



UNIVERSITY OF LINCOLN

“To design and develop a mobile application that adheres to the components of usability. The application should better provide information to prospective students on open days than the current website system in place.”

Dean Kevin Andrew Beckerton

BEC12375372

BSc. (Hons) Computer Science

The University of Lincoln.

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Supervisor: Dr. Duan Wenting

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2.0 Abstract

This project addresses the development of a mobile application that adheres to the concept of usability. This mobile application is purpose built for prospective students to use on a University of Lincoln Open day. The overall aim of this project is to provide for a new more effective method of the communication of information to prospective students than that of the University of Lincolns current system, which mainly involves either verbal communication, or the use of a website. Usability has been taken into account through the use of extensive research into usability concepts while also usability testing to allow for the most ideal developed project that meets the demands of as many users as possible. In respect to the outcome of this project, usability can be effectively applied to mobile application development to produce an application of high quality.

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4.0 Background

A mobile application or now more commonly known as an app, is a type of application that runs on a user's smart device "The term 'app' has become popular, and in 2010 was listed as 'Word of the Year' by the American Dialect Society" (Treeratanapon, 2012, 72) Mobile applications provide a similar service to that of the personal computer (PC) however; there are still a number of significant differences. Typically, mobile applications are a step away from Personal computer applications as they tend to have a more limited functionality, mobile applications were originally intended for much more basic tasks than that of the Personal computer. "Mobile applications were originally intended for productivity such as email, calendar, news alert, weather forecasting and contact databases" (Greensmith, 2011, 2) although over the last few years mobile applications are becoming more diverse than ever. "Shopping app usage grew faster than any other category of apps. Sessions on shopping apps on iOS and Android devices increased by 174% year-over-year" (Forbes, 2015) Currently the University of Lincoln use a website as a form of information distribution, therefore it could be beneficial for the University to look to develop a mobile application to expand its information distribution ability.

Around the world, mobile penetration has been a rapidly increasing market "The mobile industry continues to scale rapidly, with a total of 3.6 billion unique mobile subscribers at the end of 2014. Half of the world's population now has a mobile subscription" (GSMA, 2015, 6) in conjunction with this trend the mobile market value is also on the rise "Analyses have put it somewhere between \$20.4 billion and \$53 billion a year, with expectations that it will grow to between \$63.5 billion and \$143 billion by 2017". (Albright, 2014, 13). These statistics indicate that it could be beneficial for an organisation to enter into such a growing market in order to better reach consumers and achieve new goals.

The University of Lincoln could be one of the organisations that could benefit from entering the mobile application market. Currently the University of Lincoln provides all information about their open days via their website, this could become an issue for the organisation as arguably only using a website as a source of information could be an inefficient and ineffective method of communication of information. "Although a mobile app functions a lot like a mobile website, a mobile app gives businesses the advantage of having their own corner on a customer's device" (Business News Daily, 2014) Thus by developing a mobile application, the University would not only be entering into the fast growing market but would also have an additional method of communication to their market.

Despite however the mobile market rapidly growing, data shows that “Few UK businesses have a sales strategy for mobile technology. Over one-third (35%) do not currently have such a strategy” (The Economist, 2014). Thus indicating that still some organisations are choosing not to enter into the market, one reason for this could be due to the number of mobile applications that fail to achieve success. This can be seen in the lack of use of an application when downloaded “During the most recent survey period, it was found that 25 percent apps downloaded by mobile app users worldwide were only accessed once during the first six months of ownership.” (Statista, 2015). According to a number of resources, a lack of usability can be identified as one of the key determining factors towards a mobile applications failure. “Many facts have an influence in increasing of usage of mobile phone devices, the usability is one of these facts for the usability has been increasingly recognized as a major role of successful of the mobile applications.” (Elkheir et al, 2015). Thus this indicates that in order for a mobile application to be successful, usability needs to be thoroughly considered and integrated. Therefore, this project will look to develop a Lincoln University Open day application with usability as a core principle.

Usability is therefore an important aspect of mobile phone development “Usability is a central issue for mobile phone design and service because users need to access various functionalities via limited user interfaces (UI) often while they are on the road.” (Lee, et al, 2014) Therefore, it is important to understand and apply this concept as best possible. Usability can be broken down into a number of different components, Nielson J; stated that usability could be broken down into components such as the learnability, the efficiency, the user retention over time, the error rate and the satisfaction. (Nielson, 1994) Therefore, this project will look to develop a mobile-based application that can be used by prospective students visiting a University of Lincoln open day that adheres to all components of usability as closely as possible to develop a high quality, usable mobile application.

5.0 Aims and Objectives

The project aim is a broad statement of what the project is targeting to achieve by the ends of its process. The project aim can be deconstructed into a number of different objectives; these objectives are smaller more specific statements that need to be completed before the main project aim can be achieved.

5.1 Project Aim

To design and develop a mobile application that adheres to the components of usability. The application should better provide information to prospective students on open days than the current website system in place.

5.2 Objectives

Objective One: To conduct research into the mobile market, handheld devices and development methods to gain a better understanding of the requirements within this project.

This objective will involve conducting research into the mobile market, this objective will allow for a better understanding of the mobile market and users allowing for the ability to have a better understanding of what is required within the project to meet the user's demands. Additionally, research into development methods will allow the ability to better direct the development of the project to produce a higher quality product. This objective can be achieved by creating a survey with questions that require implicit responses. The surveys quantitative data can then be analysed to gain the understanding required to further the project. Furthermore, both book and internet based research can be completed alongside this survey to provide the best understanding possible.

Objective Two: To conduct research into usability, design principles and development tools to gain a better understanding of the principles behind good application development.

This objective involves researching a number of different topics, including usability, design principles and development tools. This research will require using a number of different resources such as the internet, books and academic journals, this research will help to better understand the principles behind developing a high quality application to better meet the aim of the project.

Firstly, this research will allow the ability to better understand the concept of usability and its components. Thus allowing the ability to better develop a mobile application that adheres to the specific components of usability meaning an application can be developed with a better learnability, efficiency, user retention and satisfaction.

Secondly, this research will involve looking at designs of similar projects (Online and Published literature work) with similar features and elements that could be applied to this project. Lastly, research into development tools will allow the ability to develop the project on the most appropriate tools to produce the highest quality product.

Objective Three: To apply understanding gained from usability and design research to develop a design prototype.

This objective involves applying research to develop a design prototype, which will help meet the overall aim of the project in relevance to developing an appropriate design. Firstly, this will involve using as much understanding as possible gained from research to develop a prototype that is of a

high quality and adheres to usability research, therefore allowing the prototype to meet the design and usability aspects of the projects aim.

Objective Four: To conduct usability testing on the prototype design to allow the ability to produce a higher quality product to meet more of the user's requirements.

This objective involves testing the design prototype, which will help meet the overall aim of the project in relevance to both more closely meeting both the design and usability aspects of the project aim. This objective will involve testing the initial prototype using a number of participants, from this the data can then be analysed and the appropriate design and usability changes can be applied before development begins. Firstly, this objective will allow the ability to review the prototype before any development takes place, allowing the ability to improve the prototype to produce a higher quality product. Secondly, it will allow the ability to further understand the requirements of the user to better produce a product with usability at its core.

Objective Five: To apply usability and development research and results gathered from usability testing to implement the mobile application.

This objective refers to the construction of the application, to meet this objective a number of tasks need to be completed. Firstly, knowledge gained from the software development tools research needs to be applied to appropriately choose a tool to develop the application upon. Secondly, it is important that understanding gained from usability testing and other research is applied throughout the development of the application to produce an application of high quality that also meets the user's requirements.

Objective Six: To fully test, the application while also testing its usability and make appropriate refinements dependent upon testing results.

This objective involves fully testing the application, to do this a number of different tasks need to be completed. Firstly, a verification and validation process must be completed this will ensure that the application developed satisfies the conditions imposed at the start of the design process and that it fits the specific requirements of the user. Additionally, both Black box and White box testing and user based testing techniques must be applied to allow for a successful evaluation of the application. Furthermore, usability needs to also be considered throughout this testing process. Subsequently, after this is completed the appropriate refinements of the application can then be completed, which may allow for an improvement of the service the application provides to the user, thus the projects aim will then be completed.

6.0 Literature Review

6.1 The Demand for Smart Devices and Applications

Studies suggest that the demand for smart phones has been a rapidly increasing market and will continue to be for the next few years at least. Research conducted by Emarketer suggests that the population of smartphone users worldwide will reach around 2 billion by the year 2016, and by 2018 Emarketer predict over one-third of consumers worldwide will own a smartphone (Emarketer, 2014). Alongside the increase in demand for smart phones, there has been a direct increase in the demand for mobile applications. Research conducted by Statista suggests that the number of mobile applications is expected to reach 268.69 billion by 2017 from 2.52 billion in the year 2009 (Statista, 2015)

This rapidly increasing demand for both smart phones and applications is suggested to be on the increase for a number of reasons. Firstly, the advancement of technology year on year is allowing smartphones to become much less expensive, research conducted by Technology Review revealed that Google have introduced a smart phone costing less than \$100, allowing for smartphones to penetrate even third world economies (Technology Review, 2014). Research conducted by Global mobile economy suggest that the penetration of the mobile market within developing countries will reach around 63% by the end of the decade and contribute to most of global growth within this period (GSMA, 2015, 14).

Furthermore, another reason that could be behind this increase in demand is due to the population's dependence upon smart phones. Research conducted by Ofcom suggest that 33% of internet users view their smartphone as their most important device for getting online compared to that of the desktop computer being only 14% (Ofcom, 2015). In conclusion, it is clear that the demand for both smart phones and applications is a lucrative market that could have the potential to be on the rise for the near future, making it an ideal market to penetrate for a business although further research into smart phone usage is still required.

6.2 Consumer Smart Phone usage

With the rapidly increasing number of smart phones within society, it is also important to look at research around the use of smart phones by their users. Research conducted by Ofcom suggests that currently around 49% of young adults (18-24) check their phones within five minutes of waking up; further studies also suggest that this age group spend nearly 2 hours a day online with their smart phone, 45 more minutes more than that of their laptop (Ofcom, 2015).

Additionally, research conducted by Microsoft suggests that consumers usually interact with their smartphones 10 to 200 times a day on average with lengths of usage ranging from 10 to 250 seconds on average (Falaki et al, 2010). In conclusion, with the rapidly growing smart phone market and mobile usage of young adults being considerably high, creating an application developed around the theme of a University Open day could be very effective.

6.3 Similar mobile applications

Currently there are a number of University's that have employed some type of Open day application, therefore research will be conducted into as many as can be found to gain a better understanding of what is required to build a high quality application.

University of Liverpool Open Day App

This application has a very user-friendly menu and navigation system allowing for the best possible usability across the application allowing for the quick access of information; this is an element that could be easily adopted into this project. Another feature within this application is the ability to find specific buildings with a Maps Api. This feature is complex but could be an appropriate feature to incorporate into this project to allow students to find specific accommodations within Lincoln as arguably on campus buildings are easy to find while accommodation off campus may be more complex making this feature appropriate for this project. (University of Liverpool, 2015)

University of Aston Open Day App

This application has a number of strengths but also a number of weaknesses. One of the strengths within this application is its login and register feature which could be incorporated into this project allowing features to be more personalised to the user. Additionally, another feature of this application is a settings area allowing for more user personalised features making this application suit as many user needs as possible. In relation to the weaknesses of this application, the menu system and design of the application are not easily usable; the application is hard to navigate around and does not look appealing. Furthermore, the application also contains no complex features making it very boring to use therefore these weaknesses will try to be avoided in the production of this application to provide for the highest quality application possible. (Aston University, 2015)

University of Nottingham application

This open day application is very basic and includes a number of errors and seems to crash a number of times when attempting to navigate around the application, these issues will try to be avoided as much as possible throughout the process of this project to allow for the best usability possible.

Although this application has a number of issues, it does include one feature than could be incorporated into this project. The news feature allows for the ability for users to access the latest information allowing for increased knowledge about the University while also being a feature that could provide for extra user interest in the application. (University of Nottingham, 2015)

Conclusion of Similar applications

As a conclusion this research, this research has allowed the ability to look at both the strengths and weaknesses of other similar applications. In relevance to looking at the strengths of the applications, it has allowed the ability to attempt to incorporate similar features to make the application meet its purpose as closely as possible. In terms of the weaknesses, it has allowed the ability to look at the weaknesses and attempt to implement an application that focuses on making sure these weaknesses do not occur, overall making the application of a higher quality.

6.4 Usability Research

With an increasing number of applications within the mobile market, it is becoming more and more important to develop a high quality application that meets all the user's needs. Research conducted by Dynatrace suggests that users will not tolerate a faulty mobile app with 79% of users saying they would uninstall an application after only one or two issues (Dynatrace, 2012). This research highlights that it is important to develop an application that is usable and has minimal issues.

Therefore, the first step towards developing an application that has a good level of usability is to first look at the problem.

Research conducted by Usabilityfirst suggests that often applications are developed with too much a focus on business goals or fancy features or technological capabilities and often miss the most important part of the process, the user. Instead Usabilityfirsts research suggests an approach should be adopted where rather than requiring users to change their attitudes and behaviours in order to learn and use an application, a system can be designed to support its intended users' existing beliefs, attitudes, and behaviours as they relate to the tasks that the system is being developed to support (UsabilityFirst, 2015). Usability can be broken down into a number of components all of which are important elements to provide for a good usability to meet the aim of the project, these components are broken down and researched below.

6.5 Usability Learnability

Learnability is one of the key components of usability. Research conducted by Lazar et al suggested that users reported wasting on average 42-43% of their time due to frustrating experiences, when looking at the specific causes of the frustrating experience that occurred it seemed to be learnability was the main issue (Lazar et al, 2006, 239). Therefore, it is important to understand what makes an application have a good learnability. Research conducted by Baradaran suggests that a good learnability leads to a good efficiency and can be achieved by having consistency, predictability and familiarity throughout the application. (Baradaran, 2005) Therefore, it is important that this project attempt to produce a good learnability thus a good usability by adhering to this research.

6.6 Usability Error Rate

Error rate is another main component of usability. Research conducted by Jordan suggests that errors can be categorised by two types, “slip” or “mistakes”. A slip occurs when a user knows how to perform a task but accidentally does it wrong while a mistake occurs when a user has an erroneous model of how the product works. Further research conducted by Jordan suggests that slips often occur when the interface of the product is inadequately designed while mistakes occur because of the underlying principles of how the product works are not intuitive. (Jordan, 1998, 21) Therefore, within this project it is essential that both the interface and underlying principles of how the product works are efficiently developed so that neither “slips” or “mistakes” are present within the final application.

6.7 Usability Satisfaction

User satisfaction is another main component of usability. Research conducted by Olubusola suggests that in mobile applications the user’s satisfaction is directly determined by what the users perceive about the application, its expected performance and match between personal values and the applications values. (Olubusola, 2014) Research conducted by a Gartner Group study suggested that when systems match the users’ needs satisfaction often improves dramatically. (Bias et al, 2005) As a conclusion, it is important that the user needs be met as closely as possible to provide for a better satisfaction thus a better usability.

6.8 Usability Efficiency

Another main component of usability is efficiency. According to Seibert efficiency can be explained as how well a user can achieve their goal when using an application. Efficiency is a direct measure of how much effort the user must put forth, examples include time, number of mouse clicks for a certain action to be completed. Seibert also suggests efficiency is an important component of usability. (Seibert, 2005) Therefore, within this project, the aspect of efficiency will be implemented throughout both the design and development processes to develop the most efficient application possible thus improving the overall usability.

6.9 Usability User Retention

The last main component of usability is the user's retention over time. According to Ferré et al user retention is a key aspect to usability because users must be able to use the application without having to climb a learning curve. The user retention is to do with how well the user remembers how to use the application after a period of nonusage. (Ferré et al, 2001) According to research completed by Forbes the average application retention rate shows only 26% of users returning to an application for a second time within a forty-eight hours of first opening the app, although over a third of activity with a mobile app lasts less than one minute. Further research by Swerve suggests that better user retention can be achieved by having a mobile application that is engaging and impactful in the first sixty seconds to better capture the user. (Forbes, 2014) Therefore, within this project the application will be as engaging and impactful as possible to help achieve a good user retention and thus achieve the goal of a good usability.

6.10 University Open Day research

Studies into University open day research suggest that open days are more important than ever. Research completed by Youthsight suggest that on average, around half of students (51%) were more likely to want to apply to an institution after attending an open day. Additional research showed that this data ranged from 81% for institutions with the best open days to 22% for institutions with bad performing open days, showing that it is important the open day is of a high performance.

Further research completed by Youthsight into the most important factors on open days suggest that an informative open day accounts for 37% up from 32% only two years before showing the growing importance of open day quality (Youthsight, 2013). Therefore, this project should allow the ability to provide for a higher quality open day due to increasing the access of information to prospective students therefore meeting the aim of the project.

6.11 Mobile applications vs Mobile websites

There is currently a large debate within the mobile industry into whether mobile applications or mobile websites better meet user requirements. According to Dynatrace research, mobile applications have generally a better level of usability and are much more productive. Research gathered from users suggested that 85% of users preferred mobile apps over mobile websites due to being more convenient to use, faster to use and easier to browse, although only 27% of users thought mobile applications provide a better user experience, this could be due to a number of reasons.

Research into user experience showed that users often find a number of issues within mobile applications; data suggests that 56% of users often find faults or issues with applications; this could be one of the key factors to why user experience may be so low. Further research into this field revealed that over the last six months 62% of users had a mobile application crash or freeze and 47% of users experienced a slow application, which effected their user experience. This data reveals the heavy importance of usability within application development, the key message to take away from this research is to produce an effective mobile application that functions precisely and has a good level of usability while also being efficient when running or otherwise the application will be at risk of being unused and not successfully meet its aim. (Dynatrace, 2012)

7.0 Methodology

7.1 Project Management

Project management is not a specific principle for which a project will achieve success, although it could be argued that it provides for the specific planning techniques that possibly direct a path towards success. “89% of high-performing organizations value project management “(Wrike, 2015) Before choosing a project management methodology the nature of the project first needs to be understood. The projects nature can be outlined as an Android mobile application that focuses around the core concept of usability. Therefore, a number of specific characteristics need to be considered to allow for the projects nature to be successfully achieved, firstly the user and their requirements must be at the heart of the projects development and planning while the product must be useable and therefore must be completed before the hand in date.

Hence, a number of different project management methodologies are appropriate within this project to meet the specific demands of its nature. The first project management methodology that can be discussed is known as Rapid Application Development (RAD) “RAD concentrates on the delivery of the product and involves the client from the start and focuses on the client’s needs, uses

an incremental approach,” (ASQ, 2005) The RAD methodology seems appropriate for a number of reasons. One of the main reasons being is that it could work appropriately with the specific demands of this project. The main core demand for this project is to develop a product centered around the concept of usability therefore the RAD methodology could be employed within the prototype staging of this project allowing for quick initial user reviews through the use of prototype testing. Which in turn allows for changing requirements to be effectively implemented all of which allow for the core demand of usability to be better achieved.

Another key project management methodology that could be adopted into this project is the project in controlled environments methodology (PRINCE2), this methodology seems appropriate for a number of the specific demands of this project. One of the main demands within this project is to develop a product under a strict period of time while also producing a product of high quality. Since these demands are important to meeting the overall aim of this project the PRINCE2 management methodology seems most appropriate due to one of its main principles being focused around quality management and time to market “PRINCE2 projects focus on the product definition, delivery and quality requirements.” (AXELOS, 2009) This advantage could be gained by taking a stage based process approach throughout the project lifecycle, allowing for a more better planned, monitored and controlled development process.

Alongside the PRINCE2 management methodology, the Waterfall methodology also seemed appropriate to a number of aspects of the planning within this project and this was due to a number of the projects specific demands. Firstly, since one of the main requirements of this project is to build an application with usability at its core it means that functionality is essential and alongside the other planning methodologies this methodology would allow for the ability to clearly outline a sequential straight forward process “The Waterfall model defines several consecutive phases that must be completed one after the other and moving to the next phase only when its preceding phase is completely done.” (Bassil, 2011, 2) This methodology could allow for an effective approach to complete all the required tasks within the project under the strict time conditions while meeting all the other required demands that was also simple to follow.

7.2 Software Development

Before an appropriate software development methodology can be chosen it is firstly important to look at the particular characteristics of the software required and its nature. Firstly, one of the main elements of the software characteristics is the product must be usable therefore it is important the product is completed in the specific timescale, Secondly the software’s characteristics also involve arguably a number of complex features. Lastly, it is also important that the software should be

developed as closely to the user's requirements as possible since usability is at the core of this project.

These specific characteristics lend themselves to asking the first question of the method of delivery available. Should the project be developed through one whole process, then tested, and delivered or should it be broken down into small-refined stages? By completing the project in all one process, it could allow for a much quicker completion and delivery, although it could be developed through a series of stages and tested for bugs through each stage meaning there would be constant new builds of the application, which may allow for better refinement. Firstly, the main benefit of building the project through one large process is that it is arguably the faster process than that of a stage-based process as there is no need for the constant rebuilding of the project. The Waterfall method is the most popular methodology that follows the approach of one whole process. Waterfall follows a sequential process to the completion of the project, although it does not allow for a functional project until all sequential processes are completed.

Within this project, the main requirements are not likely to change although the project is likely to see a number of refinements to meet the needs of the user more closely and therefore meet the overall aim of the project. The Waterfall methodology could allow for specific features that are arguably key to the project's success to be completed more effectively, "Waterfall model is recursive in that each phase can be endlessly repeated until it is perfected." (Bassil, 2011, 2) Making an iterative approach arguably effective within this project for set specific pieces.

Another main demand within this project is the concept of building an application with usability as a core principle, alongside this demand the project must also be completed by a single individual with a strict limit on the amount of time to available to develop. Ordinarily although most projects do have, strict time deadlines you will usually find projects contain a number of different developers allowing for the ability to meet development demands arguably much more easily. Therefore, a different approach to development may be required to allow all of the demands of the project to be effectively met as it could be hard to develop all of the software elements alone under such a strict period. The Component based development methodology, which allows the ability to adopt external software components into the project could allow for a better functionality. "It focuses on improving the maintainability, reliability and overall quality of the system" (Soni and Jha2, 2014) Furthermore, it also would solve the time demand issue within the project, as components would be developed much faster but still have a high quality and meet the usability demands "Using already developed components means less design, coding, and testing which in turn lowers production time" (Miller, 2011)

As a conclusion to the software development methodology that would be best appropriate for this project it could be argued that although each methodology provides for its clear advantages it would be much more beneficial to adopt a hybrid approach where each of the above methodologies are used within specific elements of the project to produce the best possible solution. The iterative approach could be applied to the more important basic elements of the project such as the database and user storage element of the project, while the component based approach could be applied to the more complex features such as the Twitter feature, Scanner feature and Weather forecast feature.

7.3 Toolsets and Machine Environments

Software Development Tools

IDE (Integration Development Environment)

Throughout the development of this project a number of different tools will be required. Since the application is to be designed to run on an Android device, these applications are usually developed on some type of integration development environment (IDE) whilst there is an abundance of third party IDE's available (Eclipse, Basic4android, Corona SDK, Delphi) developing using the official android studio IDE (Android Studio) seems much more appropriate within this project.

One of Android studio's selling points is its good user interface, this seems like an important aspect when choosing what tool to use as it allows for a much faster development process and the ability to learn how to use the software more easily which could be effective within a project within demands on time available to develop. Furthermore, Android studio also has a number of different automatic and easy customisation options available than other tools available on the market such as Eclipse where manual setups in XML were required, making Android studio arguably the better choice.

Furthermore, another key advantage of using Android studio is the support available. Android studio has an effective refactor development process available, along with many online tutorials available from the official android website, making it a more appropriate choice than other developer tools.

Another reason behind the Android studio tool being more appropriate than other alternative tools is that throughout this project an Android design principle approach will be applied to all processes. Since these Android design principles are important to this project it is even more important to choose an appropriate tool to be able to effectively implement them upon. Therefore, since these design principles often refer back to the use of the Android studio tool it may be a more appropriate

choice, thus providing for a project that better implements these principles and thus will better provide for an application with a higher level of usability

Android Platform Version



Fig 1: Android Platform Statistical Data

Android applications have to be developed for specific Android versions, therefore justification on which version must be conducted. There are a number of different versions available although the main ones for discussion include Marshmallow and Lollipop and KitKat. One of the main demands within this project is usability therefore it is important that the version chosen allows for the most possible amount of users to have access to the application.

Therefore, in terms of raw data KitKat would be the best option, Currently KitKat holds a share of 35.5% of distribution this makes the KitKat a valid option (Fig: 1). The next possible option is the Lollipop version which holds 34% of the Android distribution share (Fig: 1) while also making it a newer version than that of KitKat, therefore in the long term this is arguably a more viable choice than that of KitKat. Lastly is the Marshmallow option this platform is the newest version therefore in the very long term it will be most beneficial, although currently it only holds a 1.2% of the distribution share (Fig: 1) which would arguably not follow the idea of usability at the current time. Overall the Lollipop version seems to be most appropriate with the current period of time and also looking into the future whilst it also meets the demand of producing a usability based application.

Weather Api

One of the more complex features required within this project is a Weather Rest API, from which there are numerous options available (Yahoo Weather, Open Weather Map and World Weather Online). The Open Weather Map tool seems more appropriate than other tools available for a number of reasons. Firstly, most tools online such as the World weather online tool do not contain much documentation on how to implement the feature or tutorials while the Open weather map has a number of complex tutorials and videos to provide for a quicker implementation process meaning there is the change of less occurrence of errors, which could be argued to be beneficial when looking at the time of development as a demand. Secondly, the Open weather map feature also contains a lot of information on the Json output (Humidity, Wind Speed, Wind direction) meaning that all the

information required could be easily obtained unlike other tools online which only produced basic Json outputs meaning the feature could meet more of the user's requirements.

Maps Rest API

Another complex feature required within this project is a Maps API, from which there were again numerous options available (Google Maps, ThinkGeo) The Google Maps tool seems the most appropriate tool for this project for a number of reasons. Firstly, the Google Maps tool has links with the IDE Android studio, meaning development of the maps tool would be much simpler due to the assisted guidance meaning that the tool could be implemented much quicker while also to an arguably better quality. Furthermore, the Maps tool requires the tool to be installed to the user's phone therefore it made sense to use the Google tool due to most users already having the Google Maps installed to their Android device, therefore making it more appropriate than other tools available.

Project Management Tools

Project Storage

Storage of the project is very important in terms of the projects management. The project needs to be in a place that could be accessed easily from any computer, it also needs to be in a secure and safe location whilst also having a good storage level to allow for the ability to save multiple versions of the projects progress to storage in case of requirement of returning to an older version.

Therefore, a number of options are suitable for this project.

Firstly, is the use of the online storage system Dropbox this allows for the ability for the project to be secure through login access requirements but also having the ability to easily access the project from any computer at any time required. Additionally, Dropbox also has a large memory availability meaning multiple versions of the project can be stored, therefore meeting all of the project management demands.

Another method that seems appropriate for this project is the storage of the project on a USB flash drive, this allows for a second storage location of the project in case of loss from Dropbox therefore providing for another secure and safe location. Furthermore, the USB flash drive is a small object that can be easily kept on your person meaning again it is easy to access the project when required.

7.4 Research Methodology

Within this project, it seemed appropriate to complete initial research into the target market and how they use their smartphones, this research can be completed before any development begins to better meet and understand the user requirements. This research can then be incorporated into the design and development of the artefact.

Further research is also completed in the form of a usability based testing approach through the prototype stage of the artefact, this is also incorporated into the design and development of the artefact as this seemed more appropriate (See Section 8.1)

The overall aim of this research is to provide for a better understanding on the process of the design and development of the artefact to allow the better ability to meet the overall project aim.

Research Questionnaire

The questionnaire was given to a number different first year students, as this was as closest to the target market of this artefact as possible. The questionnaire was designed with the Fanning format in mind. “Your goal is for your respondents to read and respond to it with the same understanding of the questions so that you get a more consistent response quality” (Fanning, 2005, 10) following this format seemed appropriate due to it being a tried and tested method that has already proved successful while it also gave some clear guidelines to produce better results to provide for better analysis. (See Appendix 13.1)

Question One: If you own a Smart phone device, what manufactured device do you own or would prefer to own if you had a choice?

This question is aimed to research what device the target market (students) own or would prefer to own. This question will provide for the ability to develop an application more suited to the specific needs of the user by developing on the correct platform. All results were valued in this process although only one platform could be developed upon due to the strict time period available therefore, it is required to choose the best platform possible.

Question Two: Would you use a smart phone to research information on an Open day?

This question asks the target market if they would use a smart phone device while at an Open day. This question will allow for a proven response that developing some type of mobile application will be useful to assist students on an open day thus allowing for the project aim to be achieved.

Question Three: Would you prefer to access information on an Open day through a mobile application or a mobile website?

This question is aimed to ask the target market on their preference of either mobile applications or mobile websites. This question will allow for a response that can then be analysed to decide whether a mobile application or mobile website would be more suited to this project.

Question Four: What features would you expect to find on a mobile app or mobile website?

This question is aimed to better understand the user requirements within the project in terms of the applications features. This question will allow for a response that can then be analysed to allow for the correct features to be implemented into both the design and development of the application allowing for the project to more closely meet the user requirements.

Question Five: Would you class 'usability' as an important aspect to accessing information via a mobile application/ mobile website?

This question is aimed to research if usability is an important aspect to the target market. This question will allow for a response to which then can be analysed to make sure that usability is a key feature to provide for a successful application that will meet the projects aim.

Questionnaire Results

In total 21 students took part in this questionnaire. This section will discuss the results for each question.

Question One: If you own a Smart phone, what manufactured device do you own or would prefer to own? Please Tick the appropriate box

The response showed that students owned either an Android or iOS platform device (Fig 2), with 11 students owning an Android device (52%) and 9 students owning an iOS platform device (43%), while only one student owned a windows platform device (5%) and no students owned a blackberry device or other manufactured device (0%). The response from this question was ideal due to it allowing for the ability to justify a choice of platform to develop a mobile application.

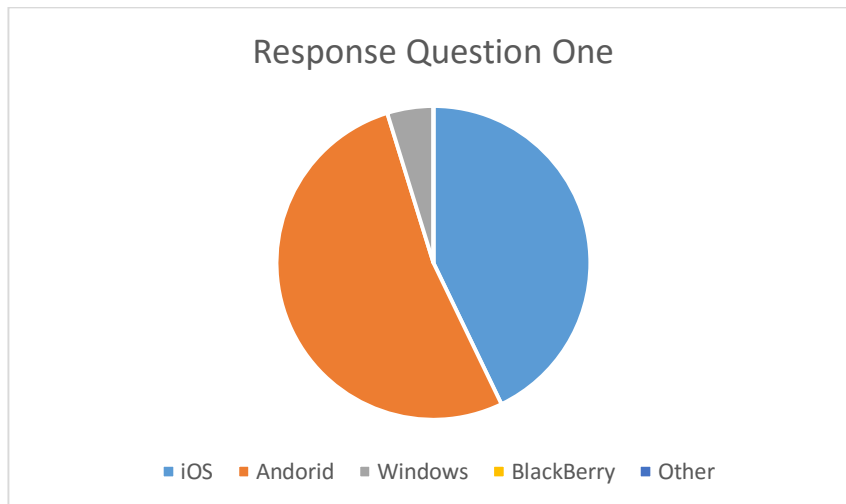


Fig 2: Research Response Pie Chart Question One

Question Two: Would you use a smart phone to research information on an Open day?

Yes/No, if No why?

The response for this question showed that nearly every student would use some type of smart phone to research information on an Open day with 19 students agreeing (90%) and 2 students disagreeing (10%). With the 10% of responses being mainly due to respondents preferring the use of verbal communication to the use of smart phone devices.

The responses from this question were again ideal, as this allowed for the knowledge that a mobile application would be useful to effectively give students access to information on an Open day meaning the project aim has the ability to be achieved effectively.

Question Three: Would you prefer to access information on an Open day through a mobile application or a mobile website? Please justify your reasoning

The response for this question showed that 14 students preferred to use mobile applications while 7 respondents preferred to use mobile websites. In relevance to further detail in these responses the students who preferred mobile websites seemed to justify this response with reasoning such as “more friendly”, “easier to use”, “quicker to load up” and “use without worrying about the internet” Meanwhile students who preferred mobile websites justified their reasoning with responses such as “less hassle” and “prefer websites layout”.

The responses from this question were good as they allowed the ability to better understand the preference of the target market in relevance to a choice of either a mobile application or mobile website. Thus meaning the correct application can be developed to more appropriately meet the user’s demands. Furthermore, the justification behind the users reasoning allows for the ability to

understand the key principles that are required to be implemented throughout the design and development process of this project to better develop a higher quality application.

Question Four: What features would you expect to find on a mobile app or mobile website designed for a University Open Day? Please Tick where applicable

Login/Register, University News, Weather on Open Day, Building finder, Accommodation Finder, Course information, chat forum, Activities in the City, Contact numbers, Directions, parking, Refreshments, Other Please State.

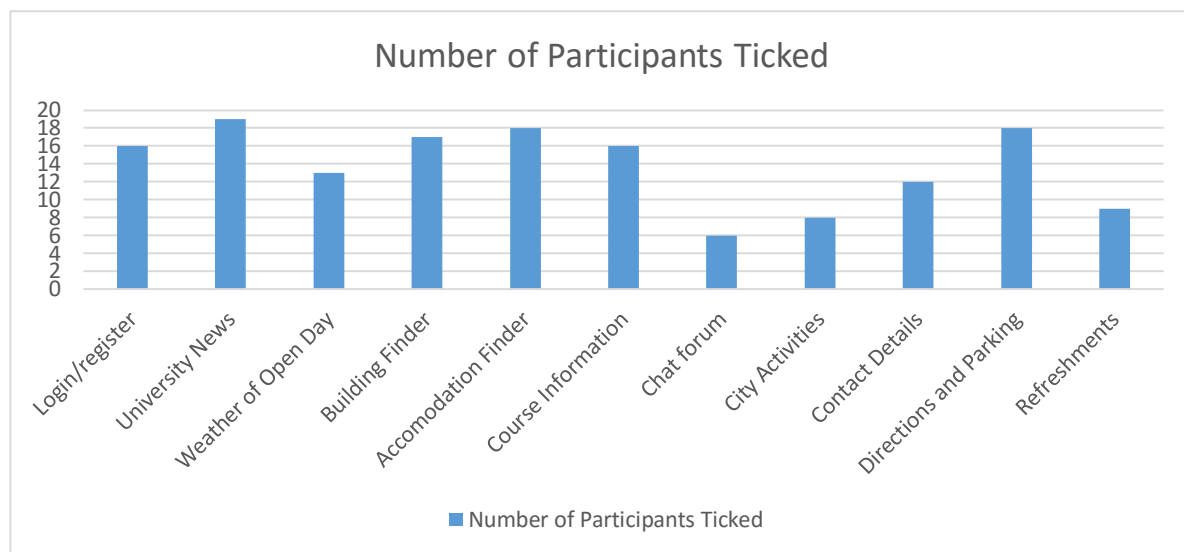


Fig 3: Research Response Bar Chart Question Four

The responses for this question ranged greatly from a minimum of six participants expecting to find a chat forum to a maximum of nineteen participants expecting a University News feature (Fig 3). The responses from this question allow for a better understanding of what the user expects in terms of features within the artefact therefore allowing the ability to implement the correct features throughout the design and development process of the project.

Although this question provided for a good response, it could also be argued that all these features are desired by at least one type of user and due to time restrictions not all of the above features can be implemented therefore the most appropriate features need to be chosen that will provide for the best possible application.

Question Five: Would you class 'usability' as an important aspect to accessing information via a mobile application/ mobile website? Yes/No, please justify your reasoning

The response from this question revealed that all 21 students who participated within this questionnaire classed usability as an important aspect to accessing information via a mobile application/mobile website. The student's response of reasoning for this choice indicated that usability was important due to statements such as "makes the application easy to use", "reduces time trying to find information".

This questions responses proved useful as it indicates that usability is critical to designing and developing a high quality application. Furthermore, the responses reasoning also indicate students want an application that is both easy to use while also easy and not time consuming to find the desired information.

Conclusion

The questionnaire provided a number of valuable responses, which can be applied to many different aspects of the project to provide for a more effective outcome. The first aspect is a better understanding of the target user's requirements in relevance to the applications features and usability aspects, which will allow for a more precise design and development process to produce an application that can better meet the projects aim. Secondly this research has also allowed for the ability to effectively choose the most appropriate development paths in relevance to what type of mobile platform to develop upon, allowing for the application to be used by as many users as possible, therefore again allowing the application to better meet the projects aim.

8.0 Design, Development and Testing

8.1 Design

One of the main objectives within this project is to implement a design prototype of the mobile application that allows for a clear interface and functionality approach to develop a high quality usable application that meets the projects aim. This process will be broken down into stages of implementation following the Rapid application development methodology as discussed earlier. (See section 7.1)

Each stage of the prototype will also be usability tested. Testing will firstly involve a concurrent probing method. "Concurrent Probing (CP) requires that as participants work on tasks—when they say something interesting or do something unique, the researcher asks follow-up questions." (Usability Gov, 2015) this will require the participant to complete a number of tasks they would be

expected to complete when using the application (See Appendix 13.2), followed by completing a system usability scale (See Appendix 13.3), these pieces of testing should allow for the ability to reflect and continuously improve the design of the application.

8.1.1 Stage one prototype

Application Appearance

These features will be used throughout the application to set a general theme.

Background – White (#FFFFFF) a white background seems appropriate as this will allow for all content within the application to be easily readable and allows for specific features within the application to stand out.

Text Format – (Ariel) The default text format seems appropriate to make information clear and readable to as many users as possible.

Text Colour – Black (#808080) this text colour seemed appropriate as it is a default colour and will allow for information to stand out from the background.

Button Background – Green (#08AE9E) this button colour seems appropriate to implement to the design of the application due to it effectively allowing the button to stand out from the background making it easier for the user to identify.

Login Screen Design

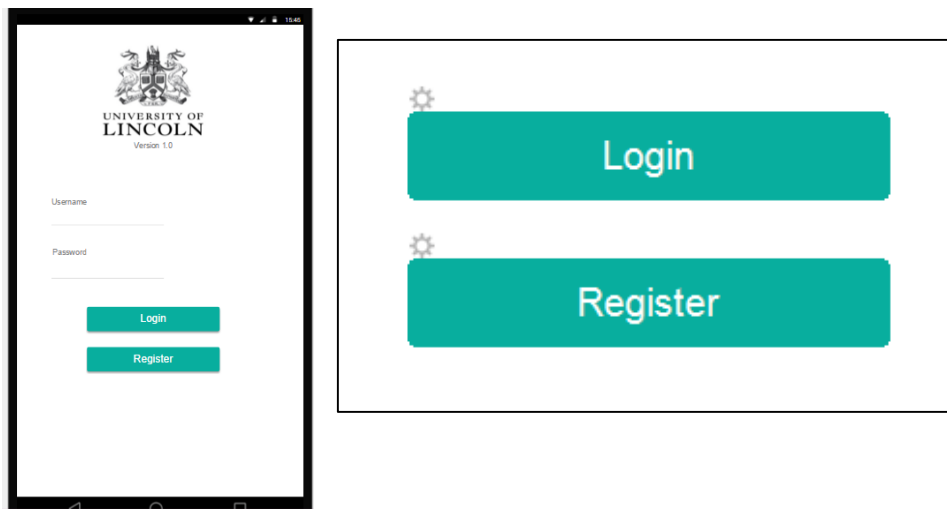


Fig 4: Stage one Login screen design

The main functionality of this screen is to provide for an access area to the application. (Fig 4)

Basic input text fields have been used within this screen design to provide for a clear method of functionality to access the application, furthermore these fields should also be centered in the middle of the screen making it clear to see and use. Additionally, buttons have also been used within

this design, the “register button” functionality involves the user being navigated to the register screen, meanwhile the “login button” functionality involves a user authentication function that refers to a database for user access. Both of these buttons will be centered in the middle of the screen making the buttons easier to use and see for the user.

Login authentication design

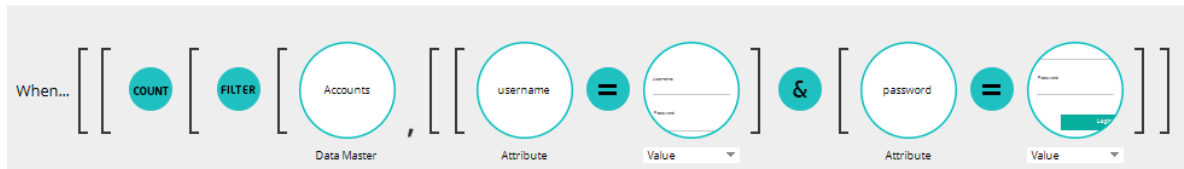


Fig 5: Design Login Authentication

The login authentication design (Fig 5) firstly accesses a database where it looks through the database via searching if both a username and password meet both fields.

Register Screen Design

Fig 6: Stage one Register screen design

The functionality of this screen is to allow the user to create an account to allow them to access the application. (Fig 6) Firstly, input text fields seemed appropriate for this design as they are simple to user to use, meaning the user understands how to input data into these fields to register, each text filed is spread evenly apart to allow for room for the user to input details more easily, therefore reducing the likelihood of errors occurring on user input.

Lastly a button was appropriate for this screen design as it allows for a simple functionality for a user to confirm their registration to the application (Fig 7), this button has also been centred to allow for the ability for the user to easily identify this feature and also easily use the feature.

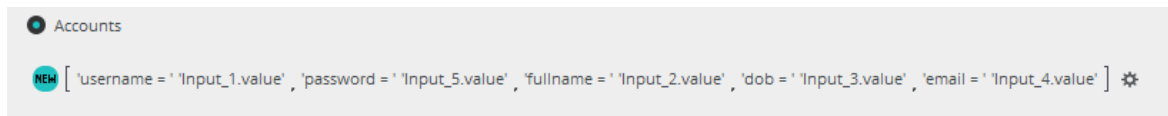


Fig 7: Stage one register functionality design

Main menu Screen Design

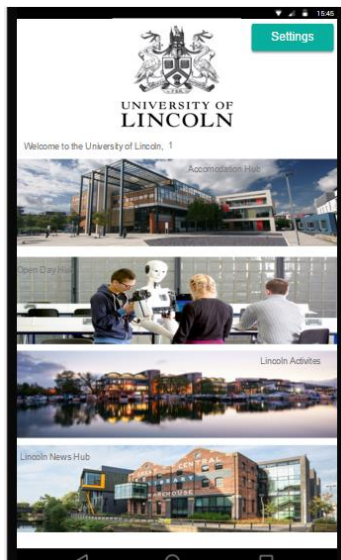


Fig 8: Stage one Main menu screen design

The functionality of this screen is to mainly act as a navigation point for the user, therefore this screen was designed with this functionality in mind. (Fig 8)

Buttons have been chosen to function as navigation for the user. These buttons will have background images to make the screen look more interesting but also make the buttons stand out to the user.

Furthermore, each button within this screen will be centered and large to further ensure the buttons are noticeable, although the settings button will be placed at the top right corner of the screen as this provides a separate feature than the other buttons used on this page.

Lastly, this screen will also display the user's username and a brief welcoming ("Welcome to the University of Lincoln ") this will give the user a more personalised experience when using the application. This feature will be placed above the buttons in the centre of the screen therefore making this information clear to read for the user.

Accommodation Screen Design

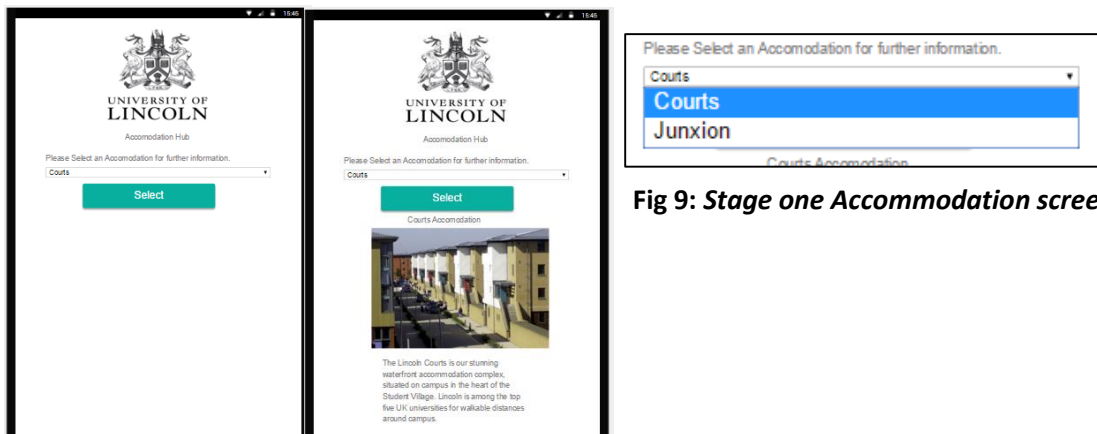


Fig 9: Stage one Accommodation screen design

The functionality design of this screen is to allow the user to view the available accommodations within the city and also gain additional information about the accommodation (Fig 9)

Firstly, a drop down feature seemed appropriate for this design as it allows for the ability to access large amounts of data choices very simply and quickly, this seemed more appropriate than having multiple screens for each accommodation, furthermore this feature is also centred and also a good size to make the feature better identifiable and more usable.

The information outputted on the choice of accommodation consist of two text fields and an image field, these features have been centered and also put into clear space making them easier to view for the user. Lastly a button seems appropriate to implement into this design, the “select button” functions as a confirmation to the dropdown menu feature (Fig 10), this was appropriate to the design as this means the user will less likely make an error as it requires them to confirm they wish to look at the specific accommodation choice. The functionality of the button works by checking the value inside the selection component, dependent upon the value a number of different features are either shown or invisible.

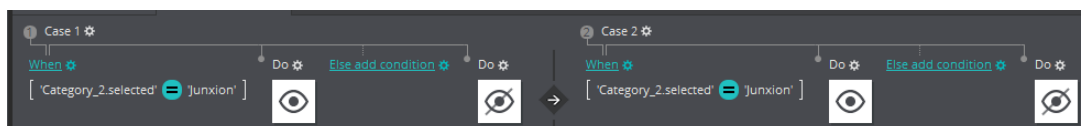
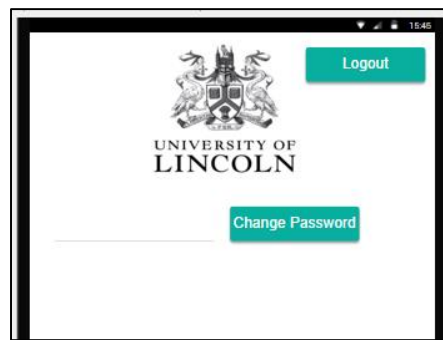
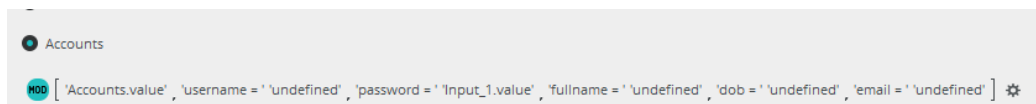


Fig 10: Stage one Drop down menu functionality

Settings Screen Design**Fig 11: Stage one Setting screen design**

The functionality of this screen is to provide for an area for the user to edit some of their account details. This screen design compromises of an input text field that is placed in an area with clear space making the feature more likely to stand out, this field functions as a change user account password field (Fig 11).

Another feature within this design were buttons. These buttons were made a good size and also were put into clear space allowing the ability to identify and use these features more easily, the first button is the “change password button” this feature should call upon a database to which it then changes the field of the password to the desired input value therefore changing the password for the user (Fig 12). Lastly the login button function returns the user back to the login screen.

**Fig 12: Stage one Accommodation screen design**

University News Screen Design



Fig 13: Stage one News screen design

The functionality of this screen is to use the Twitter Api to display a list of news via the use of tweets. The design of the feature is to display a drop down menu of a list of tweets, due to this being a prototype this features functionality is only shown by using an image (Fig 13) to display an impression of what the application will be intended to look like.

Scanner Screen Design

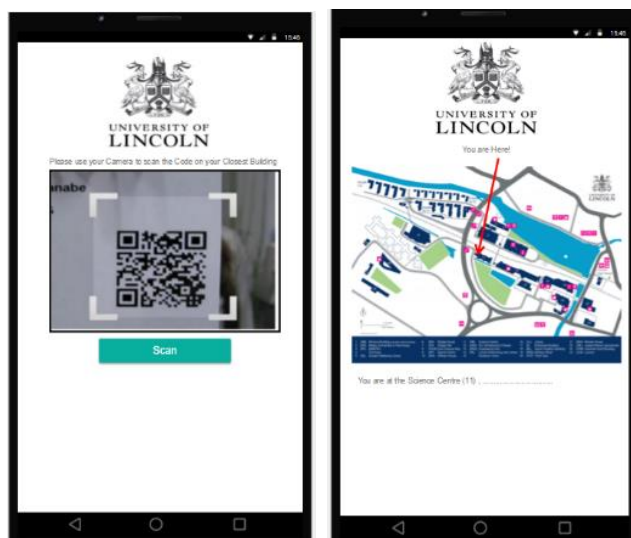


Fig 14: Stage one Scanner screen design

The functionality of this feature is to allow the user to use their camera to scan QR codes to display information about building locations.

The design of this feature involves using a camera view to scan the QR code (Fig 14), this will then be followed by a display of an image representing the map location of the user dependent upon the QR code (Fig 14).

8.1.2 Prototype Stage One testing

In total ten Participants took part in testing the prototype (See Appendix 13.2), this testing firstly involved a Concurrent Probing method (See Section 8.1) followed by a SUS (system usability scale) testing approach. (See Appendix 13.3)

Results

<u>1) Task One: Please attempt to login to the Application.</u>
Mistakes: Participants attempted to register multiple times, user's inputted incorrect information to authentication without knowing.
Additional Comments: "Screen looks boring and not interesting", "no conformation on register is confusing", "doesn't tell me if I got my password or username wrong"
Review: After the results of this task It may be appropriate to implement a more interesting design with additional colours to make the application more interesting for the user, furthermore it may be appropriate to add user assisted conformations when the user registers or gets their password incorrect.

<u>2) Task Two: Look up the Junction Accommodation and find its location</u>
Mistakes: Participants often chose the wrong button which navigated them to the incorrect screen.
Additional Comments: "Pictures were unclear"
Review: As a review of the results gathered from this task, it may be effective to implement a new menu system that is more clear to the user.

<u>3) Task Three: Scan the University building for additional information.</u>
Mistakes: Participants chose the wrong button navigating them to the incorrect screen.
Additional Comments: "Pictures were unclear"
Review: As a review of the results gathered from this task it may be effective to implement a new menu system backed up by further evidence with another task also having similar issue.

4) Task Four: Change your password.
Mistakes: Users changed their password multiple times without knowing.
Additional Comments: “no user conformation makes it confusing, screen is a little empty and boring”
Review: It may be beneficial to implement some user conformation into the design so users understand the functionality of the application better.

5) Task Five: Please look at the latest University News.
Mistakes: Users often went to the wrong screen from the main menu
Additional Comments: “the main menu is unclear and makes it hard to find the correct screen”
Review: Many tasks now have had the same issue regarding an unclear menu and navigation system. Since this is not the only task to have the same issue it could argue that it is crucial to implement a better design regarding the main menu feature of the application to produce an application that better meets the aim of this project.

6) Task Six: Please find information about the English course and go to the website.
Mistakes: Multiple times participants navigated themselves to the wrong screen
Additional Comments: “unclear from the menu system how to access this information”
Review: It may be appropriate to implement a new design for which the user has the better ability to know where information is held within the application thus making the efficiency for the user’s experience of the application much better.

7) Task Seven: Please logout of your account.
Mistakes: None
Additional Comments: None
Review: Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented.

System Usability Scale (Stage One)

Overview

This testing was conducted to allow the ability to better develop an application that adheres to the concept of usability. “it has been found to be a remarkably robust measure of system usability. In addition, SUS has been effectively applied on a variety of software systems and/or devices. In other words, it is technology agnostic” (Katsanosac et al, 2012) therefore by completing this testing process it should allow for the ability to better meet the projects aim in retrospect to its usability.

System Usability Scale Results (Stage One)

1	SUS Calculation											
2												
3	Participant	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
4	p1	3	2	4	4	2	3	3	2	2	3	50.0
5	p2	2	3	3	3	1	3	3	2	3	2	47.5
6	p3	3	1	3	3	2	2	2	3	3	2	55.0
7	p4	1	2	1	2	1	5	2	2	2	2	35.0
8	p5	2	1	2	3	1	4	2	3	1	3	35.0
9	p6	3	2	2	3	3	2	3	2	2	2	55.0
10	p7	2	3	1	2	2	3	2	3	2	3	37.5
11	p8	1	1	1	4	3	2	3	2	2	2	47.5
12	p9	3	2	2	2	2	3	2	2	2	2	50.0
13	p10	1	2	2	2	2	1	2	2	1	2	47.5
14												
15											Average SUS SCORE	
16												46.0
17												

Fig 15: Stage one System Usability Scale Results

Results

The system usability scale for the stage one prototype was conducted by ten participants, from this a usability score can then be calculated, the overall average score came out to 46.0 with the lowest score being 35 while the highest score being 55. (Fig 15)

Reflection

As a reflection of this testing it can be argued that the design is currently not of a high quality in relevance to usability standards since the average score achieved is below the recommended average guideline. “a SUS score above a 68 would be considered above average and anything below 68 is below average” (Usability Gov, 2015) it is clear that further implementation must occur to the design stage of this project to allow for the application to effectively meet the projects aim.

8.1.3 Stage Two Prototype

Overview: This section will look at the second iteration of implementation of the design prototype for this project. Implementation took place on this stage by reviewing the testing results of the stage one prototype and then making the appropriate changes to develop a design of higher quality.

Application Appearance

Changes were made to the applications overall theme appearance in relevance to background colour, text colour and button colour to make the application look more interesting to the user which according to current test results could make the application better meet the usability requirements.

Background - (#699CFC) – more interesting colour, making application stand out more.

Text Colour – (#434343) – much clearer to read for the user.

Button Background – (#676CFB) much clearer and stands out from background.

Login Screen

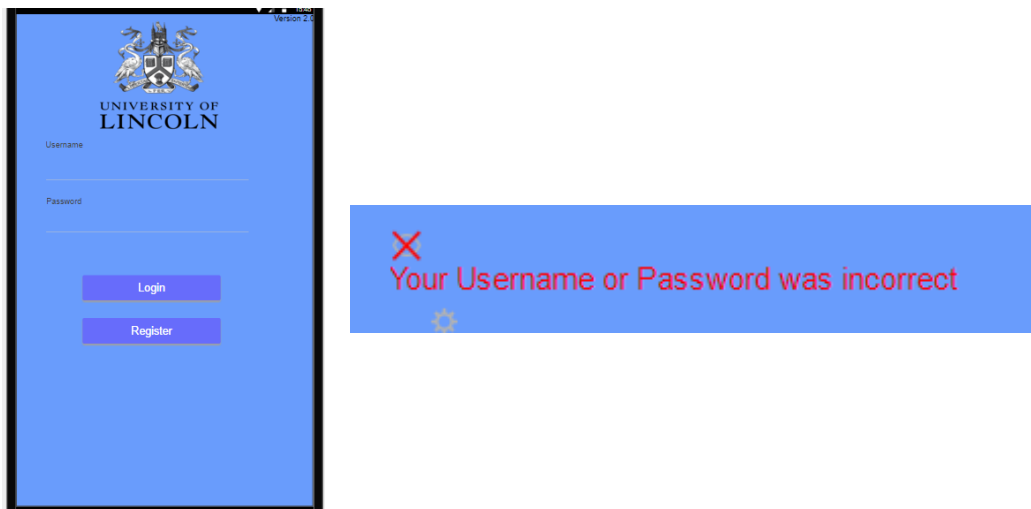


Fig 16: Stage Two Login design and user prompts design

Stage one prototype testing showed that users struggled to know whether their username or password was correct, this was clearly a design issue.

Changes occurred in the form of user prompts if their password or username was incorrect, allowing them to understand what had gone wrong (Fig 16). This function occurs when a username or password is inputted incorrectly this will result in an error message being shown to the user to notify them of the issue (Fig 16), this should give extra guidance to the user and increase the quality of usability within the application.

Register Screen

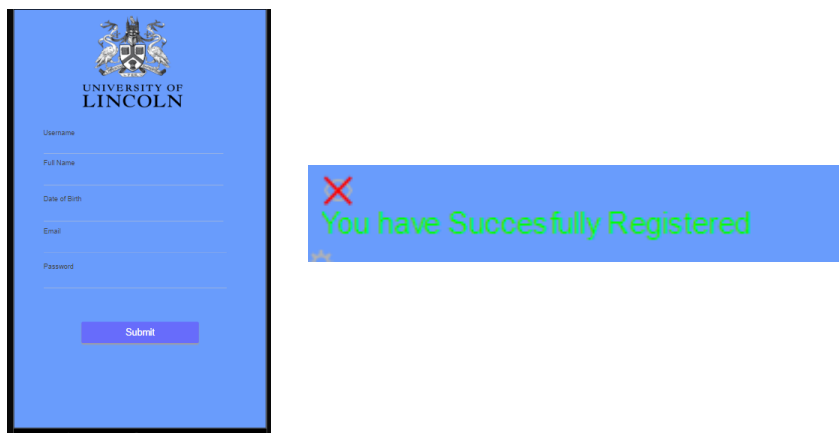


Fig 17: Stage Two Register design and user prompts design

Stage one prototype testing indicated that users struggled to know whether they had registered with the application, causing them to register multiple times, this is clearly a design issue.

Changes that occurred to this screen include a user prompt for when the user has successfully registered to the application, allowing for a better understanding of the processes of the application (Fig 17)

Main Menu Screen

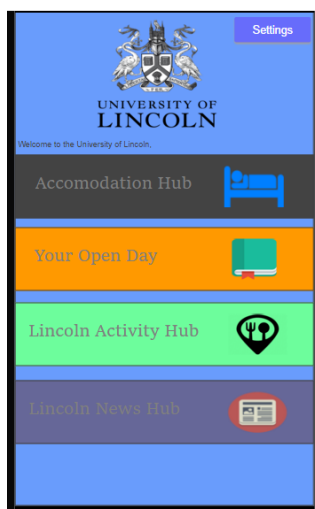


Fig 18: Stage Two Main menu design

Stage one prototype testing showed that users did not think the design of the main menu was clear, causing users to navigate to the wrong screen multiple times, this was one of the largest issues present in regards to the design of the application.

Changes that occurred to this screen include a new menu system that instead is much clearer (Fig 18) to the user to what screen each button functions as, making this screen much more user friendly in regards to its usability.

Open Day Screen



Fig 19: Stage Two Open day design

Stage one prototype testing identified that users found the application to have a bad navigation system, making usability a key issue in relevance to the design of the application.

Therefore, refinement of the applications design occurred by implementing a new screen that provides for a better and more organised navigation system for the user. (Fig 19)

8.1.4 Prototype Stage Two testing

In total ten Participants took part in testing the second stage prototype (See Appendix 13.2), this testing again involved a Concurrent Probing method (See Section 8.1) followed by a SUS (system usability scale) testing approach. (See Appendix 13.3)

Results

<u>1) Task One: Please attempt to login to the Application.</u>
Mistakes: None
Additional Comments: None
Review: : Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented.

2) Task Two: Look up the Junction Accommodation and find its location**Mistakes:** pressed wrong option on dropdown menu**Additional Comments:** None**Review:** Since this mistake is not very large and only occurred to one individual it is arguably not a problem that needs to be reviewed and the feature is sufficient to the users demands and does not need to be implemented.**3) Task Three: Scan the University building for additional information.****Mistakes:** None**Additional Comments:** None**Review:** Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented.**4) Task Four: Change your password.****Mistakes:** None**Additional Comments:** None**Review:** Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented**5) Task Five: Please look at the latest University News.****Mistakes:** None**Additional Comments:** None**Review:** Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented**6) Task Six: Please find information about the English course and go to the website.****Mistakes:** None**Additional Comments:** "Is this needed?"**Review:** Comments suggest that this feature is not needed within this artefact therefore it could be more beneficial to not implement this feature and instead implement another.

7) Task Seven: Please logout of your account.
Mistakes: None
Additional Comments: None
Review: Since no mistakes or additional comments were present it could be argued the design of this feature is sufficient to the users demands and does not need to be implemented.

Concurrent Probing Summary

By completing this concurrent Probing method in the stage two prototype it has allowed for the ability to reduce the number of issues within the application to the point that when the user completes most of the required tasks no real errors occur, thus it now may be appropriate to begin the implementation process as long as the usability testing also shows a similar result.

System Usability Scale (Stage Two)

Overview

The system usability scale was conducted a second time within this project to show that the design refinements that occurred to this application provided for a better level of usability, therefore helping the project meet its overall aim. In regards to the system usability scale used it is the same as the previous test, therefore making the results fair, additionally the same participants took part in this testing.

System Usability Scale Results (Stage Two)

1	SUS Calculation											
2												
3	Participant	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
4	p1	4	2	4	2	4	1	5	3	4	2	77.5
5	p2	5	2	4	1	3	2	4	4	4	2	72.5
6	p3	5	1	5	2	4	2	4	3	4	2	80.0
7	p4	4	1	4	3	5	2	5	4	5	1	80.0
8	p5	3	2	5	2	4	1	5	4	3	2	72.5
9	p6	4	3	4	2	4	1	3	4	4	2	67.5
10	p7	5	2	4	3	5	2	3	3	4	2	72.5
11	p8	5	2	3	2	5	1	4	4	4	3	72.5
12	p9	4	2	3	1	4	3	4	5	5	1	70.0
13	p10	5	1	3	2	5	1	5	4	4	3	77.5
14												
15	Average SUS SCORE											74.3
16												
17												

Fig 20: Stage Two System Usability Scale Results

Results

The system usability test score for the stage two prototype was conducted by ten participants, the overall average score came out to 74.3 with the lowest score being 67.5 while the highest score being 80.0 (Fig 20).

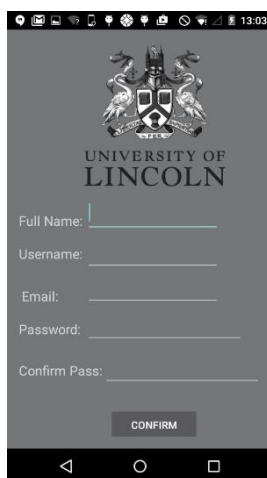
Reflection

As a reflection of this testing it can be argued that the refinement process from the stage one prototype testing allowed for a suitable design to be developed from which the SUS score is now at an appropriate level. “a SUS score above a 68 would be considered above average and anything below 68 is below average” (Usability Gov, 2015) Since the average score came out to 74.3 this is arguably a good amount above the average score which is a massive improvement from the first stage design being an average of 46 (Fig 15), which is a 28-point increase, this has arguably allowed for the application to better meet the users demands and better meet the overall project aim. Since the SUS score is now considerably above 68 it makes sense to begin the development phase of the project.

8.2 Implementation

This section outlines the development processes taken to implement the mobile application. The application will be developed to follow the design specifications achieved in the previous section to provide for a high quality application that also adheres to the usability principles.

Register Feature



```
// Strings to Database
String namestr = name.getText().toString();
String emailstr = email.getText().toString();
String unamestr = uname.getText().toString();
String pass1str = pass1.getText().toString();
String pass2str = pass2.getText().toString();
String colourset = "o";

// Contacts The Database with new user
Contact c = new Contact();
c.setName(namestr);
c.setEmail(emailstr);
c.setuname(unamestr);
c.setPass(pass1str);
c.setColour(colourset);
```

Fig 21: Implementation register screen and database

The register feature within the application functionality requires the user to input their personal information into input text fields and then confirming this information via a button. In relation to the development of this feature it firstly requires the development of a database to which the user information created via the register feature is stored (Fig 21), therefore when the user attempts to login to the application the data can be pulled from the database and grant access to the application.

```
1 SQLiteDatabase db;
2 private static final String TABLE_CREATE = "create table contacts (id integer primary key not null , " +
3     "pname text not null , pemail text not null , puname text not null, ppass text not null, pcolour text not null);";
4
5 public Database(Context context) {
6     super(context, DATABASE_NAME, null, DATABASE_VERSION);
```

Fig 22: Implementation SQLite Database Creation

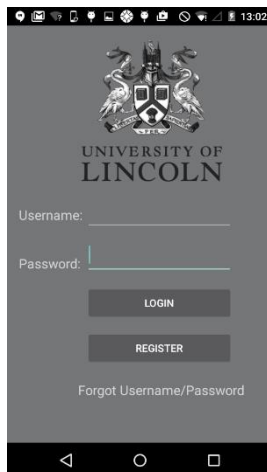
Therefore, in relevance to the development of this feature this involved firstly, developing a SQLite database (Fig 22), which stores the user data in a static table format. This involves creating a database inside a Java file that firstly creates the table and then assigns value names to each column within the table to allow for data to be stored appropriately. (Fig 23)

```
//Contacts Database
private static final int DATABASE_VERSION = 1;
private static final String DATABASE_NAME = "contacts.db";
private static final String TABLE_NAME = "contacts";
private static final String COLUMN_ID = "id";
private static final String COLUMN_NAME = "pname";
private static final String COLUMN_EMAIL = "pemail";
private static final String COLUMN_UNAME = "puname";
private static final String COLUMN_PASS = "ppass";
private static final String COLUMN_Colour = "pcolour";
```

Fig 23: Implementation SQLite Database users account

After the database has been created to store the data, a Java file is required with access to the database to create a new user id, this requires the input fields within the application to be read and parse data back to the database. This can be achieved by converting the input fields values into strings and assigning each input a value name and then contacting the database with the new user account. Thus, this will allow for the ability for the user data to be accessed later by the user.

Login screen



```
// Search Users Pass
public String searchPass(String uname)
{
    db = this.getReadableDatabase();
    String query = "select puname, ppass from "+TABLE_NAME;
    Cursor cursor = db.rawQuery(query, null);
    String a, b;
    b = "not found";
    if(cursor.moveToFirst())
    {
        do{
            a = cursor.getString(0);
            if(a.equals(uname))
            {
                b = cursor.getString(1);
                break;
            }
        } while(cursor.moveToNext());
    }
    return b;
}
@Override
```

```
if(pass.equals(password))
{
    Intent i = new Intent(LoginScreen.this, Mainmenu.class);
    i.putExtra("Username",str);
    startActivity(i);
}
else
{
    Toast temp = Toast.makeText(LoginScreen.this, "Your Username and password don't match!", Toast.LENGTH_SHORT);
    temp.show();
}
```

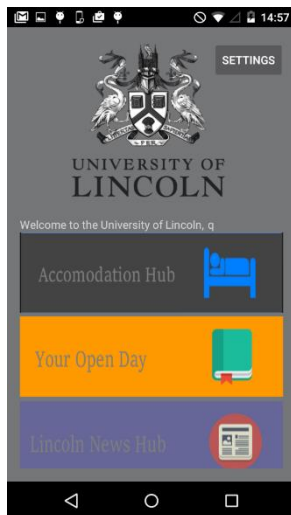
Fig 24: Implementation Login screen and login authentication

The login features functionality requires the user inputting both a username and password into a text fields and logging into the application via a button. In relevance to the development of this feature, for the user to login to the application this requires creating a Java file that has the ability to

call user data from the SQLite database, this can be achieved by creating a button validation, this simply calls the function searchpass “String password = helper.searchPass(str)” from the database.

In relevance to the database function “searchpass” this function involves searching the database for a username and password that match for a specific user (Fig 24). This can be achieved by using the strings inputted on the login screen and then using these string to search through the database tables iteratively until a username and password are found that both match. Once completed this will then return a value to the login screen. The value will then call upon an If statement which will either allow the user to access the main menu of the application via the use of creating a new intent and then starting the activity if the password and username match. While if these credentials do not match it will activate the else part of the if statement which will output a Toast message to the user, explaining they have either got their username or password incorrect.

Navigation menu



```

}
public void onClick(View v) {
    switch (v.getId()) {
        case R.id.settingbutton:
            Intent a = new Intent(Mainmenu.this, Settings.class);
            a.putExtra("Username", user_name);
            startActivity(a);
            break;
        case R.id.imageaccom:
            Intent b = new Intent(Mainmenu.this, AndroidSpinnerExampleActivity.class);
            b.putExtra("Username", user_name);
            startActivity(b);
            break;
        case R.id.imageday:
            Intent c = new Intent(Mainmenu.this, openday.class);
            c.putExtra("Username", user_name);
            startActivity(c);
            break;
        case R.id.imagenews:
            Intent d = new Intent(Mainmenu.this, TwitterFeedActivity.class);
            d.putExtra("Username", user_name);
            startActivity(d);
            break;
    }
}

```

Fig 25: Implementation Main menu screen

The functionality of this feature is for primarily for a navigation area for the user to have easy access to all features within the application. In relation to the development process of this feature, it firstly involves creating a Java file and a button function, inside this function a switch statement can be implemented, (Fig 25) each with a number of different cases which will be linked to individual buttons. Inside each case an intent can be created to which a new activity can be implemented to navigate the user to a new screen.

Settings Screen

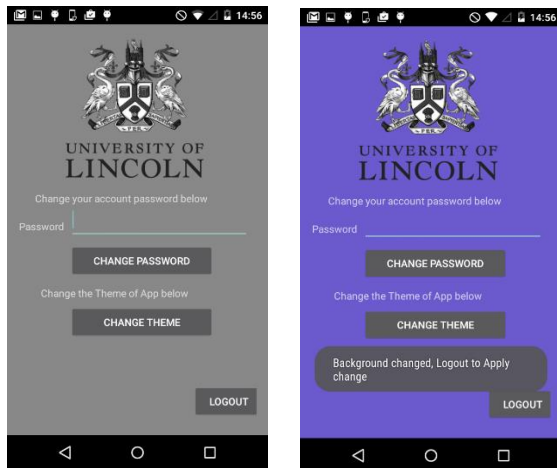


Fig 26: Implementation Settings screen

The functionality of the settings feature is to allow the user to change basic settings within the application, this involves two different main functions. Firstly, the change password function allows a user to input within a text field a new desired password and then change the password via the confirmation of a button (Fig 27). In relevance to the development of the change password feature it involves converting the inputted data from the user into a string value from this the application then searches for the username of the user through the use of an intent, this then relays to the database to find the specific user, once this function has been completed it will confirm this to the user via a toast output.

```
public void onClick(view v) {
    if (v.getId() == R.id.Changepass) {
        EditText passwordchange = (EditText) findViewById(R.id.inputnewpass); // Name
        String msg2 = String.valueOf(passwordchange.getText());
        final String username = getIntent().getStringExtra("Username");
        helper.editpassword(username, msg2);
        Toast pass = Toast.makeText(Settings.this, "Your Password has been Changed", Toast.LENGTH_SHORT);
        pass.show();
    }
}
```

Fig 27: Implementation Settings password change

The second feature within the settings screen is the background changer (Fig 28), the functionality of this feature involves the user simply pressing a button, from this the background should automatically change. In relevance to the development of this feature, it involves changing the background value of the applications properties to a specific colour "colour.rgb(106,90,205)" this can then be applied across the application by applying the colour value to the user's database "String colour = helper.getcolour(username);" meaning when the colour is changed this can be applied to all screens.

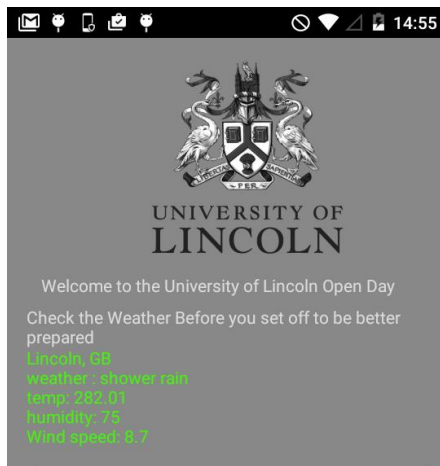
```

if (colour.equals("grey")) {
    AbsoluteLayout mealLayout1 = (AbsoluteLayout) findViewById(R.id.mealLayout);
    mealLayout1.setBackgroundColor(Color.GRAY);
    View b = findViewById(R.id.changeTheme);
    b.setVisibility(View.GONE);
}
if (colour.equals("blue")) {
    AbsoluteLayout mealLayout1 = (AbsoluteLayout) findViewById(R.id.mealLayout);
    mealLayout1.setBackgroundColor(Color.rgb(106,90,205));
    View b = findViewById(R.id.button1);
    b.setVisibility(View.GONE);
}

```

Fig 28: Implementation Settings colour change

Weather feature



The functionality of the weather feature is to display the latest weather information on the area of Lincoln to allow the user to better be prepared for an Open day. In relation to the development of this feature, this requires using the openweathermap api to read weather data and then display it, this can be achieved by firstly gaining an authentication id, this id can then be applied to a query from which Json data is then outputted.

The Json data can then be filtered into the objects you wish to display and then simply parsed into a string format to display. (Fig 29)

```

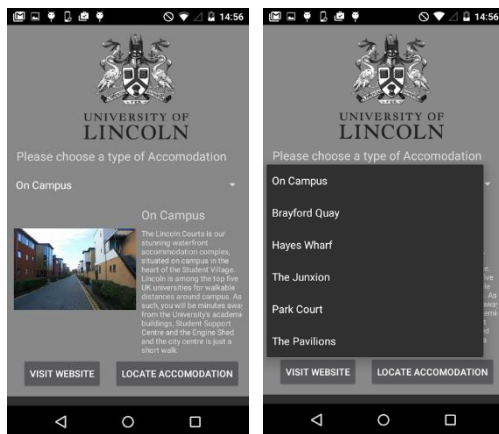
String dummyAppid = "43f731e0e6e3a844ac57868b9325b259";
String queryWeather = "http://api.openweathermap.org/data/2.5/weather?q=Lincoln,uk";
String queryDummyKey = "&appid=" + dummyAppid;

JSONObject main = jsonHelperGetJSONObject(JSONObject, "main");
if(main != null){
    jsonResult += "temp: " + jsonHelperGetString(main, "temp") + "\n";
    jsonResult += "humidity: " + jsonHelperGetString(main, "humidity") + "\n";
}
JSONObject wind = jsonHelperGetJSONObject(JSONObject, "wind");
if(wind != null){
    jsonResult += "Wind speed: " + jsonHelperGetString(wind, "speed") + "\n";
}

```

Fig 29: Implementation Weather API

Accommodation feature



```
// Spinner Drop down elements
List<String> categories = new ArrayList<String>();
categories.add("On Campus");
categories.add("Brayford Quay");
categories.add("Hayes Wharf");
categories.add("The Junxion");
categories.add("Park Court");
categories.add("The Pavilions");
```

Fig 30: Implementation Accommodation screen

The Accommodations features functionality involves a drop down menu feature that gives the user the ability to select specific accommodations and then display information about the chosen accommodation. In relation to the development of this feature it involves firstly creating a spinner, the spinner comprises of a list of categories in an array based structure (Fig 30)

Each category within the list is dependent upon an if statement, if the spinner item equals that of the array then the specific item is displayed, comprising of the display of an image, text and specific buttons. (Fig 31)

```
if (item.equals("On Campus")) {
    Toast.makeText(parent.getContext(), "Selected: " + item, Toast.LENGTH_LONG).show();
    TextView tv = (TextView) findViewById(R.id.accomname);
    tv.setText(item);
    ImageView imageView2 = (ImageView) findViewById(R.id.accomimage);
    imageView2.setImageResource(R.drawable.courtspic);
    TextView tv1 = (TextView) findViewById(R.id.accomdesc);
    tv1.setText("The Lincoln Courts is our stunning waterfront accommodation complex, situated on campus");
    Button b1 = (Button) findViewById(R.id.button2);
    b1.setClickable(true);
}
```

Fig 31: Implementation Drop down menu

Map Feature

```
<string name="google_maps_key" templateMergeStrategy="preserve" translatable="false">
    AIzaSyBbqT2ZUNk9a-uvO1nmSVThalat5sq9dQ0
</string>
</resources>
```

Fig 32: Implementation Map screen and Google API

The map feature functionality involves the user being able to view the location of specific accommodations within Lincoln. In relation to the development of the feature it involves the use of the Google maps rest api, firstly this involves using a built-in feature within Android studio to create a basic template of the Java application for this feature.

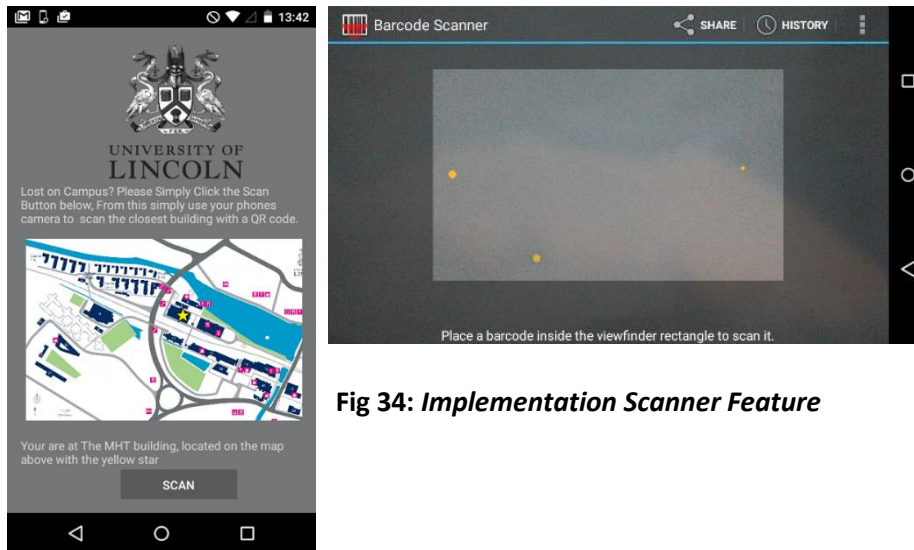
Next a google maps key can be inputted within the manifest xml file to allow authentication access to read the data from the google maps api. (Fig 32)

Lastly the location of the accommodation is then required, this can be achieved by using the latitude and longitude. "(53.230707, -0.555671)" In relation to this feature the location depends upon the accommodation chosen, therefore an if statement contains the specific location settings, from this a marker is then created upon this position and lastly a camera function can be used to focus on the specific position with a specific zoom scale. (Fig 33)

```
if (TextView.getText().toString().equals("On Campus"))
{
    LatLng Junx = new LatLng(53.230707, -0.555671);
    mMap.addMarker(new MarkerOptions().position(Junx).title("On Campus Accomodation"));
    googleMap.getUiSettings().setZoomControlsEnabled(true);

    CameraPosition cameraPosition = new CameraPosition.Builder().target(Junx).zoom(15).build();
    googleMap.animateCamera(CameraUpdateFactory.newCameraPosition(cameraPosition));
}
```

Fig 33: Implementation Map Positioning

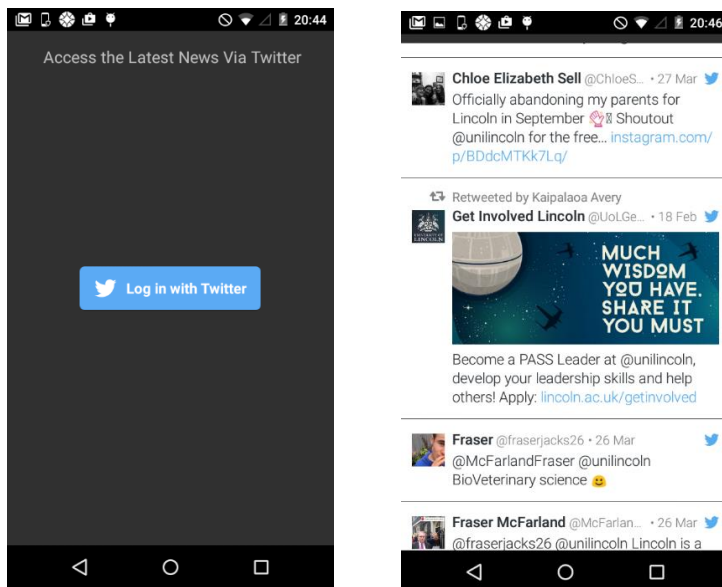
Scanner feature**Fig 34: Implementation Scanner Feature**

The scanner feature functionality involves the user being able to scan a barcode with their smart phone camera to display their location around the university campus. (Fig 34)

In relevance to the development of this feature, it firstly involves creating a Java class that can call data gathered from the Barcode scanner, this data then needs to be displayed, this can be achieved by converting the data into a string format and then set as a textview (Fig 35). Furthermore, this feature also requires that QR codes need to be created for this specific feature (See Appendix 13.8), therefore these needed to be generated by using online engines, furthermore an if statement was then required to read the barcode scanner result to then display the correct location of the user.

```
public void onActivityResult(int requestCode, int resultCode, Intent intent) {
    IntentResult scanningResult = IntentIntegrator.parseActivityResult(requestCode, resultCode, intent);
    if (scanningResult != null) {
        String scanContent = scanningResult.getContents();
        String scanFormat = scanningResult.getFormatName();
        formatTxt.setText(" " + scanFormat);
        contentTxt.setText(" " + scanContent);
    }
    else{
        Toast toast = Toast.makeText(getApplicationContext(),
            "No scan data received!", Toast.LENGTH_SHORT);
        toast.show();
    }
}
```

Fig 35: Scanner Api Implementation

News feature**Fig 36: Implementation News Display Screen**

The news feature involved using the Twitter REST API, which allows the ability to read and write Twitter data. The functionality of this feature requires the user to access the Lincoln University Twitter feeds (Fig 36), this requires the user to firstly log into the Twitter REST API therefore allowing the user to see the latest Tweets in a list format. To do this Twitter requires application user authentication (OAuth) this involved using both a consumer key and secret key to retrieve the user a token to which allows access to read and write twitter data (Fig 37).

```
// Note: Your consumer key and secret should be obfuscated in your source code before shipping.
private static final String TWITTER_KEY = "OmmSUSTE3qumBXXca64Rc1sS5";
private static final String TWITTER_SECRET = "neFpxqsp4HcRmktRVuZxF1t3YJq1bW08aIdAt3e8w9nkljiLId";
```

Fig 37: Implementation Twitter OAuth

Once the authentication has been completed the data the Twitter Api returns data in the form of a JSON format, this data can then be parsed into a list format to which allows for an effective way for the user to read the Twitter data, lastly a search type can then be created which allows for the ability to filter specific Tweets into the list and a search count can also be produced to limit the amount of Tweets within the list.

8.3 Testing

Within this section, the developer and three other participants will test the application. The testing of this application will firstly involve white box testing through the process of validation and verification of the main features within the application. Secondly, the three participants will complete system usability scale testing of the application. In relevance to black box testing, this type of testing was completed during the process of implementation, meaning as soon as a feature was developed it was immediately tested for any issues. The aim of testing this application is to eliminate any errors or faults present within the application to allow for an application of high quality and that meets usability requirements.

Developer Testing Plan

See Appendix 13.4

1. The first error that appeared was within the register feature, the user had the ability to register with required text fields still blank, meaning that this could cause large issues within the database. A solution was implemented in the form of an error handle feature that requires the user to input details into all fields before the user can successfully register, otherwise this will result in an error, prompting the user to input all values before continuing.
2. Another error that was present within this application was the background change feature on the settings screen, this caused the main menu to be a different colour than other pages. A solution was implemented in the form of simply changing the colour values to allow the main menu to be the correct colour.
3. Another error present within the application was within the password change feature, the user had the ability to change their password to be empty, resulting in the user having no password. A solution was implemented in the form of an error handle that requires the user to fill in the text field before pressing the button to change their password.
4. When the internet is not connected to the application the weather feature fails to appear, leaving a large area of unfilled space, making the application look very unprofessional. A solution was implemented by creating an else statement to prompt the user to connect their phone to the internet to allow for the display of the weather feature.

Participant 1 Test Plan

See Appendix 13.5

1. Text on the accommodation page is very small and hard to read. This text was coded to be small so all the text could appear on the screen, a solution was implemented by slightly increasing the size of the text to allow for better readability.
2. On changing the colour of the background the main menu sometimes returns to the original colour while other screens apply the new background. This was due to the code having an issue with creating a new activity, this was not done for the main menu. A solution was implemented in the form of creating a new intent for the screen meaning the colour would be implemented correctly.
3. Another issue present within this application was when the screen goes horizontal all features within the application are either stretched or in the wrong position, this was a design issue. A solution was implemented by only allowing the application to run in a vertical position.

Participant 2 Test Plan

See Appendix 13.6

1. On opening the accommodation screen a user prompt telling the user they have selected the on campus accommodation automatically appears, this was due to the drop down menu having no value for an item not selected. In relation to a solution that was implemented the drop down menu now has no user prompt which is less likely to confuse the user.
2. On the main menu when the user's username appears, this is sometimes too long and causes some of the username to not fit on the screen, this was due to the design of the code being too close to the side of the screen. In relation to a solution that was implemented the text field that outputs the username was moved closer to the centre of the screen meaning longer usernames fit on the screen.
3. Attempting to use the Twitter feature without an internet connection prompts the user telling them they have invalid tokens, this could be argued as confusing to the user. A solution was implemented to instead prompt the user to check their connection.

Participant 3 Test Plan

See Appendix 13.7

Participant three carried out all tasks without finding any errors or faults.

Usability Testing (implementation)

	A	B	C	D	E	F	G	H	I	J	K	L
1	SUS Calculation											
2												
3	Participant	q1	q2	q3	q4	q5	q6	q7	q8	q9	q10	SUS Score
4	p1	5	2	4	1	5	1	4	5	4	1	80.0
5	p2	4	1	5	1	4	1	5	4	4	1	85.0
6	p3	5	2	4	1	5	2	5	3	5	1	87.5
7												
8												

Fig 38: Usability Testing Implementation

Result

The results from the system usability testing showed a range of SUS Scores from 80.00 to 87.50, this is arguably a near perfect score for this test, therefore showing that the implementation process of this artefact is arguably completed to a high quality and high level of usability level that meets the aim of the project thus concluding the implementation process.

9.0 Conclusion

This section will evaluate the developed application and if it has achieved its aim. The main elements of the projects aim involved designing and implementing a mobile application that adheres to the components of usability and that provides for a new effective method of communication of information to prospective students. There are a number of points that can be discussed to whether this application achieved its aim.

Firstly, both suitable and extensive research was conducted into the mobile market and target users. This research allowed for a better understanding of the market and its user requirements, thus this meant research could be better applied to both the design and development processes of the application which allowed for the ability to more closely adhere to the concept of usability by better meeting the user's specific requirements.

Secondly, research was conducted into usability which allowed for the ability to more finely tune the applications design. This research allowed for a better understanding of both the concept of usability but also how to apply usability to the application, allowing for the implementation of an initial prototype design that would better adhere to the concept of usability thus more closely meeting the aim of the project.

Additionally, usability testing was conducted on the prototype design of the application which allowed for the ability to more finely tune the design of the application to better meet the components of usability. This testing allowed for the ability to identify any usability issues within the design and then implement the appropriate refinements to the design to better meet the concept

usability, this was completed a number of times on a number of different prototypes until the level of usability was at an acceptable level to begin development. Thus this testing allowed for a higher quality end application that better meets usability requirements and again more closely meets the aim of the project.

Implementation of the application was completed with the use of both research and knowledge gained from the design stage of the project. Previous processes within this project allowed for a clear method to effectively develop an application that adhered to the concept of usability and also develop an application of high quality. Thus allowing the ability to meet the aim of developing an application that adheres to the concept of usability.

Furthermore, white box and black box testing the application was a main objective to achieving the aim of this project. Testing the application allowed for a method to reduce any errors or issues within the application thus improving its overall quality and also meeting user requirements more closely since error handling is a main component of usability (See Section 6.6) Thus meaning testing the application helped better achieve the aim of the project.

Lastly usability testing was also conducted on the final iteration of the application, allowing for the maximum usability quality of the application to be achieved, in relation to this helping meet the aim of the application, usability results showed that scores ranged from 80.0 to 87.5 a huge increase from the initial usability test where scores ranged from 35.0 to 55.0 (See section 8.1.1) thus allowing for a better level of usability to be achieved and more closely meet the aim of the project.

As an overall conclusion it can be concluded that these points prove that this application has achieved its objectives and thus the aim of the project.

10.0 Critical Reflection

This section will look at the processes completed within the project and what could have gone differently if a project similar to this were to be repeated, therefore this section will look at both the positives and negatives and then argue what more could have been completed to address these problems.

Introduction

Looking back, I believe the introduction does its purpose in that I believe an individual could read the introduction alone and understand the direction and what this project is looking to achieve. On the opposing end of the argument when it came to backing up my points in the introduction I found it extremely hard to find both relevant and recent data using the Lincoln university Library or Google scholar website to back up my points, this meant that I spent a longer time than expected

attempting to write an introduction which meant that I had less time on other arguably more important processes. Therefore, if I were to repeat this process I would look to find a different site to source my information from if possible that may provide for more relevant and recent data.

Aim & Objectives

Reflecting on the aim and objectives of the project I believe the aim of the project was clear and effectively identifies the purpose of the project, meanwhile I also believe the objectives are specific and provide a clear outline of what needs to be achieved to achieve the specific objective.

The process of writing the aim was very easy and took little time, additionally writing the objectives was very similar to this, I personally found it relatively easy to break down the aim into a number of objectives that I believe were clear to follow within later processes. Furthermore, I believe over the process of the whole projects lifecycle all objectives were achieved making this process a success. One thing that I did find as an issue was I found it hard to know whether these objectives were all realistic due to setting these objectives before any main process had started, this was mainly an experience issue and should not be an issue if I were to repeat a project in the future.

Literature review

As a reflection of the literature review of this project I believe I have a comprehensive literature review that provides a clear background and foundation to this project. I personally believe a number of things went well in this literature review, I managed to find all the content I required using the Lincoln University library and Google scholar and managed to effectively contextualise my work with respect to existing published literature. Although a number of things went well there were still improvements that could be made, one improvement being, I found this process very time consuming to find both relevant and recent academic literature meaning time again had to be taken from other processes within this project, ultimately I handled this problem by allocating more time to complete the project, if I were to repeat a similar project I would look to find an another or possibly different location to source my academic literature.

Design

In terms of a reflection on the design process of this project I believe on an overall basis I developed a high quality design that closely adhered to the components of usability and was effectively usability tested. As a reflection of this process I believe a number of things went well but also a number of things could be improved on in the future. In relation to what went well, I was able to develop a high quality design prototype in a shorter time period than expected which meant I could allocate this time elsewhere. Furthermore, testing of the prototypes proved effective, as this

allowed for both the identification of any issues within the design but also allowed for the ability to better meet usability requirements. Meanwhile there were a few aspects that did not go as well as planned, one of these being the software used did not provide for a clear functionality for some of the features that I planned to develop. Thus making it less effective to test that if it functioned correctly, this meant that I had to come up with alternative methods of showing these features functionality usually by simply the use of images. If I were to design an application again I would probably look for an alternative software to design the application and also conduct more research into the tools so that I know I am using an appropriate software.

Implementation

Reflecting on the implementation stage of this project I believe I effectively completed this process, although I do believe there were a number of things that could have been done differently for an even more effective implementation process. On an overall basis implementation went really well, I found that I chose an appropriate tool to implement the application upon which provided for a more effective implementation process than first thought, furthermore all features were successfully implemented and the design and research was also effectively applied to the whole process. Meanwhile a few things could be improved on in the future, one issue I found about this process was some features such as the Twitter api were more complex than first expected thus requiring more time to implement, therefore I had to allocate more time to this process than first thought. If I were to repeat this process, I would likely do additional research into the features I plan to implement to gain a better understanding of the time requirements for this process to provide for a better project plan.

Testing

As a reflection of the testing stage of this project I believe on an overall basis that I conducted effective testing of the application, although I would argue there is room for improvement. In relation to what went well within this process, firstly testing allowed for the identification of a number of issues via the use of participants, this allowed for the ability to refine the application thus improving its overall quality and usability and therefore better meeting the projects overall aim. Furthermore, the errors identified were mainly small and were easily fixed without much hassle. Meanwhile there still was arguably room for improvement, one aspect that didn't go as well as planned was the amount of participants that completed testing for the fully functional application, arguably I could have done with more than three participants but due to time restrictions within the project this restricted me from additional participants taking part in the testing, which could mean

testing results may not be as effective as possible, meaning if I were to repeat this process in the future I would probably look to better manage my time throughout the project.

Summary

As an overall reflection of the entire project I believe the project was a success, the aim and objectives outlined at the beginning of the project were all achieved, I also believe I would repeat a number of these processes similar to how I completed them within this project although I would still make the odd refinements to better improve the project as a whole.

11.0 Future Works

In relevance to looking at future developments of this project, one area that could be beneficial would be the integration of the application on a different platform such as Apple iOS. Thus this would allow for more users of the target market to have access to the application and therefore better meet more user's requirements. Furthermore, this application could also look into integration with tablet devices as again this would allow for more users to use the application and overall better meet usability requirements of the user.

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13.0 Appendices

13.1 Research Questionnaire

Questionnaire

Question One: If you own a Smart phone device, what platform device do you own or would prefer to own if you had a choice?

Devices	Tick Box
Android	
iOS platform	
Blackberry	
Windows	
Other	

Question Two: Would you use a smart phone to research information on an Open day?
Yes/No, if No why?

Question Three: Would you prefer to access information on an Open day through a mobile application or a mobile website? Please justify your reasoning

Mobile Application / Mobile website

Question Four: What features would you expect to find on a mobile app or mobile website designed for a University Open Day? Please Tick where applicable

Features	Tick Box
Login/Register	
University News	
Weather on Open day	
Building Finder	
Accommodation finder	
Course information	
Chat forum	
City Activities	
Contact details	
Directions and parking	
Refreshments	

Question Five: Would you class 'usability' as an important aspect to accessing information via a mobile application/ mobile website? Yes/No, please justify your reasoning

13.2 Concurrent testing

Lincoln University Mobile Application
Usability Testing Prototypes.

Task Scenarios

- 1) Task One: Please attempt to login to the Application.
- 2) Task Two: Look up the Junction Accommodation and find its location
- 3) Task Three: Scan the University building for additional information.
- 4) Task Four: Change your password.
- 5) Task Five: Please look at the latest University News.
- 6) Task Seven: Please logout of your account.

Task Analysis

Task One

Mistakes Made:

Additional Comments:

Time taken to complete:

Task Two

Mistakes Made:

Additional Comments:

Time taken to complete:

Task Three

Mistakes Made:

Additional Comments:

Time taken to complete:

Task Four

Mistakes Made:

Additional Comments:

Time taken to complete:

Task Five

Mistakes Made:

Additional Comments:

Time taken to complete:

Task Six

Mistakes Made:

Additional Comments:

Time taken to complete:

13.3 System Usability scale (SUS)

	Strongly disagree					Strongly agree
1. I think that I would like to use this system frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
2. I found the system unnecessarily complex	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
3. I thought the system was easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
4. I think that I would need the support of a technical person to be able to use this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
5. I found the various functions in this system were well integrated	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
6. I thought there was too much inconsistency in this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
7. I would imagine that most people would learn to use this system very quickly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
8. I found the system very cumbersome to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
9. I felt very confident using the system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	
10. I needed to learn a lot of things before I could get going with this system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1	2	3	4	5	

13.4 Testing Document (Developer)

Testing Document

Name: Developer

Please complete each test and document the test plan, outcome and if any errors arose.

Test Description	Test Data	Test Outcome	Errors or issues?
Register and Sign in to Application	Input personal details into textboxes & then logging via button	register Confirmed & auto navigates to login, allows access	allows to register with missing detail
Navigate to Accommodation screen	Clicking on button on main menu	Navigated to accommodation screen	no errors
Select an Accommodation and find its map location	Clicking dropdown menu & then button for location	information & location about accommodation is shown	No errors
Navigate to the settings screen	Click on button on main menu	Navigated to settings screen	no errors
Change your accounts password	Input into text field & Press button	Password Changed Successfully	Password field can be changed when empty
Change the background colour of the application	Pressing the change background button	background colour changes	main menu colour differed to other screens
Navigate to the Open day screen to view the weather	Click Open day button from main menu	Navigated to Open day screen, weather missing	Internet issue leaves empty space, no display
Navigate to the Building finder screen and scan a QR code	Use 'Library QR code' use camera to scan code	Information on library is shown	no errors
Navigate to the News screen to view latest tweets about the University of Lincoln	Clicking on news button on main menu	Navigated to news screen, tweets shown on Univ of Lincoln	Internet connection no errors
Navigate to the Settings screen to logout	Clicking on button to logout	navigated to settings then account is logged out back to login screen	no errors

13.5 Testing Document (Participant One)

Testing Document

Name Participant One

Please complete each test and document the test plan, outcome and if any errors arose.

Test Description	Test Data	Test Outcome	Errors or issues?
Register and Sign in to Application	Personal details button to confirm	Successful register taken to main menu screen	No errors found.
Navigate to Accommodation screen	Press main menu button.	Successfully taken to main menu accommodation screen.	No errors found.
Select an Accommodation and find its map location	Use drop down + button.	Information shown on app + map location but hard to read.	Information very small and hard to read.
Navigate to the settings screen	Press main menu button.	Successfully taken to settings screen.	No errors found.
Change your accounts password	Input password + press button.	Password change confirmed.	No errors found.
Change the background colour of the application	Press background button on settings page.	Background successfully changed but background old colour.	Main menu wrong colour.
Navigate to the Open day screen to view the weather	Press main menu button.	Successfully taken to open day screen + shows weather	No errors found.
Navigate to the Building finder screen and scan a QR code	Use 'Library QR code' Use camera.	QR code successfully scanned + info on library shown.	No errors found.
Navigate to the News screen to view latest tweets about the University of Lincoln	press main menu button + input twitter login.	Shows tweets but when horizontal cannot read.	Screen horizontal hard to read
Navigate to the Settings screen to logout	Press main menu button + button on settings screen.	Successfully logged out.	No errors found.

13.6 Testing Document (Participant Two)

Testing Document

Name: Participant Two

Please complete each test and document the test plan, outcome and if any errors arose.

Test Description	Test Data	Test Outcome	Errors or issues?
Register and Sign in to Application	Input personal Details to both Screens. Press button to Confirm	registration confirmed and login access main menu also navigation	No errors Present
Navigate to Accommodation screen	Press Button on the main menu	Successfully nave to accommodation screen	no errors Present
Select an Accommodation and find its map location	Use Drop down list and button to get location	Information on accommodation and map details shown	auto selects 'Courts' on the screen opening
Navigate to the settings screen	Press Button on the main menu	Successfully nave to Setting screen	no errors Present
Change your accounts password	Input text into a textfield and Confirm by using button	Password Change Confirmed	Username too long and disappears on main menu screen
Change the background colour of the application	Press Button on the Settings screen	Colour of background changed Purple	No errors Present
Navigate to the Open day screen to view the weather	Press Button on main menu to open	Successfully navigated and weather displayed	no errors Present
Navigate to the Building finder screen and scan a QR code	Use 'Library QR code' Use Camera to Scan Code	Information about library shown	No errors Present
Navigate to the News screen to view latest tweets about the University of Lincoln	Press button on main menu input twitter details	Failed to access at first, then managed to show tweets	Without internet Connection, error messages appear
Navigate to the Settings screen to logout	Press button on both main menu and setting screen	returned to login screen	No errors Present

13.7 Testing Document (Participant Three)

Testing Document

Name Participant three

Please complete each test and document the test plan, outcome and if any errors arose.

Test Description	Test Data	Test Outcome	Errors or issues?
Register and Sign in to Application	Insert personal info, press button to confirm	Registration and Login confirmed	No Errors Found
Navigate to Accommodation screen	press button on main menu	Taken to accommodation screen	No Errors Found
Select an Accommodation and find its map location	Use drop down menu and press button for location	Accommodation info and map location found	No Errors Found
Navigate to the settings screen	Press button on main menu	Taken to settings screen	No Errors Found
Change your accounts password	Insert password and press button	Password confirmed changed	No Errors Found
Change the background colour of the application	Press button on settings screen	Background changed to purple	No Errors Found
Navigate to the Open day screen to view the weather	Press button on main menu	Taken to open day screen, weather shown	No Errors Found
Navigate to the Building finder screen and scan a QR code	Use 'Library QR code' Use Camera and scan code	QR code scanned information shown	No Errors Found
Navigate to the News screen to view latest tweets about the University of Lincoln	Press button on main menu and insert twitter info	Taken to new screen, tweets shown	No Errors Found
Navigate to the Settings screen to logout	Press button on main menu and settings screen	Taken to login screen	No Errors Found

13.8 QR Code (MHT)

