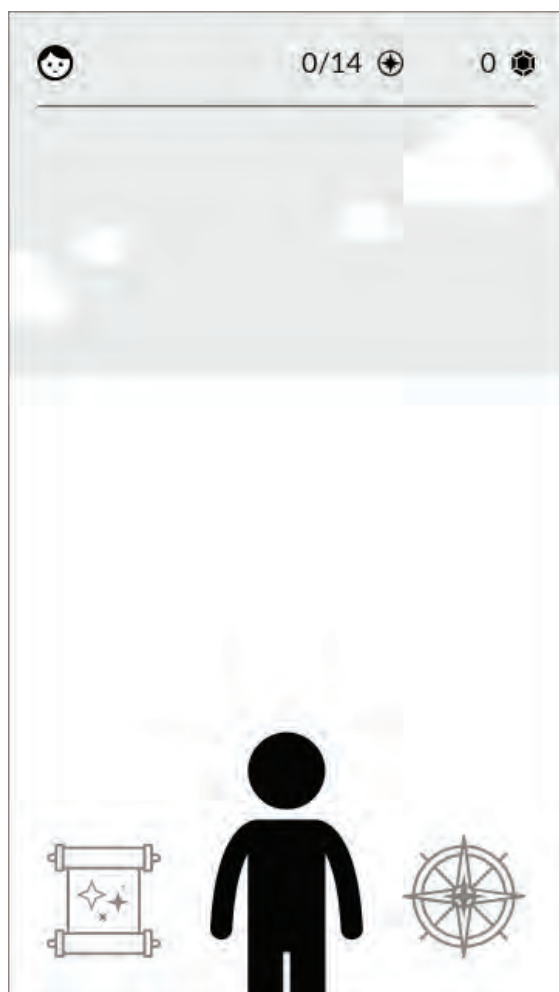
Loading Screen with Logo (TBD)



Main Menu. Denis selects single player game. It is assumed the game has already been configured for his user account and permissions are set.

3. Gameplay

Gameplay Walkthrough



Layout of the in game screen.



Denis is Greeted by the NPC at Kilkenny Castle. In this case, a former Knight, called Robert, who lived at the castle. The Knight has misplaced some items around the castle and needs help to find them.

3. Gameplay

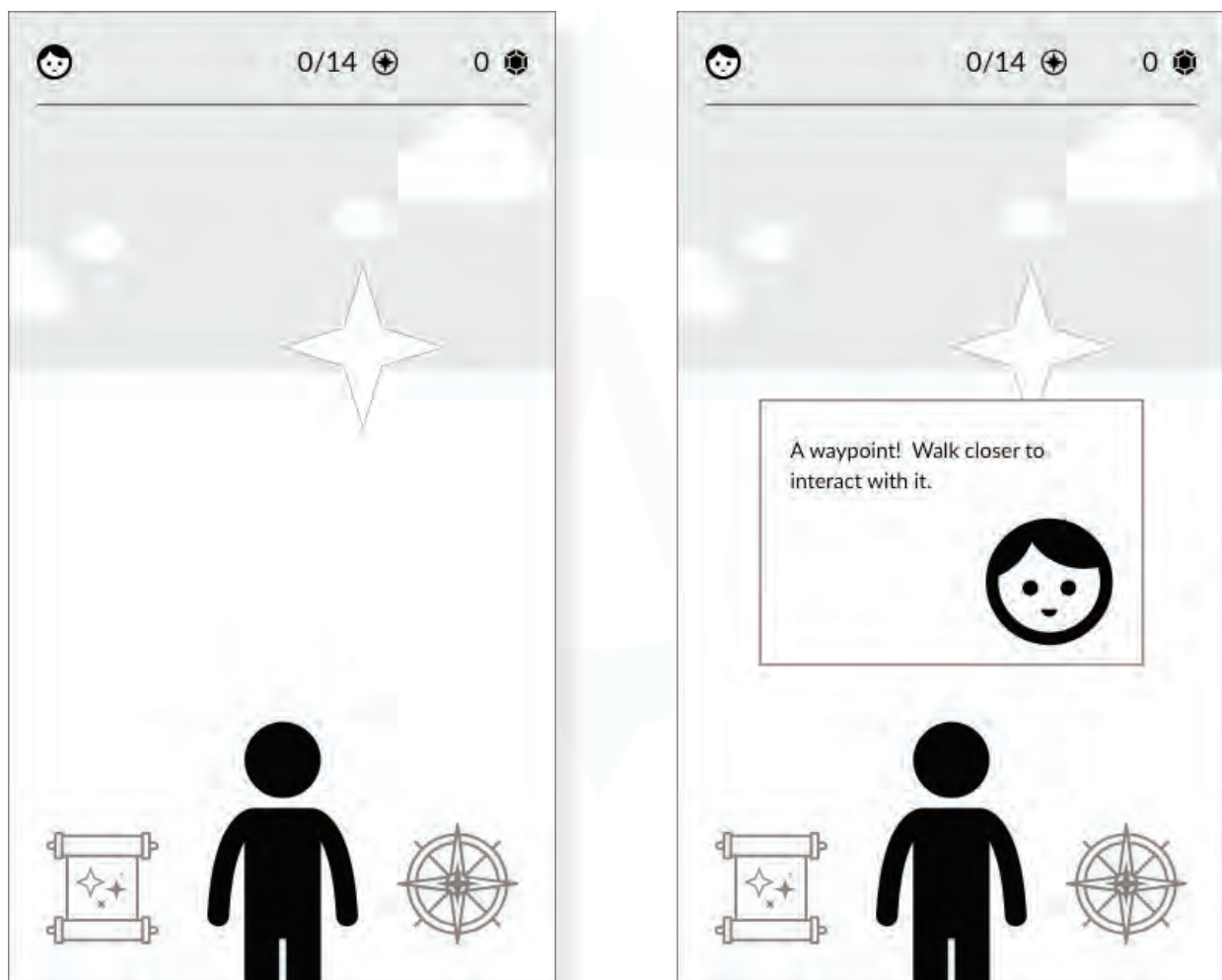
Gameplay Walkthrough



Robert explains the game objective to Denis.

3. Gameplay

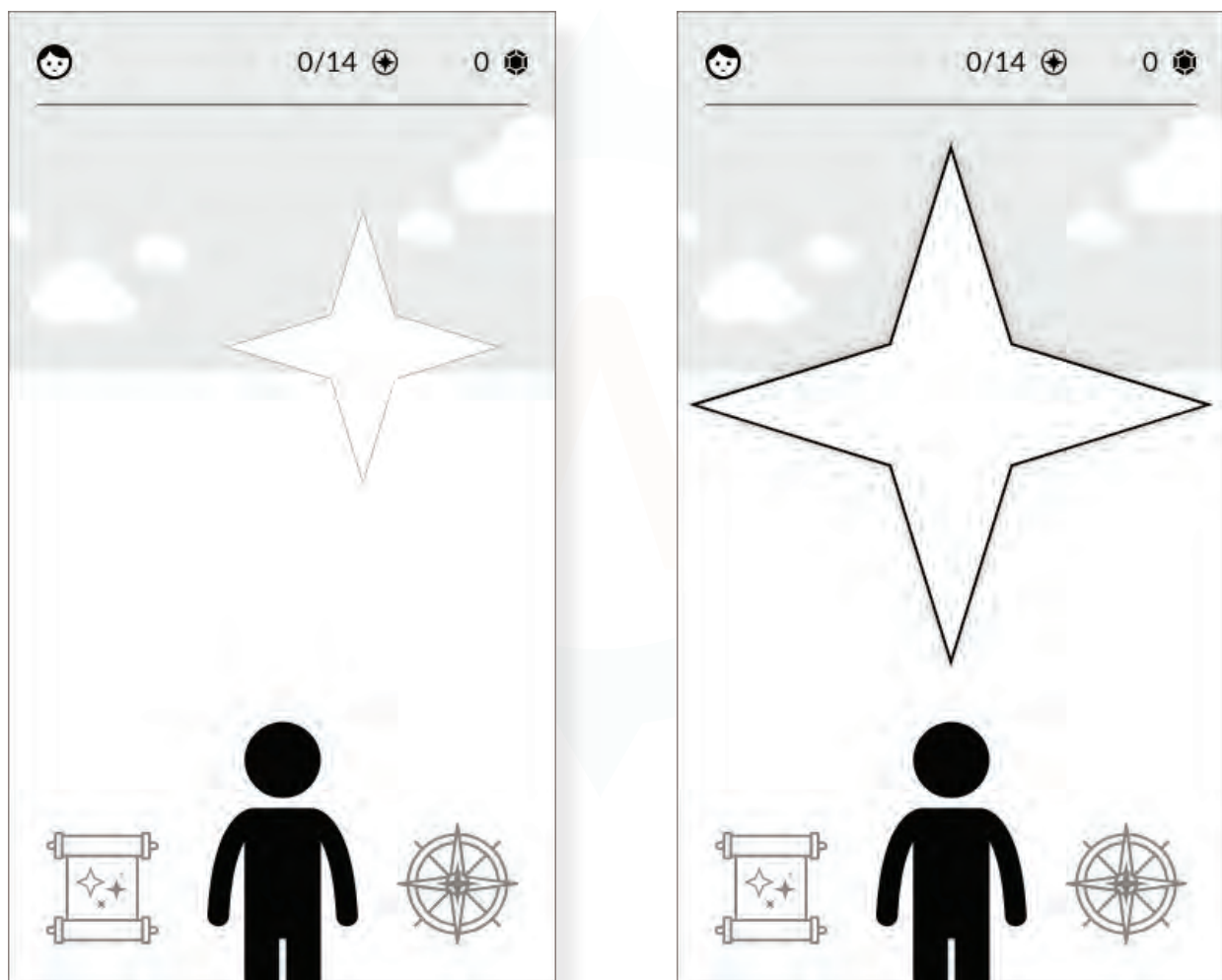
Gameplay Walkthrough



Robert identifies a Point of Interest and encourages Denis to approach it.

3. Gameplay

Gameplay Walkthrough



The App tracks Denis' motion in real time relative to the Point of Interest. When close enough Denis can tap it.

3. Gameplay

Gameplay Walkthrough



This reveals what Denis has found, in this case, the grave of the pet dog of the last owners. It includes some details of interest about the site, provided by the site owners

The App records that Denis has found one of the fourteen items, and awards him with 60 points.

3. Gameplay

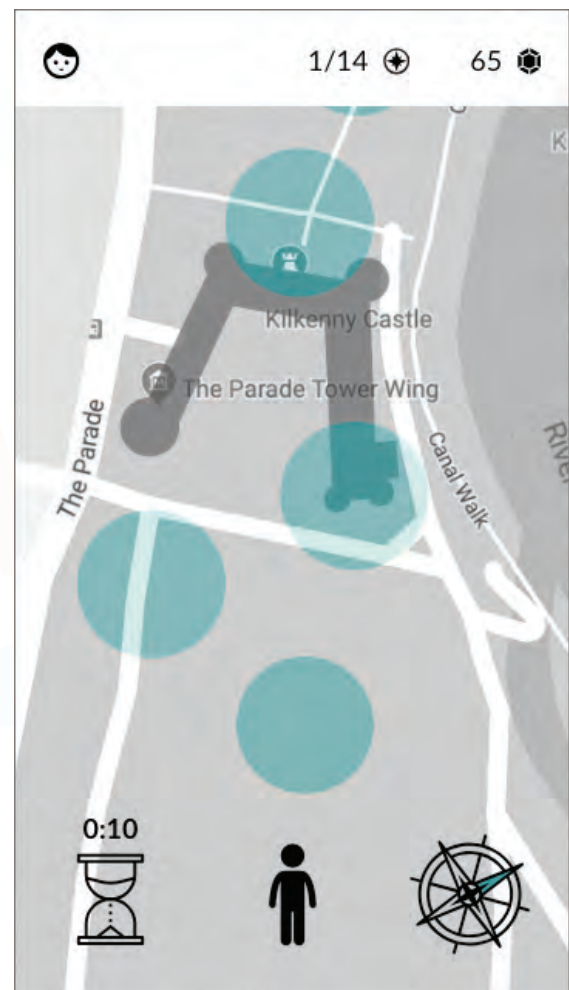
Gameplay Walkthrough



The next screen allow Denis to earn some more points by tapping on gems before they disappear.

3. Gameplay

Gameplay Walkthrough



Robert again pops up to take Denis through the next stage of gameplay, introducing a map of the area, with Points of Interest noted. To prevent users simply staring at their phones rather than engaging with the site, or worse, injuring themselves, this map is presented only for a short time. The User must find the points by exploring.

3. Gameplay

Gameplay Walkthrough



Robert prompts Denis to tap the compass icon in the corner. This opens up the magic compass that will guide Denis to the next Point of Interest.

3. Gameplay

Gameplay Walkthrough



The compass uses intuitive “hot and cold” directions in both description and colouration to guide the player to the next point.

3. Gameplay

Gameplay Walkthrough



The Point of Interest is found. This time it is a generic item. For sites without management or bespoke data, the game creates generic points of interest around the site.

3. Gameplay

Gameplay Walkthrough



Denis continues his search...

4. Non Technical Design

Story, Setting and Character

Setting

The physical setting for the game are the many thousand of heritage site found all around Ireland. The game world is based and built upon this existing world.

Story

The premise of the games story is that these historic sites are alive with stories to tell. Stories told by the spirits of people who lived at these sites. Ordinarily these spirits are imperceptible to ordinary people and their stories remain untold.

A central conceit of the game is that each game comes with it's own guide, a púca. A púca (alternatively pooka, phouka, phooka, phoooca, puca or púka) is the Irish word for a ghost, but in folklore they are spirits that can take the form of people, goblins or animals. The Púca acts as a guide and interpreter, letting the player communicate with the ghosts of the ancient sites of Ireland. These ghosts can then communicate with the player and ask for their help in finding things they have lost, and share their stories.

Characters

Player

To play the game the player must physically move around the real world environment. They will be represented by a digital avatar on screen. As an option, perhaps their appearance can be altered by the addition of collectable virtual objects to create costumes and props.

Púca Companion

The Púca is a companion and guide for the character. It's ability to appear in many forms create a highly customisable companion for the player. Artist would have free reign to create a huge variety of cute characters for the player to choose between.

NPC Ghosts

Each site should have one or more NPC character ghosts to act as a "quest giver" for that location. A Princess or Lady, a Knight, a Monk, a Viking or Gaelic warrior. The national monuments data set includes classifications of sites to allow the application to match an appropriate character to a generic site. For managed site with bespoke data, specific characters can be more closely tailored to the site. Perhaps offering a choice of NPC's to allow the application to better match a players interests. Kilkenny Castle, for example, might have a Knight ghost, concentrating of Points of Interest such as the Sally Forth and Battlements, and a Lady ghost concentrating on the rose garden and former stables.

NPC's should have an individual name chosen randomly from a suitable pool, and a class used to define suitable sites to appear at and suitable items to use as "fetch items" at Points of Interest.

They should be "collectable" in that when a player completes the quest at a site, they gain the ghost as a new friend. The player can review past friends to be reminded of "adventures" they had with the ghost and any details they learned about the site.

4. Non Technical Design

Level/Environment design

Requirements:

- A database for The National Monuments Service Sites and Monuments Record
- Array of Pre Generated NPC classes
- Array of historic artifacts to be found at points of interest
- Geolocation API (Google Maps or Mapbox) to provide other points of interest such as restaurants
- A database of added media for bespoke Points of Interest

The National Monuments Service Sites and Monuments Record serves as the base data set for the generation of sites. It provides the coordinates of the site.

Points of Interest can be procedurally generated centred on the site. There will have to be parameters set to prevent points of interest generating too close to each other or too far away from the site. This determination will have to be done experimentally.

Also included in the dataset are a class code and class description. NPC classes are chosen to match the class of site (eg a Monk at a monastery site, a knight at a castle). Names for the NPC can be randomly picked from a pool. The type of site can also be used to determine the types of artifact at each site.

The Geolocation API is used to provide location and directions of other sites of use and interest to tourists such as museums, restaurants or cafés.

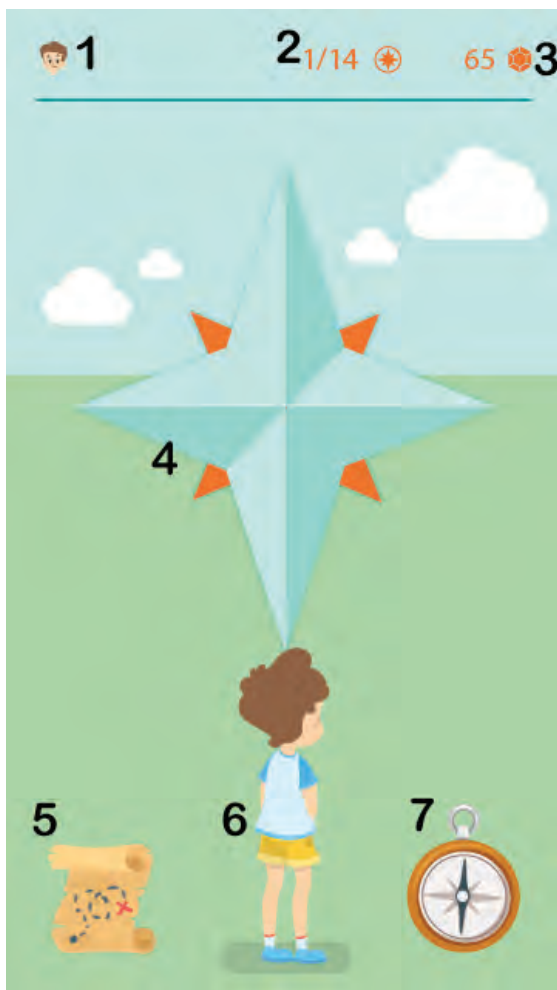
This setup allows for the procedural generation of any number of generic sites based on the data set.

On top of this generic framework it is possible to build a more detailed, bespoke and engaging experience by replacing generic entries with specific entries, for a specific coordinate, the sally forth in the wall of Kilkenny Castle for example. In addition to chosen locations, a managed site can add media to the point of interest. An explanation of what a sally forth is, in text format, pictures or even audio and video. These resources would have to be provided by the managers of a site, or perhaps by as a service by Heritech to add value to the heritage location in question.

4. Non Technical Design

Interface

Game Screen & Map Screen



1. User Account
2. Points of Interest found/total
3. Point Score
4. Point of Interest in play field
5. Map of Points of Interest (timed, to give a hint, and to prevent users focus being on the application screen instead of the environment)
6. Player Avatar
7. Magic Compass (hot/cold clues to direction of next Point of Interest)



1. Point of Interest
2. Point of Interest
3. Point of Interest
4. Point of Interest
5. Timer

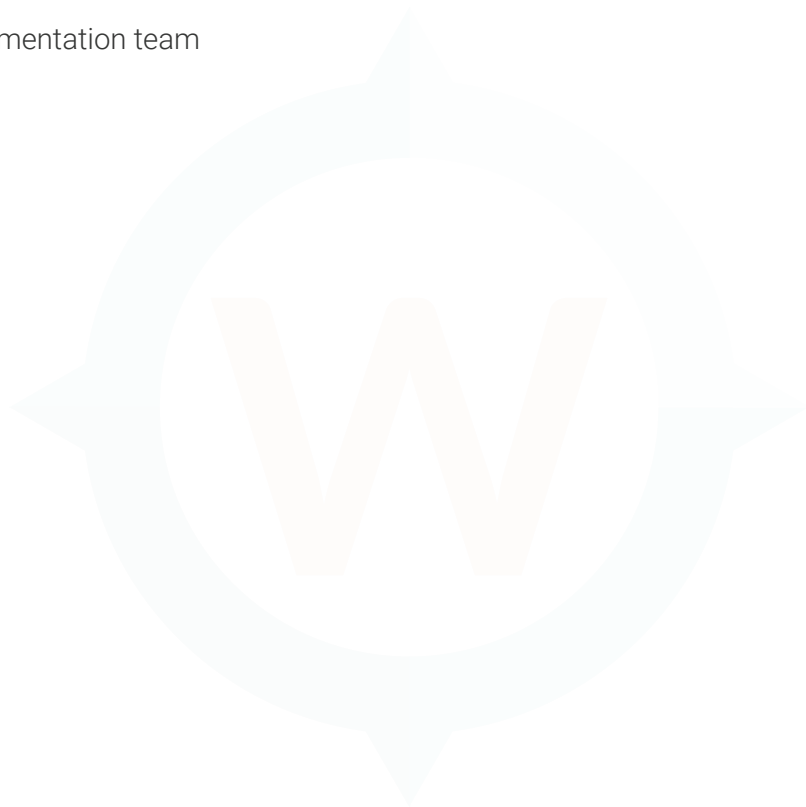
4. Non Technical Design

Art

Child friendly
In keeping with style guide document
Design left to implementation team

Sound and Music

Child friendly
Design left to implementation team



5. Technology

Target Hardware

- Android Device
- OS Android 5.0 (Lollipop) to cover 85% of devices

A single target platform was chosen by IP to focus on.
Android was chosen due to a combination of good market share, and ease of marketing.

Technology - Design Tools

Technology used for Production of Wireframes/Prototype

- Adobe XD - Wireframes and High Fidelity prototype for the application.

Software Technologies used in Production of Reports

- Microsoft Office suite - Word, Excel.
- Google Docs - collaborative document writing.
- Vizzlo - For Presentations, Charts, Timelines and collaboration.
- Typeform - For Market Research, Live Questionnaires, Data Analysis

Technologies used for Style Guide and Mockups

- Adobe CS (InDesign, Photoshop, Illustrator, etc.)

Technology - Implementation

Frontend

Option 1: Native Android application

Language : Java
IDE: Android Studio
APIs: PubNub and Google Maps

Upon research and experimentation a basic implementation of geolocation and map labelling was constructed using the following technologies. The implementation was tested by emulator and by physical device.

Android Studio, the official Integrated Development Environment for Google's Android language. It is based upon JetBrains' IntelliJ, a Java API, built to meet the requirements of Android, and as a replacement for Eclipse, the previous official IDE for Android development.
The Software is free, and available on Windows, MacOS and Linux.

PubNub are an American infrastructure-as-a-service (IaaS) company providing a global Data Stream Network (DSN). It can be used to provide Realtime Messaging, in this case updates of the longitude and latitude of a remote object.

5. Technology

The Google Maps API provides Android with Mapping Functionality. A wide variety of attributes can be configured and changed as needed, including size, zoom level, map style, Map Markers and other effects and features.

Android emulators for testing the code we find Bluestacks is the latest popular emulator for Windows XP, Windows 7, Windows 8/8.1 or Windows 10 and it runs 97% of what's inside the Google Play Store. Alternatively the IP can use real Android device for testing the app. Comparably emulator is faster and easier to testing the code. Transferring data with emulator is quicker than a physical device.

This implementation can form the basis for a walking skeleton application, a demo application, and as a test bed for the Technological Roadmap to be delivered. With the underlying structure in place the game can then be built upon it.

Option 2: Unity Game Engine

Language: C#

API: Mapbox

An alternative to native development is to build the game in an existing game engine that supports the target platform.

Unity is a cross-platform game engine developed by Unity Technologies, released in June 2005. The Unity editor is available for Windows and Mac, and can build applications for 27 platforms, including Android. It has approximately 4.5 million subscribers and holds about 48% of the Android mobile market (compared to Unreal's 13%) <https://www.linkedin.com/pulse/unity-vs-unreal-engine-more-confusion-game-nisha-patel/>

Unity doesn't charge on a per-title basis, and it takes no revenue or royalty share from games that harness the engine. Licensing ranges from a Personal licence, free for revenues under \$100,000 to Professional at \$125 a month.

For more on Unity, read the following white paper.

https://unity3d.com/files/solutions/unityformobile/A_Guide_To_Moving_From_Internal_Game_Engine_Technology.pdf?utm_source=adopting-unity&utm_medium=bottom-cta

While support for Google Maps is no longer offered (outside of negotiated partnerships) Mapbox offer an Software Developer Kit for use with Unity, offering real time Geolocation API. Mapbox is used by the likes of foursquare, Facebook and Snapchat. Mapbox offer commercial licences.

Recommendation

Using existing resources the development team could quickly focus on graphics and gameplay and make bringing the application to market far easier and quicker. Costs during prototyping and development are low to none, with Unity costing no more more once active and deployed making Mapbox licencing the significant cost.

5. Technology

Back End - Which Database Solution to Choose:

When comes to database solution for this particular app, user information should be stored directly on the mobile device not in the server as there are only two main options, they are SQLite and Realm.

Option 1: SQLite Database

SQLite database is the most commonly used relational database management system (RDBMS) which provides in the form of a library that is linked precisely with the application. Like other RDBMSs, data can be accessed using SQLite database by Structured Query Language (SQL).

Room is a library which provides an abstraction layer over SQLite which can smooth out all the weaknesses of SQLite. It is easy to use LiveData in a few steps with the help of Room. It is very small in size, pleasant data migration and has flexible multithreading facility.

Though SQLite has been very popular and has some great feature it also has a range of drawbacks and imperfections such as Security, Maintainability, scalability and Complexity which led to a release of the second most famous and popular android specific DB solutions - Realm.

Option 2: Realm Database

Realm is a new database engine replacement for SQLite. It's a non-relational database management system which let us work with objects. It is extremely simple compared to SQLite and requires to write minimum code. In some cases, it works even faster than pure SQLite. It is well documented and can boast of many new features such as JSON support, encryption support and fluent API while using Realm in Android projects.

Recommendation:

The recommendation is to choose option 2 - Realm based on an assumption that the proposed app will be a small or midsize project. It's a great turnkey solution which works straightforwardly without additional settings with so many additional feature and benefits.

But if there is any possibility to grow the project bigger and more complex option 1- SQLite and Room will be better to choose.

5. Technology

Implementation roadmap

This document is written to support a proof of concept to taken to investors. Without knowing the funding level, development team or deadlines there are too many unknown variables to allow the formation of a formal technology roadmap.

There is enough concept design work to suggest an iterative implementation plan.

1. Concept

This projects documents detail the research and design decisions behind the application concept, the target audience, genre and tone, the desired gameplay elements etc. The first step should be familiarising the implementation team with the concept.

2. Set environment

Determine the tools to be used. Game Engine, language, APIs, IDE and version control that will be used. The Recommended set up would be to write it in C#, using the Unity Editor for deployment to Android. Using Mapbox as the Geolocation API and GitHub for version control and code sharing.

Install and configure the required software, accounts and any licencing.

3. Create a Minimum Viable Product

As a rough rule of thumb, a game project should include production of a Minimum Viable Product within the first 3 weeks. Minimum Viable Product in this context does not mean a shippable product, but a stripped down implementation with the absolute minimum feature set and almost no content to test the core structure.

In this example we need an android device that can track the users location, compare it to a single Point of Interest location and once we are close enough, present a single String message from a database. This allows testing and validation of the core functionality without the distraction of content.

4. POI generation

Work should begin on the algorithms to generate Points of Interest for sites. Attention will need to be paid to density for best gameplay and what can be done to geofence areas.

5. Content Generation

The player's púca companion, the NPC ghosts at the sites, and collectable items for generic POI's need to be added. Design on these can begin at the concept stage (both graphically and a template of NPC and item attributes), but they should not be integrated until the core mechanics are working. Content can be added throughout the rest of the process, but should not begin before this stage.

6. Map and Magic Compass

With the core functionality of the main game screen done, work should begin on the Map screen and the

5. Technology

hot/cold guidance of the “magic compass”. This content will require testing and iteration to get the “feel” right.

7. Configure Database for Added Media

The ability to add specific media at chosen locations has the potential to add real value to both the application and to heritage sites who take advantage of the feature. Some examples should be built into the database, and the application coded to stream data from the database.

To make the process easier for site managers, a web service should be built to allow sites to upload media to the database.

8. Add Points of Interest from Geolocation API

Points of Interest in this context means the locations of churches, museum, bars, restaurants and so on from the likes of Mapbox or Google Maps. While not a core gameplay component, adding this information will add value to the application as a aid to tourists. It should combine particularly well with urban locations such as Waterford’s Viking Triangle, or Kilkenny City.

9. Iterate Through Improvement Builds

With the core mechanics in place, work should begin on adding content, improving appearance, building character and story through iterative sprints and building up the gameplay experience.

Other Considerations

Multiplayer

A decision will have to be made on whether to offer multiplayer games at launch, or to leave to a later date. If it is to be included at launch it should be integrated at or shortly after the MVP stage.

Templating of Entities

NPC ghosts, and collectable items should have their attributes templated early.

Sites should be categorised by types. Huts and Fulacht Fia sites should be filtered out as visually uninteresting.

Sites should be linked to suitable NPC’s and Items. A ruined monastery should feature the ghost of a monk searching for religious items like a relic, crucifix or psalter.

NPC should have pools of appropriate names and some variety of appearance.

Extensibility should be kept in mind. It should be set up to allow inclusion of more character types and items over time to allow the Application to be updated with fresh content.

Future Development

The accompanying research document includes proposals for integrating What3Words into gameplay. Also discussed with the IP were the possibilities of extending the application into other areas, such as nature and wildlife tours, presenting media on and locations of plant life and wildlife for nature tourists. While beyond the scope of the application at present, the mechanics should be designed in a modular manner with an eye towards future expansion.

6. Appendix

Google Maps and Pubnub

Android geolocation Tutorial

<https://www.pubnub.com/tutorials/android/mapping-geolocation-tracking/>

Step 1. Sign up for PubNub account to obtain API keys.

Step 2. Get an API key from the Google Cloud Platform Console.

Step 3. Download source code from <https://github.com/pubnub-dsn/pubnub-android-map-tutorials>

Step 4. Clone or import project to Android Studio.

Step 5. Update Google Maps API key in AndroidManifest.xml

Step 6. Update PubNub publish and subscribe keys in Constants.java

This configures a basic runnable application that can be modified to meet application needs.

Unity and Mapbox SDK

Link to Unity

<https://unity3d.com/>

Link to Mapbox SDK for Unity

<https://www.mapbox.com/unity/>

Building location based games with Mapbox in Unity

<https://www.youtube.com/watch?v=-RMdkG0VL4A>

Tutorial series on building a Pokémon Go clone in Unity using Mapbox

<https://www.youtube.com/watch?v=RhG1kfDBhgM&list=PL86WBCjNmqh4bDQycScKKIP0ETkjo39gG>



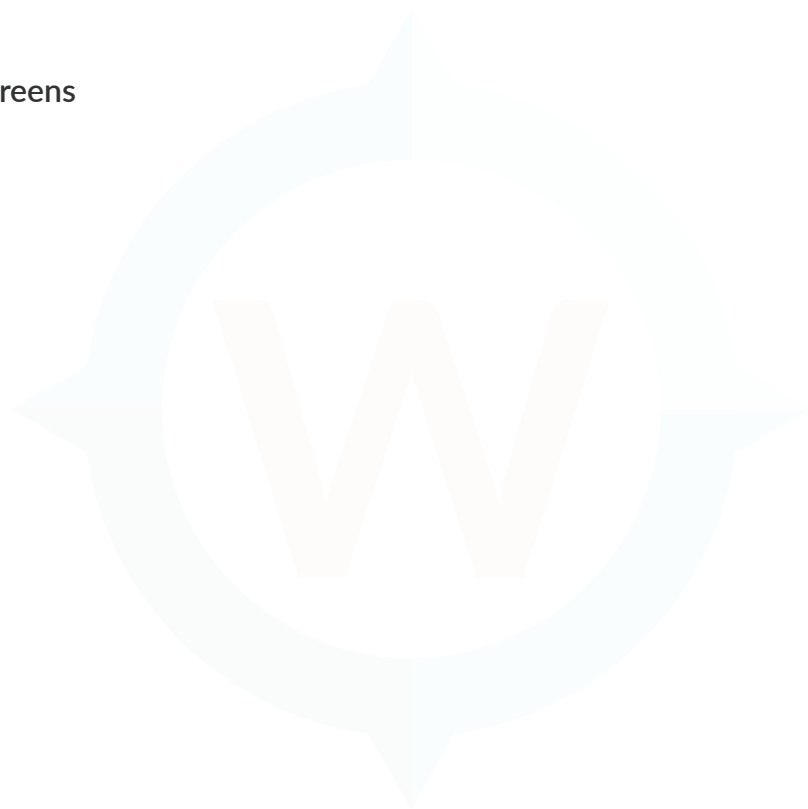
Project Púca/IP33

Foundation Style Guide

Team WayPoint | HeriTech Explorer | WebElevate

Table of Contents

1. Typography	04
2. Colour Palette	05
3. Information Architecture	06
4. Wireframe UI Elements	07
5. Game Art	08
6. Key Game Screens	09



Foundation Style Guide

1. Typography

We deemed the font Lato a suitable choice for the applications typography due mainly to its strong readability on mobile devices. It has a strong structure that conveys stability and seriousness, while it's semi-rounded style conveys warmth. We think that this makes for a suitable font that will appeal to users young and old.

Primary Typeface

"The quick onyx goblin jumps over the lazy dwarf"

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qq Rr Ss Tt
Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 (@ & \$ * : ; ! ?)

Lato Bold

"The quick onyx goblin jumps over the lazy dwarf"

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qq Rr Ss Tt
Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 (@ & \$ * : ; ! ?)

Lato Semibold

"The quick onyx goblin jumps over the lazy dwarf"

Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qq Rr Ss Tt
Uu Vv Ww Xx Yy Zz 0 1 2 3 4 5 6 7 8 9 (@ & \$ * : ; ! ?)

Lato Regular

Foundation Style Guide

2. Colour Palette

The sense of fun the app needed to convey influenced the colour palette greatly, on this basis we deemed that the colours chosen should be positive and approachable, based on the young user base.

The color palette chosen has a Tertiary earthy feel, the colours were bright but nothing overly garish was used to minimise eye strain on the user. Accessibility was also a factor in the colour palette decision, the colours had to be friendly and distinguishable for users with colour blindness.



Persian Green

#01999e
R1 G153 B1158
C81 M20 Y39 K1



Tango

#ED6B26
R237 G107 B38
C2 M72 Y98 K0



Kournikova

#FEDD73
R254 G221 B115
C1 M11 Y66 K0



Spring Rain

#A3CD9D
R163 G205 B157
C38 M3 Y48 K0



Jagged Ice

#BAE3E0
R186 G227 B224
C26 M0 Y13 K0



Black Haze

#E6E7E7
R230 G231 B231
C9 M6 Y66 K0

Secondary Color Palette



Teal

#007c7c
R0 G124 B124
C87 M33 Y30 K10



Mantis

#76c267
R118 G194 B103
C57 M0 Y80 K0



Sandy Brown

#f49c68
R244 G156 B104
C1 M46 Y63 K0



Monte Carlo

#89d0c8
R137 G208 B200
C45 M0 Y25 K0



Golden Glow

#fde399
R253 G227 B153
C1 M9 Y47 K0



Silver Sand

#b9bbbd
R185 G187 B189
C28 M21 Y21 K0

Foundation Style Guide

3. Information architecture

These are the Wireframe gameplay screens derived from the scenario. The player is guided around Kilkenny Castle visiting Points of Interest and scoring points by receiving gemstones upon learning the knowledge of the site. For a more detailed look at the screen flow please refer to the Game Design Document.

Wireframes Key

- | | |
|-------------------|--------------------|
| 1. Loading Screen | 5. POI Information |
| 2. Main Menu | 6. Gems Released |
| 3. Guide Appears | 7. Map |
| 4. Waypoint | 8. Magic Compass |



Foundation Style Guide

4. Wireframe UI Elements

The wireframe UI elements are below. These are the basic forms that move the gameplay along and inform the user of where to go in the game and how they are progressing. They are designed to scale well to small devices and tailored to a young audience.

Wireframe Elements Key

1. User
2. Settings
3. Gem Score
4. Waypoint Count
5. NPC

6. Navigation
7. Compass
8. Player Avatar
9. Gem Style 1
10. Gem Style 2

11. Gem Style 3
12. Timer
13. Cloud
14. Magic Compass

1.



2.



3.



4.



5.



6.



7.



8.



9.



10.



11.



12.



13.



14.



Foundation Style Guide

5. Game Art

Stock assets were used from Adobe Stock to represent the UI and Game art elements. They were chosen based on the wireframe elements, to be simple and appeal to a young audience. A Viking character was used to represent the character of “Robert” referred to in the Game Design document.

Game Art Elements Key

- | | | |
|------------------|-----------------|-----------------------|
| 1. User | 7. Navigation | 13. Gem Style 3 |
| 2. POI Collected | 8. Compass | 14. Gem Style 4 |
| 3. Gem Score | 9. Puca Guide | 15. Timer |
| 4. Multiplayer | 10. Waypoint | 16. Map Player Avatar |
| 5. Settings | 11. Gem Style 1 | 17. Magic Compass |
| 6. Player Avatar | 12. Gem Style 2 | |



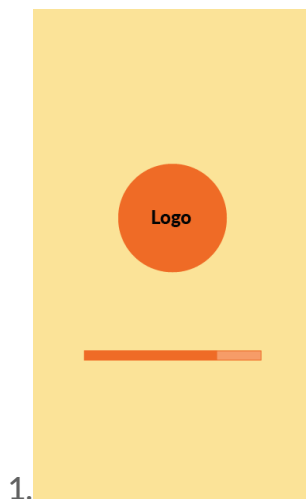
Foundation Style Guide

6. Key Game Screens

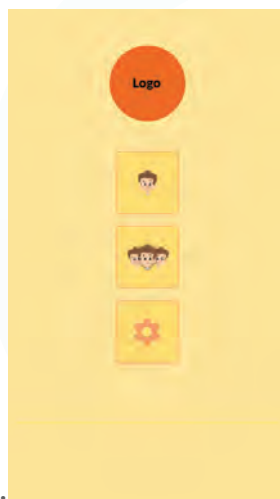
The colour game screens were generated in accordance with the tertiary colour palette chosen. The design at this stage is in a simplistic state to allow the gameplay be defined.

GameScreens Key

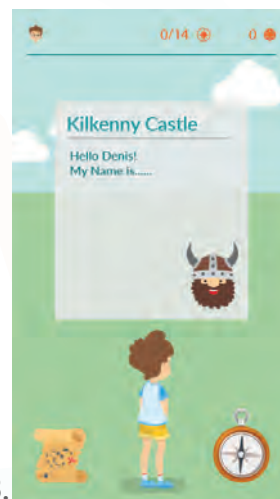
- | | |
|-------------------|--------------------|
| 1. Loading Screen | 5. POI Information |
| 2. Main Menu | 6. Gems Released |
| 3. Guide Appears | 7. Map |
| 4. Waypoint | 8. Magic Compass |



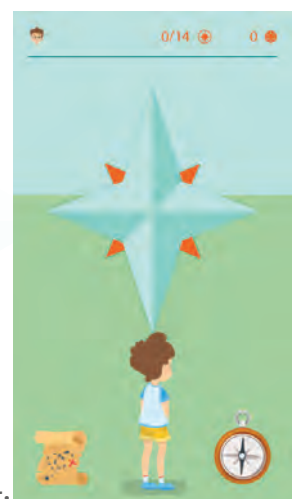
1.



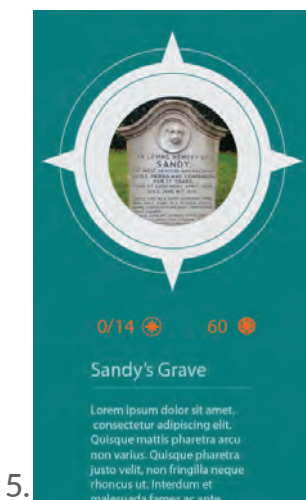
2.



3.



4.



5.



6.



7.



8.