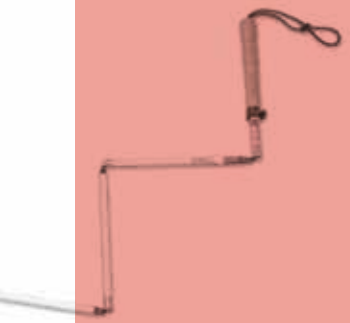
experiencing ***the moment***

Enhancing surroundig awareness when walking



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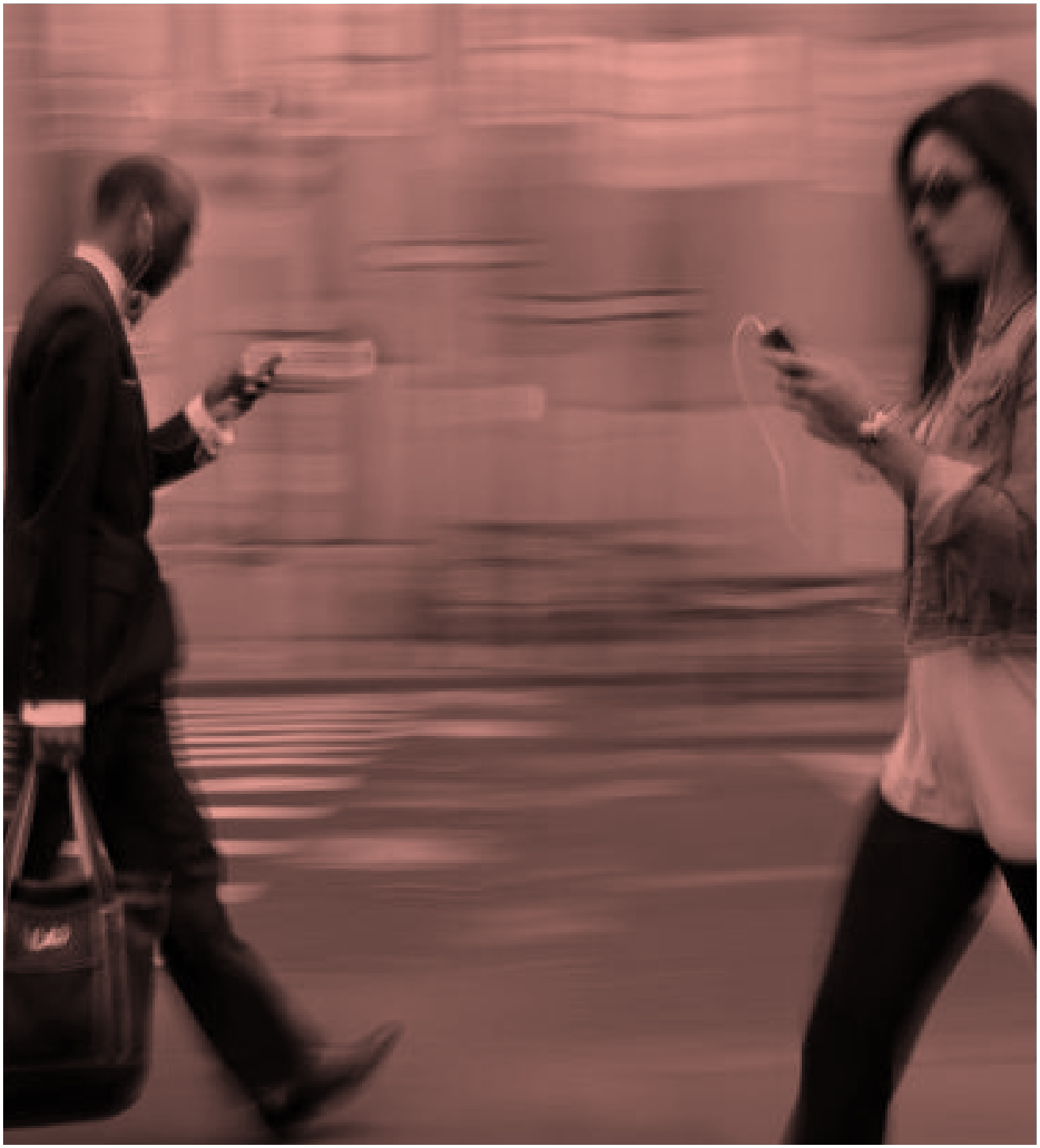

Abstract

Todays technology provides the ability for people to interact with devices at all time. This ability brings big advantages, but it doesn't come without a drawback. When interacting with devices people get so immersed with the content on the screen that they sometimes completely loose touch with their surrounding, regardless if being still or moving.

The aim of the project was to explore how might we bring peoples attention back to the surrounding by rethinking the way we interact with devices when walking in an urban environment.

The human centered design approach led me to the understanding that the biggest add on that technology brings to people when used on the go is guidance. However the research pointed out that the current interaction type with devices is making people constantly gaze down at the screen in order to seek reassurance if on the right path, which is preventing them to embrace what is actually happening in their surrounding.

Therefore this project explored alternatives to the current way of providing guidance while walking. In the project I approached the issues of current interaction type by trying to design in the context, rather than design for the context. This design approach led to several iterations of prototypes that were tested with people in the context of guiding while walking and led to findings that were based on observations and feedback gained from people.

The findings are showcased in a form of concept that introduces a flexible multi modal guidance system. The system provides the ability for people to focus on their surrounding by guiding them with visual cues or haptic feedback rather than screen interaction, as well as provides the ability to recall the guiding information with a tap gesture. The information is provided in a way that eliminates the need to stop-to-interact to gain route information and gives people the ability to focus on their surrounding while walking.

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Introduction

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Initiating observation

What sparked the interest for this thesis topic was seeing how people constantly interact with their smart phones when on the go and seeing how it effects their attention to what is happening in their surrounding. I felt that the issue at hand are not people, but the way people can interact with devices. It felt that the interactions with devices were not designed with motion in mind and that is causing the issues.

The interaction with devices today feels similar to the way we use our desk computer, but for those we are static; meaning sitting down at a desk. But today we see people walking around blindly staring at their smart phones and therefore not being aware of their surrounding.

Hence what I wanted with this project is to explore how might we rethink the way we design interactions based on the context of use, for which I have predefined walking in a city landscape.

Project scope

In my thesis project I looked in to the context of using devices while walking in the urban environment and how does that affect peoples surrounding awareness.

In order to gain that understanding I posed a few questions in hope to get peoples perspective on the issue which helped me narrow down the scope of the project.

I looked into **WHY** people interact with devices when on the go, **WHAT** are the most common use cases, tryed to understand **HOW** does using devices while walking make them feel.

The research findings narrowed down the scope of the project to navigation and continued with exploration of alterantive ways of providing guidance. The aim of the project was to find a way to guide people without taking their attention away from the surrounding and was therefore focusing on interactions that would not involve screen interaction while walking.

The design process led to designing in context where various prototypes of guiding with different modalities were tested with people while walking. The project resulted in a guiding concept involving various modalities and fulfilled the aim of non screen interaction with the system while walking.

Goals & Wishes

Goals

My project goal is to explore interaction principles in order to find the best interaction type for devices when walking, that would bring people closer in the moment, rather than take them away form the actual world with the type of interaction.

I hope the end result will be a product solution that would showcase the benefits of a design approach that is heavily based on the context of use, rather than technology first. The result should therefore focus on a specific use case scenario, where the focus is on interacting with a product while on the go in an urban environment without hindering peoples surrounding awareness.

Wishes

During the project I wish to explore human behaviour and try to understand(and in the end also showcase) how big of an effect technology and interacting with devices has on the society today. I want to talk with people(visually impaired, teenagers,..) to gain bigger insights on what benefits technology brings to them when walking and would also like to immerse myself in various experiences that could help me create a better understanding of what makes us more/less aware of our surrounding.

I hope the design process will allow me to build prototypes that would led me to bigger understanding of how might we incorporate context of use in the design approach. I wish to prototype and validate with people a lot along the process, experiment with em- bodied interactions and in the end present my findings through a use case scenario(potentially a video format) that would show how people could interact with technology while fully experiencing their surrounding.

Collaboration partners

During the thesis I have been looking for feedback from:

Danny Stillion, Partner and Executive Design Director at IDEO Palo Alto
Gaetano Ling, Senior Product Designer at IDEO Palo Alto
Teachers and external tutors at Umea Institute of Design, Sweden

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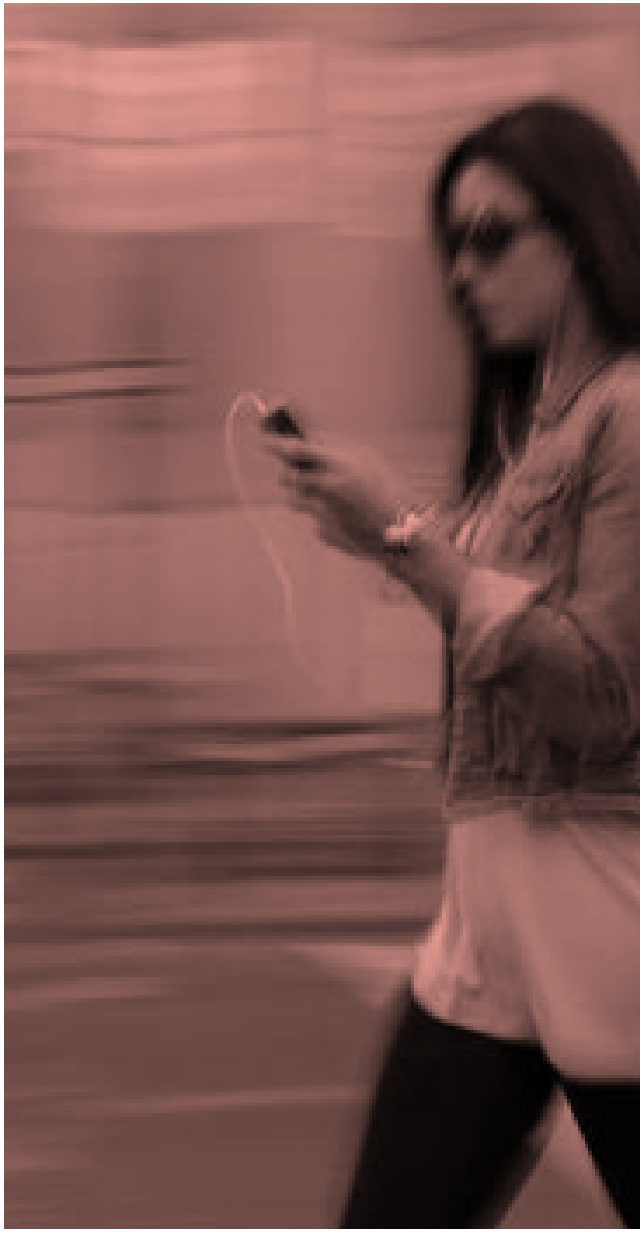
Background

Background



Relevance for society

The way we are accessing the digital world has a big impact in our daily life. Everyone is carrying a smart phone in their pocket through which people are granted access to the vast amount of information and at the same time allow to be interrupted at any time.

Smart phones provide such an attractively easy access to information, that people developed the habit of excessively checking their phones without conscious self-control. Due to the constant stimuli provided by smart phones, the condition response is to immediately use such devices to gain the “reward” effect. Notifications are sometimes even intentional by the design of the applications. The intent is to nudge people into looking at their smart phones in order to gain profit(Harris, 2016) for companies, but all of this can result in attention disorder(ADHD).

The effect of constantly looking at our phone creates a cognitive overload and prevents people to interact with their surrounding. The result is visabe in changes in visual behaviours (e.g., minimal glances at traffic lights), vehicle performance, reaction time, and reduction in speed. The technology has a big impact on our attention when we are still, but even greater when on the move, since it can affect pedestrian safety through the impairment of looking behaviours and detection of roadside events or through the inability to maintain a certain direction while navigating obstacles. The issue is that the human brain can only pay attention to about three things at a time and concentrate effectively on just one of them(Nobre, 2010). It can feel as though we are constantly absorbing information from the world around us. But in reality we are focusing on just a few key features. Applying this knowledge to the problem of using the phone while walking, it makes it clear why accidents are inevitable. When people look at their phone, their brain is physically incapable of consciously attending to anything else(tunnel vision). Whilst walking and looking at the phone’s screen, people are incapable of acquiring concurrent visual information from the fovea (central part of the eye which provides the highest level of visual acuity) of the surrounding environment to guide locomotion. This results in pedestrians walking slower, deviating more from a straight line or changing direction more, and demonstrating reduced situation awareness and/or in-attentional blindness.

Whilst usage of phone in the vehicle has not been allowed in the majority of countries for a while(drivers response time slows for around 37,5% (far more than after marijuana or moderate alcohol use)) laws are slowly being applied to pedestrians as well due to the rise of traffic related accidents due to mobile phone use(Approximately 62% of Americans report using their phone whilst ‘on the go’). Analysis of NEISS for emergency departments between 2000–2011 identified 5,754 cases of emergency department admissions related to mobile phone use and the numbers just keep rising each year.

Previous attempts to address the issue

With recent concerns about smartphone-related accidents, actions related to smartphone usage have been implemented in public in a few countries. In the state of New Jersey (USA), city planners decided to anchor traffic lights to the road so that smartphone users can be more visually aware of the changing lights as they stare at their devices. In Chongqing (China), a walking lane was especially created for pedestrians glued to their smart phones. Finally, Korea initiated a pilot project in which safety signs were installed to warn the public about the danger of smartphone-related accidents. Some urban authorities are even thinking of installing smart kerbside sensors that alert the phone-obsessed who are about to step into oncoming traffic. While cities like Ontario(CA), Honolulu,.. banned the use of mobile phones when crossing the streets and will fine pedestrians who do. These actions tie into united nation sustainability development Goal 3 that is tackling the issue of global deaths and accident that are caused by traffic incidents. To which as mentioned the usage of mobile phones while walking contributes, by taking peoples attention away from their surrounding. There is a need to do something to reduce the usage of screen interaction with phone while walking or rethink the way people could interact with phones while walking in order to insure the UNSD goal of halving the amount of road traffic accidents by 2020 and with that ensure healthy lives and promote well-being for all ages.

There is a clear correlation between the use of technology and our attention to the surrounding which can lead to serious accidents. Therefore we, or mobile technology, need to evolve. Dr Joe Marshall, HCI specialist from

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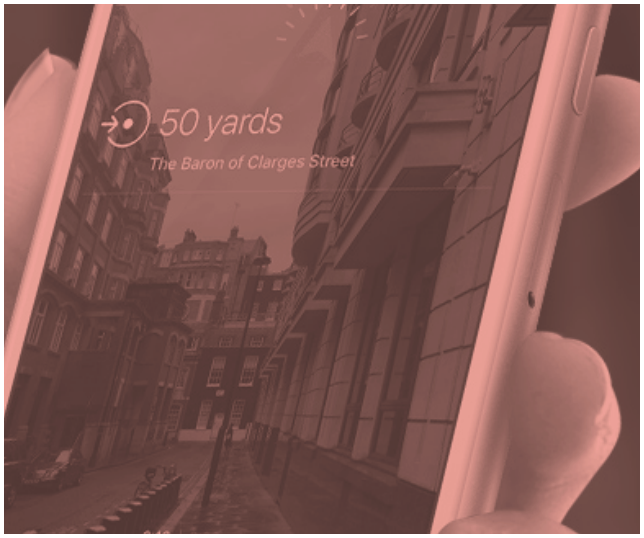
the University of Nottingham, says that it's not necessarily people who are to blame - but the phones themselves. "The problem with mobile technology is that it's not designed to be used while you're actually mobile. It involves you stopping, looking at a screen and tapping away." He believes that if we want to stop people being distracted by their phones, then designers need to completely rethink how we interact with them. But so far, there is no completely satisfactory alternative.

Interacting in motion

Existing research point to a conclusion that current mobile device user interfaces are primarily based around people stopping and visually attending to a touch screen at any point they wish to interact with the device. These mobile systems are so called "stop-to-interact"; designed for active interaction only when a person is standing still, paying visual and mental attention to the device. However, people are increasingly carrying and using devices while undertaking a wide range of movement activities, such as walking, cycling, running. Of course there are many applications that present data to the user without forcing them to use



a screen, such as music, navigation instructions and the audio from phone calls. However, this is typically a one way transfer, with the screen being used to stop calls, change how music is being played, or set the navigation instructions. When interacting with a mobile device while being mobile, it is assumed that the user has two underlying tasks, firstly to engage in locomotion(walking, cycling or driving) and secondly to perform an interaction with a digital system. The recent history of mobile device interaction design has very much been a journey from special purpose devices (e.g. GPS navigators, heart rate monitors etc.), to a small, general purpose computers which are extremely portable. Designing for interaction in motion may in some ways conflict with this. (Marshall and Tennent, 2013)

The highlight of the papers is that the interaction varies based on the purpose; is the main intent of the product to get to a certain location(navigation system), is it for increased awareness of surrounding, increased awareness of our body(Fitbit, Apple watch, etc.), is it to reduce the frequency of taking the phone out of the pocket(notifications, interruptions, messages),... When interacting with mobile devices people concur challenges such as increased cognitive load, physical constrains, terrain constrain and presence of other people. As designers, we cannot ignore the reality of devices we use; we should either design to support locomotion use cases, or perhaps consider how our designs can encourage users not to do so in the case we judge it to be too risky since people might use them regardless and this is what we have seen.
(Marshall, Dancu and Mueller, 2016)

The mentioned approaches for designing interactions for a specific purpose(in this case locomotion) have been assessed by the design society. Some of the products have already been implemented on the market, while some of the mentioned are research prototypes.

Google maps, illustrates how different locomotion activities place different constraints on the interaction - In walking mode, the interface is largely unconstrained, and users can browse maps, search, and use navigation freely. In driving mode, the phone must be mounted on the car and operates basically as a car satellite navigation device - the user is given strict instructions only to touch the screen whilst not driving, so can only follow turn by turn directions or use voice commands to search for a new destination. It is also possible to use turn by turn navigation for cycling. Google maps announced AR version of maps(May 2018) and has started private testing(Feb 2019), which would help people with orientation and finding shops, bars, etc. through the usage of the phones camera in order for people to not look down at the floor.

Augmented Reality has been used before in smartphone walking apps, such as Type-n-walk, that displayed the camera video feed so the person could see where he walked while texting. It has been used to add value through locomotion and made people play games like Pokemon-go, Ride-On, etc. in the real world, but unfortunately didn't foresee the potential negative effects such as pedestrians walking on the road and being hit by a car, falling down the stairs, hitting a street sign, etc.

"Crash Alert" was a research prototype that used phones-mounted sensors in order to detect oncoming obstacles and displays on-screen information relating to these obstacles.

"Skin display" concept for BlackBerry from Special Projects projected a snippet of a text message on the persons finger when reaching for the phone, so the person could see a glimpse of the message and than decide if he wanted to take out the phone and see the whole message.

Smartwatches, such as the watches powered by Android Wear OS, Pebble Watch and Apple Watch are primarily devices that show notifications on the user's wrist, and notify by sound or haptic feedback of events like messages and incoming calls.

The likes of "Google glasses", "Intel Vaunt glasses", "North Focal Glasses" etc. optimise the information feed to the user so they don't have to glance at their phone to get the information, but receive them in a car like HUD. A small screen on the periphery of the user's vision is used to show notifications and information such as navigation directions. Voice control allows it to take input. Glasses require a shift in visual focus for interaction versus locomotion, which may take time away from both.
Accessing assistants via "voice control" through commands like "OK google", "Hey Siri", "Alexa" take a way the need of looking at the phone and getting the information, but they are restricted by environment noise and require a constant network connection.

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Google/Levi's Jacquard project was a take on a specific task of accessing Google assistant via the jacket sleeve, but didn't consider that the person should have both hands on the bicycle handlebar in order to safely commute in the city. For the person to indicate the interaction with the assistant the user has to take one hand off the handlebar.

A good use case example where they were building on peoples actions was the audio tour app "Detour(recently acquired by BOSE(unfortunately has shut down))", where they mixed visual & audible feedback based on the persons GPS location. The app is utilising smart phones embedded technology in a way that brings attention to the person when discovering new places via audio narration and nudges users through "sound interaction" to do a "stop to interact" action to access the additional layer of information through the "screen interaction" and in some instances adds delight through a 'head-up' AR interaction style. However that is only one app I came across and wonder, if there are ways of using a similar approach that would help people in their daily life(pedestrian safety) and adding delight when appropriate in urban environment.

Based on the existing products that tried tackling the biggest issue of designing for interacting in motion is that it is harder to design a successful interaction method for general purpose interaction during movement than for a specific activity. However failure to design systems with movement in mind may increase risk of both interaction problems and unsafe device use and is therefore needed to take into consideration when designing new products.

Designing for better surrounding awareness

What I found while conducting desk research was that when people move; regardless if it is for navigation or for entertainment or sport, awareness of our surroundings is important and we should design in a manner to be able to support it. Therefore I feel that as designers we should first and foremost look into existing interaction modalities: haptics (touch), sound (voice), vision (sight), and movement(gesture) that are supported by the existing products at the starting point and define what type of interaction would suite the context of use best.

The question that puzzled me was, if bringing another product to solve the issue of peoples surrounding awareness would be beneficial only for a specific activity or could it be used for various contexts of use? Therefore I started thinking what should the interaction with devices on the go be like and how might different interaction patterns enhance peoples experience of the surrounding?

And since I started generating more questions that answers I decided at that point that it's best to take a step back from desk research and start involving people in my project. This led me to in depth interviews with people that helped me understand how interaction with products on the go enhances their experience the most. Based on those findings I than defined the context in which I pursued the project further.

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Methodology

Methodology

In my thesis project I followed human cantered design approach where people were involved throughout the whole design process. Having people involved in all the steps helped me gain richer insight on how people interact with devices when on the go, what really matters to them and understood what type of interaction would be appropriate for the context I was designing for, based on user observation and the feedback I got from people.

Design research

In-person interviews, Expert interviews, Online surveys & Shadowings helped gain bigger understanding of why people interact with devices when on the go and how does it contribute to their well being. The project started by conducting in depth in-person interviews and an online survey was ran on the side in order to provide bigger number of responses. This process of combined qualitative and quantitative research helped narrow down the scope of the project to navigation & guidance since it was the most highlighted feature.

In addition to getting in touch with people and gaining insights from their perspective I immersed myself in the experience of being guided through first hand experiences. This approach led me to experience guidance from a perspective when not having sight, to getting guided in a completely new environment by conducting field research and conducted several other immersive experiences that helped generate ideas.

Synthesising research findings

Collected insights from interviews, online survey results, observations, shadowings, and immersive experiences were cross referenced and put into common buckets that led into forming of guiding principles. The technique helped form an understanding into what makes people reach for their device and interact with them while walking as well as narrowed down the scope of the project to navigation, where I would be focusing on creating reassurance for people when being guided, so they could focus their attention to the surrounding.

Ideation

Based on the research insights and synthesis the generated ideas were clustered and compared with the defined guiding principles. In order to gain bigger perspective a brainstorming workshop with designers was conducted. This technique validated initial findings and ideas as well as contributed to new solutions that were further developed prior to testing with people.

Prototyping - Designing in context

Due to the context of the project the still process of generating ideas had to be quickly abandoned and the ideas had to be prototyped and tested in the actual context of guiding while walking. In order to validate and further build on ideas I had to involve people, since I could not guide myself and could only assume how the idea would work(designing for the context). The initial ideas were prototyped through various Wiz-of-Oz techniques and tested with people. This technique sped up the process of understanding what ideas had to be abandoned due to them not working in the context and what ideas had a potential to build on, based on positive user feedback.

The approach of designing in the context with people led to back to back prototyping, testing & refining of ideas that essentially led to two most prominent directions and a formation of design principles that I felt were needed in order to create a guiding system that creates reassurance & with that gives the ability to explore while being guided.

Refining and concept direction

In order to further refine the most prominent directions were tested in an outdoor setting since they were previously tested in an indoor environment. This approach was crucial to validate if the ideas would work in an actual open outdoor setting, which was essentially the context I was designing for.

The prototypes were refined based on previous findings and were adapted to the outdoor setting. Several tests were conducted with people that participated in prior tests. They were presented to the refined ideas one after another as well as in a simultaneous manner(multimodal guidance).

This approach helped me focus on testing and refining the ideas by observing how people responded to the prototypes in a new testing environment(bigger distances, longer test times, etc.). The prototypes were build in a manner that allowed quick modifications on the spot and had various pre-designed interactions that were mandatory due to the unpredictability of the environment. Testing in the actual context of guiding outdoors was crucial and led to findings that could not have predicted otherwise.

The tests provided crucial understanding of what was most important to people in order to set the hierarchy of information right and to fine tune the interactions together with them. This last step helped fine tune the interactions and brought the concept to a more detailed stage.

Communicating

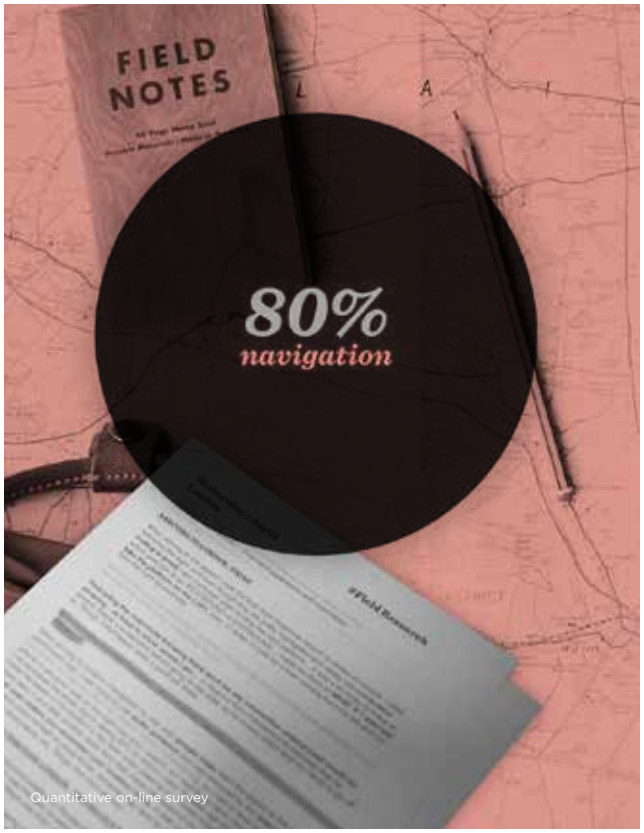
In this stage of the project I was focusing on communicating how a designing in context can have a positively impact on the end solution and how can it benefit the society.

In order to do so I decided that the findings will be showcased through a video format. In order to do that I had to build a system blueprint and define all the needed interaction points with the multi modal guiding system. The concept video will present how peoples attention to the surrounding could be maintained if the interactions with the system were designed with the approach of designing in the context. To further highlight the importance of this design approach a video of existing interaction types with devices while walking will be shown as well.

Research

Research activities

In this part of the project I wanted to gain a bigger understanding from peoples perspective on how technology and interaction with devices on the go effect their surrounding awareness. In order to do so I wanted to involve as many people as possible. How I went about doing that was by conducting an online survey, conducting in-person interviews, talked with experts in the field of mobility design, conducted two shadowings and immersed myself in various immersive experiences to get in pair with all the learnings I gained by talking with people and try to experience them first hand. All these activities helped me gain a bigger understanding on what devices and interacting with them mean to people when on the go and helped narrow down the scope of the project to navigation & guidance.



Quantitative on-line survey

Initial survey based exploration

The survey resulted in 50 responses from people in age groups 21 -62 from all around the world(interestingly enough the result were pretty consistent and didn't vary based on peoples location or age). The survey consisted of 10 single-choice, multi-choice and open ended questions focusing on peoples experience when interacting with devices when walking.

The most interesting results of the survey was that **80%** of the people responded that they mainly use their device(smartphone) for the purpose of navigation, while the other use cases like listening to music(26%), communicating(25%) or capturing moments(22%) were following in lesser numbers and other available options even lesser.

The second most interesting result was that **60%** of people responded that they continue to walk while interacting with their device, **48%** responded that they stop to interact and only a few(**8%**) responded that they use voice commands in order to interact with their device while walking. What was very interesting there was that a lot of people in the survey and later on in the interviews responded that they don't want to interact with their devices vocally when in public spaces.

The survey also showed that people are aware that the way they are interacting with devices is taking their attention away from the surrounding by giving answers such as **"The phone somehow limits the experience of the surrounding"** and that they therefore try to interact with it as little as possible while walking. This also lead to a second big insight that the majority of people responded to the question of **"how would they like to interact with their device?"** would be **"in a way that it doesn't make them look down(at the screen)"**.

I feel that the biggest learning from this survey was the tension between the benefits that devices bring to people when walking (providing them guidance when navigating) and the negative effect of not being aware of the surrounding, which is a result of the way they are interacting with the devices. The survey really helped me narrow down the scope of the project to navigation & guidance since that was what people highlighted the most. This helped me formulate further activities in the research phase.

Qualitative interviews

I conducted over 18 qualitative interviews with various people and gained rich personal insights on how people orient themselves in the surrounding while walking and how does technology contribute to their spatial awareness. Since I didn't have a defined user group I wanted to involve as many people as possible to see how their view on guidance and technology would vary.

I was fortunate enough to get in touch with people from different age groups, managed to get insights from extremes, people that have hampered vision(visually impaired and blind people) and teenagers(smartphone addiction) as well as get valuable professional insights from experts that work in the field of mobility.

Visually impaired & Blind

To gain inspiration about other ways of guiding beside looking at the map or screen I talked to those that rely on guidance the most - visually impaired and blind people. I asked them how they orient themselves and if technology helps them along the way. From interviewing them I learned how senses other than sight could be initiated to create better spatial awareness. My interviewees 1 visually impaired and 3 blind people(one expert in assistive technology, and one guide dog owner) highlighted the need for knowing where one starts the journey and what a person is facing in order to be able to find way back as well as highlighting the need for constant feedback (In their situation getting haptic feedback from cane or a guiding dog) in order to have the reassurance of being on the right path. Another finding focused on how the guiding information is delivered; it appears that descriptive information such as landmarks or other visual cues are better than metric units. The most important for me was to learn that "hearing = seeing" what means that if a blind persons hearing is obscured they loose the sense of surrounding awareness, same as if a person that can see focuses their sight away from the route and surrounding(e.g. looks down at the phone).

Research activities

People inteviewed in qualitative interviews

Teenagers

The second group of people I managed to get in touch with were 4 teenagers(12-15y.o.). I approached these interviews by asking what makes them interact with their phones when walking and how they go about doing that. What I found interesting during the interviews was that they were all completely aware that interacting with the phone while walking is completely taking their attention away from the surrounding and mentioned that they are doing so in order to create a "safe space" for themselves, in other words to block themselves from the surrounding. However they than mentioned that the biggest advantage that they feel their phone gives to them is navigation or guidance when in an unknown environment. However the also noted that the interaction with them makes them look down and they loose track of where they were going(where they are, what they have passed), due to blindly following where they are on the map in order to get reassured that they are on the right way. This finding and them telling me that they prefer orienting by being told where to go(with visual cues) correlated with what I heard from blind people and really made me understand that what is important when guiding is the reassurance one has in the guide and how one is being told where to go.

Millennials

To gain an even bigger perspective on how people view orientation, guidance and how technology contributes to their surrounding awareness I talked with 5 individuals that have either travelled for an extensive period of time of moved abroad for work. Since I was conducting these interview on-sight in London I also took the advantage of having the ability to shadow two of the interviewees on a daily commute to work and when exploring a new part of town. During these activities I started seeing patterns in how people perceive their surrounding and what helps them orient. They all noted that navigation system helps when in a new environment, but at the same time mentioned made them loose attention to their surrounding, while orienting themselves around landmarks were more impactful and memorable, so they started using navigational systems on their phones only when in rush with time(e.g. going to work, meeting a friend). This led to one of the most important finding, which was "value of time".

People that I spoke with all mentioned, that how they have experienced their surrounding was completely and utterly depending on the available time.

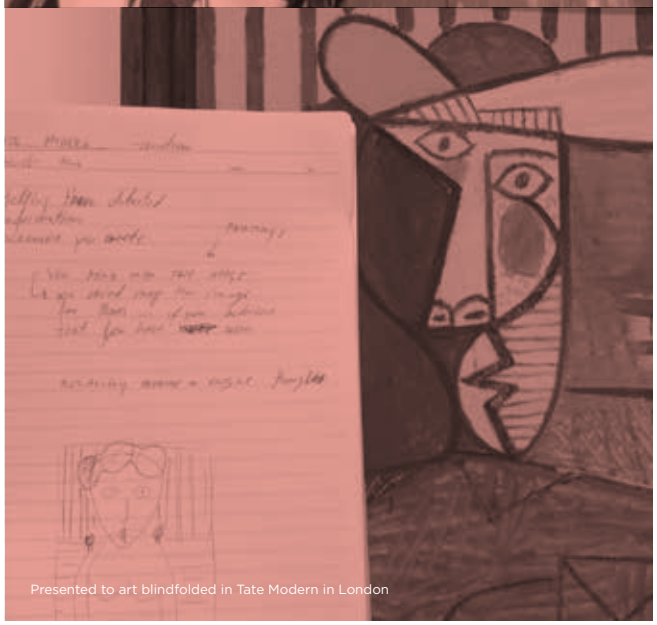
Experts

Since my research findings were pointing to navigation more and more I managed to remotely reach out to design experts in mobility in order to see if there were any parallels between my project and what was done in the space of navigation in the mobility industry. What I was keen to find out was that their findings based on years of research matched my findings based on talking and observing people. The experts mainly pointed me out to how the information is being presented matters, since studies showed that people relate to and remember visual cues better than map based systems, due to human precision and just the basic knowledge that navigating by visual cues makes people look up, which also ties back to Ancient Polynesians way finding(knowing the first turn and where you come from, gives the sense of knowing where you are going). What was also highlighted was the importance of time when it comes to latency(when the information is presented) and that the journey type and with that the experience of the surrounding heavily relies on the available time. The last thing that was pointed out and I found super important and a thing to build on was hearing that multi sensorial experiences heighten peoples awareness and forming of memories.

Key findings

Research activities

Guided blindfolded by a guide dog for blind in Umea



Presented to art blindfolded in Tate Modern in London

Immersive Experiences

A really big part of my research phase was gaining first hand experiences out on the field. Hearing so many different stories and personal experiences from people made me realise that I had to experience being guided and explore a completely new surrounding in various ways in order to understand how one experiences different type of guidance and hopefully validate some of my findings and get inspired along the way.

One of the things I tried was trying to take away one of the primary senses(sight) in order to understand how that would make me experience my surrounding, what would make me reassured when being guided, etc. How I went about doing that was by trying to orient myself with a cane, be guided by a guide dog, experience eating in full darkness and even experience being guided through Tate Modern blindfolded and being presented to art.

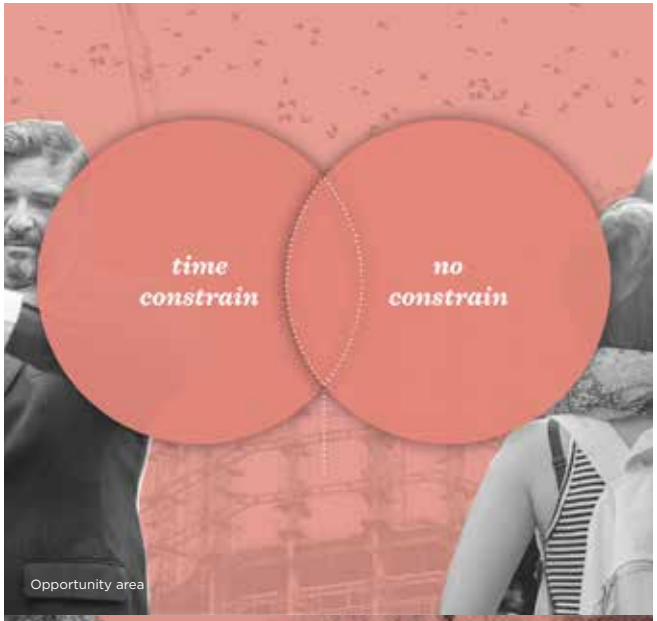
In order to understand how I would experience different ways of being guided in a new environment led me to fly to London. I chose London because I was not familiar with the city as well as it providing other immersive experiences I couldn't have experienced in Umea(Tate modern, Eat in the dark,..). I tried using different systems to navigate and explore a new city and see how I would experience being guided with different modalities. How I went about doing that was by using existing available technology and tried out phone navigation systems by looking at the screen(Google Maps, Citty Mapper, Apple Maps, etc.), to using headphones and try being guided with only audio(where I couldn't recall the information so I had to divert back to the phone to get reassurance), to using a smartwatch(provided just the basic info so I had to go back to the phone), I tried AR navigation apps as well as tried an immersive audio guided tour app "Detour". In comparison to that I tried being guided through the city in a more traditional way, by being guided by a friend, used a paper map, used public transport, joined several tourist guided tours(walking, bus, boat).

I managed to enrich my experiences even further by visiting a video game exhibition(V&A museum) where there was a visible contrast in how people engage with their surrounding when using controllers(heads up) vs. games that uses touch screens(heads down). I also went on a Harry Potter guided tour where the guide was using narrative from the movie to guide us and compared the scenes from the movie with the real world by bringing in the scenes from a movie at the location via an iPad.

My biggest learnings from all these different experiences was that in order to freely explore a person needs to be in a mindful state when being guided, and in order to have that the person needs to be aware of the time and have complete trust in the guide. Feeling a constant pull from the guide dog for example gave me that trust, while I didn't get that constant feedback, for a navigation app either through my headphones or watch, which made me constantly look at my phone. I quickly realised that I was constantly seeking feedback when using a navigation system, which prevented me from looking up and be active in the surrounding.

Another really big learning and at the same time validation was experiencing the importance of how the information is being presented. Being told to turn SW or continue walking for 250m by navigations apps made me question my sense of surrounding awareness, while being told by a friend to turn at a landmark or the words being used when I was presented a Picasso painting when blindfolded made me create a picture in my mind and with that created an understanding of what I will be looking for and walking up to. The words created a sort of a visual mindmap that created reassurance.

Research phase analysis



Opportunity area

Project direction

In order to define the scope of the project and define the direction for next phases I had to synthesise the vast amount of information gathered through desk research, online survey results, gather all the rich insights I got from talking with people and experiences gathered during my field trip to London and first hand experiences in Umea. This activity lead me defined a set of directions to follow in the next phases and set a potential opportunity area I than further explored.

Synthesising findings

I approached going through the vast amount of information by downloading each interview and each experience on the day of the interview/experience. This exercise of noting down the best quotes, observations,.. and putting them on a board helped me be very selective in picking out the main findings as well as making it easier to see the big picture later on in the project by having the findings in-front of me. I quickly saw how all the gathering information from various sources were overlapping and that helped me form “how might we questions” which direct me throughout the research and also helped narrow down and bucket all the findings in a HMW questions.

The findings led me to understanding that **getting reassurance** is what makes people reach out for their device and interact with them while walking,. When looking into what else is needed in order to get people more aware of their surrounding apart from reassurance was time. This led me to understand that the type of the journey or the context of it is really important. Another finding was that people first need to be aware of their surrounding before they start the journey in order to have surrounding awareness and last but not least how the information(where to go) is presented defines how people will experience the journey.

Guiding principles

Based on the research findings I formed “4 guiding principles” to go back to when forming and validating ideas.

1. **REASSURANCE** The system needs to create reassurance(complete trust like when being guided by a guide dog, so people wouldn’t constantly look down at the phone to get reassured that they are on the right path.)

2. **VALUE OF TIME** How we perceive our surrounding varies based on the time we have available(more time = exploring, less time = get me to end destination asap).

3. **GUIDE LIKE A HUMAN** It’s not important how you get to the place, it’s how you get told. Being told how to get to a destination is different if you are being told by a person than how you are being guided by a device(e.g. navigation application).

4. **SET THE STAGE** People need to be aware of their surrounding before they start the journey. People need to know if they are facing the right direction, so knowing what should be in front of them or on their side matters (Know where you come from and all the rest will fallow).

Opportunity area

Observing how people can be guided and how technology can help along the way made me realise that current products for navigation mainly focus on providing information on how to get from place A to place B as fast as possible and don’t provide the ability for people to explore their surrounding while being guided. However I also found that the main issue for people not being attentive to the surrounding while being guided is the interaction with products. It seems that it was not designed with locomotion in mind, but designed with stop-to-interact approach, meaning that peoples attention is taken away from their surrounding each time they feel the need to get reassured if on the right path, by having to look at the phone(map).

These findings led me to a **potential opportunity area** of creating a system that would allow people to explore their surrounding in the time they have available, while being guided in a way that would not ask for their attention.

What led me to this opportunity area was understanding the importance of time and how it defines how a person is experiencing their surrounding, and at the same time understanding the importance of being able to interact with the system in a way that it doesn’t make a person stop-to-interact. The system needs to provide reassurance and not just directions in order to create mindfulness that is needed for surrounding awareness.

5.0

Ideation

5.1

Generating ideas

Generating ideas

In this part of the process I wanted to generate as many ideas as possible in order to find different ways of creating reassurance without having to look at the screen as well as generating ideas on how to guide, but still let explore. What helped guiding me along the process of generating ideas was a how might we statement I formed in the previous phase: **HMW** create reassurance and with that bring people in the moment so they can freely explore while having limited time.

Cross referencing ideas with guiding principles

Developing initial ideas

I started off the ideation phase by looking at the journey of a person. Where and how does a person start the journey, when does the journey ends and what happens along the way. In this part of the process I decided to focus on the middle part of the journey, where a person is already on route, but needs to have trust so he can freely explore the environment. Hence I started of the ideation focusing on how might we create trust.

I went through the ideas I generated along the research phase and were building on top of them and started putting them in groups that were based on the formed guiding principles. This approach made me quickly learn that there was an overlap, where the formed ideas related to more than just one principle.

However the ideas gathered in the bucket devoted to creating reassurance were mainly focusing creating trust with different modalities, mainly trying not to involve a screen. The majority of ideas were focusing on audio and haptic as a way of guidance.

While when it came to creating ideas of creating better understanding of the surrounding, these ideas brought together the bucket for guiding like a human and setting the stage. Since the formed ideas were heavily focusing on the finding: in order to know where one is going the person needs to understand what is around him where they start, and the language in which they are being presented the information with. This led to generation of several ideas that were looking into guidance with narration and visual cues.

Time was an overarching theme throughout all the generated ideas, which led back to my HMW statement and the opportunity are that I defined prior to the start of this phase.

Forming ideas into groups and the seen overlapping made me understand that I can't focus only on the part of the journey where the person is already walking, but also have to look into how the person is presented with this new type of the guidance since there is a need to first create trust in the system.

Brainstorm workshop

In order not to get stuck or start developing initial ideas into prototypes prematurely I reached out to the UID community in the later part of the first week and conducted a brainstorm workshop where I have asked fellow designers to generate ideas which would try to respond to two HMW statements.

HMW create trust when navigating without looking at the phone? & HMW subtly nudge people to go off the path and experience something new?

The workshop provided several new ideas as well as provided validation for ideas that were formed before. After the workshop I used the same technique of grouping ideas into buckets and cross referenced them with the guiding principles.

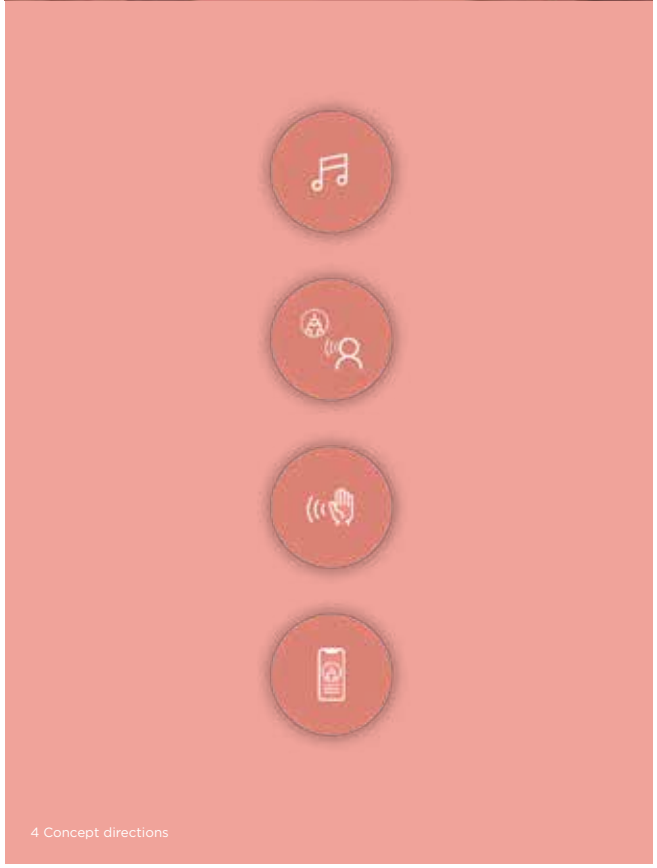
The add on to the bucket for creating reassurance were the ideas that weren't focusing on creating reassurance by providing feedback from the system with different modalities, but were focusing on how the person could ask for reassurance(tap on the phone, ask with voice, etc.) and in what way the person would be provided back with the information. This idea really resonated with one of the findings from the research phase, where a person told me "the issue with being guided with audio guidance is that one can not recall(ask to hear it again) the information, while one can always see the information on the screen".

Guiding like a human and value of time formed a common bucket since time became more prominent in majority of ideas and connected with how a person is being guided; again mainly by focusing on visual cues and narration. However there were several ideas that used both narration and value of time, such as the idea that the person shouldn't be told that he took the wrong path, but should simply be re-routed to a new path, while the system should make sure the person gets to end destination in time.

There were also several ideas that referred back to latency of information, focusing on time and movement. This really made me think of when is the right time to provide information to the person, should it introduce information depending on the persons walking pace(walking fas = don't inform because there will be more created anxiety). As well as how should the information be presented; meaning in what tone in order not to create anxiety.

Generating ideas

Brainstorm session & defining interaction points



4 Concept directions

Another really prominent idea that resonated well with the research findings was step by step guidance.

And similar to the first grouping of ideas the last grouping here was again focusing on how a person is being presented to the system and to the surrounding. What matters is the language and the words that are being used in the beginning that create trust in the system. Hence I again got a confirmation that I will not be only focusing on the part of the journey where the person is already walking, but will also have to focus on the on-boarding or as I formed it with a guiding principle on setting the stage.

Interaction points in the journey

Prior to diving deep into building and prototyping ideas I made a **"journey interaction flow"** where I mapped out the needed interaction points during a persons route in order to create reassurance. I primarily looked into existing navigation systems that are mainly focusing on screen interactions and noted on how many occasions a person need to stop and look at the phone or glance at it while being guided to get reassures that on the right path, on the other hand I found that there is another point where a person is interacting with the system, and that is when receiving information about a route change e.g. which normally informs a person with haptics, but still the person needs to look at the screen in order to see the information.

After looking into screen interaction points in the journey I mapped out potential needed interaction points if one was using different modalities than visual(screen)... creating hypothetical interaction flows for the most prominent 4 directions. This made me wonder if one modality is enough to create reassurance when guiding and providing additional information when needed. This activity made me think that using only one modaluty could obscure the persons attention to the surrounding due to a sometime forced type of interaction mode that is not optimal for the context.

Mapping out needed interaction points made me realise that I will have to focus not only on the interaction points during the journey, but will also have to focus on the step prior to starting with the journey. It seems as the over arching principle was VALUE OF TIME, which defines how a person will approach the journey, SETTING THE STAGE is crucial to create trust in the system and raise awareness of the surrounding prior to the start of the trip(On-Boarding), while GUIDING LIKE A HUMAN and creating REASSURANCE were mainly focusing on the interaction with the system while being guided.

Defined concept directions

The result of these activities formed several ideas of guidance that pointed out to **4 directions of guidance**, that I have set to ideate in further and test in an actual context of guidance. The first direction I wanted to test out was guiding with **sound**, second was using **narration** to guide people by focusing on visual cues with both audio and visual interfaces, the third type of guidance I wanted to test was guiding with **haptics** and at the same time test how would people interact back with the system by using embodied interactions and lastly that I will also have to focus on introducing these new interactions and will most probably have to incorporate needed **screen interaction**, but at the same time haven't fully discarded the use of screen to navigate at that time, so I intentionally left that option open in case my test findings would point me to the need of a screen to create reassurance(the primary focus was to still create reassurance without involving the screen while walking).

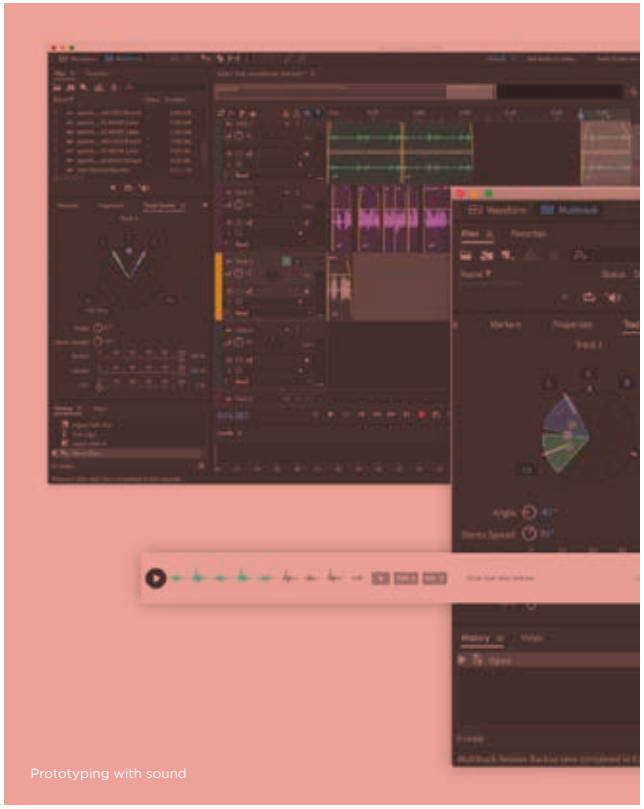
5.2

Prototyping and validatin ideas

Prototyping and validating ideas

In order to validate and further develop the generated ideas I had to put them in the actual context.

Designing for the context of guidance made testing and validating ideas on my own literally impossible, and would lead to a lot of assumptions if I were to design in that way. Therefore it was mandatory to involve people in the design process. This approach let me to quickly test the directions that were defined in the ideation phase through a series of prototypes. In the first round of prototyping I tried guiding people with sound, music(binaural recordings), haptics, narrations, etc. In order to do that I had to prepare different interaction patterns for specific actions, had to build a scenarios for guiding, create on-boarding animations to introduce new type of interactions/guidance,..



Prototyping with sound

Guiding with Sound

Learning from how people are being guided with sound(especially referring to blind people(hearing = seeing)) and also experiencing it fist hand formed several ideas already in the research phase and was highlighted the most prominent modality for guiding during the brainstorm workshop.

This led me to look into theory about sound, how it travels, how do people perceive different tones, etc. I started experimenting with different sound with the use of software's such as Adobe Audition, Audacity, Launchpad, Massive, etc. in order to try and simulate bi-neural recordings in hope I'd be able to define interactions(controls) with sound that would make people turn left, right, continue walking, stop,.. however sitting down and trying these tests on my own and with fellow classmates didn't yield sufficient results since we were static. This proved the hypothesis I made in the beginning of the project, that the interactions should be deigned not only with context in mind but in the actual context.

This of course meant a lot of planing and figuring out how to even approach designing new type of interactions and how to prototype them to be tested in movement. After seeking advice from a sound designer Andreas Estensen I decided that the only way to go about prototyping is to just try it. I gathered all the prepared sound material and tried guiding people by controlling them via a bluetooth headset connected to my computer through which I was playing and manipulating sound.

I conducted several test that all yield results and made me build on top of the findings.

Guiding with a song

In this test people were guided by following the sound. I simulated bi-neural recording by changing the directionality of where the test participants heard the sound. When the song stopped it meant they had to stop, when I changed the pitch to the left they would have to turn left, etc.

The biggest learning from this test was that people were focusing so much to where the sound was coming from that they were completely unaware of their surrounding. The second big learning was the importance of latency of when information is presented. In this situation based on the intensity and speed of changing the pitch people responded differently; some turned extremely fast and some missed the turn since they were either not focusing enough or just couldn't tell where the sound was coming from. Another thing I understood from the test was that even though hearing the song provided constant feedback from the system it didn't provide full trust in the system and has not only taken away peoples attention to the surrounding by focusing too much on the sound, but also preventing them from hearing sounds from the environment, which would further isolate the person from the environment.

Guiding with sound scapes

Based on the learnings from the first test I tried guiding people with sound scapes. The participant would hear the sound only when approaching the turn and would hear from the direction they would have to turn to.

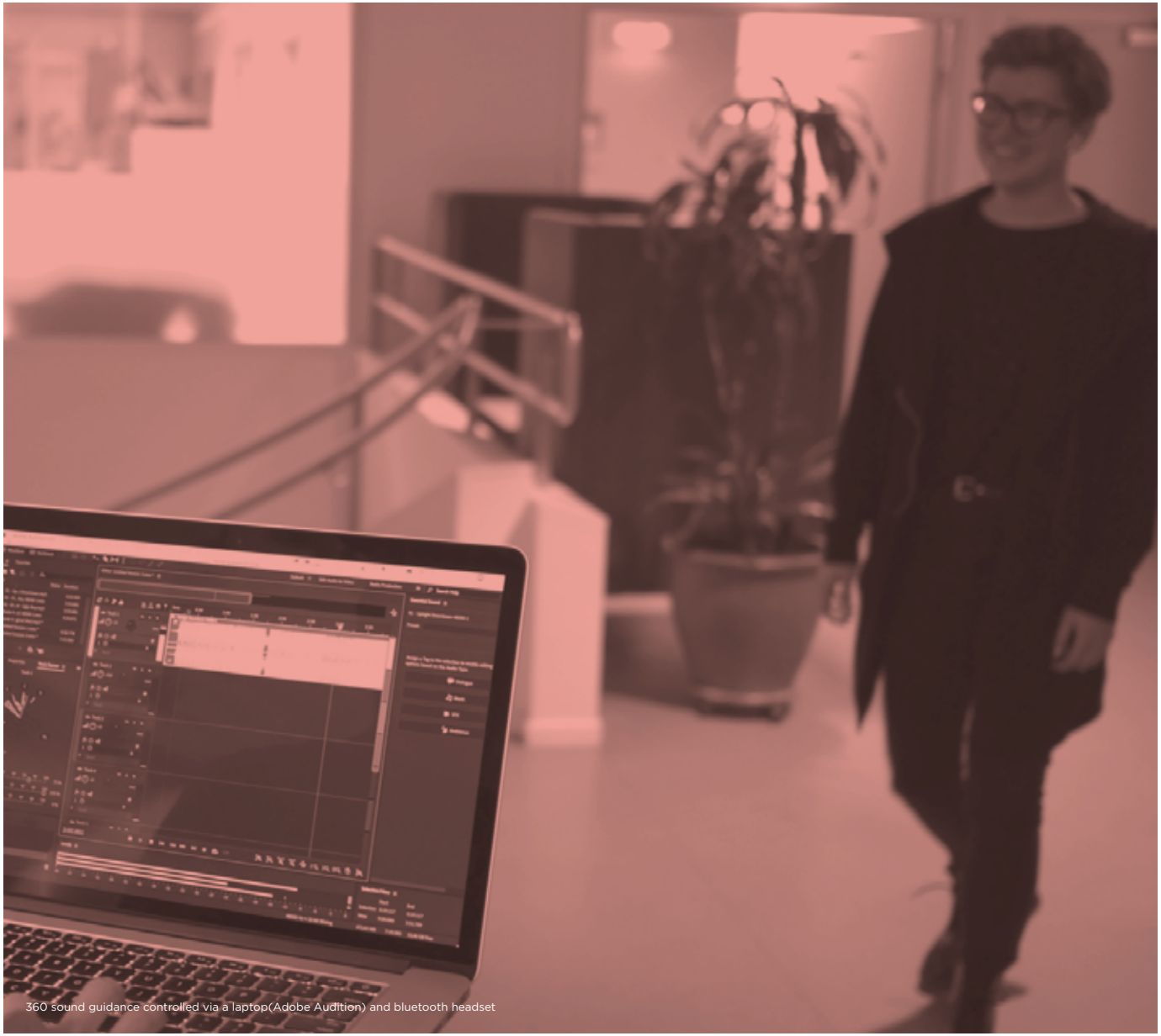
I quickly learned that walking in silence while waiting to hear a sound that would initiate a turn made people less attentive to their surrounding. The reason behind that was they were focusing their thoughts on hearing the information when to turn and where therefore weren't attentive to the surrounding with other senses. What this test confirmed as well was that directing with sound coming from a certain location(left/right) can be confusing and makes people wonder if they heard the song from the right direction. This made me understand that guiding with directionality of sound is not the efficient way to guide.

Guiding with a song + direction change command

Since I learned that guiding people by pitching sound was not effective and created more confusion than assurance, I tried a different technique where I introduced pre-recorded narration to direct people at the turn, while still using music to give people reassurance when walking(when they heard a song it meant they should walk and when it stopped it meant they are not on a right path).

The result of this test was that this type of guidance was more effective and less confusing. Using a voice saying "you will take the next available turn" prior to the actual

Prototyping and validating ideas



360 sound guidance controlled via a laptop(Adobe Audition) and bluetooth headset

turn confirmed that the information needs to be presented prior to the turn in order to create a more guided feel and was perceived better than being told “turn left”at the turn. These learning tied to my findings about the importance of latency as well as the importance of language that is being used for presenting the information.

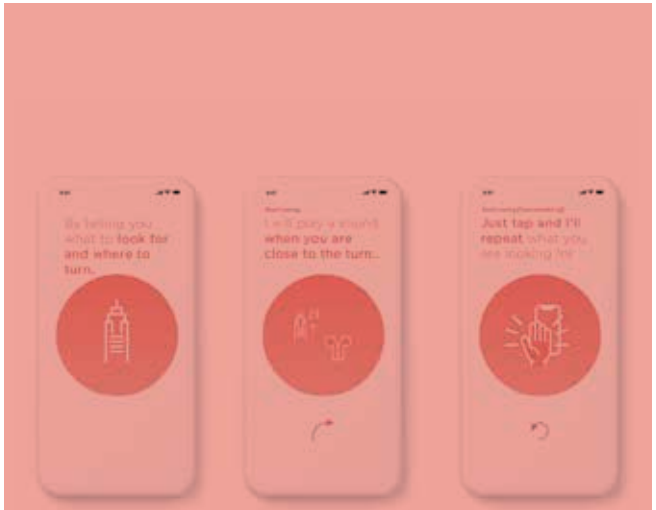
Overall guiding with sound test findings

These test were very sufficient and made me quickly understand the importance of designing through prototyping in context. I learned from each test and each iteration, which made me quickly build on my learnings.

The main learnings were that focusing primarily on one sense to create guidance takes so much attention from the person that they can not freely walk about and enjoy their surrounding. When the information is given and in what way confirmed the importance of time as a design material when guiding people and made me realise that the information should be given on the way to the turn rather than at the turn. Almost the most important finding was that there is a need to have the ability to interact with the system to create the reassurance if on the right path, rather than having to wait for the information or having an overload of information. This last finding resonated with one the findings during the research phase, where an interviewee mentioned “you can always go back and re-see where you have to go, while you can’t ask the system to repeat the turn you should take if you heard it via headphones”... so having the ability to recall information is really important.

From a prototyping and testing perspective my biggest learning came from an issue of not being able to fully experience what and how the test participants were receiving the information, because I controlled the experiment via my computer through visual commands, while participants heard the sound from the bluetooth headset. I felt detached from their experience, because I didn’t hear what they were hearing, therefore I had to completely rely on their feedback and observation. Even though I have pre defined the values prior to the test, I still felt it would be much better if I could experience what they were experiencing in order to be fully in pair with them. That was one of the key findings that I tried bringing in to next tests... try the prototypes on yourself and if possible have a mechanism that allows you to double up the feedback so you can feel/hear what the participant is feeling/hearing.

Prototyping and validating ideas



Onboarding animation was used to present type of guidance to participants

Amazon Polly was used to narrate text to speach

Guiding with Visual Cues

Based on the principle guide like a human, a lot of formed ideas were referring to guidance with visual cues and narration. This led me to try and prototype guidance with narration, where the narrator would be pointing the person to walk towards a landmark. Unlike guiding with sound I started of by preparing one test which consisted of several parts and was done in several iterations that helped me fine tune the interactions.

Guiding with narration meant focusing on guiding with audio and meant I could build on top of the learnings from the previous test. In order to create a narrative guidance I had to first define a route through which I will guide the participants. I then defined needed points where the system should provide information along the route as well as define the way in which the participant could recall information, since that was heavily highlighted during previous tests in order to create reassurance and with that mindfulness that is needed for people to freely walk about.

I used Amazon Web Services text to speech AI Polly to transcribe the guiding scenario I wrote down in a human like guide narration. Every point of the interaction from the system had to be introduced at the exact location in order for the test to work. This meant I had to do a lot of dry runs in order set the timings right in Adobe Audition where I stitched together all the recordings. Using this software allowed the flexibility to modify timings of presented information during the test themselves.

Since I was introducing quite a few new interaction points for the participants they had to be presented to the type of guidance prior to the test. This tied back to the design principle SETTING THE STAGE. In order to present the type of guidance and interactions I prepared a video on-boarding which presented them the narrator(the companion), how they will be guided(told to walk towards a landmark, inform with a song when approaching a turn) and how they can recall information(tap on the phone to start the guidance and recall information). I build this setup in Adobe After effects and used AWS to introduce the type of guidance in a story telling way with the guidance narrator voice(in hope that would also create a connection with the system later along the way).

Presenting the interaction

All the participants were first presented with an application like video on-boarding to the interaction. This helped speed up the on-boarding process and was as it was at the same used to validate this type of an introduction to the guidance.

This prototype validated the importance of setting the stage. It wasn't only introducing interactions but was also creating trust in the system by presenting the narrator that was later guiding them. Even though I tried going away from screen interactions using screen to introduce the system was a good decision since it really engaged people to be attentive to the presented information. However what also turned out to be valuable was subtly reminding people how to the interaction works while they were already on the path. One of the biggest learnings for me was that re-introducing the way to interact with the system when actually guiding was more memorable than when introduced in the beginning of the journey.

Guiding with narration 1

In the first test I tried controlling the experience remotely. This meant that the participant was again wearing a bluetooth headset that was paired to the participants iPhone. This setup provided me with the participants point of view, while I was providing audio/narrational guidance instructions by playing it from my computer(via Facetime).

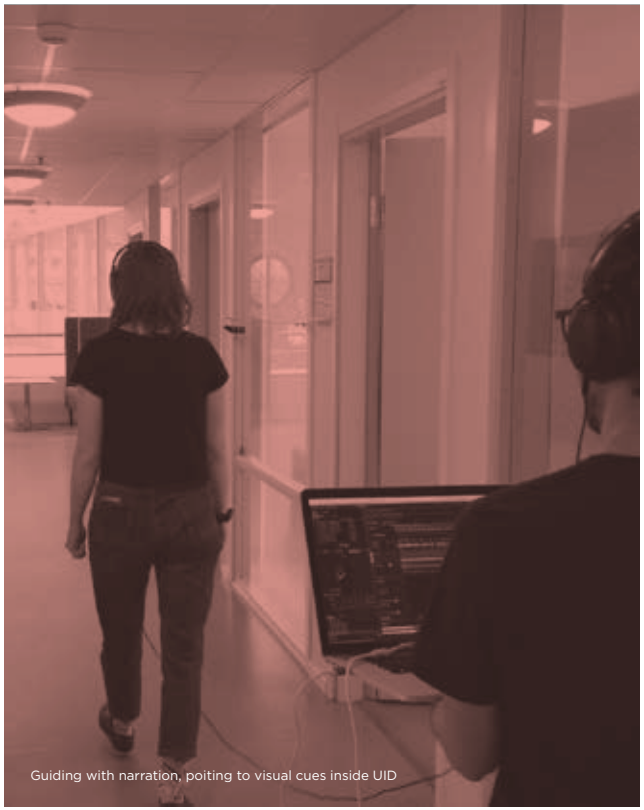
Even though the execution of this test didn't turn out the best it provided a big learning on how to prototype such experiences in the future, as well as provided valuable insights for guidance with narration, based on which I refined both the test and how and when the information is delivered to the person when being guided.

The biggest learning from setting up the test remotely was that I couldn't see the participants reactions, but only saw their point of view. This made me ask the participant to tell me when they needed to recall the given information rather than seeing if they would actually remember the interaction to recall the information that was presented to them. Based on this I couldn't know if they understood the guidance instructions. It made me wonder if it was sufficiently presented, or might there be an issue with the connection, etc. There was definitely a big issue with the connection, due to conducting the test remotely.

Prototyping and validating ideas

There was a big issue with latency and resulted in few occasions where the guiding information was presented too late. .

However these issue also yield important findings. I found that when a person was presented with the information of what to walk up to they freely walked and didn't need reassurance, while not knowing what to walk up to and waiting to hear instruction created uncertainty, which resulted with the need to interact with the system. The second really important thing I learned was that the selected visual cues I was referring to when guiding had to be bigger and I had to reference their body position to(e.g. there should be a wall with posters on your right side and should be facing the hallway).



Guiding with narration, poiting to visual cues inside UID

Guiding with narration 2

Based on the findings from the first version of guidance with narration I updated the scenario, where I guided people to more prominent visual cues and referred their body position to it. Due to experiencing that people were sometime questioning the interactions I added a few reminders on "how-to" recall information while being guided as well as added a sound scape to see if it would catch their attention and ask how would they respond to an extra information if presented to them.

How I went about testing the experiment was by following the test participant with my computer and using an aux adapter that allowed both the participant and me to hear the audio. This approach turned out to way better since I could be completely in pair with the participant. I could observe their actions and could try additional things I had prepared in order to simplify or complicate the interaction, so I could gain more insights about the type of guidance and peoples reactions to it.

The second iteration of the test provided me with positive results. People were paying a lot of attention to the surrounding while being guided. The fact that they were told to walk up to a visual cue and weren't directed to turn at the location made them freely explore the surrounding. They also quickly remembered how to interact with the system if wanted to recall the information by tapping on their pocket(phone), which created trust in the system.

In addition I tried probing them with an extra soundscape along the way, in order to get their attention and introduce a potential interest point. However I noticed that introducing an extra sound threw them off their path and made some of them forget what they were walking up to, so they had to recall that information. This made me understand that the system should not overload the person and that the informations should be very selective. This finding pointed me in a direction that it is better to use another type of modality to introduce additional information.

Overall guiding with visual cues test findings

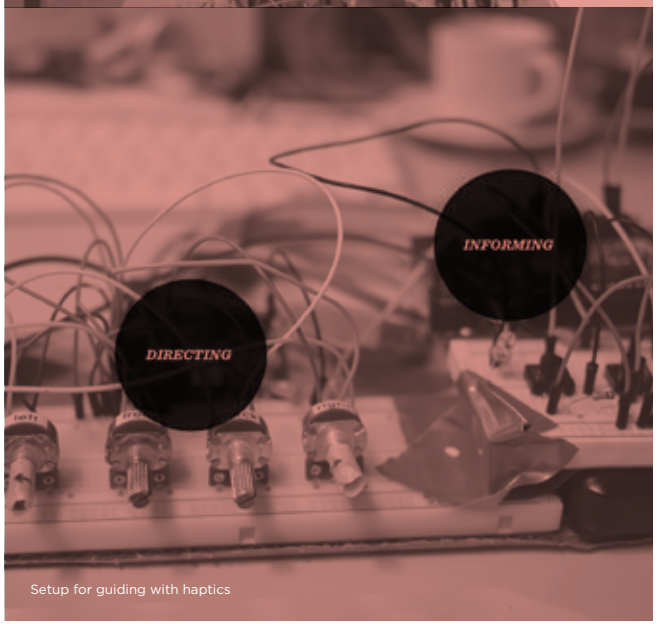
Guiding with narration yield really positive results and made me want to move forward with this direction and try it in an outdoor setting, since these tests were conducted inside UID premises. I feel that what was really positive with this test was that I wasn't focusing only on the type of modality but more on how to put a person in a mindset of being guided, while using audio to guide and screen interaction with sound to introduce the interactions.

The main learnings from this test were that it is really important how the information is presented, at what time is it presented and how can a person access it after the fact. Presenting the interactions using a screen turned out to be a good use of that modality for the context of use, since people were still and it made them really focus. Guiding people with narration in a way of telling people what to look for made them more attentive to the surrounding and less anxious when walking in silence at the same time. It turned out that referencing the persons position to the object the person should be facing or what object should be on their side gave people a sense of spacial awareness and created confidence that they are on the right path. Another big learning from this test was the ability to recall information creates trust in the system. Interestingly enough people that also participated in the test where they were guided with haptics asked to re-hear the information by tapping on their shoulder(the haptic engine that informed them in that test was placed there). This really showed how one idea could be built on top of a different test and this would not have happened if I hadn't had the chance to test all the prototypes with the same people along the way.

This test took a lot of preparation and each iteration took a lot of time to build and execute. Testing out a part of the guiding experience was more time consuming for the participants as well, compared to how quick and snappy the previous tests were. However taking more time to prepare several variations of this setup saved a lot of time in the end. The needed changes based on feedback and observations were minor, so I ended up fine tuning the interactions and the test approach rather than building it form the scratch.

Prototyping and validating ideas

Vibration motors positioned on shoulders



Setup for guiding with haptics

Guiding with Haptics

Trying to explore what other types of modality could be used to guide people led me to embodied interaction. This meant trying to prototype ideas that were gathered during the ideation phase as well as trying to simulate type of guidances that I have experienced fist hand when being guided with a guide dog, using a cane, etc.

In order to do that I've build several prototypes where I tried designing vibration patterns that would simulate different guide like gestures(pull, tap, hold, etc.). I used an arduino uno and several vibration motor discs that I have first tried positioning throughout my own body to experience first hand what position and what type of haptic pattern feels most appropriate. I later involved people with which I was co-designing the most guide like feedback by fine tuning the vibration patterns and define the best positions that made them feel as if they were being gently pulled in a direction. These test led me to the finding that the best position for guidance with haptics was by positioning the vibration motors between the neck and the shoulder. Based on these tests I then designed a few haptic patterns(for guiding and informing) that I later tested with people in the context of being guided while walking.

Testing guidance with haptics

I approached testing guidance with haptics differently than previous tests. This time I didn't introduce the interactions, but wanted to see how people would react to them and tell me what they thought the designed vibration patterns meant. The setup that I used allowed me the flexibility of adjusting the intensity of the haptic feedback on the spot while guiding which led to valuable findings.

The main findings from this test was that the guidance left/right felt more as directing a person on the spot than guiding them and letting them explore. Having a flexible setup with potentiometers made me understanding that this type of a system would have to be adjustable, since peoples reaction time varied based on their sensitivity to haptics. Similar to guiding with sound scapes people were walking and waiting for the feedback, this meant they were not in a mindful state of mind and weren't walking freely; as mentioned it was more directing than guiding. A really important finding was that a tap like gesture(tapping on a persons shoulder) made everyone immediately turn in the direction of the tap and made them interested what is there. This gesture was not perceived as guiding but rather informing and made people interested in knowing what is there. When asked how would they respond and would want to know what is there, they responded that they would simply tap back and would want to hear the information. This was a really key learning that I took forward in the project and would not have happened if I didn't have this type of and open test setup that allowed me to ideate on the spot with people.

Overall test learnings

This approach to testing was really good and provided me with genuine feedback from people as well as gave the option for them to tell me what they would use this type of guidance for and how they would interact with it. Following people and observing their primal reactions made me quickly realise what worked and what didn't. But at the same time this test was not just validating ideas, but made it possible for me to ideate with people while testing in the actual context which lead to important findings.

Prototyping and validating ideas

Defined design principles

Test findings & directions

The methodology of ideating by building prototypes and testing them in the actual context and not just thinking about designing for the context proved to be very efficient and led me to findings that I otherwise couldn't have come to. Based on this learning I have decided that I shall follow this approach further in the process and build on the directions that were formed during the first round of prototyping.

Defined direction based on findings

Based on my test findings from the first round of prototyping I came to a conclusion that using narration to guide people with visual cues created better surrounding awareness, while using haptics turned out to create a more directive guidance that would require more reassurance(way of recalling information). However haptics turned out to be the best modality to introduce subtle nudges with which people could be informed about additional information, as well as provide a gateway for interaction with the system(tap to recall information). These learning led me to understand that it is hard to provide an adequate guidance with only one modality and that a certain type of modality is best for providing the right information at the right stage of the journey.

These findings started pointing me out to the direction of creating a multi modal guidance system in the next stage of the project. In order to work towards designing a guidance system that would provide reassurance in order to create better surrounding awareness for people I have created a set of design principles that I would have to follow.

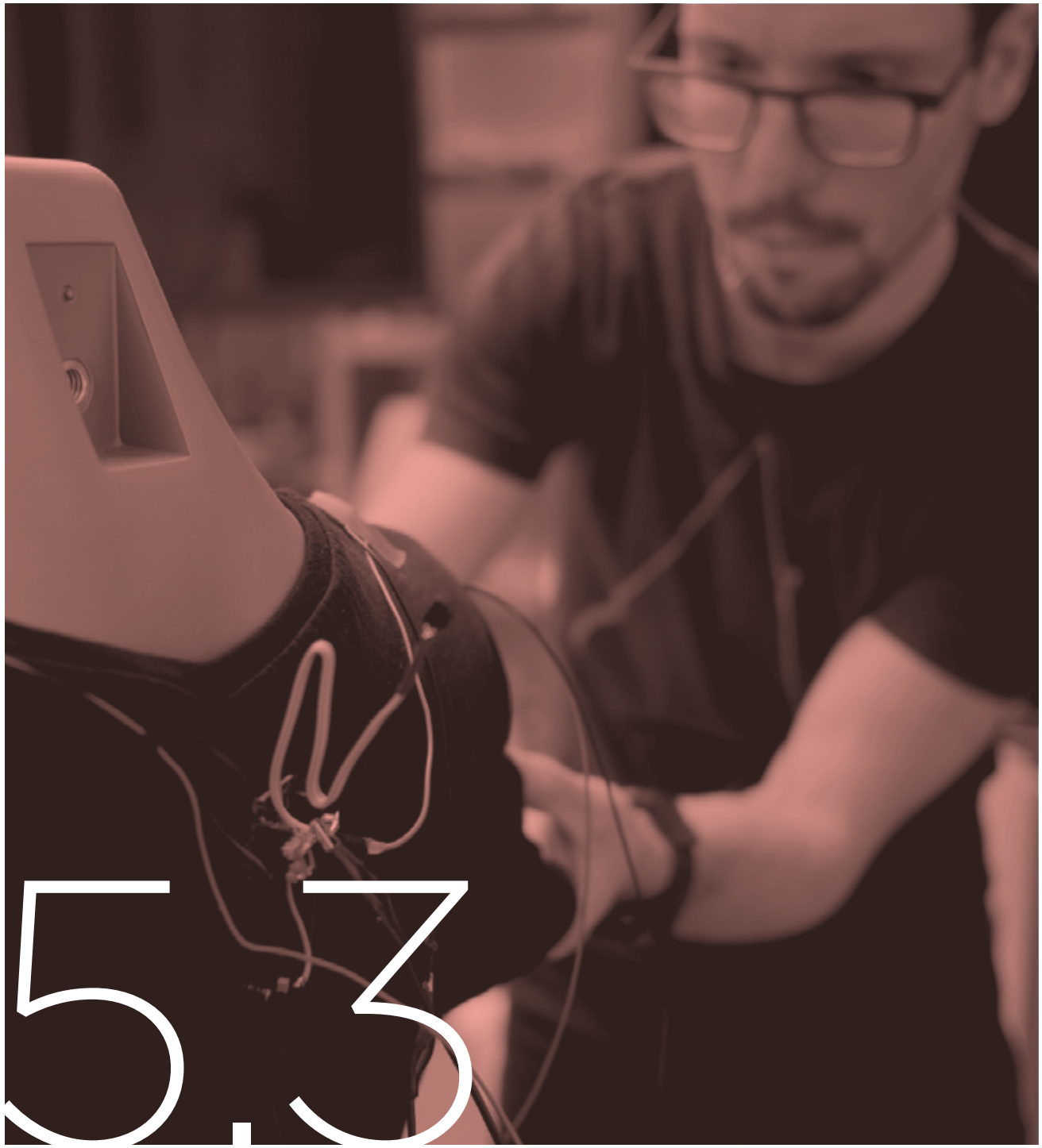
1. **INTRODUCE INTERACTIONS** Introduce interactions at the first point of contact with the system, as well as introduce them along the way while guiding for the first time (learning while doing is more memorable)

2. **GUIDE BUT DON'T DIRECT** Do not guide by giving directions WHEN to turn but tell them WHERE the next turn will be or what to walk up to

3. **RIGHT INFORMATION AT THE RIGHT TIME**
Inform only if the information is needed

4. **RIGHT MODALITY MIX FOR THE CONTEXT**

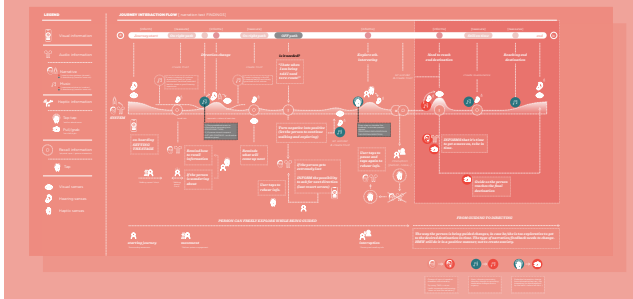
5. **PROVIDE HELP AT HAND** Give the ability for the person to recall information at any point without having to interact with the system by stopping and looking at the screen



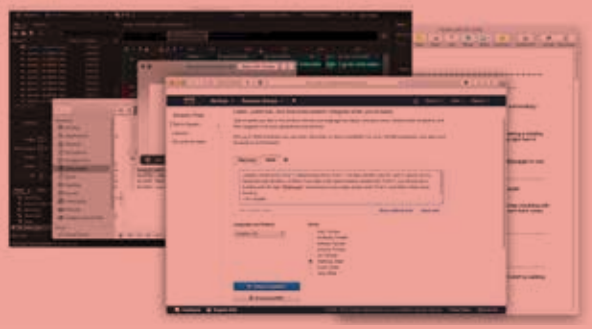
5.3

Refining and validatin ideas

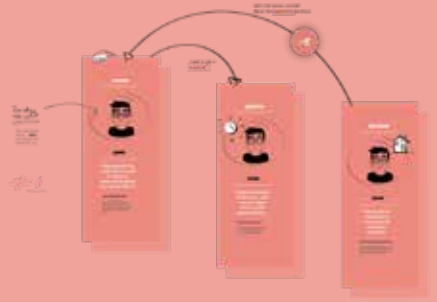
Refining and validating ideas



Interaction flow blueprint



Refining text to speach with SSML



Defining narrator character

Refining interactions

Since I wasn't focusing so much on the whole guidance journey in the previous tests, I decided to first define which modality would be most appropriate for which part in the journey since I wanted to define how a multi modal guiding system would work based on my learnings from previous tests. To define these interaction points I create an interaction flow blueprint that helped me pre-define design patterns for key interaction moments and also helped me try and understand how the character of the interaction would have to change due to the type of guidance.

I created two scenarios of how a person could be guided, but ended up focused on a scenario where a person would be guided from point A to point B and had time to explore. I also introduced an interruption along the way so the type of guidance would change from explorative guidance to a directive guidance. This meant I had to look into how the interaction should change in order not to create anxiety.

In order to prototype this change in the character of guidance I had to increase the fidelity of the prototypes. How I went about doing this was by looking into story telling(movies, podcasts, radio shows, etc.), embodied interactions, voice user interfaces,.. in order to get inspired and tried creating an appropriate character(haptics and voice) of the interaction that would guide people and hopefully create a sense of mindfulness for people when being guided by providing reassurance and with that create trust in the system, so they could be more aware of their surrounding when exploring in the limited amount of time.

Refining narrational guidance

How I approached refining narrational guidance was by first defining different types of guide character. I have defined that the voice of the guide should in general provide a calm like guidance that creates trust. However the characters voice should create concert if there was a need for a change of the path and the person would have to be redirected. However I had to make sure that type of a narrator voice change should not create unnecessary anxiety. The third type of narration voice would have to create a sense of excitement and this would be used when presenting additional informations that I called "fun-facts".

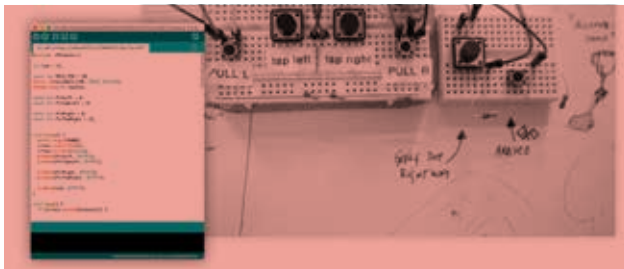
How I went about trying to create this type of change in the narration voice was by using AWS Polly, but this time looked into SSML(Speech Synthesis Markup Language) that allowed me to change the pitch of the voice, add pauses, breaths,.. and in general made the speech more human like. What I wanted to test out with this was if people preferred one narrator vs. multiple narrators(talk host like shifting over when needed a change in guidance).

I build several voice narration characters and tested them out while still refining them, but quickly came to a conclusion that people preferred to have one narrator with which they could form a stronger connection. This finding led me to understand that having a constant type of interaction also creates a stronger bond and with that builds trust, while having several characters might create confusion. Therefore I continued with one narrator throughout the remaining of the testing and was focusing on refining the voice as much as possible throughout the test.

Refining haptics

Based on my learning from the first round of testing I have build a new setup for testing guidance with haptics where I have defined specific haptic patter that would initiate a pull like gesture that would be used to direct(turn left/turn right) as well as refined the haptic pattern for informing with a tap like gesture.

During the testing I found a need to further refine guidance with haptics by introducing a distinct pattern that would inform a person that he has arrived to the destination and added a pattern that informed the person if they should continue along the path if the person would ask for reassurance(should I turn or continue).



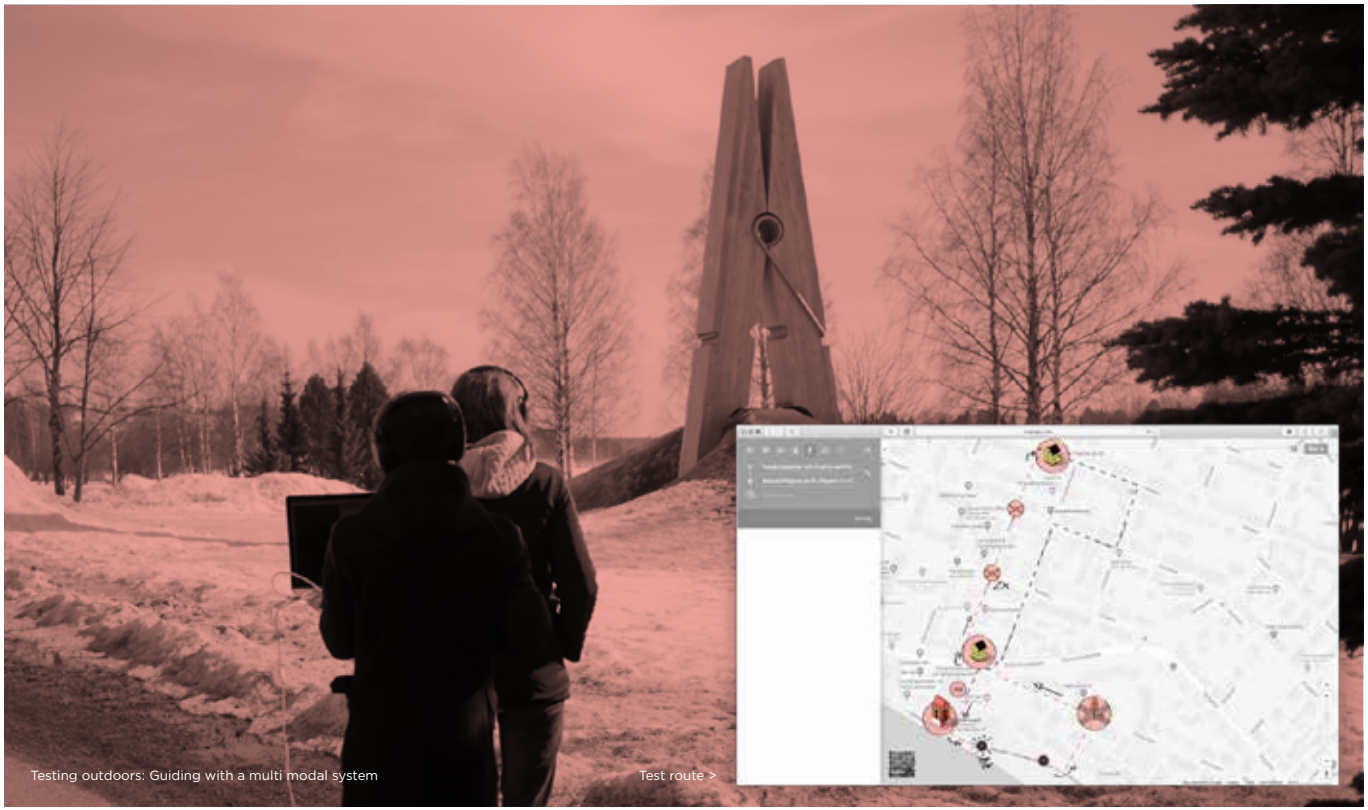
Defining haptic character

Refining and validating ideas

Testing & validating in the outdoor setting

Since my main intent was to test and validate the prototypes in an outdoor setting to see how people would respond to the type of guidance in an actual context I prepared a route(UID to BookCafe) for which I have defined several interaction points(mainly focusing on buildings, objects,.. that were standing out from the environment) as well as prepared additional inputs such as turn left/right, etc. How I approached the tests was that I started with maximum amounts of interaction points and reduced the amount with each test in order to see how the test participants would respond. This approach led me to see the minimum amount of interactions that is needed from the system to provide sufficient guidance, as well as provided the information of which occasions prompted people to recall information or interact with the system.

How I went about testing was by first introducing the test participant to the guiding system. They were presented to the system through an updated on-boarding animation that explained how they will be guided(narration, haptics) and how they can interact with the system(tap to recall). The haptic interactions were physically introduced to them while watching the on-boarding video in order to form a better memory/learning of the interaction. Due to the learnings from the first round of prototyping I prepared the haptic feedback in a way that the intensity of the interactions could be altered to the participants best feel prior to the start of the test.



Testing outdoors: Guiding with a multi modal system

Test route >

Guiding with a multi modal system

In this test people were guided in a similar manner as in the previous guidance with narration(visual cue) but in the outdoor setting. However this time I also added haptics to the equation to see how people would respond to multiple type of informing simultaneously as well as trying to see if people would prefer subtle nudges with haptics (tap to inform) to adding sound scapes to get peoples attention. Based on the findings from the previous tests I kept the interaction of asking for reassurance by tapping on the shoulder as well as used that interaction to confirm if the person wanted to hear the information about the interests nearby.

How I went about testing the experiment was similar to the previous test indoors. I have followed the test participants with my computer and using the same audio setup, but added the haptic setup to the system. I have attached a patch with 4 vibration motors(2 on each side) on the participants shoulders and were controlled via an Arduino setup that I had on my computer with four commands(turn left/right, inform about interest(tap) on left/right side). This approach again allowed me to be completely in pair with the participant, I could observe their actions and respond to their reactions with pre-prepared audio clips for guidance if that was needed.

The participants were mainly guided with narrative guidance to visual cues and were reminded about the interactions type and how to recall information along the way. During the route I had prepared several additional info points if a person would seem to be anxious when walking on long straights, but that wasn't the case. The main visual cues they were presented to walk up to were more than enough for people to be guided.

Providing people with additional information via an haptic interaction turned out better than previously used sound, and provided enough interest that they have tapped to hear that pre recorded information. Presenting participants to the final destination with a "song clip" turned out to be positive and people perceived it as a nice token to the end of the journey "Melissa: I loved the song letting you know that you're at the destination. It's like getting to the end of the game."

Refining and validating ideas

Participant feedback

Test findings

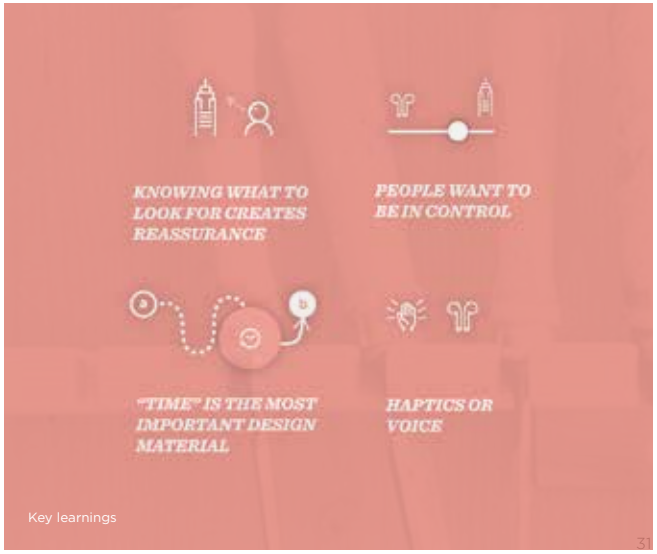
Guiding with a multimodal system in an outdoor setting confirmed findings from the test conducted in the indoor setting with narrational(visual cue) guidance as well as provided with additional learnings due to a longer route that was also less known to the participants than being guided inside UID.

The biggest finding and validation of this test was that guiding with visual cue really created reassurance and made people walk freely and observe their surrounding. People needed very little or almost no additional guidance from the selected reference points. The learning was that referencing to a specific building, object,.. that can be visible in distance is creating mindfulness. People walked towards that reference point without having any hesitation while being completely aware what was happening in the surrounding. Even when probed about a potential interesting point through the haptic interface, they interacted with the system to hear the "fun fact" but either continued walking to the reference point or listened the information and continued when it stopped without having the need to ask for the information of where to go again. What really confirmed this finding was when one of the participant made a wrong turn and was then guided back to the right path with "backup commands - take the next left, etc.". The person started getting doubts if on the right path or did the mistake, and was about to ask for recall of information right when I introduced the next visual cue to walk up to; hearing the visual cue put her at ease. That really proved the power and the reassurance in the system that people get from being guided to a certain point rather than using turn command, metric systems, etc.

The second key finding was that instead of changing the type of narration to indicate time pressure what is more important is to reference how long does it normally take to the destination and how long would it take with the current walking pace. This type of informing puts people at ease, since the information is transparent. However this information needs to be presented at the right time, so the person still has enough time to reach the end destination with ease. Another finding that pointed to time as a valuable design element was that providing information ahead of time is better than at the turn. So telling people that they will make the turn "to the left" in a bit was better than informing at the turn.

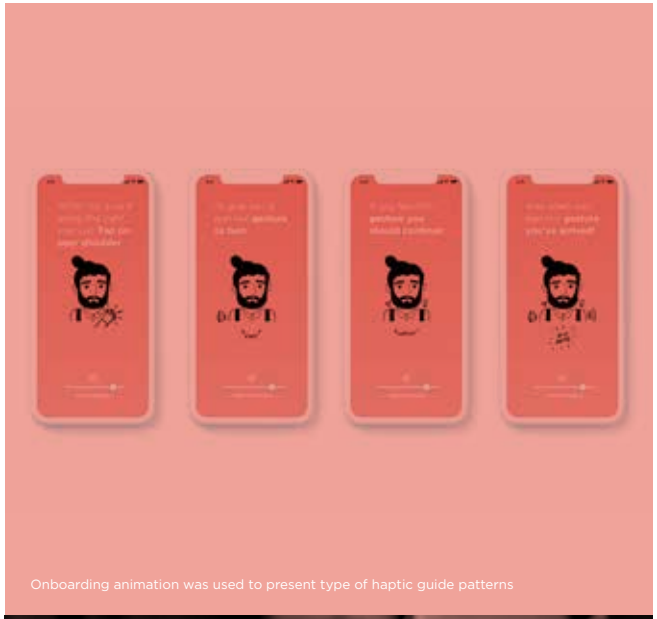
The third big finding was that using multiple modality at once creates confusion. Used both voice command and haptics at the same time people made people question why did they hear and feel the information at the same time. This learning pointed me out to the finding that haptics should only be used to inform about interest when people were guided with narration. Another thing that this test led me to is that informing with haptics was less intrusive than adding sound when having narration(audio) as the main source of guiding. This guided me to a key learning, that separating modalities for specific actions was a better way to go.

And last but not least, what I found with this test was that people like to be in control how much information they are receiving and that therefore the system need to provide the ability to set how much information a person is getting to be guided. This lead to one of the key findings that the system needs to be flexible and provide the ability to change guidance settings either prior to the start of the journey or during the journey(maybe people want to know more, but then want to know less).

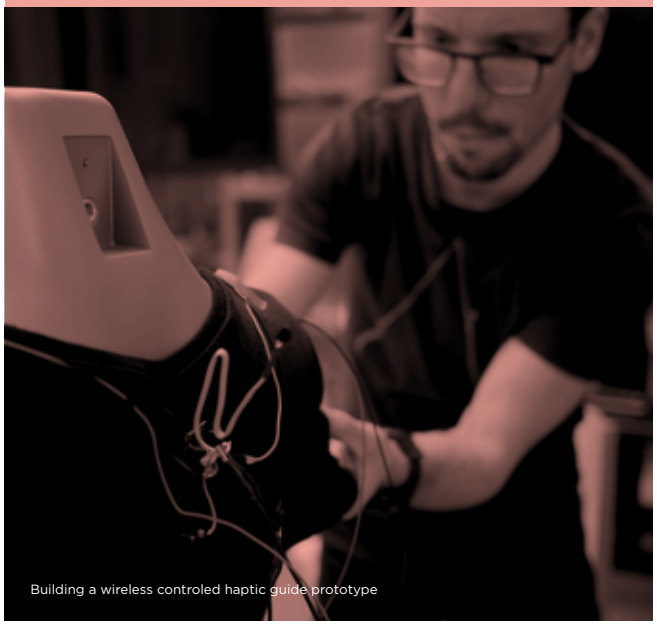


Key learnings

Refining and validating ideas



Onboarding animation was used to present type of haptic guide patterns



Building a wireless controled haptic guide prototype

Guiding with haptics

This test was performed with the same setup I was using when guiding people with narration & haptics. This time I was guiding people from the final destination(Book Cafe) back to UID and only used two commands turn left and turn right that imitated pull like gestures on the shoulders.

I conducted this test in order to see how people would respond to being guided only with haptics in comparison to having just experienced being guided with narration. What I wanted to test was their attention to the surrounding and if they at any point felt they would want to ask the system if they are on the right path and how would they go about it.

Test findings

The biggest finding from the test was that people acknowledged that they were more aware of the surrounding when being guided with narration and being told what to walk up to, while they had to be more in the state of mind of wanting to be aware with this type of guidance. However what the test also reviled was peoples desire to have the ability to choose how they want to be guided. People really liked being guided just with haptics, saying that sometime they just want to walk in silence and that they could see themselves using this type of a system in a day to day setting while they would use narrational guidance mainly only when in a new city and most probably alone. So this was pointing to the ability of choosing the type of guidance based on the context of navigation.

Another thing that pointed into the need to further explore guidance with only haptics was that people started immediately comparing it to being guided with the phone, but much preferring being guided with haptics since they didn't have to look down at the phone to know that they have to turn as well as saying that they felt comfortable and trusted the system so they didn't feel the need to get reassured if on the right path.

However I took this feedback with a grain of salt, due to several things. What led me to doubts was they were guided through a pretty straight forward path, they knew where they were going and as well as me being fairly close due to the setup(cables).

Guiding with haptics 2.0

Since the feedback to being guided with only haptics was so positive I felt the need to build a second prototype and conduct another test. With this test I wanted to build on top of my observations, which meant adding three interactions to the existing pull left/right like gestures that informed about the up coming turn. First interaction I added was a way to get reassured(recall information), by adding tap on the shoulder gesture to ask if on the right path. The second was a pattern that would tell people to continue on the path(simultaneous vibration of both vibration motors(left/right) on the top of the shoulders) and a vibration animation pattern that would inform a person that he or she has arrived at the destination.

How I went about this test was by building a prototype that allowed me to wirelessly guide the participant(using Arduino Leonardo micro and an infra red receiver), I presented the participant the interactions through a video on-boarding prior to the test. However this time they didn't know where they were going, which was intentional in order to see if that would create anxiety and make them more frequently ask for reassurance or they would trust the system as mentioned at the previous test.

Test findings

Not telling people where they were going was a really good way to go about the test, since it made people question if they were on the right path quite a bit. However by introducing them to a way to interact with the system by taping on the shoulder and getting reassurance turned out to be a really good way for people to get reassured and quickly made them trust the system. This test confirmed the importance of having the ability to get reassured as well as that by having just a few simple and distinct haptic patterns to let people know when to turn, continue on the path and that they are at the destination is enough for sufficient guidance without having to stop and look at the phone to get reassurance via a map.

Another big learning from this test was that people need to have a general sense of where they are going prior to starting their journey. They need a visual overview of the route to create a mental picture of the route which makes them feel at ease when being guided.

Refining and validating ideas

Participant feedback

Setting up the guidance

Throughout the testings I was constantly being referred back to the guiding principle “setting the stage” as well as to a design principle “introduce interaction” with my findings. This led me to build a several screen based on-boardings that presented the interactions and turned out to be a good way to introduce interactions. However the last tests guided me to the finding that there also needs to be a first point of contact with the system that amongst other things gives the ability to choose the type of guidance and shows the route and what is on the way.

This led me to build a provisional GUI where the person could set the destination, time of arrival, have an overview of the journey(route & interests) and define type of guidance prior to the start.

Validating GUI

How I went about validating the user interfaces was by presenting several layouts with different hierarchy of information as well as presented different ways of an overview of the route(a more abstract view and a map based view).

When it came to information hierarchy people pointed out that the most important information is the destination and time. What followed was an overview of the route, where they preferred a map based view and mentioned that type of an overview gives them the ability to form a mind map of the route which makes them have orientation when being guided, especially in a new environment.

Key learnings

5.4

Directions

Directions

Designing in context

The methodology of ideating by building prototypes and testing them in the actual context and not just thinking about designing for the context proved to be very efficient.

This approach enabled me to gather valuable information from people during the testing in the actual environment in which the product would be used as well as provided me with the ability to prototype on the spot while testing.

Simulating an experience of guiding in an actual context with a Wiz-of-of prototype was of course more challenging and sometimes did not work out. However we do not learn only from success, but also from mistakes and in my situation a broken connection, a wrong turn, etc. led to findings that I could have not gotten to if I was to test in a static environment.

The chosen design approach provided the ability to observe how people respond to the probes in the context of guidance and the observation was sometimes even more valuable than the feedback people gave me after the fact. Every approach to testing, even if just slightly different from the previous provided a valuable learning. Regardless if all the steps were carefully defined and though of prior to testing, or if people were introduced to the interactions or even if they knew how the test will go about, versus if they were in the dark. These different approaches were possible only because I was testing and refining in the context. This design approach has therefore led me to constantly break patterns of testing by having the possibility to observe people in action. I would therefore say that there is a need to break test patterns since it may lead to more findings.

Participation of people in this type of design approach is mandatory. Testing with the same people turned out to be very valuable in my project, since it pushed the ideas further in a shorter period of time, by having the ability to build on previous findings(already knowing how people responded previously). Of course it would be better to have a bigger number of participants, which would have definitely led to even more results, but I feel having fewer people available throughout the testing allowed me to also focus more on details of interactions and made it possible to build design patterns rather than focus mainly on the big overarching system that would be needed for guidance.

Learnings

All my test led me to and understanding that narrational guidance with visual cues creates better surrounding awareness by guiding people towards a defined point. My findings were that people are much calmer and assured that they are on the right path if the know what to walk up to by seeing it in the distance. This also gives them the ability to freely observe their surrounding without having the need to double check on the map, since they are guided step by step. Of course in order to do that there needs to be an established trust, which can not be done in a single use of such a system. The interactions need to be presented and the route needs to be shown in a transparent way prior to the start and for this screen interaction is still the best way to go about presenting this information.

However when being guided I learned that time is a vital design material in creating trust; when is the information presented is as vital as how it is presented. And when it come to how the information is presented my learnings from the test is that it depends on the context in which the person wants to be guided, which led me to understand that people want flexibility when choosing how they want to be guided.

There is no one perfect way of guiding, but what my tests reviled was that we can still create a guiding system that allows people to look up and at least have the ability to look around when being guided with narration or haptics. However when all these different modalities come together they create a system that provides adequate information in the right way at the right time and with that give people the opportunity to freely observe their surrounding when being guided.

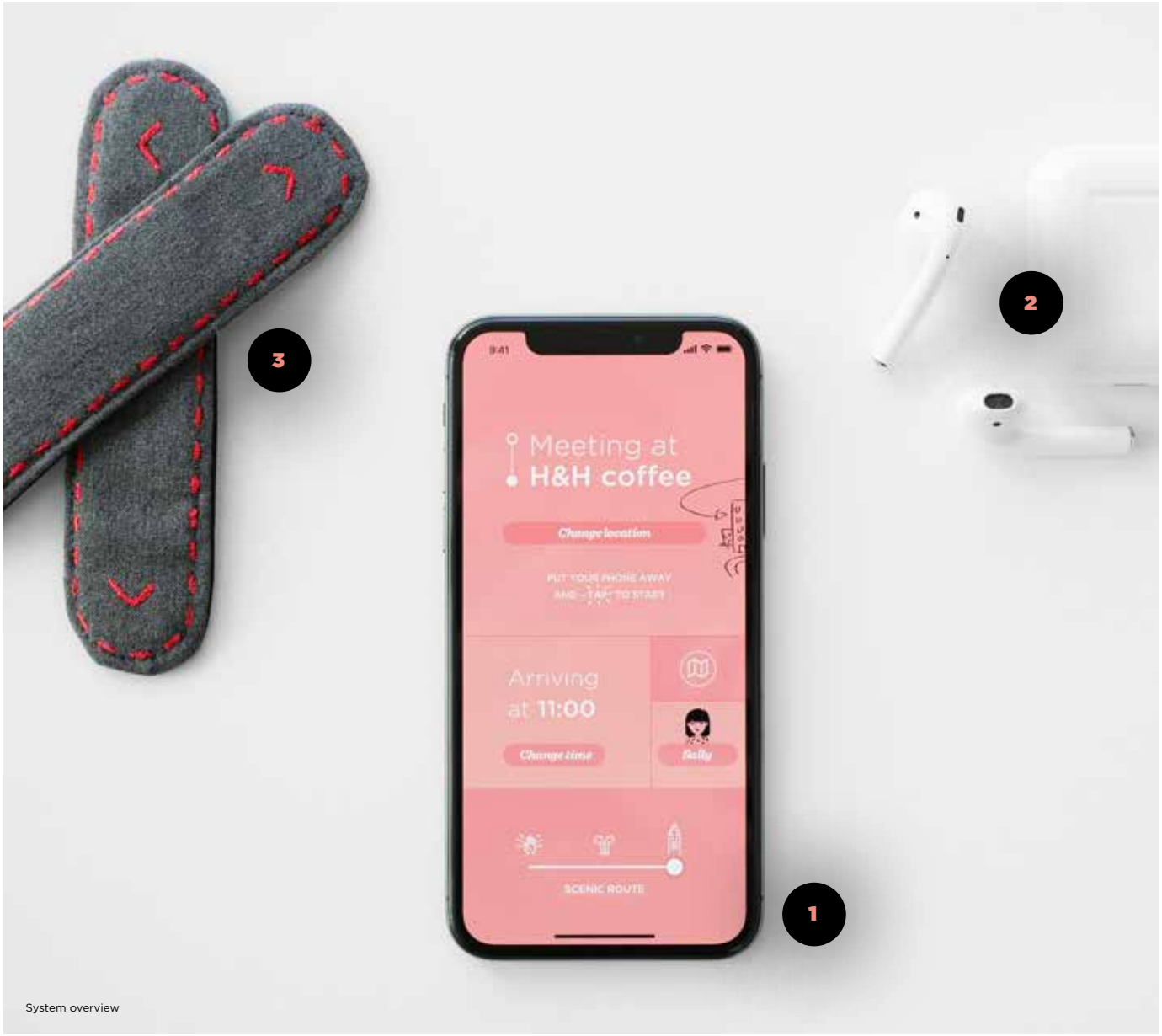
Concept direction

These findings led me to the concept direction that will be presented in a form of a flexible system that focuses on creating better surrounding awareness by providing reassurance in all guidance modes and giving people the freedom to chose how they want to be guided.

6.0

Final proposal

UP - flexible multi modal guidance system



System overview

Up is a flexible system that guides people throughout their route by providing reassurance in all the steps on the way. Starting from their current location by setting up the type of the journey when setting the end destination and providing a route overview, to providing guidance and ability to recall information while walking without the need to look at the screen.

The main focus of "Up" is to get people to "look up" while they are walking. "Up" gives the ability to choose from two type of guiding modes and with that provides people the freedom to chose how they want to be guided while focusing on creating better surrounding awareness.

The system consists of three parts

1. Up app

A mobile application that is a gateway for the user to set the journey. The user can set the destination, time of arrival, type of navigation(multimodal, haptic, audio and additional ask to get informed about interesting points along the way).

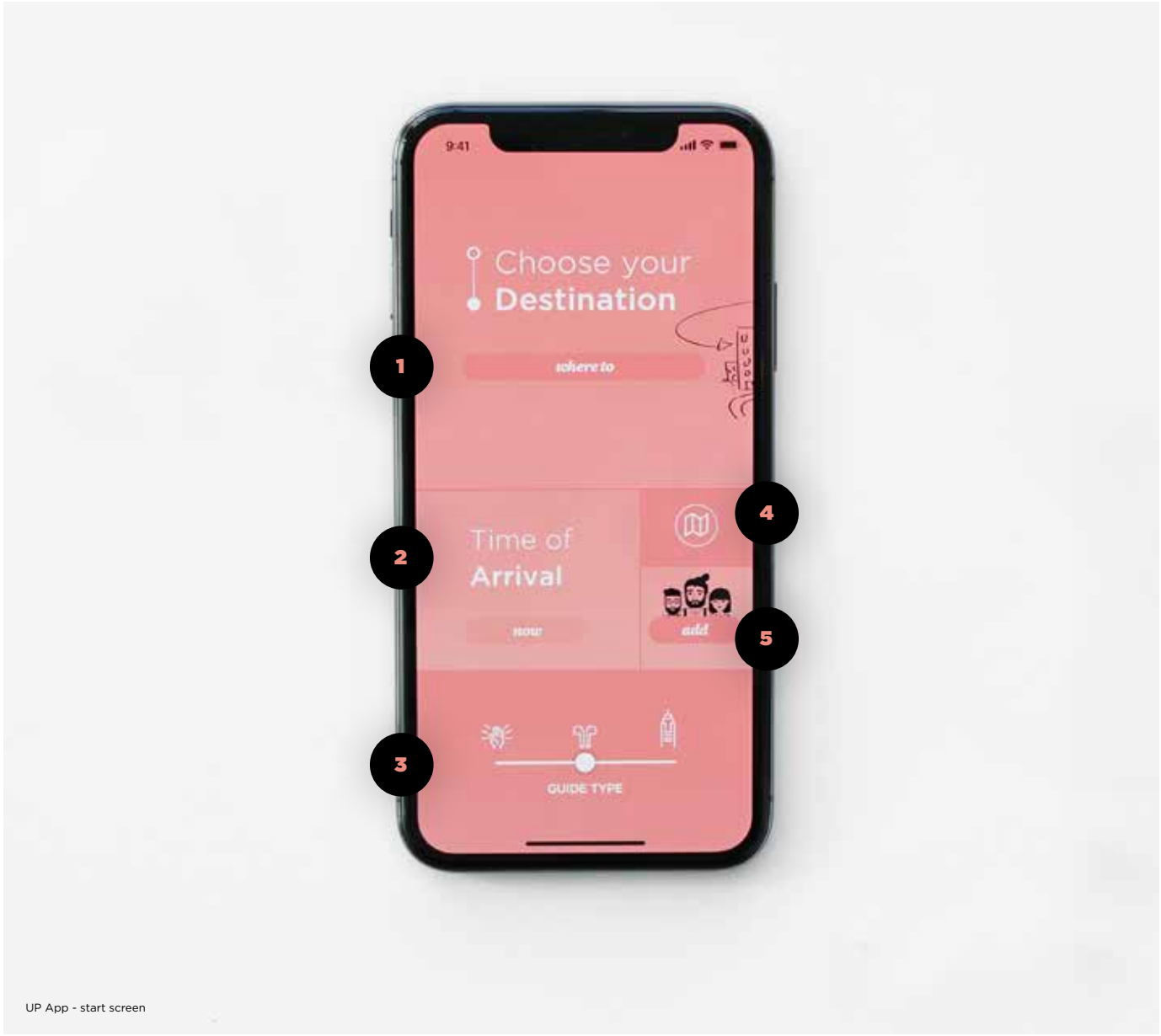
2. Narrational guidance

A headset is needed for providing guidance with narration. The system informs the person of visual cues(landmarks or visible objects) in the surrounding the person should walk up to and therefore subconsciously ask for greater attention to the surrounding while walking.

3. Patch

Is a haptic guidance accessory that is attached on the person shoulders and informs a person about the direction of the path, informs of interest points along the way and acts as an input device to recall information, initiate the system or pause information with a simple tap.

UP app



UP App - start screen

The UP app gives user the ability to set the journey prior to the start. Meaning the person can set the need information before starting to walk and can focus his/her attention to setting:

1. **The destination**

2. **Time of arrival**

3. **Type of guidance**
   Silent(haptic),
   Narrational(audio)
   Explorative(audio - scenic route)

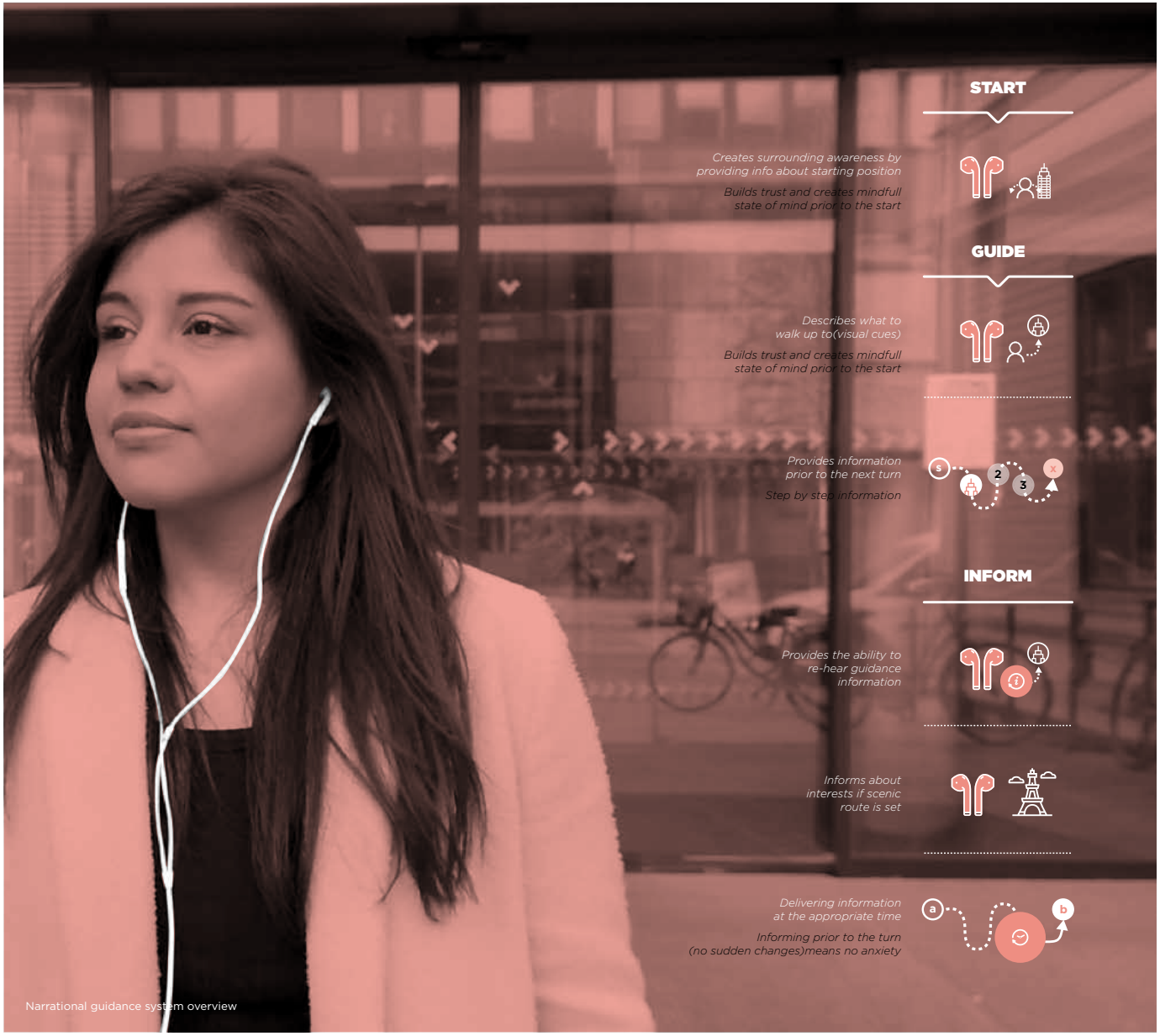
4. **See an overview of the route**

5. **Share users location with another person**
   so they can both be informed about a potential change of the meet-up that might effect the route.

Route overview

The person has a quick overview of the route when setting the desired destination and can see optional interest points along the way and how much time that would take as well as see the time of the route. This feature gives people the freedom of choice when selecting type of guidance. When confirming the destination the person is ready to start the guidance at any time. The guidance system is initiated with a tap on the “patch“ or a tap on the phone (when screen is off - locked screen).

Narrational guidance



Narrational guidance system overview

Narrational guide type guides the user on his path to the destination by providing visual information about the surrounding in a narrative manner.

The user is provided with the information of what objects, buildings, landmarks, etc. are surrounding him prior to the start of the journey. This action provides the needed confirmation that the person is facing the right way and therefore starting from the right direction.

The person is guided in the same narrational manner of being told what object, landmark, building, etc. to walk up to. This prompts the person to be more observant to the surrounding. The system provides sufficient information needed for a person to be guided as well as allows the user to recall the information of what to walk up to at any time(this can be achieved by a simple tap gesture either on the patch or the phone(when locked and tucked away)). Upon arrival to the final destination a sound snipet is played to informs about the arrival in an uplifting manner prior to informing with a narration.

The information is provided based on the persons location(how close he/she is to the turn) and speed of walking. The narrational guidance works in a step by step basis, meaning that the information about the next turn or change of direction is provided after the reached step. With this action the person can walk freely to the next step. If the person should hurry up his/her step the system gently informs that the current walking pace might lead to a slight delay and presents the information of the needed time to reach the destination with the current pace in comparison with the pre calculated walk pace. This creates reassurance of knowing how much longer the route will take with the current pace and can decide how to go about it.

If the scenic guide type is chosen the system provides additional information(historical facts, etc.) when a person is close to the landmark through a haptic gesture with the patch. If the person would wish to hear the information he/she would simply taps the patch and the information will be given.

Patch

Patch interaction pattern

Patch is a guidance accessory that provides information from the system with haptics and acts as a gateway to interact with the system with embodied interactions, by tapping on the product.

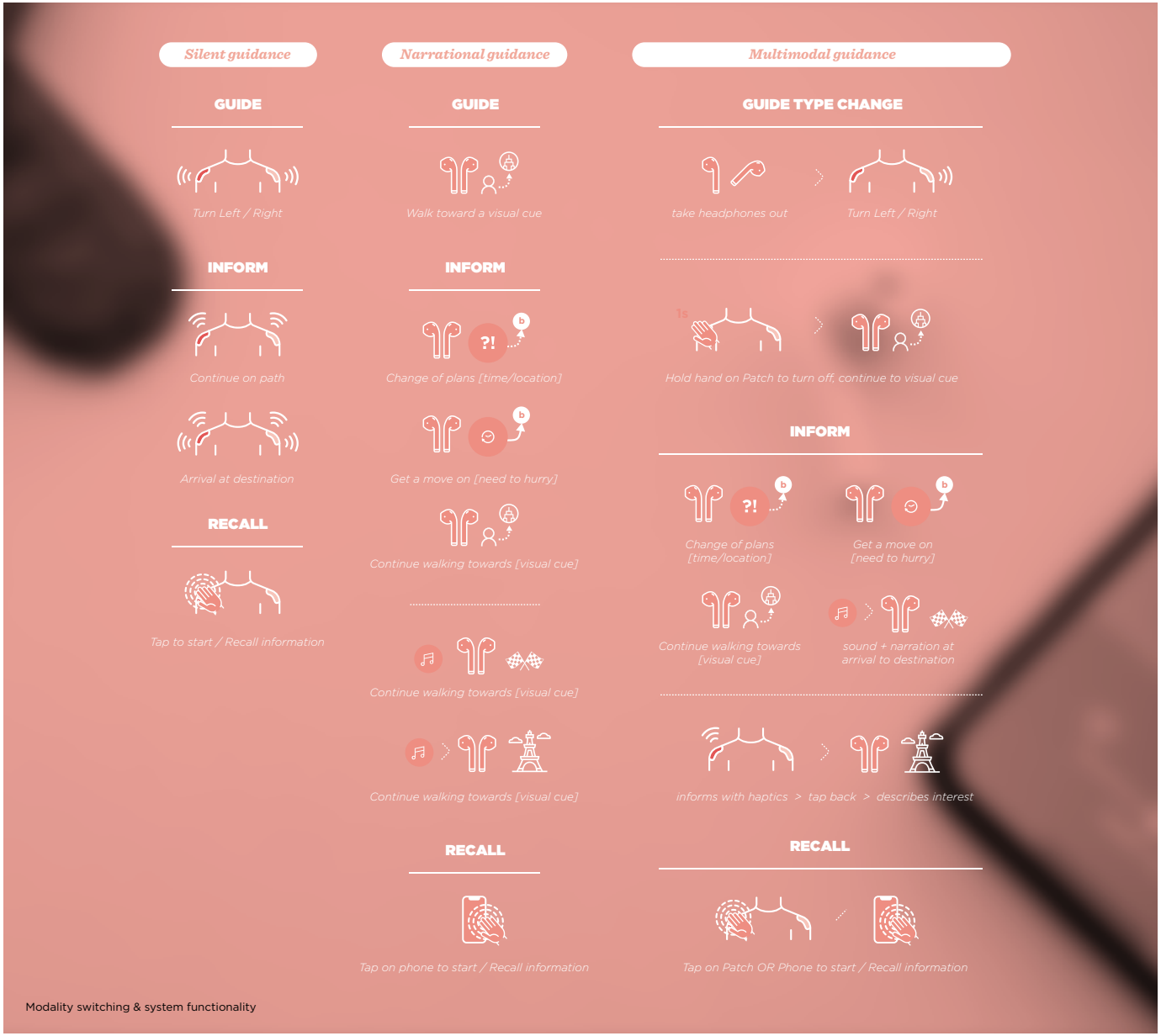
The products guides with clear distinct patterns that are easily understandable by providing pull like gesture prior to the turn, gives a confirmation pattern if the person asks for reassurance(by tapping on the patch) if on the right path and provides a distinct arrival pattern when close to the defined destination.

The interaction patterns are presented to the user when setting up the UP app account. The system also provides the ability for the person to fine tune the intensity of the vibration motors to fit his/hers liking.

Patch interaction on-boarding

Patch is connected with the Up App guidance system via a bluetooth module that allows for seamless haptic information. The haptic feedback is provided via two vibration motors placed on each ends of Patch. The product is charged via an inductive charging mechanism which allows it to be water resilient and can therefore be exposed to various weather conditions. Patch can be attached to any garment and can be simply attached and removed(the bottom layer of patch consist of Geckskin™ material) without any damage to the garment.

How does the system work



Modality switching & system functionality

The system is designed in a manner that it doesn't need all the components to sufficiently guide the person. However the Up app is always needed in order to setup the route and does not provide guidance via the screen. In order to be guided the person needs either the headphones or Patch accessory. However for most optimal guidance both components are needed. Switching between type of guidance is done automatically by the system if the person removes the headphones or patch accessory..

1. Multimodal guidance

Patch is used as an input device to initiate actions such as start(tap), silence(hold), ask to repeat information and provides haptic nudge to inform of upcoming interests. Alternatively recalling info or guide start can be initiated by taping on the phone.

Audio narration is used as primary modality and guides the person with directioning to visual cues. Providing information via audio allows notifications to inform user of route changes, needed walk tempo change(behind schedule), informs of arrival to destination with a song and provides information about interesting sights if initiated via tap on the patch.

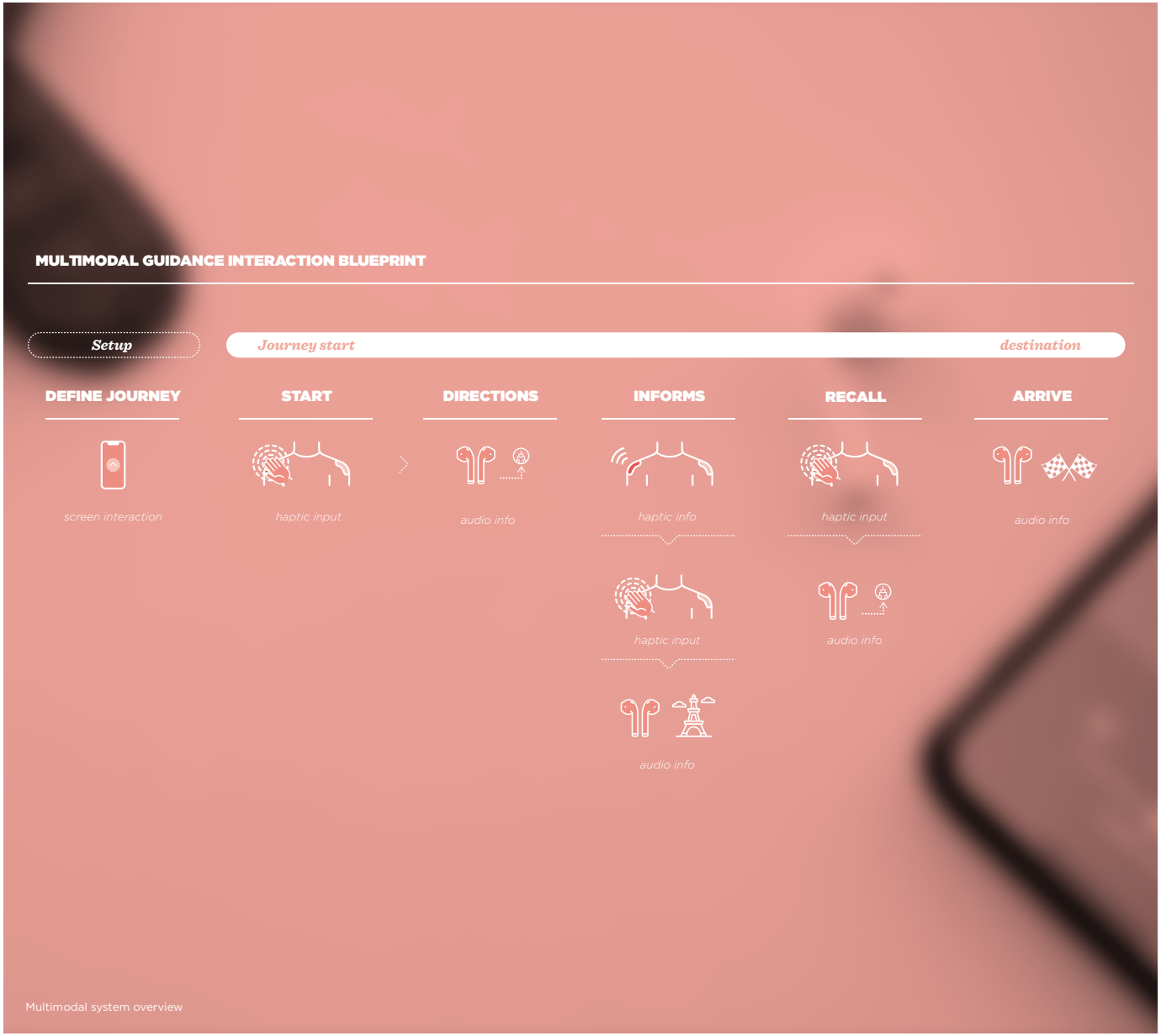
2. Only narrational guidance

The user initiates the guidance by tapping on the phone(when in lock screen-in a pocket/purse) as well as recalls information by double tapping on the phone.
The only other difference in this type of guidance is that the information about upcoming interests(scenic route) are informed with a sound scape and can be initiated by tapping on the phone.

3. Silent guidance

Patch is mandatory for guidance with only haptics. It provides the input for starting the route and asking for confirmation if on right path. This can be achieved by tapping on patch. There are three distinct haptic patterns used for guidance: left/right pull like gestured(turn left/right), top pull gesture simultaneous on both sides(continue on route) and an animation using all vibration motors to inform of arrival.

System overview



Multimodal system overview

The proposed guidance system would allow better surrounding awareness by providing the ability for the person to interact with the system through the modality that is optimal for the context. The type of interaction with the system would therefore vary based on the part of the journey.

Screen interaction would only be used prior to start of the journey and would allow the user to set the destination and see the overview of the route prior to walking. In this way the person can familiarise himself with the route, sees the time needed for the journey, etc. With this action the system creates mindfulness and sets the stage for the person prior to the journey.

The system then transfer the interaction to audio(narrational guidance - guide like a human) or haptic feedback that provides guidance while walking. This multimodal system is the key element that provides the appropriate interaction type for the context of use and guides by focusing the persons attention to the surrounding rather than to the system.

The flexibility of the system allows the person to choose the type of guidance(audio, haptic) prior to the start of the journey, as well as allows switching between the guidance types during the journey by simply removing the physical products(headphones or patch).

Since the main issue with guiding systems today is providing reassurance when on the route, recalling information about the route is vital. UP provides the ability to interact with the guiding system and ask for reassurance while walking via a simple tap gesture on the “shoulder patch(haptic guidance accessory)” or by tapping on the phone while in the pocket(without taking it out of the pocket) if not using the patch. The system responds with voice information of a visual cue(landmark) to walk up to(guides like a human), or simply provides haptic feedback via the patch to let the person know in which direction to continue walking(left, right, continue straight) at the appropriate time(takes latency into account). The information is provided ahead of time so the person has time to respond and if still makes the wrong turn the system guides the person to the defined destination without prompting the person to turn around but rather by simply rerouteing to a new path that will take him/her to the destination and therefore not causing unnecessary anxiety.

7.0

Reflection

Project reflection

I feel I had a lot of ups and downs throughout the project, but have never felt that I have chosen the wrong topic and that I was not learning from the process. Prior to start of the project I set a goal for myself that I will try and build as much as I can. I would have never thought I would have used all the skills I've learned since my first day at UID and learn even more. However one thing that really helped me throughout the project was writing reflections each week of the project. I did that up to the execution phase, and even though I rarely went back to read my reflections I feel it kept my memories from experiences fresh. Noting down notes not just in writing but also just by recording myself turned out to be great and I'll definitely use it in the future.

The research phase was definitely the most mentally challenging. Getting in hold with people to interview, planing a research trip, synthesising the wast amount of findings was really intense. However it was really rewarding and guided me along the project. I feel what was really beneficial was going with my gut feeling and learned experiences from interning at IDEO, that lead me to do several immersive experiences. Getting first hand experiences helped me a lot in understanding how people feel when being guided in a different way, and I would have never tried narrational guidance if it wasn't for first hand experience of being presented with art blindfolded in Tate Modern in London.

For me ideation and refinement phase felt almost like one big phase of testing out ides. They were definitely the most fun phases that allowed me to explore a lot through prototyping. The nature of my project pushed me in the direction of building a lot and with that met one of my main wishes, as well as contributed to my main goal of the project, which was to see how the end result could change if one was to design in the context and not just with the context in mind.

The approach of building and testing in the context was definitely the right one and I feel designers should approach projects like this more often. I am stating this since the test results of prototyping in context with people led me to findings and understanding of human actions that I could not have learned otherwise and I feel it would have been impossible for me to come to these findings if I was designing sitting down and thinking of how might people be guided or testing with them while asking them to think, act, etc. as if they were walking.

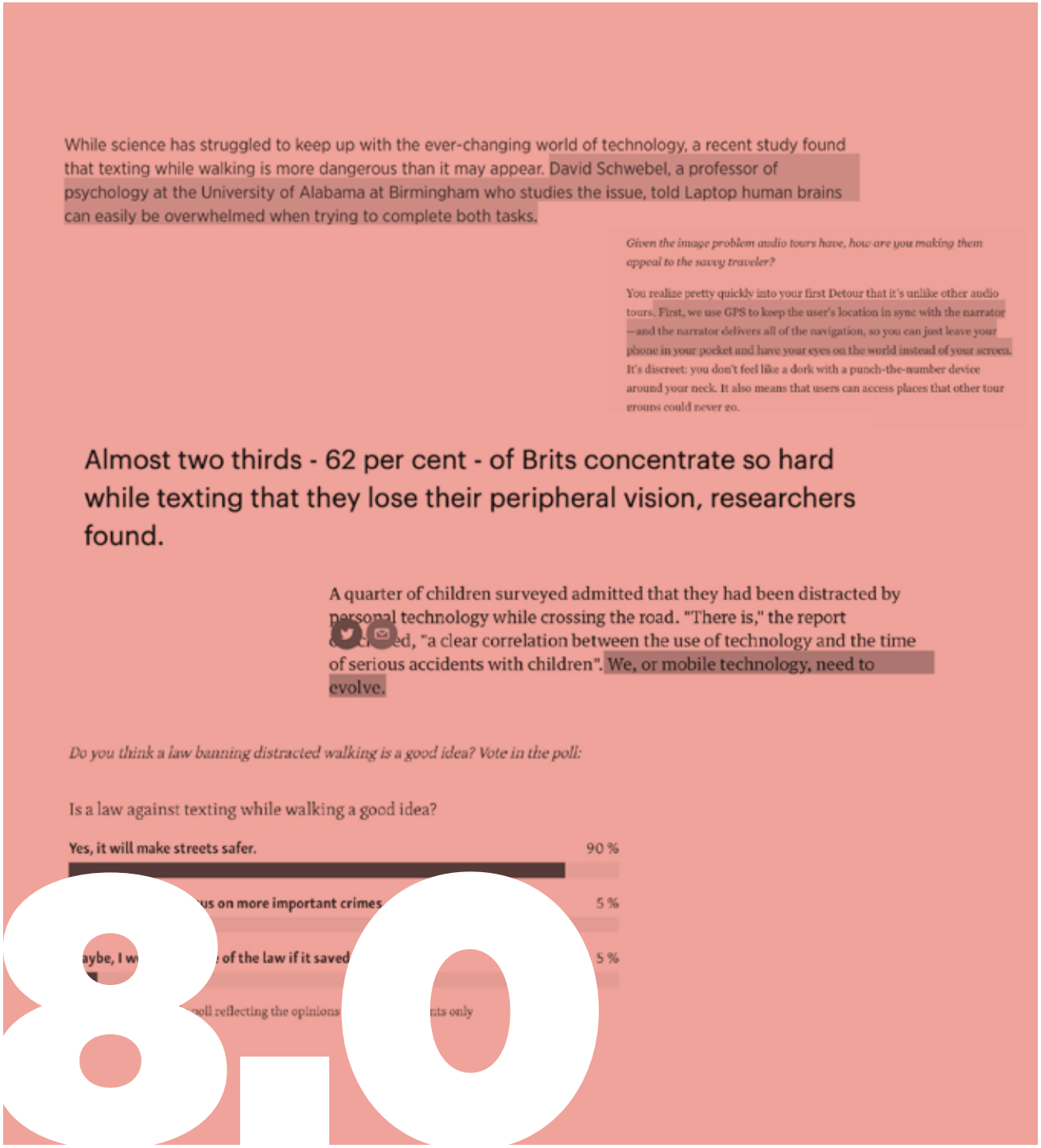
However saying that I feel that what needs to be taken into the account with this type of a design approach is that it is definitely more challenging and time consuming. For example I didn't have a slight clue on know how to even approach prototyping guidance with narration and having people in the equation didn't make things easier. This process took a lot of preparation prior to testing(writing scenarios, finding locations to guide people, finding people to test with(taking a lot of their time), etc.), so seeing how days were passing by so quickly was really intense, but in the end all the planing, pre testing,.. led to findings on which I could immediately build(update prototypes) and test again and the results from that approach was better that I could have ever expected.

Therefore I would say that designers can step over the initial hurdles I had by involving people that have expertise in various design fields and not be afraid of prototyping on the spot with people. They can greatly speed up the process by involving people that specialise in sound, haptics, etc. as well as overcome questioning if the prototype is working or not. This project was definitely to much to handle for a single person. However what designer can take away and not start from fresh if designing for guidance is that: 1st. people need to have an overview of the route prior to the start of guidance, because it puts them in a mindful state, 2nd. people need to have the ability to choose and change the type of modality with which they want to be guided at any time, 3rd. guiding with visual cues prompts people to be more observant and therefore more aware of their surrounding, 4th. when pointing out to a visual cue, it needs to be easy to detect in the environment(high contrast, tallest building, etc.(sth. that stands out)), 5th. time is vital and if a change of direction is needed it needs to be referenced in comparison with the walking/driving/riding tempo at the moment, not to cause anxiety. I feel these are the key findings from the project that designers can build on top of.

Even though I am mentioning the hurdle of doing the project alone and the amount of pressure I therefore felt, I feel the more pressure there was and the more ambiguous the state of the project was, the more satisfying the result was. However what I would have loved would be that I could have find the balance between these extremes that produced immense amount of stress and the same time extensive amount of joy in the end.

I definitely felt I was most at ease at the process gateway. I've reached my goal of honing down the finding and pointing at a concept direction that I have set for myself when making the timeline. I felt that really taking a lot of time for putting down the plan for the project played out. I was on track throughout the project, apart on two occasions when preparing for research and 1/2 presentations. I feel the biggest issue was that I've started to late due to wanting to build more even though I all read had way too much material to present. As per usual I used the techniques of pre stressing myself in order to deliver on time, however I felt the closer to the end of the project we are the worse it gets and harder to control and is effecting my physical and mental state. I know I prefer working in a slow and steady phase, so what I've learned from this is to do it this way even if it means sacrificing a free weekend since that was another personal goal. Design takes time and trying to look at every single detail to make sense of the big picture while focusing on micro interactions sometimes doesn't help when it comes to work life balance. But I guess that will be my lifelong learning.

I feel the biggest thing I took out of this project was finding what I really love to do and that is to build and test with people. I learned that even though I like finalising the projects at the end it produces more amount of stress due to being a perfectionist and not being able to leave a stone un turned. Hence focusing on the early stages of the projects where people are involved to inspire, test and build with provides me with more satisfaction and is healthier for me than rushing to build a perfect finished project.



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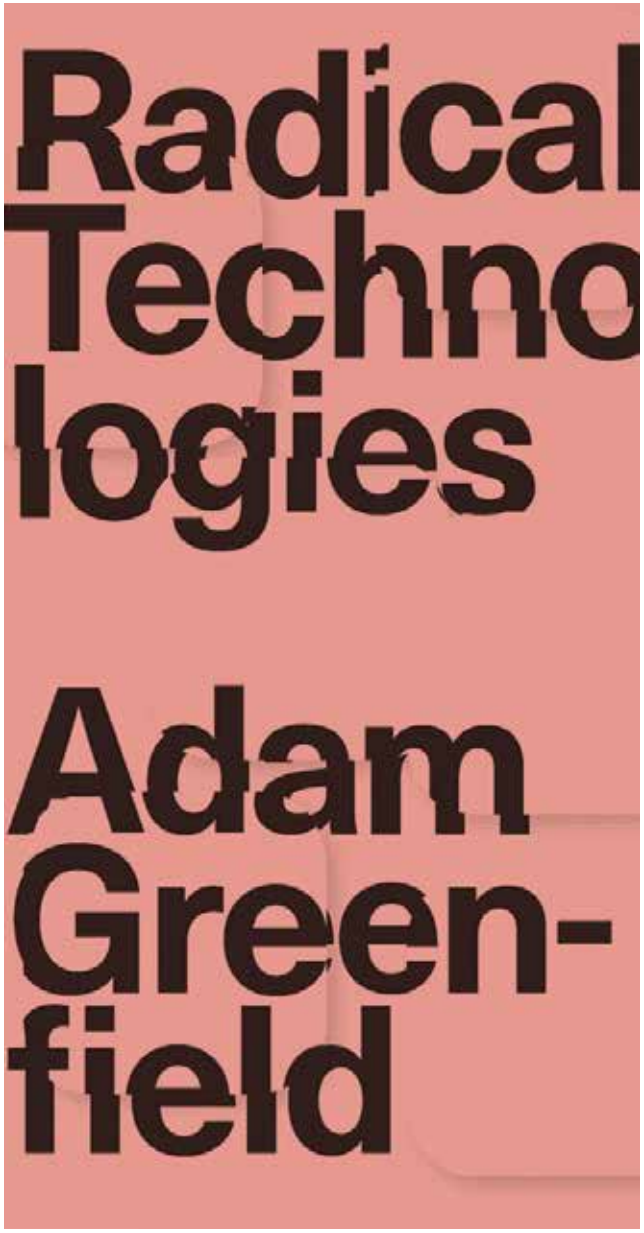

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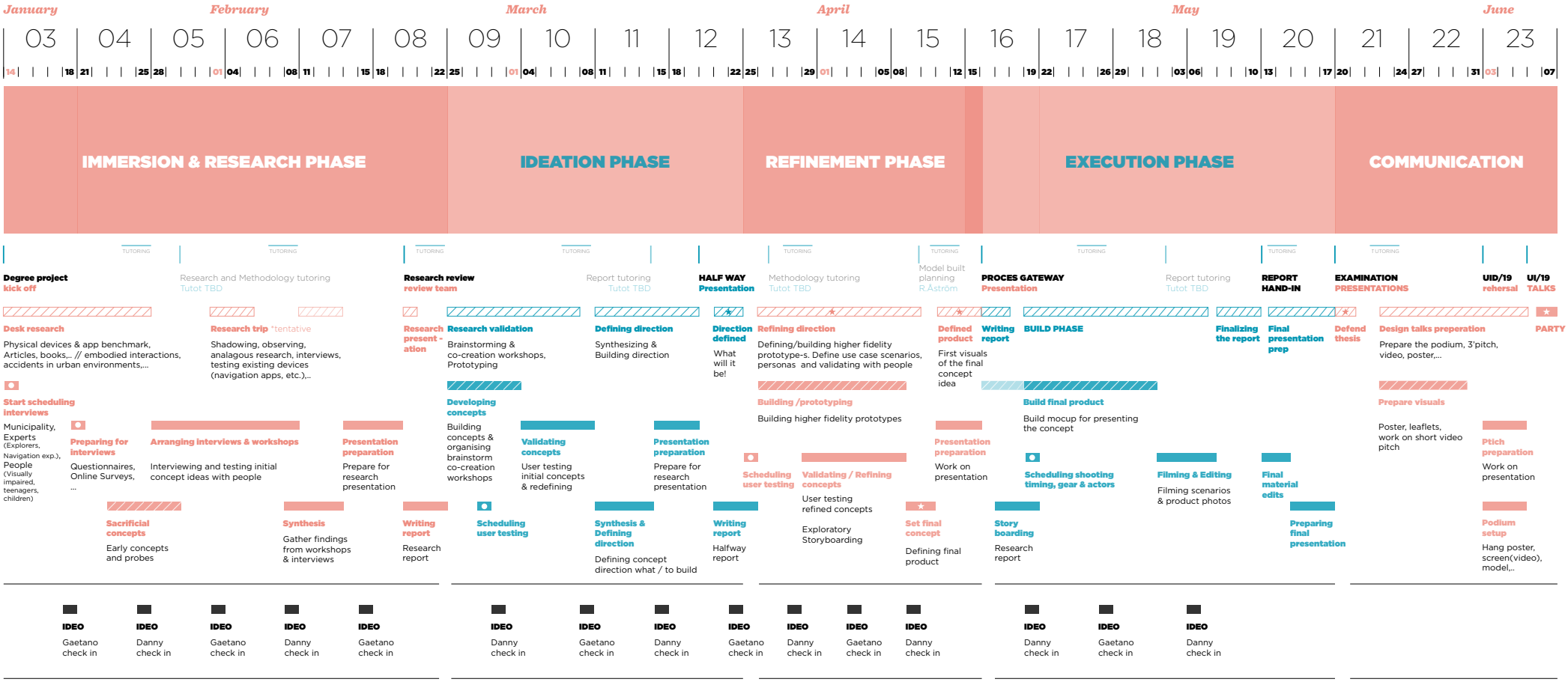
9.0

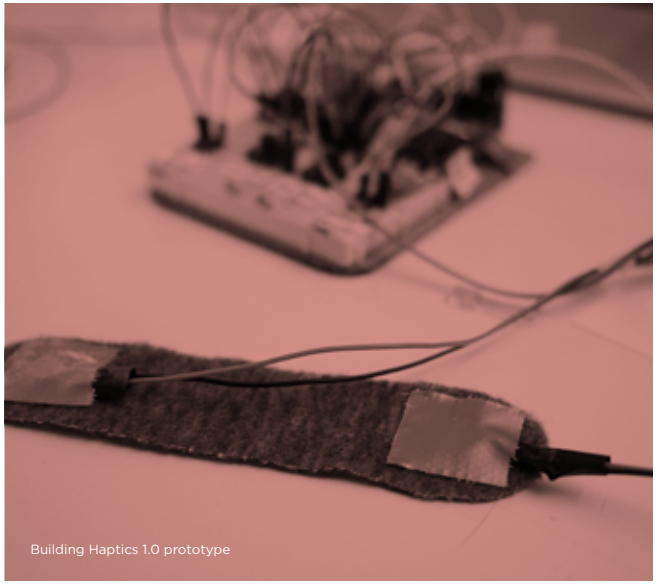
Appendix

Timeplan



*** Every Friday** // write report and document work

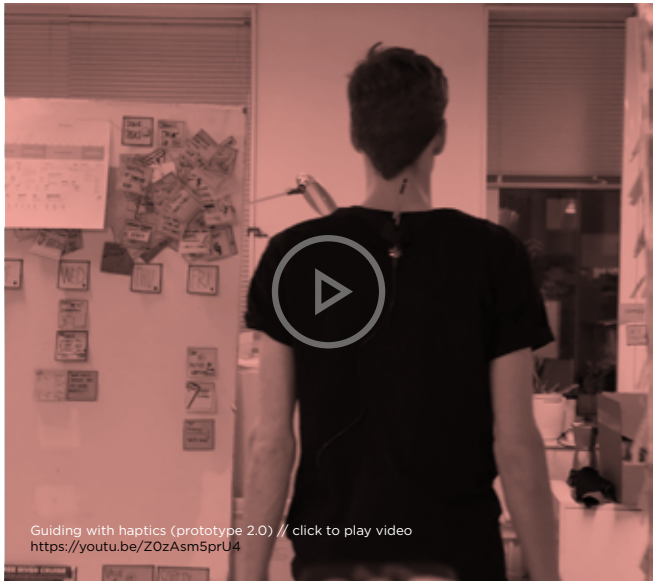
Prototyping



Building Haptics 1.0 prototype

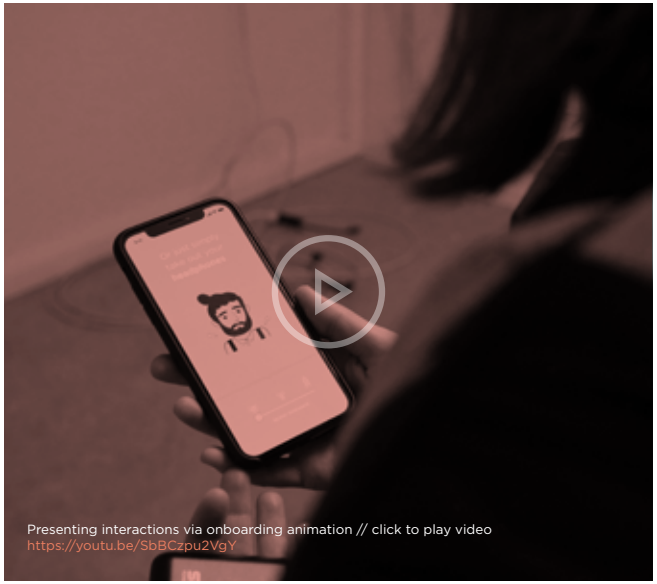
Buildging Haptics 2.0 prototype

Testing GUI



Guiding with haptics (prototype 2.0) // click to play video
https://youtu.be/Z0zAsm5prU4

Guiding with visual cues (prototype 3.0) // click to play video
https://youtu.be/pbCeUGwIixU



Presenting interactions via onboarding animation // click to play video
https://youtu.be/SbBCzpu2VgY

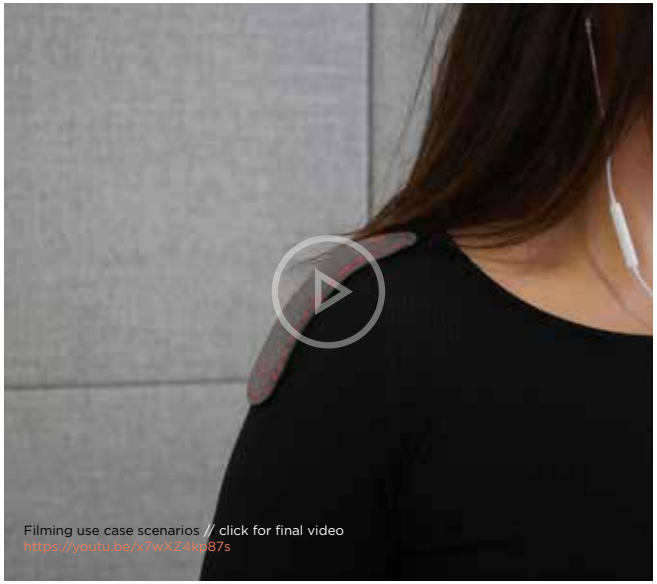
Model making

Mood board

"Patch" sketch

From tests to final model

Model on manekin



Filming use case scenarios // click for final video
https://youtu.be/x7wXZ4kp87s