

IMD11112 Design Dialogues

Assessment 2

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1. Introduction

1.1 The 'LightUp!' system

'LightUp!' is an interactive blended space based at the Lion's Gate garden at the Merchiston Campus. Blended spaces are "where a physical space is deliberately integrated in a close-knit way with a digital space" (Benyon, 2014). The garden (the physical space) contains a light and music experience which can be transformed by the visitor's movements and by adjusting parameters on the companion mobile application (the digital space). 'LightUp!' has a focus on providing entertainment and information, specifically on permaculture, to its visitors.

Visitors can book themselves a private evening timeslot to visit the garden via the app. Within the garden there is a network of lights, a lighting interface, a PA system, and motion sensors; these are connected to and controlled by a computer, which itself connects to the visitor's mobile phone via Bluetooth. The visitor can personalise the light & music experience through the adjustment of various parameters on the app. The computer takes in data from the motion sensors and changes the lighting and music to 'move' with the visitor around the garden. Visitors can read information on permaculture principles and practices via information boards placed around the garden, illuminated by the lights as they approach them.

The companion app also serves as a place to extend the visitor's experience beyond visiting the garden. On leaving the garden, they will find they have a 'take-home' map viewable on the app. This will show them the information on permaculture they discovered in the garden, how they can apply it at home and a birds-eye view map of the locations that information was found.

1.2 Project rationale

One of the main reasons this system has been designed was to help limit the negative mental-health effects which could be caused by the coronavirus restrictions (Brooks et al, 2020). It has been shown that spending time in gardens can reduce feelings of depression, anxiety and stress (Vujcic et al, 2017). Music can also help in the creation

of a “healing environment” (McCaffrey, 2008) and could bolster the positive effects of the garden experience.

The educational side of the system is also important as the Coronavirus pandemic highlights the need for greater adoption of sustainability and permaculture principles. Taking steps to lessen the negative effect we have on the environment may actually help mitigate the effects of diseases like Coronavirus. For example, Ching shows that studies are finding correlations between cities with poorer air quality having higher Coronavirus death rates. As he puts it, “The intertwined relationship among environment, climate change and public health is exemplified in the pandemic of COVID-19” (2020).

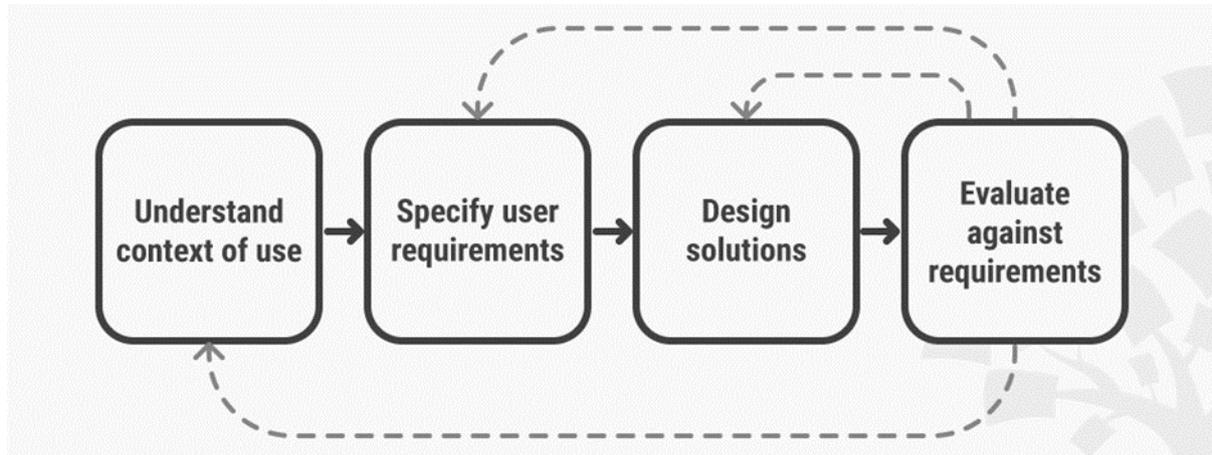
1.3 Objectives of the design

The objective of the design is to create an immersive, relaxing, informative, and interactive blended space. By letting visitors personalise and manipulate the experience through their movements and selections, it is hoped that they will feel connected to both the physical and digital elements of the blended space. It is hoped the experience will be a welcome break from the monotony of Coronavirus restrictions and invite people into the world of permaculture.

2. Design Approach

The design approach used will be the user-centred approach. User-centred design means that you keep the user at the heart of everything you do. According to the Interaction Design Foundation, the user-centred approach requires that you: specify the context of use, specify the user requirements, create design solutions to meet those requirements and then evaluate those solutions against the requirements (*User Centred Design*, 2020). This process should be iterative in order to design a system of the highest possible quality. This process can be seen in *fig. 1*.

fig.1 User centred design process (User Centred Design, 2020).



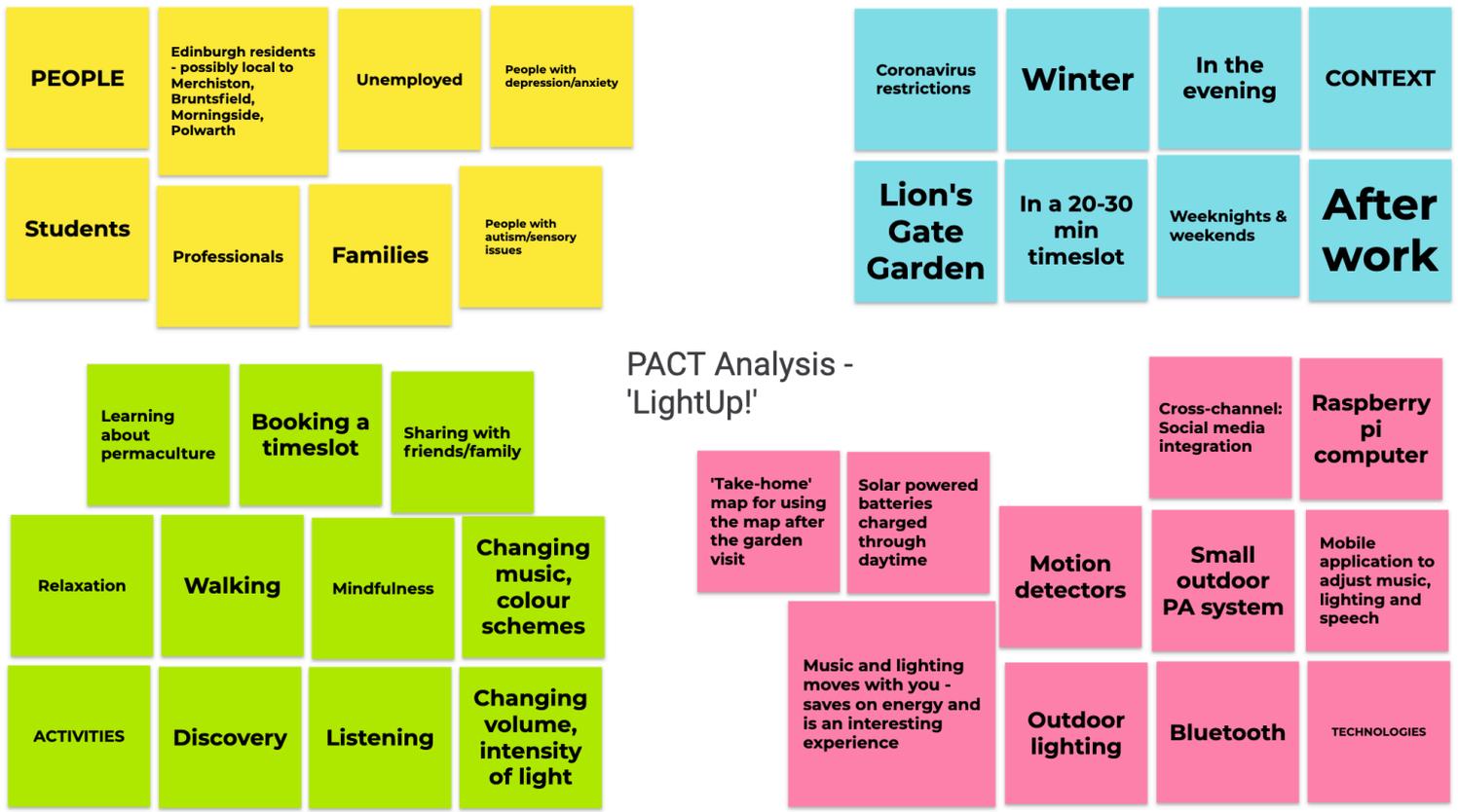
3. Understanding

3.1 Semi-structured Interviews

Semi-structured interviews were conducted with 3 participants with the aim of discovering what different users would want to see in a system like 'LightUp!'. The interviews were conducted over Zoom and were recorded for transcription. Consent forms were issued to each participant, an example of which can be seen in appendix 1. Sketches and a moodboard were used to facilitate understanding of the system.

To prepare for the interview, a PACT analysis (*fig. 2*) was conducted to help understand the kinds of people that may use the system and in what contexts.

fig 2. PACT analysis



Some questions were also taken from Oli Mival's guide to developing a structured research activity (described in *Designing User Experience* by David Benyon) and worked through (see appendix 2). This helped to determine how the 'LightUp!' system would be described to interviewees and focus the prepared questions. As they were semi-structured interviews, the interviewer was allowed to delve deeper into responses and ask unprepared questions. After each interview, the questions were iterated slightly to include generated ideas and see what other participants thought of them. The interview transcripts can be found in appendices 3 - 5.

Results:

The interviews proved very useful in establishing initial feelings about the system and what users would like to see in it. Examples of findings are listed below:

- 'LightUp!' was a popular, understandable concept. It was something that people felt they would be comfortable doing during Coronavirus restrictions.
- People were mostly attracted to the music and lighting element of the experience. The permaculture learning side of it had mixed reactions.
- An idea for 'mindfulness prompts' was developed into a 'mindfulness space', where timed heatlamps could be installed to combat cold weather.
- A tracking feature to see where you had been in the garden was not seen as very valuable.
- The 'personalisation' elements of the experience (parameter controls on the app) were seen as very valuable to accommodate as many types of user as possible.
- A gamification element for kids was seen as something that could be included (not included this time to stop over-complication).
- The information boards (rather than screens) were seen as contributing to an immersive experience.
- An idea for music social media integration was put forward.
- The 'Take-Home' map was seen as providing lasting value to the application. It extends the learning portion of the experience beyond the garden and into the lives of the visitors.

3.2 Probes

Probes are methods used for understanding the contexts of a system's use. They can provide an insight into the states of mind of potential users and help empathise with them (*Probes for context mapping*, 2020). As the user-centred design approach is

being implemented, it was felt that it would be good to try and understand the current feelings and wishes potential users have.

Two participants were selected for their interest in the system and a video call was conducted where the process of the probe was explained to them. After some discussion, an iteration of the probe was formed that everyone felt comfortable engaging in. It would involve the participants writing a paragraph in the style of a small journal entry, a sort of 'snapshot' of their current feelings about things like the Coronavirus restrictions, their mental health and isolation. An example was written and sent to the participants (see appendix 6). They would also take a photo or two of where they were spending most of their time during restrictions. The finished probes can be seen in appendices 7 & 8.

Results:

The probes were helpful in understanding the current feelings and wishes of the types of users who may engage with 'LightUp!' and contributed to the creation of the personas. They helped to maintain empathetic considerations towards the users throughout the design process and keep the aim on providing a system that can facilitate their needs. They were not a lot of help in directly eliciting user requirements for the system.

3.3 Personas

To help bolster the understanding of the types of users who may engage with 'LightUp!', two personas (*fig. 3 & 4*) were created. The details of each persona were informed by the qualitative data gained from both the interviews and the probes. They were used when implementing some of the other envisionment methods and helped to keep the user in mind throughout the design process.

fig.3 Persona 'Robert'

PROJECT: 'LightUp!' Personas PERSONA: Robert



Background

Graphic designer living in the south of Edinburgh. Living with partner and working from home since March 2020 due to Coronavirus restrictions. Enjoys taking walks with their dog to get out of the house. Misses being able to spend time with family & friends.

Goals

- To find activities he and his partner can do outside of the home.
- To get involved in experiences he can photograph and share.
- To reduce anxiety and irritability.

Demographic

♂ Male 29 years

Graphic Designer

Quote

“We've enjoyed spending more time with each other at home, but the monotony of restrictions has definitely been getting to us. Getting out for exercise and walks around town are fine, but most days are much the same at the moment.”

Frustrations

- Spending so much time in front of screens.
- The lack of things to do in the city during restrictions.

Skills

- Photography
- Yoga
- Empathy

fig.4 Persona 'Sandra'

PROJECT: 'LightUp!' Personas PERSONA: Sandra

NAME

Sandra



Background

At-risk retiree living in Morningside, Edinburgh. Has spent a lot of time shielding at home since Coronavirus restrictions were brought in. Spends time in her own garden and with her organic farming group.

Goals

- To spend time in places where she won't be in contact with others.
- To find out more ways to improve her home garden.
- To practice mindfulness to maintain a sense of calm through lockdown.

Demographic

♀ Female 63 years

Retired teacher

Quote

“While I am lucky to have my own space outside that I can spend time in, its still nice to get out for a change of scene (especially now!). I like being able to learn with my farming group but its always good to find new tips and hints on gardening.”

Frustrations

- Not having anything to do out in the evening during winter.
- Dealing with difficult technologies.

Skills

- Gardening
- Jogging
- Mindfulness

4. Envisionment

4.1 Initial ideation sketches

To be able to start visualising the 'LightUp!' system ideas and the user's potential experience, some ideation sketches were carried out. This was the beginning of the 'design solutions' section of the user-centred design process shown earlier. Rough wireframe ideas (fig.5), a storyboard (fig.6) and a user journey map (fig.7) were all created.

fig.5 Rough wireframe ideas

Sketch 1: Welcome to Lionsgate...

- Scan to begin
- Scan Now

• Scan at entrance
• QR Code
• Registers attendance
• Stats can be booked via app too?

Sketch 2: Default experience

Here

Personal experience requires bluetooth connection

Here

• Default experience requires no pairing
• Bluetooth could be used for controlling parameters in personal experience.
• Consider that pairing may not work/ people may not want to pair
• Different default experiences?

Sketch 3: Experience Selection

More Intense

Normal

Less Intense

• Simple options to default (found in better word) experience

Sketch 4: Settings

Colour

Less Bright | More Bright

Palette 1 | Palette 2 | Palette 3

Music

Quieter | Louder

Type 1 | Type 2 | Type 3

Prompts

10m | 5m

• Parameters can include: colour brightness, colour palette, music volume, music type, mindfulness prompts? volume for prompts (had letter work)

Sketch 5: Take Home Map

1 2 3 4 5

5

• 'Take Home' Map
• Top down view of goal
• Key areas 'discovered' highlighted with info about each part available
• This is an option due to some people not wanting location accessed

fig.6 Rough user journey map

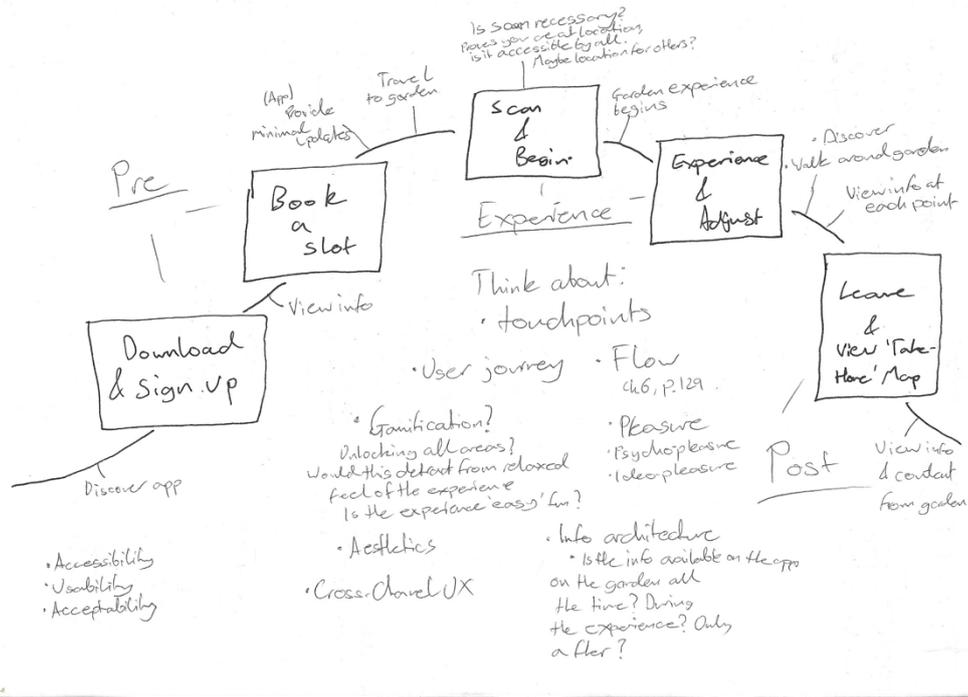
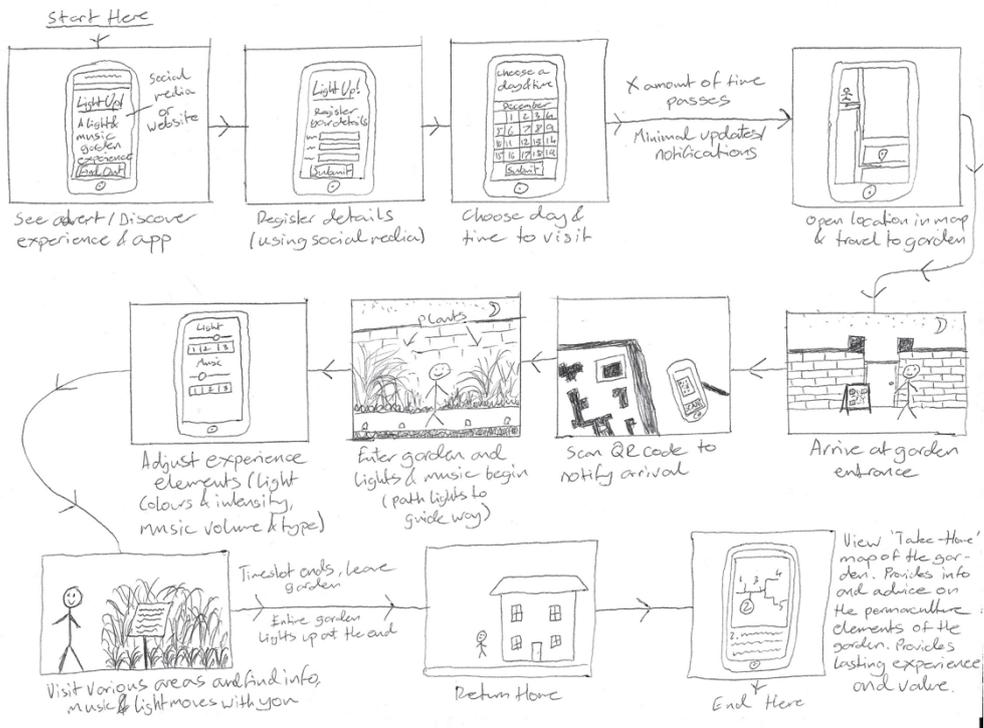


fig.7 Storyboard of typical user scenario



4.2 Moodboard

An initial moodboard was generated to help get ideas for the visual aspects of 'LightUp!' and to start building a design language. The first moodboard can be seen in *fig. 8*. The second iteration of the moodboard included more ideas on the design language: possible fonts, colour schemes and imagery. This can be seen in *fig. 9*. After some testing, the moodboard was updated one more time to increase the clarity of its communication (*fig. 10*).

fig.8 Initial moodboard



fig.9 Second moodboard iteration



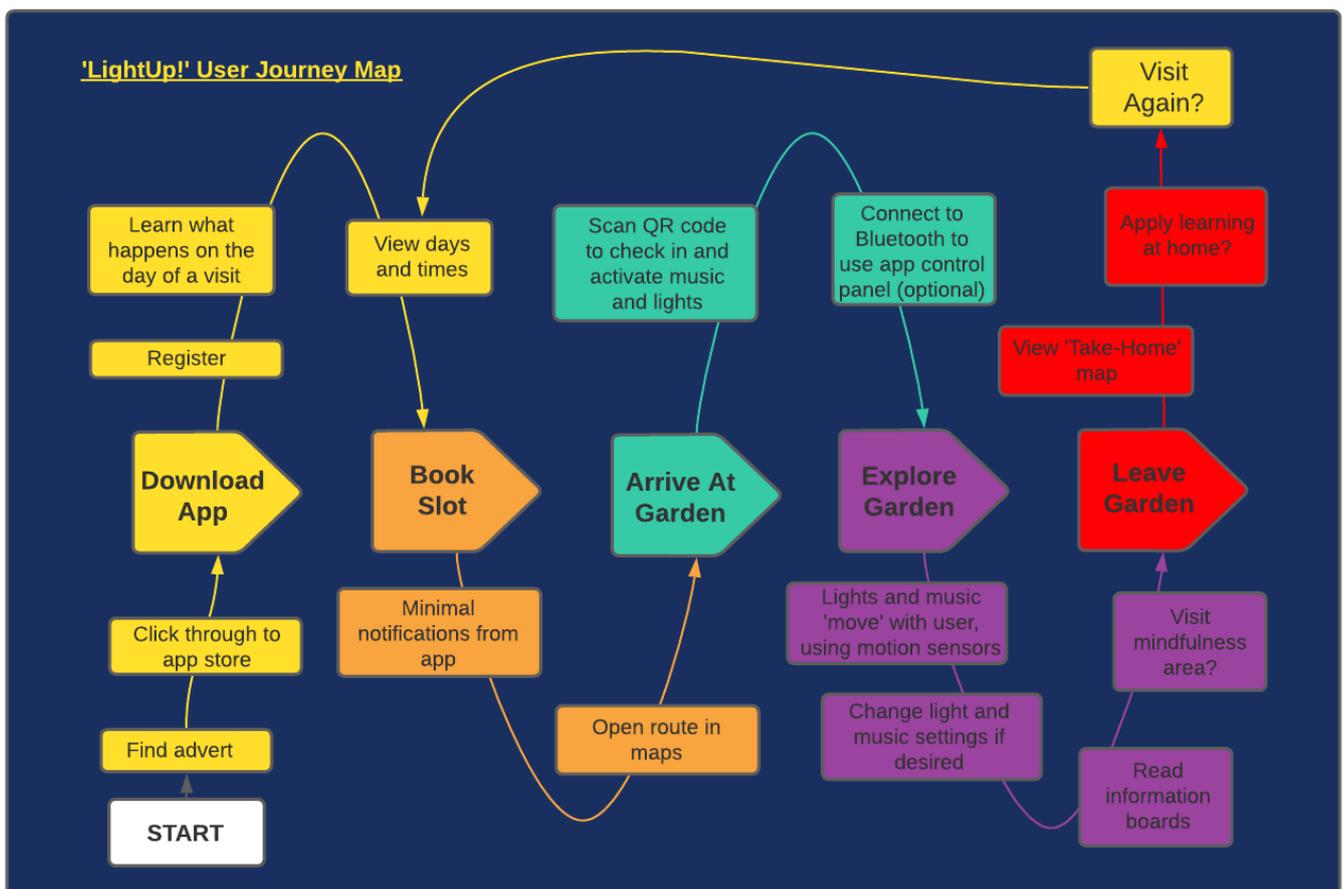
fig.10 Third moodboard iteration



4.3 User journey map

This user journey map was an iteration from the one produced during the ideation sketches envisionment process. It was developed using some of the qualitative feedback from the interviews and probes. It aims to show the 'flow' of the user's experience from beginning to end, with the possibility for continued uses of the system. It can be seen in *fig. 11*.

fig.11 Second user journey map iteration



4.4 Wireframe sketches

The wireframe sketches were improved to build on the ideation versions. They implemented more of the user requirements generated from the interviews, probes and personas than the initial sketches and tested out some different ideas around information architecture, layout and navigation. They can be seen in figures 12 & 13.

fig.12 Wireframe sketches 1

Registration page

LightUp!

Welcome!
Please register to begin.

Name

Email

Address

Phone

Password

Language English

Note - These details are needed for trade & trace

Guide page 1

Welcome to LightUp!

This music & light experience is based at the beautiful Lion's Gate Garden in Merchiston, Edinburgh

After this guide, you can book a visiting timeslot for your household

On your arrival, scan the QR code at the entrance to start the experience. The scan button will light up just before your timeslot begins.

Once you are in the garden, the 'LightUp!' Bluetooth connection will become available. Connect your phone to personalise the experience on the control panel.

Logout	Next Page
--------	-----------

Guide page 2

Motion detectors will sense your movements around the garden. Watch as the light 'glow' where you go' and brighten up wherever you walk.

Take a seat in the mindfulness area, where timed heat lamps will turn on as you approach. A voice will guide you as you soaks in the experience (voice can be turned off on the control panel).

Find information on permaculture practices used in the garden on the info boards dotted around the experience. This info (and more!) will still be available to you when you leave in the 'Take Home' map.

Previous Page	Book Now
---------------	----------

Calendar page

Select a day & time to visit...

S	M	T	W	T	F	S
6	7	8	9	10	11	12

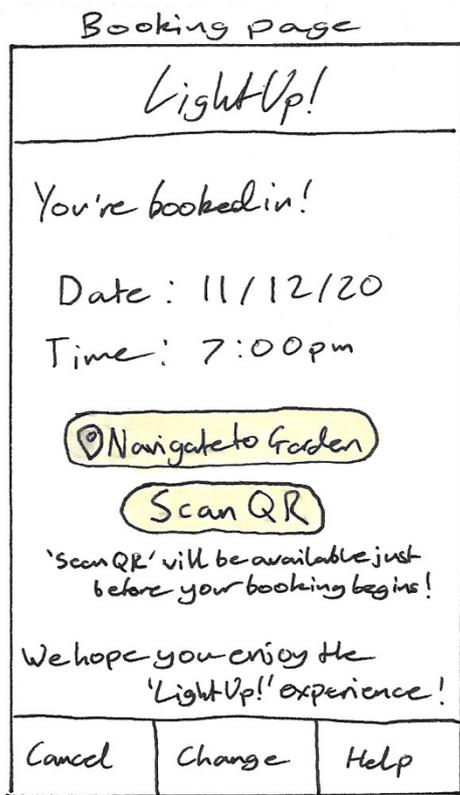
Wednesday 9 December

6:00pm	Booked
6:30pm	<input type="button" value="Book"/>
7:00pm	<input type="button" value="Book"/>
7:30pm	Booked

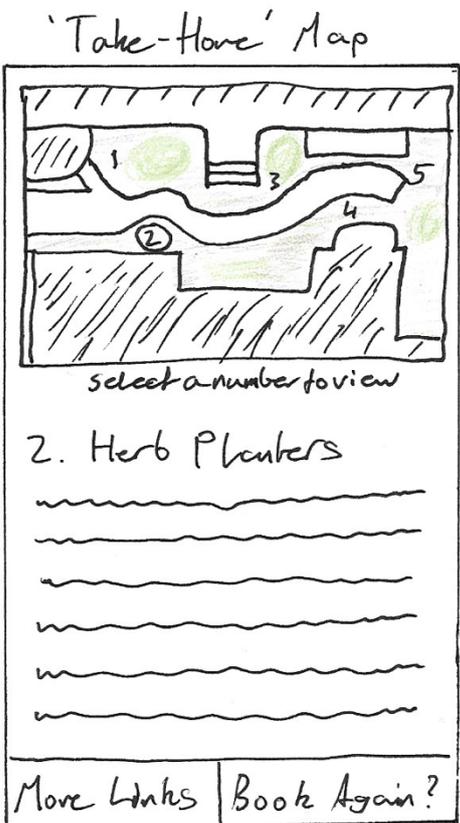
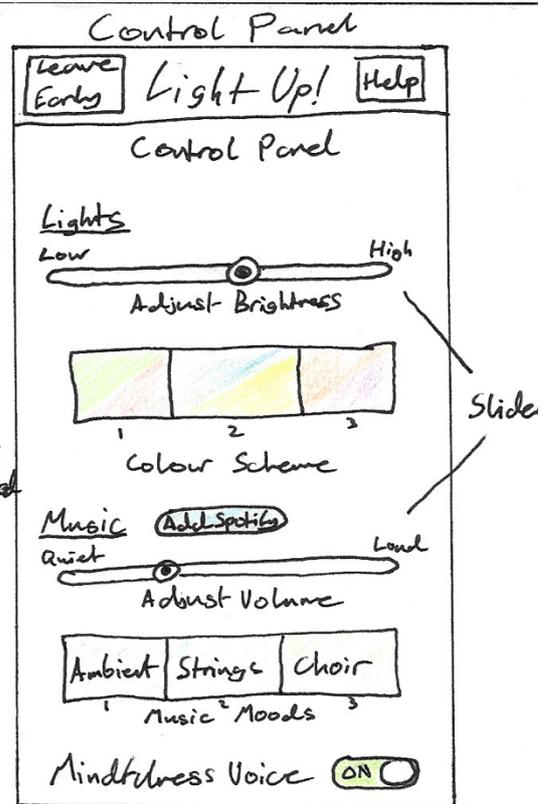
Scroll bars

Back to Guide	Help
---------------	------

fig.13 Wireframe sketches 2



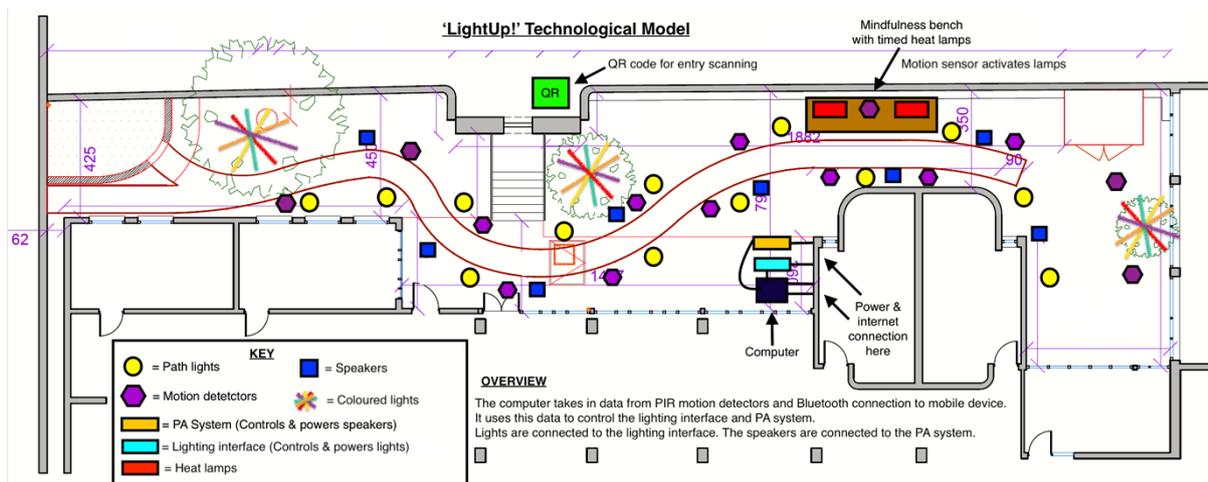
→ After QR code scanned



4.5 Technological Model

A technological model of the installation was developed to help envision the ontology and topology of the technology in the physical space and how it would all connect and communicate with each other. It aims to help users understand how they have agency in the physical space through their movements, as well as through the companion app. It can be seen in *fig. 14*.

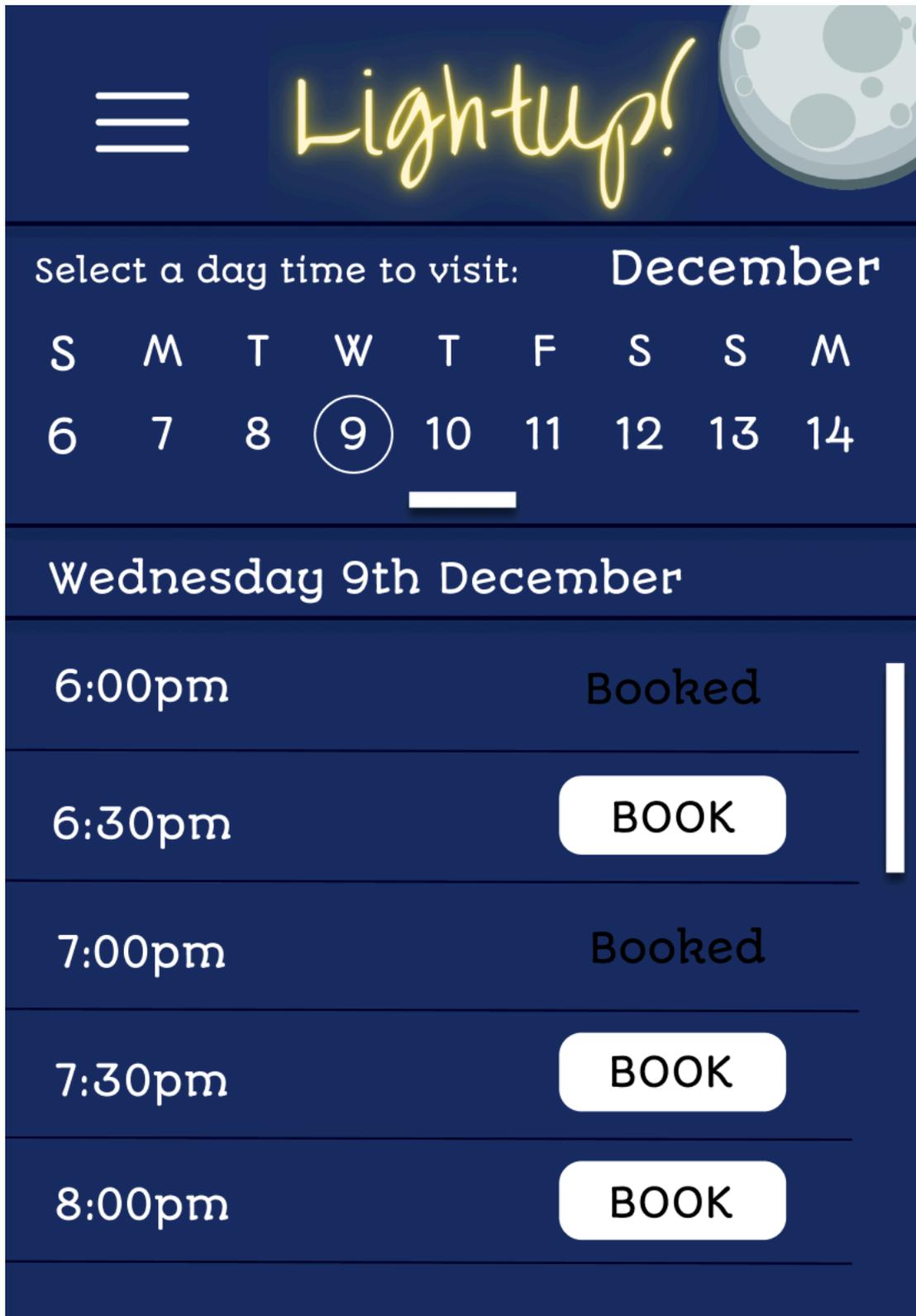
fig.14 Technological Model



4.6 Concrete wireframes

After all the other environment methods were created, iterated and testing on them carried out, some concrete wireframes were developed. They pulled together all the information learned through the understanding and testing methods. They implement more of the design language than the sketches and have more consistency across each page. There are three examples: *fig.15* shows the booking page, *fig.16* shows the control panel and *fig.17* shows the 'Take-Home' map.

fig.15 Booking page



The image shows a mobile application interface for booking. At the top, there is a dark blue header with a white hamburger menu icon on the left, the word "Lightup!" in a glowing yellow script font in the center, and a stylized moon graphic on the right. Below the header, the text "Select a day time to visit:" is followed by the month "December". A calendar grid shows the days of the week (S, M, T, W, T, F, S, S, M) and the dates (6, 7, 8, 9, 10, 11, 12, 13, 14). The date "9" is circled in white, and a white horizontal line is positioned below it. Below the calendar, the text "Wednesday 9th December" is displayed. The main content area is a list of time slots with their booking status:

Time	Status
6:00pm	Booked
6:30pm	BOOK
7:00pm	Booked
7:30pm	BOOK
8:00pm	BOOK

fig.16 Control panel page

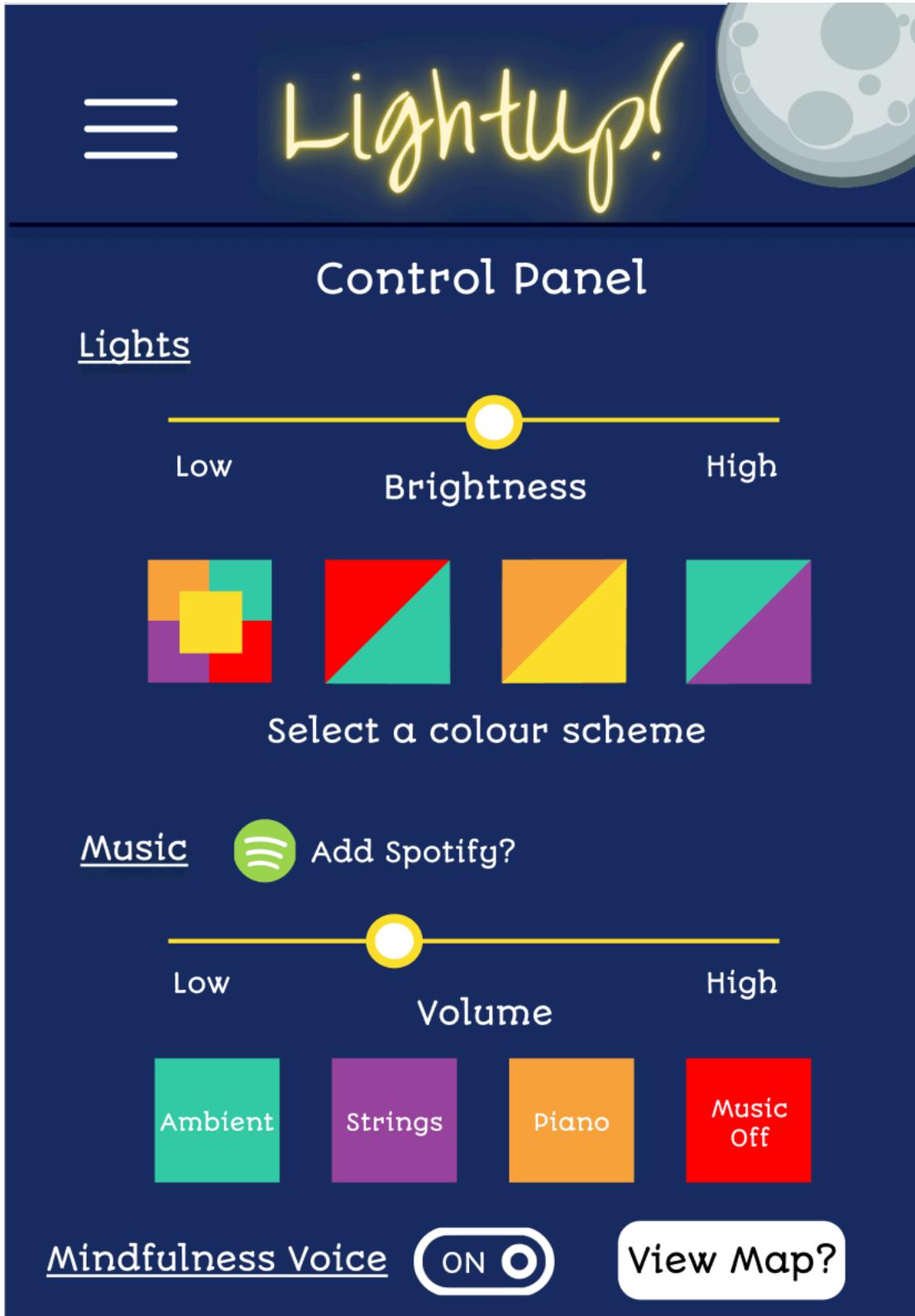
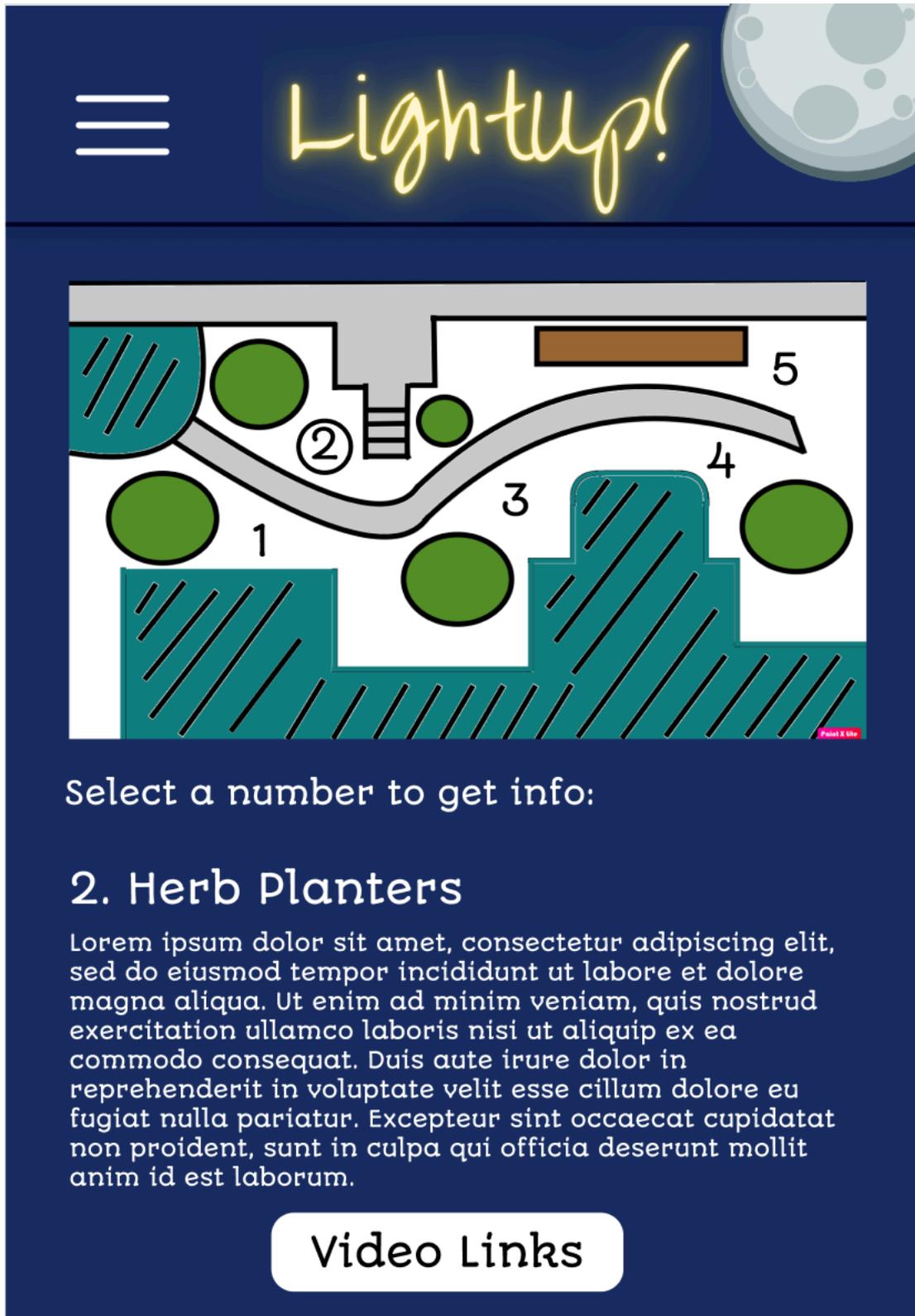


fig.17 'Take-Home' map page



The image shows a digital map interface titled "Lightup!". At the top left is a white hamburger menu icon. The title "Lightup!" is written in a glowing yellow script font. In the top right corner, there is a stylized illustration of a moon. The main map area is a top-down view of a building's floor plan, with various rooms and corridors. Five green circles are placed on the map, each with a white number inside a circle: 1, 2, 3, 4, and 5. A grey arrow points from circle 2 towards circle 4. The map features teal-colored rooms with diagonal hatching and grey corridors. A brown rectangular object is located in the upper right part of the map. A small red "Print & Use" button is visible in the bottom right corner of the map area.

Select a number to get info:

2. Herb Planters

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

[Video Links](#)

5. Testing

Throughout the process of the design, several tests were carried out on the developed envisionment materials. The tests were implemented to make sure that the design process was staying focused on the potential users and that it was meeting their requirements. This is part of the 'evaluate against requirements' section of the design process. The methods and results of the various tests are described below

5.1 Interview tests & post-interview survey

The storyboard scenario and the first moodboard were used during the interview process to help aid the interviewees with their understanding of the 'LightUp' experience and the companion app. The interviewer verbally talked them through the user's journey, using the storyboard and moodboard to help the interviewees visualise what was being described.

After the interviews, a post-interview survey was sent to the interviewees to complete. This survey asked them questions about whether the envisionment materials used aided their understanding of 'LightUp!' and the user's journey through it. It also asked questions about the interview itself, meaning it tested the quality of the interview too.

These envisionment materials were also tested during a small focus group session over video with several participants. The system was again described verbally during this session, with the materials providing further understanding and illustration.

Results:

All the interviewees were verbally asked before starting the interview questions whether they felt they understood how the whole system worked; all interviewees responded positively. This shows that while that understanding may have partly come through the verbal descriptions of the system, the storyboard and moodboard certainly did not hinder or confuse their understanding.

The survey results confirmed that those materials actually helped to further the interviewees understanding of 'LightUp!' than the verbal descriptions would have on their own. The results also showed that the users felt they were treated well during the interview. This is important from an ethical standpoint (*Conducting Ethical User Research, 2020*), but is also helpful for getting an insight into the quality of the qualitative data obtained. The survey results can be seen in appendix 9.

In the focus group session, all participants provided positive feedback on the materials. It was felt that the concept of 'LightUp!' was strong and understandable, with the materials making things like the typical user scenario and the aesthetic direction comprehensible.

5.2 Discussions & semantic differentials

The second iteration of the moodboard, the user journey map, the wireframe sketches, the technological model and the concrete wireframes were all tested on the interviewees and two of the focus group members. During video call sessions, feedback was collected verbally through questioning the participants on various aspects of each envisionment material. Then they were each sent two semantic differential questionnaires, the first of which addressed the first four envisionment materials noted above. The second addressed the concrete wireframes specifically.

Results:

Second moodboard

- It was felt the aesthetics and design language suit the concept of 'LightUp'.
- The music aspect could be noted somewhere.
- The second page could be re-arranged to make it clearer.
- The way the information boards are interacted with could be made clearer. Consider this for future iterations of this system.
- Semantic differential: All felt it was vibrant, clear and colourful.

User journey map

- Some small details on the wording of certain sections were questioned e.g. 'Explore' was changed to 'Explore Garden'.
- It was noted that there was some disruption in the flow during the 'Arrive at Garden' stage. The sub-sections on the lines were re-arranged a bit to help address this.
- Semantic differential: All felt it was clear, simple and flowing.

Wireframe sketches

- It was felt the 'guide' pages were very wordy. They could be broken down into little sections and condensed a bit more.
- Asterisks should be used on registration to show which details are essential for track & trace. Not all people may want to provide address for example.
- Not much of a theme in terms of layout and navigation happening yet. Buttons are in different places on different sketches.
- In general, it felt intuitive, user-friendly and immersive.
- Semantic differential: Feelings were split on whether sketches were consistent or incongruous. Most felt they were simple and intuitive representations. Some felt they looked a little complex.

Technological model

- It was felt it was helpful with envisioning the technology within the physical space. It helped participants understand how the sensors would track visitors and alter the lights and music around them.
- More could have been done to show the information boards and the lights/sensors associated with them.
- Questions were asked about how the system would cope with multiple people moving around the garden in different directions. This could be considered in a future iteration of the system.
- Semantic differential: Most felt it was clear, simple and useful. Some felt it was complex.

Concrete wireframes

- It was felt they were inviting and intuitive.
- When asked about what various buttons would do, participants felt it was clear and obvious what sort of functions would be carried out by each.
- Participants felt it was clear that the 'hamburger' button on each panel was for navigating around the app and viewing different pages.
- Participants felt the 'View Map?' button on the 'Control Panel' page would allow non-English speakers to use the 'Take Home' map page in the garden rather than using the info boards, allowing greater accessibility to the system.
- Semantic differential: It was felt by all that the wireframes were clean, consistent, intuitive, understandable, appealing and fitting with the overall concept of 'LightUp!'.

Semantic differential results can be seen in appendices 10 – 14.

6. Evaluation

To evaluate the entire 'LightUp!' system and deduce whether the design process had fulfilled the objectives of the project, adhered to the chosen design method and met the user requirements, two evaluation methods were implemented: The system usability scale and a UX questionnaire. These were distributed to the interviewees and two of the focus group members. The results are presented below.

6.1 System Usability Scale

The system usability scale (SUS), created by John Brooke, is a way of evaluating the overall usability of a system (Brooke, 1996). This method was chosen due to its ability to indicate how easy a user may find a system to use. With user-centred design being the chosen design method, it was felt that this was a key factor to be evaluated. The SUS presents 10 statements to the participant and they have to rank the statements in terms of their agreement. These statements can be seen in appendix 15. There are 5 choices for each statement, going from Strongly Disagree (1) to Strongly Agree (5).

The answers from each participant are calculated in a specific way to give a 'score' out of 100. The 'scores' from each participant were summed together and then divided by five (the number of participants) to get an average 'score'.

Results:

The 'score' for 'LightUp!' was found to be 92. Bangor et al found that in 2,324 SUS studies, the mean score for all surveys was 70.14 (2008). 92 is therefore felt to be an excellent SUS score for this project and would hopefully mean that if implemented, the 'LightUp!' system would be found to be highly usable. Although it must be acknowledged that participants of this SUS did not actually use the system in a physical sense, this SUS evaluation was helpful in showing that the system has been presented clearly through the various envisionment methods and that it has stuck to the core design principle of being user-centred.

6.2 UX Questionnaire

The user experience (UX) questionnaire was developed to assess the overall 'LightUp!' system on qualities relating to things like aesthetics, accessibility, acceptability and some of the aims for the system listed in the objective such as how relaxing, immersive and informative it is. It was developed as a semantic differential like in the testing methods, with positive and negative qualities listed on the left and right sides respectively. Participants were then asked to make a selection on each row of the questionnaire that would indicate whether they agreed more with the positive statement or the negative statement. The questionnaire can be seen below in *fig.18*.

fig.18 UX questionnaire

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	
Understandable	<input type="radio"/>	Confusing				
Appealing	<input type="radio"/>	Repelling				
Vibrant	<input type="radio"/>	Dull				
Immersive	<input type="radio"/>	Superficial				
Accessible	<input type="radio"/>	Exclusive				
Relaxing	<input type="radio"/>	Stressful				
Informative	<input type="radio"/>	Ignorant				
Flowing	<input type="radio"/>	Stilted				
Simple	<input type="radio"/>	Complex				
Consistent	<input type="radio"/>	Incongruous				

Results:

The results of UX questionnaire were very positive overall and showed that the aims of the project and the design process had been met. The majority of the answers were either 'Strongly Agree' or 'Agree' for the positive statements. The results can be seen in appendix 16.

7. Conclusion

The user-centred design process of 'LightUp!' went through four iterative stages:

1. Understand context of use
2. Specify user requirements
3. Design solutions
4. Evaluate against requirements

The Understanding section helped fulfil stages 1 and 2; the Envisionment section developed stage 3 and contributed to stages 1 and 2; The Testing section contributed to all stages; The Evaluation section focused on stage 4.

Overall, the user-centred design process was very successful at developing the 'LightUp!' project in the sense that it met both the objectives and the user's requirements, as is evidenced in the Testing and Evaluation sections. The methods chosen at each stage were shown to contribute to the user-centred nature of the design, including those methods pulled from the scenario-based design method like the storyboard scenario, the personas and the iteration of envisionment materials from conceptual to concrete.

Ethical issues such as making sure the system is accessible, treating participants in user research in the correct manner and obtaining consent forms were also considered throughout the design process. The results of the Understanding, Testing and Evaluation processes show that these issues were approached with consideration and were effectively handled.

8. References

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10. Appendices

Appendix 1: Consent form example

Informed Consent for 'LightUp!' Interview

Please tick the appropriate boxes	Yes	No
1. Taking part in the study		
I have read and understood the study information dated 24/11/2020, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I understand that taking part in the study involves having my interview answers recorded.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Use of the information in the study		
I understand that information I provide will be used for an academic assessment	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I understand that personal information collected about me that can identify me, such as my name or where I live, will not be shared beyond the study team.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I agree that my information can be quoted in research outputs.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I agree to joint copyright of the interview answers to Fraser McMillan	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. Future use and reuse of the information by others		
I give permission for the qualitative data that I provide to be retained by Fraser McMillan so it can be used for future research and learning.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4. Signatures

 Name of participant [IN CAPITALS]	 Signature	<u>24/11/20</u> Date
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I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensure that the participant understands to what they are freely consenting.

<u>FRASER McMILLAN</u> Name of researcher [IN CAPITALS]	<u></u> Signature	<u>24/11/20</u> Date
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INFORMED CONSENT FORM TEMPLATE

PRODUCED BY UK DATA SERVICE

Appendix 2: Oli Mival questions

- What am I designing and why?
- What info am I not sure about that's holding me back from making informed design decisions?
- What questions can be answered that will help me find that information?
- Who do I need to ask these questions to and how do I do that?

Appendix 3: Interview transcript participant 1

Details: Male, 34, currently unemployed, lives with partner

- Would an experience like this be a welcome addition to your life during Covid restrictions?

“Yes I think it would. It's a reason to leave the house. It's almost like a nice date idea that doesn't involve going to a restaurant or being around other people. And there's no worry about having to touch things that other people have touched. I know you said that there would be timeslots but even if you had 5/10 minute grace periods between timeslots just to ensure nobody else was around that would be good. It just takes the worry away. I know there are people that would still want to go out to a restaurant or a pub just now but I am just not one of them, even when its allowed. But something like that sounds like something I would do”.

- And do you think those timeslots would be enough time?

“Well it depends on the size of the garden. Realistically it's only going to take you five minutes to walk round the place so 20 mins would be enough to actually enjoy it.”

- What things would primarily interest you about this sort of interactive experience: The outdoor music and lighting experience? The chance to learn more about permaculture? The opportunity to spend time outside the house during Covid-19 restrictions?

“It’s probably all 3. I mean permaculture and gardening are not things I’m particularly interested in. I’d probably go and read the stuff but not ever really do much with it. But if decided to and I had a garden to do stuff like that with, I would have the information there in the app. It’s not something I’ve ever really had the opportunity to think about. Probably it would be a nice excuse to get out, and the lights and the music, I love when they do that stuff at the Botanics.

- So its almost like the permaculture learning could be a nice by-product of the music and light experience?

“Yeah, I’m not the kind of person who is attracted to stuff like that. The music and lights would get me there and then I’d learn about that stuff because of that.”

- Several different functions are being considered for the system. What do you think of the mindfulness prompts?

I think they should be an optional thing. For me mindfulness is more about taking the time to focus on yourself at that point and be present. And I guess saying things like ‘take time to notice this...’ is a way of grounding yourself and being present. I feel like this sort of thing would be quite a calming experience. So if you were to monopolise on that, and if you’ve got seating areas and things maybe say take 5 mins, and once you get to the seating area maybe have something there where you actually sit and it takes you through some breathing exercises. But not specifically say ‘breathe in for 5 seconds, breathe out for 5 seconds’. I don’t know, just something that’s going to help with that.

- So it could almost be something that activates when you’re in a certain part of the garden? Because there is a meditation space in the garden.

“Yeah! Cause that’s something you could also use during the day too I suppose”

- What about the tracking feature on the take home map?

“Again, maybe it should be optional. Like if it’s something that overlays on the map, then maybe you can have a checkbox thing, tick it if you want to see it or untick it if you don’t. It also depends on the size of the garden. I don’t feel like it’s something you need.”

- It could be optional in the sense that when you get there, the app might ask you if it can access your location. Cause if you said no, you wouldn’t get that feature.

“I feel like if it benefits you, or the people who created the garden to know what routes people have taken and how long they’ve spent in each area then its information that’s valuable. But valuable to the people who’ve created the system, not someone going round the garden.”

- What do you think about being able to select a default experience or a personalise-able experience?

“I think that’s good, as while it’s a calming experience, or at least I would consider it a calming experience, you might have someone going in who has Asperger’s or autism, any kind of sensory thing, and the option to be able to turn down the music if that’s too much would be good. I mean I get it, if the telly is on and the radio is on and someone is talking, I just have to get out of there, it’s too much at once. I can fully appreciate how even lights and music could be too much and overwhelming and could detract from the experience. So while I see it as something that sounds really nice, other people might see the lights and the music being too much all at once. So I think it’s a good idea to have the options to alter it.

- What do you think of the Gamification idea?

Until you knew what extra information you would give, if they allowed location tracking, that you wouldn’t give to someone who didn’t, I don’t really know how well that would work. I mean maybe you could have surveys, favourite plants in that area, or a quiz. I

don't see how it would be of value to only get more information if you've allowed location tracking. Until you know what it is you would be unlocking then I don't think I can give a good answer. You could maybe make it more exciting for kids that way? Like if a quiz opened up and said 'how many of these can you spot?', 'what can you see in this area of the garden?', they could select whatever flowers or plants they can see. But that would definitely be more aimed at kids. Again, that's a different audience you could cater for. Like if parents are trying to go with their kids, and their kids aren't excited about it maybe makes it a bit more interesting for them. I could see that maybe being a way of gamifying it.

- What about social media integration?

I think this would be useful. I use my google account a lot for logins, just for ease.

- Do you think that sort of integration would be good for sharing information discovered, like information stored in the 'Take-Home' map?

Yeah, cause again you're gonna have people that are not able to go, maybe they live in a different local authority. Like it's something I can imagine my auntie would like going to but might not be able to, so she would at least get to experience a wee bit of it if I could share it with her through the app. Maybe wouldn't be so necessary that way in normal times, but for just now when people can't go and do whenever it would be.

- What do you think of the idea of using boards in the garden for the information rather than screens? Would this be preferable or would you rather have screens, where information could be in video format?

I think what we talked about earlier, in terms of trying to make this an immersive experience, you don't really want people looking at their phones or at screens while they're going round. It takes away from the experience if you're constantly looking at a screen. If your signs (boards) are well enough lit and have enough information on them then I don't think you need screens for videos. I do think it would be useful to have the information in the 'Take-Home' map. I think if you were gonna have any kind

of interactive screen, video or anything, it would be better to have it coming up on the phone at the moment, because you don't want people touching screens and things right now. But I don't think you need either. I think this whole 'Take-Home' map with the extra stuff is the best route.

- What would concern you about this sort of experience? There are some things that have been considered like Covid-19 and the cold weather, is there anything else you can think of?

Well yeah the cold would be something. When we were talking about the mindfulness stuff and if people were sitting for five minutes or something, then you might want the space to be heated. That was the only downside I was thinking of something like that. If you were going to something like this in winter, you would probably be well wrapped up though. If you're not then that's probably your own fault.

- That's another reason for the short timeslots, people are probably not going to want to be out for too long.

Then if you are offering this space to sit and relax, you don't want people getting cold. Heating the mindfulness seating area is a good idea.

- Say restrictions were slightly eased, and say it was an option to go with people outside of your household, is that something you would want? If so, it makes a little bit less personalise-able.

I wouldn't mind the choice. If it was just my household then that would be fine, if it was with friends then that would be fine. I wouldn't really want to go and then five minutes later another group we didn't know came in. The fact that it can be personalised, I don't want to go in and someone else changes the music.

- It could perhaps be a part of the social media integration. Like you could invite someone to join your timeslot via social media?

You could, but you don't usually need to for that sort of thing, you would just meet them outside. But it could be helpful, maybe for like track and trace. It would be good to have the option.

- Do you have any questions about the system? Any flaws you've noticed?

I think I talked about most of them. Will it work on all phones?

- Yes, it will be cross-platform

Ok then I think that was all of it.

Appendix 4: Interview transcript participant 2

Details: Female, 24, NHS nurse, lives alone.

- Would an experience like this be a welcome addition to your life during Covid restrictions?

Yes definitely. I would definitely go. If I saw it come up Instagram, then I would think it would make a great date night. And it's totally private as well.

- Is that a good selling point for you? The fact its private and personalise-able?

Yeah, I wouldn't really want to be going with anyone else at the moment. And I like to play about with that sort of thing, like the part on the phone you can change stuff with.

- What things would primarily interest you about this sort of interactive experience: The outdoor music and lighting experience? The chance to learn more about permaculture? The opportunity to spend time outside the house during Covid-19 restrictions?

I like all of them, but for me it would be about the sounds and the lights. And I would go more than one time and make a little playlist for when I was there.

- Apologies, I may not have explained the music aspect fully. The music would be pre-determined choices. Do you think being able to play your own music when you are there would be a good feature?

Yeah! Like if it was close to Christmas you could play Christmas music. Ideally it would be set up to your Spotify. I think if it was an option then that would be great.

- Do you think learning about the permaculture side of things would be a good by-product of the music and light experience?

I think it would be interesting, but I'm not sure it's what would really draw people into the whole thing. Unless they already were interested in it. If you were going as a family, it would be great learning experience for the kids.

- Several different functions are being considered for the system. What do you think of the mindfulness prompts?

Yeah I love that idea! Like reminding people to smell the plants and that kind of thing.

- Well an idea another interviewee had was to just have it based in one area. There's a meditation space in the garden. Would you prefer to have it in one place or around the garden?

Well, I think cause it will be cold and dark people are not going to want to sit and do mindfulness. I think they'll want to keep moving.

- They also had an idea about having heat lamps in that space. What would you think of it then?

Yeah, I think that would be good. Cause you could explore around for a while and then have a sit and relax.

- What do you think about being able to select a default experience or a personalise-able experience?

I love it. Its like on your iPhone where it puts all your pictures together and you can pick a song for it. I think having being able to personalise it appeals more to me but I guess if people want to just get on with it then they could make it the default option.

- What do you think of the Gamification idea? In a previous interview we talked about making it for kids, what do you think about that?

Yeah it could be like a scavenger hunt, so you'd have things that say 'have you seen this yet?', or 'have you done this?', and the end if you get them all right it unlocks something maybe?

- What about social media integration? For logging in and sharing information?

I think I would probably use it for logging in, but maybe not the sharing. I'm not really interested in the permaculture stuff and I don't see myself sharing it around.

- What would concern you about this sort of experience?

Not a lot really, I mean it's quite wholesome. As long as stuff was getting cleaned you know? Like for Covid? But as long as other people weren't in there while you were there then that would be fine.

- Say restrictions were slightly eased, and say it was an option to go with people outside of your household, is that something you would want? If so, it makes a little bit less personalise-able.

If restrictions were lifted a bit, then yeah I'd probably want to go with my pals. If there were good lights and stuff then people would probably want to take some pics for Instagram. But that's not really the point is it?

- I guess the point is for it to be more of a personal, immersive, relaxing experience. But then if a way for you to do that was to with your friends, would you want that?

Well I guess so, I think the having the option could be good.

- Do you have any questions about the system? Any flaws you've noticed?

No, not really!

Appendix 5: Interview transcript participant 3

Details: Female, 58, retiree, lives with partner.

- Would an experience like this be a welcome addition to your life during Covid restrictions?

Oh definitely, in my case. I mean it would be ideal for me to get out to do something like that where I don't have to meet other people. I'm not shielding any more, but I have been and you do begin to feel a bit stir-crazy. We're lucky we've got a sizable garden, but you still want a change, a change of scene. And something that you could go to like that and you're not gonna bump into anybody and just enjoy it would be ideal.

- So the way that the concept is at the moment, where you go with your household and not with anyone else, that's preferable than going with others?

Oh yes, definitely. I mean I could see myself going with friends if things were different, but at the moment it would be ideal for me.

- What things would primarily interest you about this sort of interactive experience: The outdoor music and lighting experience? The chance to learn more about permaculture? The opportunity to spend time outside the house during Covid-19 restrictions?

Definitely a combination of all of those. The fact it would lead on to me learning more about growing my own stuff and how to manage it would be great. Its almost like bite-size chunks of learning because if you saw one particular aspect in the garden, you could follow through with that. You wouldn't need to try and take the whole thing on board. And to have something you could go back to (the 'Take-Home' map), it's not a 'once-and-you're-done' kind of app, you could think 'They had this, let me just look up and see what you did about that', you know you could keep going back to it. You try something and it doesn't work, you could back and try another aspect of it and see. With going to Incredible-Edibles, I've learned a lot over time, but I haven't come home after one visit and I'm an expert. You pick up tips and hints, so to keep revisiting an app like that would be good. And I think you would almost want to go again after a while, cause you're bound to miss stuff the first time.

- Would you want to see the app provide extra info on stuff that wasn't in the garden too? Or would it be better just to see information just about stuff that was in the garden?

I think you would want links to see how people do things. Like how people plant things, or how someone has caught rainwater. I think if it was just basic information on stuff that was in the garden that would be fine, but it's always better to learn by watching. Well, people have different learning styles, some people just do want to read. But if I want to learn how to take a cutting of something in our garden, I would look for it on YouTube and I would watch someone doing it. If there were lots of links, that would be helpful.

- Several different functions are being considered for the system. What do you think of the mindfulness prompts? In a previous interview we discussed having the mindfulness prompts in one area, the meditation space, with some heat lamps too. What do you think of that idea?

I think it should be an optional thing. If I was going round, I'd want to be able to sit for a mindfulness section. I think you'd want people to be able to close their eyes, sit and just listen for a while. If that was in some sort of undercover area that would be better. So you'd have the option or not to do that. I would certainly use that option. If you have a herb section where people could maybe crush a leaf and smell it, but then you're into touching things and you're trying to avoid that.

- What do you think about being able to select a default experience or a personalise-able experience?

Is the default where it would be when you first go into it? You could just not change it?

- That's a good point. So maybe it's not something that needs to be specifically in there as an option, but it could be set to a default until you started changing it.

Yeah, you could almost have a wee line of text that says 'These are the default settings' but still have the option to turn it up, turn it down and all that. Personalise the experience.

- What do you think of the Gamification idea? In a previous interview we talked about making it for kids, what do you think about that?

When I was a teacher we used to do things on trips to gardens and the kids had to find something purple or find something jaggy, that kind of thing. Kids love ticking stuff off. If there was something that they touched the phone to and it recorded something so that they could fill up a chart.

- Touching something with the phone could maybe work. It might work better than say, tracking the phone around the garden.

If it was something just to touch the phone to and it recorded the fact you'd been there or found the thing, herbs or whatever, and then you get something, I don't know. If you had a full house, so to speak, it could unlock something.

- Yes that's definitely been considered, the idea of unlocking something.

It could be a treasure box or something that opens up. I mean they're probably not getting anything, they're not getting on to the next stage or anything.

- Maybe something extra in the garden lights up. Like a wee treasure box like you said.

Yeah, like find all these things and it might be a wee animal figure that lights up or something. It wouldn't happen unless you found all of these things. You wouldn't want that to take over the parent's experience of the garden, if the kids are rushing about madly then the parents are not getting allowed to just wander through it.

- What about social media integration? For logging in and sharing information?

I'd probably use the login thing. I think the share stuff would be useful too. Quite often I'll be chatting to someone about something and I'll say 'I'll send it to you', so yeah you could have that. You could send stuff on and say 'this is what I was talking to you about, this is what we saw in the garden we were at'

- What would concern you about this sort of experience?

Well if it was a wild, horrible night I wouldn't want to go of course. What would happen then? Would I be able to cancel?

- Yes, that would be an option.

Ok yeah that would work. Cancel it and then maybe someone could take the slot if they wanted it? Or maybe if you weren't well, there needs to be an option to cancel the booking. I would go on a cold night, that probably wouldn't stop me. I suppose the security aspect of it too. I mean, no one else should be there but if it's just open, as a woman on my own I wouldn't go in the dark. In case anyone was lurking about.

- Do you have any questions about the system? Any flaws you've noticed?

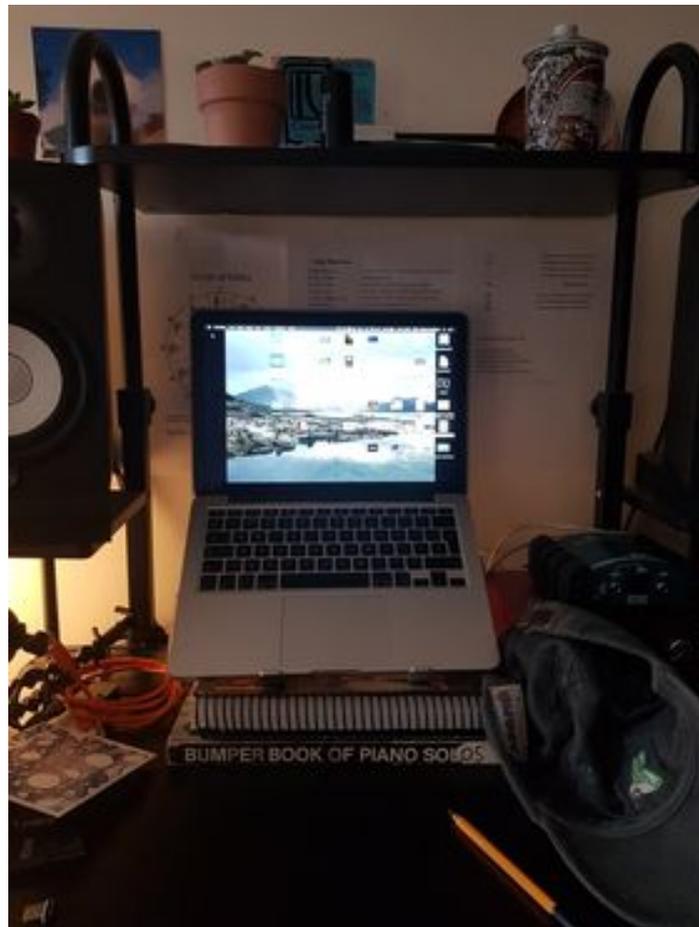
What there would be options for other languages? Just in case there were tourists visiting or something like that who wanted to go to it.

- That's a good point. Because all the information boards in the garden would be in English.

Maybe there would be numbers on each board, so you could say to the app 'Can I have board 14 in French' or something like that. I mean it's not a standout tourist attraction, but the option should maybe be there. Quite often with these things you get a language choice.

Appendix 6: Probe example

I'm definitely feeling a bit more deflated about the situation just now. Knowing I'll be spending evenings where I spend my whole days is a bit depressing, with no real option to do anything else. It's difficult to meet people outside just now due to the darkness and coldness. I tend to spend most evenings either working on my laptop or watching TV. I do get concerned about my mental health and how I'll cope over the next few months. Communication with friends & family over video helps, as well as engaging in activities like reading, playing music and cooking. I do feel like I'm getting a bit of the 'cabin fever' again, like I did a few months ago near the end of the first lockdown.



Appendix 7: Probe 1

Details: Female, 28, Creative advertiser, lives with partner.

Every day is pretty samey. I get up, I work, I eat, I watch something on my laptop and I sleep. I thought working from home was great but home should be a place you go for shelter and comfort, not somewhere you feel trapped in and a place you now associate with work. Because I'm not commuting anymore, there are days I don't go out of the house at all - it was ten minutes before but still! I've taken up running as an excuse to go out every other day and clear my mind. Yoga is also helping heal my broken computer neck and my forever anxious mind. We've been a bit irritable lately. The weekly takeaway has gone from something we are looking forward to, to something that has become the norm and therefore not so special anymore. I miss my friends. I miss my family. I miss live music. And I miss being able to enjoy every activity this city has to offer.

I'm on very much needed holidays at the moment. Even though there's not much going on in the city right now, I'm looking forward to having time during the morning to enjoy the daylight and go for long wanders - which is something I can never do during working hours - and especially, allowing myself some time out in the physical world.

Saying this, I also feel lucky I have a cosy home and someone I can hug without feeling careless.



Appendix 8: Probe 2

Details: Male, 26, Shop assistant, lives alone.

During lockdown I found myself spending far too many hours in front of my phone/laptop/tv screen. Now I am lucky to have a job which allows me to go out during the day and get away from it all a bit. I still find myself inside in front of a screen in the evening though as there is not a lot else to do. It's really frustrating to feel as though you have no choice but to stay inside, although I realise I'm lucky to even have that option! With the festive season approaching, I'm usually out with friends, out shopping or having dinner so I feel quite isolated being unable to see my friends at all of an evening. I regularly walk my dog in the evening to help feel less trapped in my house and more connected to nature, which helps me feel more hopeful that this won't last forever.



Appendix 9: Post-interview survey and results

Q1

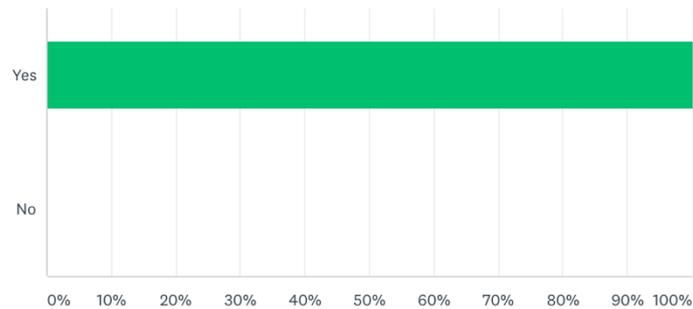


Customize

Save as ▾

Were you made aware the interview would be recorded?

Answered: 3 Skipped: 0



ANSWER CHOICES	RESPONSES	
▾ Yes	100.00%	3
▾ No	0.00%	0
TOTAL		

Q2

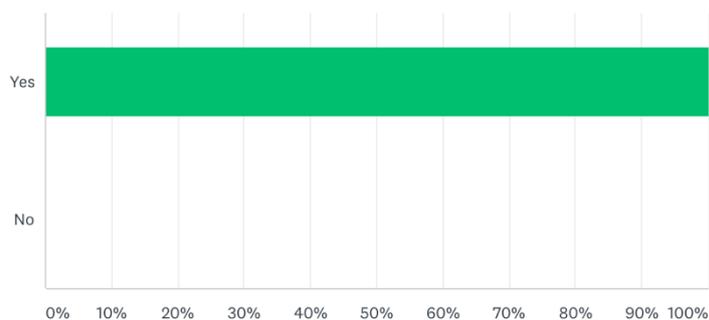


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Were you made aware the recording would be used for transcription and not be made available to anyone but the interviewer?

Answered: 3 Skipped: 0

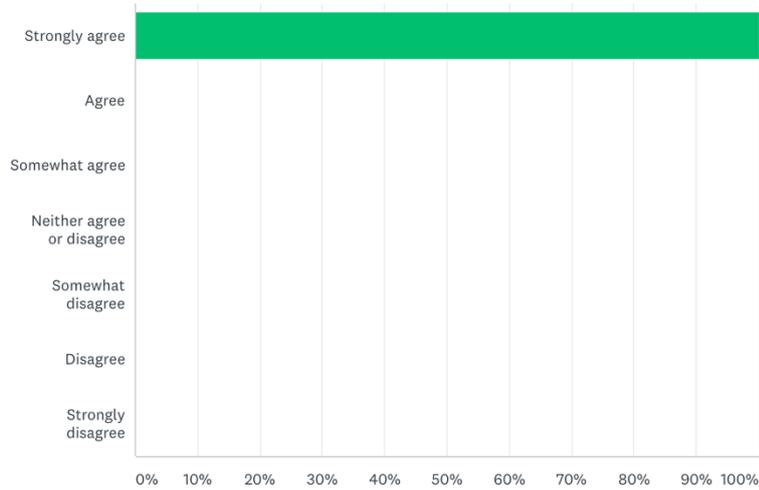


ANSWER CHOICES	RESPONSES	
▾ Yes	100.00%	3
▾ No	0.00%	0
TOTAL		3

Q3

Do you agree the interviewer made you feel comfortable and free to voice your opinions throughout the interview?

Answered: 3 Skipped: 0

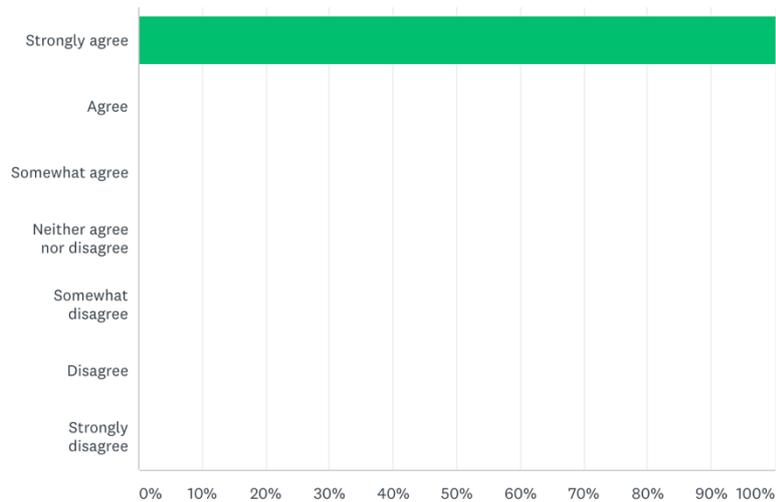


ANSWER CHOICES	RESPONSES
Strongly agree	100.00% 3

Q4

Do you agree that the interviewer was able to verbally describe the 'LightUp!' experience to you in a way that helped you understand how it would work?

Answered: 3 Skipped: 0



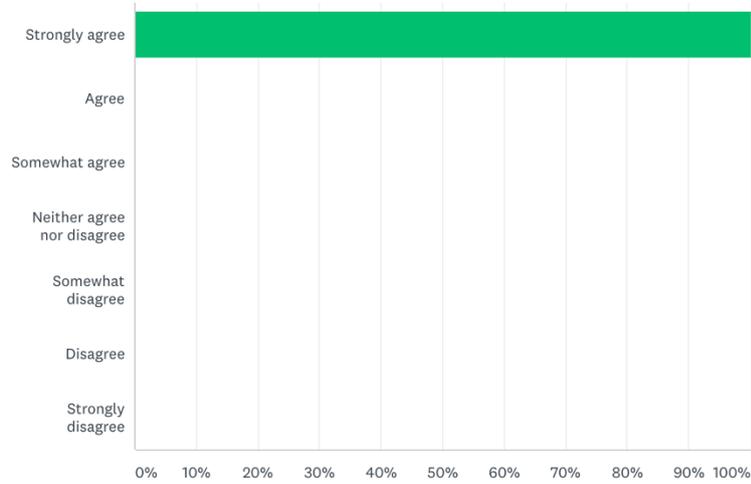
ANSWER CHOICES	RESPONSES
Strongly agree	100.00% 3

Q5

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Do you agree that the supporting materials (The storyboard and the moodboard) helped to facilitate your understanding of the 'LightUp!' experience even further than the verbal descriptions would have on their own?

Answered: 3 Skipped: 0

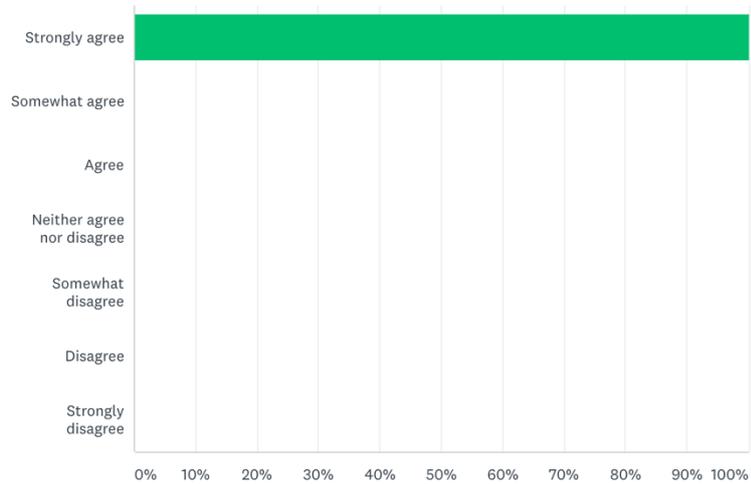


Q6

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Do you agree that all of your questions about the 'LightUp!' experience were answered by the interviewer?

Answered: 3 Skipped: 0



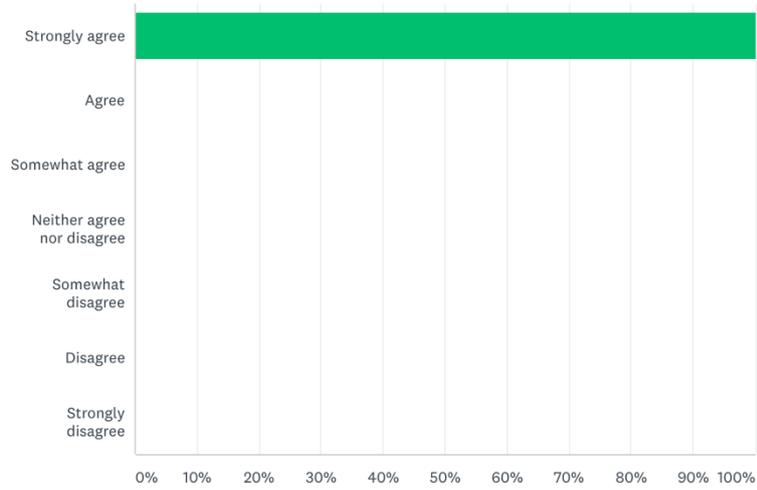
ANSWER CHOICES	RESPONSES
 Strongly agree	100.00%  3

Q7

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Do you agree that you felt your ideas and opinions about 'LightUp!' were listened to and noted?

Answered: 3 Skipped: 0



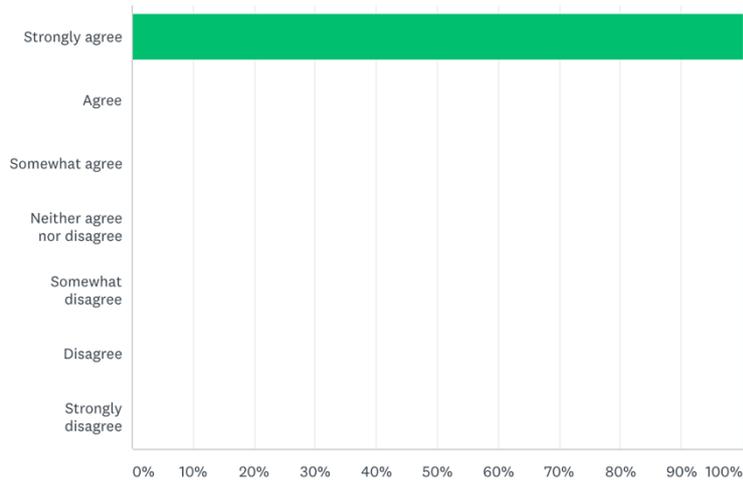
ANSWER CHOICES	RESPONSES	
▼ Strongly agree	100.00%	3

Q8

 Customize  Save as ▼

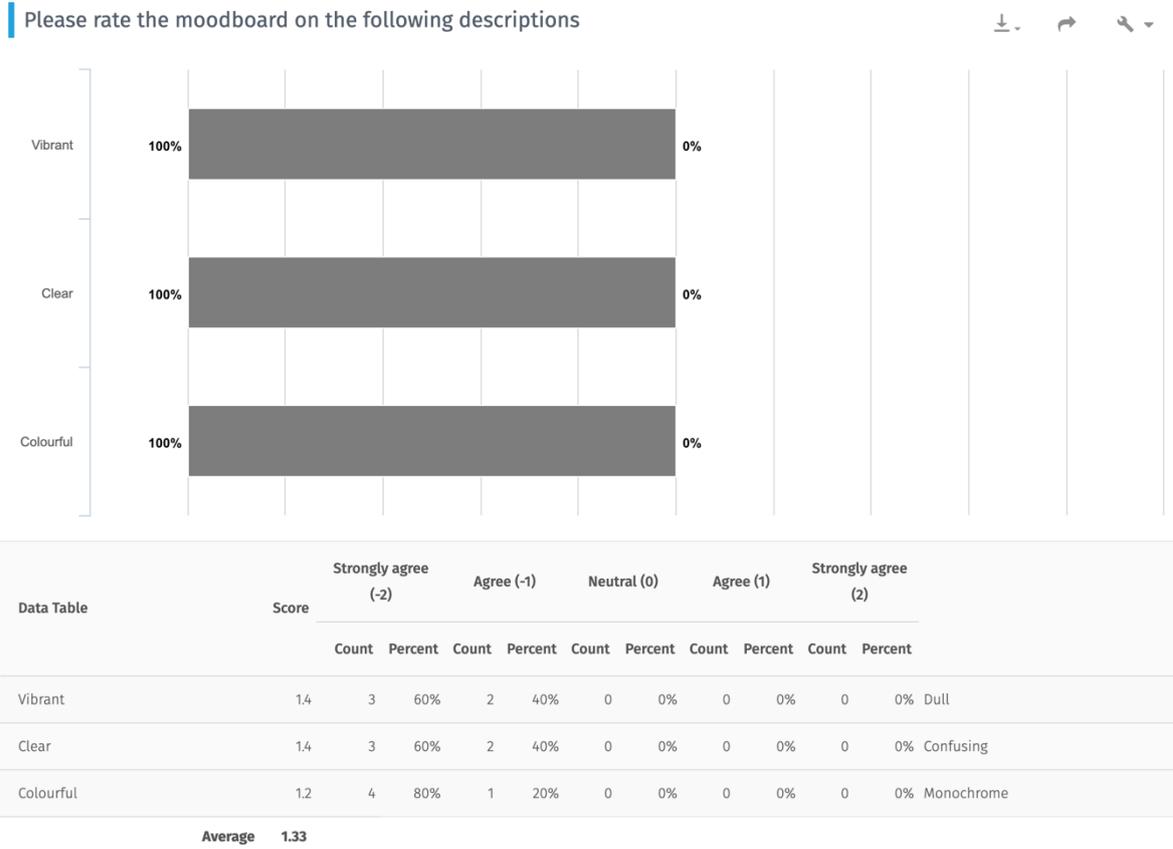
Do you agree that you left the interview feeling like you had a made a positive contribution to the development of 'LightUp!'?

Answered: 3 Skipped: 0

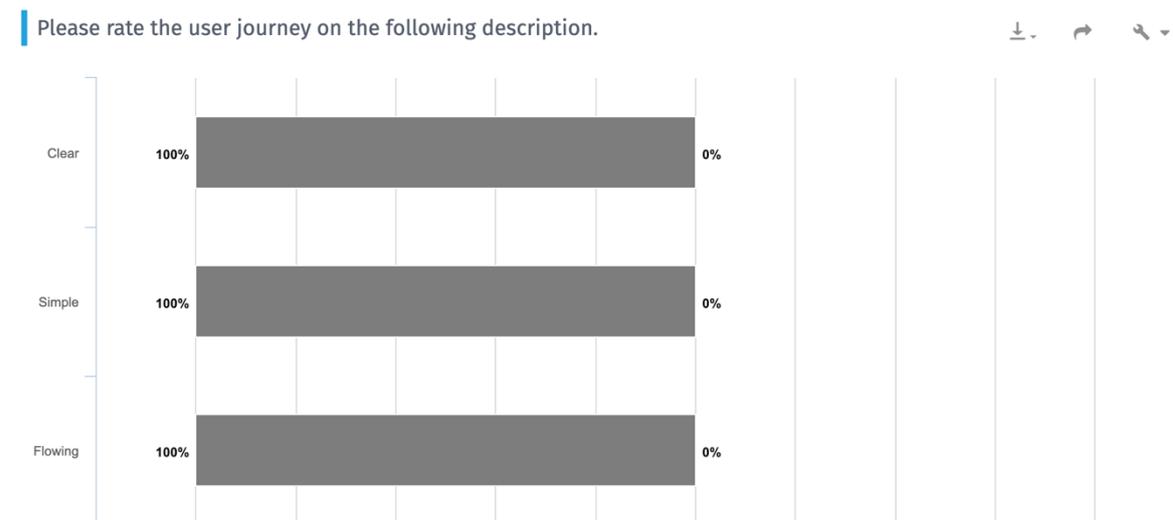


ANSWER CHOICES	RESPONSES	
▼ Strongly agree	100.00%	3

Appendix 10: Moodboard semantic differential results



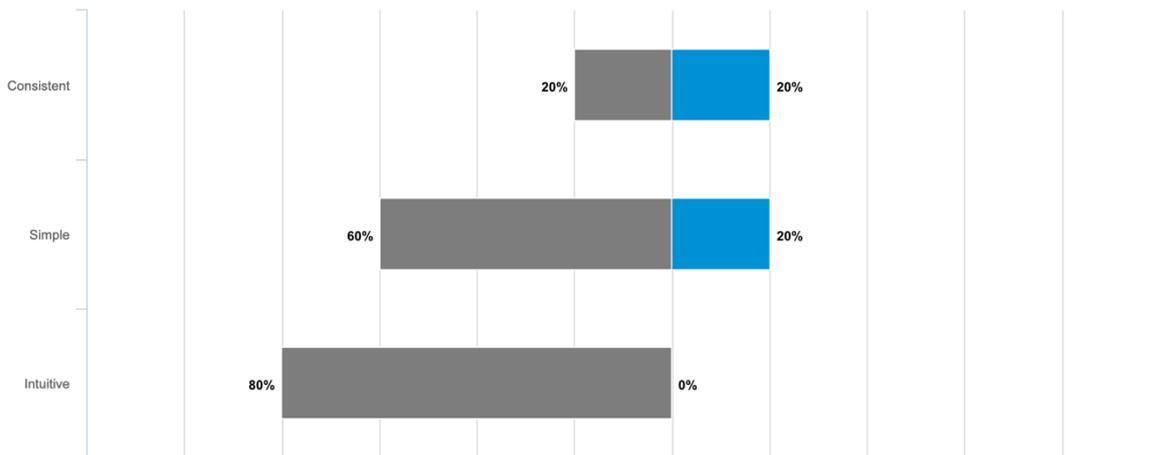
Appendix 11: User journey semantic differential results



Data Table	Score	Strongly agree (-2)		Agree (-1)		Neutral (0)		Agree (1)		Strongly agree (2)		
		Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
		Clear	1.4	3	60%	2	40%	0	0%	0	0%	
Simple	1.4	3	60%	2	40%	0	0%	0	0%	0	0%	Complex
Flowing	1.4	3	60%	2	40%	0	0%	0	0%	0	0%	Stilted
Average		1.4										

Appendix 12: Wireframe sketches semantic differential results

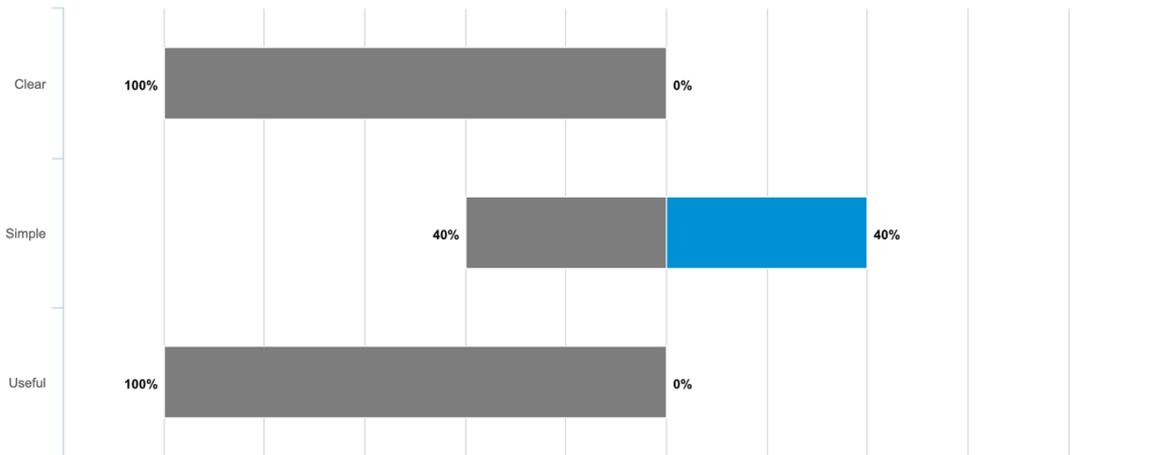
Please rate the sketch designs on the following description.



Data Table	Score	Strongly agree (-2)		Agree (-1)		Neutral (0)		Agree (1)		Strongly agree (2)		
		Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
		Consistent	2.8	1	20%	0	0%	3	60%	1	20%	
Simple	2.2	2	40%	1	20%	1	20%	1	20%	0	0%	Complex
Intuitive	1.8	2	40%	2	40%	1	20%	0	0%	0	0%	Confusing
Average		2.27										

Appendix 13: Technological model semantic differential results

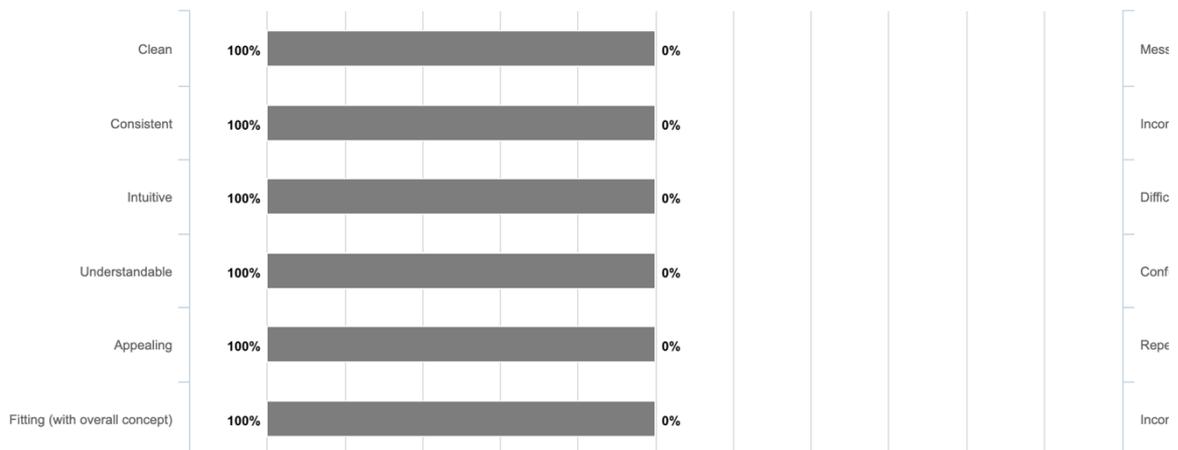
Please rate the technological model on the following description.



Data Table	Score	Strongly agree (-2)		Agree (-1)		Neutral (0)		Agree (1)		Strongly agree (2)		
		Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
		Clear	1.2	4	80%	1	20%	0	0%	0	0%	
Simple	2.8	1	20%	1	20%	1	20%	2	40%	0	0%	Complex
Useful	1.4	3	60%	2	40%	0	0%	0	0%	0	0%	Useless
Average		1.8										

Appendix 14: Concrete wireframes semantic differential results

Please rate the Wireframes on the following descriptions.



Data Table	Score	Strongly agree (-2)		Agree (-1)		Neutral (0)		Agree (1)		Strongly agree (2)		
		Count	Percent	Count	Percent	Count	Percent	Count	Percent	Count	Percent	
		Clean	1.2	4	80%	1	20%	0	0%	0	0%	
Consistent	1	5	100%	0	0%	0	0%	0	0%	0	0%	Inconsistent
Intuitive	1	5	100%	0	0%	0	0%	0	0%	0	0%	Difficult
Understandable	1	5	100%	0	0%	0	0%	0	0%	0	0%	Confusing
Appealing	1.2	4	80%	1	20%	0	0%	0	0%	0	0%	Repelling
Fitting (with overall concept)	1	5	100%	0	0%	0	0%	0	0%	0	0%	Incongruous (with overall concept)
Average		1.07										

Appendix 15: SUS statements

Question	Count	Score	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I think that I would like to use this system frequently.	5	1.6					
I found the system unnecessarily complex.	5	5					
I thought the system was easy to use.	5	1.4					
I think that I would need the support of a technical person to be able to use this system.	5	5					
I found the various functions in this system were well integrated.	5	1					
I thought there was too much inconsistency in this system.	5	5					
I would imagine that most people would learn to use this system very quickly.	5	1.4					
I found the system very cumbersome to use.	5	4.8					
I felt very confident using the system.	5	1.2					
I needed to learn a lot of things before I could get going with this system.	5	4					

Appendix 16: UX questionnaire results

Overall, I feel that the 'LightUp!' system is:

