Coursework 2

Word Count: 3058

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40504081

Design Dialogues

IMD11112

Abstract

The Lions' Gate Garden at Merchiston is undergoing redevelopment which has created the opportunity to design a novel interactive experience. By analysing users and evaluating ideas a physical user-centred system is designed using Near Field Communication (NFC) technology. The application of NFC will allow for communication and information throughout the garden while applying blending theories to integrate the system into the garden. Created using human-centred design techniques the report will discuss understanding, envisionment, testing and evaluation methods in regards to user experience and provide results of each section. In conclusion, a sustainable and ethical system will be described which blends an appreciation of nature and NFC in a manner suitable for its users.

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1. Introduction

The Lions' Gate Garden is an urban permaculture project being developed to create interactive experiences to encourage users to utilise a space. This assignment will design and evaluate physical user-centred ideas to make use of current technology to get the best out of the space while continuing to blend in the permaculture principles already utilised throughout the garden. Currently, the team working at Lions Gate are "using digital technology to explore interaction design's capacity to create meaningful tangible experiences that become influential in how you perceive ecology" (Egan, Thompson, & O'Dowd, 2019, pp.7). The created system will aim to continue to improve on the goals of the existing team.

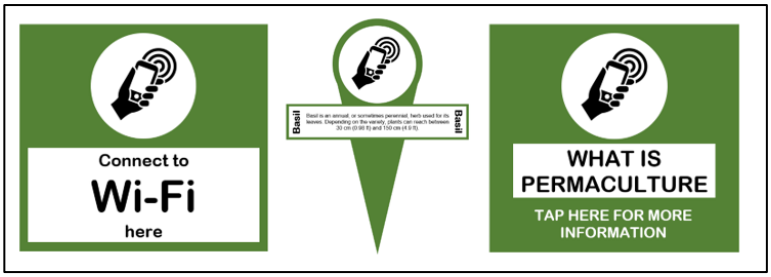


Fig.1 Initial Design Ideas

The technology used within this report is Near Field Communication (NFC) tags. An initial design (Fig.1) was created to help show how the system might look. By making use of devices that most people already have, the NFC tags will allow the users to interact with the Lion's Gate Garden in a way which has not been possible before. The results from a small trust test (App. A) survey completed show most people will have a smartphone (100% of people surveyed) which would allow them to be able to use the NFC technology. Further to this, 80% of the people surveyed would be happy to complete interactions through their phones. It is believed that with the correct design and implementation that more people would be happy to interact with the garden. The application of the NFC tags will allow various types of activities which can include gaining information and communication. NFC tags will allow these interactions to be done quickly and simply which will encourage the user to visit and interact with the garden. Utilising NFC tags are also suitable for the current pandemic. Using smartphones to scan the tags does not require any contact. As no one knows how long this will last it must be considered within the design.

The main motivation behind this project is to create a user-centred interactive space by designing a futuristic garden utilising today's technology. By using NFC technology this can be done simply. Once the setup is complete the tags will not require much maintenance. It is hoped that more users would be encouraged to venture into the garden and learn about the importance of nature and permaculture.

Throughout this design, a robust and scalable system will be created. The end goal of the report is to offer a suitable and sustainable system utilising new technologies created with the users in mind. By conducting various UX methods of creating user research the system will be tested and evaluated at every stage possible. By researching and analysing potential users as well as allowing peer to peer evaluation (App. C) of the design the final system proposed will be ready for implementation within the garden. Further research and advice would be required in terms of funding and setting up the project if the initial idea is approved.

2. Design approach

The creation of the system will be based on human-centred design techniques. Benyon (2005) explains "systems will be more effective if they are designed from a human-centred perspective and people will be more productive" (Benyon, 2005, pp. 24) Before deciding on any aspects of the system first it is important to learn who will use the garden. The system creation will review how to blend the technology into the existing garden and review design patterns to allow consistency and ease of use.

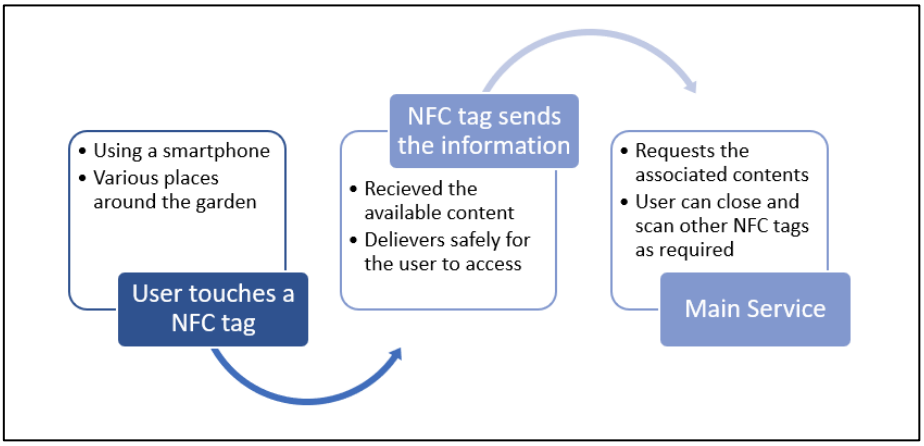


Fig.2 Conceptual Model

A conceptual model (Fig.2) shows an overview of how the user will interact with the system. To confirm if the conceptual model was suitable and made sense, peer-to-peer feedback was requested. “This gives me a clear idea of how the whole system works” (J.Hagan, personal communication, November 29, 2020). Further peer-to-peer feedback can be seen at the end of this report (App. C). The main purpose of the conceptual model is to help get the process of the system clear. Johnson & Henderson) (2002) conclude that “good user interfaces start with clean, simple, task-oriented conceptual models. The conceptual model is the bones of the design” (Johnson & Henderson, 2002, pp.32). The conceptual module also highlights potential security issues that may be of concern to the users. Using user-centred design techniques it is also important that the technology being added to the garden does not look out of place or affect the aesthetics of the garden. This is known as blending. “Blended spaces are places where virtual and physical worlds are intentionally melded in a manner that produces experiences of a particular quality” (Egan, Thompson, & O'Dowd, 2019, pp.2). When creating the design, the garden will be taken into consideration to allow for a clean integration into nature. The system aims to create a futuristic garden, this does not mean it should look like one. Mood boards (App. B) created will be analysed later in the Envisionment section. Before going any further with the design of the system the report will detail and create an understanding of the potential users of the system.

3. Understanding

To understand the requirements of the system first we must understand the needs of its users. There are many ways in which this can be done. Hassenzahl & Tractinsky (2006) explain “UX is a consequence of a user’s internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs” (Hassenzahl & Tractinsky, 2006, pp.95). To understand the user requirements for this system, the report will use a PACT analysis (Fig.3), a scenario-based on a typical day out at the garden and personas of typical users. In an ideal, non-COVID-19 world, card sorting, and focus groups would have been suitable – it is believed doing this remotely works but may

not be as effective. First, the report will detail the PACT analysis followed by the personas and finally a scenario which will combine the first two to create a clearer image of how a user could interact with the system.

3.1 PACT

A PACT analysis (Fig.3) is completed before designing the interactive system for the Lions Gate Garden. A PACT analysis will help understand the current situation and possible improvements on the original idea based on potential user needs.

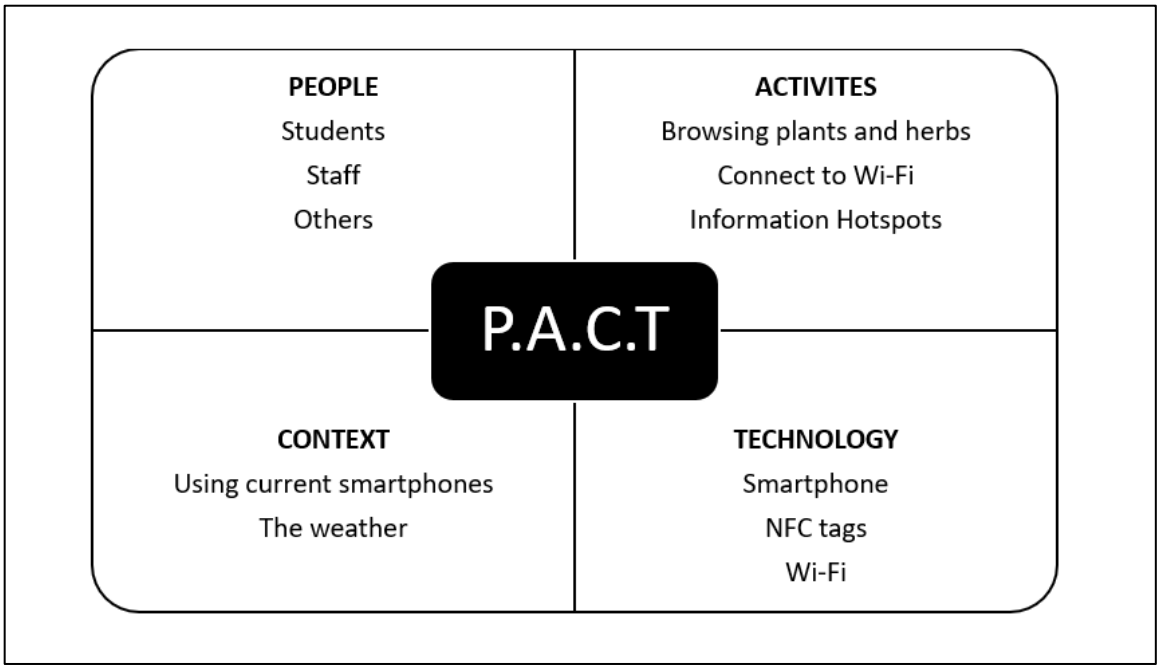


Fig.3 PACT Analysis

Each section of the PACT analysis must be critically evaluated to determine how each section will impact the design.

3.1.1 People

It is important to consider the main requirements regarding the users. To be as inclusive as possible the technologies implemented will be designed for beginners, any level of computer literacy will be able to interact with the system. Diagrams and illustrations will be created to help show interactions within the garden to save confusion and be suitable to use for most levels of cognitive

abilities. For physical abilities, all signs and interactive components within the garden will be accessible to as many users as possible. Components will be at a suitable level for wheelchair users as well as being in contrasting colours for anyone suffering from colour-blindness. Any important text should be large enough to be seen for anyone with other sight-related difficulties.

3.1.2 Activities

The main daily activity throughout the garden will be browsing the plants and herbs that are grown and learning about permaculture. Regarding system response times, this will, unfortunately, be more to do with the user's smartphone than the tags. NFC tags to automatically connect to the Wi-Fi within Napier will be at each entrance and spotted around suitable areas. The Garden will have designed Hot Spots to supply information to users as they navigate the space as well as smaller tags for information regarding which plant, herb or area they are looking at. Initially, the NFC tags will be set to relevant websites with information, in future, the Lions Gate website will be fully updated and maintained to store the information. However, for the initial product directing to existing sources will help save many resources in setting up.

3.1.3 Context

Activities always have a context in which they are done. This context can be designed for users or certain contexts will be controlled. Using their current smartphone, the users should have a reasonably clear understanding at least on a basic level of operation. As interacting with the NFCs tags will be within the garden there are a few contexts which will need to be considered. The main factor is the weather. The tags will need to be waterproof and protected by natures other elements. Due to Covid19, many users will be uncomfortable while in public. Using NFC tags will allow users to learn without needing to touch items in public places. This will help create a safe space for users.

3.1.4 Technologies

The main technology utilised is a smartphone. NFC tags are readable by the majority of Android and iOS smartphones. To make sure the garden is as inclusive as possible and offer some level of interaction to a user with no phone access the signs will have basic information where possible. Wi-Fi will be supplied as normal via Napier. NFC welcome signs will direct the user to log in pages.

3.2 Personas

Personas (Fig.4) help define types of user who will interact with a system. The following personas are stereotypical users who may interact with the garden. Creating personas allow the system to be considered from the viewpoint of a user as opposed to the biased opinion of the designer. Coorevits et al. (2016) explain the benefits of creating fictional personas, “envisioning real users in the form of a persona rather than abstract groups of people makes it easier for developers to focus on the user” (Coorevits et al., 2016, pp.98).

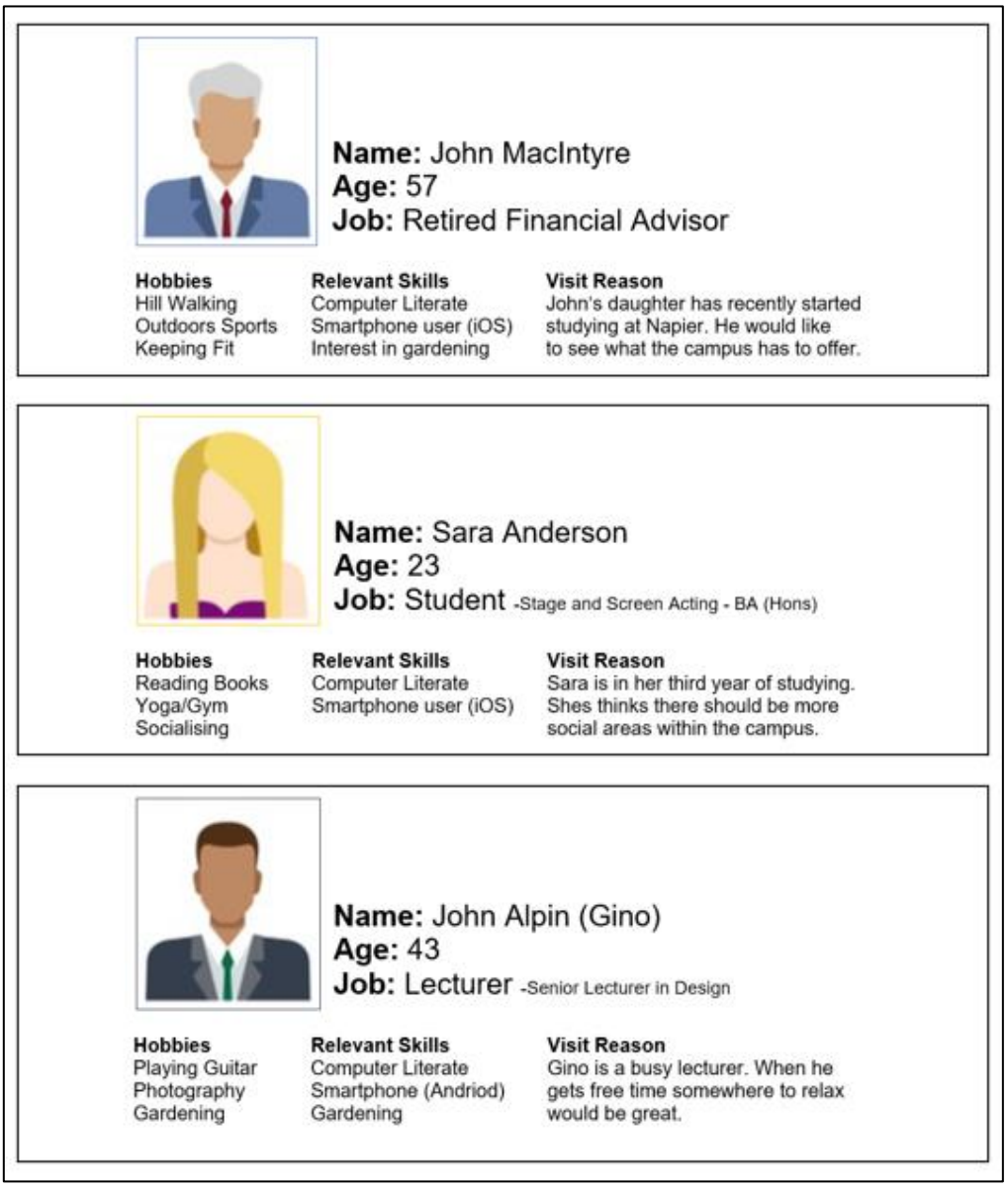


Fig.4 Conceptual Scenario Storyboard

3.3 Scenario

Scenarios are created to review how a system will be used. Based on the PACT analysis and personas, a conceptual scenario storyboard (Fig.5) shows how a group of friends would interact with the garden.

Fig.5 Conceptual Scenario Storyboard

The users with the garden would be able to learn either alone or within a group about the plants growing in the garden as well as about permaculture. To allow for access to the technology via their smartphones they will have access to Wi-Fi provided by Napier. Sharing to social media websites about the garden is controlled via either the operating system on the phone or the sites that the user will be directed too.

4. Envisionment

Envisionment is an essential part of the design process to help see the system. Benyon (2019) explains that ‘envisionment is fundamental to effective human-centred design, to enable designers to see things from other people’s perspectives’ (Benyon, 2019, pp.5). The initial design concept (Fig.1) helped show a basic design idea and makes the designer consider shapes, sizes, and colours. To remove the bias of a design there are tools available to help shape a design for the user's needs and to create a blended space. Mood boards (Fig.6) were created to help think about the colours and the feel of the system. Creating a blended space is important to the team at the Lions Gate. Designing a system using similar colours to the garden will allow for the signs to be noticeable but not distracting. The mood boards can be seen in more detail at the end of the report (App. B).

Fig.6 Mood Boards

Mood boards are a fantastic tool for imagining how a system will look and helps generate ideas. When creating a human-centred design making the idea visible for users to see to evaluate helps restrict people’s imagination when a system is described. Another Envisionment tool which can help shape the design is creating user empathy maps (Fig.7). An empathy map was created to consider how a potential user would feel as they enter and interact with the Lions Gate Garden. The mood boards were also peer-to-peer reviewed for feedback by other designers (App. C). The additional feedback added the third and final mood board. The idea for new spaces is not part of the NFC tag system as such but to help imagine an overall feel for the garden.

Creating user empathy maps allow the designer to think about how a user would think and feel while interacting with a system. Thinking about how you want a user to feel, what they will hear and see and even how they will interact with the system and other users creates a clear image.

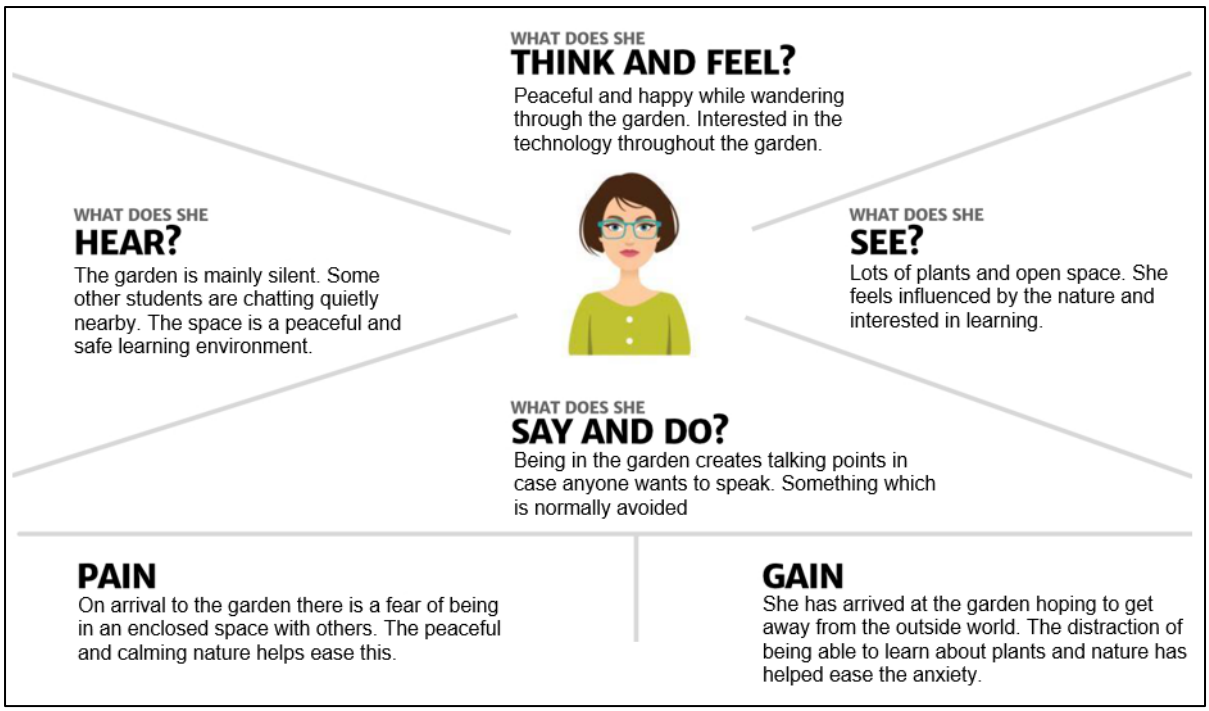


Fig.7 Empathy Map

These questions lead to changing a design based on the emotional experience user will have to interact with a system. The empathy map above is based on a user who has come to the garden to find a peaceful space. Creating Envisionment diagrams and utilising these methods within user-centred design brings designs to life for all designers and users. When creating a user-based system it is important from an ethical viewpoint to make sure the users do not suffer pain or distress when using the system.

5. Testing

Testing is a very important aspect of the design. Maguire (2001) while discussing methods of identifying problems explains “when running user tests, the emphasis may be on identifying system problems and feeding them quickly into the design process (formative testing)” (Maguire, 2001, pp.614). When designing a system specifically for users it is important to test aspects of the system to gain data for supporting why aspects of the system will work as they do. The first test use was a trust test (App. A). The trust test was designed to find out if potential users had heard of NFC before and how much they trusted using their smartphones for interacting with technologies.

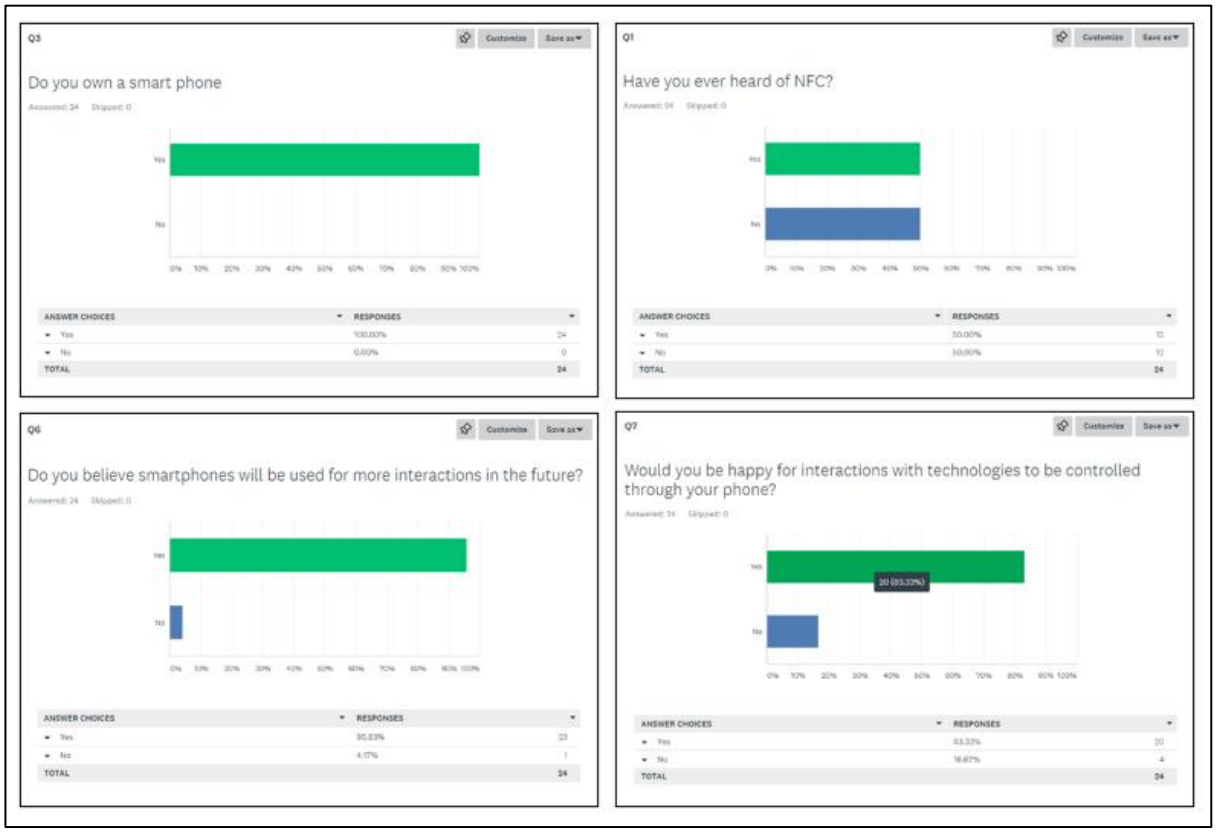
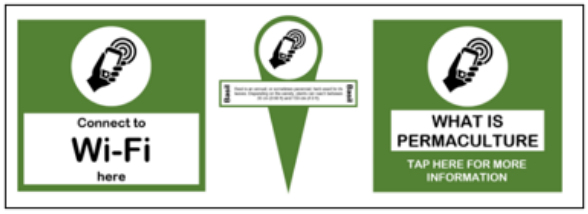


Fig.8 Trust Tests for NFC and Smartphone usage

The main information the trust test wanted to answer was if users had a smartphone and if they would be happy for interactions to be controlled on their phones. The survey started by asking if they had heard of NFC before. Although only 50% of people surveyed had heard of the term NFC before, over 95% expect more interactions through smartphones in future. Just over 95% of users surveyed suggested they would be happy to try new technologies but the majority selecting if it is from a trusted source.

Although 100% of the people surveyed have a smartphone the sample size is too small to suggest everyone has. The result of this question will suggest that most users will have a smartphone. From the trust test, the design will be required to inform the users of how NFC works to a basic level as well as make sure the users feel secure using the tags. Almost 80% of users surveyed feel using a smartphone there data is sometimes or usually safe for interactions with technology. Around 4% feel smartphones are never safe to use and 16% believe that smartphones are always secure with regards to data security. To design a safe and secure system issues such as GDPR and data security should be implemented. The NFC tags should only access safe and secure websites. As well as the trust test created to find out if users would be comfortable using NFC there was also a first impression test (Fig.9) to discover the initial reaction to the initial design (Fig.1).



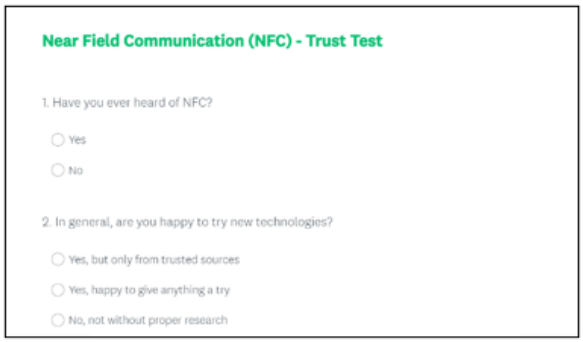
"Third image makes me want to connect to find out about permaculture. Can't read middle image. First image, out of context could be for 'free 'wifi'"

Fig.9 First Impression Test

Although not a great amount of feedback was given the consensus was that the text was hard to read and there would be some confusion with the Wi-Fi sign. When creating a system, it is important to test the system as often as possible. Another important aspect is evaluating a system.

6. Evaluation

As well as testing where possible, constant evaluation should be done at each stage of the design. Any work completed should be reviewed and amended as required whenever possible. Designing with an agile mindset while creating user-centred designs allow for a continuous loop of testing, evaluation, testing and feedback. By the time the system is to be implemented a rigorous set of questions should have been answered to confirm the system is suitable for its users.



"Very suitable questions to gain a base level of trust regarding NFC and using mobiles for interactions"

"An introduction would have been good to explain what NFC is, never heard of it"

Fig.10 Peer-to-peer Evaluation Example

The main evaluation process used throughout this design has been peer to peer feedback (Fig.10). While discussing evaluation methods, Benyon (2019) states one of the three main types of evaluation "involves a usability expert, or UX designer, reviewing some form of envisioned version of a design" (Benyon, 2019, pp.239). Over many different stages of the design, the ideas and diagrams have been sent to various designers for feedback. All feedback can be used when creating the final system. All feedback is relevant and creates a non-bias overview of how people see the system. The feedback offered will help shape the future of the project and adds to the usability of the design. To evaluate the system, it is important to understand the system. A cognitive walkthrough (Fig.11) of the system shows the steps a user will take while in the garden.

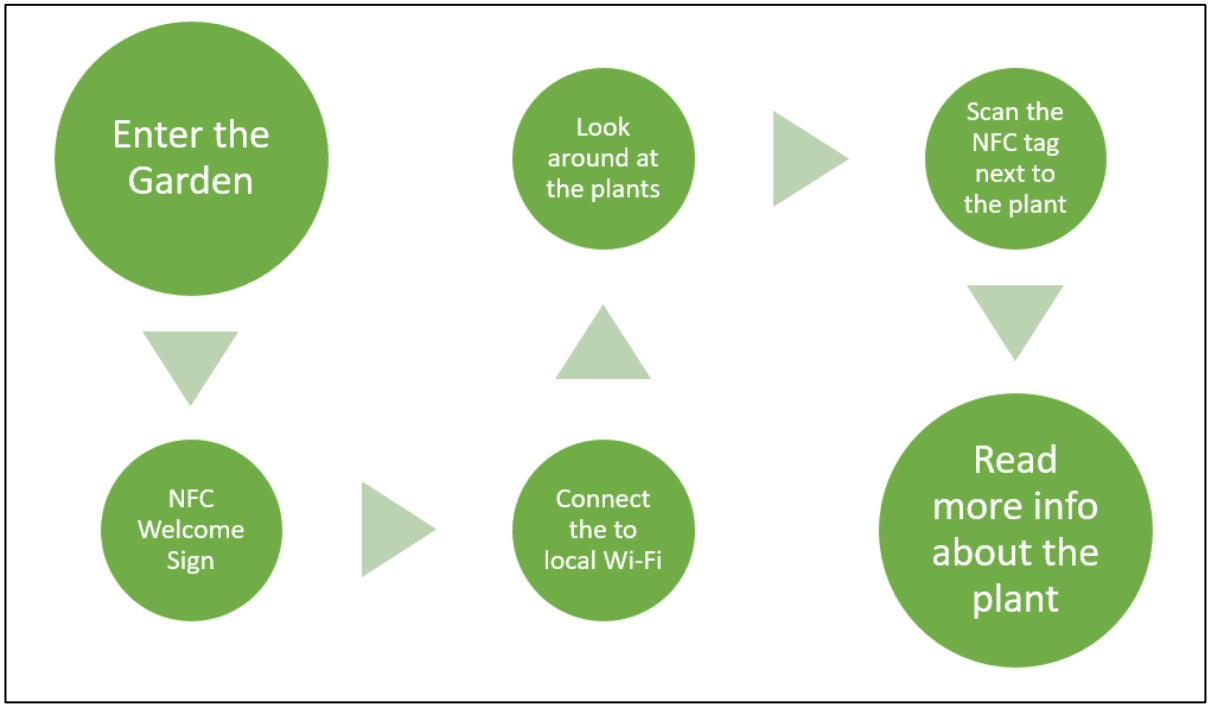


Fig.11 Cognitive Walkthrough

From first arriving in the garden the user will see a welcome sign explain NFC, the interactive garden and allow the user to connect to the university Wi-Fi. Once connected the user will be able to look around at the plants and scan an NFC tag if they are interested in learning more. This will direct their phone to a website. A cognitive walkthrough helps show usability issues the user may face while using the interactive garden. The main issues highlighted are about accessing the information via the internet.

7. Conclusion

As with the scenario-based design work previously submitted around permaculture, there is a need for systems to have the correct research completed before being designed. The research selected for this report tests and evaluates many aspects of user-centred design. The outcome of these methods is clear and should be applied to any or all future work at the Lions Gate Garden. Any application installed at the garden must fit in with its surroundings while being ethical, accessible, trusted, and relevant to permaculture. Utilising NFC tags within the garden would be a suitable, sustainable, and manageable way of creating novel interactive experiences within the garden. The research conducted throughout this report creates a solid base on which future design work could be based. From an ethical viewpoint, there will always be work to be done, however using empathy maps, trust tests and peer-to-peer feedback will aim to get the system on the right tracks from the start. It is believed NFC is a suitable project which the Lions Gate could implement without major costs or issues. This system creates a safe environment which can easily be blended into the current garden while being informative and supporting permaculture principles.

8. References

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10. Appendix

Appendix A – Trust Test

Q1

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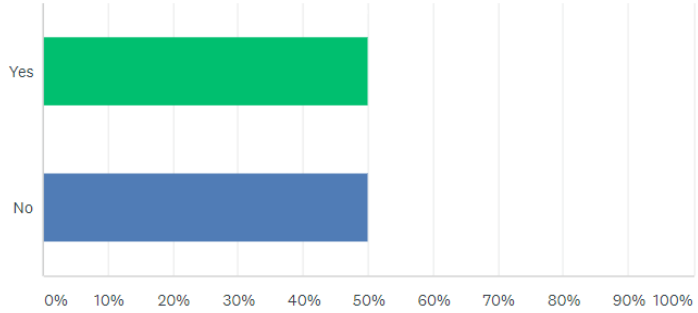
Have you ever heard of NFC?

Answered: 24 Skipped: 0



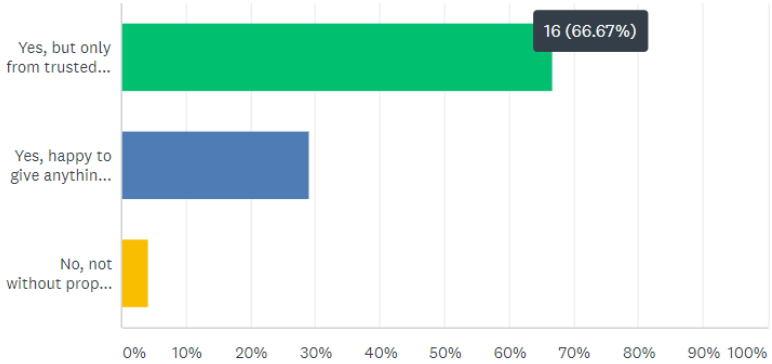
ANSWER CHOICES	RESPONSES	
Yes	50.00%	12
No	50.00%	12
TOTAL		24

Q2

Customize Save as

In general, are you happy to try new technologies?

Answered: 24 Skipped: 0



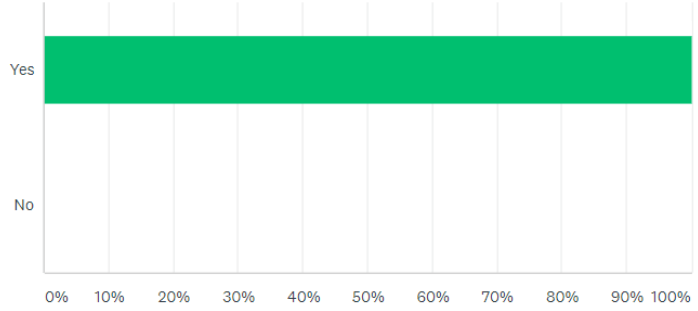
ANSWER CHOICES	RESPONSES	
Yes, but only from trusted sources	66.67%	16
Yes, happy to give anything a try	29.17%	7
No, not without proper research	4.17%	1
TOTAL		24

Q3

Customize Save as

Do you own a smart phone

Answered: 24 Skipped: 0



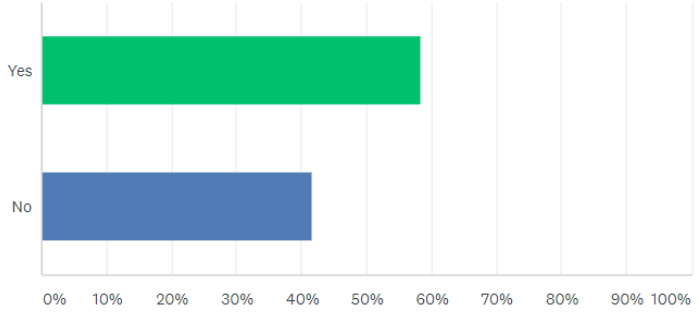
ANSWER CHOICES	RESPONSES	
Yes	100.00%	24
No	0.00%	0
TOTAL		24

Q4

Customize Save as

In the past, have you used a smartphone to pay for something in a shop?

Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	58.33%	14
No	41.67%	10
TOTAL		24

Q5

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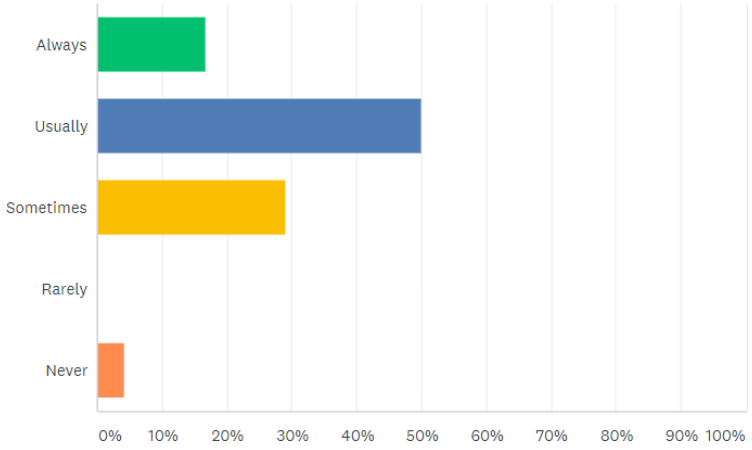
In regards to using a smartphone, do you feel your data is secure?

Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Always	16.67%	4
Usually	50.00%	12
Sometimes	29.17%	7
Rarely	0.00%	0
Never	4.17%	1
TOTAL		24

Q6

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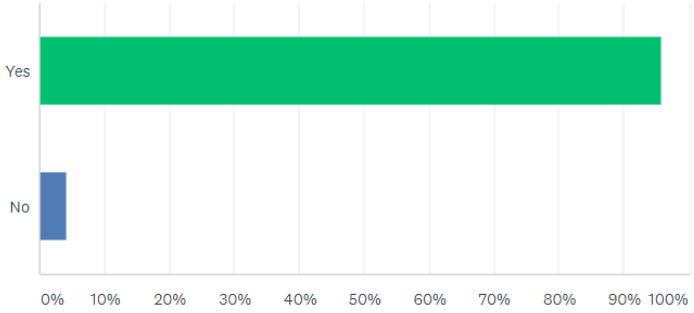
Do you believe smartphones will be used for more interactions in the future?

Answered: 24 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	95.83%	23
No	4.17%	1
TOTAL		24

Q7

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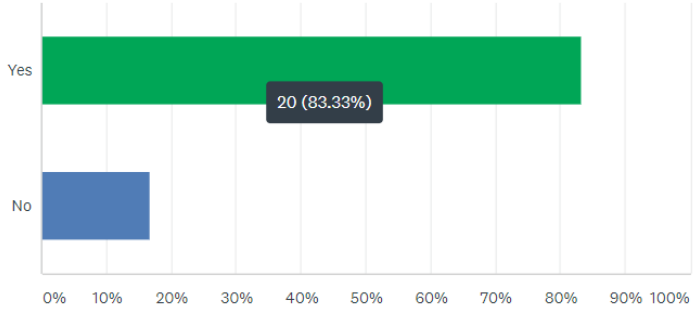
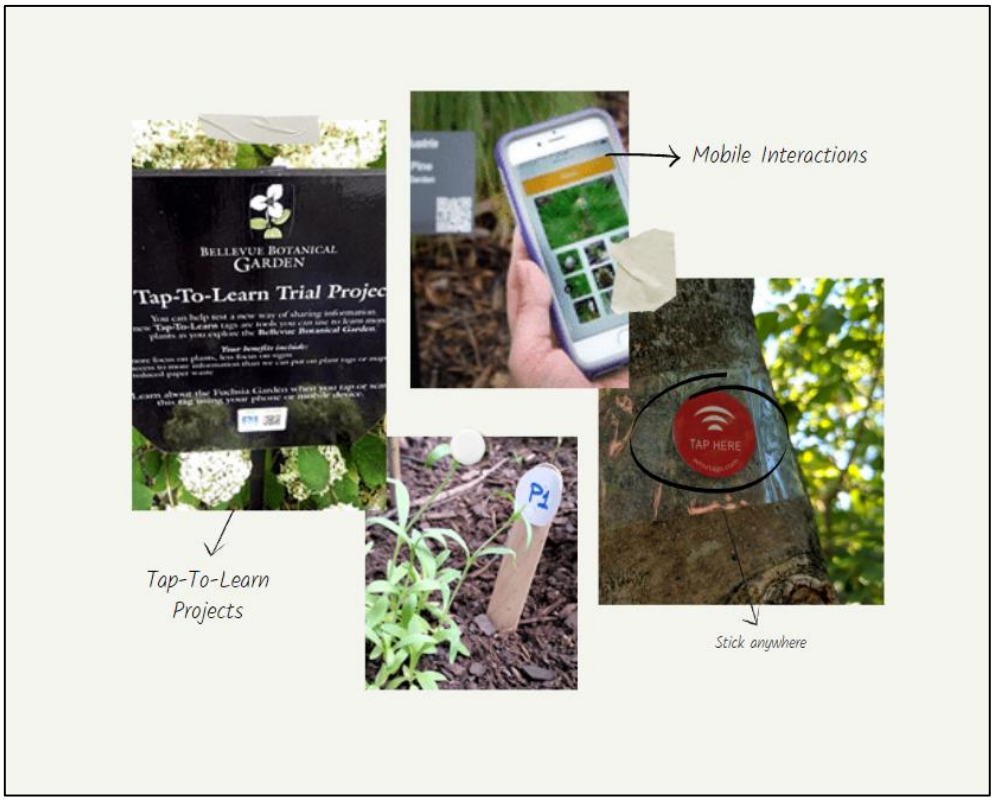
Would you be happy for interactions with technologies to be controlled through your phone?

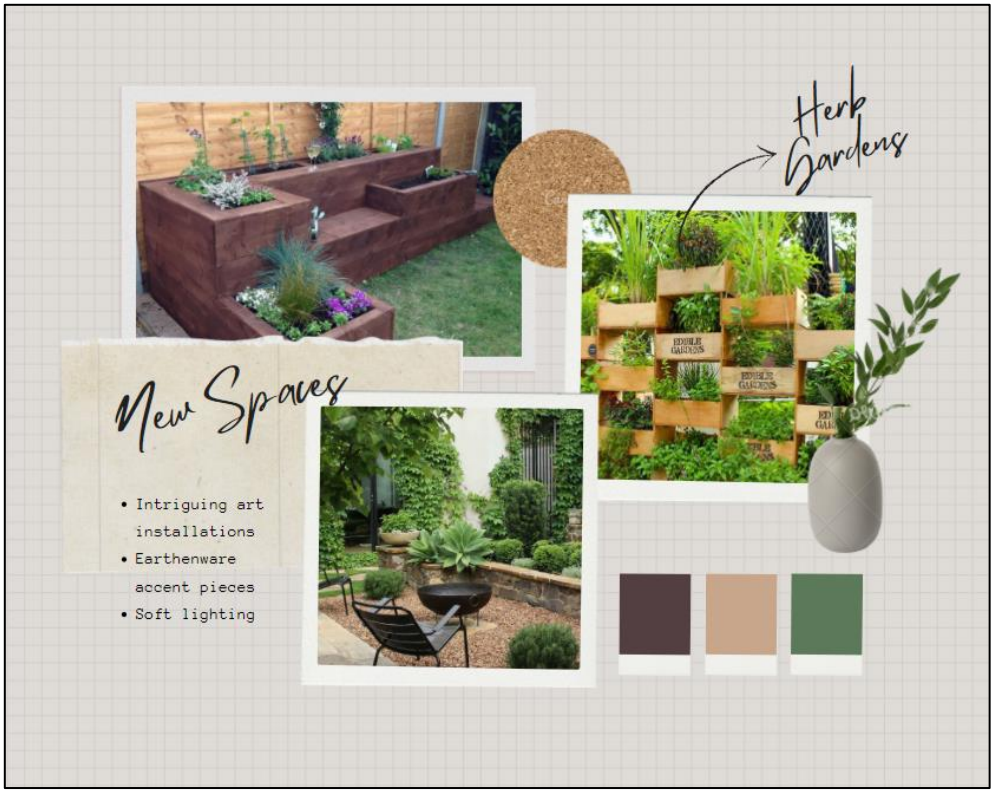
Answered: 24 Skipped: 0



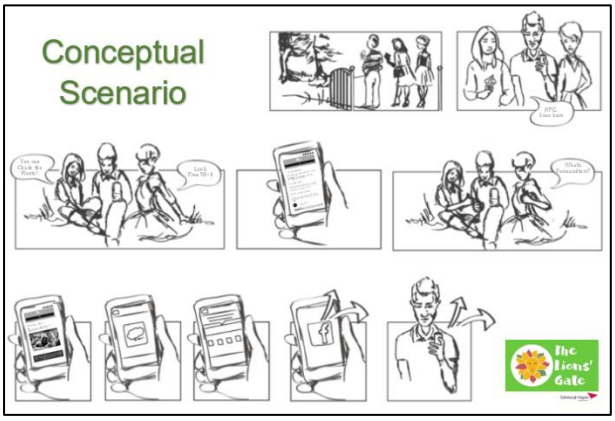
ANSWER CHOICES	RESPONSES	
Yes	83.33%	20
No	16.67%	4
TOTAL		24

Appendix B – Mood Boards




Herb Gardens
New Spaces
• Intriguing art installations
• Earthenware accent pieces
• Soft lighting

Appendix C – Peer Evaluation



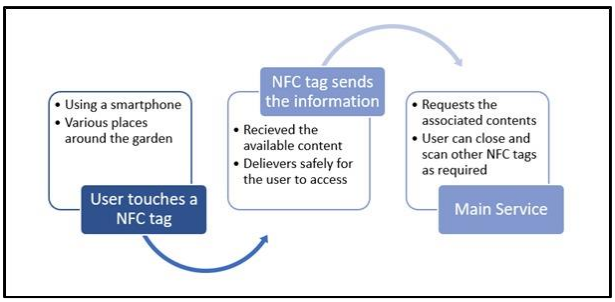
"I think conceptual scenarios are quite abstract by nature."

"That looks great 😊"

"I like how structured it is! I would change one thing, the size of the text"

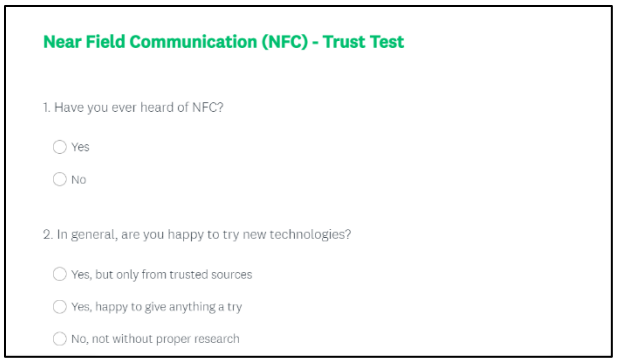
"Great layout and fantastic way of showing the colours to be used in the design."

"I would add in some information about spaces and layouts"



"oh yeah I like that it's a nice graphic and makes sense"

"This gives me a clear idea of how the whole system works"



"Very suitable questions to gain a base level of trust regarding NFC and using mobiles for interactions"

"An introduction would have been good to explain what NFC is, never heard of it"