

AN EXPLORATIVE STUDY INTO THE IMPACT OF  
AUGMENTED REALITY ON THE EXPERIENCE FOR  
CYCLISTS VISITING CULTURAL HERITAGE SITES



By

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## ABBREVIATIONS AND KEYWORDS

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- Augmented Reality (AR)
- Virtual Reality (VR)
- User Experience (UX)
- User Centred Design (UCD)
- Hi-Fi – High-fidelity prototype
- Lo-Fi – Low fidelity prototype
- Point of Interest (POI)

## ABSTRACT

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Cycling applications have reported an increase in around 500,000 cyclists using mobile applications to supplement their cycling experience in Lincolnshire. To motivate more people to cycle in Lincolnshire, Visit Lincoln has established cycle routes around the county that visit locations of historical significance to the region. The county has a rich history ranging from landmarks such as the Brayford Wharf, which the Romans built to aid supply lines and the Vikings using it as a port. Despite the region's significant heritage, many tourists and cyclists may not be aware of its history.

Augmented Reality (AR) has been a ubiquitous technology in recent years, with many implementations of the technology being developed and deployed on mobile devices. However, there is a gap in research looking into the effects of AR in the context of cycle tourism and cultural heritage. The study presented in this thesis aims to bridge this gap. A qualitative approach was taken to interview participants, who tested a prototype that featured three diverse types of AR along one of the established bike routes and then thematically analyse the data. User perceptions showed that AR could be useful for enhancing cyclists' experiences and impacting their riding. Metric data indicated that location-based and interactive marker less features were the most generally adopted AR features. Additionally, thematic analysis displayed that the visualisations that were appropriate for the setting considerably enhanced the user experience, supporting the claim that augmented reality is a useful tool for improving the experience of cyclists visiting culturally significant sites. The information also concluded that gamification significantly enhanced the user experience while obtaining rewards for visiting these locations.

# 1 INTRODUCTION

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According to today's independent research, the 2018 Tour de Yorkshire increased the county's economy by £98 million. Over the four days of activity from May 3–6, a record 2.6 million spectators lined the route, and overall spending increased by 54% to £97,973,806 in 2017. (Brailsford.,2018). Visit Lincoln and Welcome to Yorkshire created Cycle England in 2018 in reaction to this. The project received funding from Visit England's Discover England Fund to develop new cycling routes and experiences in Yorkshire and Lincolnshire.

Statistics report that Lincolnshire's tourism industry generated record-breaking numbers at £1.5 billion in 2018 and further supports the motivation for exploring AR in the context of cycle tourism (Fish.,2019). The Research was conducted with the support of Visit Lincoln, an organisation focusing on tourism in Lincoln for cyclists and pedestrians. A benefit of working with Visit Lincoln was the access to resources, such as established cycle routes and the point of interest (POI). Schubert (2020) states that cycling applications have logged over 500,000 cyclists in Lincolnshire, and the numbers are increasing, which highlights that cycling is a popular mode of transportation and according to statistics published by Cycling UK (2021), cycling for education makes up over 10% of people's reason to cycle. The benefit of this research being based in Lincolnshire is the ability to take advantage of the county's rich history. Researching in collaboration with Visit Lincoln allowed the artefact to be evaluated alongside newly developed cycle routes. Lincoln has a diverse cultural heritage from periods such as the Roman, Viking, and the world wars. This further argues the motivation behind the study in this thesis, as presenting the history through AR could have a significant impact on the user experience, as well as exploring the feasibility of AR within this context. Research has been conducted that outlines the trends of cyclists and any market changes or growth, with the increase in cyclists during the pandemic being the most notable Cycling UK (2021). Han et al. (2014) discuss AR's impact in the context of cultural heritage and found that participants were accepting of the technology.

Hawkinson (2018) defines AR as blending digital content in and on the physical world. AR has become a ubiquitous technology, especially with the improvements in the accessibility of mobile devices. This is discussed by Wu et al (2013), who suggested that mobile AR could be effective in users developing their knowledge and skill in a certain topic. With the advances in the technological capabilities of smartphones, AR has been proven as a reliable medium for presenting information, including visual aids and entertainment, as well as being used for advertisement and games, with several technical and industrial uses such as marketing (Rauschnabel et al., 2019). AR can be considered an umbrella term for the several implementations of the technology. With AR being a broad and growing technology, it is important to understand what characteristics must be met to be considered truly AR. Azuma (1997), highlights three criteria for AR; 1) combines real and virtual, 2) interactive in real time and 3) Registered in 3D. With these in mind, different AR technologies can be considered when exploring the impact on UX. Several AR tracking technologies meet the criteria, such as GPS tracking, vision-based tracking and hybrid tracking (Billinghurst et al., 2015).

### **Aims and Objectives:**

- To bridge the gap in knowledge between AR heritage and heritage-based cycling routes.
- To determine whether AR can enhance the experience of cyclists visiting cultural heritage sites.
- To identify whether AR is a feasible technology to be used in the context of cycling and visiting POI. Furthermore, identifying the type of AR that most effectively adds to the experience will also be insightful.
- To evaluate the most successful AR implementations that enhance the experience.

As discussed above, there is a gap in research focusing on the UX of cyclists using AR on their journey. Despite this, research has been conducted into how mobile applications can motivate users and how factors such as gamification or social features directly impact cyclists (Navarro et al., 2013). This correlates with the research as the findings can be applied to motivating cyclists using AR. Sites

of historical significance tend to have signposts or plaques to display information about the location. A motivation behind the study presented in this document is to evaluate whether AR can be used as an alternative to these signs or to enhance the user's experience reading them. The gap in exploring this topic raises the question of whether AR can be used to enhance the experience of a cyclist visiting a cultural heritage site, and the research described in this paper aims to contribute to this existing research. Enhancement of the user experience is a commonly used term. Several pieces of literature use the term when discussing how factors such as gamification, 3D visuals and engagement can improve the user's experience (Hammady et al.,2016; Han et al.,2014; Deterding et al.,2011). Therefore, the term 'enhance' has been used when referring to a positive impact on the user experience due to AR.

### **Hypotheses:**

- AR will enhance the user's experience when visiting cultural heritage sites.
- Users will feel more favourably towards interactive experiences.
- Users will prefer experiences with visuals over text.

The hypothesis is that users may react positively to experiencing AR on their bike rides. There are several examples of AR being used in the context of cycling. However, it has primarily been used for navigation (Ginters,2019). The experiences provided at these points of interest has been built with the requirement elicitation, and the themes it offers allows for more accurate data collection. The importance of AR can be determined by identifying if and how the artefact enhanced the experience. The primary focus of this study is to examine whether Lincolnshire's cycle tourism industry can be positively influenced using an AR application that highlights the county's cultural heritage sites. User experience and user-centred design (UCD) are key themes throughout the research and have been proven to be effective strategies in existing literature (Preece et al., 2015).



This report is structured chronologically, starting with the literature review, which provides insight into the existing research that has inspired and aided the study presented in this thesis. Following this, the first study, which includes the methodologies used in the requirement gathering and the results. Additionally, the design process of the artefact and the methods used have been discussed in length. the main study has been displayed, and their efficacies have been evaluated. This is followed by the main study, which discusses the processes used to recruit participants, test the artefact and gather data. Subsequently, the findings have been discussed and analysed to determine their effectiveness in answering the research question. Finally, a conclusion has been made that collates all the findings and assess the research's advantages and any potential drawbacks.

To meet the aim and objectives of this study, semi-structured interviews were conducted to gather requirements from cyclists. Thematic analysis highlights these requirements and informs the design of an AR product for cyclists. The product was tested, and participants were observed and interviewed. Additionally, quantitative data has been collected and analysed to inform the participant's behaviours when using the application. The interviews were thematically analysed again, and the themes are discussed and evaluated later in the report.

## 2 LITERATURE REVIEW

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The focus of the research is to evaluate whether AR can be effective in enhancing the experience of cyclists visiting cultural heritage sites. Reviewing existing literature is to understand the background of several topics and the functionality of technology such as AR. Additionally, the reason for gathering the literature is to identify similarities amongst existing research and patterns in the findings that relate to the study presented in the paper. This also allows for the comparison and evaluation of methodologies. The literature gathered is separated into themes that correlate with the scope of the research topic, with each theme's relevance to the study outlined in this document being analysed. Some studies focus on AR and its impact on user experience, and comparative literature has been categorised into themes. Further trends in the literature have led to themes such as the behaviour of cyclists and UX and UCD principles being separated into sections. Research has been collected regarding AR in the context of cycling; however, since the gap in the research does not cover AR and cycling in the context of cultural heritage, this topic has not been reviewed in detail.

Useful literature focuses on AR, which shows how influential and fast-growing the technology is. One of the technology's most effective use is in the educational field. This is further suggested by a study by Williams et al (2020), who adopted a user-centred design approach to assess whether augmented reality or virtual reality is more effective in the context of education and tourism. They found that AR is more effective because it allows for more spatial awareness when engaging with the technology.

### 2.1 What is AR:

In recent years AR has been utilised heavily in marketing and other industries such as employee training. Papagiannis (2017) identifies current uses of AR that have increased the technologies popularity and aided its growth. Papagiannis (2017) explains further by highlighting recent benefits of AR that can provide educational experiences, such as AR-based web browsers that provide

information on the object in the camera view. Additionally, Alsop (2021) reports that by 2023 there will be an average of 2.4 billion users of AR mobile applications, which means that there is increasing potential for a successful AR cycling tourism application as more people are learning to use the technology. Papagiannis (2017) discusses that one of Microsoft's main utilisations of AR is their HoloLens device. In this thesis, wearable tech refers to those typically used in the context of AR as well as cycling. Such as AR glasses and smartwatches being key examples of the technology. Despite wearable tech increasing since it was first announced, only one billion people will wear at least one piece of wearable tech, which is less than half of what is projected for mobile AR users (Sujay Vailshery.,2021). There are enough papers that research the effectiveness of AR in the tourism industry. One source discusses the design principles of AR in the context of tourism and argues that the events that trigger the AR are just as important as the content itself (Hawkinson.,2018).

## 2.2 AR technology

Simultaneous Localization and Mapping (SLAM) is a crucial technology used in AR. Munoz Montoya et al. (2019) define SLAM as a marker less tracking technology that leverages the environment to present AR. Tsai and Chiang (2019) researched using SLAM for an AR tourism application and found that using SLAM at historical locations enhanced the user experience, which correlates with the findings by Kounavis et al. (2012). The literature gathered suggests that there is a pattern of the experience of those visiting POI having enhanced experiences due to AR.

## 2.3 AR and cultural heritage

Reviewing the literature has outlined uses of AR, and Khan et al. (2019) discuss AR as having a positive impact on education, precisely how this can motivate students to learn about history and heritage as well as the method by which learning materials are provided. This literature aids in forming an understanding of users' perceptions when using AR at sites of historical relevance. Furthermore, AR also allows users to view elements they would not be able to visualise in the real world and create unique experiences (Khan et al.,2019). This links to the research as the objective is

to provide experiences to cyclists visiting cultural heritage sites. Azuma (1997) published literature outlining several typical AR applications, including educational, medical and entertainment. However, the study was published in 1997 and, therefore, may not be an accurate representation of the current capabilities of AR. Reviewing the existing literature around AR and tourism has identified the most common types of AR as marker less, marker-based, and location-based. Kounavis et al. (2012) discuss the different uses of AR for those travelling to new cities or countries. The literature reports that AR is proven to enhance the experience of tourists by educating them and providing entertainment at POI (Kounavis et al., 2012). The literature effectively outlines the positive impact that AR can have on the user experience (Kounavis et al., 2012). The source concluded that AR would substantially impact businesses' success in the tourism industry, as it provides significant resources that may increase with the advances in mobile technology (Kounavis et al., 2012). This links to the study presented in this paper as one of the main focuses are to determine whether AR can positively impact those visiting cultural heritage sites. Additionally, Kounavis et al. (2012) report that AR can risk 'Information overload' if not designed correctly. This relates to literature by (Browne and Rogich, 2001), who state that new systems and applications often fail when requirements are not properly gathered beforehand. Which further illustrates the importance of understand the user's needs when taking a UCD approach.

An AR application called EduPark, by Pombo and Marques (2017), investigated the impact marker-based AR can have on young people visiting urban parks. The research involved using markers around the park at POI that would display quizzes and information books after scanning the marker using their device's camera (Pombo and Marques., 2017). This links to the project as it involves visiting POI to gather information. However, the quizzes and information on the EduPark platform were science-based rather than history-based (Pombo and Marques., 2017). Pombo and Marques (2017) discussed that the study was successful because of the users' engagement with the games involved. The study in the literature showed that one of the main challenges of AR currently is usability, whereas marker based is shown in the research as a form of AR that is easier to use as the

technology needs a smartphone camera and a pre-existing marker created by the developer (Pombo and Marques.,2017).

Research into the existing literature has outlined that immersion and presence are key factors that can positively impact the user experience. Richey (2018) defines presence as the ‘feeling of being in a place’ caused by technology and explains that presence can be increased through several factors such as high-fidelity models creating a believable virtual environment. This source found that presence positively impacted the user's ability to learn and accept information, and presence is argued to be more effective with AR due to the blending of 3D models and the environment (Richey, 2018).

## 2.4 AR and cycling

Lumsdon (2000) defines cycle tourism as the connection between transport by bike and visiting tourist locations and expands upon the benefits of cycle tourism by suggesting that it increases visitation at POI. With the user experience of cyclists being at the forefront of the study outlined in the paper, it is essential to collect literature that evaluates the trends of cyclists visiting POI and their typical behaviour. Ginters (2019) conducted a study that focused on how AR can be used to improve the quality of cyclists’ experience. However, there was a limitation to the relevance of this study as the focus was on wearable technology that can leverage AR and not necessarily mobile phones. Despite this drawback, essential conclusions can be drawn from the literature. Ginters (2019) found that cyclists still have a positive outlook towards AR and a willingness to accept the technology, therefore having a positive experience on their journey. Additionally, the source outlines some key factors that can impact the effectiveness of AR, such as the device's capabilities. They found that the device's battery and weight impact useability (Ginters.,2019). As mentioned previously, one of the more researched uses of AR in the context of cycling is its impact on navigation and real-time information to improve safety on routes. One researched topic for cyclists and AR is technology's impact on

safety. According to Guo et al. (2021), a considerable percentage of cycle accidents are caused by distracted cyclists and drivers. The study shows that most participants believe that AR applications should not be used while cycling due to health and safety risks (Guo et al.,2021). This has influenced the study described in this paper as all safety hazards must be outlined before participants can be recruited. It is essential to understand the literature that discusses typical cyclist behaviour so that experiences can be built around the users' needs and the appropriate questions can be asked in this study. As stated previously, it is essential to gain a background into cyclists visiting points of interest and the demographics. One way to gather this information is by reading and evaluating statistics compiled by organisations such as Cycling UK (2021). This study suggested that tourism and education are two driving motivators for cyclists planning their routes, thus aiding this research and supporting the purpose of the study presented in this thesis (Cycling UK.,2021). Cyclist behaviour is further outlined by a study conducted by Shaker and Hermans (2021), who discusses the behaviour of cyclists visiting national parks in the UK (United Kingdom). Shaker and Hermans (2021) explain that individuals are more likely to go to POI on their bikes if they are connected well via a cycle route. Since the routes used by Visit Lincoln are established bicycle routes, it can be assumed that participants may be more inclined to cycle between the POI. To accommodate cyclists' diverse needs and behaviours, Visit Lincoln has designed routes that vary in length and difficulty, which means that AR can be applied to both experienced and casual cyclists. Literature supports the idea that POI can motivate cyclists on their routes, and there is an interest in visiting them (Shaker and Hermans, 2021). By gathering literature that outlines cyclist behaviour, a more informed design could be conducted to ensure that the artefact is created with the usability of cyclists rather than standard tourists.

There is limited research regarding the percentage of cyclists participating in tourism / cultural heritage-related activities whilst on their route. This argues that a requirement elicitation may be suitable to bridge the gap (Han et al.,2014). According to Cycling UK (2021), cycling has increased by 22% in Outer London since 2019, indicating that it is getting more popular. As a result, there may

be a rise in biking for tourism. However, the usefulness of this source can be viewed as limited because it does not address the behaviour of cyclists in Lincoln.

Additionally, it is crucial to understand the number of individuals who own smartphone devices capable of AR. There has been a wide range of research conducted around this. For instance, Berenguer et al. (2016) report that more than 61% of adults in the UK owned smartphones in 2016, and it may be claimed that this increase may indirectly affect the number of people using electronics while bicycling. As discussed earlier, Ginters (2019) conducted a study that asked participants if AR could improve their cycling experience. This involved using AR glasses instead of mobile phones, leading to overall negative feedback towards the glasses due to the price and inconvenience of wearing them (Ginters.,2019). However, they found that when asked, the participants stated that they felt optimistic about the functionality of AR features (Ginters,2019).

According to published research, more people are using cycling applications, which is corroborated by Strava Year in Sport 2021 report (2021), stating that the application Strava has had an increase in users from 72 million to 95 million. These statistics show an increase in familiarity with mobile technology to improve the cycling experience. As a result, existing studies deduce that cycling-related research can have wider target groups that include both genders and a wide age range, as sources showed that cycling is experienced at least once a week by ages 18 to 55 (Cycling UK.,2021).

## 2.5 Further concepts

Reviewing the literature has outlined existing motivational theories, such as the nudge theory and the self-determination theory (SDT) (Okeke et al.,2018; Moreno et al., 2010). Okeke et al. (2019) define nudging as an intervention that leads people in a particular direction without taking away their ability to make a key decision. By applying the theory to the study detailed in this thesis, the user could be encouraged to engage with the functions of the application by simply sending notifications that they are approaching a POI. Moreno et al. (2010) define SDT as a motivation framework that identifies factors that can improve users' determination to take part in activities and discusses that factors such

as engagement and enjoyment can be effective in motivating the user. This relates the study presented in this thesis as AR can be utilised to enhance engagement and inspire a broader range of cyclists to participate in the activity. Research has been conducted into tourist behaviour when using AR applications at cultural heritage sites. Chung et al. (2015) found that AR was well received amongst participants and found minimal usability issues due to its visual appeal. This can inform the assumption that cyclists visiting points of interest may feel engaged with an AR application.

Deterding et al. (2011) propose that the definition of gamification is the use of game design elements in non-game contexts. This relates to the nature of the artefact, as it is primarily a cycling app aimed at visiting cultural heritage sites that leverages AR. A considerable amount of literature focuses on gamification and AR in the context of cultural heritage. This allows for a better understanding of the importance of gamification on the user experience. Deterding et al. (2011) discuss the impact of 'playfulness' in applications and state that it is seen as a desirable user experience. A connection can be found between this, and the research proposed in this paper, as it explores the impact of potentially gamified AR on the user's experience when viewing cultural heritage sites. Distinguishing between the positive effects of AR and gamification allows for a more detailed understanding of the benefits the technology can provide.

Navarro et al. (2013) conducted a study investigating how mobile devices can make cycling more appealing. Although it lacks any mention of tourism and cultural heritage sites, it considers the features that can heavily impact the user experience (Navarro et al., 2013). The surveys that were conducted showed that 60% of participants found cycling more appealing if the experience was more gamified and provided rewards (Navarro et al., 2013). This relates closely to the artefact as gamification can be used with AR to deliver a better user experience. Navarro et al. (2013) also discuss that participants felt that if a reward were given to cyclists, there would be a much higher chance of retaining users. This could be implemented in the artefact by using 3D models to give a more engaging experience for all ages, rather than just using text to describe the history of a location.



This piece of literature has shown the knowledge gap between cycling and tourism in the context of AR.

Another area to consider is the importance of GPS-focused applications within the tourism industry (Hawkinson.,2018). Hawkinson (2018) discusses this and the prevalence of GPS features in new mobile games. Hawkinson (2018) debates how GPS can be utilised in a way that leverages AR for tourism applications, expanding by discussing popular applications such as Pokémon GO which is an example of using AR and GPS data in games. Pokémon GO centres around visiting real locations and experiencing AR.

## 2.6 Data collection and analysis methodologies

Existing literature on AR and UX for tourism has outlined key methodologies that allow for effective analysis of the impact it can have. Han et al. (2014) used the thematic analysis methodology to evaluate the data from interviews and argue that this method effectively presents and interprets the study laid out in this paper's findings. Braun and Clarke (2021) define thematic analysis as a method for developing, analysing, and interpreting patterns in a qualitative dataset, which can be considered a fundamental methodology when evaluating qualitative data. In earlier publications, Braun and Clarke (2012) highlight the types of qualitative analysis that can be conducted in a study, specifically mentioning a deductive or inductive approach. It is further explained that deductive thematic analysis involves generating themes from data with predetermined assumptions, and inductive thematic analysis does not include assumptions (Braun and Clarke.,2012). An inductive approach correlates with reason to conduct a requirement elicitation, as the researcher may not have an assumption beforehand of the user requirements (Braun and Clarke.,2012; Browne and Rogich, 2001)

Another methodology outlined by existing research is the user requirement gathering process, especially for UCD. Haumer et al. (1998) define requirement gathering as the definition of requirements for a future system at a conceptual level. Han et al. (2014) suggest that user requirement

elicitation is important to developing an AR application and understanding what can make it successful. However, the source discusses a gap in academic literature regarding user requirements for AR as it is still considered an innovative technology. As a result, Han et al. (2014) decided to elicit their user requirements from semi structured interviews that asked what the users would expect from an AR tourism application. Existing literature is fundamental in determining how data will be analysed. Braun and Clarke (2012) define thematic analysis as a suitable methodology for analysing qualitative data. Other academic sources which were gathered used different methodologies of obtaining data from participants, which allowed for an understanding of various insights into how the research goals and objectives could be achieved and which could be the most efficient. Vredenburg et al. (2002) discuss using questionnaires to gather qualitative data to answer the question of how important user-centred design can be to the development of an application. This journal used a questionnaire to collect qualitative data and identify how practical a UCD approach could be. Comparing different pieces of literature that use various methodologies in their studies is advantageous, as it gives an insight into what benefits the methodology provides. Considering the data, qualitative and quantitative research should be considered, such as the collection of metric data (Han et al., 2016). Overall, it was noted that collecting analytics is an effective way to analyse user behaviour when using the application (Han et al., 2016). Han et al. (2016) also explains the impact analytics gathering can have on understanding elements such as usability and UX but also behaviour.

An additional data gathering methodology is observing participants. Mulhall (2003) defines observation as entering the field without any predetermined notions towards the product and observing participant behaviour, outlining the benefits by discussing the ability to observe raw reactions towards the product, and getting an accurate representation of the user experience.

Collecting literature allowed for comparing different methodologies, which led to evaluating which methodologies were successful. Reviewing the literature permitted the evaluation of which strategies are the most popular among similar types of research and which are industry standards. For example,

Braun and Clarke (2012) had been cited by several other research papers and thematic analysis was proven to be an effective way to analyse qualitative data (Perannagari and Chakrabarti, 2019).

## 2.7 User Experience and User Centred Design

Unger and Chandler (2012) define UX as creating and synchronising elements that can influence the experience of a user. This establishes a connection to the research since it is integral to the study laid out in this thesis' success that the participants do not feel negative about the application for reasons other than the AR (Unger and Chandler.,2012). Therefore, it is essential to consider that the general usability of the application is up to an acceptable standard. It is fundamental to ensure that elements such as the user interface and functionality are well received by participants, as this could negatively impact their perception of the AR features and thus invalidate the data (Pratama and Cahyadi, 2020).

Norman (2013) outlines the significance of UCD and its effectiveness in following the core design principles; Use both knowledge in the world and knowledge in the head, simplify the structure of tasks and making things visible. These principles outlined gives a standard guideline to follow when using participant feedback to influence the design of the product (Norman.,2013).

Before the artefact's design can be initiated, an understanding of UX principles and the commonly used methodologies should be considered. The literature allowed for the development of these design skills, as well as identifying the most useful methodologies. For example, a key design method highlighted by Rosson et al. (2009) is the scenario-based design method, enabling rapid communication about the possible usage of the application. Literature by Merritt and Zhao (2021) discusses UX design's importance and its relevance to UCD. This literature is beneficial to building the knowledge of principles and looking at UX design in more depth. For example, this source advises on the five planes of UX design, with the surface plane being the first, including what the user can visualise when interacting with the experience (Merrit and Zhao.,2021). This report also discusses

how important the surface plane is as it will be the user's first impression of the artefact (Merrit and Zhao.,2021).

The existence of literature regarding UX will inform the methodologies used to design the artefact.

Mood boards, for instance, are an often-discussed design methodology, according to Rieuf et al.

(2017), who define mood boards as an effective way to design in the inspiration phase. Reviewing the relevant literature that outlines design methods allows for the design of an artefact that can elicit important feedback from participants (Rieuf et al.,2017)

Keating et al. (2011) define a challenge when designing AR experiences as the need for the AR to be location specific, which suggests that the 3D model or asset shown in the camera view should fit the context of the environment to have a positive impact on UX. Keating et al. (2011) further discuss applicable design methodologies to achieve a positive UX, such as paper prototyping is an essential way to rapidly design the app features and define the methodology as a powerful tool for exploring ideas before the technical implementation stage. The source relates to both UX and AR design, and the concepts discussed in the literature are still relevant to the design of current AR applications (Keating et al.,2011). To support the success of the artefact, the researcher should consider designing the artefact around the opinions of potential users.

Collecting literature that best identifies UCD approaches could also be helpful towards the success of the study investigated in this document. Keating et al. (2011) also discussed the impact of user testing as a method of UCD and tested a mobile AR application in an outdoor environment to gather the data. It was also essential to identify the potential disadvantages of UCD, which was discussed by Williams et al. (2020). This source explains that UCD was found to provide feedback from the user that they want a fully functional application without issues, which is proven unrealistic, especially when designing a prototype (Williams et al.,2020). This shows a disadvantage of testing those who do not have experience with developing software. Considering this approach's drawbacks is helpful (Williams et al.,2020). However, UCD was shown to be an effective method for receiving feedback that could improve the UX of the artefact (Williams et al.,2020). Williams et al. (2020) also found that

the UCD approach helped quantify the application's usability, which could prove helpful in the requirements gathering as usability can be considered key when aiming for a positive UX.

## 2.8 Conclusion

In summary, the literature has highlighted a trend amongst researchers to explore AR in the context of tourism and the impact it can have on user experience. As mentioned previously, AR applications were tested, and the findings suggest that AR has positively impacted the tourist's experience (Han et al., 2016). In addition, the literature review demonstrated current trends in cyclist behaviours that can be expected when testing an AR application. The current state of relevant literature shows that UX is an important aspect when considering using AR to enhance an experience.

With any literature, disadvantages can be identified, such as the date it was published and evaluating the relevance to the project. A benefit of focusing on AR is that it is a developing technology with regular research. This is corroborated by data from Datapro (2022), which reports that the expected AR market value will rise to \$50 billion by 2024. As design principles are consistently updated, it is essential that the literature provided is up to date and reflects the new requirements.

Despite existing literature on AR, there is a gap in the research that explores AR in the context of cycling and tourism. This provides further justification for the research, as shown in the previously mentioned literature. Tourism is one of the key motivators for cyclists (Cycling UK, 2021). In the future, it would be beneficial to see research conducted that focuses on the experience of cyclists or those using another mode of transport in the context of AR. This research links closely to the literature reviewed, as UX design and UCD are a large aspect of the study evaluated in this document, and the findings should highlight what factors can impact cyclists' UX. The research will hopefully provide a new perspective on designing AR applications and the successful type of AR. Additionally, the research will provide insight into which methodologies were used in gathering the data and how they impacted this study's outcome, which could influence future projects and the methodologies that will be adopted.

## 3 The Study

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### 3.1 PROJECT PLANNING

A key project management methodology needed to be identified before conducting the study displayed in this thesis. Several methodologies were considered, all of which had their positives and negatives. An agile approach had been decided as the most suitable option due to the longevity of the project and the potential need for adaptation later (Moniruzzaman and Hossain, 2013). Moniruzzaman and Hossain (2013) state that an Agile methodology can be beneficial to the project's pace and flow, explaining that Agile allows for a non-linear approach to project management. Therefore, more flexibility is allowed if a previously completed milestone needs to be revisited (Moniruzzaman and Hossain.,2013). This was advantageous as it permitted more than one milestone to be worked on at a time, thus not limiting productivity. Due to the pandemic, delays were prevalent in the project, including difficulty recruiting participants or personal situations, which delayed the timeline that goals were met. Agile allowed for the rearranging and restructuring of when tasks should be completed.

One of the first stages before starting the research project was to produce a plan. The project plan enabled access to guidelines and referred to any deadlines or targets throughout the project. The first method of project planning was to produce a project brief. This document outlines the goals and objectives of the project, identifies the demographics, and provides a brief of the research topic. The project brief influenced the research as it allowed for research questions to be developed. It also allowed the researcher to refer to the plan when a new stage would start, and the ideas outlined briefly could contribute to the research. The importance of creating a project plan is evidenced by Quist (2015), who discusses that a project plan supports the research development.

Secondly, a risk assessment needs to be conducted to determine the potential issues experienced within the main study. This is in addition to the health and safety risk assessment, which needs to be completed with the ethics application. It included risks such as failure to meet deadlines and not to recruit enough participants. Outlining these issues has allowed for preparation to mitigate the risks or reduce the impact they could have on the research laid out in this thesis. For example, deadlines were missed throughout the project due to personal circumstances

and the effects of the current global pandemic. However, due to these mitigations, these setbacks could be addressed. One of the mitigations to solve a lack of participants was expanding the search and contacting a broader demographic of cyclists. Producing a risk assessment matrix was advantageous to this research as some risks are more likely to occur than others, and having contingencies allows for the research to continue.

An additional methodology that was used in the planning process was the development of a Gantt chart. Wilson (2003) defines the use of the Gantt chart as an effective way to manage and schedule projects. This method was chosen for project planning because it was used previously, and therefore there was an existing experience with it. This meant a more robust understanding of its advantages and the format most suited to developing the Gantt chart. One of the main advantages of using a Gantt chart is its flexibility when missing deadlines. If a deadline is missed, it can be adjusted accordingly, and the entire scope of the project can still be viewed. It also allows for the planning of tasks to be completed simultaneously and keeping track of the progress made on each task.

### 3.2 Study 1 – Requirement elicitation

The purpose of the requirement elicitation was to engage with potential users of the application that meet the demographic and perform a requirement elicitation, which follows the UCD approach. This ensures that the artefact is developed with the user in mind and can make more effort to ensure that the experience matches their needs. As mentioned previously, it is important not to invalidate data by testing a product that will negatively impact the user's experience for reasons other than the AR experience, such as poor UI. Khan et al. (2020) defines requirement elicitation as the key to success when developing any system.

The requirements elicitation involved contacting cyclists who cycle over twenty miles a week. The recruitment range was between six and ten, as Fugard and Potts (2015) recommends this number of participants for smaller projects. The chosen number was also more achievable and allowed for the tasks to be completed in line with the project plan. The methodology for selecting the appropriate participants involved assessing the most suitable demographic, such as those who cycle a certain number of hours per week. Cycling UK (2021) suggests that the

most popular age groups can range between 16 and 64. However, for the research and ethical approval, the demographic has been limited to those over 18 years old.

### 3.2.1 Participant Recruitment

Several methodologies for recruiting participants were considered, such as advertising on social media. Frandsen and Ferguson (2014) suggest that online study advertisement is more effective than traditional methodologies, discussing that the increasing number of users on websites such as 'Facebook' directly impacts the success of study advertisements. Compared to other methods, such as advertising on non-social media platforms, there can be high costs to consider. At the same time, Dworkin et al. (2016) suggests that social media sites are more successful than other strategies due to the larger demographic that they can reach. This supports the findings in the research as a broader range of participants was gathered. A benefit of social media advertising was using the platform's tools to create a visually appealing advertisement. This is further demonstrated by Thompson et al. (2008), who state that the tools provided by social media can improve usability and other UX issues. Thus, there could be a positive correlation between posting the adverts on social media and the number of participants.

Participant recruitment was achieved by emailing popular cycling clubs in Lincoln and several Facebook pages. This was one of the most effective recruitment methods, as responses were prompt. One concern was a lack of communication between the admins and managers of the Lincoln Facebook groups. This was mitigated by expanding the search for participant recruitment to a national scale. The reason was that the requirement elicitation was not dependent on the participant living in Lincoln, only that they use technology and cycle more than twenty miles a week. The posts on the Facebook groups led to individuals contacting the researcher to express their interest in this study. They were then sent the participant information sheet, and if they agreed to the research and their responsibilities, they signed a consent form. Once consent had been obtained, semi-structured interviews took place.

Due to the pandemic, there were difficulties with obtaining participants. Six participants were interviewed and transcribed, and the data was then thematically analysed. Initially, more participants were recruited; however, issues



with consent forms not being filled out promptly arose. This led to the affected participants being removed from the sample groups to avoid ethical problems and data being collected without consent.

### 3.2.2 Semi-Structured Interviews

According to Khan et al. (2020), the requirement-gathering methodology can be separated into two categories. Direct approaches include structured and semi-structured interviews, case studies and prototyping. The second is an indirect approach involving methods such as questionnaires and surveys (Khan et al.,2020). It was decided that a direct approach would best suit the scope of the project. Before the recruitment could commence, the method of gathering data had to be found. Several methods were considered, such as questionnaires. It was later discovered that semi-structured interviews would be the most effective way to gather the data. As discussed by Pathak and Intratat (2012) this is an impactful way to collect qualitative data. The best way to achieve this is to ask the participant broader questions that allow for conversations. It was found that semi-structured interviews allow for more flexible questions to be asked to gather more useful data if needed. Khan et al. (2020) explains that requirement-gathering techniques such as semi-structured interviews are a legitimate method of collecting direct requirements.

The questions were designed once the methodology had been decided. The most appropriate way to plan these questions was to word them comprehensively and then ask sub-questions that would follow up on important points depending on the participant's response. This interview style was most effective in ensuring that there were no one-word answers, as these can often cause difficulties when producing themes.

The meetings were recorded with the participant's consent and then transcribed. Although Microsoft Teams feature its transcription service, it was found to be inaccurate mainly if the participant spoke inaudibly. This was mitigated by watching recordings, cross-referencing what was being said with what Teams interpreted, and

making changes accordingly. One of the impacts this had on the research was the time it took to transcribe the interviews accurately; however, this ensured the data was accurate and valid.

### 3.2.3 Thematic Analysis

It was decided that thematic analysis would be the primary methodology for analysing the data in the requirements gathering. More specifically, the inductive approach was the most suitable research type. Since the study in this thesis is explorative, it is important not to have any preconceptions of the data before analysing as this could impact the conclusion of the results. Once the interviews had been conducted, the recordings were transcribed automatically and analysed to ensure that the transcription was accurate. Using guidelines set by Braun and Clarke (2021), the thematic analysis could be initialised. The first step was to code the transcriptions and give each important phrase or term a code that would have significance to the user requirement. Using NVIVO to code the data was helpful to the research due to the number of tools and functionality the platform provides. Once the data had been highlighted to be coded, the phrase was given a keyword or identifier. Coding phrases through coding made comparing all the simplified codes more straightforward and determining a pattern easier. After every relevant phrase had been coded, those related to one another would be grouped to generate a theme. Once the data had been coded, the next step was to look through the codes and search for themes that might be appearing. NVIVO was an invaluable tool for this as it made grouping codes together far easier. The choice was made to do this manually rather than NVIVO's automatic coding function as this would mitigate the risk of erroneous data and mistakes in the themes. Once the themes were found, a codebook was produced that allowed themes and sub-themes to be given a description providing details and their meanings.

Thematic analysis was impactful to the evaluation of the user requirement elicitation since it has enabled the detailed analysis of data gathered during the interviews. Other methodologies for analysing qualitative data were considered, such as discourse analysis (Atkinson et al., 2000). However, thematic analysis is more suitable since

it focuses more on concise and exact findings, while the discourse method focuses more on how participants converse with each other and not the substance of what they discuss (Braun and Clarke.,2021; Atkinson et al.,2000). An additional methodology compared was the narrative analysis, which involves analysing stories told by participants (Franzosi., 1998). However, this is limited as it restricts the ability to compare datasets and makes a distinct observation from the results (Franzosi., 1998). According to Khan et al. (2020), there are still drawbacks that need to be considered with using the thematic analysis approach, such as the need for it to be appropriately conducted; otherwise, codes can be formed inaccurately. It is helpful to outline the potential pitfalls of the methodology as it allows for the mitigation of the issues outlined. To ensure that the thematic analysis is being conducted properly, guides have been followed step by step to guarantee that everything is done up to standard (Braun and Clarke.,2021).

### 3.2.4 Results of the first study

#### Thematic analysis

Theme	Sub-themes	Notable codes
Cycling Purposes	<ul style="list-style-type: none"> <li>- Health &amp; Recreational cycling</li> <li>- Explorative cycling</li> </ul>	<p><i>'Cycling as an escape'.</i></p> <p><i>'Cycling for fitness and pleasure'.</i></p> <p><i>'Takes more breaks depending on energy burned'.</i></p>
Local information gathering	<ul style="list-style-type: none"> <li>- Interest towards history and historical sites</li> </ul>	<p><i>'Willingness to deviate based on the information about a POI as it is being passed'.</i></p> <p><i>'They use google to find out information as they enjoy information on demand'.</i></p> <p><i>'Key facts shown and not lots of text'.</i></p>
Social Cycling	<ul style="list-style-type: none"> <li>- Social functionality for cycling apps</li> <li>- Differences in social cycling</li> </ul>	<p><i>'Enjoy when applications allow friends to interact and be social'.</i></p> <p><i>'Breaks are usually longer with a group'.</i></p> <p><i>'Back at uni I would go cycling with my housemate most of the time and we just you know,</i></p>
Cycle Safety		<ul style="list-style-type: none"> <li>- <i>'Typically does offroad routes'.</i></li> <li>- <i>'Follows national cycle routes'.</i></li> </ul>

		<ul style="list-style-type: none"> <li>- <i>'I wouldn't be able to wear a headset and listen to music'.</i></li> </ul>
Gamification	<ul style="list-style-type: none"> <li>- Gamification Benefits</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'Rewarding users with awards or badges benefits the experience'.</i></li> <li>- <i>'Gamification can make any activity more enjoyable'.</i></li> </ul>
Visual information	<ul style="list-style-type: none"> <li>- Interest in scenery and viewpoints</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'They find visuals much more engaging than text'.</i></li> <li>- <i>'Interested in visiting rivers and waterways'.</i></li> <li>- <i>'Attracted to areas that are pretty'.</i></li> </ul>
Technology	<ul style="list-style-type: none"> <li>- Importance of accessibility</li> <li>- Technology with cycling</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'They have used AR in the past to view nearby locations.'</i></li> <li>- <i>'They enjoy using AR to visualise objects in their space'.</i></li> <li>- <i>'A drawback of using applications is the battery draining'.</i></li> </ul>

Table 1 Thematic analysis of requirement elicitation

### Cycling purposes

This theme discusses the participants reasons for cycling. The significance of this theme is that it indicates that there is more than one reason to consider cycling. Sub-themes have also been formed that outline these reasons. This sub-theme appeared, with quotes such as *'Cycling for fitness and pleasure'* highlighting some of the main

motivations when choosing to cycle as well as the motivation to explore being explained in quotes like *'If it's something I haven't seen before or if it's anything that's new or you know'*.

The theme additionally shows the participant's willingness to stop on their route. The sub-theme was a collection of reasons for stopping, such as to regain energy as mentioned in the quote. In contrast to this, the sub-theme also displays that the codes that created this theme suggest cyclists are motivated to explore and visit POI on their routes.

### **Local information gathering**

This theme shows a pattern in the cyclist's opinion towards information gathered at points of interest on their routes. Methods of gathering information at these sites were mentioned in the interviews. The theme also includes the user's interest in reading information boards which they notice on their journey. Codes such as *'Key facts shown and not lots of text'* indicates that users prefer the information to be more condensed on their journey.

The sub-theme suggests an interest in the history of bike routes' locations and the cyclist's motivation to learn more about the background of the location. Specific quotes reference Lincoln's history and heritage and outline some of the specific eras that the participants were interested in such as *'being an air base, but you know, I'm planning in the future at some point'*.

### **Social Cycling**

A theme formed that displayed a preference towards social networking features in their cycling applications. The theme suggests that the inclusion and implementation of these features can impact the UX. The theme shapes ways that these features can be implemented, such as allowing users to share their experiences and comparing journeys with others. The sub-theme demonstrates a change in attitude towards cycling as a group compared to cycling as a solo activity for example, the purpose of cycling solo tends to be different to cycling as a group. Codes explain the behaviour of cyclists when in groups and could predict how users will engage with the application if they are within a group. This is supported by the code *"Breaks are usually longer with a group"*. The codes present a preference for cycling in a group when the reason is for leisure and exploration. This theme and its codes emphasise the aspects

of social cycling and the positive impact it can have on their experience. Which is further shown in the quote *'Back at uni I would go cycling with my housemate most of the time and we just you know, just talk the whole time'* which implies that being able to share the experience with someone, can enhance it.

## **Cycle Safety**

The formation of this theme suggests that safety is one of the most important factors to consider when designing the application, as it can significantly impact the user experience if they feel the journey is unsafe. The codes also summarise cyclist behaviour in the context of safety. This theme will directly impact the way in which the users are expected to behave when using the application and will guide the development to not include any interactivity that can happen whilst the user is cycling. Quotes such as *'Follows national cycle routes'* suggest that it is important to follow established routes as this could avoid hazards. Additionally, the need to reduce distractions while cycling is essential as explained in the quote *'I wouldn't be able to wear a headset and listen to music'*.

## **Gamification**

A theme emerged from the codes that show a preference for game features in their cycling applications. Codes in this theme also highlight the specific game features that the participants feel favourably towards. Examples that were discussed were score systems or the ability to compete with friends and share progress. These will all be considered when designing the artefact. The sub-theme shows an understanding amongst participants of how game mechanics in their used application can add to their overall experience. As supported by the code *'Gamification can make any activity more enjoyable'* and the quote *'I personally I would like that kind of gamified thing'*.

## **Visual Information:**

Several participants explained that they prefer to learn information visually rather than textually. Features such as 3D models and animations were mentioned as tools for displaying information. The quote *'much more engaging'*

*than just blocks and blocks of text*' displays a positive outlook to this feature.

This theme highlights a pattern amongst the participants that shows the impact the scenery and viewpoints can have on the journey and the code *'Attracted to areas that are pretty'* shows a positive opinion to visually pleasing environments.

### **Technology:**

There was a clear pattern when analysing the data that technology and mobile applications play a part in the cycling experience, whether for navigation purposes or keeping track of fitness and health or tourism as shown by quote *'the phone for navigation because using the phone for navigation is great'*. The theme showcased that technology in cycling is prevalent, suggesting that participants know what makes these applications more successful and improves UX. Sub-themes were formed from codes that discuss the need for accessibility in mobile applications to have a positive experience. For example, according to the codes participants prefer applications that will not reduce the battery. Ease of use is also identified as a driving factor when impacting UX.

The codes formed a pattern highlighting the advantages of using mobile applications while cycling, such as aiding navigation and finding POI. It is also shown in the sub-themes that technology could be seen as having a direct impact on the experience of users. Quotes mention existing applications that are used for cycling such as *'Strava is the one I used'*.



### 3.3 DESIGNING THE ARTEFACT

The design stage was a considerable task as ensuring that the methodology used was industry standard would have a lasting effect on the success of the second study. The goal of the design phase was to implement the requirements outlined in the analysis of the interviews and present them in suitable ways. A design document was created to compile all this work to organise the design techniques; further design procedures can be found in the appendices. Several methodologies were used in this process, showing the progress made in developing the artefact. The design choices needed to come straight from the user's feedback as this would allow for the testing phase to be conducted more accurately, providing more useful data. UX and UCD directly impact the chosen methodologies.

Another useful methodology for the design process was user scenarios/personas. Using personas for the design can be especially useful for deciding the demographic and predicting potential research responses (Chang et al., 2008). However, Chang et al. (2008) concluded that this methodology was not always effective since the personas would often reflect the researcher's thoughts and opinions.

#### 3.3.1 Influence from the requirement elicitation

The requirement elicitation highlighted that several aspects of AR in the context of education could be implemented in the artefact. For example, participants mentioned that they often enjoyed reading information about the point of interest they are currently visiting. This requirement to be able to read information on demand led to the idea that the user should be able to be presented with text when they are at the location. Additionally, participants stated that they wish to learn visually, which could be achieved by producing experiences that offer visual assets and not just text.

The themes had a direct impact on the functionality of the application. For example, "Cycling purposes" identifies that there are several reasons that people cycle for, and the application should be tailored to meet the needs of the

user. Moreover, the sub-theme “Exploration cycling” displayed that users could benefit from the application allowing them to visit locations that they wouldn’t necessarily visit otherwise and aid exploration. One implementation of this requirement was to display a map that would show a description of the upcoming POI and the route to get there, this would aid exploration by making it easier to do so.

Additionally, the theme “local information gathering” meant that users had previous experience with gaining knowledge about a POI on their bike route – whether it be through physical information boards or googling the location after. This influenced design as it made the researcher question how information can be displayed to the user and how the application can streamline the previously mentioned methods of gathering knowledge. This led to the creation of the marker-based experience, where users are presented with a virtual information board.

The theme “Visual information” highlighted a requirement that users may feel positively to information being displayed that wasn’t solely text-based and could leverage the nature and environment around them. This led to the consideration of developing two experiences that conformed to this idea, one being the location-based Viking ship and the second being marker less WW1 tank.

A core concept to consider when designing aspects of the application was to make it safe and suitable for cyclists. Which meant that it was a requirement that each experience can only be accessed when the bike is stopped, as well as not requiring too much interaction so that the cycling experience is not detracted from.

### 3.3.2 Sitemap

Newman and Landay (2000) describe site mapping as an effective way to visualise the user experience of navigating a website or mobile application early in its design. This effectively displayed the themes outlined in the analysis of transcripts to the design choices. For example, the thematic analysis showed that participants appreciate a mixture of visual and textual information. This led to the design choice to include several experiences for the participant to test. A site map also effectively displayed the themes and sub-themes to

visualise the analysis and its results. This was beneficial as visualisation made the data easier to reference when designing the artefact.

Experiences and design choices were made easier to develop after looking at the sitemap – since the requirements were grouped together and patterns could be recognised amongst the themes.

### 3.3.3 Mood board

Mood boards effectively collate the designs and colour schemes of existing applications and their features. It was beneficial to gain inspiration from applications with a similar purpose to the artefact to increase this design methodology's efficiency further. Rieuf et al. (2017) explain that mood boards are an essential part of what is known as the inspirational phase of the design process, and the generation phase later follows this. This involves using what has been gathered in the inspiration phase and visualising the effects on the design choices. Several platforms exist that aid in generating mood boards. There were few alternatives to this methodology other than researching existing applications and making textual notes on their key design aspects.

### 3.3.4 Lo-Fi prototyping (Sketching and wireframes)

The first prototyping method was sketching, which involved physically drawing the proposed application using pen and paper. The purpose of this was to gain a visual understanding of what the user will experience, despite this stage not being shared with participants. This involved drawing each experience and feature onto individual pieces of paper, where they were then annotated so that each design choice could be understood and justified. Sketching the design on paper allowed for more freedom as sketches can be drawn far quicker than using programs. This was beneficial as it allowed multiple designs to take place, and different iterations could be created until the main design choices could be decided. This is further discussed by Newman and Landay (2000), who explain that sketching is crucial to the exploration phase of design as it allows for many possibilities to be explored in a low-cost and low-time-consuming matter.

Unger and Chandler (2012) define wireframing as identifying elements that will be displayed on a page or screen. A more advanced wireframe was developed to display in greater detail what the artefact should look like. While sketching is better for quick iterations because it is hand drawn, the choices may not be presented in the most informative way. Platforms such as Adobe XD were used to create a working wireframe that included colours and highly detailed imagery to encapsulate the application's purpose and display what the experiences will look like from the user's perspective. Other platforms, such as Balsamiq, were considered to generate the wireframe; however, the platform was found to have a sketch-like aesthetic. The wireframe was also semi-functional as the buttons could be used to navigate throughout the application as a user would. Wireframing was effective in visualising the high-fidelity prototype (Hi-Fi) before development. As shown by Unger and Chandler (2012), wireframing is an industry standard regarding UX design methodologies; therefore, it was the chosen method for the project. As seen in the sketches and the wireframe – a score counter was initially considered. This was later decided against as it was felt that gamification could be implemented to the experience in different ways, such as collecting AR models to user later similar to existing AR applications like Pokémon Go.

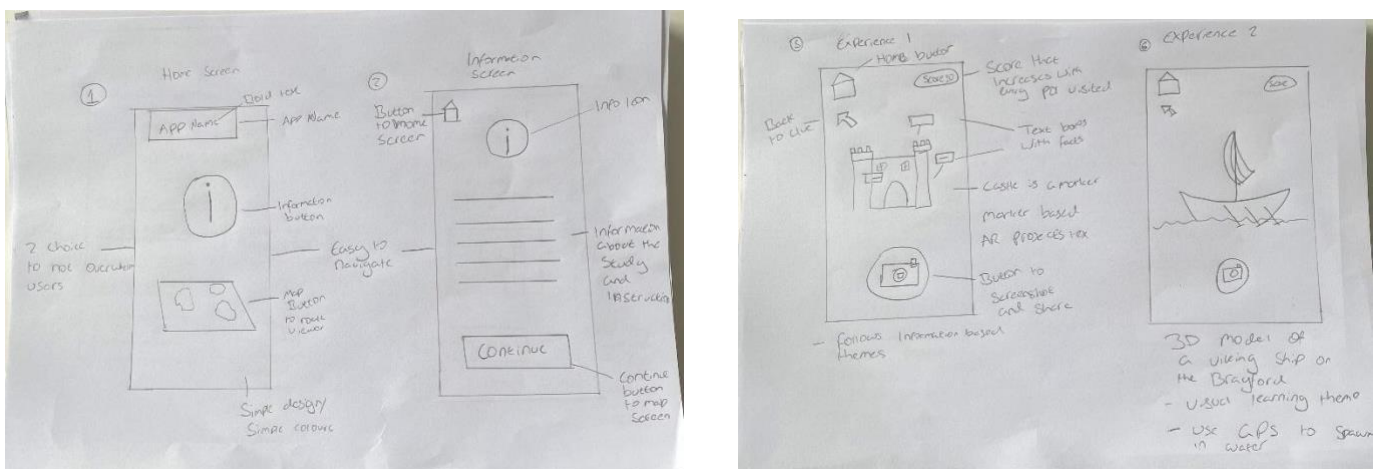


Figure 1 Wire frame

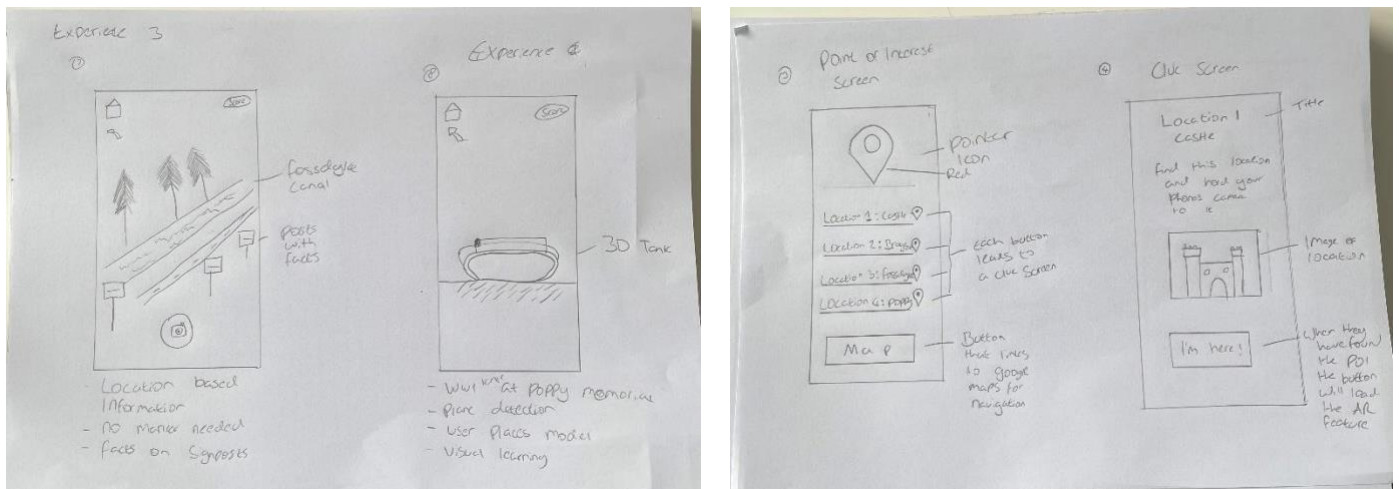


Figure 2 Wireframe

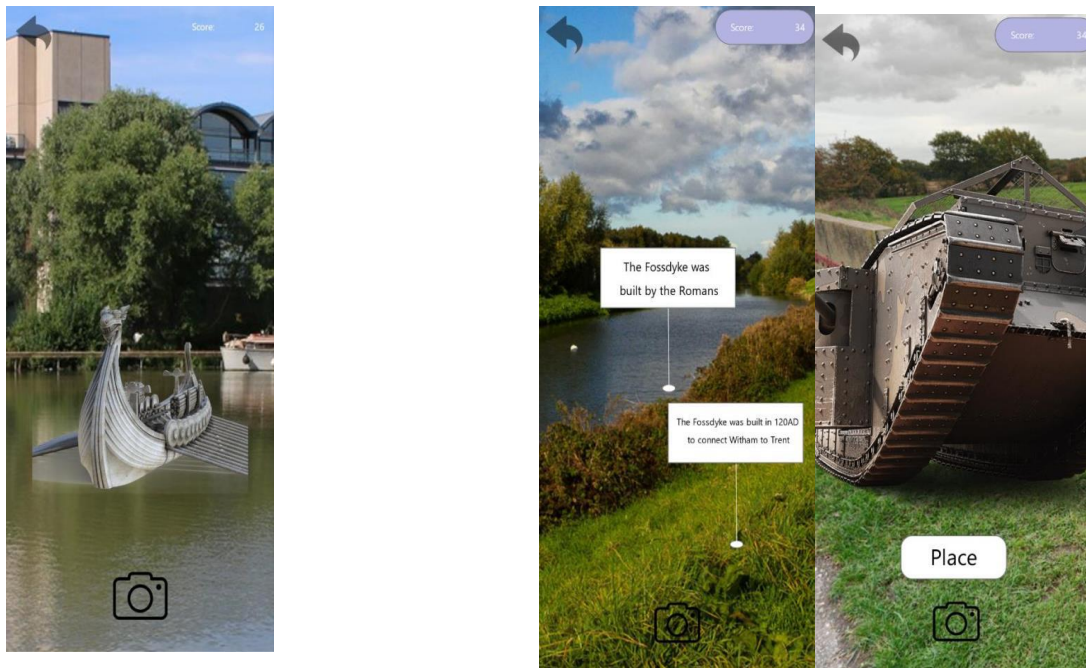


Figure 3 Lo Fi Prototypes

### 3.3.5 Hi-Fi prototyping

To display the design choices derived from the thematic analysis of the requirements gathering, a HiFi prototype was developed to influence the UX of participants testing the application. Hi-Fi prototyping was an effective way to manage the testing process of the research. Developing a prototype in this way can guarantee that the product tested by the participants will have been built with the UX in mind. Babich (2017) explains that Hi-Fi prototyping can give more meaningful feedback in usability testing as the prototype looks and feels like an actual application. The prototype was developed as a whole application; the purpose of this was to ensure that the AR used was created professionally. This was achieved by developing the artefact using Unity, which allowed for programming to be used to go into more detail on the usability and functionality of the artefact and have more freedom with the tools provided.

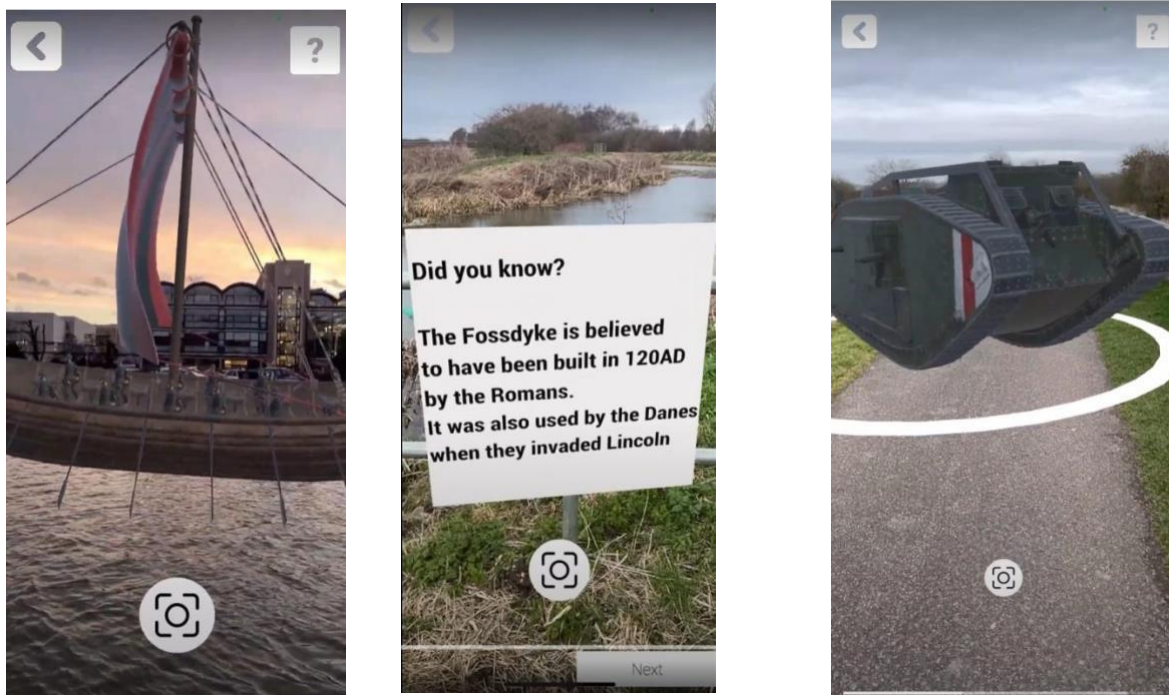


Figure 4 The experiences in the application

The feedback from the interviews informed design choices and allowed for certain aspects of AR to be focused on. AR foundation had been used to develop the application on Unity. AR Foundation was chosen as it allows for cross-platform development. AR Foundation also features several functionalities that have aided the development, such as plane detection and detecting the device's orientation. Developing the application on Unity was beneficial as more effort can be made to make the application look better aesthetically; additionally, Unity allows for development in C#. An iterative development approach was used so that features could be revisited and updated. It was clear that the most efficient way of evaluating the impact of AR on cycling tourists would be developing three different experiences, each portraying a different utilisation of AR. The application featured a map to aid participant navigation. Once each POI is reached, they are given the option to begin the experience and then continue to the following location after. As a result of the types of AR highlighted in the literature review, the first experience featured location-based AR, the second featured marker-based and the third featured plane detection with an interactable model. It was originally designed to have four different experiences; however, it was found that this could overburden the user and harm their experience.

### 3.3.6 Pilot Study

The pilot study involved conducting tests where the data would not contribute to the results in the end and were disregarded. The pilot study was a trial for the main study. It involved the participant participating in the trial study, allowing any bugs or issues with the artefact to be identified. Additionally, the pilot allowed for practising the structure of the tests, such as providing information sheets and consent forms as well as the methods for gathering data. This process influenced the research by allowing the studies to be conducted more accurately and with fewer issues. The pilot studies also informed the iterative design process as the feedback gathered influenced the development of the artefact to ensure that it is useable for the participants.

The pilot study highlighted an issue with the route and the number of POI that could negatively impact the overall user experience. This was due to the route starting at Lincoln cathedral, which can be a difficult location

to reach. This was reflected by feedback from the pilot study; the number of experiences was reduced from four to three.

### 3.4 MAIN STUDY

This study aimed to test the developed prototype using the feedback from the interviews in the requirement elicitation. The main study involved recruiting participants to take part in an hour-long bike ride where they visit three cultural heritage sites (POI) on the route. Each stop featured an experience using a different type of AR at each location. The first stop simulated location-based AR and showed a Viking Longship sailing on the Brayford Wharf. The second stop used marker-based AR to overlay a virtual information board over a marker on the route. The final stop featured Marker less AR, where the user could place a WW1 tank at a war memorial using plane detection. Different AR technologies were used to differentiate the factors that can impact UX.

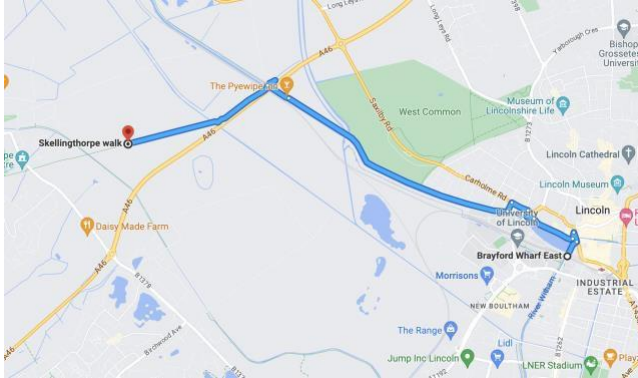
Each study involved two participants taking part in the research at a time to simulate a normal bike journey; the requirements elicitation suggested that cyclists prefer to cycle in groups. The methods used to collect data have been outlined in this section and the benefits they provided to this research. Other methodologies were considered, such as questionnaires given to the participants to fill out after the bike ride. However, it was decided that this could overburden the participants when combined with the hour-long bike ride and a 30-minute semi-structured interview. Therefore, it was decided against as the amount of data gathered from interviews, observations, and metric gathering would be sufficient.

#### 3.4.1 Study set-up

To keep each study consistent, certain factors had to be constant to ensure that patterns can be deduced from the data. For example, all journeys took place along the same route with the exact same stops to visit. As well as all studies taking place in December and January – meaning that the weather conditions were similar across the whole study period. The weather was mostly overcast and sometimes sunny, however studies were organised to avoid bad weather such as rain or ice to avoid injury or negatively impacting the experience. The studies took between 60-90



minutes which included the time it took to interview after the journey and the travel back. All participants used the same mobile device – Motorola G22, in order to replicate the experience for all users.



*Figure 5 Cycle route*

### 3.4.2 Participant recruitment

Since this study featured primary research, it was necessary to recruit participants again. Similar methods such as sharing advertisements on social media were used. However, these methods were not as effective as the first study, since the research involved physically taking part rather than remotely. This led to decreased individuals responding to adverts on sites such as Facebook and its cycling groups. To mitigate the risk of recruiting too few participants, another methodology was achieved to increase the number of participants. A word-of-mouth strategy was adopted, which involved physically speaking to interested parties and them mentioning the research to those individuals who also cycle in their social circle. This method benefited the main study, as participants were recruited quicker, and the research advertisement had more freedom. Additionally, the demographic of participants, was mixed with ages and genders being varied amongst studies. This did not influence the main study as the data gathered was not related to the demographics of participants. The choice to not gather specific information from participants was to keep the study explorative and focused more on the impact of AR.

### 3.4.3 Participant observation

Several methods were used to collect data in the main study, with the first being observations. This involved following participants on their bike rides and being there to observe their behaviour when engaging with the artefact. Mulhall (2003) describes observation as a way to capture data in a more natural environment, which benefits the study in this thesis as the findings could impact the answer to the research question. Mulhall (2003) also discusses the existence of two observation types, structured and unstructured and defines the first as observing behaviour with pre-determined elements in mind. Unstructured is defined as a method with much more freedom, and its purpose is to capture the behaviour and reactions of participants (Mulhall,2003). This was the method adopted in the research as it proved to be more suitable to the theme of this study since it was explorative. This method involved taking notes on the journey that captured key behaviours by the participant. Overall, collecting data through observations has been beneficial for several reasons. One is the ability to support or counter the claims made from the analysis of other data, such as the interviews.

### 3.4.4 Semi-Structured Interviews

Semi-structured interviews were used again to collect the main data since it was decided that the method would be an effective way to gather qualitative data. Understanding the lessons learned in the semi-structured interviews in the requirement elicitation allowed improvements upon elements such as the designing of the interview questions and conducting the interviews. The main difference between these interviews was that the second interviews were conducted in person and were recorded using a mobile recording device which would later be uploaded and transcribed. A notable difference in the main study is that since the interviews were conducted directly after the bike ride, the experiences were still fresh, allowing for more accurate feedback.

The interview questions were designed to be more conversational, as it was felt that this would allow for more diverse and detailed answers from the participants. Alternatively, if the questions were more concise the

feedback could have been less impactful to the study. The interview questions were designed to first ask the user their general opinion on the overall experience. This was then followed by questions that were tailored to gather feedback that was directly linked to each of the three experiences. Participants were also given the opportunity to voice any criticisms or drawbacks of the experiences that they encountered. This made the thematic analysis more effective as a variety of unique codes were drawn from the transcripts.

#### 3.4.5 Metrics gathering and quantitative analysis.

Abu Addous et al. (2022) discuss that analytic gathering as a methodology can gather substantial amounts of data and inform design decisions in the context of UX. Metric data was gathered through the app to gain an additional understanding of the participant's behaviours and feelings towards the application. Several data types were collected, such as the time the user spent in each experience and how many photographs they took. The purpose behind this was to support any arguments made by the thematic analysis of the transcripts. The data would then be analysed using SPSS and LAERD to identify the best analysis method to show the most reliable results. The decided analysis method was the One Way ANOVA with repeated measures, as three groups would be compared to each other.

Laerd (2023), has defined the one way ANOVA method with repeated measures as a suitable strategy for when participants are subjected to 3 or more conditions along the study. This matched the main study presented in this thesis, as the participants tested 3 different experiences and therefore this methodology was most suitable.

A sphericity test was conducted to determine the findings' validity further. Additionally, a pairwise comparison was used to determine where the significance lies, if there is one.

### 3.4.6 Results of the main study

#### **Metric analysis**

Two sets of metric data were taken during the tests; the amount of time spent in an experience and the number of photographs taken. The purpose of recording the time taken for each experience was to quantify which type of AR could be perceived as more engaging and motivational to carry on using it. The reason for recording the photographs taken in an experience was the hope that it would show a pattern of favouritism for a particular type of AR. The methodology of analysing the data was a One-way Anova with repeated measures. LAERD was used to evaluate the methodology that best suited the study presented in this thesis. Please note that the additional tables and graphs that are referenced in this section can be found in the appendices section.

#### **Analysis 1 – Time spent in each experience.**

#### **Hypothesis**

This analysis hypothesises that users will feel more favourably toward interactive experiences. Since the third is the most interactive of the three experiences, it can be assumed that this will have the highest average time spent.

*Table 2 Descriptive statistics for seconds in each experience*

<b>Time in experience(seconds)</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>N</b>
<b>Experience 1</b>	57.42	15.848	12
<b>Experience 2</b>	41.08	20.282	12
<b>Experience 3</b>	62.58	21.857	12

Table 3 Test of within subjects for seconds spent in experience.

		Type 3 sum of squares	df	Mean square	F	Sig.
Time spent in experience (seconds)	Sphericity assumed	3022.889	2	1511.444	3.658	.043
	Greenhouse Geisser	3022.889	1.831	1650.514	3.658	.048
	Huynh-Feldt	3022.889	2.000	1511.444	3.658	.043
	Lower-bound	3022.889	1.000	3022.889	3.658	.082

The results show a higher mean for the third experience as expected, the further analysis of the data shows a significant difference between the values. With a mean of 62.58, the tank experience can be identified as having the most time spent on it. However, the Brayford Viking experience also has a mean of 57.42, potentially showing a positive outlook towards both. The results can be argued as reliable as the data shows that the test of sphericity has not been violated. As indicated in the Greenhouse-Geisser findings and the test of sphericity, the sig(P-value) is lower than 0.05%, showing a statistical significance in the data. This means that the hypothesis may have been successfully met, and the participants' third experience has been statistically proven to have the most time spent in it.

However, it was decided to conduct a pairwise comparison to see in more detail where the significant difference lay. The pairwise comparison contradicts the p-value of the within-subject test as it shows no significant difference between all three experiences. Furthermore, there is a clear difference between the second(marker-based) experience and the first and third experiences.

This data can be interpreted as the first and third experiences being the most engaging. Due to both experiences featuring 3D models and sound as well as the third experience having a level of interactivity that the others didn't. The second experience had a lower average time spent and this could be due to the lack of interactivity and visual aid when displaying the content. However, it must be noted that the third experience involves more set-up for the model to appear and this could influence the time that is spent at this POI.

## Analysis 2 – Photographs taken in each experience.

### Hypothesis

As the hypothesis suggests that the interactive experience will elicit the best response from users, it can be assumed that the third experience will have the most photographs taken.

Table 4 Descriptive Statistics for photos taken in experience.

Photos taken in experience	Mean	Standard Deviation	N
Experience 1	.83	.577	12
Experience 2	.59	.669	12
Experience 3	1.33	1.073	12

Table 5 Test of within subjects for photos taken in experience.

		Type 3 sum of squares	df	Mean square	F	Sig.
Photos taken in experience	Sphericity assumed	3.500	2	1.750	3.448	.05
	Greenhouse Geisser	3.500	1.417	2.471	3.448	.071
	Huynh-Feldt	3.500	1.565	2.236	3.448	.065
	Lower-bound	3.500	1.000	3.500	3.448	.090

As shown in the table above, the third experience does have a higher mean than the others at 1.33. This supports the hypothesis as it does show a higher volume of photographs taken than the other experiences. The results show no violation of the test of sphericity, which increases the viability of the results and its impact on the main study's conclusion.

Despite the test of sphericity showing a significant difference between the three experiences, the pairwise comparison showed P values of above 0.05, meaning that there was no key significance between the values. Therefore, the hypothesis should be considered null. It can still be argued that the most significant difference is between the third experience and the second experience as the P value between the two was .168 which was lower than the rest of the P values.

This set of data can be interpreted as, the participants being more willing to take pictures of the 3D models integrated with the environment. Although not showing a clear difference amongst the three experiences, there is a notable difference between the second experience and the third. Meaning that this hypothesis could be true.

## **Observations**

Complete observations can be found in the appendices. When testing the artefact, participants were observed with the purpose of making notes of their behaviour and interaction at the POI. Each experience has been summarised with its most notable observations.

### **Experience 1 – Brayford Viking Ship**

- Participants found the Viking ship easy to spawn.
- Users seemed engaged with this experience.
- One participant reported the asset wobbling.
- Participants shared the experience with each other.
- One participant moved around the ship to get a better angle.

### **Experience 2 – Foss Dyke Canal Information Board**

- Participant used the AR as experience.
- The participant seemed eager when reading the facts.
- Participant dismounted to get a better look at the information board.
- The experience was well received by the participants.
- The participant seemed surprised that the location had a historical significance.

### **Experience 3 – Poppy Wall World War 1 Tank**

- The participant moved around the environment to view the tank.
- The participant mentioned being impressed by the interactivity and the sound of the tank.
- Observed comments being made regarding the experience being more immersive.
- The participant was most engaged with this experience.
- Participants played with the tank model and took photographs of each other with the asset.



## Thematic analysis

Theme	Sub-themes	Notable codes
AR specific enhancements	<ul style="list-style-type: none"> <li>- Location-based AR enhancements</li> <li>- Marker-based enhancements</li> <li>- Marker less enhancements</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'The first experience was easy to use'.</i></li> <li>- <i>'Location based requires less interaction from the user which can be beneficial on colder days.'</i></li> <li>- <i>'Viking ship took a second to appear, but this didn't impact the experience'.</i></li> <li>- <i>'Marker-based and markers can be a lot easier to use and find'.</i></li> </ul>
AR Limitations and potential improvements		<ul style="list-style-type: none"> <li>- <i>'The AR wobbled when fitting into place'.</i></li> <li>- <i>'Audio translation could make the app more accessible'.</i></li> <li>- <i>'Demand for notifications when nearing a POI'.</i></li> <li>- <i>'If it is cold like today and you were in gloves you don't need to actually touch the phone at all'.</i></li> </ul>
General positivity towards the app	<ul style="list-style-type: none"> <li>- Use in future journeys.</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'App is simple to use'.</i></li> <li>- <i>'The app provides facts quicker than googling'.</i></li> <li>- <i>'They would use the app in different cities.'</i></li> <li>- <i>'They would use the application on new routes.'</i></li> </ul>

Cycle Enhancements	<ul style="list-style-type: none"> <li>- Education enhancements.</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'Saw objects/models that they wouldn't normally have access to'.</i></li> <li>- <i>'Adds fun to their cycling experience'.</i></li> <li>- <i>'The stops led to them learning about the history of Lincoln'.</i></li> <li>- <i>'Felt gratified finding POI'.</i></li> </ul>
Motivation	<ul style="list-style-type: none"> <li>- Exploration motivation</li> <li>- Motivation through gamification</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'Being rewarded models allows for tracking progress'.</i></li> <li>- <i>'Unlocking models could motivate the user to go out again'.</i></li> <li>- <i>'Felt incentivised to read facts.'</i></li> <li>- <i>'The app makes them want to cycle more'.</i></li> </ul>
Social Enhancements	<ul style="list-style-type: none"> <li>- Social networking functionality</li> </ul>	<ul style="list-style-type: none"> <li>- <i>'Being in a pair allowed them to figure out how to use the app easier'.</i></li> <li>- <i>'Cycling with another person improved the experience'.</i></li> </ul>

Table 6 Thematic analysis of the main study

## **AR specific enhancements**

This theme refers to the pattern of positive opinions towards the first experience, which involved the user viewing a Viking ship on the Brayford Waterfront. The theme points towards the features that achieve this positive outlook. For example, location-based AR was received well, due to the lack of triggers needed to load the asset. Specifically, the code *'Location based requires less interaction from the user which can be beneficial on colder days'* describes this.

The sub-theme outlines how the implementations of AR impacted their journey positively. Within the theme, codes suggest the unique features of the different types of AR that caused the participant to feel favourably towards the experience. It was found that the participants felt some negative aspects towards the experiences. For example, a code suggested that the experiences can vary depending on how easily the asset appeared. Which is explained in the quote *'It was a bit Shaky until you moved it away'*.

This theme also refers to the second experience, which involved users cycling to the Foss Dyke Canal and scanning a sign along the river, overlaying a fact page over it using marker-based AR. The data showed a theme of positive opinions towards this experience, and the codes defined which features directly impacted their feedback with quotes such as *'The way it came up, with the sign on the second one was very cool'*. The sub-theme appeared, explaining that marker-based AR can have a specific impact on the UX due to its technical benefits, such as a lack of interactivity leading to less time off the bike.

Additionally, the theme shows a positive outlook on the third experience, which featured using plane detection to place a World War 1 tank at a war monument and interact with the model. The theme shows that the inclusion of this experience was received positively amongst users. Codes suggest that the interactivity of the experience was beneficial. The theme identifies the potential impacts of using this type of AR.

The quotes identify that the model itself had a positive impact on the experience. This included factors such as the quality and the sound effects that it included. Which can be understood from the quote *'I loved the audio with it as well'*.

### **AR Limitations and potential improvements**

The Theme identifies potential drawbacks and room for improvement within AR. Specific codes refer to the first experience when the boat first loads into the environment, which has issues due to the water not being a static plane. Additionally, the theme highlights that potential improvements could be made to the experience and identifies the factors that could have an impact on the UX. The codes also highlight possible accessibility features that can benefit a broader demographic of cyclists such as *'Just maybe the audio button for if you were with a younger generation.'*

It was mentioned in interviews that certain types of AR would be more suitable for when it is colder, and the cyclist is wearing gloves or not stopping regularly. This is displayed in the quote *'If it is cold like today and you were in gloves you don't need to actually touch the phone at all'*.

### **General positivity towards the app**

The theme displays an overall positive opinion towards the app's entire experience. The theme includes codes that discuss usability and other features, such as the social functionality of the app. For example, the quote *'That's quicker than Googling it'* details this.

The theme appeared to show a general opinion that the application is worth future use, including AR and the navigation between POI as the main factors. This is mentioned in the quotes *'If a new route was created, I would want to try it out'* and *'If it was in different cities and I didn't know that city, well that would be really good too'*.

## **Cycle Enhancements**

The findings from the analysis showed that the application had a positive impact on the UX through multiple varied factors, such as the use of AR to provide education to the user. Specific quotes suggest that using AR along their route can make the journey more entertaining such as *‘It really just makes a journey just a little bit better, just adds to it’*.

The sub-theme discusses the impact of AR's information on the experience. The findings suggest that educational information through the AR medium successfully added value to the experience and can even be considered a viable option for providing educational materials on bike rides. This is proved by quotes such as *‘I've learned that it's so much more than just some tiny little footpath that people used and built maybe 100 years ago.’*

## **Motivation**

The analysis of the interviews showed a clear theme that users felt favourable to being awarded the 3D models that they could view at the end of the journey using AR and plane detection. The models were interactable and could be placed anywhere they chose. The theme shows a favourable opinion towards this feature and even shows a potential improvement to their cycling experience. A sub-theme stated that the collection and unlocking of models through visiting POI motivated them to continue to use the application further. This can be understood from the quote *‘I think that's a really fun feature and I think that's like an incentive to go to the next bit as well’*.

The findings of the analysis suggest that there is a theme regarding the motivation that the user feels from using the application. The codes show the impact of the use of AR in obtaining information and the impact on the user's motivation to cycle more in general. The enjoyment of being able to explore POI along the route is a motivational factor and can be considered as a positive implementation that should be used in future applications. This can be seen from quotes such as *‘so I think the stops really do incentivize you to go further’*.

## **Social Enhancements**

It can be seen from the analysis that there were benefits to running this study in groups, which is shown in the codes that highlight the benefits that it provided, such as making the application easier to use as well as sharing the visuals that they are viewing on their mobile devices with each other. This links directly to the observations as it was noted that users were conversing with each other when using the app. It is further supported by quotes such as '*It's just fun to do it with other people and bring other people into it*'.

The sub-theme shows that features such as the ability to share the AR they are viewing with others online impacted the UX in a positive manner. It was discussed that users would be willing to share the photos they take along their journeys on social media. This can be considered an enhancement as the AR application provides an experience that they would share with others. A notable quote relating to this point is 'you can recall the information just from like the pictures that you took' as it shows one of the benefits to the users of having the opportunity to capture photos.

## 4 DISCUSSION

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The purpose of this study is to explore whether AR can effectively impact cyclists' experience visiting cultural heritage sites. The research aims to test several types of AR and evaluate their effectiveness in contributing to the cyclist's experience. The research question is 'Can AR have an effect on the experience of cyclists visiting cultural heritage sites?' The most significant findings are the themes that are identified within the thematic analysis, as these can be interpreted to indicate which experiences had a positive or negative impact on the user experience.

### 4.1 REQUIREMENT ELICITATION DISCUSSION

The main findings of the requirement elicitation are shown in the thematic analysis. The themes found in the data evaluation have impacted the artefact's design process. This purpose was to develop an application with the users' requirements and will inform the design process. The analysis provided twelve different themes and their sub-themes. The requirement elicitation's purpose was not to answer the research question but to ensure that the main study was accurately designed to answer the question most effectively. The results of this study correlate to the research question, as one of the main objectives is to explore how AR can be used to impact the UX of cyclists visiting cultural heritage sites. The analysis identified factors that can add to the experience by generating themes such as 'Preference towards visual information'. To summarise the findings from this study, there are apparent features that participants feel positive about and have the potential to impact the UX positively. For example, the theme 'Local information gathering' displays an enthusiasm for gaining knowledge from visiting POI, whether it be historical or geographical. Additionally, themes such as 'Cycle safety' outline important aspects of this study, such as any hazards that can be encountered on

a particular route. Moreover, this study's results effectively addressed the research topic and generated interpretations as to what can be effective in enhancing the UX.

#### 4.1.1 Interpretation of results

To accurately inform the requirements of the participants, it is essential to interpret the themes and sub-themes. One theme is 'Preference towards visual information', which can be construed as the participants preferring to view visual assets such as 3D visuals and gathering information through models rather than reading extensive amounts of text. This informed the research as the artefact was then designed with several experiences featuring 3D models at the POI. This is further validated by codes such as 'Prefer to learn visually', which implies a preference toward learning through 3D models rather than text. The motivation to learn facts about a POI is further shown by the theme 'Local information gathering', implying that cyclists are enthusiastic about learning from the locations they visit along their route. This is expanded upon by the sub-theme 'Interest towards History and Historical sites', which suggests that historical information is a positive aspect of visiting cultural heritage sites. The interpretation of these themes suggests that AR can be used as a medium for providing historical information at locations and an improved experience. This relates to similar research produced by Liono et al. (2021), who report that AR can be a helpful learning tool for visual learners.

Further interpretations can be made from the themes, such as the participant's enthusiasm for exploring and visiting cultural heritage sites. This is corroborated by the theme 'Participants willingness to explore', which also includes the sub-theme 'Positive outlook towards exploring POI'. These themes imply an interest in visiting the POI and would benefit from the locations outlined in the application for navigation purposes. The participants mention their willingness to plan routes around the POI that they would like to visit and will even deviate from the route to visit these locations. These findings show demand for an application that shows POI on the route and can add to



the experience of visiting them. This can be seen in the statistics provided by Cycling UK (2021), which suggest that cycling for tourism is one of the primary motivators in cyclist behaviour. Additionally, requirements were gathered from another theme, 'Positive opinions towards gamified features', which identifies the potential benefits of including game mechanics in the experience. It can be interpreted that including game mechanics in this non-game application could be beneficial for adding to the experience. This informed the design process and led to the inclusion of rewarding the user with interactable 3D models when visiting the locations. The literature by Deterding et al. (2011), which explores the effect that gamification can have on the experience of users using applications, supports the premise that game elements, such as rewards, can improve the experience. The code 'Game mechanics allow for competing with friends' further suggests that adding challenge and competitiveness can enhance the user's overall experience.

An additional interpretation is 'Interest in social functionality in mobile applications when cycling', which implies a demand for mechanics that leverage social networking. This is expanded upon further by codes such as 'Enjoys when applications allow friends to interact and be social' and 'They enjoy visiting the home feed and viewing other's progress', suggesting that users enjoy viewing other users' journeys using social media. This led to the implementation of the feature to take photographs of the AR experiences and share them on social media as the participants perceived it to benefit the overall experience. This is explored further by de Los Ríos et al. (2014), who found that AR and social media in the context of cultural heritage sites can potentially engage users further and benefit their experience.

The thematic analysis of the data implies that participants are also interested in visiting scenic and historic locations. This was interpreted from the theme 'visual information' and data shows that some participants cycle to visit unique geographical locations. This raised the question of whether AR can add to locations that are not noticeably historical. This led to the implementation of the marker-based experience, where the user could read facts about the Foss Dyke canal and learn about its historical

significance to Lincoln. This implementation of AR was further informed by the theme ‘Local information gathering’, as there was a clear interest in some text being provided using AR. A different interpretation can be made from the theme ‘Technology’ that users may have experience using technology to aid their journey. These codes highlighted standard features amongst cycling applications, such as the demand for navigation features and ways to track previous rides.

Additionally, the theme identifies the accessibility issues that can be mitigated in the ride, such as battery draining which is an issue when using graphically intense AR models. By addressing concerns made by the participants, an overall improved UX can be achieved.

Specific themes informed the structure of the main study, such as how the main research will be conducted. For example, the theme ‘Social Cycling’ showed a preference for cycling in a group for longer journeys and visiting POI. As a result, it was decided that participants would be tested in pairs since it would allow for the freedom to discuss the artefact and share their experiences. This relates closely to the research topic as understanding cyclists’ preferences can lead to an improved UX. Guo et al. (2021) discuss that social interactions in AR applications can positively increase physical and mental health.

Moreover, the theme ‘User has experience with AR’ meant that participants may be more familiar with using AR than expected. This impacted how the application was designed as it can be assumed that users will be able to understand and use simple types of AR such as marker-based and location-based and will not be overburdened with reading tutorials. This connects to the literature review findings and corroborates the discovery made by Chung et al. (2015) that users accept augmented reality when used in the tourism industry. The user was given tips on how to use each experience before it loaded and the option to read further instructions if they were stuck on an experience. It was later observed that no participants used this option.

#### 4.1.2 Limitations of the requirement elicitation and recommendations for future improvement

The requirement elicitation had clear limitations, such as a reduced number of participants recruited for this set of interviews. The goal for recruiting participants was between six and ten; this is the suggested range by Fugard and Potts (2015), who state that this is the more suitable range for interviews for smaller projects. However, due to unforeseen circumstances, including COVID-19 and the research advertisement not being as effective as expected, recruitment became especially difficult. As mentioned earlier, although cyclists had much interest, data could not be gathered from several participants who did not return consent forms. The risk of unethically collecting data outweighed the benefits of a smaller participant pool.

Furthermore, a notable limitation would be the significance of the themes produced from the requirement elicitation since none of the themes identifies a specific type of AR that would be successful amongst participants. However, the demographic is cyclists who may not have a predetermined understanding of AR and only have a basic comprehension of the technology. Consequently, it may have been doubtful that participants could name specific applications of AR that they would anticipate. The themes still provide an insight into the participant's behaviour when cycling and factors that improve their journey that AR could be applied. For example, as seen when evaluating the data, the theme 'Local information gathering' suggests that AR can be applied to the displaying of educational material.

To improve the requirement elicitation phase, more emphasis will be made on recruiting participants and gaining more data. Additionally, adopting the improved recruitment methods made in the main study, such as verbally and online advertising, positively impacted the volume of participants reached. Given the knowledge obtained from this study and the consequently more impactful data, it is reasonable to anticipate that any subsequent work will have an efficient thematic analysis. In addition to these improvements, general adjustments can be made, such as ensuring that deadlines are adhered

to, and the software used to record and analyse the transcripts are more effective so that goals can be met easier.

For future research, requirement gathering is a recommended methodology as it has proved beneficial to the research and has been effective in informing the design of the artefact. When UX is a key aspect of the research, it is important that users can provide insight into what is expected from an application or how the demographic's trends and behaviours can impact how well received the artefact is.

#### 4.1.3 Summary of requirement gathering

Requirements gathering has proven to be an effective way to inform the design process and ensure that all decisions can relate to answering the research questions and applied to the topic. UCD is a well-known system and has positively impacted the way the design has been conducted, as displayed by Williams et al. (2020), who discussed that UCD allowed specifications to be designed not through their own opinions but informed by the needs and wants of the user. This relates to the inclusion of the requirements gathered in this study. Furthermore, the findings of the requirement elicitation can be considered in future research to inform design decisions.

## 4.2 MAIN STUDY DISCUSSION

### 4.2.1 Interpretation of results

From the analysis of the main study, there is a clear pattern amongst the data that AR has been effective in adding to the participants' experience. The themes generated from the transcripts show an overall positive outlook toward the application and the AR experiences it offered. Many participants discussed that the application added the ability to learn the location's history more engagingly. The themes show that features like collecting the rewards from each POI significantly impacted their motivation to continue the route and to stop and explore additional locations. To further explore the use of AR for cycle tourism, it was essential to understand what implementations of AR were successful amongst participants. For example, the third experience that featured the placeable tank was the most engaging and immersive according to the codes generated. The themes must be further interpreted to conclude the findings. The themes suggested that all three experiences positively impacted their ride. Sub-themes indicated that there were drawbacks to certain aspects of the experience, which can be addressed in future iterations of the artefact and future research.

Another key finding of the main study is that the reward system was significant in motivating the user to continue with the journey and visit more locations and encouraging them to take part in future cycling journeys using the application. The positive outlook toward the application is explained by the results of the observations from this study. It was observed that the features were well received by the participants, who appeared impressed and enthusiastic about the experiences. Most notably, the third experience elicited a positive attitude from several participants that took photographs of their partners near the AR model. Testing the participants in a pair proved beneficial to this research's success as engagement appeared to be at a higher level due to the ability to share the experience with another individual. The analytics gathered from the mobile devices used on the journey proved useful in identifying if there was a significant difference between the experiences and the level of engagement presented by participants. The results from the analytics showed that there was not a clear significance

between the three averages. However, the marker-based experience can be identified as the experience with the least level of engagement, which the codes can reflect.

An interpretation can be made from the themes “General positivity towards the app” and “AR specific enhancement”, which can be understood to relate directly to the research topic as it displays an enhancement of the UX. The theme can be understood as the participant’s cycling experience improved by experiencing the AR at the locations. Several codes generated the theme when grouped; A key code was “Adds fun to their cycling experience”, which implies that the ride was made more engaging through taking part in the application. Despite not explicitly mentioning AR, the argument can still be made that AR is the application's sole feature; therefore, the code will be referring to the implementation of AR in the experience. The theme also comprises sub-themes that support the inference of the findings, such as “Education added to their cycling experience”, which further demonstrates that leveraging AR to present information and historical models has proven effective in enhancing the cyclist’s experience.

Furthermore, the sub-theme “Stopping at POI had a positive impact” shows that the activity of stopping and visiting the locations positively impacted the experience for many reasons, including giving the participant a break to rest and recover, as well as the POI being an opportunity to learn about Lincoln’s history. This is further shown by codes such as “The stops led to them learning about the history of Lincoln”. Moreover, it was mentioned that the activity of finding the POI was gratifying and presented game mechanics to the experience. This experience relates directly to the research topic, as the primary question is whether AR can impact the experience of cyclists and the existence of the theme provides an insight into whether this had an impact or not. These findings are significant in addressing the research topic as they directly identify the user experience being enhanced by AR.

Another interpretation can be made from the theme “motivation”, which refers to the features offered in the artefact directly impacting the cyclist’s motivation to carry on with the route or to take part in similar routes in the future. This theme can be interpreted as AR having a positive impact on the

experience of cyclists in the future. It can be argued that an application that leverages AR in this way could be popular. Several aspects of the application were found to motivate the participant, the first being shown in the sub-theme “exploration motivation”, as this suggests that the locations themselves and the experiences that they offer can be one of the main factors when quantifying the level of motivation that the user feels. The user’s motivation is shown in more detail through notable codes such as “The app could encourage less experienced cyclists to cycle more”. It is important because it implies that some AR types are more user-friendly than others. Additionally, this point links closely to the primary motivation of this study; to understand if AR can positively impact the cycle tourism industry in Lincolnshire.

On the other hand, the theme also includes codes that suggest that motivation depends on principal factors, such as “The app would motivate as long as POI are spaced out”. This is important for future implementation of similar applications, as too many stops at POI can harm the experience. This aids the exploration of the impact that AR can have on adding to the experience of cyclists, as motivation can be a key indicator of a positive UX. Khan et al. (2019) support this by advising that AR is impactful in increasing the motivation of those who want to learn.

A similar interpretation can be made from the theme “Motivation”, which relates directly to the inclusion of game mechanics in the artefact. Rewards were implemented in the artefact and could be collected by visiting each experience. The rewards were 3D models relating to the participants' location, and the users could place and interact with plane detection AR, similar to the third experience. This feature was implemented following the requirements gathering, as the data suggested that users prefer to be rewarded for participating in applications. The appearance of the theme suggests that earning the AR models was beneficial to their experience for a multitude of reasons. One notable code state, “Being rewarded models allows for tracking progress”, which is supported by the requirement gathering process as this was an opinion shared amongst several participants.

Additionally, “Unlocking models allow for competition that incentivises people to go out on the routes” was coded, suggesting that the ability to earn AR rewards adds a new social aspect to their cycling experience and raises the question of whether gamification is a driving factor for motivation in the context of AR, which relates to the success of games such as ‘Pokémon GO’. The sub-theme “Enhancement through gamification” further supports the idea that the inclusion of rewarding models positively impacted the experience. The sub-theme emphasises the impact on motivation that viewing 3D models in their own time had. It included notable codes such as “Unlocking models could motivate to go out again”, which further implies the improved experience of cycling using AR. This relates to research conducted by Hammady et al. (2016), whose findings suggest that AR can motivate those visiting museums to visit again due to the addition of gamification in their app. A limitation of the theme is the possibility that non-AR rewards could elicit the same emotions from the user. However, this can be mitigated as multiple participants explicitly mentioned AR as being the reason that the reward system was positive.

Further interpretation can be made from the code “Using the app socially benefited the experience”, which displays the positive impact that using the app in a social context had on the experience. As the cyclists were testing the artefact in pairs, they could share the experience and discuss the AR. The observations made by the researcher further evidences this, and codes such as “Cycling in a pair allowed them to discuss routes and POI” further explain the benefits of the experience of cycling in a group. It can be argued that using the application solo could harm factors such as navigation and engagement, lowering the effect of the experience. This is further shown by the code “Cycling socially was beneficial to navigation”. Morrison et al. (2011) reported similar findings in a study that showed that those using AR applications in groups had benefits such as an increase in ease of use compared to using the app solo. The code “Sharing photographs of the experience online would motivate others to try the app” implies that the inclusion of the option to take photographs of the experiences and share them on social media would positively influence and encourage others to engage in the application. The social networking functionality adding to the experience is further



supported by codes such as “Sharing the rewards could motivate others to try the app”, which can be interpreted as AR rewards being a motivator for cycling more. This theme relates to the research topic as it highlights the context of AR that can be more effective in improving the experience for cyclists and can influence future implementations of AR to include social features, whether through group work or social networking features. However, there are limitations to the relevance of this theme. For example, social networking features do not relate directly to AR; therefore, the context of sharing the experience socially must connect to the AR provided in the experiences.

The same interpretation can be made from three separate themes: “Positive feeling toward the first experience”, “Positive feeling toward the second experience”, and “Positive feeling towards the third experience”. The themes show a positive outlook toward all three experiences, and all feature subthemes that outline that the types of AR have limitations. Each theme relates to a different type of AR; for example, the first experience is location-based, the second is marker-based, and the third is marker less / plane detection. The positive outlook towards the first experience is comprised of codes such as “The fact that the boat was to scale was good”, which discusses the benefits that the model had on the experience. This is useful for evaluating the data as the code implies that the model is a key factor when quantifying the success of AR experiences and the scale having an impact. A conclusion can be drawn from the first theme, that the use of location-based AR and displaying a 3D model that relates directly to the location that the user is visiting positively influenced the journey. The experience featured a to-scale Viking ship with animated crew members floating on the water. It is stated by the codes that not having to trigger the model to load physically was beneficial to the experience, and as a cyclist, this would be beneficial when weather conditions are worse, and the user would not want to take off their gloves to interact with the model. The benefits of this type of AR apply directly to cyclists, as the activities interrupting the journey the least could have the most positive overall impact. This is further outlined by codes such as “Location-based requires less interaction from the user, which can be beneficial on colder days”. A key finding from the sub-theme is that users feel this type of AR is the easiest to access for those new to AR. This is important as

usability is a key factor when considering UX. One reason that generated the theme was the immersion that user's felt with this experience due to factors such as the model and the sound improving the quality of the experience. Drawbacks were also outlined, such as slight movement when the asset loads into the environment, which is a limitation of AR when first placing the model. A key code from the theme was "The first experience was their favourite", which implies that this use of AR was the most effective in adding to the route. This is partially supported by the metric analysis, which suggests the first experience has the second-highest time. However, due to the lack of a significant difference between the data, this cannot be solely relied on. Despite this, there was a significant difference between the first experience and the second, showing a preference for this implementation of AR. Following this, the second theme discusses the marker-based theme's positive impact on the UX. This experience featured the user scanning a sign along the Foss Dyke canal and reading the facts overlayed onto the sign using marker-based AR. The theme has a similar interpretation that the experience was overall positive. The codes in this theme relate to the first experience, with the lack of interaction positively influencing the cyclists that do not want to stop at a POI for long. The theme also outlines ways that this experience could be improved. One of the key suggestions was the inclusion of 3D models, so the experience was not solely text-based. This can be interpreted as AR being used to display only text can be less engaging to the user. Finally, the third theme suggests a positive outlook toward the third experience. A notable code in this theme was "Felt more involved with third experience", which implies the inclusion of interactivity and the freedom to place the model where they wanted, positively impacting their engagement. A link can be made to similar research that studied AR's effects on visual learning, which concluded that there may be a positive impact on the experience of users, but would need further research (Abas and Badioze Zaman, 2011). It can be argued that the third experience was considered the most interactive of the three experiences, and the generated codes implied that this was the favourite experience amongst most participants. The theme also comprised factors that led to a positive experience, such as the detail of the model being high quality, as well as participants feeling more inclined to take

photographs of this experience and spend more time at the POI. A drawback coded for this experience was “Interactive models may be harder for those new to AR”, which implies that this may be the least user-friendly for inexperienced users.

The final theme was “AR specific enhancements”, and the existence of this theme suggests that AR could be identified as a specific factor for enhancing the experience of the cyclist. The theme comprises all the codes that mention how AR was utilised in the artefact to impact the user’s experience. Codes such as “AR added to the landmark” suggest that the POI on their route was improved using AR. The theme was useful in identifying how the AR specifically enhanced their experience. Significant factors include that the models were to scale and educate the user on what objects like Viking longships would look like in that era and the models linked to the location's context. Further, the asset loaded into the scene will benefit the experience if it fits the site's context. Hammady et al. (2016) conducted similar research that involved displaying 3D models that matched the location in museums, which positively affected user enjoyment. To further support the benefit of using AR in adding to the bike ride, the code “AR made the experience more engaging” suggests that AR made the participants overall cycling journey more appealing. An additional interpretation can be made from the code “Felt gratification from finding AR models”, which can be understood as the activity of encountering the AR models giving the journey more purpose. Overall, the existence of this theme helps to gain a stronger understanding of AR’s place in the context of cycle tourism and whether it can have a lasting impact on the experience of cyclists.

In addition to the thematically analysed transcripts, the metric analysis proved to be a useful methodology for generating interpretations from the data. The results showed that two data sets were gathered from the tests. The first was the time spent in each experience, and the second was the number of photographs taken during each experience. This information was gathered to determine whether participants felt inclined to spend more time in one experience than another. The reason for collecting the number of photographs taken in each experience was to understand if any experience

was more impressive to the participants and if they would be more motivated to share it with friends and family. Each analysis showed that the third experience would have the highest average. The results from the time in each experience initially showed a significant difference between the third experience with the interactable tank and the other two experiences. Upon reviewing the test of sphericity, it was initially concluded that the third was the most favourable experience amongst the three. However, after conducting a pairwise analysis of the data, it was shown that there was no significant difference between all three experiences, and therefore a null hypothesis must be accepted. Despite this, there was a distinct difference between the second experience with the sign on the Foss Dyke and the other two being lower. This can be interpreted as AR experiences that feature 3D models are more engaging than those that only feature text, as participants spent more time at the 3D model locations.

A similar conclusion can be made from the analysis of the photographs taken. Initially, a significant difference was shown, and the highest average belonged to the third experience. However, after conducting a pairwise comparison, there was a lack of significance in the data. This can be interpreted as cyclists' behaviour being unpredictable when taking photographs along their journey, and this could be because of various factors such as the weather and the cyclist's motivation to carry on with the route. To summarise the importance of collecting the analytics from the mobile devices, it is helpful to the research as the interpretations of the findings can still aid the exploration aspect of the study in this thesis and raise questions regarding which type of AR can be seen as least favourable amongst participants.

The observation of the studies was a useful methodology for supporting findings in the thematic analysis and quantitative analysis. Several conclusions can be made from the observations of this study. For example, the third experience garnered the most positive reaction amongst participants; some even played with the model itself and took photographs of their partners with it. It can be suggested that using interactable models along their journey leads to more engagement in the

experience. Additionally, the observations identified that usability was not an issue. It was not observed that participants needed support with features such as navigation or any of the experiences. It was also observed that participants did not need to access the help icon to fix an experience. This methodology also allowed for any issues to be identified, such as the slight movement of the assets when first loaded into the scene, as some of the participant's reactions to this were noted. The observations highlighted potential drawbacks in each experience; most notably, some participants needed to dismount from the bike to read the sign at the second location. This makes the argument whether marker-based AR is as suitable for cyclists as the other types or whether the text itself was too small to read from afar. These observations allow for improvements to be made in future research.

#### 4.2.2 Limitations and future improvements

To improve for further research, it is essential to identify the limitations that impacted this research. Most notably, the pandemic influenced the number of participants that could be recruited for this study, as well as milestones being met in time. Due to the reduced number of recruited participants, quantitative data such as analytics are less reliable and unlikely to show a clear pattern. Since recruitment was more challenging than expected, the demographic was widened; as mentioned previously, this was both beneficial and disadvantageous. For example, the wider participant group meant that diverse groups of cyclists were recruited, such as those who cycle more casually or are more experienced and prefer longer distances.

On the other hand, this study may have benefited from a specific demographic being tested because this could give more insight to Visit Lincoln when deciding to pursue the use of AR on their routes. However, the explorative approach of this study allows for the discussion of the positive impact of AR on different cycling groups. It was found that participants were less motivated to take part in studies that were not remote due to the fear of the pandemic. Further disruptions from the pandemic

involved a lack of access to equipment and a workspace for the researcher. This impacted the progress of the research and the deadlines that were being met.

Limitations occurred during the development of the artefact, such as issues with the location-based experience of loading the Viking ship at incorrect coordinates. This was due to the limitations of both AR and mobile phones. This was mitigated by simulating the location-based AR using a marker to spawn the boat on the water. It was thought that those unfamiliar with AR development would not notice this change. However, AR experiences will vary depending on the device used, which is why the Android devices are given to the participants at the start of the experience. The design and presentation of a prototype are not representative of a fully released product; therefore, feedback could be considered limited. Other features of the application, such as the user interface, were not worked on by experienced graphics designers but by the researcher. This meant that the application presentation may not have been up to the standard of released applications.

A limitation of the data interpreted from the quantitative analysis would be the unreliability of the times recorded. To expand upon this, the third experience had the highest amount of time spent on average. However, it can be argued that this experience requires more set-up than the others as it expected the user to scan the terrain and place the tank, which would require a certain amount of time. This would take even longer if the users were unfamiliar with mobile technology and AR. This was mitigated by providing the user with clear instructions at the beginning of each experience.

Due to the limitations of the quantitative analysis, significant conclusions cannot be drawn that would impact the outcome of this research. This is since the lower number of overall participant's would have an impact on the reliability of that specific data. As well as the data being gathered not being the primary focus of the main study, and only gives an indication as to what experience could be seen as more enhancing and not giving any further insight. This indicates why, the thematic analysis was chosen as it would provide more insight into the patterns that emerge from the participant's feedback, thus providing the most impact to the conclusion of this study.

Despite the methodologies chosen being successful in the research, there are limitations to each method. For instance, the thematic analysis may be constrained because the resulting themes are the primary means of interpreting the data. This is further explained by Nowell et al. (2017), who report that thematic analysis is limited as it prohibits the researcher from making claims regarding the specific language used. Other methodologies were considered, but the thematic analysis was best suited for this qualitative study.

Another limitation would stem from the requirements gathering. Despite being useful in informing the main study's design, the data produced from this methodology is limited. Since participants can only discuss their requirements based on what they have experienced with previous applications they have used, this limits the usefulness of the method, as one of the goals of the research is to develop a new and innovative experience for cyclists, and therefore requirements can only be applied so far.

In the future, the research could benefit from collecting extra data from participants, such as their age and gender, as well as more precise information on their cycling trends. This would best identify the specific demographic that would benefit from an application of this nature. This would be advantageous to organisations such as Visit Lincoln as it can help make decisions on whether to invest in ideas that utilise AR to attract more tourists to the region. If the findings from future research are significant, this could support existing research and provide more insight into the behaviour of cyclists.

Additionally, due to the struggles with recruiting participants for both the requirement gathering and the main study, future research would benefit from dedicating more time and resources to advertising this study. Despite the goal being exceeded for the participants recruited in the main study, the requirements gathering had fewer participants than expected, which could have negatively impacted the requirements highlighted.

The explorative approach of this study has allowed for several types of AR to be tested, and the success of each type was discussed. It can be argued that AR, which includes 3D models that match the environment's context, is the most popular amongst the participants. A study that focuses on this specific implementation could prove beneficial in further identifying the positive effect that AR provides on this experience. Since the first experience and the third experience have been evidenced as the most favourable, the thematic analysis shows that the users perceive visuals as more engaging than text-based AR, which is supported in the requirements elicitation. It would be beneficial to explore the impact of location-based AR, specifically to see if an application that uses only one type of AR could still be useful in improving the UX.

Further benefits could be provided by using different methodologies and gathering additional quantitative data from such methods as UX questionnaires. The benefit of using methods such as this is the reduced burden for participants and the ease of creating questionnaires. It was decided not to use this methodology in this study because it was felt that an hour-long bike ride with thirty-minute interviews and a questionnaire to fill out could overburden the participant and negatively impact the data gathered. By taking a more quantitative approach in the future, more conclusions can be drawn from patterns in the data and highlight any abnormalities. For this to be more successful, a more significant number of participants will need to be recruited.

#### 4.2.3 Summary of the main study discussion

To summarise, the findings of this study draw multiple conclusions, and it can be argued that the methodologies used successfully gathered data that would effectively answer the research question and address the topic.

One conclusion that can be made from this study is that AR has been a useful tool in enhancing the experience of the participants. This has been displayed by several different themes and specific codes



that mention this. One factor that outlines AR's effectiveness is that it adds educational value to the bike ride, and the participants felt favourable toward this. This is further supported by the themes gathered from the requirements elicitation, displaying a clear interest amongst participants in local history. It was also highlighted that AR added to the locations the user was visiting. For example, the inclusion of a 3D model of a tank integrated into the environment of a war memorial was said to add to that location. This was further expanded upon by the mention of the cyclist's routes being improved because they were made more aware of the historical significance of their route.

Another conclusion that can be made from the main study is the preference for visual learning and not textual education. This means that users felt favourably towards the experiences with viewable 3D models and even felt inclined to take photographs and share these photographs via social media. This was further supported by the first and third experiences having the highest amount of time spent on them.

Additionally, the UX depends on several factors, such as the weather impacting the user's motivation to use the application for specific durations and how interesting the user finds a location. If the weather is colder, the user will benefit from an AR experience that does not require too much interactivity, such as location-based or marker-based, highlighting the limitations of marker less and interactive AR.

Furthermore, an argument can be made that the inclusion of gamification in an application is important to motivate the user to recommend it to friends and repeatedly use the application. this study showed a preference for game mechanics such as unlocking rewards for visiting locations. To expand upon this, it was mentioned that unlocking rewards also allowed the user to keep track of previous routes, which further shows the benefits of implementing these features.

## 5 CONCLUSION

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This thesis aims to identify whether AR can effectively add to the experience of cyclists visiting cultural heritage sites. Furthermore, this study seeks to explore AR as a technology and determine if any type elicits a more positive response from the user than the others. The motivation behind this study was to gather information on how AR can be utilised to draw more cycle tourists to Lincolnshire and support Visit Lincoln. AR has gradually increased in recent years in the context of education and cultural heritage. As outlined in the literature review, there is a gap in the research which focuses directly on this topic.

Furthermore, one of the aims of this study is to determine whether AR is a suitable technology for cyclists overall. This study's goal is to identify any benefits from a particular AR and if they have any flaws for cyclists. Therefore, an explorative approach was the most effective way to communicate these findings. A key theme of this study is UX and UCD and how their methodologies can be used to design an AR prototype that can best impact the experience. One of this study's main goals was to develop and test a prototype that was created whilst considering the behaviour of cyclists. The reasoning was to gather more accurate data and elicit responses from the user that best represents the user's perception of AR.

Regarding the research question, 'Can AR have an effect on the experience of cyclists visiting cultural heritage sites', the findings suggest that AR is an effective tool in enhancing the experience of cyclists. This conclusion has been drawn from the themes produced by the thematic analysis and supported by the observations. Despite the quantitative results initially showing a significant difference between the time spent in the experiences, further analysis contradicted these results, and therefore they could be considered unreliable. Furthermore, as discussed earlier, the explorative approach has led to the conclusion that AR experiences that feature 3D models are more effective in

improving the experience than text-based AR. The findings also show that for the journey to be positively impacted further, the 3D models projected through AR should match the context of the environment that they are visiting. It can be further deduced that the AR that features the least set-up, such as marker-based and location-based, can be more suitable for cyclists taking part in longer routes and those affected by the weather. However, participants mentioned that AR experiences that feature interactivity with the model were more engaging and immersive than those that do not. This could mean that experiences that leverage marker/location-based AR and feature interactable models could elicit the best response from users. Certain caveats were highlighted in this study that impacts the UX. For example, the frequency of POI that features an AR experience was important since an overabundant amount can take an individual away from their bike ride. The content provided at the POI should also feature a mixture of text and visuals to ensure that education is easily accessible. It was found that the inclusion of AR models being rewarded for visiting POI further added to their experience and increased their motivation to carry on and use the app in the future. A common pattern amongst the participants was that they felt the application was worth using in the future, which explains how AR has impacted cycling behaviour. Additionally, the combination of AR and social functionality benefited the UX.

Several key points of this study impacted the success of the research and the data gathered. The first key point of this study was to identify any gaps in the research and how this study could have an impact on future research or how it could support existing studies. This was achieved through a literature review involving gathering relevant data and studies and drawing inspiration from those who apply.

Highlighting the methodologies that would best benefit this study was essential. The first methodologies to be highlighted were those that contributed to the project's planning. One of the main methodologies was the requirements gathering, which featured thematic analysis of semi-structured interviews and the findings to develop the artefact using the UCD approach. Furthermore, identifying

methodologies allowed for developing the structure of the research. This key point of the thesis highlights the methods used to conduct the main study and how each methodology effectively drew data from the participants.

The next key point of this study was to display the results of both the requirement gathering and the main study. This section allowed for explaining key findings such as the themes and the metric data. Following this, the results had to be analysed and evaluated using methods such as thematic analysis and One-Way ANOVA with repeated measures to analyse the data quantitatively. Once the analysis had concluded, evaluating the data, and discussing the findings was the last step. This involved referring each key finding to the research topic. Overall, the methodologies chosen were of use to the research laid out in this thesis and were individually responsible for the favourable outcome of the research. Each chosen methodology was inspired by reviewing existing literature and drawing comparisons from the methods they used and their success before applying them to this research. Although it must be noted that the quantitative analysis approaches that were selected only offer an initial perspective of the overall results and cannot be substantially relied upon to impact the conclusion, they were still evaluated to be the most appropriate ones.

As highlighted previously, there were limitations to this study, such as the lower number of participants recruited. This has impacted the outcome of the quantitative data; however, the impact was less significant as this study was primarily qualitative. For future research, the researcher could benefit from collecting more quantitative data to represent any trends amongst participants better and understand how demographics interact with the technology.

The research relates to the most recent increase in interest in AR in tourism and mobile applications. With the pandemic restricting many activities, cycling and walking has increased exponentially over the years (Musselwhite et al., 2021). This means that those engaging in cycling activities, seeing more of the area they live in, and exploring other regions of the country are increasing. As mentioned earlier, there is a trend in research focused on AR for education and cultural heritage. Studies have

shown that AR can be useful for keeping users engaged when visiting cultural heritage sites and museums by bringing historical imagery to life. This study aimed to explore the same technology but from the perspective of cyclists. One could claim that this research was successful in achieving this goal. It may be argued that the research is important for helping to fill a gap in the body of knowledge. This study intends to shed light on the subject and serve as inspiration for future research that will enable the researchers to delve further because there is a gap in research examining AR and cycle tourism. As it has been concluded that AR is useful in adding to the UX of cyclists, further research can be conducted to find out the specific demographic that would benefit from this technology.

Moreover, determining a specific use of AR that impacts UX would be insightful. This study can impact society's approach to cycle tourism since it has identified a gap in the means for delivering educational material to cyclists. The impact of the artefact on the user's motivation could prove beneficial to organisations such as Visit Lincoln, which aim to increase the level of cycle tourism to the county. Additionally, the impact on physical health would be positive, as it seeks to motivate experienced and inexperienced cyclists to participate in these routes.

To conclude, AR is an ever-expanding technology that can be combined with rapidly expanding physical activity to deliver an informative and engaging experience to a wide range of people (Cycling UK.,2021). It is recommended that further research is conducted into this topic, as the exploration of this activity is in its infancy, and any further findings on the effectiveness of AR in this context could be invaluable. Cycling is an industry that overall could benefit from this type of technology. This study shows that cycling over long distances can take users to various historic locations, from Roman ruins to World War monuments. AR can enable cyclists to be more aware of the historical landmarks along their regular bike routes and potentially bring a new passion for education and discovery to a new generation of technology users. This study has identified that AR can be effective in positively impacting the cyclist's experience, who would not typically leverage technology in this way.

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### **REQUIREMENT GATHERING TRANSCRIPTS**

#### **Participant 1 Transcript**

**So how often would you say  
you cycle in a week?**

Probably minimum four times  
a week and that would be, you know,  
back and forth obviously  
depends on my work rota

**So what sort of reasons do you cycle then.**  
prior to starting work again,  
it was just for fitness pleasure and now I  
do it to commute back and forth to work.

'cause it's a lot quicker.

**OK, so when you're cycling,  
sort of for leisure describe your typical  
session like how far you go, how long?**

It depends on what I'm like doing it for,  
so if it's just for leisure,

I might go out for about an hour and a half and I tend to just pick a road and just.

Go straight down it and see what I can find.

I don't do that many country  
roads 'cause a lot of them,  
aren't like paths and they've got a lot

of blind corners so I tend to  
do that more like city biking

And then if I'm doing it for fitness it  
will probably be about 40 minutes and

I'll pick a circuit and I'll just go  
as fast as I can around that circuit.

**OK, and so how do you decide which  
route you're gonna take beforehand?**

There's not really much thought to it.

I'll get to I'll get out my house  
and I'll think well left or right.

And then every time I see a road if I've  
not been done it before, our mind think,

Oh yeah, I'll go down that one, why not?

There's not much rhyme or  
reason to where I'm going.

**OK,  
so you don't really have a planned out route,  
so you don't really have a route you stick too.**

Yeah, I just if it's for leisure and

I'm just trying to get out the house,

I'll just go and you know,  
trying to find new things sort of thing.

Just explore a bit.

And when I'm doing my fitness I've  
got routes that I'd like to follow.

**OK and.**

**Do you tend to stop at all on  
you're cycling route for breaks?**

Yeah, yeah, I'll stop quite a bit.

I've not got the best stamina.  
maybe after like 20 minutes.

So like if I have to stop cross the  
road I might take a little bit extra  
just to catch my breath.  
**so you typically stop for like a break.**

Yeah, just to recharge a bit,  
**how many stops did you  
say you take a session?**  
Probably once every like 20 minutes or so.

So if I'm going for an hour and a half is,

I might have three or four.

And yeah, I don't know.

**And when you stop, how long do you stop for?**

Probably 5 minutes Max.

I've just finished the Hill.

**Yeah no, I get that. I probably  
need more than five minutes.**

**Do you enjoy cycling to points of interest?**

**So Lincoln obviously has a lot of  
old Roman structures, airbases.**

**They have a lot to do with World War Two,**

**so do you tend to like stop at places.**

**You can just sort of like lookout  
and exploring?**

Yeah, yeah.

So if I'm going on for leisure it's,  
you know I'm kind of trying  
to find stuff like that.

I'm not necessarily like getting  
on my phone and going.  
Oh, this is where this is,  
but if I passed the place, yeah,  
then I'm usually really happy about it,  
you know?

**OK, can you think of  
any way you visited in the past?**

**Any points of interest?**

I don't know the names of any of it.

You know up near steep Hill to the  
to the left of the main area of steep hill.

There's like a windmill.

OK, I went there recently.

Three months ago.

Uh, yeah, I'm sure there's quite a few,  
but I just I never know the names  
of them 'cause I'm I don't actually.

Check it, you know.

I mean, yeah.

**Yes, fair enough.**

**So is there any type of point of interest  
that you find interesting or any  
specific error or any type of structure?**

Historical stuff definitely.

You know it's always nice  
to go up near the cathedral.

Stuff like that. There's this is  
old English Castle really far down.

Well, it's actually like halfway down.

The High Street That's pretty cool.

So yeah, just like historical stuff

**And so when you're cycling,  
is it important for cycle with others?**

I've never really cycled with others,  
not something I've done.

**Do you use any kind of technology  
when you're cycling so a speedometer or anything like that?**

My bike is Nope. I've been,

I've been trying to repair the  
thing over the last few months.

I've not got up to adding  
any fancy stuff to it though.

**But if you want to use technology would**

**use it before, after or during a session, so this can also include applications.**

Yeah, I think it be nice to have one  
of those route planners you know little  
you can get those little GPS things  
that you just put onto your bike  
so you don't have to keep your phone on you when you're doing like the route tracking they are a bit  
expensive aren't they?

**Yeah, yeah it can be.**

Yeah, I mean I would.

I would be up to adding technology.

I love technology anywhere in  
my life like it's always.

It's always a good thing

**So you're open to it then**

So yeah, if I had the money then

It would be kitted out I would have the  
what the E bike converter on  
the front and everything.

**So we talked about like mobile applications.**

**So you talked about a route  
planner and is there anything you can think  
of that you do use?**

**Any mobile application?**

**Says I know a lot of these Strava.**

Yeah, I don't use any at the minute I've not really got into it.



I mean look like I said at the minute I'm just using it to commute.

So I've not really had time to do any of the leisure or the fitness stuff in quite awhile, but I definitely want to.

**And do you have an iOS device or an Android device**

Android.

**Is any reason why you still pick Android over iOS?**

They're easier to mess about with, you know you can do Android studio stuff.

Uhm, apples like a close garden software, so you can't really mess about with them at all,

**So yeah, is there any features of Android that you find sort of enjoyable?**

**Anything that just stands out.**  
And just yeah, just the fact that it's quite open source and I can mess about with it and do little things that change how it works.

You know I can plug it into my computer and do debugging stuff.

I've never even had a Apple phone, so I wouldn't really know yet if someone asked me,

I won't be able to compare them.

I just like messing about with my phone,

**So it's the customisation of them then**

Yeah definitely that's what I was saying

**So is there any technology that you would like to use  
for cycling but you don't have yet?**

**There's anything that you've  
got on your radar.**

That's a really good question.

Yeah, one of those E converter kits.

Actually their proper cool.

They have like this little satchel.

You just plug it onto you from your bike  
and wire it up and then it can turn  
any bike into like an electric bike.  
**yeah my dad has that.**

**When you first said e converter I didn't actually realize.**

no I don't know what they're called.

**They are handy, for Hills.**

Yeah that's the one there's a Hill coming up and click the button.

Got to get the summer body ready.

**So do you like visiting sites of historical interest?**

**So yeah, we were talking about it before,**

**Why do you like visiting them**

**for gathering information?**

It's just cool to see something  
that's been around like ages I don't know.

I don't have a very intellectual answer,  
it's just you see something old  
and you're like cool, right?

It's like when you see,  
like Dinosaur bones you like, that's sick.  
I don't want to learn everything about it,  
but that is like that's cool.

**But like a little bit of information  
about it like maybe like condensed.**

Yeah, no. To be fair,  
when you get the little tooltips  
and it's something you didn't know,  
it's like actually that's it's like

It's like when you're playing a game and  
there's actually something interesting  
on the load screen you're like,  
actually, yeah, OK.

**What could make them more  
interesting to you then?**

Probably Accessibility.

I don't want to have to,  
so I'm quite dyslexic.

So when I'm going up to a historical site  
and there's these huge plaques of info,

I can't get through it all.

All you know if it was like I said,

if it was more like smaller or easier to if it was more easily communicated.

that would be probably better for me.

**OK, so actually that's quite interesting**

**'cause it's going to be in the context of an augmented reality application.**

**So for you would it be a lot more helpful, something more visual like models of what that area used to be?**

That would be,  
yeah 'cause.

'cause like I said reading for me is can be a bit of a hassle so.

I remember I went to this place and they had basically it was kind of augmented reality.

They had these semi translucent screens

and it played like almost a holographic video on top of it on top of the side.  
kind of a bit like that and  
much more engaging, much more engaging than just blocks and blocks of text.

Everywhere

**OK, yeah, that's interesting.**

**So we talked about gathering information from these sites, so when visiting them, what's your preferred method of gathering that information?**

**And so you said you don't like to read loads, so you still prefer like the key points then?**

Key points if things can  
be made really visual.

You know if there's like if you looking at let's say ruins of a church.

You know, if it's all in text what's happening then?

I'm not going to read it,  
but if they've got a picture of what it  
used to look like and it's annotated.

It's like, oh, here's where the

workers used to live

It's more engaging for me anyway.

**So in your own opinion.**

**We saw it's more interesting to you then,  
so when you're cycling past them.**

**What would make you pull over and stop then?**

If it's something I haven't seen before or

If it's anything that's new or you know,  
so novel or. Yeah,  
anything that I'm like I go passed and I've

I've never seen this before.

I don't know what it's about.

Something that's going to  
catch my eye kind of thing.

You know, if I if I'm just cycling  
past and it's just an old barn that

I've seen 1,000,000 times and I'm  
not really that bothered, yeah?

**So do you have a lot of knowledge in  
augmented reality then**  
not in the slightest

**OK, well, you know you know,  
sort of the basics of what it is like,  
how, how it's used,  
sort of you know Pokémon Go Snapchat, yeah?**

**So can you think of any examples of**

**Augmented reality you have used in the past?**

Well I used the HoloLens once that was proper cool have today have that is that is.

Augmented, isn't it?

**Yeah, so it is.**

**I cant remember the word it might be mixed reality**

**OK, so what stood out about it then?**

That was that was for someone's thesis study.

Yeah, it's just cool interacting  
like with digital things on the  
real world at the same time I have done  
Pokémon go as well. My mate uses Strava.

He runs around doing shapes and then.

Yeah, yeah, just simple.

**Oh, I think you lost your sound. Hello.**

**Yeah no, yeah just yeah went off a bit.**

Yeah I touched my cable alright my  
computer is hanging by a thread.

**So yeah, so for mobile applications then**

**Pokémon Go is what stands out the most.**

Then yeah, I got way too many hours into that game.  
so God knows how long.

**So then augmented reality applications**

**you say would interest you then  
is it particularly because its gamified?**

So what is the reason Spent so many hours on it.

For me, actually, I think Pokémon Go.

I only ever played it when all my  
mates were playing it and because I  
just had a group of like three or  
four people who played it for a long  
time then that's why I kept it up.

So I think anything that friends  
are involved and it's a new.

Like the social aspect kept me there quite a while,  
but any new technology that.

Shows me something like interesting,  
although I've not seen before,

is it's always going to be quite  
exciting and engaging to me earlier.

**so building on Like you said you played it 'cause  
your friends are playing it Yeah, if there was a competitive  
aspect of this app so.**

**You went to visit these.**

**You'll go on a route and it will show**

**you which sites are on this route and  
then use your phone to look at these sites.**

**If you were to then compare them  
with mates or if you would have  
some social aspects of it.**

**With that interest you**  
yeah, that will keep that keep you  
using it for months and months.

I think if I could be like.

Yeah, I mean I like to be, you know,  
if I can do something where it's like,  
oh I'm beating my mate at something  
like that's always good, isn't it?  
especially in lockdown,

there's nothing more to do then  
actually go out and look at things if  
you have that social aspect of I went to the cathedral oh sick me too.

Yeah, but I saw XYZ and look you've only  
got five points and I've got 25  
like that's just that would be a lot more  
engaging, OK?

**And so when you're actually at these  
sites and you've got your phone up,  
you're pointing it at an old church,  
or was So what?**

**How could that AR be used in a way that would like.**

**Would be more appealing to you,**



so would you prefer It just shows you like a 3D model.

A bit like Pokémon Go.

It will follow your phone or would you  
like to sort of put your phone up  
to an old building and it projects  
what it used to look like?

Probably the second one.

OK, that's cool,

especially if you do like if  
you do location mapping.

So if you move your phone that  
doesn't actually move at all,  
it just stays there and so you  
can see the whole thing right?

OK, similar to did you see  
Lincolns like RAF, fly over augmented app.

Yeah that kind of thing where you actually.

Like, yeah, I don't know how to explain it,

Yeah the planes going over?

Yeah that's awesome.

Yes, really interesting.

So.

Is there anything else you'd  
like to tell me Lastly,  
just about your cycling  
experience like what could make  
it better.

So yeah, if my pump worked,  
that would really know, sorry.

Welcome back my cycling spirit.

Yeah, I mean the idea of,  
like gamifying anything is always  
going to make it much better.

You know, if I can go on,  
go on my cycle and be competitive  
with my friends in some way.  
I mean, it's why stuff  
like Strava works so well.

'cause you have that competitive aspect.

Yeah, I think that would.

Anything like that's gonna make.

I mean if you can use Pokémon Go  
to make walking like the biggest  
thing for an entire summer than  
anything that's got that competitive.

That social aspect is going  
to vastly improve like.

You know your mundane activities

## **Participant 2 Transcript**

**So how often would you  
say you cycle a week?**

At the moment, not a lot because it kind of.

Well, I don't know what happened.

I kind of broke my body a bit,  
some like fatigue stuff going  
that I need to see a Doctor about but this time last year I was probably cycling 10  
hours a week I reckon,

**OK.**

And that was for two years or so I was doing Probably 10 hours a week,  
but since then haven't really done much.

**Yes that's fair enough.  
what were the reasons that you cycle?**

**Leisure or fitness?**

It started off like just for fun.

And then I kind of got more into the side of  
doing it for fitness and competitively.

So then after a while it kind of turned  
into just more just training instead.

Obviously we're still having fun,  
but it was more focused on actually  
structured training rather than

just going out for fun

**OK, and so when you were cycling regularly,  
what was your typical cycling**

**session? So how far did you go?**

**How long do you cycle for  
you said you said about?**

**Do about 10 hours a week, but for each session?**

Yeah it will.

Vary a bit like it normally be.

Tuesday and Thursday I might  
do 2 hours on each day,  
and then I would probably do  
an easier ride after that.

And then Sunday I'd normally do a longer ride.

I usually like 4 hours long.

**OK. And how did you decide what  
route you're gonna take?**

**Do you plan beforehand?**

**Do you always stick to that route.**

So I kind of just figure it out myself.

Just from experience and which roads  
are quieter and nicer to cycle along?

But also on like Strava,  
and there's other websites as well  
where you can see popularity of where

people have been before and you can  
see other people's routes as well,  
so you can kind of look at that to see what other people  
are going and kind  
of figure out from there as well, OK?

**And so when you're on your routes,  
do you ever take any breaks to  
stop on your route? Any point?**

Yeah, I'd probably stop a few times, if it's a long ride to  
eat or you know to go to the toilet.  
If I've had too much water

Well, normally I try to not stop  
as much as I could just because  
if you stop I get.

A bit a bit tired once I  
get back on my bike.

But yes, probably two or three times normally.

**And how long do you would say  
you stop for each time?**

If I'm just stopping to  
have something to eat,

it probably only be a couple of minutes,

5 minutes at the most, but.

Before obviously coronavirus and

everything happened and do more rides with other people,  
and we sometimes you know stop  
at a cafe and get a coffee and  
a piece of cake or something.

Obviously if we're doing that  
and stopped for half an hour,

45 minutes apart,

**OK, and do you enjoy cycling  
to points of interest?**

**So Lincoln has a lot of airbases  
around and sort of like remnants of  
like Romans or structures and stuff like that.  
does stuff like that interests you?**

I'm not sure as far as

points of interest,

I've cycled out to the Wolds before.  
were the highest point in Lincolnshire is,  
so I've kind of cycled out  
to there to go to there.

And there's a couple of  
viewpoints I've gone to.  
Is that a viewpoint North  
of Lincoln near them?

Scampton I think

Yeah, there's a viewpoint there that  
I've cycled through a couple of times,  
but as far as like historical things,

I don't really think I have Purposely gone out of my way to go to one,  
**but if you were to sort of come across.**

**Say, if you were on a route and**

**you came across an old  
structure or something like that,  
yeah would you be interested to stop?**

Yeah probably would I reckon if

I was passing by and I thought  
you know that looks really cool and  
probably stop and have a look at it.

**Would you say it's important to  
cycle socially or do you enjoy  
cycling mostly on your own?**

Yeah, I think it's important to  
cycle socially just because.  
it can get pretty boring just by yourself.  
I found that a lot last year.

Obviously we couldn't go outside with  
other people that have really missed  
going out with people 'cause you know,  
sit on your bike for four hours by yourself.

And I'm talking to you.

It's a bit a bit boring.

**Yeah, I can imagine.**

Yeah, time goes up.

It goes along.

Time goes a lot faster when  
you're with someone else 'cause.

Back at uni I would go cycling with my housemate  
most of the time and we just you know,  
just talk the whole time and it just  
seemed like half an hour instead of two hours.

**Its more fun to enjoy with other people?**

**So do you use any technology when  
you're cycling?**

Yeah, I use a Garmin.

If you're familiar with it,  
but it kind of got the speed distance all  
sorts.

I can connect it to my heart rate  
monitor and also a power meter  
on my bike which shows how much.

How much effort I'm putting out?

Really.

Yeah, it's just all sorts of metrics  
and stuff really

**OK and why do you use**

**These technologies? To monitor your health?**

Yes you can monitor like how far I've gone.

It's got GPS so it will log  
where you've been.

Then you can upload that.

And yeah, you can monitor your like your progress.

You know if you're

Doing the same average speed  
and your heart rate slow,  
obviously you probably gotten fitter that kind of thing.



**So would you usually use this**

**technology sort of before, during,  
or after a session and use it  
throughout the whole time?**

Yeah, kind of throughout the whole time.

Maybe not before, but definitely during it.

Use it to kind of record everything  
and after you have a look to.

I don't know.

Look at your speed maybe or your  
heart rate to look at how well  
you did or something like that.

**And do you use any mobile applications  
when you're cycling.**

I used to because I used to record it on my phone.

Instead of using the garmin,

but obviously my phone would just die for awhile compared the garmin longer.

Battery life so I started using that instead.

**Ok and when you did use mobile applications was it strava?**

Yeah strava

**Do you own an iOS device or an Android device?**

I've got an iOS device, an iPhone 11.

**And is there any particular reason why  
you chose iPhone over Android?**

Well, I had Android for ages.

Probably almost 10 years.

I had the s8 before this,  
but then I thought, you know,

I'll give an iPhone ago for a long time.

I was like I don't like iPhones,  
but then I was like you know what ill give it a go.

See what it's like and I  
actually prefer over it.

Just seems a lot faster and simpler.

**That makes more sense  
bit more like user friendly as well.**

Yeah yeah.

**So back to technology talking about  
what were the features of it that you found  
sort of most enjoyable or most useful.**

What's on my iPhone or Garman?

**Yeah, with both.**

**So for Strava, what did you particularly  
find  
that stood out to you the most?**

Yeah I did like on Strava how you  
could have like a segments and stuff.

So you can compare your efforts to other peoples,  
but they did make that page feature the logo.

So that's kind of but you have to pay for it.

**But if it was still free?**

Yeah that was good.

I don't know what else,  
just a social aspect of it was quite good.

OK, being able to like other peoples rides  
and stuff and comment on it. Alright,  
**and so with technology like the garmins.**  
**what stood out about it then just the battery life?**  
yeah the battery life is a  
big thing because you could.

I think they went for 15 hours  
or something before they died.

And obviously it's got like a.  
speed sensors, GPS.

An altometer whatever it's  
called for the altitude.

Altitude, speed.

Temperature as well.

There's probably things that I'm missing,  
but there was all sorts that also.

It's kind of like sensors in it that you  
could use more than you have in the phone.

I'm pretty sure, yeah OK,  
**so if you're using an app and it**  
**did show you features like that,**  
**yeah, would that make the app appeal a lot more to you?**

**'cause I know obviously**

**battery life is a big one**

Yeah it probably would.

Yeah, if there was an app that  
could do the same thing.

Then I'll probably put a lot more,  
because obviously it's the garmins are £150.

If there's an app that road less than

£150 and it be a lot better than that,

OK?

**And is there any technology that you  
would like to have but you don't because you haven't got round to buying yet?**

Maybe there is like a rear light which has a sensor

in it as well. some kind of Garmin light I think that connects to your Garmin.

They use the sensor on the back too.  
warn when something is coming from behind.

Basically that's the only thing I could  
think of, and I thought it was cool,  
but I never thought you know what I  
mean by exit 200 pounds or something.

Yeah, I thought it was cool.

**Would you say you find like historical  
sites or any sites of historical interest?**

**Would you say you find them interesting?**

**Do you like visiting them?**

**Not necessarily on bikes,**

**but in general,**  
yeah, definitely yeah.

I do enjoy it from time to time like.

I don't know.

It's just like something interesting.

Then I'll go to see it you know, yeah and.

**So yeah, what makes these interesting to you?**

**Just finding out the information.**  
yeah, just.

You know if something's got story behind it,  
there is kinda.  
You know, interesting to find out more  
about that story.

**OK, and when you're at one of these sites,  
what's sort of your best way  
of gathering this information,  
like reading or.**

**Yeah, like I know a lot of a lot of the  
points in Lincoln have like boards,  
with information**  
just Googling it.

If it's something oh that looks cool,

I'll just whip out my phone, type it in,  
and have a look to see what it is.

**OK, so would it be more appealing to  
you if you could just whip out your phone.**

**It would sort of know where**

**you are and you were to.**

**It would bring up that information  
for you as you were there.**

Yeah yeah OK.

**And so, in your opinion, what could make  
these sites more interesting to you?**

like you're saying  
with the information just being on  
demand and make it more interesting?

**OK, just a lot easier access,**

**Do you know much about augmented reality?**

I know a little bit.

But not too much 'cause.

I'm third year computer science,  
but I didn't.

Select VR is an option, so I haven't.

I haven't done that.

**OK, you know,  
sort of how like the popular versions of augmented reality like Snapchat?**

And yeah yeah,  
**more mobile augmented reality.**

**Do you think of sort of what your favorite?**

**Mobile augmented reality  
application would be.**

I'm not sure to be honest.

I think it was on Snapchat not.

ive not really used many AR apps but.

I think it was on Snapchat  
where you could like.

Make like a little character and it  
would go on your desk or something.

I don't know if that's on iOS, it does that,  
but remember that at some point,  
**so you quite like having 3D models and  
sort of like appear through your camera?**

Yeah, yeah, **so sort of in the  
context  
of your cycling and you came across  
a historical site and you were to  
pull up your phone and on your camera  
will project to like 3D model of A  
of like that building or Lincoln**

**Lincoln's a lot of medieval history.  
that would interest you.**

Yeah, that would be cool.

**So would you prefer sort of more  
more visual like with models?**

**Or would you find your texts more  
like more appealing to show you?**

Visual so like a model or something.

Would be pretty cool maybe if it was like a.

A building that had been half destroyed  
or something and you kind of get the

AR app out and it it shows it how it  
used to be or something like that,

**OK?**

**Yeah, that's good to know.**

**so is there anything that you can  
think of that would just improve your  
cycling experience just as a whole  
sort of how like technology could be used?**

**Or just in general?**

As far as technology goes,

I'm not really sure.

I can't really think of anything that would.

Make an obvious impact to it.

To be honest.

**so like you like choosing your own routes and.**

Yeah yeah, OK.

And yeah, I think that was it.

### **Participant 3 Transcripts**

**So how often would you say you cycle?**

About three times a week.

**And So for what reason do you cycle?**

Oh mainly for fitness and enjoyment It's a good getaway when I'm not working out doing something else.

It's nice to just. Right bike time to self kind of. Kind of like.



**And so when your cycling either for leisure or socially or whatever, just describe to me your session how it works.**

I sometimes I found it one of two ways so I either have a place in mind. so usually I like going out on the national cycle routes somewhere like Dodington that way or something,  
**yeah,**

or I can just go on my bike and just ride without thinking.

So from my oh I come up to a junction or somewhere else like do I go left?

I think of it at the time so I don't really have a plan in mind.  
So sometimes I just kind of put my headphones in and just go,

but sometimes I do have like OK I'm going to go there and back.

**OK, so how far do you go or how long do you cycle for?**

Probably like an hour it can be up to like. It can be more or less.

I'll say an hour roughly around that right time.

about, maybe like 12 to 15 miles. Yes,

**OK. And so we talked about a bit about the route you take so, You said that you decide.**

**as you're going,**

sometimes yeah.

**When you're deciding before you go for a cycle, what helps that decision?**

It really depends on how long I have as well as like what mind im in.

Sometimes I'm like alright, I just need I need a bit of a bit of space I'm just going to go on my bike and just see where I end up.

**Sometimes go bit more rural than urban.**

Yeah, exactly yeah, But then sometimes. Could you repeat the question?

**What helps make the decision about what kind of route you go on?**

Oh yeah, yeah sometimes because I want to do it for a not like a workout with

just you know to get out do something. So that's when I might have

a more specific route So I might go here and back cause then I

know I've done a certain distance and I'm on my bike.

**and so when you have that route so thought of before you go so you said that you decide to just go left or right at the time, do you ever have like a route that you Just stick to.**

Yeah, usually so Like I said, the one where if I don't know where to go I just go down National Cycle Route 64 now down that way down past like pyewipe like pull down the canal, then over past skellingthorpe that way so doddington in back is usually my go to route.

**Yeah,**

well I might get further than that unless I might go down a different route,

but that's usually my go to.

**OK And do you tend to stop on your cycling route any points or have breaks?**

Not really, sometimes I am If I'm going just for like leisure just getting out

Sometimes I might take my camera and stuff so I might stop if I

could see like a good view A good photo opportunity then I might stop Over then that I'll just go.

**So saying when you do go to take photos when you just stop in the cycling route,**

**how many times would you say that you stop like that opportunity on a cycle route?**

five to six Sometimes I can go out and it can be like none at all, but on average I say about 5.

**OK, and How long so when you do go to a stop, how long will stay there?**

Only a couple of minutes, I'll stop to take a picture might have a sip of water and then carry on.

So no more than a couple of minutes.

**And do you enjoy cycling to**

**points of interest? So like you said you like taking pictures of nice views,**

**but a lot of the time when you wanna cycle that you just come across like a**

**Landmark, or an airbase something like that Do you enjoy to cycle to points of interest.**

Yeah, definitely so sometimes I come across these points of interest, especially going down like rural routes. You end up like it might find that abandoned buildings or something like that. Yeah, exactly, and that's when that's when I stop as well Like to explore I guess.

**Can you think of any sort of points that interested you in the past on a cycling route?**

Well, let's start with the first one, Dodington, cause that's like Dodington halls. It's like a historic place. Uh, instead of turning off down Dodington, and carry on this there's a couple little abandoned 'cause it's an old railway there are old railway stops that are abandoned. Have the signs there and such

so it's cool to go past them and old like loading bays there's another one I had in mind I can't remember there was a There's another yes, all the way down there Then there's the old aqueduct going over the Nottingham Trent

Riverfront. That's a cool point going over I think it's third largest River in the UK So it's it's an interesting point  
You know you're high up It's an old Roman aqueduct.

**Yeah there's a lot of history to it To find out**

there's graffiti there, like graffiti That is actually like planned so you know by different art schools and stuff like  
that in different sections of the bridge, which is kind of cool.

**That's definitely something that if someone was to come across that It definitely sort of.**

**they stop for it Yeah, yeah, interesting I didn't know there was an aqueduct there.**

Yeah, it's a traditional trainline It was a Roman aqueduct which got turned into a trainline like an old,  
like a train line that went over the top of it. But then when they changed, changed the old train line and got rid of  
it, it just turned into one big long path, which is part of the cycle route. And you could just bike over it. They  
think it's about like 12 miles out or something like that. Yes, it's good. Yeah, it's a good one Long path from  
piewipe. So. No, they're not.

**That's something to keep an eye on, when it comes to developing.**

yeah, definitely.

**So is there any sort of point of interest that you find it like**

**Interesting, so like you mentioned**

**like Roman Aqueducts or Is it from that era that you find quite interesting because there's**  
**loads of air bases around.**

Yeah, there's all sorts of different things so it can be more modern

like modern historic site like 20<sup>th</sup> century or further back like I like all points of interest down the line. It's all curious and I know there's a couple of abandoned air towers that you can get to Yeah there's loads round there

they're on my radar, no pun intended with it being an air base, but but you know,

I'm planning in the future at some point

**yeah, yeah, its good to have a good mix**

**rather than doing just one route and stopping at the like Roman structures or medieval.**

**It's good to have a mix and then if you want to learn history about those places and yeah.** it will be an interesting point to actually go visit and.

Have a look at it.

**And so when you cycle is important for**

**you to cycle with others or on your own.**

I like cycling by myself sometimes because I could put my

headphones in like have time to myself. But sometimes I do enjoy cycling with others,

especially if it's a longer trip. So me and a couple of my

friends bike from

here to our hometown in Grimsby. **Oh wow,**

so that's about like 35-40 miles on a bike.

And long journeys like that It's a lot better with someone,

especially as a long distance. And with that, we're

able to go

through the Lincolnshire Wolds. So then there's more

points of interest

there, cause it's like more nature based.

So being able to actually like

explore with someone yeah, especially if it's a path that none of us took before,

so it's you know if we got lost. If it was just me there and I got lost, I'll be stranded. What was three? Or is it

a bit more of a safer,

safer bet?

**So do you think it's good to have your location**

**to hand when you're when you're cycling? So like when**

**you're using an app,**

yeah, those routes are usually more longer routes.

I have my phone on the front of my bike.

so if we need the map or anything

then it's there just in case and also on those longer routes It's fun to use things like Strava

and those kind of apps to be able to track the whole the whole route, 'cause it's a bigger route It's like more of an

achievement. OK, look. You know you got it for yourself to be like, OK, I did that and you can see

your time and everything.

Yeah, it just saves it as well. Yeah,

so it's it's good to good to have that hand. One of the benefits of an app

like that is because

it keeps track of your previous  
cycling routes and so you can just look

back at it and see what you're doing Yeah, and you can look back below. I forgot I biked to there one day and  
you know it's

kind of like a pinpoint map like a personal map of where you've been. **good to know. So we've just talked  
about strava.**

**Can you think of any technology That you use whilst cycling?** Not really other than not not

to use

for cycle there's music apps or like

podcasts and that kind of stuff but. to do with cycling.

That's probably the only one I've used strava, **Why do you use it?**

Oh, just the features on there. That are free. It's

simple. It does everything I need cause I

don't care about posting it everywhere

and looking and like training

and what I need to do to improve. I just kind of wanted to be

able to track

it so I can see it myself and then I know.

If I go down that same route again,

I can see if I got a better time

and time in certain routes,

so it's one of the most well known,

so it's just the easiest one to get

**and you use it more so for yourself rather than socially.**

Yeah, yeah. cause it is technically a social media,

but I'm using my own personal use.

Yeah, OK?

**So when you're using the**

**technology, Would you most likely use it before,**

**during or after a session?**

What as in strava or any technology?

So just the technology you mentioned. **So with Strava,**

**do use it to plan routes Or do you like? How**

**would you use**

**it on your cycling experience?**

I haven't used it to plan routes, but to be able to see. I know there's a possibility of it but

haven't really used it,

but it's something that I would want to

do be able to see other people's routes,

or you know, see that planned routes.

And then being able to go on that route. But that's not something I

have used,

but in terms of using the technology I have it on during the bike,



but I don't really check it OK, so I'll start it. I'll press start when I when I go.

Then press end when I end Sometimes I do forget to press end

and it will just be me sat in my

house for an hour at the end but.

**Yeah, so you don't use any sort of like not mobile applications. But You aren't using any sort of technology for bike anything** No speedometers or anything like that. **So, do you own an iOS device or an Android device?**

iOS

**And what's the choice? Why do you choose iOS?**

For me, because I do a lot of like

business and that kind of stuff

like technology wise, It's a lot easier, and there's a

lot of like quality of life things.

Yeah, that I don't have to worry about

on things like an Android device,

but I know it just works, so paying that extra bit for iOS devices

helps with my workflow a lot easier.

**Yeah, yeah, makes sense.**

**So you can think of like an application. in this case Strava.**

**Is there anything you can highlight that you**

**find like enjoyable about these**

### **features and what they can do better?**

What I find enjoyable is.

I can see the competition of other people of

that day and week like in the local area. So going down certain

routes,

it'll be different stretches on the

routes and be able to compare myself

with other people in that time. So on that day it'll say I'm

fault for

that day and I'll show me the other users

that got a certain speed on that path. Yeah, so that's kind of a fun

little thing to be able to.

To be able to compare and see where

you stand and. Because it's just. It's just a fun little and

fun little feature.

**Makes it a bit more competitive as well.** Yeah yeah it helps help

push like the biking aspect. You know if you're

trying to do it

for fitness and try and build on it,

build on itself is so fun thing to do. **Yeah, so do you have**

**friends that**

**Use Strava and then compare it with them**

I have a couple but most of them don't go on the same routes. or they're in different cities so it's  
it's not really something I can compare the same routes with them,  
unfortunately.

**And is there any technology**

**that you would like to use and You haven't got around to yet?**

What as in technology that I know is out there or? **Yeah,**

**so if you think the device for your**

**bike or even just a mobile application.**

Something like a speedometer,

so like be able to track the miles. I do like physically

and not with

an app is that it's more accurate. Something like that would be

with some something I'd probably

invest in the future.

**So if you did have like an app that was**

**really accurate with the miles that you do,**

yeah,

cause with Strava. I have it

on all the

time and if my phones. Like if I don't have

my phone

and my phone is low battery or something like strava takes a lot of

battery from the phone to use so

it's a pain to have to do that,

but having just a little

device which physically. Tracks it would be a lot

simpler.

I won't have to worry about it? **We sort of spoke**

**about this before**

**before, so when you're cycling and you**

**do come across a point of interest,**

**so like historical points or in**

**general landmarks.**

**Did you like visiting them?**

Yeah definitely so even if it's a

landmark like well known like the

cathedral biking around, you know?

Those areas or going

out to different points, I find them

interesting

Sometimes I like to look at what they are,

you know, history, why they are there. Like I said down there

on the path to Dodington. The aqueducts,

cause it's an old train

line you come across,

just like old stations in

a way that used to be there. But its been left

derelict,

and where there's some farms is just

like farm buildings with like big

gates where the trains used stop

and load like a temporary loading Bay. And there's a couple of

them which. Yeah,

you come across and you enter and it's OK.

It's just a. It's just a big empty room, but. It's just an old building and its

just

the fact of there used to be some kind of.

older building here,

some farms or something,

but now it's just some. A field that was left to rot. You

know there used to be history there,

so that's the kind of interesting thing about it.

Yeah, and it's still sort of like Remanence left all that time.

**And so when you're visiting sites,**

**what can make more interesting so?**

**could it be more information?**

**What would make it more**

**appealing to you to visit?**

I'm not really sure because these are places are abandoned or you

know you technically not meant to go in.

Yeah, things like that, but.

Some places have like information boards

maybe and such like on the paths

where you're allowed to go instead of  
going off the beaten track a bit and,

like trespassing in an abandoned

building alone.

There are some places which are on the track,

so having an information board might be.

You know instead of having to look it

up yourself and be like oh where am I?

What is this? OK?

Just having a small board might.

You know,

help people's interest a little bit.

**So in the context of an application,**

**an augmented reality application.**

**So you'd like to see so just like**

**information as if it was on a bulletin**

**board or on the Information Board and.**

**so say if you were to hold your phone up to**

**up to that landmark would you**

**like to gather information from it?**

**Like would you like to see like**

**text telling you what it was or models?**



definitely that's you know,  
especially if it's like an augmented

reality headset or something.

Being able to see that,

whether it's oh it scans it in,

it's like machine learning knowing

it's this type of building and it

says it says about that building or

whether it's your location saying oh,

this is actually this specific

landmark and then more about it.

Either one of those I would

enjoy to know more about it.

If you look at like that

loading Bay building,

you know you would understand what it is.

And not just some big block structure.

**Make it like more interesting just to**

**know what the place was and the dates.**

**So when you're visiting these sites,**

**you said that so for gathering information.**

**Yeah, these boards are helpful. you might get**

**information or board**

**just if any information is nearby**

it would be a lot easier to do it that way instead of having to take the

extra steps to find the information.

Yeah,

sometimes you put two and two

together and be like oh OK,

this is what this is for.

**But to actually have the information**

or yeah more details like specific

years or anything like.

**So, for you personally to get this information would you prefer**

**It more visually pleasing like if it was to use like 3D assets or do you find text based more interesting**

Little bit of both, so maybe the option

to switch between them so it's more

visual at first so it's not overpowering,

especially if you're biking

and it pops up or something.

It might be a bit overwhelming and you

take your concentration off or something.

I personally would prefer like

visual with the with the option to

be able to expand with more text.  
You know if you want people have the

option to read more.

**Yeah, so we just spoke about what would make**

**these sites more interesting to you.**

**And sort of yeah its just more information.**

**So can you think of any examples**

**for augmented you've used in the past?**

what, general augmented reality.

**Yeah, it's just general sort of just**

**the technology of augmented reality.**

I've used it quite a few times 'cause I think I mentioned I come from augmented reality.

My background.

I did computer science undergraduate as well

so I used it for the modules there and stuff.

I've used it in many different ways,

but I mainly use it as social

augmented reality effects,

so I my business I work with.

I mean, a few of us will work

on creating social affect.

So Instagram, Snapchat, Facebook,

we create those effects for businesses.

So people like Sony Pictures

to help market a film or like a sports event or something

like that you know will create.

Create this effect to help push

the marketing aspect of it

So we have worked a lot in terms

of augmented reality on social

or even like web web, AR.

So that that kind of stuff

I've used that a lot.

I've used,

I've actually used a visual AR like a headset.

I guess you have.

I don't know if you've seen the Snapchat spectacles.

where they have like 2 cameras they

sent me down to LA 2019 and we got to

use the spectacles three before they

were released and create stuff for them.

Create lenses for them and it doesn't.

You can't see it live,

but it records live and depth information.



And because there's two cameras and

then with the footage you can add stuff.

Augmented reality effects afterwards.

But that's that's kind of how I've used

augmented reality in the in the past.

**So you've obviously got a really good**

**understanding of augmented reality and yeah.**

**So say for an augmented reality application for cycling,**

**for cultural heritage. So what AR would you expect to see from an app like that**

**So marker based or markerless.**

**This interview is the user requirements gathering, so yeah.**

**If I was to build this application based  
off of what the user requirements are.**

**can you think of anything that you recommend?**

So as first of all,

I've used a couple of prototypes in

the past as well, like the weight.

So if it's actually visually

seeing it on in front of you,

the weight of the glasses

can really have an impact.

So like it's front heavy, you know it

could fall off those kind of things.

**so that it's more accessible.**

**It will be a mobile application**

**Using the mobile camera**

**so if you're using it as a**

**mobile application,**

**OK.**

**I wasn't sure if you meant like a**

**cycling like you were wearing it while you were cycling, so yeah.**

**Part of the study is to see**

**whether people would use AR.**

**While cycling,  
cause the main things.**

**Are these points of interest.**

**So yeah, say if you are at a point of interest**

**and you're using a mobile application with augmented reality.**

**what would you expect from something like that?**

So like I said scanning with marker based,

so if there was a building

or a old or something,

being able to scan it with your

phone to have information overlaid.

Uh, if it's a more well known.

Place so like some rubble

places around the cathedral or something,

but it's more well known ruin being able

to maybe see it reconstructed over the top,

On top of the top of it,

so maybe see it over the years or something.

Uh.

You know,

take away the opacity layer to be able to

see what it was like and what it is now.

To be able to compare.

**So just more visual visual learning  
then with this augmented reality experience then**

yeah,

if it's something like a model being able to see that and then text

as well to explain but. Like I would prefer something

more visual with a little bit of text with the ability to Have more information if I want to.

**OK.**

**And so if you can think of something either,**

**what are your favourite augmented reality?**

**Mobile application would be that you can think of.**

I'm not really sure that because ive used quite a few in the past. some more interesting I cant

remember the name of them. But doing all these social things I get a

lot of people coming up to us and being like,

oh, you know this is this is a new thing we're developing like so you

know we check it out like be able to 3D model in in augmented reality and being able to scan your room and

things like that I like the playable aspect of it being able to do something interesting,

unique with augmented reality.

**Quite gamified.**

Yeah yeah having that by pushing the boundaries a little bit and seeing what's what is possible with it. But I really

like just when it works So like scanning a building and it works fine yeah, cause it's like the apps where you can

use augment reality scan Flowers and things like that Then trees to be able to get the, I'm thinking that it kind of

like tracks to the flower, like the names of it. Uh, I really like just little things like that like quality of life, it'll all

work fine. Not being not scanning something be like why I scanned a building why is it giving me a pillow or

something?

**You know just yeah to have it working**

Yeah, like fully working and not only working a little bit of the time,

**it's not just one of these where you just,**

**you just place around in 3D objects and it would just move however it wants,**

I like something a little bit unique you know, like a unique selling point to it looks something.

have something I've not seen before, but when I see something kind of in that takes my interest, I use it a lot more.

**Yeah, that makes sense. And so just Lastly is there anything else you'd like t**

**mention about your cycling experience that you think is very important?**

**Like what can improve it? just overall, how you feel about cycling?**

More generally, Accessibility options for cyclists so like cycle lanes cycle routes That that that sort of thing, but that's more like City based, you know like city planning and stuff like that, but.

**So would you stick to a predetermined cycle route because this project is in support with the visit Lincoln, Lincolnshire Tourism Board so they have a load of predetermined cycle routes.**

**Most likely It will be a long one of these routes,**

**do these routes interest you or cause I know that you like doing your own thing**

**but if it is a laid-out sort of cycle route, would you be interested in taking part in one?**

And yeah, yeah definitely as I think I mentioned If there was a pre-planned route, and

it had interesting things along the way. You know it said, oh, not just this is a good bike route but

oh this is like a 10 mile bike route. But you get to visit these places along the way You know,

like there's an interesting place unique a place of interest. that's what I'm trying to say, if it had like,

oh, you know this is a route and you're gonna see this, this and this Uh, I feel like I'd be more likely to do it.

**OK yeah, it's good to know. I think that's that's everything. Yeah, thank thank you for I'm yeah, thank you for answering these questions**

## **Participant 4 Transcript**

**How often would you say that you cycle in a week?**

I cycle about three to four times  
a week, probably about 9 hours.

**OK.**

Think that's about the average.

And I think yeah,  
increased about 9 to 10 hours a week.

**OK, and what reasons do you cycle  
then like for social reasons or leisure.**

Well, initially it was eight years ago,  
nine years ago. I started to put weight on.

So I thought well I just wanna lose  
some weight and I didn't like running.

So I just kind of felt well,

What else is there and I used to

I used to like cycling when I was  
younger so I bought a road bike.

I didn't know any,

None of my University friends  
did road cycling at all.

So I just go out on my own which is



been motivating and then at the

Lincoln Grand Prix some guy just  
came over and started chatting  
and we met up and sounds romantic.

Doesn't it, then we went out and  
started cycling together.

Just built on from there.

Really, I think once you get the bug  
it's quite hard to get rid of it.

**Im the same I've got.**

**Ive put on lockdown weight now  
so I need to.**

**I've just bought myself for  
the hybrid bike so yeah,  
Trying to get into it,**

**And so when you are just cycling  
for leisure or cycling socially just  
describe your typical session for me.**

**Like how how far you go or yeah,  
how long usually?**

Yeah, so I'm a school teacher,

So what what I tend to do  
is I'll get home from work.

See the kids and I know I'll try and get out.

Do sort of 30- 35 miles in the week.

You know, maybe two or three times a week,  
and then I'll do a longer ride on the Sunday,  
which is anything from

sort of 60 to 90 miles.

**And how do you decide what route you want to take?**

Yeah, I think with anyone when you first start cycling you, you tend to stick to the routes that you know or the local area. Yeah, but as I've got kind of more confident.

It starts to get a bit repetitive if you just do the same routes all the time.

I think you need that motivation to go out and do new routes.

So I use things like Garmin Connect, so I use commutes and I use Strava.

Rider, GPS and a lot of those have got kind of. routes already there, so you can just put your post code in and then just adapt it to Your kind of needs.

And you know the problem

Lincolnshire is it's quite flat.

And so you have to go and literally find the Hills or you go to the wolds or you go through Lincolnshire,

Nottinghamshire or wherever.

So you know, I mean, Michael Gates.

Brilliant, you've got Linden Hill and a few other hills but there's nothing really that.

Is a big challenge in terms of you know Hills and stuff,

so it is very pretty flat, isn't it?

**Yeah, yeah, that's fair enough.**

**So when you're on one of your routes,  
do you stick to it?**

**Or if you see like another path,  
would you go down it?**

**Yeah, you quite flexible with it.**

I think if I know the route pretty well, I'm happy to deviate.

You know it's quite nice Sometimes you kind of.  
You are on a route that you know and if you  
see road that i've never been down there.

We do quite like to often go that  
way and just see where it takes you.

But yeah, it has to be a relatively  
familiar area otherwise.

You can end up on a-roads,  
or you can end up, you know,  
going sort of 30 mile round  
where you don't wanna go.

So yeah, yeah I would deviate but only if it is an  
area that is relatively familiar with.

**Yeah no, that's fair enough.**

**And so on your cycling route.**

**Do you tend to typically stop  
for anything you take breaks?**

Yeah, I think I think now I do.

I used to get really bad cramps if

I stopped so I didn't used to stop,  
but now yeah, typically will,  
particularly the longest Sunday rides will stop for a  
cafe and have a coffee.

You know, but you know,

I think that's kind of what a  
lot of cyclists like,  
because it breaks the ride up.

It gives you that fuel stop that you need,  
and then you know.

And also I think it's a bit of  
a motivator 'cause if you're.

If you're doing a 90 mile routes  
and you're thinking I don't really  
want to cycle 90 miles nonstop,  
you got that motivation of, or will you know?

I'm starting to feel a bit fatigued.

Got a coffee stop and then you'd be quiet happy to carry  
on so it just breaks it up a bit I think.

**Yeah, definitely.**

**And so you said you stopped for like coffee,**  
**is that what you usually stop for then**  
**like to stop at a cafe like sort of**  
**refresh a bit** yeah yeah you  
know it doesn't necessarily have  
to be a cafe,  
you can just be a something like a you  
know newsagents or Co-op and just get it.

A costa coffee machine  
or something like that?

**Yeah, fine, yeah,**

just something to break the ride up for us all,  
**so it's just the once that you say you stop.**

**Or do you stop frequently?**

Not really, but. Yeah, no.

Just just once per ride I think, yeah.

**And so do you enjoy cycling to any points of interest.**

**So obviously Lincoln has quite a  
history with like World War Two.**

**And especially with them up by the  
cathedral has lots of medieval history.**

**Does any of that interest you do ever  
a cycle to any of those kind of places?**

I think the issues that I've lived here for.

23 years now and although you never get  
bored of seeing the cathedral or the Castle,  
you know, yeah, wonderful things.

Yeah, I suppose we look for  
landmarks elsewhere now. You know so.

We're quite happy to when we go out to look for.

You know cathedrals, churches like  
you say World War Two stuff or yeah,  
points of interest or like getting across  
to Cleethorpes and do the coast you know?

So yeah, I think it is nice if  
there's there's something to aim for.

I mean the wolds,  
of course is an area of outstanding beauty.

So it's quite nice to go there  
and just take the views.

And I think you know anyone  
that comes to Lincolnshire.

That should be a place they go because

I think it's, you know, around Lincoln.

Like I said, is flat.

But you go 20 miles out.

You just got amazing rolling Hills  
stunning views and the Hills that a lot of  
people and a lot of cyclists like so.

**OK yeah, so so just out of the context of**

**Lincoln then like points of interest,  
you really do interest you and you do.**

**Yeah yeah.**

**So if you're in another County then you**

**Would be a lot more inclined to stop.**

Yeah, that's right.

And you know if I lived in.

I mean,

I'm originally from near cleathorpes  
if I lived there as a as a cyclist I  
would be really interested in cycling  
to Lincoln doing the whole Bailgates.

Looking at, you know the history  
of Lincoln and then cycling back.

It's just because of you know my location.

I'm only two miles, you know,  
away from the cathedral,  
and we regularly go there.

**So yeah, that's fair enough.**

**So can you think of any sort  
of specific point of interest? That you have  
visited in the past  
then 'cause you spoke about the  
wolds is there anything  
that at all stands out to you.**

What is in it within

Lincolnshire or just anywhere?

**Oh, just anywhere, sort of what  
type of point of interest with?**

**You be more like more attracted to.**

Yeah, I think it. Probably areas  
that are just just pretty and that  
that sounds a bit it naff, but.

You know it's not necessarily man-made  
landmarks that we try and look for It's you know, like it's more

important to get away from flat straight,  
boring roads. Yeah, you know.

So like going on the fens or way  
to Boston isn't very exciting.

But going somewhere that I don't know,  
like. Into the wolds,  
but via somewhere like woodhall spa is a really nice place to go.

So. Yeah, I guess I guess that's it, really.

**OK, so would you still be interested in finding out like maybe information about the wolds so if you were to use an app and you were to go to this location, which we thought had really nice scenery 'cause everyone I've spoken to so far I said that.**

**They mostly stop for scenery and sort of like those kind of locations.**

**Would you be interested in finding out like the history about that place?**

**If anything significant happen there.**

Yeah I would I mean, if there's an app that you know had.

Perhaps a map or a route Finder where?

It's as you get near a location, perhaps it tells you about it, or so you know when you get back on strava, you've got.

Obviously it tells you your routes.

Yeah, it would be really quite nice if

there's an app that actually said,

well if you know near this point was this, or you know, like.

But in the wolds there is quite a lot of

World War Two stuff that is large I think its I'm not sure you pronounce it steingot there's the

Old World War Two radar dishes



and nobody ever knows about them,  
but it's it's on quite a key sort of cycling  
routes just near a place called Red Hill.  
and you know,

I think people that sort of  
visit that area completely,  
miss it and bypass it by Belmont Tower.

You know it's you can see it from miles away,  
but nobody knows what it is.

So yeah, if there is an app that told you what  
specific things were or when they got back,  
you can see it on that on that app.

I think it would be interesting.

**OK, yeah that's really interesting 'cause.**

**To have it actually so as  
you're going past there,  
rather than finding out afterwards.**

**Or yeah, OK, good to know**

because I mean most people now have got cycle  
computers and with my Garmin what it  
will do is it will beep when there's a  
sharp corner and will beep with traffic behind.  
it would be really interesting  
if there is an app that beeps if  
there is a point of interest nearby.

You know we talked about that  
idea of it deviating,  
or would I mind deviating from a route?

I would if, let's say there was a beep  
and it said actually 2 miles up there,  
you've got this or a mile that way you've got that It could  
be really interesting.

**OK, so would you sort of prefer it if it's?  
quite**

**If it's been that gamified then so  
then if you ever played Pokémon Go or  
anything like that, if you were.**

Yeah I know it yeah  
**so if you went about your way to sort  
of find these locations and then  
maybe get a reward for visiting that place,  
is that something that would interest you?**

Yeah, I mean that that is something that would interest me.

I think when you say gamified,

I think it.

I kind of get where you're going with that.

I think a lot of cyclists are,  
so you've got kind of you cliquey cyclists.

Yeah, in like are very serious about everything.

And then you've got your kind of  
people that like just getting  
the bike and go places.

You could try and find that balance.

With the whole Pokémon Go thing,  
and getting a badge,

I think a lot of people would go for that.

Younger people, yeah, you know.

Like on Strava as an example,  
you get like rewards.

You get badges.

If you do.

I don't know certain  
challenges per month and stuff,  
and I think people do like that.

I mean, obviously there's the obsession of getting  
records and fastest times and all that stuff,  
**yeah**

But yeah, I mean,

I personally I would like that kind of gamified thing.

But I'm not so sure that people I cycle with.

Being that they're a lot older than I am.

Not sure if they would go for  
that kind of thing or not.

**Yeah, that makes sense and I sort  
of got that impression.**

**Definitely from the very like avid cyclist.  
Want to do it in massive groups and  
so far they just want to get on the bike.**

**And you know, yeah,  
it's just looking at.**

**So the demographic again and just getting a  
gauge of what type of cyclists would enjoy.**

**That yeah, but you know,  
it's definitely something that**

**I take into account.**

**And.**

**So do you cycle socially?**

**So do you find it important to cycle** other people?

Yeah,

I mean you know like I said  
when I first started I was I was  
cycling by myself and it was fine.

But I think if you go for 40 miles and it  
starts getting a bit boring.

You know 'cause you can.

You can use the time to  
think about work or this,

that and the other or just

just for mental health but.

Yeah, after about 40 miles you know  
for two hours you start thinking I  
just wanna be home now yeah so yeah  
that the whole social thing I think  
is really important to cyclists and.

You know, in particular  
if you're going somewhere.

You know you enjoy it more if you share that  
experience rather just seeing yourself.

Like anything,

I guess you know if you go to a  
gig and go by yourself and get  
home and tell people about it.

But it's much better to share the experience.

Yeah, thank you.

It's nice in the social side of it.

**OK.**

**So you spoke about Strava. And So what?**

**What kind of technology, then do you use?**

**Or Strava and mobile applications?**

**Yeah, if you just.**

**Which ones you use the most?**

Yes.

Certainly. strava I think.

strava is the one I used

the most over over the years.

I have a Garmin 1000 Computers, cycle computer so that  
naturally connects to Garmin Connect.

Also smart watch that  
connects to Garmin Connect so.

I guess you know because  
of the technology side.

I guess I use those two apps.

And I use ride with GPS 'cause you  
can basically plot your own routes,  
download it as a TCX file and just  
drop it into your cycle computer,  
and then it navigates as you're going around.

So that's really useful.

But yeah, that's about it really.

I mean, I've used,  
you know I've used things like zwift.

Obviously indoor training stuff.

I've used a full gas which  
is like a virtual one,  
so obviously ive trained on Turbo trainers,  
now you've got that resistance and So what?

What this is real sort of real time video,  
so the harder you cycle the quicker you  
go in the video and you know.

So it's quite good.

And then theres commute,  
which I've only just started using  
so im a bit flaky on that one,  
but that's another sort of good route app.

Sorry, which is which is alright.

**So what do you like about these apps then?**

**Is it the interface that sort of?**

**How easy they are to use is that  
what will attract you to them?**

Yeah

I think I like the social side of Strava,

'cause obviously you're  
connected to a friend.

And all the cyclist in the local area,  
there's that competitive. side as well  
that nobody  
likes to admit to, but you know,  
if you get like the fastest.

I don't know segments or,  
you know you have got that kind of buzz  
and you want to go out and do others.

See, I like the competitive side of.

Strava for and the sort  
of social aspects of it.

You know that you can comment  
on peoples rides and stuff.

And upload photos.

I think you know that's that's  
really quite a nice feature.

But your garmin connects.

That's really good for stats, \_\_\_\_\_  
the interface for the stats is  
brilliant so you know you can look  
at your last seven years in a chart.

Your last year you can look  
at your last week it's.

I think it's a lot more detailed  
in terms of the way that it connects on Garmin

Connect and it is for Strava.

But with Strava, you know,  
like I say it's more that that social side.

I think that is it's got its pull.

**OK so yeah, so so social networking is  
sort of one of the most important aspects.**

**Then for an app.**

I think it is in terms of motivator.

I don't plan.

I don't plot my routes on Strava,

I find it a little bit tedious,  
but I do quite like the interface.

You know,

I like going to the home feed and

scrolling through and looking at what  
people have done that's a really good motivator.

But yeah, in terms of stats and information, I think garmin connect is better.

But I do find it a little bit clumsy  
as to how to get to things 'cause  
there are so many buttons that unless you've been on it  
quite a lot since  
it's very hard to navigate it

**OK, and so do you find that you're  
sharing quite a lot on strava then.**

**So you add to your newsfeed quite a lot.**

Yeah, I mean yeah, I upload every ride.

I mean it does it automatically  
when I get home.

It's just I've got that settled.

And. Yeah, I think I use strava  
more than anything else in terms of,  
you know, put all my stuff on there,  
putting photos up there and. Yeah,  
it sounds really again a bit cheesy,



but it's just nice that you can see globally.

I mean, I've got friends in other countries and you can see what they're doing in their places,

and you know, I think yes,

I said again, another bonus really.

**So back to the point of interest.**

**Then if you would get a ping on your phone that you're near a point of interest would you take?**

**Would you like to use the app to take a photo of it and then share it on the news feed that you got this actually?**

Yeah yeah.

So like on Google Maps, of course you can.

Go to places and pin it take photos

Yeah yeah I would do that, yeah.

**And so would you most likely use technology before, during or after your cycling session, or just throughout.**

I would use it before hand going on the ride is just to plot the route.

During the ride I only tend to use my cycle computer for navigation purposes.

Although I do like taking photos.

Well im a photography teacher so I should be but you know so yeah,

I like to take photos.

During the ride.

Then I suppose it's the data,  
and then again the social kind of  
sharing your ride looking how fast  
you've gone compared to the people who  
went out with or you know other  
friends have been out on the same day.

When you get back I guess OK.

**So. This is more about the yeah,  
the mobile applications that you use,  
so I'll just skip that 'cause  
we spoke a lot about Strava and  
the reasons why you choose it.**

**Do you own a iOS device  
or an Android device iOS?**

IOS

**Is there any reason for you why you pick apple?**

I suppose a bit of brand loyalty.

'cause I did graphic design degree with.

With Mr Christian.

So yeah, I guess I've always been Apple.

I'm not a fan of Windows.

I don't like the interface.

Forced to use it at work,  
so I guess it's kind of  
rebellious against it now,

but now I just I just find I like  
the interface of Apple products.

I think it just looks that bit more  
polished but I will find it easy to  
use because I've always had Apple product.

**So yeah, it's the camera as well.**

**They're always a lot better.**

**Yeah, especially when you're  
taking photos on your ride,**

**they don't usually look as good on Android,  
yeah? No that's fair enough.**

**We spoke about What features of Strava etc  
that you find interesting?**

**Is there any technology that  
you would like to use? you haven't got around to yet.**

Yeah, I mean I'm looking at  
the idea of getting a power meter So it would be interesting for  
me to see you know how I'm sort of progressing in terms of my by wattage.  
But I think you know you're looking at sort  
between 5 to 800 pounds for a power meter,  
which sits in the cranks. So you can.

I mean the new ones coming out.

You can get in pedals and stuff, But yeah,

I mean that's something I'd like to do.

Just I like to get information about how

I'm cycling and how well I can improve.

But yeah, yeah, I think that's

that's about it, really in terms of.

Other stuff that I would like  
to use from cycling

**And sort of back to the historical  
sites we spoke about before.**

**What can make these more interesting to you?**

**Then? Do you like finding out  
information while you're there?**

**Do you tend to stop and read plaques.**

Yeah, yeah I do

I mean they're scattered all through  
the wolds and you know, Lincoln,  
has got an amazing RAF history so.

I think it was called 100  
voices or something like that.

Which was all the RAF places around here.

I think it was associated University of Lincoln.

And they put all the plane wings up  
and all the different places around.

Lincolnshire had a number of things like this were going from  
like 1 to 100 and cycling around I missed out on that and it looked  
really interesting, so any sort of.

Yeah RAF stuff.

Obviously we've got the red arrows here as well.

But yeah, I think anything that's sort of to do with beauty.

Anything to do with RAF  
anything that's about Lincoln's  
heritage or Lincolnshire heritage.

Because I'm a Lincolnshire lad and the  
route on the other side of the wolds.

Uhm?

Yeah, I'd be interested in finding out more.

Yeah, **so you find World War Two and RAF  
history a lot more interesting then yeah.**

I mean I've got.

Yeah, I've got an interest in history anyway.

Yeah, so you know if the wife  
goes off and I'm sitting there  
watching World War Two in color,  
which is something. Yeah, that's nice.

**OK, and so I don't know if Wayne  
told you a bit about my app**

**I'm sort of focusing my research on  
its augmented reality oh wow.**

**Like I mentioned before,**

**Pokémon Go 'cause you use phone and you see, Pokémon**

**That's sort of what I'm  
looking for to make in my app.**

**So if you were to go through these  
points of interest in so it won't  
like the wings like you said,  
you would hold up your phone  
and you would see.**

**Maybe like a Spitfire or just any relevant.**

**Yeah, World War Two fighter jet,**  
**yeah, is that something you would**  
**find quite interesting then to**  
**go out and see**  
yeah you know it really is.

There are so many routes that  
we go on where you can tell it's  
it's an old runway and it would  
be really interesting to know if  
it was a runway that was used you know, back in the 40s,  
thirties or whatever?

I mean, there's a lot of abandoned runways and stuff.

So yeah,

I think I would be really interesting,  
you know,  
and you've got a lot of  
airfields round here now.  
that are still used.

You know most of them as roads,  
but you know there are like this.

RAF Wickenby

There are a few others that I can't remember the name of yeah I would be interested.

**Is there sort of any particular way then?**

**So with augmented reality in mind,**  
**would you prefer to see?**

**Maybe like visually with models?**

**Or would you like to hold up**  
**your phone and see text? What?**

**What sort of stands out to you more are you more like a visual learner  
or you'd like to sit down and read?**

I'm a total visual learner, you know,  
and if you're if you're middle of  
a ride I think reading alot  
of text would be a turn off, yeah?

You know, perhaps something is

That is very to the point or something  
that you can slide through.

It just gives you like key.

Things that are in that area.

Yeah, you know,

I don't think a lot of cyclists  
unless they are tourists and  
cycling around leisurely.

If you like,

I don't think a lot of cyclists  
would stop and read lots and  
lots of text about a certain place.

I mean, I might be might be wrong there,  
but certain people.

I cycled I don't think they would

But yeah, if it was straight to the point and just said  
this is the birth place of this  
or this is where you know the

Lancasters flew from or you know  
something that's quite punchy and to the point can be very useful.

OK.

And so there's two sort of  
main uses of augmented reality.  
markerless and marker based so.

Marker based would be.

For example,  
if you were to hold your  
phone up to an old building,  
old ruins or something,  
and then it would use that building to then project  
what it used to look like.  
would project information onto that  
building or marker less is it doesn't use.

It doesn't sort of scan for anything,  
it was scanned for the floor,  
and it tends to use two or 3D models more.  
if you can think of the use of augmented reality,  
then is anything off the top  
your head you'd like to see.

So just 3D models or you'd like to see  
some of it projected onto something.

I think onto the buildings  
would be amazing actually. You know, and often you'll go places you and wonder what that used to look  
like or.

You know, I think anyone that's got  
any sort of interest in history.

If you can look at the building and see  
what it looked like 50 years ago or location,  
that would be amazing in terms of.

The models. You know, I know that.

If you hold your camera up,



you get things now where you get things like Jurassic World and get your dinosaurs or Google animals you get it.

I think I would be really interested so I like both of those but I think both of those have got really quite nice potential, **so even a mix.**

Yeah, a mix of both,

**Can you think of any examples augmented reality that you have used in the past? any apps or anything.**

Jurassic world No, I mean only really.

Things for the kids nothing.

Nothing I've particularly used.

No, not really.

I mean just the Google animals.

You know, the 3D animals, yeah.

Which sounds terrible, yeah, that's it. Really.

**Did you ever go cycling as a family?**

**Then like do you think it's something like your family would be interested in using**

Oh yeah they would.

Yeah, particularly with my oldest son who's 6 my youngest is only four so he doesn't go very far, really gets very tired. But yeah,

I think teenagers would be interested in it, you know, young children.

If you could go on a route.

And there are certain things that  
you could see along that route.

I think I think that's that the winner for  
kids, you know it keeps them motivated.

You know, like Pokémon,  
you know if you're collecting stuff  
or you're getting awards and stuff like that.

You know, yeah, yeah, it definitely is.

**It would open up target market  
bit and the demographics.  
sort of just Lastly,  
is there anything you could think  
about on your cycling route?**

**That could improve it.**

**So it is quite open question.**

**Yeah, is there just anything you like?**

**Tell me what your cycling experience.**

**It can make it better.**

I think. If there's more awareness  
for motorists of what it's like  
for cyclists, you know, yeah,

I think in the UK we're so far behind  
the rest of Europe in terms of,  
you know your attitude toward cyclists,  
it is dreadful in the UK.

I mean, Lincolnshire is as bad as anywhere.

So yeah, I think you know if

we could get more awareness of.

What it's like to be on a  
bike with car flying past you.

That would certainly help.

yeah, the overall experience  
that you know it's only  
really positive and I think.  
like you touched on about.

If there are places you can go to  
points of interest and things like  
that and actually find information about it as you  
rather than just

sort of guessing it as you go along,  
or that's that looks good.

What I think that  
touching on the idea of if you hold your  
camera and find out what things were,

I think that would be a  
really really nice experience.

You know like ive siad,

I've lived in Lincoln a long time,  
but just I still go places and

I don't know what things used  
to be when the kids ask me.

So yeah, anything like that I think would  
be a really cool experience as well.

**OK, so it's quite important**

**'cause I'm working with visit**

**Lincoln Lincolnshire Tourism. Yeah,  
and we've got preplanned routes by the by.**

**Visit Lincoln so it's  
quite important to then to.**

**To have Cycle safe routes.**

**And yeah, somewhere where you don't have to worry**

**too much about motorists and yeah,**  
not just getting off the roads

I think is is a real plus.

You know?

I mean there are so many  
routes in Lincolnshire,  
that's there's no reason  
you have to get on an A-road

You know you have to cross the roads,  
but yeah, if there are routes  
that were plans that were.

One you know, not just flat Fenn roads and roads

that were safe and you know,

I mean, we've got amazing cycle network.

When you go down to witham.

I mean, you can go so many different  
ways and stick to cycle tracks all the way up  
to woodhall spa  
never actually touch a road.

So I don't think a lot of  
people realize that.

So yes, if that network was perhaps highlighted  
with more particular people, you know.

Come to visit Lincolnshire.

But yeah, who were scared of going on  
main Roads and think im not going to cycle because that will mean roads,  
then that would be a real plus for anything.

**OK.**

**I'm yeah it's everything I'm gonna  
end the recording quickly, OK?**

## **Participant 5 Transcript**

**How often**

**Would you say you cycle in the week?**

Uhm, I probably cycle 4 - 5 times in a week.

I can't give you that exact  
like measurements, but from our house  
to do you know where the pyewipe is?

**I think yeah, I've heard of it.**

I probably cycle up to  
saxelby and then come back.

And just to exercise,  
and sometimes I cycle down to morrison's.

**Yeah, OK so. So for the  
reasons you cycle then do you cycle,  
then for exercise,**

**or for like leisure or social**

exercise, leisure and just to go back  
to shops for stuff.

But I wouldn't cycle to work, it's so close,  
but yeah exercising as well **OK?**

**So do you know sort of the distances  
that you cycle or just just how  
long like each ride takes up?**

My usual like exercising,  
cycling route and it will take me around.

50 minutes in total.  
coming back and for leisure taking up 20 minutes if I'm gonna  
go to the gym or if I'm gonna go like to.  
morrison's.

**OK cool, So what makes you decide the  
route that you're gonna take then do you always stick to the same route?**

Uhm, so it really depends on like  
what Google Maps is saying.

Like I will check what route it says  
and but most of the time I don't  
stick to it because it's like asking  
me to ride on like the road and

I hate riding on the main road.  
try to ride you know to ride

on a pavement and stuff

on cycle route and I don't feel  
like it really notices it so much.

So I I try to follow it.  
but I will go wherever I think is  
the safest route. For me to cycle.

**OK, so safety is quite a big thing then.**

**Uh yeah,**

**OK uhm and do you tend to stop sort  
of like on your longer journeys?**

**Do you tend to stop for a break or anything?**

Uhm,

I will stop to like have a sip of  
water but I've got like a basket  
and stuff but like I won't stop  
and sit down and rest somewhere.

It depends on why I'm going out.

Like if I'm going for leisure.

I will go all the way to saxilby and then

I'll stop there for like an hour  
to read a book and then come back  
but that's the only time ill stop

**OK.**

**So on your journeys,  
do you visit any points of interest  
so this can be anything from like**

**'cause Lincoln has a lot of history.**

**UM, so like, you'll find a lot of airbases,  
lot of castle stuff like that  
do you tend to stop for anything that  
you just find interesting in your route?**

Uhm, so like the main route I I always use  
the same route to go down the same path  
because it's like a cycle path and it's like

Near the Brayford so it's really nice and  
then I usually stop at like burton waters,  
which is like a little area full  
of like and parked boats and stuff.

And like luxury houses,  
which I think is really nice to look at.

I will just have a look and explore there,  
but that's where I mainly stop.

I never really cycle up to the castle,

Its too much hassle.

To cycle up there its better to walk up there **OK, so uhm, if you were to stop for something then  
it would be sort of more for scenery  
then rather than history**

Yeah **somewhere that's Nice to look at.**

Yeah I will stop on the Brayford  
as well and just relax there as well.

**OK.**

**Uhm, do you think it's important  
to cycle with other people?**

**Do you cycle socially?**

I've cycled once socially no couple  
of times socially and I  
think it makes the journey nicer and

stuff and but when I'm cycling with  
someone else I usually have my earphones  
so you cant really talk to them  
but I think it's a nice activity  
to do just to have company.



**But usually you cycle on  
your own then**  
yeah.

**Alright, so do you use any technology  
when you're cycling so  
applications anything like that?**

So obviously depending on where I'm going,  
either Google Maps and I'll use my

Fitbit app like to calculate  
like my distance and Spotify.

Those three

**OK. So like, why do you use those apps  
then?**

**So more for like navigation and health.**

So yeah, navigation and health and just  
to keep track of like the distance traveled,  
how long it's taken to get

there and Spotify for music,  
but mostly use that for anywhere.

And and just Google Maps just makes

Sure im going to the correct place  
and im not getting lost and stuff.

**Uhm? So would you most likely  
use technology before, during, or after a  
session or just  
throughout the whole time?**

If I'm gonna cycle down a route I don't know. I will use it before and  
during Google Maps to know where I'm going.

Spotify throughout the whole time  
and I will use the Fitbit app  
for the whole time as well. OK.

**Uhm? I'm do you own an iPhone  
device or an Android device?**

Yes.

**Iphone?**

Yeah Iphone

**Obviously I know youve got airpods in,  
but it's for the transcription,  
yeah**

**So why do you use iPhone then?**

Uhm, the reason why I have an iPhone is  
because I've been using it since I was  
younger and it's just so much more straight  
forward in comparison to an Android,  
and I feel like it's faster  
than Android or the like.  
Android is technically better if  
you if you want to do other stuff,  
however I feel its just more for let's  
say dumb people and I'm one of those  
people so I just like being straightforward.

**OK so like comfort then  
it's quite a big thing.**

**Then when you're using apps.**

I like knowing how to locate everything on the phone.

I would never go and buy an Android  
just because then it's much

different the layout and everything.

Yeah, fair enough.

**UM, is there any technology  
that you'd like to use?**

**Like any applications or anything like that,  
but you haven't got around to yet.**

For cycling.

**Yeah yeah, for cycling or like uhm.**

**Hiking or anything sort of similar.**

I don't really. I don't really like.

Look into it if there is any  
like apps that I would want to  
use or like there are any apps for cyclists and stuff like that.

Its not something that Ive really looked into to be fair not really no  
**so do like historical sites interest  
you come so obviously the Lincoln has  
its castle and cathedral do things like that interest you.**

Yeah, definitely.

**Uhm, why is that?**

**Just like finding out information about it.**

Yeah, it's just, it's just nice.

It's different because.

In the main city, you don't really  
have a lot of history and culture,  
but if you go up, to steep Hill,  
that's where you experience  
the most history and culture.

And then because you lack it so much,  
in general life I feel like it's nice to  
go up there and always, you know,  
go back in time like oh wow,  
like you know,  
people used to live in a certain way and you  
know how they  
built this and just question things.

That's why I like it.

**Is there anything that could make  
them more interesting to you to like,  
motivate you a bit more to go up there?**

If it was, if it wasn't going up the hill,  
probably yeah, **so accessibility then  
yeah**  
like accessibility.

Like if we had like a bus like easy access  
bus going up there probably that and then.

If the weather was nicer,  
more often, but I tried to spend like I,

I go up there more often than I used to.

Just 'cause I would love  
sitting in the castle area.

So that's when I'm sitting inside there.

I feel like I'm out of this world  
so it feels like a completely different world  
and different area and so yeah, **OK.**

**And so for cycling as well.**

**If you had like a route that was**

**a bit easier to follow,  
then you'd be more likely to  
go up there with your bike.**

Definitely easier and safer as well because there's like a

Steep hill which I  
don't think its too safe 'cause  
it's so steep and we have loads of  
people up there as well and there's  
a couple of other routes that are so  
steep like I don't think you could  
even cycle that's how steep it is.

Yeah, and also like I'm not very fit.

I can cycle but I can't cycle uphill.

**Yeah, me as well.**

**Uhm?**

**So when you're visiting like one  
of these historical sites then and  
you're gaining that information.**

**How do you usually get your information then?**

**Just just in general?**

Uhm, Internet. or like there's always like posters,  
and like when you're on the site,  
there's a little things that you can  
read through their stuff like that's  
more accurate than what is on the Internet.

But that's just those two methods.

Or like sometimes like I will ask it  
like when someone is working in the castle.

Just get them to like give me a

brief or something.

OK, so do you think it would be a good idea then?

Uhm, so when you're at one of these locations to have your phone recognize it and then show you that information like so, you can have it on demand.

Yeah, that would be good idea because

like if I was going on Wikipedia one

I might not have access to the Internet two and it takes time three How, how accurate is what is on Wikipedia, you know?

So what you said?

OK yeah uhm, I think youre frozen.

Can you hear me? Oh yeah. Uhm?

Yeah, we spoke about what would make these sites bit more interesting to you then come and it'll mostly be.

Uhm, so they're just a bit more accessible and sort of like getting the information.

And can you think of any examples of augmented reality they've used?

Do you have a knowledge of augmented reality?

No. So. Give me some.

Talking to me about what it is first, so augmented reality is it's when you use your phone camera and it will

**project like a like an image or  
a 3D model or like text over it.**

**UM using your camera so like**

**a Snapchat filter.**

**Uhm, you know like the dog  
filter and stuff like that.**

**Yeah yeah, that's that's augmented reality  
because it's using your phone's  
camera to project an image onto you.**

Yeah, I think I've used it like once or a

A few times, but I had this it was like a space app.

So you can use that and you can  
see like how far stuff are  
in comparison to you or it was like.

I'm not sure if it was a space  
app or if it was A history app where you get to see  
like things in real life size.

That kind of thing, but that's when I probably used it with Snapchat and stuff.

**OK, so would you like sort of to use  
this kind of technology then?  
while you're cycling and if  
you were to hold your phone up  
at a location for it to show, you show  
you information.**

Uhm? While I'm cycling to show me  
information like about the place I'm at.

**If you were to sort of stop,  
stop up like if you were to sort of get  
off your bike at a point of interest,  
like a like a location or something.**

**UM, like for example, the cathedral.**

**And then you want to use your like phones  
camera and it'll show you information.**

Yeah, I would definitely use it.

Like uhm, I feel like it  
will just make life easier.

OK, if it can like multitask like if it can  
show me a route and also like show me  
like the information about the place.

I would definitely use it

**OK?**

**Uhm? That's all the questions Ill end the recording.**

## **Participant 6 Transcript**

**So how often would you say  
that you cycle in a week?**

And so I try to try being  
the the the best word for it, and I try for at least once or  
twice a week and there's a short and there's a short eight mile  
loop that I like to do and around where I live and as a minimum.

However, I do try to go out with a bunch of friends and at least once a week, or at least every fortnight and we  
will do a ride from 20 miles to

50- 60 miles dependent on what the weather conditions are like and.

So, and I've I've got multiple bikes, so the routes vary yeah each time,  
so when I say how much do I cycle and sometimes a little sometimes alot OK  
**and and So what reasons do you cycle?**

**Then you said that you cycle with friends.**

**Do you find that most cycling for**



**like socially or for leisure?**

And so with the type of job I do, and so when I say that I try  
to go at least once a week, I've got short loop where I am,

and I do that loop mainly just to give myself effectively about half an hour,

45 minutes down time and just to get get  
away from and get away from everything.

And it's a route that I do with it.

It's it's more of an on off  
road trail route.

And So what I'll do is I'll put my  
Headset in and then I'll just  
listen to an audiobook or  
some music whilst im cycling,  
and when I go out with them with  
the lads typically that  
is more of a social ride or we're doing it in in terms of where.

The training is probably the best word,  
so we sometimes where we're  
on the road bikes down.

That's when we're doing  
our distances and but,  
and we've then got hybrids or  
touring bikes because we do a cycle  
each year and like a coast to coast  
event and obviously with COVID we  
didn't manage to do it last year.

Were probably not going to do it this year,  
but next year we've got a 210 mile  
route planned and that we're going to  
try and do in either two or three days.

**OK, so would you say that cycling socially then and  
cycling with friends is**

**sort of a good motivator then?**

Oh yeah, no definitely.

And but definitely yeah.

Oh, it's very difficult.

So if I was to go out cycling on the road,

I wouldn't be able to wear a headset  
and listen to music and stuff,  
and only 'cause you.

You've got to be able to hear  
hear cars and stuff around you.

And when you when if I go  
cycle on trails and cycle paths  
and stuff like that I can.

I can I can I can listen to a headset

cycling with friends you do have  
that social aspect around it and.

Let let's say out we we go go  
up for a 50 mile bike ride.

Halfway round typically is  
around lunchtime is when we stop.

We might end up stuck in a pub and  
end up having a pub lunch, pint and  
then cycle back so it's more of a

It's it's basically to  
escape everyday life, right?

So I've I've got I've got the I've got  
a wife and a baby and and as much as I

I love my wife and my like 2 year old baby.

My wife enjoys it when she gets time  
with the baby to all to herself.

And she also probably appreciates  
that I'm out of the way, because,  
yeah, it's one of them.

I might get in the way sometimes.

**No, I get that. No, that's fair enough.**

**I'm so you were saying a bit about  
how you'll take breaks then yeah.**

**So typically you then stop is that**

**What you stop mostly for then like sort  
of pubs or bit of refresher.**

So it's a bit of a

Effectively a refresher snack and not

Not so much to kind of rest the legs  
The worst thing is actually  
stopping on a large ride and then get  
back getting back onto the saddle  
because the backside hurts and  
but I'm I'm I'm actually type one  
diabetic so I've actually got to.

Stop now and again to test my  
sugars and test my glucose level.

And it has got a lot easier with  
that there's actually something  
called the freestyle Libra,  
and it's a sensor that goes on  
the arm and I can use it.

I can use NFC on my phone scan.

It's time you want.

My sugar level is and but I've  
got to stop every now and again  
just to kind of check back if I'm.

If I'm not feeling too clever

and but it's mainly the the main  
reason why we stopped for any long  
period of time is for lunch.

**OK**, well to have a pint.

**Makes it easier, to have a pint.**

**Uhm, so do you ever come across points of  
interest then on your site on your route?**

**uhm, so I know you like some sort  
of your trails and off roads.**

**Do you enjoy visiting points of interest?**

**So this is any sort of landmark?**

**Or just anything that interests you?**

Yes, so we. Recently,  
over the last six months we've actually  
been using an an application called

KOMOOT and KO and Double O double OT.

And I'm using and commute  
and it actually has some.

It's probably gonna be awful for

Your transcription,

but you can actually look and it's got

points of interest that are dotted on the map OK,  
and what it allows you to do is it allows  
you to plan a route so you can move from one  
location to another location,  
but you can tap on those points of interests.

Now those points of interests of  
people are points of interest that  
maybe other users of the application  
have gone and put on it.

And so for example, there's an area and and it's called

Hail Hail Lighthouse, so it's a point.

It's it's the.

It's a lighthouse set in in  
in a little village called hale.

And.

What what we might do is  
we might do a loop ride,  
but add that in as a point of interest to go

to and by using a touring bike,  
it allows you to get off the off  
the road onto the cycle paths to go  
to those points and and effectively  
also gives you a target to aim for.

And so if I wanted to cycle to

Tatton Park and tatton park to me  
is about 25-30 miles away.

So that is my point of interest.

That's my point of reference.

That's where we're cycling to for the day.

But what we'll do is we  
won't do it there and back.

Will do it as a loop,  
so we actually get to see a little bit more,  
and we're not seeing the same same thing.

And but that we we aimed  
for a point of interest.

OK, yeah, it's really interesting.

**UM, I'd heard of the app before,  
but I didn't actually know I hadn't Used it myself, so that's really similar to sort of what I'm  
looking into,  
uhm, is there so?**

**And you said before like where  
you visit in the past?  
uhm, is there any particular type of point of  
interest that you find like?**

**That you find interesting.**

So yeah, yeah. Yeah, no. So there's.

There's not anything like that.

I find interesting that I'm  
not going to go right,

**OK,**

I want to go and see this castle  
here and I'm always gonna be  
looking out for castles and or  
farm houses or whatever it is.

And it's basically just there.

A point to go to.

It's it's an excuse to go out when ride its  
an excuse to go on a different route.

So before the whole application  
and cycling along with  
friends for quite awhile now.

And. doing the distance,  
ride for at least,  
and at least let's say 10 years or so,  
if not a bit more.

And we used to be stuck doing.  
Typically a 40 or 60 miles  
ride around where we lived,  
and that's only because they  
were the roads that we knew.

But with the introduction of applications  
and then I've also got a little GPS  
computer and that'll just that  
save and download the GPX file to.

It allows us to go to these different  
different places that allows us to get out,  
and it's a change from the norm,  
so we now don't have that.

Let's say that one route that we always do.

We've got a we've got.

Let's say we've got a select few routes  
that we may always do cycle about.

OK, let's go out and we'll just  
do 30 miles or what have you.  
but by using the application

that's allowed us to branch out  
and go out slightly out of the area  
and actually see different things.  
Try different different new roads  
and different routes and then  
from there we can go right.

OK, yeah, we didn't land that stretch of it.

Let's use that.

But then let's go down here  
and have a look down here so.

By using stuff like that, it's not.

We're not going for something particular,  
and we're just going to use it to

Change what and break from the norm.

**OK, so when you're visiting these  
locations then uhm.  
when you get when you cycled passed it,  
would you find it interesting then to find  
out a bit of information about that location,**

UM?

**Or to see something,  
maybe visual, uhm?**

It depends what that location  
is right and so.

What one of the rides we did we went to.  
We literally just got to the place,  
called the Barton Swing Bridge.

It's basically an old bridge.

Its swings and allows boats to come through right,



nothing like, nothing exciting, right?

There's a little tiny plaque him  
on it that gives it a little bit  
of history on

That was literally the point of interest.

We went there and however, uh,  
another area that we go to,  
let's say tatton Park and I've  
mentioned that a bit earlier.

That again, and it's a point of interest.

They do a nice coffee in the courtyard.

In what one or two of the lads that I cycle with,  
they may be interested in knowing  
a bit more about that location and.

To to to me uhm,

I think it depends on what it is that

I'm going to see so we've done not last.

It's about three years ago.  
We've done Hadrian's cycleway,  
which is a coast to coast route,  
and we followed the old Hadrian's Wall.

Now there's not much of Hadrians wall left.

And but it was interesting to stop  
at certain points along the way  
to see what what effectively what  
that part of the route was like.  
or part, the wall was like,  
but I I think it depends on what  
it is and it's like if I go to a  
lighthouse I know it's a lighthouse.

I know what the lighthouse does.

**OK, see you you'd like that  
bit of choice then,  
so you'd like to see what the points  
of interest are along that route,  
and you only really stop and have a look  
at the ones that you find interesting.  
like yourself.**

Yeah, and typically it's even a  
point of interest, which is.  
That's the the point that we're aiming for,  
and then that's what we're gonna  
kind of stop and have a look around  
and maybe get a bite to eat then.

But As for trying to get information  
and typically it's only stuff that  
if it's really, really interesting.

If it's like that, that's quite interesting,  
like in a little village called  
hail and they've actually got.

A It's it's a big fossil.

It's called the dinosaurs footprint.

OK, it was interesting.

It was random.

It was in the middle of nowhere  
in a little Moody village.

We'd stop because there's a bakery there  
and I'm just spotted the sound that's a  
dinosaur footprint we went to then we had  
a look just to see what it was all about.

It was tiny, but but it it gives  
you the information about it, and but we  
didn't actually know that  
we just stumbled across that so.

If there's an, if you stumble across something  
then then that's quite quite cool.

**OK, so being made aware of things  
that you didn't necessarily  
know was there before.**

**OK.**

**Uhm, so you spoke a bit before about  
what technology you use. sort of?  
for navigation.**

**You put GPX files in, UM,  
so why do you use those?**

**Like why do you use that  
particular technology then?**  
because I don't want to  
put the phone up on the UM on  
the bike on the handlebars and.

That and use the phone for  
navigation because using the phone for  
navigation is great.

It eats the phone's battery.

Yeah, absolutely destroys it and.

By using a little cycle computer,  
because it's got the maps built into it.

You've gotta put you've loaded  
your route onto it.

And the battery on it is a lot better.

I can get good.

12 hours of cycling on that  
and with navigation.

Where was on my phone if I tried to do it?

My phone would be dead after a little while so.

**OK, so for a mobile application then.**

**Uhm, it would be ideal for you.**

**To not necessarily have  
to use it the whole time,  
but maybe to use the application sort  
of at certain locations rather than  
having to run it the whole time just to  
preserve a bit like your battery.**

Yeah, yeah, pretty much like.  
If I ever went to because,  
but we also do a bit of hiking and  
there's an app called like viewfinder  
where you go stand at the top of  
the the the top of the hill, right?

And you can then open up  
viewfinder and uses there.

The phones camera you turn around  
and it basically tells you.

Well, thats Helvellyn that's this.

That's that.

And you get to kind of see  
the different peaks and.

Unless you know the area you're  
not going out and.

OK, but typically I wouldn't  
use the phone to navigate me.

I'd end up using the normal map type thing,  
and in that instance until I got  
to a point and then I've got the  
novelty of that app to then be  
able to have a look what's going on.

**OK, uhm, and so the technology that you do use,  
would you most likely be most  
likely to use it before,  
during or after the session,  
or just throughout the whole time?**  
effectively throughout the whole time.

And I use after after a session.

If that I'm done with cycling but so basically.

Have a look at how far I've gone.

Average speed and time it stop.

And how fast ive gone in  
certain points and so so.

So we've got to kind of brag that  
you've gone faster than someone

else right downhill, so someone,  
someone anchored on the break from the  
distance ive done stuff like that, and.

If I get to it and forget to the  
point and then I'll use to check  
check on the route where we are,  
what the kind of the the next expected  
points are going to be.

If there's any climbs that  
we've got to kind of,  
we're going to be coming up  
against and then obviously to keep  
in touch with family.

And just to let let the wife,

Know I'm safe.

And because although im out with the lads and stuff and

And theres that many accidents  
that happen on bikes?

It's kind of good just to  
kind of check in to say yeah.

But also basically saying yeah  
don't put tea on just yet.

I'm still going to be a few few  
miles stuff like that, right?

**OK, uhm.**

**And so we spoke a bit about the  
mobile applications that use then,  
are there any?**

**You could just list for me then**

**so you said Komoot, yeah,  
viewfinder**

Yeah, so Komoot view finder and Strava  
and Garmin IQ and.

And Garmin connect and they're the ones  
that I typically use the the most,  
what when, when,  
when doing them, cycling and walking,

and stuff like that, and.

And then a good Google and Google

Maps effectively **OK,**  
**and So what would you say?**

**Your main purpose then of all**  
**these applications like do you use**  
**them for what sort of, UM, yeah,**  
**what do you mostly look for?**

Tracking

I'm using it to track the route  
that I've done and to give me a.

To effectively just give me a history of of what I've done.

So basically so I can see

exactly how many miles I've done.

So this year I can see that I'm  
aiming to do about 1000 miles  
this year and I'm just right now  
and I'm just started effectively.

Just started 7 seventh month of the year and.

We are let's have a look.

I'm just I'm about 60 miles under  
what I should be right now,  
so it's basically I've set myself  
a target and and I'm actually just  
under my halfway mark for the year.

So probably get on the bike later.

**It's fair enough, so yeah, it's.**

**For keeping track keeping records.**

**And sort of data, yeah?**

**Uh, do you use a iPhone or an Android device?**

Android.

**Is there any any reason?**

Yeah there's there's two reasons.

One of them is because of my job and

there's certain applications that I need

to have that aren't available on Apple.

Apple is very restrictive with certain aspects of their device,  
especially when trying to do and.

RF signal and just doing basic RF signal  
checks and whereas you've got that ability.

I know on the android and the the other  
reason is, uh, I prefer it.

I've used an Android and.

Pretty much since the Galaxy S2.

And so were now on the S20 now,  
so it's been quite awhile.

**Yeah, fair enough.**

**Yeah, just now I'm starting to look at developing it's a lot easier to  
build it  
on Android than it is.  
on iPhone?**



**Yeah, that's what we're sort of  
finding at the moment.**

**So uhm, is there any technology that you would  
like to use but you haven't got or  
haven't got around to using yet?**

And not necessarily,  
typically, if I'm if I want want  
a technology or want to try try it,

I I have done an or if it comes to  
to work wise and I tell my boss this is  
what I want and he says yeah just buy it.

And then. give me the reason  
for it and I give him a reason.

He says yeah OK, it's a valid reason.

You can have it. And.  
typically, and there's there's  
nothing really I want to try.

But well, I could say I wanted.

I can't, I can't even say I wanna try  
the SpaceX stuff because it's  
it's not gonna be possible, right?

Well, I hope everyone can  
have a dream of being an astronaut

**No, that's yeah, fair enough, uhm.**

**So yeah, nothing, there's nothing that  
really stands out to you at the moment.**

No, not at the moment.

**So we spoke a bit before about a**

sort of historical sites you visited.

UM, so you mentioned the  
dinosaur a dinosaur fossil?

UM, But what could make this  
more interesting to you then?

Because you said there's not You wouldn't usually be interested.

Sort of stop and have a  
look at the history of it.

What could make it more interesting to you?

I I don't know that that's a little.

It all depends on what it is and I  
can talk to a bit about experience,  
which is what I've done and.

Will work with with with with a customer,  
without naming any names and so

in a effectively in the shopping  
mall and got wireless access  
points without BLE beacons and  
using location based services,

we can push advertisements to  
someone to say come into this store  
and you'll get 10% off etc and.  
So we we've so stuff like that.

If you're maybe in an area.

And it might be useful to say.

And this is what's around.

And and then be able to have a look.

Bull I I'll.

I'll be honest probably nothing is gonna say to me that  
you need to go see this because of that.

Unless there's a compelling event  
or compelling reason to go see it.

Like I'll tell you what

England's in the final on Sunday.

I'd love to be able to go.

I haven't got tickets right It's one of them.

That's a compelling event  
that some reason to go.

And. So do you think is?

Is there an event on in an area?

Why don't you go down here?

There's a food market then yeah,  
it might cycle down there.

**OK, so in the context of an augmented  
reality application, then uhm.**

**Is there anything that could draw you in?**

**Maybe like?**

**Uhm, if it was more interactive,  
maybe if you were to go there and  
there was something you could do  
at this location then or there was  
something you could view through your**

**application and maybe like a 3D model  
or projecting using the overlay?**

**Is there anything?**

**Yeah, in the context?**

Not for me, but for UM.

If I was thinking about going  
to Delamere Forest,  
for instance, they've actually got a gruffalo statue  
and now that would be something where,

Sophie's probably a little too young now.

But and as she grows up it'll  
be quite good to kind of say,  
oh, look at this.

It's a bit more interactive  
than you're just walking along.

Can get a bit tiring, right?

Yeah, it might be interesting for stuff like that.

To kind of get young children  
out and if I was in,  
let's say, hale has that dinosaurs footprints  
might have been able  
to if I've got augmented reality,  
hold the phone up to that area to kind of see  
what the dinosaur apparently looked like.

Maybe, maybe, maybe that could be good,  
and I think it all depends on what it  
is and where you are. Hadrian's Wall.

There used to be a settlement here.

Hold up the phone and.

As your cycling along you could  
actually see then that there was actually an.  
That look pretty much like digging up,  
often having a look at the ruins there,  
but if you had augmented reality,  
hold your phone up.

You'll be able to see what  
it should have looked like.

Stuff like that could could be cool.

**So you find that more interesting.**

**You find that more interesting than**

I find that more interesting.

**OK.** Then rather  
let's say gamification, uh of something.

OK, uhm, and so you'd still find  
**that more interesting than over  
maybe information or text.**

to me, that is information  
that's kind of giving you a visual aspect of it, yeah you if you  
wanted to see the text behind it yet,  
definitely there should be.

There should be some text behind it to kind  
of give you an idea and of what what,  
what it was rather than just going.  
Oh look, this building used to be here.

What was that building it would  
be interesting to see.

What was that building right?

And I'm just just to kind of or.  
hail and the dinosaurs footprint was there's a dinosaur.

Click on it.

You find a bit more information about it so.

**OK,**  
**uhm.**

**So you'd say then your preferred  
method of gaining information  
at one of these locations,  
and it's through visuals.**

**Sort through overlaying sort of  
like presentation, UM?**

**And so just lastly, uhm,  
what is your knowledge  
of or augmented reality?**

**Are there any particular applications  
that use in the past that would stick  
out to you**

The one I've  
used

most recently for augmented reality  
actually two and one of them was  
was actually buying an new sofa during  
lock down and so I moved house and  
we've got a Conservatory we wanted.

A sofa for the Conservatory and couldn't go to  
the shops and to kind of look at them.

And then but DFS allows you to  
actually use effectively augmented  
reality through your phone to  
basically choose what sofa you want,  
hold it up and you can actually see it

in your space and actually see if it fits.

That was quite cool and the other

one I saw is in a is in a school  
environment and it was actually when we  
was looking for nurseries and and they  
they show them what they what they do.

Typically they just got in.

It's it's basically a bunch  
of A4 laminated papers It's got  
little QR code in in four corners,  
and the idea is and on they show you on  
the on the tablet that we hold over,  
they get to kind of show and see it's  
for the older the older children in  
nursery before they go into the school.  
what they were saying is when  
it gets to the school kind of age they  
then get headsets that they can put  
on to look at it and it's like, OK,  
that's quite cool and but that's my  
that's my not experience, but that's my.  
what, I've been subject to  
this is what I've been showing.

Uh, and that's it. I've not really  
used it other than for the sofa.

Not really had the need to use it.

**OK, yeah, fair enough.**

**So do you have** oh  
viewfinder?

I'd say is viewfinder augmented reality  
or is that kind of just looking at you?  
It knows where you are you looking?

at points.

It's saying this is this place.

This is that place. I don't really  
think that's augmented reality.

I think that's kind of just GPS with

Your phone looking it you're compass on  
your phone to say this is what that is.

**Well if it you said it overlays onto  
your phone's camera  
camera, yeah?**

**Uhm, so I would say say, well, yeah,**

**I'd say that would still be.**

**Uhm, yeah, that's still augmented reality.**

Obviously it's like use of it, right so?

**Yeah, and it's a big so when  
have you gone hiking?**

**It's a big part of your experience  
and you use it, yeah,**

**OK, uhm.**

**Yeah, so that was everything.**

**Uhm, do you have any questions or anything about?**

**That what we spoke about today.**

Yeah, it'll be interesting to see



if you ever come up with something, and then if you do come.

Feel free to to let me know and and I I will gladly give you feedback.

## **MAIN STUDY TRANSCRIPTS**

### **Participant 11 and 14 Transcript**

Interviewer: [00:00:00] How was your overall cycling experience?

P14: Uh, I found it really good and interesting, and I learned a lot more about Lincoln than I previously knew

P11: yeah. The cycle route was really good. Um, we saw some bits of Lincoln I've never seen before and some interesting facts.

Interviewer: Okay. Um, were you able to navigate the route on your bike?

P14: Yeah, I found it very easy apart from one part at the very beginning, but that was just my own error.

Interviewer: Um, and did you find the points of interest themselves?  
So the experiences did you find them, um, accessible,

P14: Yes they were very accessible,

P11: um yeah, easily accessible yeah.

Interviewer: Okay. Um, how'd you feel about the frequency of the stops?

P14: Uh, so there were three stops and they were all a good distance between them, which gave me plenty of time to cycle as well as look at the routes.

They were fine.

P11: Yeah, the [00:01:00] gap was like almost perfect enough time to rest and recover.

Interviewer: Um, and how did stopping at the points of interest affect your experience?

P14: Yeah, allowed me to regain my stamina from all the cycling and, um, learn more about Lincoln

P11: yes, it didn't interrupt the route or anything didn't break the experience. Yeah.

Interviewer: Uh, so would you say it's beneficial then sort of to have stops along the way,

P14: It was very beneficial I don't think I could've done it without, um, with less stops.

Interviewer: Um, and what were your thoughts and the initial, what your initial thoughts and the application.

P14: Um, yeah, just fine. I guess no comments really

P11: uh, yeah, the application worked well, and it was fairly easy to use for the most part.

Interviewer: Um, so the first experience, um, at the Brayford Wharf [00:02:00] um, uh, how did you feel about it?

P14: Well, I hadn't seen the AR in play yet, so it was very interesting to see that work. Okay.

Interviewer: how'd you feel about the experience?

P11: Yeah, that was cool that I thought the model was really good.

Um, and it was interesting seeing it alongside all the modern ships Interviewer: and stopping at the Brayford how did it affect your overall cycling?

P14: Um, it was pretty close to the start, so it didn't really affect it much, but, so, yeah.

Interviewer: Um, and what were your thoughts or observations on the Viking ship?

P14: Yeah, like I said before, hadn't seen the AR in play yet, so I thought it was very cool and I thought it was cool that the Vikings. Were there?

P11: Yeah, the model was good. Uh, it was, and it was quite large, and it fit along with the scale

Interviewer: did you think because it [00:03:00] was to scale it would have any impact?

P11: Yeah, definitely.

Definitely. Interviewer: Um, what are your thoughts about the quality of the experience?

P14: Yeah, the quality is overall good. The AR app worked very well and there weren't any issues, um, and the model was well-designed

P11: yeah, the overall quality was good. Um, maybe the UI was like slightly like basic, but other than that, it was good.

Interviewer: Um, so what do you think about the model being there as you loaded it? So you didn't use to anything to interact. It was just there as you sort of opened your camera.

P14: Um, it did take a couple of seconds to be able to find the point at which the model appeared, but it wasn't that much of a misdemeanour.

Interviewer: Okay.

Um, so what were your did you have any thoughts or observations about this whole sort of experience have you got any positives or negatives P14: uh, I thought

overall it was very positive. I've learned a lot [00:04:00] about Lincoln and I felt like if people were to use this up, they could also gain their fitness while also having educational benefits.

Yeah.

P11: Like similar to like Pokemon go it makes doing something a bit more fun and interactive and makes people more inclined to do it. Interviewer: so you mentioned that AR had an impact specifically P11: yeah, definitely.

Interviewer: Uh, what would you improve about this experience?

P14: Yeah, probably the user interface. It was like (participant name) said quite basic.

If you use some more designs to make it more appealing to people that care about that stuff.

P11: Uh, yeah, I guess the only like slight issues with some of the AR took a while to load in, or there were bugs that could be ironed out would probably make it a bit better.

Interviewer: Is there anything else you'd like to mention about the experience?

P14: No, I thought it was a very [00:05:00] positive experience

P11: Yeah it was all good overall

Interviewer: so the second experience along the Fossdyke canal, um, uh, what did you think about it?

P14: Yeah, it was good. It was in a good location next to the river. And then the, AR worked very well there as well.

I felt that was a good experience.

Interviewer: How'd you think it affected your overall experience sort of viewing that specific type of AR

P14: so viewing. That one was very interesting, but AR aside , it gave me a break which I kind of needed. Cause the first part of the bike ride was, um, used a lot of energy

P11: Uh, yeah, the second part was good. The way it came out of the sign, it was like, quite like interesting and different to the first one. So it was good to have like a varied experience.

Interviewer: Okay. Um, and what were your thoughts on, um, sort of the experience of augmenting on the physical object? So you had that [00:06:00] sign, um, and it overlaid onto it.

How'd you feel about that?

P14: Yeah, I thought it was very clever. I've not seen a lot of other AR apps do that before. So it was quite unique in my eyes anyway.

P11: Yeah. I think its good to like vary up the experiences. So the fact that the first one was a model and the second one was more of a, um, type of display .

Yeah.

Interviewer: Uh, was the object easy to find. So the sign?

P14: Yeah, it's very clear and obvious and it's the only sign in sort of the area. So if you know, you're looking for a sign, then it's very easy to find.

P11: Yes. The picture beforehand helped you identify it.

Interviewer: Did it work as expected?

P14: Yeah. It worked perfectly fine. This exactly how I thought it would pan out.

P11: Yeah. I found that I had to move back a bit to read the full thing, but for the most part, yeah. Okay.

Interviewer: So how'd you feel at the quality of this experience? The quality of the AR ?

P14: Yeah. Fine. [00:07:00] And I really liked the fact that you could zoom in and out to adjust it to your screen and then take a picture.

So it looks like the, the object is actually there,

Interviewer: okay.

Um, so how did you feel P11: uh,

what was the question?

Interviewer: Um, how did you feel about the quality of this experience,

P11: uh yeah it was good it was easily readable and gave you a fact so that

was quite good

Interviewer: so, what did you think about the facts that project projected onto the objects?

P14: Yeah, they were very informative and they were facts that I didn't previously know. So I was very grateful to learn those things.

P11: Yeah, no, the fact was good. I think maybe it could have included like another fact that you could scroll through maybe or credits.

Interviewer: Um, were they easy to read?

P14: They're easy to read. Very sort of understandable and no sort of technical language involved. Easily to, easy to understand.

Interviewer: Okay.

P11: Yeah. The font and the [00:08:00] background was all fine to read. Didn't have any, uh, like colour blind issues or anything like that. Okay.

Interviewer: Um, did you have any thoughts on this particular feature?

So did you have any thoughts about this particular part of the feature?

P14: , no additional thoughts , really? Just that it was informative and very interesting to see in AR ,

P11: yeah, yeah the, the imposition or contextual environment was cool.

Interviewer: uh, so the positives would be that you found the facts actually.

Interesting.

P14: Yes. Yeah.

P11: Yeah.

Interviewer: Uh, so how would you feel about this experience in comparison to the previous one? So the Viking ship,

P14: uh, the viking ship obviously started the experience off, but didn't quite, um, wasn't quite as. Uh, interesting as the second one. Um, and the way it came up, with the sign on the second one was very cool.

P11: [00:09:00] They were both good in there own aspects and one was more informative and one was more like interactive or cool. Okay.

Interviewer: Uh, so what would you prove improve about this experience then ? So the fossdyke one,

P14: uh, probably just a bit more information. um thats it really P11: yeah. Just more facts that you could scroll through maybe.

Interviewer: And so the final experience at the poppy Memorial with the tank, um, how'd you feel about the overall experience?

P14: Uh, I didn't really know what to expect going into this one, but then when I saw the tank pop up the screen and being able to adjust the size to put into the wheat fields, it was very interactive.

And although it's Lincoln it actually looked like it was on the, the front lines of world war 1 .

P11: Yeah, it was really interactive, probably the most interactive of the three and the fact that you could move and, uh, adjust your size. And yeah, it was a cool experience .

Interviewer: Um, and how would you think visiting this, uh, poppy memorial when viewing the [00:10:00] tank affected your overall sort of cycling experience?

P14: Uh, I think

it's my favorite part of the experience I got to regain my stamina, im into history sort of world war one history. So, and I learned more about the Lincoln sort of tank manufacturing industry.

P11: Yeah.

it was a good end I think you finished with the best one. Uh, and then like, uh, so yeah, it was the most interactive, the most fun.

Interviewer: Um, so how did you feel about the quality of the AR in this experience?

P14: Um, so the actual image was very good. Like I said, there's a lot of detail on the tank. It might've been slightly cartoony, but that's sometimes expected. I also really liked the sound of the tank. I thought it was quite realistic.

P11: Yeah. For the most part, the model was quite detailed and yeah, the audio definitely made it more immersive

Interviewer: So the audio did actually have quite an experience then, uh, an effect on the experience.

P14: Yes, definitely. And if you were to wear ear phones during this experience, I feel like it can make you feel like the tanks actually there .

Interviewer: Um, so what are your thoughts on being able to actually place, um, and interact with the tank?

P14: Uh, I thought it was very cool. You could place it wherever you want, and then you could take a picture using the app to sort of send to your friends, et cetera. So I thought that was very interactive and very interesting.

P11: I think it was important. And especially as. You could place it in different areas and it isn't just fit on one, like the Viking boat was only on the water and all that stuff.

So,

Interviewer: uh, so do you feel any, do you feel any differently about this experience to the Brayford experience with the Viking ship?

P14: Um, I think this is my favorite experience just because of the tank, et cetera. Um, [00:12:00] on the viking experience, I didn't really test out the sound and being able to move it out . So I can't really comment much.

P11: Yeah, I think they both serve different purposes and, um, they both did their, what they were aiming to do well. Um, so like theyre not directly comparable, but I think they were, you know,

Interviewer: so actually scanning the ground. Um, so you could see those dots. You can actually map out your plane, um, sort of how did that help with actually placing the tank?

P14: Um, so just allowed you to know where to actually place it. Whereas in previous experiences, it's sometimes quite hard to find the spot to place it so the dots were definitely a very much needed feature thinking about it.

P11: Yeah. It made it really clear and distinct where you could place it. Um, and there wasn't, uh, Like with the, the Viking one, it would kind of pop in and out.

Whereas this one was like very clear and defined.

Interviewer: Uh, so [00:13:00] did you find yourself like moving around the tank after you placed it, were you sort of having to look.

P14: I didn't try that out , I didn't know. That was a feature.

P11: Yeah. I walked around and saw the different sides of it and all that stuff.

Interviewer: So why did you do that?

P11: Uh, just because to see the different sides of the tank and , um, and I knew that I could physically move, but that was my previous knowledge, I guess.

Interviewer: Um, so what are your thoughts on this experience? Um, what are your, were there any positives or negatives?

P14: The positives where it's very interactive, very. immersive , but maybe a negative as we sort of just mentioned is I didn't really know that you could walk around it so maybe make it bold and clear that that's possible.

P11: Yeah. I think it was a really interactive and the model was good. Sounds good. Um, being able to move it was good. Uh, I guess any negatives, I guess the seeing the plane could technically like ruin your immersion, um, of placing the tank, but then they're obviously there for a purpose.

Interviewer: Yeah. [00:14:00] Um, you could actually disable the plane.

Uh, did you do that at,

P11: I did not no . I saw thebutton for it but I thought that would break it if I'm honest.

Interviewer: Okay. So how'd you feel about this experience? So the tank experience at the poppy Memorial in comparison to the two previous experiences?

P14: Uh, yeah, this was my favorite one. Yeah, I guess the other two experiences allowed me to gain more knowledge of the app to fully be immersed in the final experience.

P11: Yeah, definitely the most interactive, uh, and definitely had the different purpose of the other two .

Interviewer: Um, so what would you improve about this one?

P14: Uh, just make it bold and clear that the tank can be walked around because I'm not a big expert on AR. So I didn't know. That was a possibility.

P11: Yeah, just clearer instructions, I guess, on the how to place it and move it and resize it and all that stuff.

Interviewer: Um, is there anything else you'd like to mention about this [00:15:00] experience?

Um, anything you'd like to see changed?

P14: Uh, maybe you could do other things like change the model of tank. Cause there were different models of tank in world war one and then maybe for the younger generations to be able to change the color, et cetera, change the sound.

Interviewer: so more interactivity then? Yes.

P11: Yeah. I agree . More models. More sounds maybe, um, maybe could you mute the audio, uh,

Interviewer: you couldn't mute the audio

P11: , maybe that option in case people don't want to hear it.

Interviewer: Okay. Um, so I know you mentioned it, but, uh, what was your favorite experience?

P14: Yeah, I preferred the last one just because of how immersive it was due to personal hobbies and interests.

P11: Yeah. The last one, because it was the most interactive .

Interviewer: Okay. So for you, it was the tank experience. Both of you. Um, did you find that you were sharing sort of the experience with each other? So you both had a phone each, um, were you sort of, um, [00:16:00] discussing what you were seeing?

P14: Yeah. We both worked together to find, uh, to sort of work out the routes, stop at the signs because there's one point when I went past the sign and he told me to stop.

he had looked at the route in more depth than me. So yeah, we definitely would work together on this

Interviewer: and actually viewing the experience itself. Did you sort of, um, view it at the same time? Um, did you sort of share what you're both seeing?

P14: Yeah. We viewed it at the same time in doing that help each other work out the AR and things like that.

P11: Yeah. Yeah. I guess you did it individually, but together. So everything was there. Wasn't really. chance to do it together. It was more of just, it wasn't a shared experience in that sense. It was individual not together .

Interviewer: So did you think, um, because you were cycling together as a group, did that have any impact on your experience then on viewing these AR locations?

P14: Yeah, I think in general, if I wasn't with a friend, I don't think I would have found it as [00:17:00] enjoyable. Um, so. Getting me out with my friends, socializing thats good and then viewing the AR models together. Um, yeah, like I said, it helped me to work it out . I probably wouldn't have been able to have done it without a friend.

P11: Yeah. I think it made the experience better if , again, if it was unclear one person might know the route better . Uh, and yeah, it was again, a reason to do something .

Interviewer: How'd you feel about being rewarded models, visiting each location?

P14: Yeah. So the more models you got you unlocked at the end. You then could use those models wherever you want, but I did try to use the tank model at the end and it couldn't quite work it out .

Interviewer: Okay.

P11: Yeah. Thats it showed that it was like shows your completion.  
So you, you understand that you've completed, you've done that route. And then I guess if there was expansion, you would, you'd have more reason to go out and collect it.

Interviewer: Would you view the models in your own time then? So after your cycling route, would you then go back to sort of have a look at what you've been? What you've unlocked?

P14: Yeah, I thought it would be quite [00:18:00] interesting if I was to put the tank in my front room or the back garden or something and use the app to take a picture of it and send it to my friends. That would be quite funny. Okay.

P11: Yeah, definitely the same, at least once just to play around with it and show off to maybe my friends or whatever, who haven't done the route .

Interviewer: Okay. Um, so if there were more points of interest in the route, um, would you be more motivated to stop at them? So if there were more AR um, locations to visit

P14: yeah. And it would have allowed you to sort of have a stop, have a rest. Um, but it also, you could make it, you could make the route longer, longer, and people could choose where to stop.

How long to go, which ones to stop up depending on their own interests .

P11: Okay. Yeah. Um, I think if there was more to be added, I would like them to be as equally spaced out. Um, cause I think if you werestop starting , it would be a lot less fun.

Interviewer: Okay. Um, so why would more locations motivate you then?

P14: [00:19:00] Um, so if you were an avid cyclist, this was a couple of miles.

If you want it to go on say a 10 mile bike ride . This would allow you to keep going and would give you the motivation possibly.



P11: Yeah. Having more locations would give you more of an incentive to carry on cycling rather than just return

Interviewer: so for you personally, you'd be more motivated to carry on with the route.

If there were more things to visit,

P14: I would be, yes.

P11: yeah same..

Interviewer: Um, so would you use this application in the future?

Um, so your future cycling journeys on different routes. So Lincoln has a number of different routes.

Um, they've got the bomber command route, which sort of goes along airfields and things like that.

So if you were to be on a cycling route, would you be interested in using an app like this?

P14: I definitely would. Yeah.

P11: Uh, if there was like more models and more incentive to go the other routes rather than if it was recycled and then no, but if there was more of incentive to use the other ones then yeah.

Interviewer: Okay [00:20:00] um, so would you use it every time you visit a new route?

P14: Uh, definitely gives me more incentive to cycle more and get fitter as well, as well as doing this.

This also gives me a route, whereas sometimes cycling , it's hard to find your way

P11: Yeah yeah the same I'll definitely be like if a new route was created I would want to try it out, well, that kind of stuff.

Interviewer: So lastly, um, if you could improve anything about the whole app experience. So in general, um, what would you improve?

P14: As I said just various things, like better menus, uh, user interfaces, um, maybe more models. Be able to choose color, et cetera, more routes, just everything weve discussed. Really?

P11: Yeah. Just minor UI issues and, uh, user experience stuff.

Um, [00:21:00] maybe a little bit of clipping issues and all that stuff, but just minor issues.

Interviewer: Um, and so would you consider this application to be worth using in your future cycling experiences?

P14: Yes. If I were to cycle in Lincoln more, I would definitely use this app.

P11: Yeah. Yeah. It would give more of an incentive to go cycling together and make it more of a fun rather than just doing it for the sake of it.

Interviewer: So why would you consider this application to be sort of worth using.

P14: Um, yeah, I mean, another reason is, um, some people complain there's not much to do in Lincoln. Uh, socially, this sort of, you could get a group of friends together, go out and exercise together and learn more about Lincoln together.

P11: Yeah. Um, just, just makes it more fun rather than doing cycling for the sake of it.

It gives you a purpose to your cycle and it makes it more interactive. [00:22:00]

Interviewer: Thank you for that. Okay.

## **Participant 12 and 15 Transcript**

00:00:01 Interviewer

So how was your overall cycling experience?

00:00:04 P12

It was very good.

00:00:05 P12

It's a pretty route that we took and with the app as well it made it more interesting like 'cause normally when you do a cycle route, you just kind of go straight through and don't notice your surroundings. This was a good opportunity to like stop and actually notice where you are.

00:00:21 P15

It was very lovely it was a very very lovely route. You actually like learn things along the way that you normally wouldn't think about, and you don't think about the history as you're going along these places.

00:00:33 P15

So it's quite nice to actually, learn a few things.

00:00:36 Interviewer

OK, and were you able to navigate the route on your bike?

00:00:39 P12

Yeah, and if I can do it, anyone can do it 'cause I'm quite directionally challenged so It's very easy and like 'cause it has the map then it also has the option to go on Google Maps. If you are feeling a bit uncomfortable about it So I thought that was really good.

00:00:51 P15

Yeah, it was really easy It actually gave me the directions and the route was actually quite a simple, easy route to take so it was actually very good to use.

00:01:02 Interviewer

Uhm, did you find the points of interest so the places where you stopped and looked at the app?

00:01:06 Interviewer

Uh, were they accessible on your bike?

00:01:09 P12

Absolutely, I think because we're all we're on a cycle route anyway

It makes it very easy and like stopping to look at app you're not in any ones way so you can easily go to the side, there's good places to stop, look, take your time.

00:01:19 P12

You don't feel like you're rushed.

00:01:22 P15

Yeah, absolutely.

00:01:23 P15

There was places to actually stop along there, and it's good that was actually on a cycle route as well.

00:01:28 P15

It it was very good to use.

00:01:31 P15

Actually, there's plenty of room.

00:01:33 Interviewer

And how did you feel about the frequency of the stops?

00:01:35 Interviewer

So you had three places you had to stop at How did you feel?

00:01:38 P12

They're really spaced out like I feel like if there were any closer together you'd be like cycling and stopping. Cycling again, then stopping which can be quite jarring.

00:01:44 P12

So I think the fact that there's there's a good space between them, so you actually do get a good bike ride in between as well, it's it's a long route to take, its nice

00:01:50 Interviewer

So it didn't interrupt your actual cycling experience it was a good amount of stops 00:01:55 P12

absolutely like I didn't feel interrupted, like when we stopped at like a natural point to stop anyway, because again, you're out the way theres stuff to see around and right with the app as well you can really take your time and notice where you are.

00:02:06 P15

Yeah, it was good because at each stop you were actually at a very different point at different surroundings and obviously then you got a different point of little bit of information or you know history there as well, so it was good like very well spaced out

00:02:24 Interviewer

And and so how did actually stopping sort of dismounting and using the app how did that affect your experience? 00:02:32 P12

I don't think it did affect it in a way, like when the places where we dismounted like you would do that anyway. 00:02:38 P12

'cause in the cycle where it's kind of natural points where you stop like in the final stop, there's like a bench and everything so it felt very good like stopping it did not seem like an issue.

00:02:48 P15 Yeah it

was.

00:02:49 P15

It was absolutely fine and not a problem with that at all, like it was just good 'cause there's somewhere to put your bike and it was quite nice.

00:02:57 P15

'cause when you're in a different area, you might want to take a picture anyway, so you would naturally just get out your phone so it didn't affect it at all.

00:03:06 Interviewer

And So what were your initial thoughts on the application?

00:03:12 P12

Yeah, I mean I'm.

00:03:12 P12

Not really a big VR person, so it was nice to actually experience it and like see it in the outside world like the boat on the Brayford.

00:03:20 P12

I thought that was really good. The signs that tell you like the information about the vikings and the Danes. I thought that was really interesting or it was the Romans. Wasn't it?

Romans, yeah, I'm not good at history, but yeah no the VR worked really well I would recommend it.

00:03:36 P12

AR Yeah, I'm so sorry (laughs)

00:03:40 P15

What was the question?

00:03:41 Interviewer

So what are your thoughts? Initial thoughts on the application?

00:03:52 P15

I was actually quite excited to do it because I've never actually done anything like that before, so it's been really interesting. 00:03:59 P15

I I just was quite excited to try something new like that because I do cycle a lot and to Actually, uhm, put that into something that I'd normally do just made it a whole lot more like exciting.

00:04:16 Interviewer

And sort of just opening the app and using it. How easy was it to use?

00:04:19 Interviewer

Was it easy At all?

00:04:21 P12

It was easy It's like opening any app.

I didn't find any difficulties with it.

It tells you exactly what to do before each point as well, which I thought was really helpful.

'cause if you haven't used an app this before, like me having the information there and what to do where to.

Point the camera so easy, so accessible.

00:04:36 P15

Yeah, it was really easy to use. It explained everything that you did need to do and and it was just really simple To be honest.

It labeled everything that you needed to do and it was easy to use.

00:04:51 Interviewer

So how do you feel about the Brayford Wharf? The Brayford Wharf experience, so that's the first one that you did.

00:04:56 P12

Yeah I liked it. I liked how it made sense Putting the boat on the Brayford.

I feel like if it was anywhere else it wouldn't make sense. So having the setting that it was in, especially like we had all the other like more modern boats around, so it was a nice little like difference between the two.

00:05:17 P15

Yeah, it was really good.

00:05:18 P15

I I liked actually seeing the boat on the Brayford because it's like actually something that would have happened around that time and it's quite nice to kind of Like take you back there in some sort of way so it was quite interesting and nice.

00:05:32 Interviewer

Uh, so how do you think it's?

So how do you think it's affected your overall experience?

00:05:39 P12

As in just the bike ride. 00:05:40 Interviewer so like your overall general experience or viewing the Viking ship.

00:05:44 P12

Oh yeah, good like.

00:05:46 P12

I feel like if it was just an information overload like it was just like telling you loads of facts and you had to read through it, it wouldn't be as fun.

So having the boat like having something to look at it just improved it for me.

It actually made it really fun.

It's something completely different to what I'm used to, so it just added another element to actually cycling around, which is really nice.

00:06:10 Interviewer

And what were your thoughts?

00:06:11 Interviewer

So did you have any thoughts or observations on the Viking ship?

00:06:15 P12

I liked it. I don't know how you could improve it like a Viking ship is a Viking ship.

I don't know what else you're meant to do with that, but I think again just for the setting that it was in.

I don't think you could put it anywhere else and it would make sense. So no, I liked it.

00:06:29 P15

It was really good and it was really well detailed and it had all the Romans on it as well which was really nice so it was good.

00:06:37 Interviewer

How did you feel about the quality of the experience? So like overall, the actual AR experience, like how did you feel about its quality?

00:06:44 P12

I thought it was really good quality.

00:06:45 P12

I didn't have any issues with it.

It didn't take ages to load like as soon as you point your camera it was there.

00:06:51 P12

When you move your camera around, it didn't just jump about or anything like that like it stayed in its position, so I thought quality wise? Yeah stellar.

00:07:00 P15

It was really good.

00:07:01 P15

I mean there was one point where one of them just took a second to load, but as soon as it was loaded it was absolutely fine.

00:07:07 P15

You can then move around and it was all working perfectly fine.

00:07:11 P15

Yeah, yeah.

00:07:13 Interviewer

So what do you think about the the models for the Viking ship being there as you loaded the apps?

00:07:17 Interviewer

You you don't need to do anything to basically get it to load, it was just already there.

00:07:23 P12

I feel like the fact that it was just there. it's good 'cause you wouldn't want like if you're on a bike ride you don't wanna be faffing about, you just wanna point the camera.

Have it there, know the information, then move on I feel like if there's any other steps.

Towards it you'd be kind of spending more time focused on the phone then you would on the bike ride. 00:07:40 P15

Yeah, it was really good the the fact that it it was just.

00:07:45 P15

All ready to go when you actually are using it is very handy indeed.

00:07:51 Interviewer

Uh, so did you have any thoughts or observations about sort of like the the experience as a whole?

00:07:56 Interviewer

Sort of the on the Brayford.

00:07:59 P12

Uhm, there is honestly nothing I would improve on it.

I think again, as I've said before, the fact that it's there

You're looking at it You're not spending too much time on your phone, but enough time. So like you can appreciate what's going on around you and take time to not only look at the Viking ship but also to actually look at the Brayford.

I feel like the Brayford is something that you pass around quite a lot.

You don't really take The time to notice it. Yeah no I thought was really good.

00:08:26 P15

Yeah I really liked it Uhm, obviously it's really cool having the AR there but obviously on different points as well. You had like information, so maybe with the Viking boat, maybe something to click on to give you a bit information about the Viking boat as well that that might be something to improve, but honestly I did love it as it was.

00:08:46 Interviewer

OK, so is there anything you'd improve About it or change.

00:08:51 P12

Nothing that I can think of. I mean, I'm not very techy so I wouldn't even know where to begin.

But yeah, maybe if you could be on the boat, but that's A lot of effort, I don't know.

That's the only thing I Can think of, but that's not a massive thing.

Is it like I want to be on the boat?

00:09:17 P15

In terms of the actual detail, I wouldn't change anything.

It was really, really well done, uhm?

As I've said, it might be handy for an improvement if you could click on something to give you a bit of information on the actual Viking boat or the Vikings or something about when they were there.

Actually, way back when on the Brayford that might be an improvement, but apart from that I wouldn't improve anything.

00:09:39 Interviewer

Is there anything else you'd like to mention about this experience.

00:09:43 P12



Just how easy it is, I think Yeah, with normal bike rides I feel like I just fly past everything You don't take a chance to notice what's around you in Lincoln.

Actually it does have a lot of history, and it's good that you can combine the two to see the history around the place 'cause I've been here for like 4 years now and I wouldn't even like. I would have thought about any of this, so being able to incorporate like a fun bike ride with a bit of history. I've really enjoyed it.

00:10:09 P15

It was really good, uh, I think it could be a very useful tool for like those people that want to learn. It could be good useful for like little school like kids like trips or some stuff like that. 'cause then it can actually incorporate some like exercise but also learn history as well. But also for people that just generally want to learn that are out and about. It gives you a It's another way to. Access that information in a fun way.

00:10:32 Interviewer

So the second experience on the Fosdyke canal So where you scan the sign

What did you think about that experience.

00:10:39 P12

Yeah, it was a nice place to stop.

It gave you a bit of history into the Romans.

I never knew before. So yeah, I thought was really good.

00:10:49 P15

Yeah, it was a really nice spot and it gave me a little fact as well as a fun fact that I did not know and now I do know and I'm going to tell people about it. It was really nice.

00:11:00 Interviewer

So what are your thoughts on this experience? Being able to actually scan a physical object and then to use AR to sort of like project onto it?

00:11:09 P12

Yeah, I thought was really handy because like the signs there already and I liked how it switched it from being the normal one to actually having some new information on it.

And like more fun information I think.

00:11:22 P15

Yeah, I think that's really fascinating, because obviously when you're doing apps and like creating apps and stuff like that, a lot of people are gonna have to use or like make a little code or whatever.

00:11:31 P15

But you're using things that are already there, which is quite cool to me, because you don't actually have to change anything about that surrounding.

You can just scan whatever is there That's really fascinating. 00:11:43 Interviewer

Was the object easy to find?

00:11:45 P12

Yeah, really easy and the the app actually shows you a picture of where you're meant to be as well, so you can keep an eye out so it doesn't only have the directions it's got the actual image of where you should be ending up, which is quite good if you 'cause it.

It's just a sign, so it could just be easy to miss So if you didn't have that picture there, yeah, yeah.

00:12:04 P15

Yeah, it was really easy to find and actually had a map incorporated into it, so you could just use that and it did have then a picture as well.

00:12:13 P15

So then obviously you follow the map and then you already know what you're looking for by the time you get there.

00:12:20 Interviewer

So did it work as expected?

00:12:22 P12

Yeah, no issues with it. As soon as I looked like pointing the camera towards it, it changed the sign straight away In fact, I don't even remember it changing, it was just there. The information was just immediately in front. Of me

00:12:33 Interviewer

So do you think the fact that it recognized it really quickly and you didn't have to do too much sort of scanning around, do you think it Impacted how you used it.

00:12:40 P12

Yeah, yeah, I think because that one's by a bridge you wouldn't want to spend too long there trying to click on different things so you've got passers by like coming and going.

So I think the fact it was already there I mean, it was like quite quick You can dismount, look at it, then go back on and carry on.

00:12:54 Interviewer

Did it work as expected for you?

00:12:57 P15

Yeah it did. It worked really well and and obviously once you've stopped at one place and you go to the next place when you just lock it and then you unlock it, it just reopens where you left it, so it just works very well with that as well And whenever you stopped, it just opened up quickly and everything worked as it was meant to, so it was good

00:13:20 Interviewer

So how do you feel about the quality of this experience?

00:13:23 P12

Yeah again, really good. I think in all points there wasn't anything that I can critique or say it didn't work because everything worked as expected.

I don't know what more you could expect really.

00:13:35 P15

Yeah, it was absolutely fine. It worked fluently so I don't.

I don't. I didn't have any issues with it.

So it's really good.

00:13:40 Interviewer

So what do you think about actually having facts to read?

00:13:44 Interviewer

So for this experience you had facts you didn't have anything sort of visual, you had just information to read.

00:13:50 Interviewer

Were they easy to read?

00:13:52 P12

The information was so easy to read, I think the only you could add would be like the Viking boat in the Brayford 00:13:58 P12

Then here you could have the tanks or maybe something to do with like the Romans, 'cause I know you got the model for the Roman at the end so it could have been nice if that was there as well, but again, that's not like a big issue like the information was really good. Like I wouldn't like it's not a bad thing.

00:14:12 P15

Yeah, I really enjoyed the information and it was easy to read and it was really like fun little facts as well.

So it was actually really good.

00:14:22 Interviewer

And and were they interesting the facts?

00:14:25 P12

Yeah, really interesting.

00:14:26 P12

It's stuff that I didn't know before and I feel like the fact it's like a quick fact and it wasn't like an essay about the area made it so much easier.

00:14:33 Interviewer

Yeah, so that you say that sort of worked better with cycling then so to have Short facts.

00:14:39 P12

Definitely 'cause I feel like when you're on a bike ride, your main goal is to be on this bike ride and be enjoying the route that you're taking.

You don't want to be stopping and reading like paragraphs of stuff, because by at one point, like when do you stop paying attention, at least if it's like short and simple.

You know your fact You like it, you move on.

00:14:57 P15

Yeah, it was really interesting Like I've lived in Lincoln for the majority of my life and I did.

I didn't know it so it was just A good fact.

00:15:11 Interviewer

Uhm, did you have any thoughts about this feature Any positive or negative thoughts?

00:15:18 P12

Yeah, I thought it was It was like the most simple one I feel like when you're going there and it's just the sign With the fact Like which I like it was so quick and easy but again, like 'cause you had like the boat here and the tank somewhere else It might be nice if there was something Romany to go with it.

00:15:37 Interviewer

Alright, like sort of what are your thoughts about this feature?

Do you have Any positive or negative thoughts

00:15:45 P15 actually, uhm.

00:15:48 P15

It's just quite remarkable that you're able to do that with the surroundings that are there and and it was just good information and good little like, uhm, actual AR visuals to have So it's I just found it really fun and fascinating.

00:16:06 Interviewer

Uhm, so in comparison to the previous experience, How did you feel in regards to this one?

00:16:11 Interviewer

So the the Fosdyke and reading the facts?

00:16:15 P12

Yeah, so this was obviously a bit different because in the first experience you had the boat there.

There was less information surrounding the boat. It was just nice to look at so it's it was kind of nice to take it to somewhere else. We actually do get a bit of information about the place and especially like 'cause it's so specific To the area and it made sense.

00:16:34 P15

Yeah, it was really cool.

00:16:36 P15

'cause obviously the other ones like yeah when you moved around with the boat for instance like it did.

It worked when you moved around with the

Camera and the other one just gave you some information.

It's just in one point, but with here you could actually place whatever you wanted, move it around, make it bigger or smaller, oh, oh damn right, scratch that.

00:16:51 Interviewer

This is the the fact.

00:17:00 P15

Yeah, yeah, it was really good.

And obviously with the boat like it was different but to actually have like a little like poster just visually there with a quick fact it was just really quick and easy and fun to use.

00:17:15 Interviewer

So is there anything that you would improve from this experience?

00:17:19 P12

I didn't have I I couldn't think of anything like it was again just so simple.

00:17:23 P12

So I I enjoyed it.

00:17:24 P12

I wouldn't improve it.

00:17:26 P15 No, I wouldn't improve anything.

00:17:28 P15

It was absolutely perfect as it was 'cause it was quick little fact, you just pop off your bike, have a quick look and you got that quick fact, and then you're ready to go.

On to the next one, it was perfect as it was.

00:17:40 Interviewer

So the 3rd and final experience.

So at the poppy memorial with the tank like how did you feel about that experience.

00:17:48 P12

This was my favorite one.

No, I like this I like how you can move the tank around You can have like a lot of fun with it and I think because you're on like this big open field as well. Being able to like Move the tank along. yeah, I really Enjoyed this one. 00:18:03 P15

It's really good 'cause you're actually able to like do what you want with it and incorporate into your surroundings a bit more. You can actually move things and then obviously the feature of taking a picture as well, like if you're with somebody you can have a bit of fun with that, but also you can move it somewhere you know along the wall.

For instance, it's just quite fun.

00:18:27 Interviewer

So how do you think this sort of the experience of placing the tank, visiting the poppy memorial how'd that affect your overall cycling experience?

00:18:35 P12

Uhm, with the cycling experience it's a good place to end it, I think because of where you are it makes sense and this one is is more interactive, so you you're going to want to take a bit more time off your bike and like enjoy where you are. I feel like with the other ones you could kind of quickly dismount, look at it and move on Yet with this one you want to spend time.

You want to like interact with it like it lets you move it, so you may as well make the most of it.

00:19:00 P15

Yeah, it's a really lovely spot. Obviously 'cause it Uhm, you can do a lot more with it like there's actually a little bench you can actually sit down and spend more time having a bit of fun with it And and obviously, once you're here as well, you can then unlock the other features of putting all the different. Like you know, the Vikings and Romans or whatever you wanted there as well, so it's just an ideal spot to do that.

00:19:24 Interviewer

Uhm, so how do you feel about the quality of this experience

00:19:25 P12

yeah no. This one that was really good. I felt this one had more potential to go wrong, so you're moving things around. You can make it bigger and smaller. However, I I had no issues the quality was really good. Everything that I wanted to do, like it did straight away.

00:19:40 P15

Yeah, it was really fun and easy to use as well.

And and I like the fact that you had so much more to do with it as well.

Being more interactive, you can have a bit more fun with it.

00:19:54 Interviewer

So what were your thoughts on being able to actually place and interact with the tank.

00:19:58 P12

It just makes you more aware of where you are and the facts of it, and I think being able to interact more with it.

It means you're more invested in the app.

It means yes, like you can just move things around.

Be really involved.

00:20:14 P15 I just think that's really cool.

I I never thought that I would be using something like this, so it was actually really fun to use.

00:20:25 Interviewer

Uhm, so did you feel differently about this experience? The Brayford Viking experience? So they both used 3D models in two Like completely different ways

00:20:32 P12

yeah, so with the Viking model, it's just there for you to look at, like obviously when you move your camera around, you can kind of see different parts of the ship, but you don't really interact with the ship very much.

yet, with the tank, you're moving it around to make it bigger or smaller, you can really like.

Look at a tank in detail.

If you wanted to like if you're really interested in that, you can zoom in and look at all the different details.

If you just wanted to like mess around with it then you can.

Make it smaller, move it around the fields and stuff.

So yeah, highlight.

00:21:00 P15

Yeah, I did prefer this to the the one on the Brayford because obviously you could do a lot more with it and you obviously like with taking pictures and stuff you can actually do what you want.

You can place things where you want, obviously on the Brayford is where it is, which I did still love, but with this obviously you can just do it.

Play around with it a lot.

More yourself.

00:21:22 Interviewer

So what your thoughts on the tank itself?

00:21:24 Interviewer

So the model 00:21:24 P12 yeah, it  
was really good.

I think when first click on to it, it looks like you're in the tank.

Which I found really cool and then yeah, I mean, I knew that lincoln was the birthplace of the tank, so  
it kinda made sense to have that be the end point.

And you can tell it that was just a really like special feature within the app.

00:21:43 P15

Yeah, I think it was really, really well made like the detail was really good as well and and it was just  
fun being able to like make it bigger or smaller and move it around.

00:21:54 Interviewer

So did scanning the ground and seeing those white dots. Did they help at all Placing the  
tank?

00:22:01 P12

I feel like if they weren't there, you could be kind of clicking around and like maybe that could be a  
potential where it doesn't load as quickly so when you have like a clear marker of, this is where you're  
meant to start and then from there you can do what you want with it. I thought that was a really good,  
just have a good clear starting point.

00:22:15 P15

Yeah, I found it really useful and it actually really helped when I was trying to like place it and move  
things around so it worked well with that.

00:22:23 Interviewer

Did you find yourself sort of moving around the tank, sort of like physically as you placed it?

Did you have a look?

00:22:29 P12

Yes, this is the one I felt more involved in compared to the other ones because especially the Viking  
one you're kind of in your same spot and you're looking around, but only by moving your phone.

Yeah, by being able like to move the tank and move it around it.

It makes you want to move around the area as well.

00:22:45 Interviewer

So like did you find yourself sort of moving around and having a look?



At the tank after placing it.

00:22:50 P15

Yes, I did.

Uhm, obviously because you're actually being more interactive with it.

You are moving around 'cause you think.

Oh wow, I can actually place this here instead and so yeah, I was moving around and looking around a bit more with it. 00:23:03 Interviewer

So, So what are your thoughts about this experience?

Any positives or negatives

00:23:09 P12

Yeah again, as I've said that this one has been, I feel this was the most fun one I feel like because it's just so interactive you can move around with it.

It just means that you are fully involved with what's going on around you.

So yeah, I like this one.

00:23:22 P15

Like extremely positive thoughts about this, I just think it can just be a really useful tool for so many people and the fact that you can actually do what you want with it and be interactive can actually make it so much more fun for so many people and it just would be really useful for a lot of people to learn as well with it making it fun.

People are going to want to get more involved with it as well, so. 00:23:51 Interviewer

So how did you feel about this experience in comparison to the two previous experiences then?

00:23:56 P12

Yeah, I feel like as I've said before, because it's just so interactive, it really makes you aware of the history of the place like it's not just something to quickly look at then, forget about, you're fully invested into it, so it makes you really realize where you are in the history of the tank.

And there's like the war as well.

00:24:15 P15

Yeah, I think this is like my favorite one.

And compared to the other two, as I said before, like just because you are more involved with it and but also like it having with the little poppy memorial wall like the tank is very aptly placed with that.

But then, once you've done that, you've unlocked all the other things so everything you have learned along the way, you then can incorporate as well.

So it's by far my favorite, 'cause obviously the difference of how you can then use it and move things about and do things yourself like it just makes it a lot more fun.

00:24:45 Interviewer

So is anything you'd improve about this?

or anything you'd change about the experience?

00:24:49 P12

No, I I don't think I don't know how you could change it to be honest, like it's in the best place.

It's the most interactive, and as you know, as it's been mentioned before, it's just so fun.

I don't know how you'd improve it.

00:25:00 P15

I I wouldn't change how anything has been made at all, like it's actually really well detailed and really.

Fun, and but I would suggest maybe actually having a little option for having some information on some of the things as well.

Maybe like not to bombard them and have it there like but just have the option in case they did want to learn a little bit or read just a little fact as well about this to incorporate like the you know the Fossdyke bit as well in that that might.

Actually be helpful for some people.

00:25:28 Interviewer

And and is there anything else you'd like to mention about this experience?

00:25:34 P12

Not really, I think again, as you know, as it's being said, like maybe having that little bit of extra information if you did want it, that could be really good, but apart from that I can't really think of anything.

00:25:45 P15

I just want to say like I've actually had a lot of fun and actually doing something different, especially as like technology is ever evolving and I never thought I'd be doing something that I could just visually see in front of me and move about It just made it really fun, so that's what all I'd like to say on that.

00:26:01 Interviewer

OK, so you've both said what your favorite is experience is I just want to reiterate yours is the?

00:26:06 P12

The last one with the tank by the Poppy Memorial.

00:26:10 Interviewer

And so specifically why?

00:26:12 P12

Again, because it's just so like interactive, you're not just being passive about it.

You're really involved.

And yeah, again, just be able to move around.

You could have so much fun with it.

00:26:23 P15

Yeah, my favorite is the Poppy Memorial one, and that's just because it's got so much more to it, uh, you are way more involved and you can have fun with it and do what you want with it, really.

And it just really helps as well with it, like the pictures as well, you can 'cause you're moving things, you can place them and take a photo with that as well.

00:26:44 Interviewer

And so you were both cycling together as a pair.

Did you find yourself sharing your experience with each other?

Like if you when you saw something on your phone, did you sort of share it?

00:26:54 P12

Yes, so it was nice to do it in a pair.

I think I enjoyed that [P15] took the the reins when it came to directions and I like how when we could stop, we can just discuss it together and having fun with it together.

It was really nice to see. 00:27:07 Interviewer

did you find yourself actually sort of showing each other whats on the phone

00:27:10 P12

Yeah, definitely. Like when [P15] would stop and point the phone like oh, I wonder what like theyre Looking at so it yeah it was nice.

It was nice to see.

00:27:19 P15

Yeah, it actually made it a bit more fun as well, like being with somebody you can actually talk about. Like with that interesting

fact, with like the fossdyke bit like I was like oh this and then actually when we stopped and then I was actually trying to like take pictures with it. I was getting more involved.

I'll take pictures of [P12] with it, having a bit of fun, and then we're actually discussing it and be like Oh my God, look at this like.

You actually are talking about it a bit more.

00:27:42 Interviewer

So how did you feel about being rewarded models for visiting each location?

So each location you visited, you've received a message that showed that you unlocked something.

So for the first one, you unlocked a Viking, so it's related to the vikings in the Brayford.

00:27:54 P12

Yeah I liked it.

00:27:55 P12

I feel like in loads of apps you're kind of reward driven so it kind of adds to that point and it's kind of nice to collect them as you go and like they really linked into the the fact or this route that you were in anyway.

So it was Yeah it was a nice little thing to tie it all together.

00:28:12 P15

Yeah, I think that's a really fun feature and I think that's like an incentive to go to the next bit as well.

00:28:16 P15

Because once you've unlocked that, then you would be like there's something new that I can place somewhere as well.

I can have a bit more fun with this, so I think that worked really well with the app.

00:28:28 Interviewer

Would you view the models in your own time so say you had this phone on on your own device and you were to unlock these models?

Would you Find that you Would use it in your own environment.

00:28:38 P12

Uh, maybe if I was going on like this bike route again I might revisit them.

Especially like if I just wanted to remind myself.

Like a certain fact, or if like I'll sit in a place where I thought it might be particularly fun to get them out, but I feel like it's very specific to this route.

00:28:51 Interviewer

I mean so like the actual models at the end.

At the model viewer is

00:28:53 P12

Yeah, yeah, that's what I mean.

00:28:54 Interviewer

That that's what you mean.

00:28:55 Interviewer OK, so you would.

00:28:58 Interviewer

Uhm, use that model viewer then in a location that relates to sort of.

00:29:03 Interviewer

The context.

00:29:03 P12

Like it, yeah, I feel like it would be a bit weird. if I was just sitting in my living room and I.

Just thought let's pop out.

a Viking, so I don't think it had the same kind of relevance.

00:29:14 P15

Yeah, I definitely would use this Happily, I I think as well like if I was to take somebody else on this like route as well, I'd want to show them 'cause it's just so fascinating as well And if this was to like have like if it was to like actually be more adapted and add like more to a route as well. I'd be excited to use that, so I definitely would use it.

00:29:37 Interviewer

And so if there were more points of interest on the routes and more places to stop, would you be more motivated to stop at these?

00:29:43 P12

Yeah, definitely I feel like 3 is a good starting point, but if you were used to like longer bike rides and you'd want that you know throughout your journey, definitely.

I don't see an issue I don't know why people wouldn't want that.

00:29:54 P15

Yeah, absolutely.

And the facts that like there's something new at every stop.

So if there's more added on, I'd want to do that and I'd want to see what else I could unlock as well.

So yeah, I definitely would.

00:30:08 Interviewer

Uhm, so like why would it motivate you to have more points of interest?

00:30:13 Interviewer

What in particular can motivate you?

00:30:16 P12

So I feel like the first three it was motivating because it was things that you didn't know and I feel like the further along you go

I feel like it would just be nice to like really understand your area, like if there's more facts to be found, like why not?

Why wouldn't you want to go and like see those

00:30:29 Interviewer

so you think uhm, relating to the actual location is really important?

00:30:35 P12

Yeah, definitely otherwise

I don't know if it makes sense.

Like if you were coming along the Lincoln route and all sudden it's like a fact about a different country. I don't know how that would relate to.

it like as much, but yeah, if it's like models or facts again about the area or even just about their bike route or just something specific, then yeah I think it would be really good.

00:30:57 Interviewer

So like what could motivate you like how could it motivate you to stop at more locations

00:31:00 P15

well, the fact that you actually are learning things like as I've said, I've lived here for the majority of my life.

Like I didn't know like the few things that I've learned along the way already, it's just actually nice to know, like.

What was here before, and like a little bit of the history because bit like living here and you don't really intake that information and such.

So incorporating something that you would normally do like like I would normally do that cycling like.

I'd learn some facts about like where I actually live, so it wouldn't, that's why. it would motivate me 00:31:34 Interviewer

So would you use this application in future cycling journeys on different routes?

So Lincoln has a number of different routes around the city, so they have a bomber route as well that goes round all the RAF bases.

Would you be interested in using an app like this for different routes?

00:31:49 P12

Yeah, definitely I think I would be really like.

Interesting to see how The models and stuff would change depending on what route you're on.

00:31:55 P12

I think it would be a good way to keep people like interested in cycling and interested in learning about what's going on around them.

00:32:04 P15

I definitely would be honest, because then yeah, it's it's.

It's something new to learn about and it'll be a different route as well, which would be nice to actually see a bit more different scenery whilst learning about a bit more history.

00:32:17 Interviewer

Uhm, would you say would you use it every time that you went on a route then so every time you want a bike ride you'd like to use this app?

00:32:23 P12

I don't know if I'd use it every time I feel like if I'm out with like friends or I'm doing this bike route with like other people, then definitely I'd like to get them involved.

But if it was just if I just want like a quick bike ride just through Lincoln, and I wasn't worried about stopping too much, then that's probably when I wouldn't use it, but it's so social like I think it's just something.

You'd want to use with other people.

00:32:44 Interviewer

How social you are has an impact on whether.

You use the app or not.

00:32:47 P12

Yeah, definitely.

I feel like it wouldn't be the same if you just by yourself, because with some of the the interactions like with the tank one where you're moving it around.

00:32:55 P12

It's just fun to do it with

Other people and bring other people into it.

I feel like if you were just kind of stood there by yourself.

I mean, for me personally, I I wouldn't do it.

00:33:05 P15

So I wouldn't use it like every time I went out, but if, especially if it was like a new route that I'd be going on, I'd definitely use it.

Or if I'm going down a route that I've been on before I would want to refresh myself like I would because it obviously is fun.

And obviously, if I take if I go out with somebody as well, that hasn't gone on it.

I want to show them as well, so I would use it a lot.

I just wouldn't use it every time.

00:33:30 Interviewer so sort of coming to

the end

is there anything you'd improve, about the overall app sort of experience.

00:33:37 P12

Nothing major.

I think it's been mentioned that maybe having again a bit of information to go along with the boat and the tank would be nice, but at the same time it didn't take away from anything.

So overall had a really good time.

00:33:51 P15

Yeah, obviously like as it was like it was amazing.

The detail was really good and like the interactions was amazing.

But as again as it's been mentioned, obviously, maybe having the potential or the option for like just a little like fun fact or a few little bits of information.

That's the only thing that I could think of. Possibly that could improve it.

But apart from that it's been amazing.

00:34:12 Interviewer

OK, and lastly, would you consider this application to be worth using in the future?

00:34:18 P12

Definitely I feel like especially 'cause Lincoln is such a touristy place anyway and you do get people coming here for bike rides, so being able to like promote this app and saying well, why should you go on this bike ride?

Why not learn more about the city that you're visiting?

I feel that be really good to have in the future.

00:34:35 P15

Oh for sure I like I think it will be a really useful tool for so many different people like kids learning about history.



or people that actually want to come here to learn about history or like people that have even lived here for years that don't really know a lot or they want to go out and try something different. There's so many different so many different uses that it could be used for.

00:34:55 P15

Uhm, so yeah, I would really recommend it for other people.

00:35:00 Interviewer Thank you guys.

### **Participant 13 and 16 Transcript**

00:00:02 Interviewer

So how was your overall cycling experience?

00:00:05 P13

I really enjoyed the experience and thought the app was really easy to use.

00:00:12 P16

I also really enjoyed the experience.

00:00:16 Interviewer

So were you able to navigate the route on your bike?

00:00:19 P13

Yeah, yeah it was a really easy route to follow.

It was clear and laid out well.

00:00:26 P16 It was

good.

There was not too many hills.

00:00:29 Interviewer

So the points of interest.

So like the stops like the first one was at the Brayford, the second one was on the river and the third one was at the memorial.

00:00:36 Interviewer

How accessible were they?

00:00:38 Interviewer

Do you find them easy to access? 00:00:39 P13

yeah there was some where you could pull in with your bike which was really good.

You could get off and use the app whilst your bike was safe and off the path.

So yeah, it's really easy to use. 00:00:51 P16

Yeah, I found it very accessible.

00:00:55 Interviewer

So how do you feel about the frequency of stops?

So there are three altogether.

00:00:59 P13

Yep, it was really good and they were nicely spaced out.

Uhm, there was.

Like it was a good distance between each one.

00:01:08 P16

Yeah, they kind of break the journey up a bit so you had rest periods in between moving on to the next one.

00:01:14 Interviewer

So how did stopping at the points of interest affect your experience?

So actually sort of getting off.

Your bike.

00:01:21 P13

It actually made it more enjoyable because it gave you that time to rest, and between each stop and you were really focused on the app then.

00:01:29 P16

Between each each stop I was able to catch my breath.

00:01:33 P16

Look around at the scenery.

00:01:37 Interviewer

So what were your initial thoughts on the application?

So like from your from first opening it first?

Having a look at it, what your thoughts?.

00:01:44 P13 um the colors were really nice.

It was really easy to look at and visually, yeah, brilliant.

00:01:55 P16

Yeah, yeah it was easy to use.

Easy to look at.

00:01:58 Interviewer

OK.

So the first experience, which is at the Brayford Wharf with the Viking ship, how did you

Feel about that experience?

00:02:07 P13

Well it was exciting 'cause it was the first one.

It was my favorite one as well.

Uhm yeah, loved like it was getting a feel for it.

So you've you really worked out what you had to do on that first first one.

00:02:21 P16

Yeah, it was historically interesting when you've got the the new game, Assassin's Creed Valhalla, which Lincoln is actually featured in.

00:02:29 Interviewer

Yeah, so it's like it's relevant to sort of.

The history of Lincoln then.

Uhm, So what were your thoughts or any observations on the Viking ship itself?

Sort of like the the actual like model that came up on your phone.

Did you have any thoughts or observations on it?

So when it appeared.

00:02:49 P13

I I don't know much about history, but I know it was historically accurate.

00:02:57 P16 And it looked

good.

Looked accurate.

00:03:03 Interviewer

So how did you feel about the quality of that experience?

And did you Did you have any problems or anything, or was it all working as expected?

00:03:11 P13

It all worked really well.

Easy to find.

00:03:14 P16

Yeah, that was easy to use.

00:03:17 Interviewer

Uhm, So what did you think about the model already being there?

00:03:23 Interviewer

So when you open the app so you didn't really need to do anything to trigger it, you sort of hold your phone up to the water and it just appeared.

00:03:29 Interviewer

Yeah, how did you feel about that?

00:03:31 P13

That was good 'cause you could.

You could just see it instantly.

00:03:34 P13 There was no searching around for everything, it was just there.

00:03:38 P16

I found it easy because you didn't have to look around the buttons to push to to.

Bring it up.

It was.

It was just there the viking ship

00:03:55 Interviewer

So having the Viking ship just appear as you open the app

00:03:58 P16

Oh yeah yeah it was say a lot easier having it appear 'cause you don't have to search around for buttons to push.

00:04:04 P16

And obviously how to bring it up.

00:04:06 P16

So yeah, good.

00:04:09 Interviewer

And and did it all work OK for you?

00:04:12 Interviewer

Did it work properly?

00:04:13 P13

Yeah, yeah it worked wonderfully.

00:04:14 P16

Yeah yeah, it all worked great.

00:04:17 Interviewer

Uhm, so were.

Did you have any extra sort of thoughts or observations about this experience?

Any positives or negatives?

00:04:24 P13

I think it'll be really, really good for cyclists, and obviously historical enthusiasts to use around Lincoln, and it would be brilliant to put it in other cities as well.

Bringing in culture and activity.

00:04:39 P16

Yeah, obviously it.

Gets you out in the air.

It keeps you fit and educational reasons as well.

00:04:45 Interviewer

So is there anything you'd improve about this experience?

00:04:48 P13

No, I really enjoyed it.

00:04:50 P16

Electric bikes.

No, no it was good.

00:04:55 Interviewer

So in relation to sort of the Viking ship and the Brayford specifically, and there's nothing that stands out that you would improve about it.

00:05:03 P13

No no.

00:05:04 Interviewer OK, OK.

00:05:07 Interviewer

So is there anything that you would like to mention about this experience?

00:05:10 Interviewer

Just extra, just anything you felt?

00:05:15 P13

No, I really.

I just really enjoyed it and it was a good day out.

00:05:18 P16

Yeah, it was a good day out.

00:05:21 Interviewer

So the second experience on the Fossdyke canal with the sign.

What did you think about that experience?

00:05:29 P13

That was a good one as well, because you could also stop put your bike to one side and had a a section where you could leave your bike and then you can go and do the activity like the experience and so that was really good.

00:05:40 P16

Yeah, it was good.

You could just just stop and.

Look at it.

00:05:46 Interviewer

So the the actual experience itself, so it's a different type of AR.

It's so the first one sort of used a 3D model Viking ship, and the second sort of more text. Yeah, do you have any sort of thoughts on that about what you actually viewed?

00:06:00 P13 I quite liked it that it was just some text.

No, it was really good.

It looked like a sign.

It looked like as you held out, it was a signpost and you could see that information quite clearly.

00:06:16 P16

Yeah, yeah, it's interesting that I obviously it pops up and gives you information on what you're looking at.

Yeah, it's good.

00:06:23 Interviewer

So how do you think this effect so this sign specifically on the Fosdyke ?

How did that affect your overall cycling experience?

Did it have any effect?

00:06:33 P13

Well, a positive one.

00:06:35 P13

I liked the the stop and the and the information.

00:06:39 P16 Yeah, it's kind of an interesting stop, yeah?

00:06:42 Interviewer

So do you think it's important to have sort of the information be interesting?

Was that something that motivated you to?

00:06:46 P13

Yeah yeah, yeah.

00:06:48 P16 It was something you didn't know were there.

00:06:52 Interviewer

So what were your thoughts on sort of augmenting a physical object?

So you had the actual signpost that was already there in the real world, and then the app basically used that to project onto it.

Sort of like the sign that you read.

How did you feel about sort of?

Taking something that was in the real world and then showing something digital over it.

Do you have any thoughts?

On that 'cause it's a bit different too.

00:07:18 P13

Quite like the new world really isn't it is that will come into into play a bit more as the years go.

On we'll be using apps like this.

I think in in years times.

00:07:30 P16

Yeah, I mean yeah, it's going to be the future.

00:07:35 Interviewer

Was the object easy to find?

00:07:37 P13 and P16 Yes, yeah.

00:07:37 Interviewer

And so the signpost that you visited

Uh, how do you feel about the quality of this experience then?

So the quality of the sign and the quality of what appeared on your phone?

00:07:50 P13

Yeah, it's very clear you could see everything.

00:07:52 P16

Yeah, good quality you could.

You could see it all.

00:07:54 P13

Came up nicely in in the frame of the phone as well.

It wasn't the the the text was in the frame of the phone, it wasn't out the lines.

00:08:04 Interviewer

Uhm, So what do you think about

The facts themselves are, so whether easy to read or were they interesting. 00:08:11 P13

They were easy to read.

00:08:14 P16

Yeah, it's interesting to read.

Obviously, I never knew before I'd seen it.

00:08:19 P13

I think if you were with children having a a feature where you could press a button and it would speak the the words to you that.

Would be good as well.

00:08:26 Interviewer

OK, so to have sort of audio as well.

As visual.

00:08:28 P16

Yeah, possibly even used for uh, like school trips or yeah, museums or visiting ancient castles and.

00:08:36 Interviewer

Did you feel this one was more educational in the past than?



The previous 00:08:40

P13 yeah.

00:08:42 Interviewer

Do you have any extra thoughts about this second?

Experience any positives or negatives.

00:08:46 P13

No, no, that was it.

00:08:50 Interviewer

Uhm, so in comparison to the first place we visited, so the Brayford with the Viking ship.

Uhm, how do you feel in comparison?

00:08:58 P13

With the second one, yes.

00:08:59 Interviewer

Yeah, so comparing the two.

00:09:04 P13

I I think I enjoyed the the visual of the The first one more than the second one.

I liked I liked the information on the second one, but obviously having a Viking ship to look at is pretty cool.

00:09:19 P16

Yeah, obviously the other one was more visually appealing, whereas this is almost more educational. 00:09:26 P13

You like your history though, don't you?

00:09:30 Interviewer

So what would you improve about this experience if you had anything to improve?

00:09:34 P13

Just maybe the audio button for if you were with a younger generation.

00:09:38 Interviewer

OK.

00:09:41 P16

Yeah, audio button.

00:09:43 Interviewer

Uh, and so the third experience with the tank at the poppy memorial.

00:09:50 Interviewer How do you

feel?

About that experience.

00:09:51 P13

That was really good as well.

00:09:54 P16

Yeah, that was a good one.

00:09:56 Interviewer

Uhm, so how do you think this affected your overall experience?

So going cycling to the Poppy memorial and then scanning the environment and then placing the tank yourself?

how did you feel?

00:10:06 P13 that was

good fun I liked doing

that.

00:10:10 P16

Yeah, it was good.

00:10:12 Interviewer

And the quality of that experience so.

Sort of the tank.

How does it also, yeah.

00:10:18 P13

Worked really well and I like the fact you can enlarge it and make it a bit smaller so you can have a

Look at everything on the tank that was really good.

00:10:26 P16

It was good that you could move it around.

00:10:29 Interviewer So interactivity,

sort of.

Helped a bit this one then.

So what were your thoughts on being able to actually sort of place and interact with the tanks?

I know we spoke about it a little bit, but just to touch upon that.

So yeah, how do you feel about being able?

To interact and move it around.

00:10:45 P13 yeah, that was fun, wasn't it?

00:10:50 Interviewer

So do you feel so the first experience with the Viking ship and the third one with the tank? They both used 3D models. Do you feel any differently about the tank experience to the Viking experience?

00:11:02 P13

I think 'cause you could move it was really good fun.

So yeah, I'd probably say I preferred the last one out of all of them.

00:11:12 Interviewer

OK.

00:11:12 P13 That was

my.

00:11:13 P16

Favorite yeah, I preferred the model where you could move it about.

00:11:17 Interviewer

OK, and do you think that's mostly down to its interactivity then.

00:11:20 P13 and P16 Yeah yeah

00:11:22 Interviewer

Uhm, and sort of how do you feel that the tank fit into its environment?

Was it?

Did you find it believable?

Did you?

Notice a sound?

00:11:31 P13

Yeah, the sound was added.

00:11:32 P16

Yeah the sound of the engine line.

00:11:34 P13

Sound was good and it looked nice against the poppy memorial and that looked really nice.

00:11:40 Interviewer

OK So you actually had to scan the ground and find the white dots for this for the tank to appear.

Uhm, did that help with placing the tank?

Uhm, like, how did you feel about having to do that first?

00:11:52 P13

Yeah, that was fine.

It then places it on the path in the right area so you can get a good visual.

On it then?

00:12:01 Interviewer

Did you find yourself sort of moving around the tank like physically so you placed the tank and then did you find yourself sort of?

00:12:07 P13

Yeah some yeah yeah.

00:12:11 Interviewer

Uh, do you have any extra thoughts on this experience?

Only positives or negatives?

00:12:17 P13 No, I I loved the the audio with it as well.

It made it feel like you were there and it you could see it and it

Was just great.

00:12:24 P16

Yeah, no, nothing really to change about.

It just it was good.

00:12:32 Interviewer

So with this experience at the tank, how do you fill in comparison to the two previous experiences then?

So you've got the the Fosdyke with the sign and the Brayford Viking experience.

So to compare those two previous ones, like how did you feel?

00:12:45 P13 it was my favorite because you brought in the audio.

You you it was very visually there.

It was very because you were moving it yourself. it you were involved with it, it was really good.

00:12:58 Interviewer

And is anything after?

00:13:02 P16

Yeah yeah the I say the third one, but the tank was was a good one.

More emotional one because obviously World War One.

remembrance day wasn't that long ago

00:13:11 Interviewer

so do you think it had an effect, mostly because it was related to like the location you were at.

00:13:20 P16

I think they built the tanks here, didn't they?

00:13:23 Interviewer

Yeah, so Lincoln is the birth place of the tank and and that's one of the reasons why that was.

Included

Is there anything that you would improve about the experience?

00:13:33 P13

Really enjoyed them.

00:13:35 P16

No, we wouldn't improve anything.

00:13:43 Interviewer

So I know we've sort of spoken about it already, but if you had a favorite experience, what would it have been? 00:13:49 P13 the tank one 00:13:51 P16

Yeah the tank one.

00:13:53 Interviewer So why specifically?

The tank.

00:13:55 P13

I just felt very involved with it, like it was something that I I was doing.

00:13:59 Interviewer

OK.

00:14:00 P13

It fitted in really nicely with the cycle it was.

Yeah it was really good.

00:14:04 P16

And it was the last one to, yeah, you're at the end of.

A journey and then It's the last one.

00:14:11 Interviewer

Did you find yourselves sort of sharing the experience of each other so you both had a phone each?

And did you ever sort of show each other?

What each of you could see.

00:14:20 P13

Yeah, yeah, we had a look at each others didn't we?

00:14:25 Interviewer

And and how do you feel about being rewarded models for visiting each location so you?

00:14:29 P13

Yeah, that's nice.

00:14:33 Interviewer So you did, you did

enjoy? seeing and viewing the models

00:14:36 P13 and P16 yeah yeah.

00:14:39 Interviewer

Would you view?

Would you view the models in your own time?

00:14:41 P13

Yeah, yeah.

00:14:44 Interviewer

Uhm, any particular reason why that you enjoyed sort of collecting them? 00:14:49 P13

well you can show them to your friends and your family then they would get involved with probably doing it as well.

00:14:54 P13

We could do it all as a as a group.

It's something that you could pass along, isn't it?

00:14:59 P16

And you can look back and reflect on the journey, yeah?

OK.

00:15:04 Interviewer

Uhm, so if there were more points of interest on the route, would you be more motivated to stop?

So if there are more places for you to visit more sort of AR experiences, would that motivate you to carry on?

00:15:15 P13 and P16

Yeah, yeah, definitely.

00:15:17 Interviewer

OK, why?

Why would it motivate you?

00:15:21 P13

Just carried on it.

You would have carried on with a longer path wouldn't you.

If there was more more to do to finish.

That that journey.

00:15:30 P16 yeah.

00:15:32 Interviewer

Is there anything particular that would motivate you?

Sort of like anything you've experienced.

Sort of, with the three separate sort of experiences, is there anyone that you'd like?

To see sort of return.

00:15:44 Interviewer

Along the route.

00:15:45 P13

What out of those three?

00:15:47 Interviewer

Yeah, so is there any particular sort of use of augmented reality that you'd want to see a little further.

Along the route.

00:15:55 P13

Uhm, what?

With like the the visuals and the?

00:15:58 Interviewer

Yeah, so like how you interacted with so like. Uhm, with the tank one you place it yourself with the two previous.

You don't really do anything in particular to to trigger it.

00:16:08 P13

That was quite easy to do with the with the triggering where you don't have to trigger it, it just does it itself.

00:16:14 P13

That was quite quite nice, so that would.

Be nice to bring it along on different stops further down.

00:16:21 P13

I'd enjoy that.

They'd they'd be like quicker stops, wouldn't they?

00:16:26 P13

Where you would just.

Get your phone out and and have a look.

But with the tank you really get invested in what you're what you're doing.

00:16:35 Interviewer

So you'd be more motivated to stop along the ways or further on if it's just sort of quicker.

00:16:38 P13

Ones, yeah, definitely.

00:16:40 P16

Yeah, quicker ones.

And like the interactive ones.

00:16:44 Interviewer OK.

00:16:45 Interviewer

Uhm, so would you use this application in future cycling journeys?



So I'm working with visit Lincoln and they have a number of different routes, one of them being the Bomber Command route.

So that goes along load of RAF bases.

Things like that would you be interested in using an application like this?

00:17:01 P16 Yeah, that would be really good.

00:17:02 P16

Yes, yes, very interesting.

00:17:05 Interviewer

Uhm, would you use this every time you visit a new route?

Sort of like.

This kind of application.

00:17:09 P13

Yeah, I probably would.

Finding out about the different history and the culture and stuff.

00:17:16 Interviewer

So why in particular would you use an app like this?

00:17:18 P13

Well, if I if it was in different cities and I didn't know that city, well that would be really good to.

Get some information on it.

00:17:24 P16

That's quicker than Googling it, yeah.

00:17:26 P13

It's more fun as well.

More fun than Googling it.

00:17:29 Interviewer

So it's more sort of fun and engaging, and it's sort of there on demand.

So that that has a positive impact.

00:17:35 P13

Yeah, definitely.

00:17:35 Interviewer

OK.

So if there's anything about the overall app experience that you can improve, what would it be?

00:17:47 P13

I don't know.

00:17:47 P13

It was really easy to use, easy to follow.

00:17:50 P13

You could find yourself on the route.

It was.

Yeah, there's there's nothing I'd improve

It was really good.

00:17:57 Interviewer

So would you consider this application to be worth using in future cycling experiences, definitely.

00:18:01 P13 and P16 Yes,

definitely.

00:18:03 Interviewer

And just to expand upon that, and why would you consider this sort of worth using?

00:18:09 P13 Ease of

use.

Educational, there's lots of reasons, isn't there?

00:18:14 P16

Yes, educationally.

00:18:20 Interviewer

Thanks guys.

### **Participant 17 and 20 Transcript**

00:00:00 Interviewer

So how was your overall cycling experience?

00:00:03 P17

It was a very pleasant experience. To be fair, I had a good time on the bike.

00:00:08 P20

Yeah, I'd say it was a good time. I haven't cycled for a while and I I haven't cycled this far out of Lincoln previously, so it's it's nice to see parts of Lincoln I hadn't otherwise seen before.

00:00:19 Interviewer

And were you able to navigate the route on your bike

00:00:22 P17

yeah, I had absolutely no problem knowing where I needed to go using the application.

00:00:27 P20

Yeah, did have to stop once, but that was just because of my memory. So just to take a look at the app.

And the app did remind me quite well of where to go

00:00:34 Interviewer

OK and and did you find the points of interest accessible when cycling?

So obviously you had three points you had.

To stop at, how were they? How accessible were they when you stopped.

00:00:44 P17

Yeah, so they were. They were really accessible. To be fair, the the app did a really good job of showing me exactly where I needed to go.

I like the fact that it included multiple pictures, so you had like two different kind of points of view to see the location from made. It really obvious when you got to it.

00:00:58 P20

Yeah, I'd say they were quite quite easy to find.

And the app had no problems picking up the the points of interest. 00:01:07 Interviewer

And how do you feel about the frequency of the stops? So there are three altogether? Like how do you feel?

00:01:12 P17

I feel they're very well spaced out. To be fair, I'd say they were pretty similar distance between each one and it was a good distance as well, because if it was, if it's too too constant, you know you'd be spending more time on the phone than actually biking.

And obviously, you know biking is an important part of it as well.

It's good for the fitness and it's good for just getting out there.

And seeing different places. So yeah, I felt that you know you had a good distance between each one to so you weren't stop starting all the time.

00:01:37 P20

Yeah, the distance was good. I feel as if it was enough cycling and then you'd get a decent enough break whilst scanning and taking a look. So that's like always good to like. Give yourself some time to like rest.

00:01:49 Interviewer

So it's quite important for you guys then not to have too many stops, so overall it hasn't affected your sort of cycling journey in sort of a negative way.

00:01:58 P17

No, not at all.

00:01:59 P20

No, I don't think so.

00:02:01 Interviewer

Uhm, so how did actually stopping at the points of interest affect your experience?

00:02:06 P20

It was good. 'cause uh, though a lot of them. It's just parts of Lincoln that would have just passed a total blind eye to.

00:02:16 P17

Well, I mean like for me, especially like I'm really into history.

To be fair, I find it very interesting and I learned things about Lincoln that I genuinely didn't know before.

Like the first stop, the fact that the the Danes used that bridge to attack Lincoln was were really, really interesting to me.

But you know hundreds and hundreds of years ago, that bridge right there?

00:02:31 Interviewer

That was the second stop

00:02:33 P17

The second stop my bad

Yeah, so it was. It was the second stop that told me about the Danes attacking Lincoln. Just found that really, really interesting that you know that bridge I'm looking at right now was actually used hundreds of years ago by, you know, invaders.

That's really, really interesting to me, so I learned a lot and they made the stop really worthwhile as well.

00:02:52 P20

Yeah, I definitely agree.

00:02:54 P20

I'm not really someone that's into history, but learning like combining it with the exercise aspect, it's kind of like rewarding, so it's like, oh, I've cycled this far, and I've learned like, like a fact I wouldn't have otherwise known.

00:03:07 Interviewer

And So what were your initial thoughts on the application? So like just opening it for the first time, what were your thoughts on that?

00:03:14 P17

I I thought I thought the UI was pretty pretty clean. To be fair I could. I could navigate it really, really easily I had no problems understanding what I was supposed to do with the App the instructions.

Were clear the the fact that it showed you where to actually scan as well.

00:03:27 P17

I thought that was really useful if that wasn't included, you know I might not have found the location, but being able to correctly identify where I should be putting my phone to have the pop up appear.

00:03:37 P20

I say the app works well, it's just it's just does what it needs to do is quite simple. Like maybe it could be spruced up with like some animations etc, but that could obviously come way later and it doesn't.

It's not really necessary, but the the app itself works well and I didn't have.

Any problems with?

It personally, yeah.

00:03:52 P17

The main fundamentals are definitely in place.

00:03:54 P20

They definitely work.

00:03:56 Interviewer

Yeah, so the first experience on the Brayford Wharf. How? How did you feel about that 00:04:01 P17

well. I did think that like you know, trying to get the the boat to work on the water.

Obviously that was bugging out a little bit. I'm sure it's something that can be fixed, but I mean once I once I I got it correct and it it did work eventually.

And you know the the the AR stopped fidgeting about and and kind of stood still on the water. I did like the fact that you you know you've gone to the effort to make sure that it's actually only gonna appear properly on the water like a boat should be and that was really that was really smart to me and and really kind of added to the AR experience.

00:04:31 P20

I said it was good starting off in the city centre 'cause it's like easily accessible for everyone and then slowly but like bringing it out into the outskirts of Lincoln 'cause it's starting in a place that everyone can access and maybe cycling out somewhere that people wouldn't necessarily go in Their own free time.

00:04:54 Interviewer

So how do you think this experience affected your overall cycling sort of experience?

00:05:00 P17

I would say it actually added to it To be fair, I find that you know, so I go biking my family sometimes my my dad's very much into biking So we go as a family and Sometimes it can be a little bit boring especially when you're just biking for you know for hours on end and and you don't really stop that often then I just found that you know it added a added a purpose to the breaks rather than just to kind of sit down for a little bit.

00:05:20 P17

You know, as a as [P20] mentioned earlier, you're learning something new. You're experiencing something, and it's kind of cool that you can kind of collect these little figures and stuff and it gives you an incentive To to go out and do these bicycle routes other than just for fitness, which I did like.

00:05:33 P20

Yeah, it kind of reminds me of like Pokémon Go in a way, but instead of collecting Pokémon you're collecting like knowledge and trivia, and that's kind of like good like cuz cycling is, it's fun you can make your own fun of it. But if there's something to like, [P17] said, if there's something to aim towards and it's you kind of want to it, kind of wants to you to keep going.

So you find out more, so you're learning more in your cycle so it feels fulfilling 00:05:56

Interviewer

so you think having sort of a game aspect then that did have a positive experience, a positive impact on your experience.

00:06:04 P20

Yeah for sure.

00:06:05 Interviewer

So what were your thoughts or observations on the actual Viking ship? So viewing it on the water?

00:06:10 P17

When it was on the water, I thought I looked really good. The fact like I said earlier, the fact that you made sure it's it's only gonna work properly on the water as it should be added to the AR experience.

00:06:19 P17

I know that you know you can break immersion really easily with AR and VR, and if there is kind of bugs and errors it's not working properly and so the fact that ship was on the water and definitely on the water it was was a good addition.

00:06:32 P20

Yeah, for sure AR can. It can be temperamental at times and it did.

It's at some point showcase that it was a little bit Temperamental but that all really just depends on like the situation like the the weather, et cetera. But it did work it when it worked. It did work well and it was. It was quite good seeing the boat on the water there.

00:06:49 Interviewer

And how do you feel about the quality of that particular experience?

00:06:53 P17

The quality in terms of. 00:06:54 Interviewer sort of just

in general, so the model?

Like going from sort of.

The screen to actually like the camera. So how do you feel about the quality of it?

00:07:05 P17

Yeah, well I I felt I could absolutely tell what the model was. you could definitely tell it was a Viking ship.

And then you Know it, it adds to the information that you're given as well that the history on ship you're learning.

The fact you've got that visual model there in front of you that visual prompt really helps you kind of like Well, you visualising what what used to be and what used to happen, am I correct in saying there was sound effects of it as Well, yeah, I think the the sound effects definitely helped as well. With that kind of like that little bit of immersion there of like imagining, you know, picturing it back in the day.

00:07:24 P20 There was.

00:07:31 P17

What would have been happening? I thought the sound effects definitely were very a good addition to the model as well.

00:07:37 P20

Yeah, I agree with [P17] on that.

00:07:40 P20

It's just just a nice to have. It completes the immersion, like the whole sound effect aspect is it feels like it's there, but obviously it's not, but it's it feels as if.

00:07:50 P20

It's there. 00:07:51 Interviewer and would you say that's important in terms of realism

00:07:52 P20

Yeah, yeah for sure, yeah.

00:07:56 Interviewer

OK, So what did you think about the model already being loaded when you so you didn't actually necessarily have to interact with the app? As soon as it recognised you're at the water, it loads it itself. Yeah, sort of automatically, but how did you feel about that?

00:08:08 P17

I think that that increases ease of access, especially for people that might not be.

00:08:10 P17

Sort of Comfortable, and might not know what they're doing with AR. And obviously you know I'm quite experienced in technology and how to use it so it was no problem for me.

For other people, it's going to make it more accessible for a wider audience. If it's pre loaded ready to go, you know all they've kind of got to do is what the app tells them to do is very very simple and I think that simplicity is going to open it up to more people.

00:08:35 P20

So it's very easy for AR nowadays. It's a lot easier than it used to be. The fact that it just.

You can just point your phone and it it. It's there, just shows how much they put like the progress of AR has come in the past 'cause you used to have to be able to.

You'd be placing like tracking dots on the floor to even have like just see a thing like that or you'd have to Draw Something special for the app to recognise it But the fact that it just pops up and it notices this is where I am and then it pops up It makes it really, really easy to use.

00:09:03 Interviewer

So for it to be more location based then like that's a positive impact, yeah.

00:09:08 P17

Yes, definitely. OK OK.

00:09:13 Interviewer

So did you have any sort of additional thoughts or observations about this experience on the Brayford?

00:09:19 P17



No, not in particular. I think to be fair. I think the app did exactly what I expected it to do, and you know, I can say it tells you where to go, where to put your phone. You do that. You've collected the the animation and the What the the model that's what I was looking for you collect your model the animation and yeah it it just kind of does what it says on the tin really so yeah.

00:09:44 P20

Yeah no I Agree, I don't really have anything else to add.

00:09:47 Interviewer

So the so for the Brayford experience, the first location in particular is there anything you'd improve.

00:09:54 P17

Well, apart from the fact that you know, as we mentioned earlier, it was a little bit buggy at times as we were trying to, you know, kind of pan the camera up to that water Yeah, I think obviously you know it's not necessarily an essential fix. It still did what it needed to do eventually.

Obviously you can just break that little bit of immersion in in the meantime, as you know, as the as the model is trying to find.

The water and correct itself If that was fixed, it would definitely be improved, but other than that, like say you've got that can I can tell what the model is and the sound effects is there and it it accompanies the information really really well. So other than that it was. It was really.

00:10:27 P20

Yeah, I had no problems with the the Brayford part of the experience. So besides the the bugs that were the the little problems that [P17] mentioned earlier, I think it worked well. Yeah and and it was definitely the model was was decent. It was a good quality model and you could definitely tell it was a Viking ship and just having the the thought to add the sound effects to add kind of more immersion to it, I think that was nice that could.

Really like There's potential in that just to have like, oh maybe like a tour guide like oh this is blah blah and to have someone talk you through just based on like picking up your phone and like pointing at a location. And it could tell you a historical like have an audio book kind of way, like tell you a fact about the.

00:11:07 Interviewer

Area that you're in. OK, so as an improvement Then sort of more like audio cues.

00:11:11 P20

Yeah, that would be. That would be cool 'cause you could you. The technology is definitely there to add to implement that and I think that would be that would be nice.

00:11:17 Interviewer

OK, OK so the second experience on the Fosdyke canal. So with the signpost on the bridge, what did you?

Think about that 00:11:25 P17

well I thought, you know it provides some really like say, really interesting information As I mentioned, I found that incredibly interesting that the Danes used that bridge specifically to to cross into Lincoln

I think maybe if there was a you know like with the other stops, there was actually an accompanying accompanying model to go with it, or just was much more kind of like a text based. You know, here's some information and I think there's some kind of model to go with it like an attacking Dane or anything of you know, Norse. Past that could be really, really interesting to add there just to kind of show you, here's what invader would have looked like if they were coming through over this bridge. I think that could definitely add to that. Stop there.

00:12:04 P20

Uh, yeah I. I agree with [P17], it was nice having the information there, but it did feel as if it could use like a little bit more like visual flair.

00:12:12 P20

Something like to create like a visual interest. And also I think that would also work with the thing that I brought up earlier about the the sound cues and being able to use those to have. You could have someone narrate for you it's probably, and that would be good for people that may suffer from like blindness or like visual impairment, so they can also take part in the app.

00:12:30 P17

another thing really quickly about the about the signpost information there was that I did struggle to get it all on the screen at the same time I was trying to kind of resize and I couldn't quite get that to work. So I think that is one potential improvement there.

Was you know it was a bit fidgety to try and read through the whole thing. I was kind of panning my phone across quite a big area just to try and get all the info.

00:12:49 Interviewer

So being able to maybe interact with that signpost. Maybe you'd make it smaller.

00:12:53 P17

Yeah, yeah, I think that could be you know again, as [P20] said about the visual impairment if you you know if you are reading up less, you've got a hearing impairment.

You can't hear properly. You can't hear the narrator. being able to resize that. Some people might want to it

Even bigger so they can properly read it as they're.

Running through it so it can help with that as well.

00:13:10 Interviewer

Uh, so how do you think this experience so the Fosdyke Canal howd that affect your overall cycling experience?

00:13:15 P17

Well, I mean, as I mentioned that the stop to me was really really interesting and you know to me Otherwise, that's just gonna be a bridge. just a really small bridge. that its some insignificant bridge. I won't think twice about it and learn the information.

00:13:27 P17

And the stop was very scenic. Stop as well. To be fair, it's very beautiful place to kind of stop and.

Just rest for A little bit and and yeah, just added some really, really interesting.

History to the bike ride.

00:13:37 P20

Yeah, I'd say it's the perfect distance away from the first stop, 'cause you wouldn't want it to be too far and you wouldn't want it to be too close.

You wouldn't want to just cycle. Here's the next stop and it's tight. 'cause it kind of slows down your momentum.

You cycle it. It feels like you've cycled enough of a distance and it's kind of like rewarding. OK, I've cycled a fair amount. I need a rest but there's something I can look at.

Here so it it feels like perfectly spaced out just to just to have like the stop there.

And the stop was.

Good yeah, it was something nice.

00:14:05 Interviewer

So what are your thoughts on augmenting an actual physical object?

So you had that sign that it projected onto, so that was a different type of AR to what you would have experienced on the Brayford you.

Actually had a Physical object being augmented. What were your thoughts on that?

00:14:19 P17

What the thoughts on it being a sign and not a physical object?

00:14:23 Interviewer

the fact that it projects onto a physical object, so it projected the information onto that sign on the water. 00:14:29 P17 Yeah, uhm.

00:14:31 P17

Well, essentially just like kind of bonus information. 'cause obviously you can read the sign regardless in person and then obviously you can use the phone to get that extra information there as well.

I I did find it was a bit it's clipping a little bit trying to trying to find the perfect size of that sign and I think that's where the problem kind of potentially came from where I was having to to pan across quite a bit because it was maybe struggling to do that a little bit.

Obviously, you know that's not a not a fundamental issue, which is a bit of a bug. That could be, you know, ironed out, potentially in the future. More than that I did 'cause I I do like the concept of it. The fact that it would fit that signpost perfectly, because again, it, it's augmented reality is all about taking something physical and adding something virtual to the physical thing.

The fact that it would, you know fit that physical thing or physical object there? Uh, I really like that concept. 00:15:16 P20

it also makes it a lot easier 'cause the sign is something very specific like you can't miss out on the sign like you know what the sign looks like It's there ooh I can scan this like it's it's make makes it a lot easier because it's not vague, it's just you know that's that the app is telling you this is the sign that you need to scan and then you'll be like oh this. It sticks out like a sore thumb.

Something that you can very easily spot and then be able to use the app with.

00:15:44 Interviewer

So was it easy to find?

00:15:46 P20

Yeah, yeah, it is

00:15:47 P17 Really easy.

00:15:53 Interviewer

So how do you feel about the quality of this experience then?

00:15:57 P17 what, the quality in terms of.

00:15:58 Interviewer

So the quality of that specific experience at the Fosdyke Canal so. 00:16:03 P17

Oh yeah, well, I mean to be fair compared to the ones I'd say it was a bit a little bit worse simply because for me, like I I really did like the aspect of the other stops in the sense that you know Like I said, you have that physical model to look at compared to just kind of some text, it could definitely do with.

Like I mean being spiced up a little bit, just, you know, just pretty plane like white background black text, and I think if you want to, you know for me as someone that's always really interested in history It's very easy to grab my attention with that because that's a really interesting fact, specially about Norse history, because I you know Vikings are one of my favourite parts of history to be honest and so that really intrigued me, but to other people. If you kind of want to get other people on board.

This idea, and have the you know the drive and the interest to make them go cycling and make them go find these things it might do with you know, potentially needing a little bit more. Like I said, like some kind of Viking model in some way being implemented.

And just to kind of grab the attention of other people that are you know they're going to care more about seeing that visual side of history. Rather just learning the facts.

00:16:56 Interviewer

OK.

00:16:58 P20

Yeah, I I do agree It was compared to the other stops. I feel as if it was a bit lacklustre because it was just the the information and it could have had like there could have been more. There could be a lot more to it, but Uh, yeah, no, that's that's All I have to say about that really

00:17:18 Interviewer

And So what do you think about the facts themselves? Were they easy to read? Were they interesting?

00:17:23 P17

Well, I I found it incredibly interesting. It was very easy to read as well. The information was, you know, very Very clear and it was, you know, well structured, easy to read, easy to follow and understand. So I had absolutely no problem with learning on this trip.

00:17:37 P20

I'd say the font was a good size and it was a very legible font. It was a very practical font for the situation. Yeah, yeah, it was quite easy to read.

00:17:49 Interviewer

Uhm, so do you have any extra thoughts about this feature? Any positives or negatives? What was successful? What wasn't?

00:17:56 P17

I, I think the concept of the you know the plaque trying to fit the sign is a really, really good concept.

00:18:02 P17

Obviously, like I said, it seems a bit of work. if it had been implemented properly to ensure that it's actually going to fit that sign perfectly and not bug out a little bit here and there, and apart from, you know, kind of adding that that visual aid with it as well I think.

In fact, you could keep the sign in there and other visual aid as well. You can have one section of the bridge where you hover over the sign and you get that information. You have another section where you know maybe you you pan over.

The bridge and the Viking will appear on the bridge. I think having both in there is a really good potential feature allows you to add more information beyond that, what's mentioned on the app because you don't be scrolling through, you know walls and walls of text. 00:18:36 P17

Yeah, the augmented reality part makes it more interesting. The fact you're trying to you know, connect something there. It it makes it more interesting to kind of engage with and read.

00:18:45 P17

So I think yeah having the information augmented reality is absolutely fine. Just add that visual kind of aid as well of the model.

And I think It'd be perfect, OK, yeah.

00:18:56 P20

For sure I agree, I don't have anything else to say on this.

00:19:00 Interviewer

And so the 3rd and final experience at the Poppy Memorial with the tank. What were your thoughts on that?

00:19:07 P17

So the only bit that I struggled with for a little bit was trying to figure out how to get the model to appear Once model had appeared And it needed resizing quite drastically It you know, kind of filled the entire screen up and I was like oh God. Oh God, what's going on here?

I can't see anything anymore once I figured that out and I could resize it and that was a lot easier to me, uhm?

But yeah, I think all that could really do with improving was potentially just. You know, having the model resize correctly when you you find the area and maybe making it a little bit more obvious on the app just for that area. The other ones are fine and where to actually scan to get the model to appear.

00:19:42 P20

I'd say it was a nice like end to the trail because at that part the cycling had gotten a little bit more intense 'cause there was.

It was less flatland there was more hilly terrain to go over and, but that did create some interest in the cycle, so I think it could be cool.

00:20:01 P20

Potentially in the future with multiple trails having trails of like having like a difficulty on there to in like make it more gamified, something so it's something something people would want to do, like oh, this is this information trail.

It's a hard trail because there are some areas where it's heavy. It's Hillier, et cetera. Et cetera like I think, like turning it into more of like a game.

Would incentivize people to want to to do the cycles to want to exercise more because they're getting this these facts and information 00:20:29 Interviewer

so the experience specifically with scanning the ground, placing the tank and how did that affect your overall experience?

00:20:38 P17

Yeah, well like I said just you know just happen to find that correct area to find it and resize a tank I I would say I had a little bit of a negative impact on it Just because you know I wasn't really quite sure what's happening at the start. It didn't get to a point where it got frustrating and I did figure it out. You know, in in a reasonable amount.

00:20:53 P17

Of time, but you know, for people that are less Well versed with technology and might struggle a little bit more. They might have really struggled with that specifically and so I think one thing that that could be.

Included as information is how to resize something potentially on the application. You know, for me it was second nature to know how to resize them from a phone, but to someone else that's you know not as well versed in technology.

They might not know how to resize something, so if they scan that ground, that big tank appears. Either you know they're gonna be trying to step back 10 miles or try and see it, or rather than to resize it.

00:21:23 Interviewer

Yeah, so there was actually text at the beginning that first comes up that tells you how to resize it.

00:21:30 P17 oh so I might have skimmed over that

00:21:31 Interviewer

Yeah, the the one of the messages that come out initially when you first load the camera it says pinch and twist to resize and rotate. It could have been easily missed, but.

00:21:39 P17

All right, there you go, it's fine.

00:21:41 Interviewer

No, it was it was there.

00:21:41 P17

Yeah, maybe then just in addition, 'cause you know, if you were to go back to that, if you have skim read over it like a lot of people will do, and maybe you could have some kind of just some mini prompts somewhere on the application just to remind people doesn't have to be very big or anything, but just so they won't have to go all the way back to.

Kind of final information. Again, that could be a potential improvement though.

00:22:02 P20 Yeah, uh.

00:22:04 P20

The sizing I did have issues like [P17] with the sizing in the tank. It did start a bit a bit big but besides that I had no problems with it.

00:22:12 P20

It didn't really affect the experience too much and I feel as if after when we got to the final one and we'd scanned it then it opened up everything it gave us access to all the models. I think that was a nice reward, something like Cool to to look at so you can place the models anywhere and you can kind of like take some funny pictures and like make some memories with the app was like oh this is when I did this cycle and it was like a something that you can look back at and be like. Yeah this is.

00:22:36 P20

This was and you can recall the information just from like the pictures that you took.

00:22:41 Interviewer

OK, So the actual mechanics and function of this experience, so scanning the ground, recognising a plane and actually tapping to place the tank sort of being able to move it freely What are your thoughts on that?

00:22:57 P17

I really like the concept that you can. You can move the the AR wherever you'd like to. As mentioned earlier, take some like really funny photos with it.

You know? So you can take some just really kind of historical photos of it, because the models match the history of where you are so well and you know why it's there is It's always got purpose for being there. The model is correct for you know the the landmark in front of and I think that really you know it really adds to a landmark you know specifically in the past. If you're taking a photo of that, a World War One memorial for example.

It could be a little bit lacklustre. You've got a World War One tank in the background. There, you know it adds to the history, adds the the immersion of where you are. I really like that feature.

00:23:34 P20

Yeah, it's kind of recontextualizing these kind of things, but otherwise people would just like turn a blind eye to like that bridge for example.

Ah, for for any regular passerby, it's just a random bridge, but alongside that information alongside the AR experience, it kind of brings something out.

Of it recontextualizes the history of that bridge. So you're like, oh, it's not just a bridge. Actually this bridge was used by the Vikings to come into Lincoln, and that's I think.

That's really cool, actually.

00:24:16 Interviewer

So do you feel any differently about this experience and the Brayford Viking experience? So they both use models and 3D objects, but in different ways. 00:24:25 P17 is this A different route you're on about here?

00:24:27 Interviewer

I'm talking about the the tank and so the Poppy memorial in comparison to the Brayford with the Viking ship So you have like what are the two differences for you? 'cause obviously they both use 3D models, but you have completely different ways.

00:24:41 P17

Yeah, so I mean the the Poppy tank, uh?



Wasn't trying to it wasn't trying to actually pan it like I wasn't trying to connect the AR to anything in particular and you know, you you kind of scan the ground.

It appeared you could resize it, place it where you want, take your photo in comparison at the bridge, you have to try and find that sign specifically to you know, have the information clipped to it. I I think the information. clipping to it was was an interesting side of things.

As I mentioned earlier about, you know if you added that model as well, that you potentially Move with it. That could be really interesting 'cause I really like the concept of the application. You can take the photos with it obviously with the with the bridge you're kind of locked to.

If you've just got that text there, all you can take is essentially a picture of the of the sign, and that's it.

And there's some really beautiful scenery behind you as well. You can't actually get a photo of the bridge with the sign in because of how far you have to pan, whereas otherwise you know you could have that.

00:25:31 P17

Picture it, you could have that model of the Viking ship around to the bridge, you know you could take a photo of him crossing the bridge like they would have.

Done in history, so I think the.

The capability to to move the augmented reality at the Poppy Memorial at the World War Memorial was um

I I like that I like that concept. You could move it where you wanted to in comparison to have any information, kind of glued to the sign, OK?

00:25:57 P20

With the boat specifically, I like the fact that you had to pan to the water to find it. It felt like kind of like it was a treasure hunt.

Like you, you have the camera open and you're actively looking for something, and when it finally loads, this is where the boat should be and the boat appears. It's like it's gratifying. Like way this is. I've done something right

This is what the outcome should be.

Uh, but the tank was nice, being able to place that anywhere 'cause you can kind of create these photo opportunities to share with people.

And just having it there kind of bring some more significance to the memorial, I think.

00:26:33 P20

I think that both experiences were good personally.

00:26:36 Interviewer

And what are your thoughts on the tank itself? So the model, like the quality of that model, the sound.

00:26:43 P17

It was an absolutely brilliant model. It got me talking to the people I was with. Actually at the time about, you know the just the sound of it alone.

00:26:51 P17

Just the kind of the the squeaking metal of. Like you know, the the kind of turrets turning in the tank and stuff. It got me reminiscing.

Not reminiscing, I wasn't there, but it got me just thinking about how you know how terrifying it must have been to to actually encounter a tank in World War One.

If you're limited and kind of choices, how to deal with it and 'cause you know a goliath of a machine, really.

Uhm, so it got me talking about history as as as something that really interests me. It got me really talking about it and otherwise You know, without that tank model there, it. It's just it's just a block of concrete that has poppies on it, it it wouldn't have got me talking about World War One.

00:27:24 P17

And you know the horrors that the people had to go through at the time. So I think it really, really added to the memorial massively.

00:27:30 P20

I think the model is great and stuff like that is cool.

Because it's not like now, we can't be like, oh, I just want to go take a look at a tank and you can go.

You have, there are places you have to be or like museums you have to go to, but to have it accessible like this is a digital approximation of what the tank would have been.

This is how big it would have been, and just seeing that is is cool. I think like being able to to see.

Things that you otherwise wouldn't actually have access to to re contextualise like a historical space. I think that's that's a something very interesting.

00:28:05 Interviewer

And so did scanning the ground and seeing those dots that help you with placing. 00:28:09 P17

once I kind of realised what the dots were there for that made a lot more sense.

I'm not sure if previously the application it mentioned anything about the dots. Again, I kind of probably maybe skim read through there. The initial part of it too fast. Probably just my confidence with technology to be fair.

But yeah, I think like once I figured out what the dots were there for it made a lot more sense to me and then actually could map it correctly and place it on my screen.

So I think the dots did help. I just needed that a little bit of time to actually kind of realise what the dots were there for and why they were there. Otherwise I didn't really. I initially didn't really know what the dots were there for.

00:28:42 P20

Yeah, the the dots have having the dots appear. I think it was good because it shows you that you are. What you're doing is working and you just need to like.

Kind of scan the area maybe a little bit more to get more of the frame in to have the model fit nicely in the picture.

00:28:59 P20

Just having the dots there as kind of like an indicator that hey what you're doing you're doing something correct.

00:29:04 P20

Just you just maybe a little bit more. It's quite as good to have that there. Just for people that may not be technologically technologically aware.

00:29:12 P20

Just having that there so they know it's it's working. It's like a nice indicator.

00:29:26 Interviewer

So how did you feel about this experience? So the tank experience in comparison to the two previous experiences? I know we sort of touched Upon that a bit

00:29:34 P17

Yeah yeah, so well like the tank experience, you know the fact that you can move it anywhere.

And you know the size of the model alone. I don't know whether that's done specifically to kind of indicate the original size of a tank and how big.

it would have been because that could be quite interesting as well, having maybe kind of some button on there to say like this is, you know, put it to actual size so you could kind of look at it and go Oh my God, realise how big that tank actually was.

But yeah, you can move around, take some really good photos with it. You can put it in the field.

because obviously you know a lot of World War One was fought over essentially fields and trenches, so you know it's really nice.

You know, have that picture. The tank located behind the memorial kind of get the memorial and tank in there at same at the same time

And a photo

You've resized, well. You can move it around.

And once I'd found what I needed to scan to get it up, it was. It was perfect apart from.

That resizing issue

00:30:24 P20

And I'd say both both experiences were good. They've kind of brought about similar things, but with the Viking one a bit more was explored with the just having of just information with this with the sign up.

00:30:37 P20

But yeah, they were both good experiences it was a lot of fun I'd say.

00:30:42 Interviewer

OK, so if you had one, what experience did you enjoy the most? Is there anyone that stood out to you particularly? And that was your favourite. If you had one.

00:30:52 P17 I

would say.

I would say the the Viking one simply due to my my interest in Viking history. And you know how interesting it is that I'm in a location where Vikings actually once walked through to attack England with the with the information at the bridge. Yeah like say to make that like absolutely superb.

It would just need a model with it as well

00:31:13 Interviewer

OK, so why was that experience your favourite then?

00:31:17 P17

Simply due to it simply due to the fact that I learn, I think, was the fact that you know you turn something you can.

00:31:21 P17

You can kind of tell with the with the Brayford that its going to have history. There you can tell the World War 1 memorial.

It's it's got history behind. It's a memorial made for something that happened in history, right? You can, anyone can pass by those two areas and think that you know, I wonder when the Brayford was built, or I wonder when this world war one memorial was placed here, you know, is there any significance of it being placed here that bridge we passed?

Otherwise, I I've I've walked over that bridge many times and you know, I'd never think twice that there's any history behind that. 00:31:47 P17

Really, it's just simply a bridge over some water, but using the application and following the route and learning information, I've learned that it's so much more than just some tiny little footpath that people used and built maybe 100 years ago.

It's got a hell of a lot of history behind it and some really, really interesting history behind it that otherwise I would have had never, never had a clue it was there.

00:32:06 P20

I personally think that the.

The cycle to the last to the War Memorial was great because it was kind of up in the challenge and it was like.

Up in the challenge and to when you got there and saw this massive tank. It was quite like a cool experience like wow. I've cycled all this way and this is like quite sick to see.

Yeah, it was like I've 'cause just increasing the difficulty like it wasn't like flat or it's just like a cycle across flat ground like it did increase in difficulty in seeing that tank.

Kind of like made at all like oh wow this is this is really cool. I would like I feel like satisfied that I've cycled this distance. 00:32:48 P20

You know, uh?

00:32:52 Interviewer

So related to the AR then it's still your favourite so that type of AR.

00:32:57 P20

Yeah, yeah, that's, like

'cause I'd definitely say it's my favourite out of all of them that was showcased, yeah? 00:33:04

Interviewer

And did you find yourselves sharing the experience of each other so you both had a phone each? But did you ever sort of show each other what you see on each others phones.

00:33:12 P17

Yeah, I spoke on multiple occasions about what I was actually looking at. Trying to find the objects as well. Together as P20 mentioned.

Previously it was kind of a bit like a treasure hunt at times where you know you've got to try and find that right spot to make it appear.

It does add some gratification to when it appears. Yeah, Oh yeah, sound, I found the right spot and now you know I get to see this kind of Visual aid and that's quite exciting to be honest. Trying to find that. And as I mentioned as well, it got me talking about the history of Lincoln specifically, and that otherwise you know if I was on a bike ride and passing those objects.

Otherwise, I never would have been talking about history. Yeah, so you know, I I learned things from it and it got me talking more social on a bike ride as well.

So yeah, so it definitely added to the bike ride. Definitely added to the social aspect of it as well and.

And yeah, so I did find myself talking about.

The stops to the person I was with yeah

00:33:59 P20

Yeah, I did talk, talk a lot about the the stops we did take I.

I took some photos with the phone just like the AR experience posing with our experiences and you can share those online to more people and then more people could potentially see that and want to use the app.

And take these trails. Yeah, yeah, I'd definitely share that like an Instagram story. Kind of like.

00:34:16 Interviewer

Is that something you do?

00:34:23 P20

Like a moment in time that people can just like look back on.

00:34:28 Interviewer

Uhm, so you spoke a bit about being rewarded the models and how that made it into more of a game.

If you just tell me how you.

Felt about sort of getting those rewards for visiting each location

00:34:38 P17

well, I think one aspect of the the models. I really did like is that you kind of collect them and you kind of like have your little portfolio on the game of all the different models that you manage to find, and I think that's very rewarding.

And you know, as as one that does play games you know.

I sometimes like to go like achievement hunting on games and try and collect like lots of different things and kind of feeds into that kind of whole Pokémon.

Go aspect again as well as previously mentioned, the concept of that is catch as many Pokémon as possible and the concept of this is going on these bike rides. you're getting fit. You're get healthy doing it and your reward.

Doing that is you know what was previously locked before you've now unlocked, so you can turn around to your friend and say, or do you have this model?

You have this model and that can not only can incentivize you incentivize other people to go well, he's got, you know he's got the entire Viking collection I want that, so you know you're going to then go on these routes as well. 00:35:23 P17

See the actual historical locations and then collect the models with that. It's just kind of a little symbolism of like I had done. These really potentially really challenging bike rides. Log on to these locations and. And find something really cool to collect from it,

00:35:38 Interviewer so does AR have a specific impact on your motivation then.

00:35:40 P17

Absolutely, absolutely. As as mentioned earlier, you know some of these locations you know otherwise without the AR experience there behind it.

I wouldn't even have known it was historical in any in any context really, other than just you know it's just there.

So, so yeah, that definitely adds to the history of it, and it adds to the entire experience with the bike ride in a really positive way.

00:36:00 P20

Yeah, I agree with this. The gamification of the whole app kind of.

Sometimes you don't really want to go out exercise, but if you've got like kind of a reason to like with this app, you're not only are you exercising, but you're also gaining knowledge that you may not have potentially known beforehand. That kind of makes you want to get out there and want to go cycle.

Kind of bringing like Like some meaning to to the exercise like not just. I mean exercising is great, you can do it for whatever reason, but like having sometimes getting that needed you need that motivation to get you out and doing the exercise.

And maybe if the trail is already there for you, you don't have to do.

Any real all You have to really do is like find the The locations and that's quite fun within itself.

So just giving you that initial spur, that initial thing in your brain is like, oh, I'm going to go out cycling so I can learn some new information today. It's kind of like like a good Starting point to getting someone into who may not have potentially not have been into cycling into cycling 'cause it's so accessible.

You can hire a bicycle and it's just fun. It's it's definitely something that could bring someone to want to cycle more.

00:37:13 Interviewer

So if there were more points of interest on the route, so the route was longer. If you're going out for a couple hour cycle, would having more points of interest to stop at motivate you to keep carrying?

00:37:23 P17

On I, I would say definitely yeah.

I mean I, I don't have any particular issue on this bike ride so far. Had it carried on with more points of interest.

Uh, I would have carried on and we decided to turn back, turn around, and come back up simply due to the fact there aren't any more points of interest.

00:37:38 P17

You know, had there been a couple more three more, I'm sure he would have gone further out as a as a group and found them all simply because you know, I think it's it's human nature.

If you start some kind of like trail, you're gonna want to finish it. You're not gonna get halfway then come back.

Because if you want to then finish it later on, you've got to that entire half again, and then the second half. 00:37:56 P17

So I think, yeah, it's it's really good. Uh, incentive, it it really incentivizes you to to carry on to to bike further than you might otherwise not have biked further before you know.

00:38:05 P17

You know you have no incentive to come on this bike ride might have only gone half the distance you went today and then come back home for a little stroll and yeah, so I think the the the stops really do incentivize you to go further. You might previously not have gone otherwise.

00:38:21 P20

For sure I.

Agree with [P17], I had before this. I'd never come out this far and to cycle this distance I I'm I was rather I was happy to do so and I would have done more if there were more things to see.

Yeah definitely I would have gone even further. I had no qualms with going further, so yeah, more stops would be nice.

00:38:43 Interviewer

OK, so if you were to use this application in the future, would you use this application in the future?

So I'm I'm working with visit Lincoln who have a number of different bicycle routes, so one of them is around.

The Bomber Command route, so that's more RAF bases. Would you use this? An application like this? If you're on other routes in the future?

00:39:04 P17

Absolutely. I think it. It just adds something extra to that little route and you know that just makes it a little bit more interesting and the fact that you can. You can learn some really, really interesting information about history.

00:39:16 P17

And you know it, it it. It's just going to add something to a bike route that otherwise simply just going to be a bike route, right? 00:39:21 P17

It gives you some stops, some kind of like almost predetermined stops as well, which, especially if you have like less experienced bikers, they've always got that look They know they've got a little reward of the stop coming up, and not only you're going to get to stop, you're gonna get to collect something to add to your collection.

00:39:35 P17

And learn something really interesting as well. So adding knowledge as well as exercise together you know to knowledge and exercise two very important parts of to kind of like growing up and learning things so.

00:39:46 P20

I'd say with multiple routes it does kind of add to like the competition aspect of it like it's great going out cycling with other people, but if you don't if you're happening to just do like 1 route by yourself one day, but oh, I've done this route.

Have you done this route and you can kind of like like start like friendly competition to encourage you to cycle more to do and?



By doing that, you're learning more, which is just Overall quite great.

00:40:09 Interviewer

So would you use an app like?

This every time you go on a new route.

00:40:12 P17 Well, if it.

If the app was there and you know it had the route on it, then I'd have no reason not to use this app.

It's it's simply just gonna add to my experience. Make it more interesting. I'm gonna learn more and and you know, like, say, building that collection up.

00:40:24 P17

It really just adds that friendly competition that [P20] mentioned earlier. The fact that you've got that collection to show for yourself. They're gonna prove I've done this bike ride especially.

There's a very challenging bike ride. You know there's something to show off to other people, and so yeah. So I, I genuinely think it only adds positive aspects to a bike ride and when implemented completely correctly, you're gonna learn more. Experience more just to make bike rides more fun in general, yeah.

00:40:51 P20

It's it's good because it gives you the route like sometimes you.

You don't really want to think about

I've got a cycle here. Then to get to do this and I've got to do this, but having that predetermined route you kind of would make people want to cycle more because they know where they're going. They know where they're going to stop, so it kind of makes.

It's easier, just like maybe someone that is a beginner cyclist like they'd cycled too much and they'd overexert themselves. But having these stops is nice because it allows them time to.

To kind of get a rest in and maybe not go too hard and maybe potentially injure themselves. It's nice having like a like a predetermined route with stops, and you can just kind of see things and learn new things.

00:41:42 Interviewer

And lastly, if you could improve anything about the app, so overall what would it be?

00:41:43 P17

Like I mentioned earlier I think that like some some many potential prompts, or like a little help button when you're actually at the AR sections.

In case you've forgotten what to do or how to work it, I think that could be genuinely a really good addition to the application.

Obviously there are little bugs that we mentioned earlier that they don't break the fundamentals of the app. You can still tell what it's meant to do.

So that's just potentially some ironing out, but that's not really something to be too concerned about at this stage of development and.

Yeah, I think just a bit a little bit more on accessibility, potentially just so you've got, uh, you know wider audience that is more usable for I think that could be genuinely, really, really good addition to the application and all that

Yeah, as long as long as you've got roots there like predetermined routes information, I think one potential improvement you could have is a an actual GPS.

Setting, I mean I know it gives you instructions on the route of where.

To go, if there was any kind of like if it could work with GPS in some way to kind of say you are, you know if you're halfway along and you get really lost and the instructions aren't, you know potentially.

Maybe they are clear enough, but someone made a mistake. They're confused. Yeah, having that little GPS setting in there to actually say, here's where you are here. you need to get to. That could really potentially help. Some people who have got.

Lost on the way.

00:42:53 Interviewer

OK.

00:42:54 P20

I agree with what [P17] just said, but and the the the bones of the app is there we or what needs to work works and that's great, but I think it just needs some some visual flair in the in the UI.

00:43:05 P20

Maybe some user experience type stuff and like just to make maybe like nice looking buttons, animations etc. Really will tie the app.

00:43:14 P20

Together to kind of make like an overall like great experience.

00:43:20 Interviewer

Thank you for your time.

### **Participant 18 and 19 Transcript**

00:00:01 Interviewer

So how was your overall cycling experience?

00:00:04 P19

It's very good.

00:00:05 P19

I I thought the route was quite nice and there were bits that I hadn't been through before, so I thought it was quite good to go a different route and there was like varied terrain so you had like.

Tougher bits and easy.

Bits so it was. It was quite a good route

00:00:18 P18

Yeah, yeah, it was quite nice.

As they said, I'd never been there either and it was it wasn't like particularly difficult route. weren't too many hills just now, smooth ride.

it was quite nice

00:00:30 Interviewer

Were you able to navigate the route on your bike well?

00:00:34 P19

Yeah, yeah, I think so. There was a couple little twisty turny bits but you could easily do them.

Yeah, especially if you're an experienced cyclist.

Yeah, yeah, if you're an experienced cyclist, I don't think you'd have any.

Issues at all.

'cause you know there was like one or two tight corners, that was it. Everything else was pretty easy, pretty smooth.

00:00:57 Interviewer

So how do you feel about the frequency of the stop so the three altogether one at the Brayford, one at the fosdyke and one.

At the poppy memorial 00:01:03 P19 yeah, I think it was. It was good having the

three and I. Think they were quite evenly spaced out.

00:01:10 P19

Yeah, which I think kind of had that you had the bits where you were like relaxed cycling and then obviously then could have a little stop between.

00:01:20 P18

Yeah it was. Yeah yeah it was spread.

Out well like obviously first one straight away, then I. I think it must have been fairly evenly spaced between the next two.

So that's pretty good good.

Didn't feel like they were too long and get like out of breath between them or anything like that

00:01:38 Interviewer

And and so did you find the points of interest, so the three stops. did you find it accessible? did you find them sort of easy to get to?

00:01:50 P19

Yeah, I think they were all easily visible especially the third one, 'cause it's quite Like a big thing to see.

Yeah, so I think they were all very easy to spot and easy to, you know, notice.

00:02:05 P18

Yeah yeah, I agree there wasn't any difficulty.

Finding where they were.

It was, yeah, yeah, they're all. They're all very easy to see and yeah accessible as you say.

00:02:19 Interviewer

Uhm, so how did actually stopping at the points of interest affect your experience so you know stopping at the first one stopping at the second and third

00:02:27 P19

Well, I think it was good because obviously you had a break from the cycling and then you're learning stuff at the same time It's like a little knowledge, a little bit of of trying to think of a word that rhymes with knowledge that it's like fitness, but.

00:02:43 P18

Yeah no, yeah it was good. 'cause obviously if I'd just stopped there without the app then I wouldn't have learned anything about it.

00:02:47 P18

I would have just stood there, looked at river and then carried on so it was quite nice learning about the history of it. That's really going good. 00:02:55 Interviewer

so youre saying that sort of stopping at the location it sort of improved the experience by having something to to do.

00:03:04 Interviewer

While you were there.

00:03:04 P18

Yeah yeah, if it. Yeah, if I was just stopping I probably I probably wouldn't have stopped if I didn't know I was going to learn something about it every time I would have just wanted to carry on the route, just done that

00:03:15 P19

I think it keeps you up as well, 'cause otherwise I think I probably would have sat down, whereas because I'm having a break, but I'm also standing and having a look at something so I felt like I was relaxing, but then I wasn't actually physically like limiting myself from then carrying on the cycle.

00:03:32 Interviewer

OK, OK So what were your initial thoughts on the application? So like from when you first opened it?

00:03:39 P19

I'm I'm I'm supposed to go first?

Yeah, I think I think it was quite clear to follow the.

Like the instructions that were given on the actual application itself and and I think.

There may have been like It might have been a bit easier if the maps were live to like. Follow them like a sat NAV kind of thing, yeah, but I also understand why it was done the way it was.

'cause I think having to look for the things and having to, you know, keep an eye out for things as you're going past makes it more of like a.

Active experience and I think.

00:04:17 P19

The fact that you're not looking at it while you're cycling also make it probably a bit safer as well. 'cause there are some issues with satnavs and you know running into things.

00:04:27 P18

Yeah, yeah, that's true I Yeah, yeah, at first I didnt know what it's really gonna be like, but.

Yeah, it was very easy to follow So yeah, it was easily, easily used and as we said, yeah it was quite nice getting off and.

Doing the thing and the yeah it keeps you looking around and alert rather than just if you had a little notification saying your things right here and you're not just then not taking anything around you, stopping, getting off and do anything and then carrying on. So yeah, that's pretty good.

00:05:03 Interviewer

So how did you feel about the first experience at the Brayford Wharf? So with the Viking ship?

Do you have any thoughts on it?

00:05:10 P19

I thought it was quite good introduction to the AR stuff 'cause it is something that you weren't necessarily expecting.

I I know when I first got there I was expecting it to just be like an informational kind of thing and then it was like a physical thing that you could look at and it was quite good to get like a scale of it as well.

00:05:31 P18

Yeah, I agree it was a really good that you could see it to scale. Comparing it to the other boats on the Brayford seeing like difference in size. I thought that was good, yeah?

00:05:41 Interviewer

OK, so how did it impact having it?

To scale, did it sort of improve it for you? 00:05:46 P18 yes, it improved it for me I.

Thought it was Yeah, made it more interesting 'cause. I mean you could see a little narrow boat and it's like oh that's what a narrow boat looks.

Like but then you don't have any idea.

How it compares to all the boats you've got there, so you can see size the comparison so I thought that was good.

00:06:05 P19

I think it made it more immersive as well.

00:06:08 Interviewer

OK yeah yeah. So how do you think so? The Brayford Wharf experience affected your overall cycling experience so you know, going there and then seeing that like, did it have an impact on your overall cycling journey?

00:06:22 P19

Yeah, I, I think it was good introduction to it as well, because it kind.

Of it made me want to carry on see what else was there and see what other things were there to spot.

00:06:33 Interviewer So it

motivated you. 00:06:34 P19

Yeah, motivated.

00:06:36 P18

Yeah, yeah, I agree really, no. Pretty much the exact same opinion it does. It motivates you to want to go to the next thing, 'cause you know what sort of experience you're gonna have already.

'cause you've then seen that so you know you're then going to have similar sorts of information when you go to the next stops. It's just interesting.

00:06:56 Interviewer

OK, so so do you have any sort of thoughts, observations on viewing the Viking ship?

00:07:03 P19

I thought the sound design was quite cool because obviously it's yeah. It's like an extra kind of element to it because you can see the physical thing and it's obviously to that scale and then you have kind of a little bit extra from that.

00:07:18 P18

Yeah, I thought it was. Yeah yeah, I felt it was very interesting. It was.

Cool to see it how much bigger it was that I thought it would be compared to everything else. Yeah, so it's interesting.

00:07:30 Interviewer

How did you feel about the quality of the AR and this experience? So yeah, just the general quality of what you were viewing

00:07:35 P19 yeah I

think.

There were some bits where it went a bit off and it was. It was, uh, it wasn't necessarily where it was supposed to be, but once you did get it at the right angle then it was, you know where it was meant to be in the first place.

00:07:51 P18

Yeah, as with most AR things, it was still a bit janky every now and then, but yeah, when you get it in the right position and you can see everything in it then it's really good, yeah?

00:08:00 Interviewer

OK yeah, just to clarify, when it was sort of like wobbling a bit just as.

It was trying to view as it trying to place on the the water, yeah.

00:08:05 P18

Yeah, well, yeah. Like when you were, yeah when you're bringing the camera up and then it starts trying to place it and it's just all over the place and you have to bring it up to the.

Right height to get it. All of the water in view and nothing else, yeah.

00:08:19 Interviewer

So what do you think about the model being there when you load up the experience when you open the camera you hold your phone up and it just You're not doing anything particularly to trigger it yourself, just holding up and it's there do you have any thoughts on that?

00:08:31 P19

Yeah, I thought because it went straight there. It made it more like a surprise I guess.

But then it was obviously just kind of like getting it right was a bit difficult but once you did it it was good 00:08:46 P18

I said, yeah, it was. Suppose it makes it easier when you don't have to mess about doing anything trying to get it to show up. But yeah, it was just getting into the right position.

00:08:55 Interviewer

Yeah, so do you just have any sort of extra thoughts or observations about this experience? Any positives or negatives? Anything you'd improve?

00:09:06 P19

About the one at the Brayford or the whole thing in general.

00:09:09 Interviewer

Yeah, so the first experience on the water.

00:09:13 P19

Uh, I think with the. I, I think if it could be done, I don't know if it could be, but it would be nice if you could like bring it closer but still keep it to scale. So then you can see it a bit closer up as well if you wanted to.

00:09:26 P19

Yeah, I don't know how that would be possible or not

00:09:29 Interviewer so being able to interact with it?

00:09:31 P19

Yeah yeah, sure yeah.

00:09:35 P18

Yeah, I I thought was really.

Good then that it it. It did load.

In well, it was like very whats

The word I can't remember well. Either way it was straight away and then you got on with it. But then yeah, as you said it would be nice to be able to. Mess around a little bit, see it like zoom it in and whatever but yeah it was Yeah, it's good.

00:10:05 Interviewer

So the second experience then at the fossdyke canal with the sign and so just before the bridge up. Do you have any Thoughts on that experience?

00:10:13 P19

Yeah it was nice having kind of like a different kind of thing where it's more.

Informational is that I think that's the word. Yeah, yeah where you had something else to read as well. 'cause going to the first one and then going to the second one.



It gave you kind of a different experience, so it wasn't the same kind of thing which was nice. A bit of variation.

00:10:34 P18 Yeah it

was.

Nice to be able to read something about what was going on there, like yeah, rather than just always having a model to mess around with. Yeah, it's different. It's nice.

00:10:46 Interviewer OK, So what

sort of?

Mix it up a bit, then

P18 & P19

yeah, yeah, yeah.

00:10:52 Interviewer

And how do you think this experience affected your overall cycling experience?

00:10:58 P19

The second one, yeah, yeah. Well I think having it as like a reading element as well was quite good and I think the fact that you could.

Add that in everywhere.

It makes it a lot easier than you. Obviously having to like make signs like physical signs to put up because that would cost money and you have to get permission and things and it it makes it more.

Like a you could I could see implementing this in more places as well.

And and being able to read history about somewhere and like something that you can actually physically interact with is quite cool

00:11:26 Interviewer is that something you'd

want to?

See in more places then.

00:11:28 P19 Yeah, yeah.

00:11:31 P18

Yeah it was, uh, yeah, really interesting. Just being able to like read about what was going on there. Like you could. Yeah as was said like it's easier to implement.

Cheaper to do that than it is to stick signs up everywhere, nonstop.

Boatloads of information like you could have it, where you could have it where, like say tapped on it and like brought all the page up with different information as well like that sort of thing. I thought that was pretty good, yeah?

00:12:01 Interviewer

So what are your thoughts on experiencing like augmenting a physical object. So obviously you had the sign that was actually there and we projected AR onto the sign did you have any thoughts on that?

00:12:14 P19

Yeah, I think, uh. Having something that you can like when it's implementing it on to something that's in a real life, then it makes it kindmore like a believable experience.

Yeah, it doesn't make Any sense, but it it makes it feel more interactive when it's not even necessarily like More interactive in that sense 00:12:37 P18

yeah, Interactive was what I was gonna say. Yeah, like 'cause you feel more involved in it.

If you're having to get your phone or show your camera at it and then it comes up, you feel more involved in learning about it rather than just standing. There with a sample of information read like half of it and then carry on

00:12:57 Interviewer

So it's beneficial to have it.

This way.

00:12:59 P18

Yeah, yeah, it keeps you more involved.

Yeah, yeah OK.

00:13:03 P19

I think people are much more used now used to nowadays like reading things on their phone than they are in real life. So putting it on your phone probably makes it more incentivizes that.

00:13:08 P18

100%

Yeah yeah, yeah.

I think so too

00:13:15 Interviewer

So was the object easy to find? So the sign, yeah.

00:13:18 P18

Yeah, the sign was really obvious, yeah?

I think having like the bridge next to it as well.

Made it a bit more, yeah.

00:13:26 Interviewer

Uhm, so did it work as expected?

00:13:30 Interviewer

So when you held your phone up to the sign, it all loaded properly.

00:13:34 P19

Yeah, yeah, it worked fine for me.

00:13:35 P18 yeah it did. Yeah, I had no issues with anything.

00:13:39 Interviewer

How how do you feel about the quality of?

This experience then, so the second one.

00:13:42 P19

Yeah, I thought it was quite good and I thought again just having something like different from the 1st.

One was nice

00:13:48 P18

Yeah yeah I thought it was good to switch it up a bit.

And then it wasn't like it glitched out or anything. It worked perfectly fine. So yeah, high quality experience.

00:14:00 Interviewer

Uhm, So what do you think about the facts themselves.

what do you think about the facts being projected onto? What do you think of the facts themselves?

00:14:14 Interviewer

So being projected? Yeah yeah,

00:14:17 P19

I thought they were quite interesting.

And it was.

Something that you wouldn't necessarily think that you were going to be reading about.

Because obviously it's like history stuff you.

Don't think like oh, this is where this was like. Back in the day kind of thing and so yeah, that's quite cool.

00:14:33 P18

Yeah yeah, I agree. I thought the facts were interesting I didn't know anything about.

The Vikings or the Romans impact on In Lincoln and on  
the River Canal I had.  
No idea about.

That before so yeah, I thought was informative and interesting.

00:14:47 Interviewer

Were they easy to read?

00:14:49 P18

Yeah, yeah, absolutely definitely.

00:14:51 Interviewer

So do you have any additional thoughts about this feature? Any positives or negatives?

What you'd improve

00:15:00 P19

I think kind of going off that having like with you saying about like was it easy to read.

Or not.

00:15:05 P19

I think being able to.

Look at it, you could have. You can have more text than you wouldn't normally have because you can  
physically like move the phone around and look at it, which I think is quite.

A good aspect of it, because it allows you to have it.

Look like it's relatively large text than it is because I was reading off a phone screen it is.

Small text, but It looks bigger than it is, so it means that you can.

It makes it more accessible, I think in.

00:15:29 P19

That way, yeah.

00:15:30 Interviewer

OK.

00:15:30 P18

That's true, it was quite big text on the thing, so it was easy to read.

But I also think that like even if you didn't have to have it bigger, so you had to move around to see it  
all

Even if you implemented it so it was like more pages of information, if you wanted to put more on, just tap on it and then it comes up.

With the next page sort of thing yeah

00:15:52 Interviewer

So more interactivity then?

So in comparison to the previous experience, how do you feel about this one? So comparing the fossydke to the brayford?

00:16:00 P19

Yeah, I think.

Having I think they both give different.

Different benefits because obviously the first one is like something physical. You can see. I mean, they're both obviously something physical that you're seeing, but like the second one would be having more information makes it a different experience, so then maybe having like a combination of the two or then having ones where they are on their own individually it makes it more enjoyable, I think, in that way. 00:16:27 P18

Yeah, 'cause like the first one was more interactive because it was just a physical object that you see so they were both very different experiences. 00:16:36 P18

But like yeah, the first one being interactive was interesting and then having it not be the exact same experience that the next one was good like.

'cause I like to just read information every now and then. Yeah, I feel like I learn more from that, so found that more interesting. But yeah, I thought it was good that both have different benefits, yeah?

00:17:00 Interviewer

The 3rd and final experience at the Poppy Memorial with the tank. Can you tell me a bit about your thoughts on that?

00:17:07 P19

Yeah, I thought that was really good I liked how you could kind of move.

It about and put it where you wanted to, which I think it would be nice

If there was like a button where you could set it back to actual scale, but I think that being able to move it around and look at it meant that I could look at it in more detail, yeah. So that was good.

00:17:26 P18

Yeah yeah, I agree completely with that. Like the things we were saying about the first one where it was I wish we could re scale it whatever it was nice that we could do that, on the third one move it into position where you could see it to scale, but then like zoom in so you can see more detail and zoom out so you could see what it properly looked like. Yeah, you know I thought it was good.

00:17:47 Interviewer

So how do you think this affects your overall cycling experience? So you know going to the poppy memorial and scanning the ground sort of just that whole sort of experience.

00:17:55 P19

Yeah, I think it was nice because obviously it is like a memorial related to the subjects as well, so it's combining that real life thing that you can go visit with then like something informational about that as well, and something physical you can see.

00:18:11 P18

Yeah, yeah, exactly 'cause it was related so closely to.

like what is relatively recent history that we've all learned about at school and whatever, it was quite good seeing the like Poppy Memorial and then having the tank like that will have been from that time. Like really good thought it was a nice touch.

00:18:31 P19

I agree.

00:18:32 Interviewer

And and so back to the quality. How do you feel about the quality of this AR experience. So the third one in particular

00:18:39 P19 Yeah, yeah, I thought this one was in terms.

Of like the fact that you could move it about and so I think this was the best one out of the three from my perspective.

00:18:48 P18

Yeah, I'd say the third one was better than the first one from the fact that you could like move it around and re scale it and and do whatever Yeah, I thought that was it worked better Well, obviously it was like so different from the second one, it's hard To compare them, yeah yeah.

00:19:05 Interviewer

Uhm, so we've spoken a bit about this, but what were your thoughts?

On being able to actually place and interact with the tank specifically.

00:19:14 P19

Yeah, I thought that was that was really good. Yeah yeah That's great.

00:19:17 P18

Yeah, I thought I thought was good. As I said before, it was nice being able to see it more close up see more details on it and zoom it out and see what it looked like

all together and then have it to scale to know just how big it was compared to yourself.

00:19:32 P19

And it worked very well as well

00:19:34 P18 it did it placed

right Just fine, yeah..

00:19:39 Interviewer Uhm so.

00:19:42 Interviewer

I know you mentioned this a bit, but do you feel any differently about this experience to the brayford experience so they both use 3D models so how would you compare the two?

00:19:50 P19

Yeah again, just the interactivity of this one was made it a bit better I think.

Worked in its favour. Yeah yeah but again having the scale of the 1st One was still very good and I think

Combining the two would work well.

00:20:03 P18

Yeah, yeah, that's what I think. That's what I said before, but that yeah, I agree. I think, yeah, the interactivity helps benefits here.

00:20:12 Interviewer

OK, so like with the so the type of AR so with having it being having to place it yourself and having it just be there when you load it up. Like how do you feel differently about that sort of

00:20:32 P19

I think yeah, it it was very clear to know that I needed to place it down, which I think was good because the information was literally on the screen until I did it so then that made it so that it was like Oh well, if it's not working, but I just read what's physically in front of me and I think being able to place It and move it around. It was just great.

00:20:49 P18

Yeah yeah, so I mean there's a benefit to the first one like just showing up 'cause that automatically places itself where it feels is the most appropriate bit

Yeah, as if you just tap on the screen like when I did it first. It literally I just had like one big tank track in my face, nothing else and I had to move it about into the right position, yeah, so it's like there are benefits to those.

00:21:11 P19

Yeah, kind of bouncing off that the first one is then kind of like a clear starting experience because obviously it's there for you.

You don't need to worry about like doing anything you know even without knowing what was going to happen, you were then put into that experience.

00:21:25 P18

Yeah, absolutely yeah yeah.

00:21:25 P19

And to worry about it.

00:21:28 Interviewer

So, So what were your thoughts on the tank itself, uh, put in terms of it's like like the quality of it is sort of like the model sort of texture.

00:21:37 P19

Yeah, I thought it was really good and I thought even when you like zoomed in so you could see it close.

Up it was still very detailed.

00:21:43 P18

Yeah, yeah, absolutely. I mean with the AR.

its hard have it like as high quality as just a picturing but it was still in detail. You could see all the details in it, so I thought it was high quality. I thought was good.

00:22:00 Interviewer

Did you feel that it sort of fit into the background and was it like do you find it sort of believable or not believable?

00:22:07 P19

Yeah, I thought the colours of it were actually really good and it went very well with the colours of the surroundings, but obviously it was based on what it was really like at the time and with something like that it would have been made those colours to be camouflaged in the environment.

its in so it would always have ended up, you know, working quite well. In that way, it didn't look out of place.

00:22:26 P18

And it's hard. 'cause obviously, if you don't place it in the right position, it looks a bit off. But then when you get it in the right position, it looks like it's just on the path and then it yeah it works. It's just finding the right position 'cause sometimes it looks like it's just. I mean you can place it and it looks like it's sat on top of a wall.

Or you place it and it's like on the path.

00:22:46 Interviewer Yeah, yeah.

So it's having that.

Sort of freedom as well to be able to correct it yourself. Did you find yourself moving around physically The tank so like you place it or like have a look around.

00:22:58 P19



Yeah, I think I did quite a lot, especially after I made it 'cause I shrunk it down a little bit and then put.

It lower down You can look around it physically to see what it looks like on the top and the bottom. The size and stuff which I think is another benefit of being able to change the.

Scale 'cause you from the side view, when it was to scale, you wouldn't have been able to see what was on top of it and things. 00:23:17 P18

Yeah, absolutely. 'cause if you if you just seen it like to scale then you just the get side don't you. Yeah yeah. Whereas like being able to see all around it is good yes, very useful.

00:23:27 Interviewer

OK, so so do you have any additional sort of thoughts?

About this experience, any positives or negatives?

Anything you'd improve or change?

00:23:35 P19

I think it would be quite nice if there was like a if there was a physical map you can see before you set off and it gives you maybe like a area where the thing that you're going to see is and then it would give you like a oh search this area search this bit and then it would make it more of like a I guess like hide and seek kind of like a game 00:23:54 P18 like Geocaching for the sign.

00:23:54 P19 Yeah, like a game make it yeah exactly yeah.

00:23:59 P18

that's pretty cool, a good idea it's like seeing the map seeing where all three step offs were think that would be quite useful beforehand

00:24:07 P19

And also from that, if you had a short video clip so you know how you have the image of the place where you would go and have the experience, it would be good if there was a short video of somebody cycling up to that and then it stopped on the image so you could see like, oh, this is the path that I'm going down. This is kind of where it's about and then that's where it is.

00:24:23 P18

Yeah, I agree

00:24:26 P19

For them, working with the, you have to kind of find it yourself. It gives you more of like a point to go off.

00:24:32 P18

Yeah, rough idea of where you're going rather than accidentally going past the sign 'cause you just missed out the corner of your eye or something yeah.

00:24:39 Interviewer

Yeah, so is there anything you'd improve about? Sort of the tank specifically? I know you mentioned like setting it to scale.

00:24:49 P19

Yeah, I don't think there's anything else other than just like a button to set it back to actual scale.

00:24:54 P18

Yeah, that would be a good idea. I didn't think of that. But yeah, I think that would be a good idea. I can't really think of anything else I'd improve about it I thought it worked very well

00:25:01 Interviewer

OK, and in comparison to the two previous experiences, how did you feel about this one? 00:25:05

P19 yeah, just the interactivity that I think.

00:25:08 P18

Yeah, good yeah I think the interactivity worked a bit more in favour for that one than the first one, but then like the second one, was a totally different experience. It's hard to compare that one to the other two, 'cause it's just information rather than something like a model that you can mess about with. So yeah, it's hard to compare the 2nd one but I think I preferred, the third one to the first one.

00:25:33 Interviewer

OK, I know we sort of mentioned this a couple times, but if you just reiterate what was your favourite experience and why? If you had one.

00:25:41 P19

Yeah, probably for me. I'd say the third one as well, although there was quite a lot about the second one that I liked, I think I'm kind of a person that quite enjoys reading about facts and information and things. So having the second one there was very good.

00:25:54 P18

Yeah, broke it up a bit. Yeah, but I yeah, I still think I did prefer the third one. Like with the tank where you could see all around it like 'cause that was a that's the thing about the first one. Once you just get that side view and cause it's on the water, you can't exactly like go around to the other side and then see different points of it. But yeah, like being able to move the tank, be able to see it from different angles. I think that was really good.

00:26:19 P19

That would be quite a good idea though if you could, if there was a route that went.

Round to the other side of the thing, so you could have a stop where you see it from a distance so you can see the scale of it and then you can move up round close to it along the route.

00:26:30 P18

Yeah, because to be fair the bridge on the left side Like if you could get from there you could probably see from the front, and have it side on

00:26:40 Interviewer

OK, so being able to see sort of the first experience from different angles?

00:26:46 P19

Yeah, that will be quite good and it kind of encourages you to then go round as well.

00:26:49 P18

Yeah, exactly it work more in its favour of it just automatically coming up because then you you don't 'cause otherwise. Yeah you don't get to see the different angles of it, yeah?

00:26:59 Interviewer

Uhm, so did you find yourself sort of sharing the experience of each other? Did you end up sort of like showing each other what you were looking at?

00:27:07 P18

Yeah, discussing talking about it. I mean we both saw the same things on our phone. But yeah, we we talked about it.

00:27:09 P19 Yeah, yeah.

00:27:13 P18

it was nice going with another person on the bike ride to have a chat with someone on the way.

00:27:20 P19

Yeah, I think it encouraged. It would have encouraged me to go and experience it because I'm with someone.

00:27:25 P18

Yeah, yeah, absolutely. I don't think it's something that I'd always think. Oh I'll just go and do that on my own because I like to be able to talk about things.

00:27:33 Interviewer

So you're more likely you're more likely to use this in groups?

00:27:36 P18 with someone else

yeah

00:27:38 Interviewer

OK, that's interesting.

00:27:39 P18

Even if it's just one of us that has the app we can then like all use it, talk about it, sort of thing.

00:27:46 Interviewer

interesting, Uhm, so how did you feel about being rewarded models for visiting each location so you would have got a notification, sort of every time we started an experience. 00:27:57 P19

Yeah, I was thinking about that. That was I think that was quite a nice aspect of it, and I think there are some things that I feel like could add to that as well, so if maybe you could use the models that you collect with the ones that you physically go to see so for example, I don't know you can put the Vikings on. You could put the Romans on the Viking.

00:28:15 P18

Yeah, yeah, 'cause.

00:28:16 P19

Ship or something? And that could have like some sort of interactive element though.

00:28:18 P18

He could also then it would be much easier to see the different scales of the different models you've got as well. Compare the size of that sort of thing.

00:28:26 P19

Yeah, and it would encourage you to do the route again.

00:28:28 P18

Yeah, absolutely.

00:28:30 Interviewer

So you'd actually use the model viewer like with to help with the route then would you view these models in your own time so you unlock them? Like would you find yourself sort of like opening them and having a look

00:28:43 P19

I think it was quite cool and if you had some sort of like informational element to them as well and there was like facts alongside them? Yeah, that'd be quite good

00:28:51 P18

Yeah, if there was a little fact about each model that would be pretty cool, but yeah, I think. I mean I'd probably only do it Couple times after I like got back home like sort of, you know, mess around see what the tank looks like on Your street and then like Well then yeah, no, I think I would.

00:29:08 Interviewer

OK, OK, so if there were more points of interest on the route so more things for you to visit so say if there are Like 5 places to stop that? Would you be more motivated to stop at these and sort of carry on with the route

00:29:22 P19

I think they were well spaced out so maybe if there was like an optional further route you could go on.

00:29:30 P18

Yeah, yeah, absolutely.

00:29:31 P19

I think that would be quite good because it would encourage you to go on a longer cycle and improve what we did Last time, but also to be not having to like stop too frequently I think they were very well spaced. 00:29:41 P18

Yeah, so that's what I was going to say was I think they were spaced out nicely so you're not breaking up your 'cause its a bike ride It's exercise. Yeah, I know it's aimed at professional cyclists, so it's like if you were going on your route , you don't want to stop that often 'cause you're doing it to keep fit, so yeah, but it's like having those little stop offs as spaced out as they were like.

00:30:03 P18

If you could extend the route to more points of interest and have like a little route back but then that'll be good.

'cause if you could like almost loop it around then you could have all these stop offs like around. I mean I know that obviously only works when there's points of interest to fit in. But yeah, if you could extend the route 00:30:19 Interviewer

so you'd be more so they'd motivate you more to carry on as long as it's balanced 00:30:25 P18

as long as you're not cutting the amount of space too short between each one. Then it would motivate me to do more stops.

00:30:37 P19

I think again to encourage them to come back to it you could unlock like a second level of that cycle ride and it would have the same things, maybe with slightly different information, but the same themes and then you could go further and see something else as well.

00:30:51 Interviewer

So you'd be it would motivate you more to do the same route again. Yeah, if the stops were just a little bit different yeah yeah yeah OK Uhm, so would you use this application in future cycling journeys? So I'm I'm working alongside visit Lincoln and they have a number of different routes, so one of the routes is the Bomber Command route, so there's a lot of RAF bases.

00:31:12 Interviewer

Things like that if you were to go along that route and there was sort of like fighter planes you could see and things like that. Would you be interested in using an app like this

00:31:19 P19

yeah, I think being someone that enjoys cycling anyway, it does add something extra to it and I think it makes it a different experience in that way because going cycling you're doing it to, you know exercise and like you said you're doing just to exercise basically, but then doing this as well, you're it's more of like a fun experience, I think.

00:31:41 P18

Yeah, absolutely. I mean, there's times where you just want to go on a bike ride and go on the bike ride for the sake of it and loop around and come back home. But then If you were wanting to break it up a bit, then it would be really good 'cause we get that interactive experience you get to learn things that aren't just on signposts everywhere that have been there forever, so yeah, I think I'd definitely use it just for going on a cycle, yeah?

00:32:04 Interviewer

So would you use it every time you visit a new route?

00:32:07 P18

Yeah, yeah, definitely absolutely.

00:32:08 Interviewer is there any reason in particular?

00:32:10 P19

I think if you're going to somewhere new that you haven't been before, then you're seeing new facts or like new models and things, so it's giving you a different experience to what you have had in previous routes 00:32:24 P18

yeah, and it's a bit more like I now know where I'm definitely going on the journey 'cause I've got these stop offs to go to you don't have to plan it out as much.

00:32:33 P19

Yeah, yeah, definitely.

00:32:36 Interviewer

So if there's anything you could improve about just the whole app what would it be?

00:32:41 P19

I think maybe having obviously this would be the case if there was more routes added on but having some sort of like hub thing where you could go and you could see other routes and having on there like the map for each route that'd be quite good

00:32:53 Interviewer

OK

00:32:53 P18

yeah. I mean, I don't know what the other routes are like, but maybe have routes that aren't just like you get to your point. Then you turn back, you go the exact same way you came to get back.

00:33:03 P18

Yeah, a loop more so than just to get there and turn Around and come back

00:33:08 Interviewer

OK so lastly, would you consider this application to be worth using in your future cycling experiences?

00:33:16 P18

Yeah, yeah, I think so. Yeah absolutely yeah I would definitely use it.

00:33:22 Interviewer are there any sort of reasons why? any thoughts to expand on?

00:33:26 P19

Makes it more enjoyable experience, more entertaining.

00:33:28 P18

Yeah, I mean for me, yeah, for me it's like it's interactive. It gives you something more to go off and you're learning things at the same time. I mean for like a nerdy bloke like me. I like to learn things about the places I'm going to so it is nice to be able to pick up that history and that information. While you're doing it so it's more than just taking in the scenery here, then learning about it at the same time so.

00:33:51 P18

It's quite good.

00:33:53 Interviewer

Thanks guys.

00:33:54 P19 Thank you.

### **Participant 21 and 22 Transcript**

00:00:02 Interviewer

So how was your overall cycling experience?

00:00:06 P22

Cold, but you know it was enjoyable, it was a nice route Uh it was comfortable.

00:00:13 Interviewer

OK.

00:00:14 P21

Yes same answer. It was just very cold and that was the only real issue. Yeah, the app sort of directed us well and it was, yeah flat

00:00:23 Interviewer

Were you able to navigate the route on your bike?

00:00:25 P22

yeah, didn't really have any problems with it There's like one or two moments where we were like is it left or right.

00:00:30 P21 Yeah, and we would just check the app quickly

00:00:32 P21

And it was all good.

00:00:34 Interviewer

Did you find the points of interest so the three stops along the way? did you find them accessible?

00:00:39 P22

Yeah, they weren't I was kind of half expecting them to be a bit hidden Away and hard to try to find them though, but they were on the path.

00:00:47 P21

Yeah, definitely. The wall was definitely easy to find and I guess the sign could have been mistaken for another sign on the way, but you just needed to check it again and then it'll be fine.

00:00:55 Interviewer

Yeah, and how did you feel about the frequency of the stops. There were three altogether.

00:01:00 P22

Yeah, I think it's quite nice spacing as well, obviously I don't want to like, stop and start all the time.

00:01:07 P21

Yeah, well paced. Yeah good amount of distance between the stop 00:01:10 Interviewer

And and how does stopping at the points of interest affect your overall sort of cycling experience.

00:01:17 P22

Definitely means a lot of breaks. I'm like yeah they were. They were more well timed as well. They were at the points where I don't know if that's down to my overall fitness, but they were at the points that I was like Yep I need to breathe.

00:01:29 P21

Yeah, I agree with that.

00:01:32 Interviewer

So what your initial thoughts on the application? So from opening it for the first time? What were your thoughts? 00:01:39 P22

I liked it, it was I like that it was like step by step. There was nobody trying to find on this like the website where to go or other apps It was, it was right there in front of you step by step

00:01:51 P21



its going to be a lot better in different cities as well 'cause the Lincolns cathedrals up a giant hill no one really wants to cycle up that, but say like London, whereas everything sort of scattered about the city and you can cycle dead easy. Just go on the app Click on a location and you gotta go find it that would be good

00:02:09 Interviewer

So the first experience on the Brayford Wharf with the Viking ship just tell me some your thoughts on that.

00:02:16 P22

I loved it the Viking ship was my favourite but I'm biased Yeah, it was a bit Shaky until you moved it away from the sign, but I think like the the size ratio of it as well, I thought was spot on because from where I was stood it was like right there it wasn't off into the background which I quite liked

00:02:35 P21

Only issue I had it doubled it for some reason, but I like, yeah, I just closed down the app and restarted it and It fixed it for the next time and yeah.

00:02:44 Interviewer

Uhm, so how do you think stopping at the Brayford Wharf and viewing that Viking ship affected your overall sort of experience cycling? 00:02:52 P22

It was a good start Yeah, I don't think it impacted my cycling too much.

00:02:57 P21

Yeah, it didn't impact cycling too much. I enjoy cycling and it's just like a cool little stop on the way I guess.

00:03:04 Interviewer

So do you have any thoughts or observations on actually viewing the Viking ship? 00:03:10 P22

as I said before I I liked how the scale of it was spot on. It did feel like it was right next to you kind of thing and fit into the background

00:03:23 P21

Yeah, similar stuff It was cool

00:03:29 Interviewer

How did you feel about the quality of the experience with the AR?

00:03:34 P21

The quality of the models or just the quality of the app in general.

00:03:36 Interviewer

Yeah, so just the quality of that experience in general, so on the Brayford

00:03:41 P21

Yeah, but I definitely like if you go to a city I could Imagine like like.

00:03:45 P22

Yeah it is a good combo. Not it's not just like a straight fact, it was that you've got a little interactive model there It gives you something to do and also cycle Yeah, so it's like you get a bit of outdoor time and get see some cool stuff about Lincoln.

00:04:02 Interviewer

So what do you think about the model being there? So when you load it, so you didn't need to do anything to trigger it? You sort of just hold your phone up to the water and it's there

00:04:13 P22

Well, I I feel like that's definitely more accessible for people that are a bit less tech savvy Also, I guess if you if it is cold like today and you were in gloves you dont need to actually touch the phone at all.

00:04:22 P22

Yeah yeah. Especially when like every time we stopped I had to like warm my fingers before I got the phone out and that made it helpful not having to zoom in or out.

00:04:33 Interviewer

That's interesting So do you have any extra sort of thoughts or observations about this experience any improvements or any positives or negatives.

00:04:45 P22

I quite like that the model was like attached to the sign that, like it was a generic sign and like no ones going to walk past and think

What? was it a dangerous fall sign

00:04:54 P21

Yeah, it's just a random sign, so I guess it doesn't. It's like you will only go there if you have the app Yeah, so it could also create like if two cyclists actually meet at that sign, and then it could create like a lotof cool little experience like interactions I think.

00:05:08 P22

I like that the the virtual model was linked to a physical landmark I really like the idea that i'll walk past the Brayford now and see that sign and be like ha Viking ship everyones gonna look at me really weird 00:05:20 P21

I guess you could add like a GPS thing where if someone got a phone holder on their bike you could add like a direction like 'cause I think you can just like use Google Maps for that and just have it where it shows you the route as you're going on so you don't get lost, so like more complicated routes I guess yeah.

00:05:36 P22

Yeah, the one thing I was thinking of is you know Google Maps Like, even if it's in your pocket, it buzzes when you're near a location maybe as you cycle It buzzes when you're near landmark.

00:05:47 Interviewer

Yeah, so some kind of just notification system.

00:05:50 P22

Yeah yeah on the way.

00:05:52 Interviewer

OK is there anything else you'd like to?

00:05:56 Interviewer

Mention about the experience.

00:06:01 P22 and P21 No dont

think so

00:06:03 Interviewer

So the second experience with the Fosdyke canal you had that sign give me your thoughts on that.

00:06:11 P22

I think that was like the big sign wasn't it I like it had good facts, it was like really nice and clear Like it was like a big poster, but I did prefer the models. I don't know. Maybe its like childish like interactive models, but still still quite a good idea, but I think out of all three that was my least favourite.

00:06:32 Interviewer

OK.

00:06:32 P21

Like maybe if it had more information, like 'cause. It only really says like one thing so maybe it had like a few bullet points like why like why? Because the Brayford is artificial So you could say that it was made by x like in the year whenever, so maybe just more data like.

00:06:50 P22

It can be cool if you had like a little like animation So still 2D, still flat. I kind of did like the the flat screen. It's easy and simple to read.

00:07:01 P22

But yeah like a little animation. One thing I noticed that I Really liked is, I thought I'd have to move the phone to read it but you fitted it in the camera and I was like ah cool

00:07:10 Interviewer

Yeah, so that made a like sort of positive impact.

00:07:12 P22

Yeah yeah, I like 'cause I Was like I moved my phone as if I was going to read it and then I realised it already fit in the camera. 00:07:22 Interviewer

So the actual experience itself, so on the Fosssdyke canal, how did that impact your overall cycling experience. 00:07:31 P22

As in, like the route choice.

00:07:32 Interviewer

So just sort of getting off your bike on on the Fosssdyke canal. Sort of like viewing the facts. Did that have an impact on your cycling experience?

00:07:42 P22

Once again, really nice timing for a break. Yeah, yeah, I think it's just nice having something to do instead of just sat there wheezing.

00:07:52 P21

Yeah, instead of going from like point A to B, you've got like some like stops, predetermined for you and I feel like along that canal Scenery is beautiful, but it's very repetitive. You've got water on your left fields on your right maybe a sheep or two yeah, it just breaks it up a little bit as well there is, it was something else.

00:08:14 Interviewer

So it's all adds to what you're already doing oK, so So what were your thoughts on actually sort of projecting onto a physical object so the sign was there and the app it sort of posted facts onto it.

00:08:29 P21

I think I prefer that use of AR than just like placing a model in it yeah, it seems a very sturdy Model in it and Yeah, interacting with like reality rather than just like placing something in it. I prefer it but.

00:08:42 P22

Well, once again it links to the whole, I'm going to pass that sign now and think of the Dutch invading Lincoln. 00:08:48 P21

Yeah, well, I guess you could do it with like the cathedral as well.

Where if you point on something that's iconic to the cathedral and then some AR sort of like interactable.

00:08:57 P22

It it does link to the virtual to the reality of it more, there's a bit more blend to it.

00:09:05 Interviewer

So was the object easy to find? the sign itself.

00:09:10 P22 Other than mistaking it for that first sign.

00:09:11 P21

Yeah yeah pretty easy to find.

00:09:13 P22

yeah it was So I remember I was getting slightly tired and I saw the white sign and I was like yes!

00:09:21 P21

I guess it is the least recognisable out the other two. Yeah, but I guess it's just you just pick a halfway point between those two And then try and find something else.

00:09:29 Interviewer

Yes, ideally it would be like a like an actual logo, sort of of Lincoln. Yeah yeah. So it would be. You'd see it, you'd realise that was for the app and then scan it.

00:09:35 P22

So little bit more distinct.

00:09:41 Interviewer

But obviously that like doesn't exist yet so it all worked as expected?

00:09:47 P21

Yeah, yeah fine.

00:09:49 Interviewer

And how do you feel about the quality of that experience?

00:09:55 P22

Yeah, once again still good, but like out of all three.

00:09:58 P21

Yeah, yeah, I guess it was the least complex because it was Just a white box with text in it, so there's only so much you can do with that.

00:10:04 Interviewer

Yeah, so like the design of the fact itself. Is there anything you'd change about it?

00:10:09 P22

Yeah, I'd I'd go like the presentation, even it's like basically font or stuff like make it look like a a sign.

00:10:15 P21

Yeah, or like you could make it look like a Viking piece of paper or something with like like make it look like a warm piece of paper. that's like pasted on top of this sign or whatever

00:10:23 Interviewer

Would that improve the experience for you

00:10:25 P21

Yeah, I think that might be cool it be more like immersive.

00:10:29 P22

I feel like if you had like a like a house style to the app as well so, so it's like so you see, and that is like the distinct colour of the company or logo or app or whatever

00:10:38 Interviewer

So what do you think about the facts themselves So the actual yeah, the facts that get projected?

00:10:49 P22

I I quite liked them, like I didn't realise was it the Breit-ford? or what they used to call the Brayford

00:10:56 Interviewer

So the first one was the Breit-ford and then the facts that were on the like the signpost, yeah?

00:11:02 P22

The Yeah the Dutch. Yeah I didn't I didn't know those. I feel like a lot of time. I'll go around Lincoln and you'll get a lot of people like oh did you know the cathedral was the tallest building in the world Yeah, everybody has heard that fact down here. It's nice to hear something that I would not have come across unless I did that bike ride?

00:11:21 P21

Yeah similar sort of stuff the actual facts were interesting. it always nice to learn about the history of a place.

00:11:29 Interviewer

So were they easy to read? You know, we spoke about the design, but were they? Was it quite accessible?

00:11:34 P22 Yeah, same again with I thought it would be too zoomed in and I.

00:11:34 P21 I agree

00:11:39 P22

Had to have to move acrossBut like it was all in one screen.

00:11:43 P21

And it was white text on the black background, in the phone, and then black text on white background to contrast makes it easy to read.

00:11:48 P22

Not too fancy of a font like I know you're saying like a good idea to have like the Viking like parchment Also, at the same time, yeah.

00:11:56 P21

You don't want to turn wacky.

00:11:57 P22

You see, the people who go like full into that and just colligraphy can't read it well.

00:12:06 Interviewer

So I know we spoke a bit about sort of comparing to the previous experience over the Brayford Viking ship, but do you have any thoughts on like sort of in comparison to the two experiences? So comparing this experience to the Brayford experience.

00:12:22 P22

I did like that the fact was In that it was, it was It wasn't just on my screen it was there in front of me I do prefer like the model of the Viking ship, but if there was, like if the fact that came with the Viking ship was also like on the sails of the ship or something like in front like that I would quite like the integration. 00:12:43 P21

Yeah, and I guess to have the middle one as a fact as well. That's because obviously you got the boat and then you've got the tank so they're like like showstoppers stuff that's almost where it's like exciting, exciting, then the middle you've got so not like it's boring but not as like keeps you going yeah, it keeps you going and then you get to the tank at the end so it's a bit like a good balance of I don't know excitement in a way.

00:13:04 Interviewer

OK So, so do you just have any extra thoughts about this experience? Anything to improve any positives or negatives?

00:13:16 P22

I'd say Where we stopped to look at the sign was smack near that bridge where it's it's not a single file, but it was a bit of a narrow path well, yes, I mean it's not that much of a popular route, but I'd say like If you did implement that in cities, I'd try and do it in a way that you're not putting people smack in like foot traffic.

00:13:41 Interviewer

So the third experience with the tank at the Poppy Memorial? Do you have any thoughts on that?

00:13:47 P22

It was a really good model.

00:13:50 P21

It was also a really nice location. I thought like I've never seen the poppy wall before. Yeah and and it like each location does link up with the model or the sort of AR experience you've made, yeah?

00:14:02 P22

Yeah, I did like the the connection between the fact it was a memorial and the tanks.

00:14:06 P21

Yeah, it wasn't like you went to the memorial and then you found out about how Vikings invaded Lincoln. Yeah, and it's good that it matched up.

00:14:09 Interviewer

So it's good that its in context to where you're visiting? OK, so how do you think this affects your overall experience? So going to the Poppy memorial Uhm, placing the tank.

00:14:27 P22

I quite liked that I could move it around myself, especially if I mean like I, I know a lot of AR stuff doesn't always go to plan in terms of you get the shaking stuff I like the fact that you can manually move yourself, whack it in the right place. I think it's always helpful. I don't know how Maybe people are less into tech, would figure stuff like that out.

00:14:51 P21

I think your dad would actually really love that yeah, like.

00:14:54 P22

my dad's 60 now and he's like you'll give him something like that and he'll be amazed he would walk around the house putting tanks everywhere but he he'd like put tank in there and then maybe then put you in the shot and then take picture of it Yeah yeah he yeah he would be taking screenshots and everything.

00:15:06 P21

And then, like Yeah, and so I think being able to take picture with like a cool piece of history next to you in a nice area is pretty good use of it

00:15:17 P22

No, I need to get my dad up here, I think in general he would love it like if if you want a 60 year old on on your thing he loves bike rides

00:15:25 Interviewer perfect

00:15:27 P21

and I wouldnt have gone to the poppy wall without the app So it gives you something to do. Like it improved the experience because I got to do the experience.

00:15:35 Interviewer

So again the quality of this specific experience, do you have any thoughts on it so like the tank?

00:15:41 P22

it was a nice little end to it I don't know if you like put that there as an intention of like a a finale kind of thing, but it was it was a really nice model. It was like nice to distract myself from how tired I was. Playing around with the models and walking around but I was still like, no. I'm going to stand up and walk around this model.



00:16:05 P21

I think it would be good to have like a picnic day with well, you have the option to go on a bike ride and then you get some more experiences as you go and then you get like a a coffee or whatever. At the end it might be a good day out.

00:16:18 Interviewer

So what are your thoughts on being able to actually place and interact with the tank so you scan the grounds, see the dots.

00:16:25 P22

it seemed a lot easier to like look to the floor and then looking back though, it seemed like it worked a lot better I don't know if that's just like the AR and computing side of it or if It was just we were lucky

00:16:41 P21

Yeah, I do think placing it around is like having it as different like if you had the boat as the same like interactive activity as the tank I think that would be worse, almost because it's different, so having three different experiences rather than three like you just place it down. I think it's better that way because it's different, right?

00:17:01 P22

And also with like the the width of that memorial depending on where people are standing otherwise people like scan the floor.

00:17:09 P21

Yeah yeah, it would be hard to have like one spot because you couldn't really have that because with that sign. We always can look at the sign and you can scan it

00:17:17 P22

and back again to my my dad's like he he would happily like get me or my mom stood there For a solid 5 minutes in the cold while he lined up his tank perfectly I I would hate that, but I know him as a user of the app he'd be absolutely over the moon with that feeling like being able to place exactly before he took this picture.

00:17:40 Interviewer

So this experience and the brayford experience, they both used 3D models. Did you feel any differently about this experience to the Brayford experience?

00:17:51 P22

I dont know actually I think the tank was like I could have a proper look at all the details of the model more And I'm really biased 'cause I'm obviously like I really, I'm really into Viking stuff so I I always go for that Viking stuff

00:18:03 P21

Yeah, you love Vikings.

00:18:07 P22

But if they were the same model I think I want to prefer the tank because I I I it was there and I felt like I could walk around and yeah.

00:18:15 P21

Yeah, like yeah so I was in awe of the boat but you can like play with the tank more you can like like geek out a bit and look at every bit of it so it's like a different experience.

00:18:28 Interviewer

So what your thoughts on the like tank itself? So the model like? Was it realistic at all?

00:18:35 P22

I thought that it was.

00:18:35 P21 Yeah, I I thought was realistic.

00:18:39 P22

A pretty realistic model.

00:18:40 P21

Yeah, every old fashioned tank ive seen like it looks like an old fashioned tank to me. I'm not a tank expert, but.

00:18:45 P22

The detail as well. I don't know if it was because it had a pretty looky colour scheme or something, but it was rendered really nice as well, like it didn't look really shiny and out of place it was.

00:18:55 P21 To be fair for a phone it looked really good

00:18:57 P22

Yeah, it's one of the first things I noticed when like when I zoomed out of it, it didnt look like the stuff that I've seen before

00:19:07 Interviewer

So is it almost kind of did it blend into the environment then?

00:19:11 P22

Yeah, yeah. 00:19:11

Interviewer like believable

00:19:12 P21

Yeah, it was quite believable. Obviously there's like you can tell it's not there, but it still yeah, it's good.

00:19:20 Interviewer

did Scanning the ground and seeing the white dots and scanning out the plane. Did that help at all with placing the tank

00:19:30 P21

I might be biased because I've done some AR development, so I I knew what those were.

00:19:37 P22

I think when I did mine it was like the tank was huge and I was in the tank which which it didn't look like it was done on purpose, but at the same time I was like this is pretty cool I don't know if that was like me being a child

00:19:50 P21

I think it was quite big 'cause when I tried it was like huge and but it was like with the intent to have it like place far away. So then it's like huge in the background.

00:20:01 Interviewer

Yeah, sometimes it's just the size that will it come In sometimes yeah I think because of that If you don't tap at a distance you'll be inside of it, yeah?

00:20:14 P22

I quite liked being in the tank

00:20:17 Interviewer

But as like an improvement then would you like start off smaller and?

00:20:20 Interviewer

Then be able to enlarge it yourself.

00:20:21 P21

Yeah, I don't know if you'd be able to like guide the user on whereabouts to place it like give like a sort of like an area of like Show them where on the ground to like click. So then it'll like be a decent size. Then you can tell them like zoom in and zoom out

00:20:34 Interviewer like a reticle.

00:20:35 P21

Yeah, like the reticle or just some instructions about how to like grow it and stuff 'cause you had to tell me like you need so you can you can grow and shrink it whereas the app didn't really tell me, I don't think the app told me that.

00:20:45 Interviewer

There was some text that came up and when you first load the camera that tells you to pinch to zoom etc

00:20:49 P21

OK.

00:20:51 Interviewer

But that could be down sort of like being easy to miss

00:20:55 P22

I do think that the thing we said was missing was yeah, that identified object to scan like the signposts. I really like the fact that you scanned and saw something

00:21:05 Interviewer

so 'cause there's a bit more freedom and didn't have a clear sort of objective, yeah? 00:21:12 P21

Yeah it was just like you're here and I obviously missed the instructions and maybe have something on it like a box It's like it only disappears when you click OK or something like that. It's like in this one you can press the button and then spawn the tank and stuff like that.

00:21:24 Interviewer

OK so you you spoke a bit about you, sort of moved around the tank a bit after placing it is there any reason for that?

00:21:36 P21

Yeah, yeah, it's fun.

00:21:38 P22

You you give a kid a toy tank we're gonna pick it up and look around and stuff, and I think this exact same mentality here of you gave me an interactive little model there and I was gonna look at all sides like purely 'cause I could. I think just 'cause I have the ability to I was like im gonna do that

00:21:55 P21 I'm going to play with this tank

00:21:56 P22

I can make it huge. I can make it tiny.

00:22:00 Interviewer

Fair enough and and did you have any like? Do you have any extra thoughts and any thoughts about this experience? Any positives or negatives or any improvements?

00:22:10 P22

It was a nice little like end to it in terms of I was shattered, I was cold and my back hurt but there was a tank I don't know how to word it is like it just distracted me from.

00:22:26 P21

All the pain

00:22:26 P22

Yeah, the fact that I'm going to have to bike all the way back but I was like no, there's a tank in front of me yeah, for these few seconds I don't care.

00:22:36 P21

Yeah yeah, yeah again I I. It really just makes a journey just a little bit better, just adds to it. And maybe an improvement could be that you could make it so the objects have like some sort of animations play so the boat you could press a button and then make the Vikings like row their oars and then press a button, make the tank fire or rear its tracks that could be quite fun.

00:22:58 Interviewer

So in comparison to the two previous experiences, how do you feel so. This being the final experience and yeah, how do you feel in regards to the previous two.

00:23:07 P22

Yeah, get rid of my bias for Vikings I do, I did, I did really like the tank

00:23:13 P21

I I don't know if I'd want all of them to be like the tank. And yeah, 'cause having the tank be special is also nice in itself.

00:23:22 P22

Yeah, yeah no, I get it.

00:23:26 Interviewer

Is there anything else you'd sort of like to mention about the experience any thoughts?

00:23:34 P22

You know, like I said, I think one of my favourite parts is that it linked to something in the real world 'cause that kind of bridged the gap between the virtual and the real world. And yeah, the fact that the 3D models themselves

00:23:48 Interviewer

OK, so I know we spoke a bit about it, but what was your favourite experience? Just to reiterate.

00:23:57 P22

yeah without my bias the tank with my personal bias to liking Vikings, the Viking, boat.

00:24:04 P21

I think the boat will be better if it didn't go off the yellow sign as well I don't know, that's just like a technical limitation. If it was off the the big sign and then you could like go off to the left or something and then the boat spawn or something on that that could be cool, but I imagine it quite difficult to actually do.

00:24:18 Interviewer

It's just a matter of getting the the phone to recognise where you are, yeah that was sort of a problem, but so if if that was all sorted then the Brayford would be yours?

00:24:30 P21

I think it would be better that way, but I do it. It's hard to say because like the tank is after the bike ride so you're in a different mindset after the bike ride yeah, it's hard to say that.

00:24:41 P22

I think I think the boat was shaky, but the placement of it was really well put to the point where like if I put that there manually myself it would Kind of ruin It a bit because I like, I put that there there's me that judges my own kind of perception of that instead of someone being like no, this is where its meant to go. 00:24:57 P21

Yeah, probably true yeah, and it gives you a scale of how big these boats are supposed to be

00:25:01 P22

Yeah, that's it. Like I can zoom in and zoom out on that tank, but I didn't actually know how big that tank was meant to be yeah.

00:25:10 P21

But I think you've got a bit more of a scale of what tanks size should be like, you know.

00:25:14 P22

Yeah, obviously I knew it wasn't like a foot tall like a dog round my feet kinda thing, but.

00:25:18 P21

But I I've never. I've never seen like a Viking boat in real life it gave you , like it showed you how big these boats actually are, and like how they move through here by the water, which I thought was cool, yeah.

00:25:31 Interviewer

So, did you find yourself sharing the experience with each other on the journey? So did you sort of have a look at each others phones what you were seeing.

00:25:38 P22

There was one point on the tank part where I put my phone away, my fingers are too coldI was stood behind you watching yours but then I was like I should be doing this on my own phone I was like no. I was like more than happy watching you like move roman soldier around 00:25:57 Interviewer

So how do you feel about being rewarded models for visiting each location so for visiting each one you got sort of a bit of text on the screen did you recognise it and then at the end you could sort of put your own model in did that have any impact, like actually being rewarded?

00:26:15 P22

I felt so childish, but in the best way Like not in a condescending way, but in a way like you've done work. Here's your treat I mean, it did literally feel like the equivalent of someone handing you like a

toy car or something, but in literally all the right reasons not remotely in a like a I'm offended way No, it was It was, it was just nice little wholesome because I earned it.

00:26:38 P21 just playing around I can play with some 3D things, yeah.

00:26:41 Interviewer

so it had like a positive impact then being rewarded for going to each location. OK interesting, would you view the models in your own time. So if you would have the app on your phone like now, would you find yourself looking back?

00:26:55 P22

I do think like as much as it did distract me from the fact that I was cold and tired

I didn't focus as much as I would like say, if I had it out now, I could sit and have a proper look at it.

00:27:08 P21

Maybe there was like I probably wouldn't do the same route again, but if there was like multiple routes, I think I would do this like around different locations.

00:27:18 Interviewer

So if there were more points of interest on the route, so if it is a longer route.

00:27:23 Interviewer

Would you be more motivated to carry on? Would you be more motivated to visit more places and see more AR experiences?

00:27:30 P22

Yeah, it like reminded me a bit of Geocaching yeah. Yeah, it was like it was nice to know, even if it like. Even if I went to one and I wasn't actually that big fan of the fact or the model Just the fact that I've been there, I've like unlocked that one in a way like

I've ticked that one off my list 00:27:48 P21

yeah, actually that that's that's sort of being able to explore an entire city and like finishing it 100% in The city, yeah Something like each city has achievements and you've gotta unlock those achievements that would be quite cool I think 00:27:57 P22

like a completionist sort of thing and maybe an app where like if you unlock it does it log only the ones you've visited and you only can see the ones you visited

00:28:08 Interviewer

Yeah, so the models that you got at the end were related to the ones you visited so Yeah, yeah.

00:28:15 P22

That's really cool.

00:28:19 Interviewer

So would you use the application in your sort of future cycling journey?

00:28:24 Interviewer

So I'm doing this with visit Lincoln, so they've got other routes. They've got the Bomber Command route which has a lot of RAF bases and things like that. Would you be interested in using an application like this, but for other routes? 00:28:35 P22 absolutely

00:28:35 P21

Yeah, it's like if the routes are interesting, then yeah I'd definitely go on it

00:28:39 P22

Like I've I've been down that side canal before, I didn't realise you could turn off at the pub and go down this way

00:28:43 P21 Yeah it is.

00:28:45 P22

Even for the fact of Just finding new routes yeah, like Google Maps you can you can find pathways if you know where to look for them yeah, but I I always struggle with you. Can't really just type in like where do I go for a walk?

00:29:01 P21

Yeah, yeah, 'cause google answers just everything. So it's it's like an overload. This is much more like if you want like somewhere interesting to go in the city.

00:29:09 P22 you're here to cycle or look for landmarks

00:29:10 P21

Yeah, yeah, I mean, I guess you could, even as a non cycle thing like especially like if you put like the

00:29:14 P22 Yeah, yeah.

00:29:16 P21 Cathedral, like some of the uni buildings maybe? But yeah, yeah.

00:29:19 P22

So I I would.

00:29:20 P22

Happily walk that route as well

00:29:21 P22

I'd do the same.

00:29:25 Interviewer

Would you use it every time you cycle a new route, would you sort of look for AR things on new routes.



00:29:33 P22

Mainly or again like if I did that route a few more times I would. I would still scan it. 00:29:39 P21 if it's more like a new exploration sort of thing

00:29:42 P22

Or maybe if like my parents have been visiting, I'd be like oh look at this

00:29:45 P21

Yeah, yeah, it's yeah. Mostly I would say like a one time thing you do it and then so yeah.

00:29:48 P22

If I haven't done that route in a while.

00:29:52 P21

You could do it again.

00:29:57 Interviewer

So if there was anything you can improve about the entire app experience so if there's anything that you can improve about the overall app experience, what would it be?

00:30:10 P21

I think I have said all of my improvements already

00:30:12 P22

Yeah, I said like General UI design, to be fair there is like a pretty much like a house style and a colour scheme to like? Yeah just general like.

00:30:24 P21

Just yeah, just more usability options I'd say yeah, yeah.

00:30:27 Interviewer

Quality of life.

00:30:28 P21

That's right, and then I think it'd be like the the concept is there and I really do like the concept is really cool I think.

00:30:37 Interviewer

So lastly, would you consider this application to be worth using in your future cycle experiences?

00:30:43 P22

I would get it.

00:30:44 P21

Yeah, I'd use it.

00:30:47 P21

like I'm actually excited if this

00:30:47 P22 Oh yeah, I do want to see where this goes it's really interesting

00:30:47 P21

Grows massive yeah yeah.

00:30:51 Interviewer

Thanks for your time.

## QUANTITATIVE DATA

### Photographs taken in experiences

Experience1	Experience2	Experience3
1	1	2
1	1	1
0	0	2
1	1	2
2	1	3
0	0	2
1	1	2
1	0	0
1	0	2
1	2	0
0	0	0
1	0	0

### Descriptive Statistics

	Mean	Std. Deviation	N
Experience1	.83	.577	12
Experience2	.58	.669	12
Experience3	1.33	1.073	12

Figure 11 Averages of photographs taken

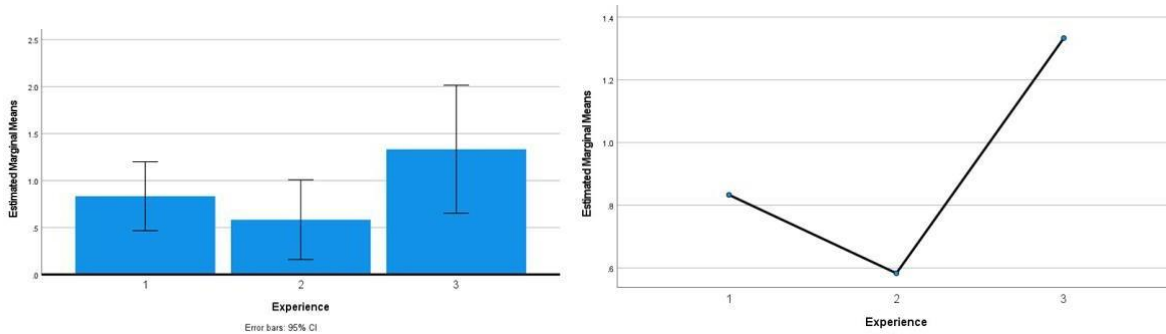


Figure 12 – Graphs showing averages of photographs taken

### Mauchly's Test of Sphericity<sup>a</sup>

Measure: MEASURE\_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>b</sup>		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Experience	.588	5.309	2	.070	.708	.783	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Experience

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

### Tests of Within-Subjects Effects

Measure: MEASURE\_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Experience	Sphericity Assumed	3.500	2	1.750	3.448	.050
	Greenhouse-Geisser	3.500	1.417	2.471	3.448	.071
	Huynh-Feldt	3.500	1.565	2.236	3.448	.065
	Lower-bound	3.500	1.000	3.500	3.448	.090
Error(Experience)	Sphericity Assumed	11.167	22	.508		
	Greenhouse-Geisser	11.167	15.582	.717		
	Huynh-Feldt	11.167	17.215	.649		
	Lower-bound	11.167	11.000	1.015		

### Pairwise Comparisons

Measure: MEASURE\_1

(I) Experience		(J) Experience		Mean Difference (I-J)	Std. Error	Sig. <sup>a</sup>	95% Confidence Interval for Difference <sup>a</sup>	
1		2		.250	.179	.573	-.256	.756
		3		-.500	.314	.418	-1.385	.385
2		1		-.250	.179	.573	-.756	.256
		3		-.750	.351	.168	-1.739	.239
3		1		.500	.314	.418	-.385	1.385
		2		.750	.351	.168	-.239	1.739

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

		Type 3 sum of squares	df	Mean square	F	Sig.
Photos taken in experience	Sphericity assumed	3.500	2	1.750	3.448	.05
	Greenhouse Geisser	3.500	1.417	2.471	3.448	.071
	Huynh-Feldt	3.500	1.565	2.236	3.448	.065
	Lower-bound	3.500	1.000	3.500	3.448	.090

### Time spent in experience

Experience1	Experience2	Experience3
56.00	84.00	38.00
33.00	52.00	108.00
41.00	23.00	59.00
45.00	21.00	46.00
52.00	31.00	92.00
41.00	26.00	46.00
65.00	42.00	70.00
86.00	46.00	61.00
58.00	69.00	70.00
71.00	45.00	48.00
75.00	39.00	37.00
66.00	15.00	76.00

### Descriptive Statistics

	Mean	Std. Deviation	N
exp1	57.42	15.848	12
exp2	41.08	20.282	12
exp3	62.58	21.857	12

### Tests of Within-Subjects Effects

Measure: MEASURE\_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>a</sup>
Experience	Sphericity Assumed	3022.889	2	1511.444	3.658	.043	.250	7.316	.612
	Greenhouse-Geisser	3022.889	1.831	1650.514	3.658	.048	.250	6.700	.583
	Huynh-Feldt	3022.889	2.000	1511.444	3.658	.043	.250	7.316	.612
	Lower-bound	3022.889	1.000	3022.889	3.658	.082	.250	3.658	.415
Error(Experience)	Sphericity Assumed	9089.778	22	413.172					
	Greenhouse-Geisser	9089.778	20.146	451.188					
	Huynh-Feldt	9089.778	22.000	413.172					
	Lower-bound	9089.778	11.000	826.343					

a. Computed using alpha = .05

### Mauchly's Test of Sphericity<sup>a</sup>

Measure: MEASURE\_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Greenhouse-Geisser	Epsilon <sup>b</sup> Huynh-Feldt	Lower-bound
Experience	.908	.965	2	.617	.916	1.000	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Experience

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

## Pairwise Comparisons

Measure: MEASURE\_1

(I) Experience	(J) Experience	Mean Difference (I-J)	Std. Error	Sig. <sup>a</sup>	95% Confidence Interval for Difference <sup>a</sup>	
					Lower Bound	Upper Bound
1	2	16.333	6.926	.114	-3.199	35.866
	3	-5.167	8.896	1.000	-30.253	19.920
2	1	-16.333	6.926	.114	-35.866	3.199
	3	-21.500	8.915	.104	-46.641	3.641
3	1	5.167	8.896	1.000	-19.920	30.253
	2	21.500	8.915	.104	-3.641	46.641

Based on estimated marginal means

a. Adjustment for multiple comparisons: Bonferroni.

## PROTOTYPE DESIGNS

### Wireframes and Lo-Fi Prototypes

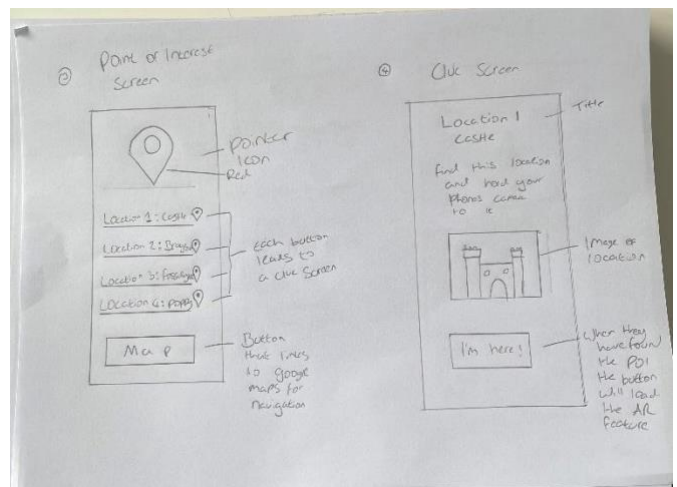
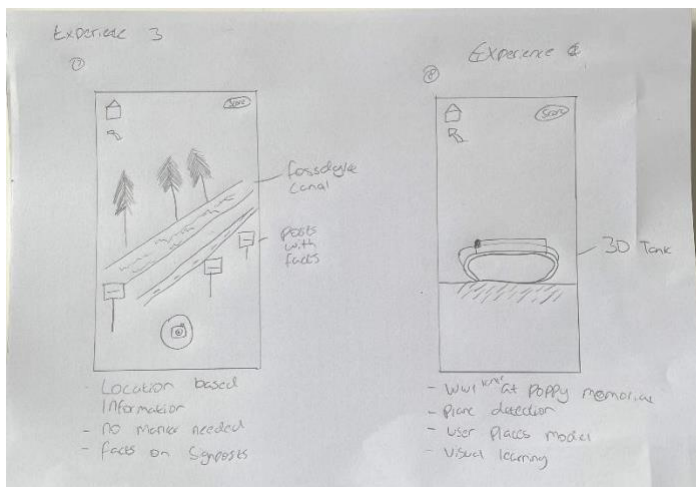
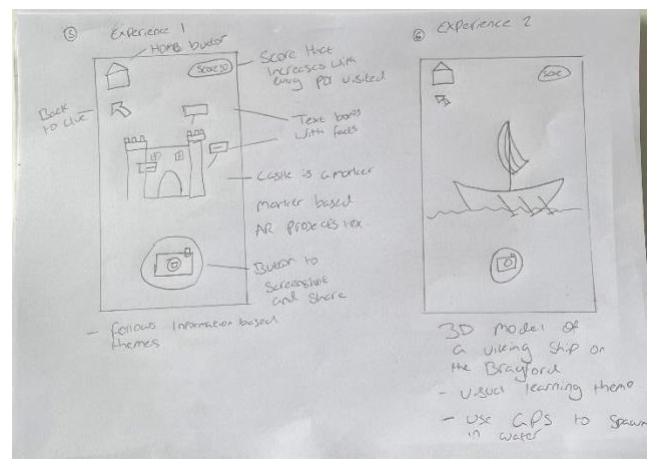
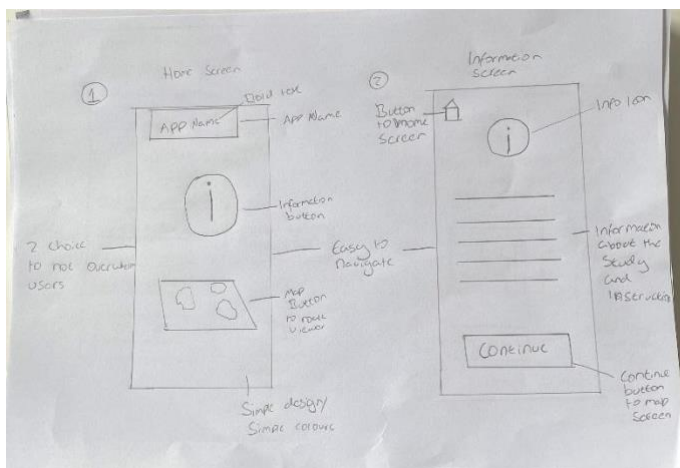
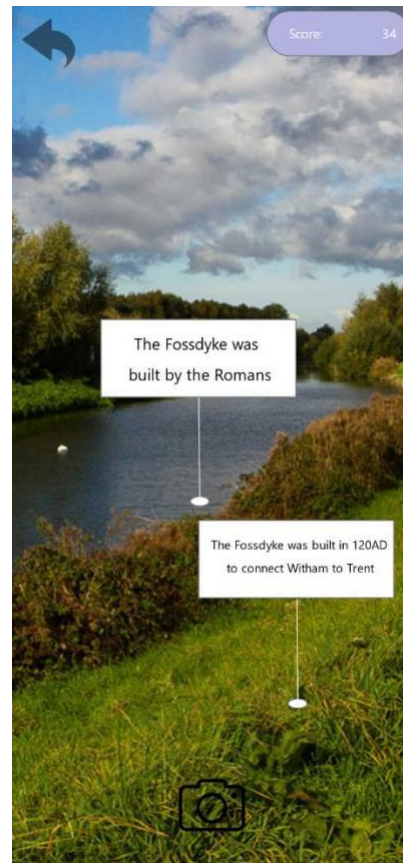


Figure 1 Sketch of design









#### Location 4: Poppy memorial



When you reach this location press the 'I'm here' Button  
and choose where you want to place the object

I'm here!

*Figure 2 Adobe XD wireframe*

- **Sitemaps and user scenarios**

User Scenario: John Smith

Age: 30

Gender: Male

Occupation: Digital Marketing

Marital Status: Married

Location: Sincil Bank

Mobile Device Owned: iPhone 11

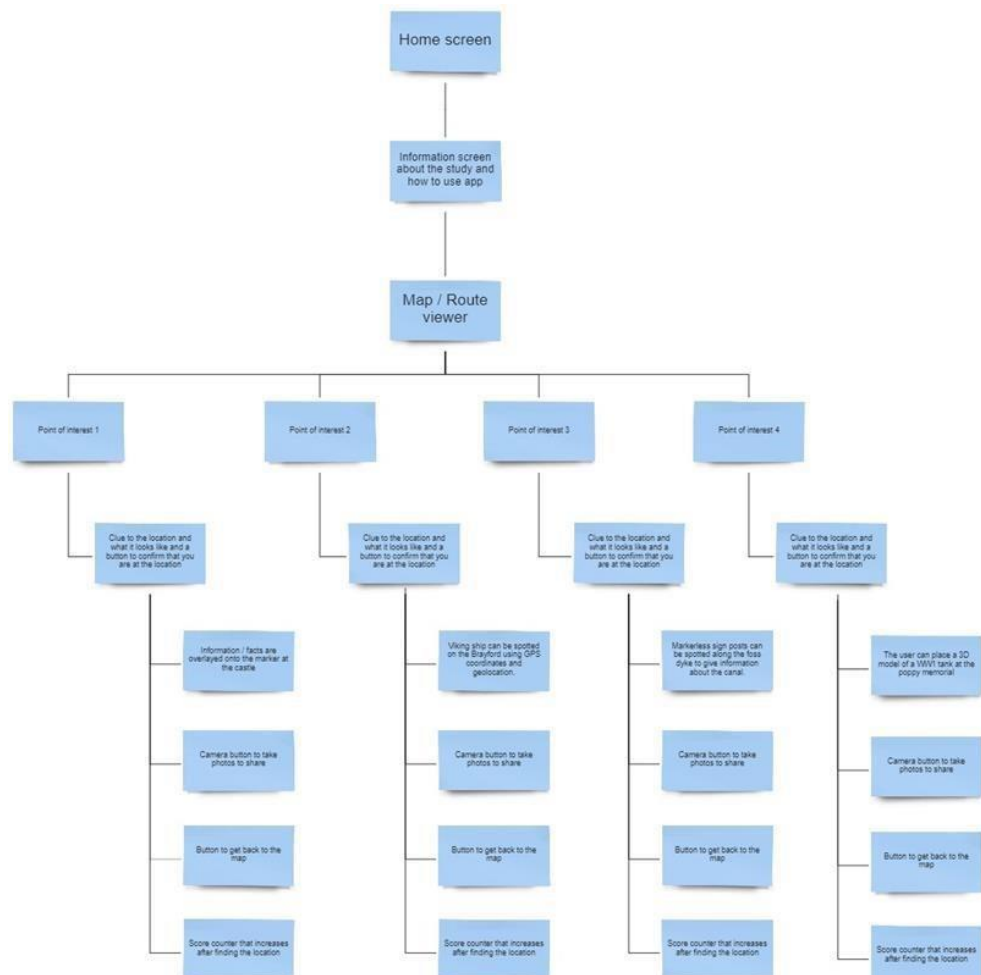
Amount cycled in a week: 2-3 Times

Background: John works full time and therefore finds it easier to cycle during the weekend due to his schedule. Due to his career, his experience with technology is very strong and integrates that with every activity he does. One example being using applications to track routes and compare with others. Studying History at college has given John a keen interest in historical locations and often stops to

read information boards whenever he is out exploring. Because of his busy career in the city, John prefers to spend more time along quieter routes and cycles solo to escape from day-to-day life.

**Goals and Motivations:** To motivate himself, John will often take breaks along his routes at points that he finds particularly interesting, especially on the more rural stretches of the journey. One of John's goals is to experience new things on every route and to visit any interesting sites along the way.

**How John will interact with the app:** John will select the featured route on the application and view the points of interest along the route that interest him the most. From looking at the photos of the points of interest, John will keep an eye out when he is reaching that section of the journey to see if he recognizes the landmark from the photo. John stops his bike at what he perceives to be the right spot and takes out his phone and notifies the application that he is at the location. John then views the facts about the Foss Dyke canals and learns that it was built by the Romans in 120AD, he didn't know this before. John is satisfied with the fact that he learned facts about the location using the camera. John continues on with the rest of his journey stopping at several points of interest and seeing if the application can provide content regarding the location.



miro

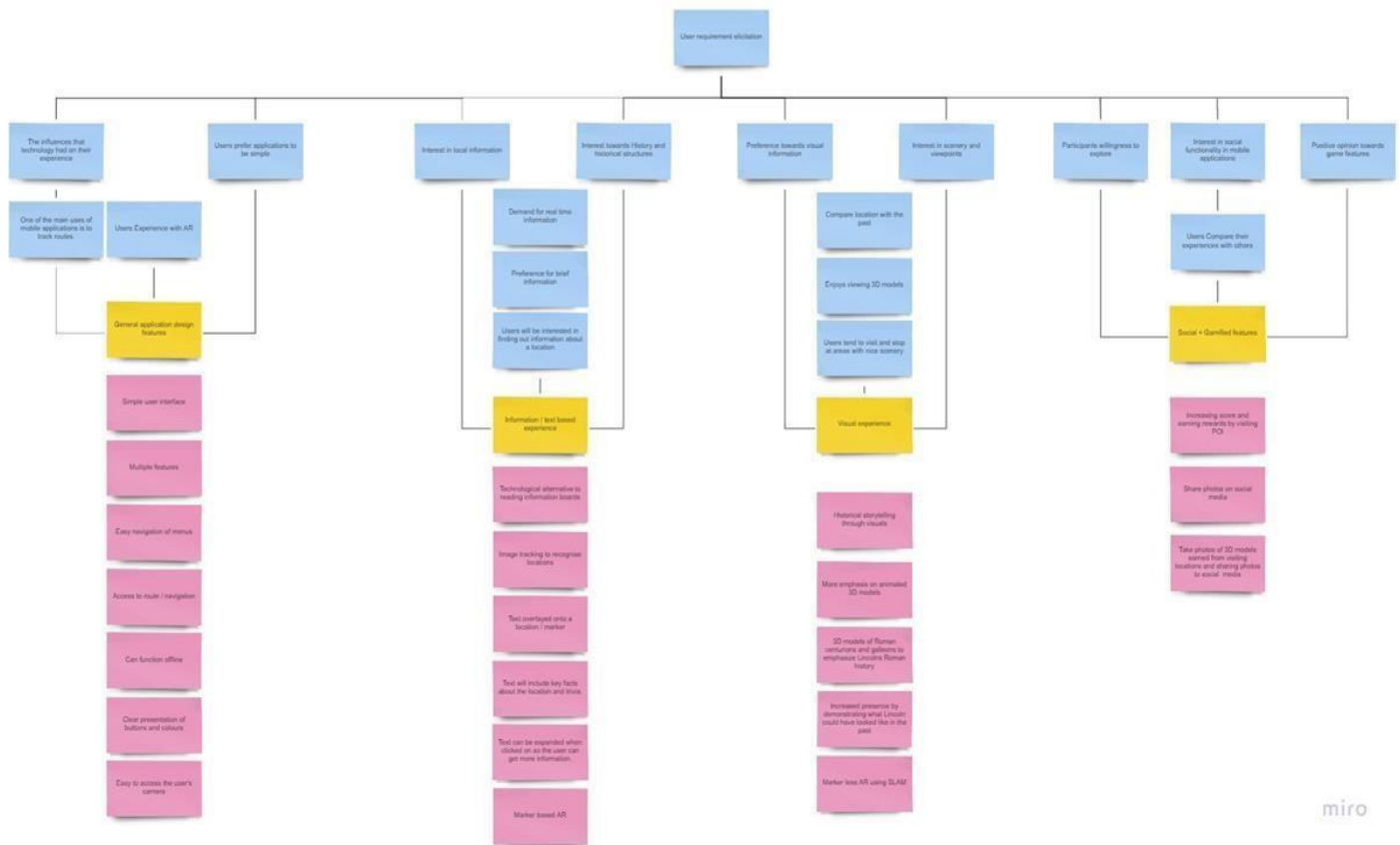


Figure 3 Sitemaps of themes to design choices

## INTERVIEW QUESTIONS

### Requirements gathering interview questions

1. How often would you say that you cycle?
2. For what reasons do you cycle?
3. When cycling for leisure/socially describe your typical cycling session.
  - o How far? For how long?
4. How do decide what route to take? o Do you always stick to you your route? Why?
5. Do you tend to stop on your cycling route? o What do you typically stop for? o How many stops a session?
  - o How long do you stop for each time?
6. Do you enjoy cycling to POI (points of interest)

- Where have you visited in the past?
  - What type of POI do you find interesting?
7. Is it important for you to cycle with others? Why?

#### **Questions about Cycling and Technology**

8. Do you use any technology when cycling?
- What kinds and why?
9. Would you most likely use technology before, during or after a session?
- Can you elaborate on the answer you have given?
10. Do you use any mobile applications when you are cycling? ○ Why do you use it?
11. Do you own an IOS device or and Android Device?
- Why?
12. What features of that technology do you find useful/enjoyable?
- Why do you find these features enjoyable? ○  
What can they do better?
13. Is there any technology that you would like to use, but don't have?

#### **Questions about Cycling and Technology Heritage and Tourism**

14. Do you like visiting sites of historical interest?
- Why?
  - What could make these sites more interesting?
15. When visiting tourism sites, what is your preferred method of gaining information on the history of the location?
- Do you have any recommendations?
16. In your own opinion, what could make visiting these heritage sites more interesting to you? And why?

#### **Lastly**

17. Can you think of any examples of augmented reality that you have used in the past?
- What would your favourite augmented reality application be and why?
18. Is there anything else you'd like to tell me about your cycling experiences?

## Main Study interview questions

1. How was your overall cycling experience?
2. Were you able to navigate the routes on your bike?
  - a. Did you find the points of interest accessible when cycling?
3. How did you feel about the frequency of stops?
4. How did stopping at the points of interest affect your experience?
  - a. In what way?
5. What were your initial thoughts on the application?
  - a. Expand on thoughts given
6. How did you feel about the Brayford Wharf experience (Location-based)?
  - a. How do you think this experience affected your overall experience?
  - b. What were your thoughts / observations on viewing the Viking ship?
  - c. How did you feel about the quality of the AR experience?
  - d. What did you think about the model already being there when you loaded the experience?
    - i. Did it work properly – onboarding?
  - e. What are your thoughts/observations about any part of this feature?
    - i. Find positive and negatives ii. What was successful and what was not
  - f. What would you improve about this experience?
    - i. What would you change?
  - g. Is there anything else you would like to mention about the experience?
    - i. Is there anything you would like to see changed about this experience?
7. What did you think about the experience at the Fosdyke Canal? (Marker-Based)
  - a. How do you think this experience affected your overall experience?
  - b. What were your thoughts on this experience augmenting a physical object?
    - i. Was the object easy to find ii. Did it work as expected?  
No – what was expected
  - c. How did you feel about the quality of this AR experience?
  - d. What did you think about having facts projected onto an object?
    - i. Were the facts easy to read?

- ii. Were they interesting?
  - e. Did you have any thoughts about any part of this feature?
    - i. Positives or negatives?
    - ii. What was successful and what wasn't?
  - f. How do you feel about this experience in comparison to the previous experience?
  - g. What would you improve about this experience?
    - i. Is there anything you would like to see changed about this experience?
- 8. How did you feel about the AR experience with the tank? (poppy memorial)
  - a. How do you think this experience affected your overall experience?
  - b. How did you feel about the quality of the AR experience?
  - c. What were your thoughts on being able to place/interact with the tank?
    - i. Do you feel differently about this experience than the Brayford Viking experience? ii. What were your thoughts on the tank in terms of realism (Did they notice the sound)?
    - iii. How did scanning the ground for a flat surface help with placing the tank?
  - d. Did you move around the tank after placing it?
    - i. If so why?
  - e. Did you have any thoughts on this feature in the experience?
    - i. Positives and negatives?
    - ii. What was successful and what wasn't?
  - f. How do you feel about this experience in comparison to the 2 previous experiences?
  - g. What would you improve about this experience?
    - i. What would you change?
    - h. Is there anything else you would like to mention about the experience?
    - i. Is there anything you would like to see changed about this experience?
- 9. What was your favourite experience? (If applicable)
  - a. Why?
- 10. Did you share the experience with the other cyclist on your journey?
  - a. Why / why not?
- 11. How did you feel about being rewarded models for visiting each location?
  - a. Would you view the models in your own time?
  - b. Why?

12. If there were more POI on the route, would you be more motivated to stop?
  - a. Why would it motivate you?
  - b. What could motivate you?
13. Would you use this application in future cycling journeys for other routes? For example, the bomber command route?
  - a. Would you use it every time you visit a new route?
  - b. Why?
14. Lastly, If you could improve anything about the app experience, what would it be?
  - a. Why would you improve this?
15. Would you consider this application to be worth using in your future cycling experience? a. If so why?

## STUDY OBSERVATIONS

### 01/12/2021 Observations Participant 11 and 14

#### Experience 1

- Users found markers to spawn Viking ship easily
- Participants seemed engaged with experience
- Participants dismounted to view model in more detail

#### Experience 2

- Participants dismounted to hold the phone to the marker
- Worked as expected
- Participants read all the facts before continuing
- Participant 11 seemed eager when reading the facts

#### Experience 3

- One participant started to use the experience while mounted
- Participant 11 walked around the environment to view the tank • Participant 14 asked how to place the tank before realising themselves
- The most positive reaction to all 3 experiences.

### 16/12/2021 Observations Participant 12 and 15

#### Experience 1

- Users found markers to spawn Viking ship
- Participants were engaged with experience

- Participants dismounted to move the phone around

#### Experience 2

- Participants dismounted to hold the phone to the marker
- Participants read all the facts before continuing
- They discussed the facts with each other before continuing

#### Experience 3

- The most positive reaction to all 3 experiences.
- Participants played with the tanks and tried running each other over.
- Seemed to have the most fun
- Took photos of each other with the tanks

### **02/01/2022 Observations Participant 17 and 20**

#### Experience 1

- Participant 17 seemed to take longer to load and view the Viking ship
- Once the ship loaded the participants seemed to be engaged.
- Participant 17 complained about the model 'wobbling' which can be caused by the placement on the water.

#### Experience 2

- The experience seemed to be well received by the participants.
- They seemed happy with the provision of facts and information.
- The participants were surprised that the location that they were cycling through had a historical significance and seemed to appreciate this.

#### Experience 3

- Participants appeared to be impressed with the interactivity of the sound
- Observed comments being made about the benefit of including sound to the model.
- Participants took photos at the location of the tank.
- Heard comments regarding immersion.

### **03/01/2022 Observation Participant 13 and 16**

#### Experience 1



- Participant 13 took longer to trigger the Viking ship but didn't require assistance.
- Participants shared the experience with each other.
- They both moved around to get different angles of the ship.

#### Experience 2

- Seemed to be less engaged with the marker and the facts
- Reacted positively to the facts themselves
- Both participants dismounted to get a better look at the facts.
- The participants discussed the facts and their meanings.

#### Experience 3

- Participants seemed to be the most engaged with this experience.
- Did not observe any issues with using and placing the tank.
- Participant 16 seemed impressed when inspecting the model.

### **20/01/2022 Observations Participant 21 and 22**

#### Experience 1

- Used the experience with no issue except for slight wobbling mentioned.
- Found the POI easily
- Seemed happy with the overall app layout
- P21 readjusted the camera to get a better view of the boat

#### Experience 2

- Participants used the experience as expected and reacted positively to the facts shown.
- No other notable observations for this experience

#### Experience 3

- Initially both participants viewed the models, However, due to the cold weather they eventually shared the experience and viewed it together.
- Participant mentioned that it was beneficial to have this experience at the end of the route.

### **25/01/2022 Observations Participant 18 and 19**

#### Experience 1

- Seemed visibly impressed by this experience and the AR
- Participant 19 inspected the Viking ship in detail. Experience 2
- Participants initially cycled past the marker before realising that they should stop at the sign. This was quickly rectified
- The stop at the sign was quicker and participants seemed less engaged Experience 3

- Both participants interacted with the model and commented on its design.
- They shared the experience with each other.

#### ASSETS USED IN THE PROTOTYPE



*Figure 4 Viking Asset*



Figure 5 Tank asset Viking

assets link:

<https://assetstore.unity.com/packages/3d/characters/humanoids/free-viking-starter-pack-116281> Tank

assets link:

<https://sketchfab.com/3d-models/mark-v-ww1-tank-700c267aa1354015b46f035cf4877c26>



# Study Plan

1. Arrange to meet with participant at designated location (same each time)
2. Ensure consent forms and information sheets are obtained before meeting
3. Meet participant at time and location
4. Give the user the information sheet and consent form and dedicate 5-10 minutes to read each form and sign the consent form. Explain that they must sign two consent forms, one for them to keep, the other for the researcher to collect.
5. Collect forms from participant
6. Explain the structure of the study and answer any questions the participant might have. For example, explain the 3 stops and how to use the mobile phone and inform them that they will be observed but not engaging directly with the study.
7. Once the study is explained, give the participants the mobile devices and ensure they can use them.
8. If participants agree to commence the study begin the route.
9. Follow cyclists along the route and make notes of key observations regarding behaviour.
10. Visit all 3 locations and finish the route.
11. Depending on weather, conduct the interviews at the end of the route outdoors, or indoors depending on participant's preference.
12. Give participants information on how the interview will work and inform them it will be recorded then deleted once transcribed.
13. Conduct the interviews once the participants are happy with the information.
14. Ask the user if they have any additional questions regarding the study.
15. Conclude the study and ensure the mobile devices are collected.