

Social Navigation. Appendices

Master Thesis - 2023
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Appendix 1. Complete List of Characters

Appendix 1. Complete List of characters

Table FIXME provides a list of all people that are blind or have low vision (PBLV) that helped during this project, what they helped with and what they gave permission for. Table FIXME provides a similar list on all sighted people (SP) that helped during the project.

Permission statements: Yes, No, N.A. (not asked)

1.a Overview of PBLV that helped during the project

<i>Name</i>	<i>Description</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
Sophie	A woman in her forties, has been strongly visually impaired for about 20 years, has a job as an experience expert, and has a child.	Interview 09-02-2022 Interview 06-04-2022 Shadowing session 12-04-2022 Feedback gathering concept generation 20-07-2022	Yes	Yes	Yes
Hans	He is nearly seventy years old and for twenty years suffers from Macula Degeneration. He also works as an experience expert ¹ .	Interview 07-02-2022 Interview 07-04-2022	Yes	Yes	N.A.
Karin	She is at the end of her fifties and has both low vision and low hearing, but the exact diagnosis is unknown. She lives on her own.	Interview 25-02-2022	Yes	N.A.	N.A.

<i>Name</i>	<i>Description</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
David	A male in his thirties that has been legally blind since birth. As a child, his vision used to be slightly better but it has deteriorated over time. He lives on his own and has a job in the nightlife.	Interview 24-02-2022 Interview 05-04-2022	Yes	Yes	N.A.
Maria	A woman in her eighties that has been suffering from Macular Degeneration for thirty years now. She is retired and lives together with her husband.	Interview 07-02-2022 Shadowing Session 12-04-2022 Haptic understanding test 05-06-2022 Location Mode testing 09-09-2022	Yes	Yes	Yes
Laura	A woman in her thirties that recently became a mom. She has two different jobs and lives together with her husband and child.	Interview 08-04-2022	Yes	Yes	N.A.
Alice	A married woman in her sixties that has been completely blind for twenty years now. She lost her vision relatively suddenly. She works as an experience expert.	Interview 13-04-2022 Interview 19-05-2022 Haptic understanding test 03-06-2022	Yes	Yes	N.A.
Zoe	She is in her twenties and is studying. She is completely blind in one eye and in addition struggles with hearing loss and the inability to smell.	Interview 20-04-2022	Yes	N.A.	N.A.

<i>Name</i>	<i>Description</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
Bas	A male in his forties, who has been visually impaired since birth. He has low vision, works as an experience expert and lives on his own. He has cooperated in one interview.	Interview 12-04-2022	Yes	N.A.	N.A.
Lisa	A teenager that is still in high school. She lives together with her parents and has been completely blind since she was 3 years old.	Interview 21-04-2022	Yes	Yes	N.A.
Lia	She is in her eighties is retired and lives together with her husband. She has limited vision because of a congenital visual impairment.	Shadowing session 12-04-2022	Yes	Yes	N.A.
Nick	Nick is a guy in his twenties, who has been completely blind since birth.	Feedback gathering concept generation 10-6-2022	Yes	Yes	N.A.
Rick	A guy in his 20-30's who is completely blind	Feedback gathering concept generation 10-6-2022 Final feedback gathering Sofi 14-10-2022	Yes	Yes	Yes
Jasmin	A woman in her 20-30s, exact vision unknown	Feedback gathering concept generation 10-6-2022	Yes	Yes	N.A.

<i>Name</i>	<i>Description</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
Bjorn	A man in his 20-30s, exact vision unknown	Feedback gathering concept generation 10-6-2022	Yes	Yes	N.A.
Ruben	He is a middle-aged man, who used to be a chef. His exact vision is unknown.	Feedback gathering concept generation 10-6-2022	Yes	Yes	N.A.
Sara	A woman in her 20-30's, her exact vision is unknown	Feedback gathering concept generation 10-6-2022	Yes	Yes	N.A.
Sam	A guy in his twenties who has been completely blind since birth.	Final feedback gathering Sofi 14-10-2022	Yes	Yes	Yes
Tanja	A woman in her thirties and has deteriorating very low vision since birth	Final feedback gathering Sofi 14-10-2022	Yes	Yes	Yes
Iris	A woman in her twenties who has been completely blind since birth	Final feedback gathering Sofi 14-10-2022	Yes	Yes	Yes

1.b Overview of Sighted People that helped during the project

<i>Who</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
I. ten Have (ergotherapist)	Interview 08-03-2022	Yes	Yes	Yes
SP 1	Cards against Designers 17-05-2022	Yes	Yes	N.A.
SP 2	Cards against Designers 17-05-2022	Yes	Yes	N.A.
SP 3	Cards against Designers 17-05-2022	Yes	Yes	N.A.
SP 4	Cards against Designers 17-05-2022	Yes	Yes	N.A.
SP 5	How Can We session 10-05-2022 Cards against Designers session 18-05-2022 Location mode testing 07-09-2022\	Yes	Yes	Yes
SP 6	Cards against Designers session 18-05-2022	Yes	Yes	N.A.
SP 7	Cards against Designers session 18-05-2022 Location Mode Testing 07-09-2022 Quick Guide Mode testing 12-12-2022	Yes	Yes	Yes
SP 8	How Can We session 10-05-2022	Yes	Yes	Yes
SP 9	Cards against Designers session 18-05-2022	Yes	Yes	N.A.
SP 10	Haptic Understanding test 05-06-2022	Yes	Yes	Yes
SP 11	Haptic Understanding test 05-06-2022	Yes	Yes	N.A.
SP 12	Haptic Understanding test 05-06-2022	Yes	Yes	N.A.

<i>Who</i>	<i>Helped with</i>	<i>Data Permission</i>	<i>Photo anonymized permission</i>	<i>Photo permission</i>
SP 13	Brief test paper prototypes 09-06-2022 Location Mode testing 07-09-2022 Guide Mode testing 1 01-12-2022 Guide Mode testing 2 21-12-2022	Yes	Yes	Yes
SP 14	Location Mode Testing 07-09-2022	Yes	Yes	Yes
SP 15	Location Mode Testing 07-09-2022	Yes	Yes	Yes
SP 16	Guide Mode testing 1 01-12-2022 Guide Mode testing 2 21-12-2022	Yes	Yes	N.A.

Appendix 2. Interview plan social challenge research

The goal of this research was to get an understanding of what challenges PBLV experience in their social life. For these specific interviews, nine PBLV cooperated. The interview procedure used, will be described below.

1. Introduction - 5 min.

- Chatting about how people are doing
- Explain my project
- TU Delft, Industrial Design masters
- Medical passion
- Graduation project
- Why focus on PBLV (because of my grandmother)
- Conducted at Envision
- Earlier conducted interviews with five PBLV and one ergo therapist. Based on these interviews I learned that having a VI often has negative effects on social life, which mostly is not accounted for by assistant devices.
- Therefore my project goal became:
“Developing a supporting device that makes PBLV feel more at ease in social situations”

- Need: to figure out how a VI influences different social situations. And I want to retrieve this information from interviews.
- Explain that I would like to talk about social life and VI during this interview.

2. Asking for Consent - 5 min.

- Explain that I understand the topics might be sensitive, therefore interviewees should never feel required to answer a question. Explain to the interviewee that he/she can always decide not to answer a question or stop the interview when he/she feels like
- Ask consent for (voice) recording the meeting for notetaking afterward. The recordings won't be used for anything else but notetaking and won't be shared with anyone.
 - Notes and quotes will be anonymized/pseudonymized.
 - If screenshots from zoom meetings will be used in the report/pictures from interviews, the participants will be illustrated to make them unrecognizable.
- The information retrieved from this interview will be (anonymously) shared with Envision and used for my graduation project and report.
- Ask for audio consent for all things above.

3. Introduction questions - 15 min.

Questions in case I did not yet talk to the person before:

- Repeat information received in advance

If time, and I feel that it is helpful:

- How are you feeling now about your VI?
- and/or: How do you feel about the ways you are currently dealing with your VI?

Questions on what feeling at ease is like?

- How would you describe feeling at ease in a social situation?

If needed/helpful:

- Can you name an example of a social situation where you feel at ease?
- Can you name an example of a social situation where you feel not at ease?

4. Discussing specific social situations - 45 min.

If inspiration was needed, the following list of social situations was used:

- Meeting up with a friend at their place
- Going to a restaurant with family
- Community BBQ in a park
- Online meeting for a job application
- Going to a club with friends
- Playing a game with friends at home
- Discussion with a colleague during a business meeting
- Group sports session at the gym
- Having a 'blind date' at a bar
- Taking part in public transport

The situations were selected to cover different locations, differ in the number of other people present, and differ in the familiarity of others.

Questions per situation

- Have you been ['Situation'] before?
If yes:
 - Frequently?
- Imagine that you are in the situation
- Can you describe how you would experience being in that situation?
 - Which environmental factors influence this experience?
- How do/would you feel in this situation?
 - At ease or tensed?
 - Nervous, insecure or confident?
- How would you behave during the situation? / How did you
 - Passive/active
 - Adaptations?
 - Preparation
 - Processing afterward
- Do you feel like your VI influences your experience of this situation?
 - Practical/social
 - Feeling, + score disturbing scale 1-10

example: How would you feel if you, because of the crowding of the environment, would not

be able to recognize others in the club?

- How do you deal with it?
- How would you ideally like to experience this situation?

5. General questions - 15 min.

- From the situations we discussed,
 - For which situation would you wish that your VI had a less great role in the situation?
 - Social, practical?
 - What kind of challenges in particular?
 - How do these challenges influence the way you feel at ease in the situation?
 - Are there other social situations where you experience the same/similar challenges?
 - Did you select this situation because you experience the most challenges here? Or because this situation/these challenges have the greatest value to you.
- Are there other social situations where you feel less at ease because of your VI?
 - Why?
- Are there any social situations (from the ones we discussed, or others) that you would currently avoid because of your VI?
 - Why
- Are there situations (from the ones we just discussed or others), where you feel that your VI does not play a role?

- Simply no issues or good coping mechanism?
- No issues in the past as well? Or in the future?
- Based on what we just discussed, is there any social challenge you experience due to your VI, that you would love the most to be solved? Or its impact to be reduced?
 - Why?
 - In which situations do you encounter this challenge? (How do you deal with it?)
 - What opportunities would solving/reducing it open up?

6. Shadowing and Closure - 5 min.

- Thank people for their openness
- Ask them if I might be able to contact them again later on.
 - Possibly ask if they would be okay with a shadowing session, but stress that answering no to this question is entirely okay and justified.
- Explain that I will contact them at the end of my project (which was at that time expected to be around November/December), and what kind of outcome they could expect (explain that despite my desire, it will be very unlikely that this project will result in a real helping device on the market)

Appendix 3. Complete list of Social Challenges

The table is presented on the next pages.

Appendix 3. Complete list of social challenges for PBLV (table)

Here the complete table of social challenges found during the research described in chapter 5, is provided. To keep the table comprehensible, the titles of the articles are provided below, and abbreviations of the articles are used in the table (article A,B,C, etc.). Furthermore the challenge area 'Understanding of others' is abbreviated to 'Understanding'.

Article A: Personal and professional reactions to blindness from Diabetic Retinopathy

Article B: Emotional well-being and adjustment to vision loss later in life: a meta-synthesis of qualitative studies

Article C: Group therapy with blind diabetics

Article D: A Systematic Requirements Analysis and Development of an Assistive Device to Enhance the Social Interaction of People Who are Blind or Visually Impaired

Article E: An Evaluation of a Wearable Assistive Device for Augmenting Social Interactions

Article F: Conveying facial expressions to blind and visually impaired persons through a wearable vibrotactile device

Article G: Wearable-assisted social interaction as assistive technology for the blind

Social challenges for PBLV

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>People being uncomfortable using words like 'See you', or 'Let's have a look'</u>	Stigma	Book Blind Spots	David Hans	
<u>Being stigmatized by others, others treating you as unequal</u>	Stigma	Article A Article B Article C Book Blind Spots Book Usher	Alice Bas David Karin Lisa Zoe	

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Worrying of what others might not think of you</u> (usually at the beginning of the VI journey)	Stigma	Article D	David Hans Laura Lisa Maria	
<u>Behaving different because of feeling insecure on the risk of being stigmatized</u>	Stigma	Book Blind Spots	David Hans Lisa Nora Sophie	
<u>Others asking you</u> (inappropriate) <u>questions about your VI</u>	Stigma	Article A	Karin Laura Lisa Zoe	
<u>Others not interested in your story or asking how you are doing because of your life being so different. Or others ignoring your VI, not daring to ask about it. Or forgetting to take it into account</u>	Stigma Understanding		Nora Sophie	
<u>Others being overly suprised of your presence or overly suprised on what you can do</u>	Stigma	Book Blind Spots	David Hans Nora Sophie	
<u>Feeling of being less then others / Feeling like not fitting in</u>	Stigma	Book Usher	Alice Nora Sophie	

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>People acting upon their own expectations/wrong assumptions. Making assumptions on what you can or can't do</u>	Stigma	Article C Book Blind Spots Book Usher	Alice David Hans Lisa Sophie	
<u>Having to explain yourself and your VI (at moment of arrival) in a social situation</u>	Stigma	Article A Book Blind Spots	Bas David Hans Karin Laura Sophie	
<u>People acting different in an interaction due to your VI</u>	Stigma	Article A Article C Book Blind Spots	Alice David Hans Lisa Zoe	
<u>Tension to tel or not to tell about your VI. Or your VI being obvious or not</u>	Stigma	Book Blind Spots Book Usher	Inge ten Have Laura Lisa Maria Nora Zoe	
<u>Not wanting to be a burden to others</u>	Dependence Stigma	Article B Article C Book Blind Spots Book Usher	David Lisa Nora	Alice Maria
<u>Getting a lot of (negative) attention because of walking outside with a cane or a guidedog</u>	Stigma		Alice Bas Hans Karin	
<u>People misunderstanding you because you do not behave or look 'blind'</u>	Stigma	Book Blind Spots Book Usher	Hans Laura Lisa Nora Sophie	

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>People behaving negatively because of your VI (gossiping, negative approaches etc.)</u>	Stigma		Alice Bas David Hans Karin	
<u>Others offering/enforcing unsolicited help</u>	Stigma	Article A Book Blind Spots	Alice Hans	Maria
<u>Having issues focussing because of all the environmental sounds</u>	Processing		Hans Nora Sophie	Sophie
<u>Being tired after social event because of having had to process all the impulses</u>	Processing	Book Usher Documentary Usher	Bas Karin Lisa Sophie Zoe	
<u>Getting overwhelmed because of other sensory impulses to process</u>	Processing	Documentary Usher	Bas David Hans Inge ten Have Karin Nora Sophie Zoe	
<u>Getting overwhelmed by the amount of (unclear) visual details to process</u>	Processing	Documentary Usher	Bas Karin Nora Zoe	
<u>Changing social behaviour due to being oversensitized and overwhelmed by the environment, and getting tired because of that</u>	Non-verbal outing Processing		Bas Karin Sophie Zoe	Lia Maria

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Losing orientation because of overwhelming sensory impulses</u>	Orientation Processing	Book Usher	David	
<u>Having the desire to be without helping devices for a bit</u>	Dependence		Bas	
<u>Someone having to help you read something</u>	Dependence	Book Blind Spots Book Usher	Alice Hans Laura Maria	
<u>Someone helping you receive social information, like who is sitting where</u>	Dependence		Alice Lisa Sophie	
<u>Someone having to help you orient yourself</u>	Dependence Orientation	Book Blind Spots Book Usher	Alice Hans Nora Sophie Zoe	
<u>Having the desire to be at the location very early so that you can take a proper orientation point and won't have to enter when the others are already there</u>	Dependence Orientation Recognition Stigma	Book Usher	David Lia Maria Sophie	
<u>Someone helping you to act out a certain task</u>	Dependence	Article C Book Blind Spots Book Usher	Alice David Karin Laura	Maria

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Someone having to help you with transportation</u>	Dependence	Book Blind Spots Book Usher	Alice Bas David Hans Laura Lisa Nora Sophie Zoe	Maria Sophie
<u>Having to plan everything elaborately in advance in order to be able to attend the social event properly.</u>	Adaptation Dependence	Book Blind Spots Book Usher	Bas David Sophie	
<u>Not wanting others to feel uncomfortable, for example when bumping into others</u>	Orientation Sighted perspective		David	
<u>Inability to know where people are to not bump into them</u>	Orientation		Lisa Nora	
<u>Having to stand/sit at a certain location within the social environment in order to feel at ease</u>	Orientation		David Hans Lisa Nora Sophie Zoe	Lia
<u>Inability to know where objects are to not bump into them</u>	Orientation		David Hans Lisa Nora Sophie	Alice

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Having less interaction with certain people because of limitation with VI combined with orientation</u>	Orientation		Lisa Zoe	Sophie
<u>Having to make small environmental adaptations to act properly in the social situation</u>	Orientation		Bas David Hans Lia	Lia Maria Sophie
<u>Being overly expressive yourself to make others feel comfortable in the situation and manage the interaction</u>	Non-verbal outing Processing Stigma		Bas Sophie Zoe	
<u>Inability to make (proper) eye-contact for the perception of the sighted person</u> <u>Having to put in conscious effort to direct your face towards the person you are interacting with</u>	Non-verbal outing Non-verbal perception	Article E Book Blind Spots	Alice Bas David Hans Lia Lisa Maria Zoe	David Hans Laura Maria Sophie
<u>Having different body manerism during social situation</u>	Non-verbal outing	Article D		Bas David Lisa Maria Sophie
<u>Struggle to look in the webcam for phone or business meetings / being tiring to look at pc screen</u>	Non-verbal outing Non-verbal perception		Bas Nora Zoe	

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Not knowing when to join/start the conversation</u>	Non-verbal outing Non-verbal perception	Book Blind Spots	David Sophie	Sophie
<u>The desire/inability to know what someone else (especially new people) look like</u>	Non-verbal perception	Article D	Alice Bas Hans	Maria
<u>Not noticing when others want to end or join the conversation</u>	Non-verbal perception	Article D		Sophie
<u>Missing out on body language and facial expressions makes it harder to get clarity on whether you like the person or not, find the person sympathetic</u>	Non-verbal perception	Article D	Hans	
<u>Inability to know who is talking to who</u>	Non-verbal perception Recognition	Documentary Usher	David Inge ten Have Sophie	
<u>Not noticing when others make eye-contact / greet you non-verbally / not knowing where others are looking at</u>	Non-verbal perception	Article E	Bas Hans Laura Lisa Maria Nora Sophie	
<u>Not knowing if others are facing you or not</u>	Non-verbal perception	Article D	Alice Hans Lisa	
<u>People approaching you that you do not want contact with but you cannot avoid the interaction</u>	Non-verbal perception Recognition	Article G	Alice Nora	

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Being unable to fully understand the social setting</u>	Non-verbal perception Orientation Recognition	Article D Article E		Lia Maria
<u>Not noticing when others leave you, as in end the conversation, or move to another location</u>	Non-verbal perception Orientation		Alice David Inge ten Have	Sophie
<u>Missing out on facial expressions to interpret how others react to the interaction</u>	Non-verbal perception	Article D Article E Article F	Alice Bas David Inge ten Have Karin Sophie	Maria Sophie
<u>Not noticing when not answering a question correctly.</u>	Non-verbal perception			David Hans Maria Sophie
<u>Not noticing when others approach you</u>	Non-verbal perception Orientation		David Nora	Alice
<u>Missing out on body language and facial expressions to detect how someone is feeling</u>	Non-verbal perception	Article D Article E Article F	Alice Bas David Hans Inge ten Have Sophie	Maria Sophie
<u>Missing out on jokes because missing out on facial expressions and body-language</u>	Non-verbal perception		Bas	Lia Maria
<u>Inability to mingle in groups of people</u>	Orientation Recognition		David Hans Lisa Nora Sophie	Lia Maria

Aa Challenge	≡ Category	≡ Literature	≡ Mentioned by	≡ Observed at
<u>Inability to recognise people</u>	Recognition	Article D Article G Book Blind Spots	Alice Bas David Hans Inge ten Have Karin Laura Maria Nora Sophie	
<u>Feeling of having to proof or justify yourself, what you can and cannot do, that you are nice enough</u>	Stigma Understanding	Book Blind Spots Book Usher	Karin Maria Sophie	
<u>Having issues explaining your VI to others, having issues to make others understand your condition, understand what you can see and can't see</u>	Understanding	Book Blind Spots Documentary Usher	Bas Karin Laura Lisa Nora Sophie	
<u>Having issues expressing personal needs to others</u>	Dependence Understanding	Book Blind Spots Book Usher Documentary Usher	Alice David Hans Nora Sophie	Sophie
<u>Having to give up on social events because the event itself takes too much effort to adapt</u>	Adaptation Dependence		Nora Sophie	

Appendix 3. Complete list of Contextual factors

The table is presented on the next pages.

Appendix 4. Complete list of contextual factors (table)

Here a complete list of contextual factors found during the research described in chapter 5, is provided. All the factors found, have been grouped into three categories: PBLV specific, Audience specific, and Environmental.

Contextual factors that influence the challenges

Aa Influence	≡ Explanation	≡ General category	≡ Variables	≡ Source
<u>Type of VI</u>	What type of VI someone has, and what the percentage of leftover vision is, influences the challenges someone experiences	PBLV specific	<div>Completely Blind</div> <div>Legally Blind</div> <div>Low vision</div> <div>Nightblindness</div> <div>Photophobia</div>	<div>Alice Bas David Hans Laura</div> <div>Lia Lisa Maria Nora Sophie</div> <div>Zoe</div>
<u>Onset of VI</u>	The onset of the VI seems to have an influence in how well you adapted to missing the visual cues.	PBLV specific	<div>From birth/early in life</div> <div>Later in life</div> <div>gradual</div> <div>sudden</div>	<div>Alice Bas David Inge ten Have</div> <div>Lia Lisa Maria Sophie</div>
<u>Visibility of VI</u>	How obvious it is to others that you are visually impaired or not	PBLV specific	<div>invisible</div> <div>visible</div>	<div>Alice Bas Book Blind Spots</div> <div>David Hans Laura Lia Lisa</div> <div>Maria Nora Sophie Zoe</div>
<u>Identity integration</u>	To what extent have VIP 'accepted' their condition, this has often a great influence on if they feel comfortable telling others or asking others for help.	PBLV specific	<div>Multiple stages</div>	<div>Bas David Hans Laura Lisa</div> <div>Maria Nora Zoe</div>

Aa Influence	≡ Explanation	≡ General category	≡ Variables	≡ Source
<u>Remaining personal characteristics related to energy level and how outgoing someone is</u>	Could be age, could be the person itself, could be being an introvert or extrovert, but all these factors do influence how someone perceives a social situation. If someone has high levels of energy, or is an extrovert, going out with friends might still be intense but not as tiring. Could even be dependent on how well people slept	PBLV specific	High energy Low energy age extrovert introvert	Bas David Laura Lisa Nora Sophie Zoe
<u>Amount of people</u>	Generally speaking the more people are at the social situation, the more challenging the situation becomes	"Audience"	Little people Many people	Article: Group therapy with blind diabetics Bas David Hans Inge ten Have Karin Lia Lisa Maria Nora Sophie Zoe
<u>Familiarity of people</u>	Familiarity influences the extend to which VIP feel at ease, and know they will be treated the right way	"Audience"	Mix Semi known Unknown Well known	Alice Bas David Hans Karin Laura Lisa Maria Nora Sophie
<u>Type of setting</u>	Whether the setting is in professional life or personal/private life.	"Audience"	Emotional Formal Informal Practical	Bas Inge ten Have Lisa Nora

Aa Influence	≡ Explanation	≡ General category	≡ Variables	≡ Source
<u>Spontaneity</u>	If an event is planned in detail or spontaneously organised has a huge influence on how VIP perceive the situation, in general planned situations seem to be preferred.	Environmental	Frequent Planned Spontaneous	Alice Bas David Laura Sophie
<u>Illumination during situation</u>	For some people they need more light to see something, for others the darker the better, it depends on which VI someone has	Environmental	Changing Dark Light	Bas David Hans Laura Lia Maria Nora Sophie Zoe
<u>Size of the environment</u>	The larger the environment, in general, the more challenging it is experienced.	Environmental	amount of unknown space related to crowdedness	Bas Hans Maria Nora Sophie Zoe
<u>Familiarity of the environment</u>	The more unknown the environment, the more challenging it will be for PBLV to navigate themselves and orient themselves properly.	Environmental	Been there before new environment	Bas David Hans Laura Lisa Maria Nora Sophie Zoe
<u>Day or night event</u>	Related to illumination but also goes for completely blind people	Environmental	Day Evening Summer winter	Alice Bas David Hans Inge ten Have Laura Maria Nora Sophie
<u>Background noises</u>	How loud all the sounds are in the environment, has relationship with crowdedness but could be also due to the nature of the situation	"Audience" Environmental	Silent loud	Bas David Hans Lisa Maria Nora Sophie Zoe

Aa Influence	≡ Explanation	≡ General category	≡ Variables	≡ Source
<u>Activity</u>	Is it a setting where everyone has things to do, is walking around, dancing, or mingling, or is everyone sitting at a fixed location.	Environmental	<div>Changing situation</div> <div>Constant situation</div> <div>Interaction is main activity</div> <div>Interaction is part of activity</div>	<div>David</div> <div>Laura</div> <div>Lisa</div> <div>Maria</div> <div>Nora</div> <div>Sophie</div>

Appendix 5. Analysis of Social Challenge areas

A semi-quantitative and qualitative analysis was used to define which of the challenge areas defined in chapter 5 should receive priority to be solved, which subsequently provided inspiration on how to narrow down the project goal towards a design goal. In this appendix, both analyses will be explained.

Semi-Quantitative Method

For the semi-quantitative method, all the individual challenges described within each challenge area were accumulated, for example, it was calculated that 20 individual challenges were described within the challenge area of 'Stigmatization'. The amount of subchallenges gives an indication of the scope of the challenge area and therefore can be issued as an indicator for prioritization. The larger the scope, the more important it might be.

In addition, it was accumulated how often individual challenges were mentioned by literature sources and mentioned by/observed at PBLV (and expert ergo

therapist I. ten Have). The average coverage of each challenge area also gives an indication of its importance. For stigmatization, the individual challenges were mentioned 30 times by the literature sources, and 82 times mentioned/observed at PBLV (and expert ergo therapist I. ten Have).

These three numbers were subsequently used to calculate the average literature and PBLV coverage of individual challenge areas within a challenge area. For stigmatization, each individual challenge was covered by $30/20 = 1,5$ literature sources and $82/20 = 4,1$ PBLV. This process of calculations was repeated for all eight challenge areas.

The results of these calculations are shown in table A1. The areas marked green scored average/above average high in comparison with all the challenge areas. The challenge areas that scored relatively low on both the number of sub-challenges, average literature- and PBLV coverage, are considered not in the need to receive priority.

From these calculations it seems that the areas of stigmatization, (in)dependence, nonverbal perception, and recognition are of higher priority to be solved. Furthermore, these calculations show that **processing stimuli** might have the least priority to be solved (within this project).

<i>Social Challenge Area</i>	<i>Amount of Challenges</i>	<i>Literature Coverage (source/ challenge)</i>	<i>Stakeholder Coverage (stakeholder/ challenge)</i>
Stigma	20	1.5	4.1
Proc. Stimuli	7	0.7	4.4
(In)depen.	11	1.6	4.5
Orientation	13	0.3	4.0
Nonverbal expression	6	0.8	5.5
Nonverbal perception	17	1.1	4.2
Recognition	6	1.3	4.7
Underst. of others	4	1.8	4.3

Table A1: Semi-Quantitative Analysis

Average challenges/area = 10.5

Average literature coverage/ individual challenge = 1.1

Average PBLV coverage/ individual challenge = 4.5

Important to note is that the goal of this analysis is not to prove the validity of challenge areas, but more to get a view of their relative importance. Furthermore, it is important not to treat this data as statistical findings, as here a quantitative analysis has been executed based on qualitative data.

Qualitative Method

During some interviews priorities regarding challenge areas were expressed. Not all people expressed a preference, but for the PBLV that did, their preferences will be shown in table A2 below.

<i>PBLV</i>	<i>Personal priority</i>
Bas	nonverbal perception, especially seeing how someone feels.
Lisa	(In)dependence
Sophie	1) Stigmatization, 2) Understanding of others (clos friends and family, 3) nonverbal perception
Maria	Couldn't make a clear decision, but prioritized crowded and busy situations.
David	1) Nonverbal perception, 2) (In)dependence
Nora	Orientation, Processing stimuli, Recognition, Stigmatization
Zoe	Processing stimuli

Table A2: PBLV preferences

This list of preferences is not a statistically proven finding. Furthermore, the goal of this analysis is not to prove the validity of challenge areas, but rather to get an indication of which challenges area PBLV might consider more important than others.

It is interesting to note that nearly all areas were mentioned by at least one PBLV as a 'priority', except for the challenge area of '**nonverbal expression**'. This could be due to the fact that PBLV might be less aware of their challenges with nonverbal expression, as this is more often noticed by sighted people that interact with PBLV (for example me observing it during interviews and shadowing sessions).

However, as I focus this project on designing for what PBLV need, the result of this table might indicate not to put the main focus on solving challenges with nonverbal expression.

Appendix 6. Studied Technological Developments

In this appendix, a more elaborate summary will be provided of the four projects that were studied in more detail for chapter 6, Design Context: Technologies for improving social situations for PBLV.

Project 1: A Systematic Requirements Analysis and Development of an Assistive Device to Enhance the Social Interaction of People who are Blind or Visually Impaired

By Krishna et al. (2008)

During this project, four students attempted to design a system that allowed PBLV to receive information on nonverbal communication. **Their goal was to allow PBLV to more freely engage with sighted others.**

In advance, they conducted a study in which they provided PBLV with a list of challenges and asked them to rate their relative importance according to them. Their analysis showed that PBLV would like to know when personal mannerisms might interfere with their social

interactions with others, and would like to be up-to-date on the facial expressions of others. Furthermore, PBLV appeared to consider awareness of (changes in) the appearance of others to be less important to them. (Krishna et al., 2008)

Their project resulted in a first prototype of a smart-glass system that was able to detect, track and recognize faces, count, and locate people. For the future, they also aimed to include the processing of facial actions, facial expressions, body gestures, and physical descriptors.

Their progress is remarkable, nevertheless the prototype they created functioned as a proof-of-concept (Krishna et al., 2008). It worked well in a controlled laboratory setting, but could not handle drastic changes in light conditions or pose angle (Krishna et al., 2008).

Furthermore, privacy regulations (when saving data about someone's face) and an assessment of the appearance of the product by PBLV were not included in the report.

Krishna et al. (2008) provided well argumentation on why further development of such a Social Interaction Assistant is valuable and desirable. Unfortunately, no follow-up of this project could be found.

Project 2: An Evaluation of a Wearable Assistive Device for Augmenting Social Interactions

By Qiu et al. (2020)

This paper also describes a project executed by students. They set themselves a clear goal at the start of the project, namely to create an **assistive device** that helps PBLV by simulating **gaze behavior** and by notifying them when they make eye contact with someone.

During their project, they described how gaze behavior is an important factor in communicating with others. They explained there are four types of gaze behavior:

- No gaze,
- Constant gaze,
- Random gaze and
- Interactive gaze, this one was perceived as the most effective.

Furthermore, they wanted to focus on designing for PBLV as both **'receivers' and 'senders' of gaze information**, rather than similar projects that only focussed on allowing PBLV to perceive when others make eye contact with them.

They created a setup where a sensor in the middle of two persons would track the participants' eyes, subsequently, they had a glasses prototype with artificial eyes presented on it, that could 'look' the sighted person in the eye.

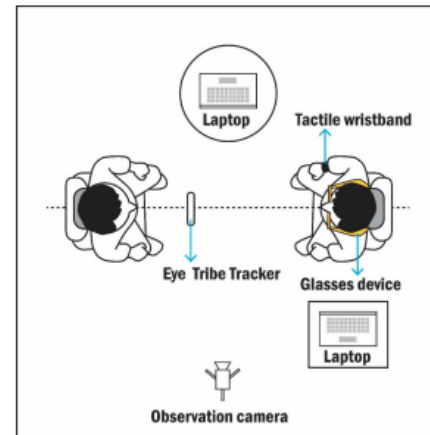


Figure A1: "Overhead view of the experimental setup: the eye tribe tracker detected the gaze from a sighted participant, and a non-sighted participant wore the glasses device and the tactile wristband." (Qiu et al., 2020)



Figure A2: "A dummy wore a glasses device with the interactive gaze" (Copyright Bart van Overbeeke; Qiu et al., 2020)

They conducted experiments with both blind-sighted and blindfolded-sighted groups. Although their general results showed positive effects on participants' co-presence and perceived affective understanding, and increased sense of safety for the non-sighted participants; the effects seemed less strong for people that were blind versus people that were blindfolded.

The aim of this study, allowing PBLV to make proper eye contact with sighted others, is valid (as they argue in their paper, and as confirmed by eight PBLV during my own interviews). However, more steps need to be considered before this technology could be developed as an actual assisting device.

First of all, they argue that their concept has to be tested more elaborately to prove its effectiveness. Secondly, their concept has only been tested in a two-person conversation scenario, where the persons were sitting in front of each other, along with that the test setup included an eye-tracking camera located between the two, which does not seem like a realistic future scenario. Lastly, I feel that aesthetics have not been taken into account that much yet, along with the effects such a product might have on stigmatization.

Project 3 Conveying facial expressions to blind and visually impaired persons through a wearable vibrotactile device

By Buimer et al. (2018)

For this project, students explored the possibilities of designing a **sensory substitution device** (SSD) that would **detect and communicate facial expressions** of others to PBLV in real-time. Their prototype consisted of a head-mounted camera and a haptic belt that would provide PBLV with vibrotactile cues around the waist which corresponded with the facial expressions of others.

They used vibrotactile cues to make sure that the SSD did not interfere with other sensory modalities. They studied the effectiveness of their prototype and its desirability.

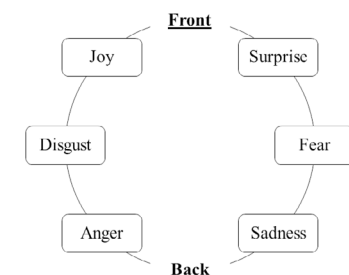


Figure A3: "An overview of the sensory substitution system worn in the study." (Buimer et al., 2018).

The system was used to detect six basic emotions and map them around the user's waist as shown figure A3. Subsequently, they let both PBLV and sighted people (SP) test the prototype with projected faces on a wall.

Significant results were found for PBLV's ability to recognize facial expressions, especially for material that did not include audio cues. For SP the improvements were consistent but not statistically significant.

Their positive results show that a device like this might help PBLV with detecting the emotions of others. Furthermore, it is an inspiring example of how vibration cues can be used for communication. As their design seemed to work, it also means that people were well enough able to perceive the vibrational data around the wrist and link it with certain meanings. However, they do add the critical note that in real-life when other sensory inputs are present, the ability to process tactile information is likely to be significantly worse. This forms their argument for making their design as simple as possible, with not more than six vibration signals.

Their concept is promising, however, there are some interesting limitations to discuss. First of all, although the authors argue that the Face Reader has high accuracy in detecting emotions from two known sets of emotion picture databases, in general AI's ability to detect emotion is arguable. In real-life, emotions have a very subjective nature, which makes emotional AI especially

prone to bias (Purdy et al., 2019). Purdy et al. (2019) explain that for example, emotional analysis technology assigns more negative emotions to people of certain ethnicities than to others. Other sources also argue AI's inaccuracy to detect real emotions because of the complexity of human emotions (Hagerty & Albert, 2021; Joshi, 2022).

In addition to the bias and inaccuracy of the Face Reader, in real-life, the camera conditions also might not be ideal. In their paper, they explain how for the test setup the face images were presented in a fixed position, and participants were instructed regarding the location of the face images (figure A4). In real-life the user would have to focus the camera on the desired person itself, furthermore, the light conditions may be insufficient, or someone might not properly face the user once their emotion is being interpreted. This might increase the difficulty of use and the inaccuracy of the system.

Lastly, the study does not touch upon outsider perception of this helping device, stigmatization, and possible privacy issues. The authors note that aesthetics will still have to be covered in a possible follow-up of the project. However, beyond aesthetics, what do outsiders think of someone else wearing and using a camera continuously in public, do they think that is acceptable? And, what are the privacy issues related to detecting and communicating someone's facial expression? These are questions that are not answered in this project and are in the need of some more investigation.



Figure A4: “Experimental setup. The participant was positioned in front of a projector, which projected stimuli on a wall 2m away” (Buimer et al., 2018).

Project 4 Conveying facial expressions to blind and visually impaired persons through a wearable vibrotactile device

By Hayden (2014)

This project focussed on “an end-to-end wearable system designed to learn and assist its (potentially blind) wearers with daily social interactions” (Hayden, 2014, p.3). A very detailed process is described of how they realized a prototype of a product that could detect when a social interaction was taking place. Subsequently, after the detected interaction took place, the user was asked to

identify the person interacted with via audio snippets. The system would link this information with the visual data that they collected with a camera, with which the system would be able to recognize the other person on the next encounter. In a social setting when the service would recognize someone it would tell the entire name via Bluetooth earphones. If the wearer was searching for a specific person, it would notify the user with a simple buzz via a smartwatch when the particular person was detected.

Their project focus was based on their standpoint that little work focuses on increasing PBLV's ability to initiate social interactions.

“This [ability to detect familiar individuals in proximity] imposes a subtle but real limitation in their ability to form relationships and collaborations as they often find themselves at the mercy of circumstance, waiting for others to approach and identify themselves” ~ (Hayden, 2014, p.17).

They specifically designed for three scenarios:

- Spotting proximate acquaintances
- Quickly identifying proximate acquaintances
- Alerting the wearer about the presence of a specific acquaintance

‘Soft requirements’ that they named were that the system should be comfortable to wear and that it should not attract (negative) attention from others (which would make others to avoid the contact in the first place). Based on that they decided to place the camera (using a mobile phone for the prototype) on the chest of the user. Furthermore, locating the camera on the chest of the user would prevent it from moving excessively when the user is walking for example.

The project was mainly focused on designing the software and hardware for the concept but did not cover any real-life testing with the target group. Nevertheless, a critical look at its functioning and possibilities for future work were defined.

First of all, they discussed that either the inconvenience of using the wearable should be very low, or the value it provides must be high (Hayden, 2014). During the designing phase, they took this into account, especially with the placement of the camera, and they suggest further miniaturization of the hardware for this concept. However, they do not discuss possibilities for increasing the value of this concept by increasing functionalities or merging it with currently existing helping devices.

Secondly, they discuss privacy and acceptance of the concept. For future work, more research is needed to reassure that using a camera in public settings is accepted, as well as using headphones/earphones.

Furthermore, the aesthetics of the design should be further elaborated upon. The author did a small study on the obviousness of a camera on different positions of the body but did not yet elaborate on the design of the specific wearables in use.

Lastly, the author defined some specific elements to further improve the functioning of the design. Next to those technical improvements, it could also be suggested to test the concept in the real context with the target group to see if there are any UX elements that were previously not considered.

Appendix 7. Changing Stories

To gain a better understanding of what the impact would be of designing for one of the four project goals described in 7.1, I wrote two social stories, in which the main character was a PBLV. Subsequently, the stories were rewritten with the idea that there was a solution designed for one of the design goals. Rewriting stories helped to see the tiny aspect of where the impact could be made. One story focused on going out in a club, whereas the other one focused on a friend's BBQ birthday party.

The two social stories will be presented below. For each story, first, the original version will be provided, followed by four adjusted versions that show the impact of designing for the four design goals respectively. The four initial design goals defined in chapter 7.1 were:

- Helping PBLV to improve their social navigation (social navigation meaning being able to mingle around, recognize people, find people to talk to, etc.)
- Allowing PBLV to initiate interaction
- Allowing PBLV to perceive non-verbal cues during interactions
- Allowing PBLV to feel more in control when asking for and receiving help

Impact areas will be highlighted with bold text.

Story 1: Going out with friends

Original Story

The taxi stops, it is 21:30 and I arrived at a bar named Sundance. Tonight I am meeting up with three of my friends. We planned to go out, just like we used to in the past. Only now, my vision further deteriorated and I am fully night blind. But it is Sara's birthday, so whatever she wants...

The taxi driver is kind enough to help me out of the car, of course, I can do this on my own as well, but I decided not to make a big deal out of it, he is trying to be friendly that is all. I don't want to use my cane tonight, first of all, it is this local bar where there is a high chance of bumping into people that I know, or actually that recognize me, and I probably won't recognize them. Anyway, I do not feel ready for everyone to know, if they approach me I will tell them about my vision loss, but otherwise, they don't have to know. Secondly, a cane won't really help me in a crowded environment full of dancing and chatting people.

But, the moment I get out I realize I should have taken it with me, of course, it is already getting dark and I don't know the place as I used to anymore. At this point, my vision is so low that I can only guess where the entrance is based on the increased sound of chatting people in a certain direction. So slowly and carefully I try to walk in the noisy direction. I feel like an idiot, people must see

how weird I am walking right now, but I decided not to let these thoughts dominate my mind and continue walking.

I already texted one of my friends that I arrived, therefore Loes is supposed to be outside already, but of course, I do not see her. When I am close to the entrance (or at least I think I am), I feel someone tapping on my shoulder. Luckily it is Loes 'Hey Lisa, you arrived!'. I am relieved, and I grab her elbow while she guides me inside. It must look weird to others that I am holding her, but at least less weird than walking with my cane I guess...

The other two of my friends are already inside. Thank god, they are standing at the bar. We greet and hug each other and start chatting. It requires a lot of energy for me to focus on the conversation, as the background noises are quite dominating.

I want to get myself something to drink, and as we're standing at the bar, I decide I can do this myself. I turn towards the bar and try to get the waiter's attention. Only, I can barely see him, let alone see if he is helping someone else or actually making eye contact with me... So I... I wave, clumsy as it is, it works. He walked towards me and asked me what I wanted to drink. I order a coke. When he is about to serve it, I ask him if he can put it into my hand, I do so to make sure I won't knock over it.

Happy with this successful move, I turned back to my friends. But it turns out that Loes is talking to someone else that I do not seem to know, and Rosa and Sara are both gone. I guess Rosa is visiting the toilet and Sara is outside smoking. So there I am, standing next to my friend who is talking to someone I don't recognize, I only see a blur of people, no clue who they are. Loes is too busy to notice me just standing there.

After a minute or so, I collected the guts needed to say 'Sorry to butt in, but Loes, do you know where Rosa is?'. Loes responds 'Oh Lisa, this is Derek, you know, we used to have mathematics together'. My brain is cracking... Mathematics class... Derek.... and before this awkward moment takes too long I say 'Oh Hiii Derek!' and embrace the guy whom I actually still do not know who he is.

I chat a bit with Loes and Derek and slowly remember who he is. Still not being too engaged in the conversation, I ask Loes again where Rosa is, and as it is hard to explain in an environment where I can barely see, she grabs my hand and points it in the direction where Rosa is apparently chatting. I know it was necessary for her to help me this way... but still, I feel humiliated. The conversation with Derek has now even more obviously been spoiled (added to the fact that I did not recognize him). So just before I am gonna attempt to walk towards Rosa, I feel the need to set things straight, and say 'By the way Derek, just to clarify for you, I am visually impaired for 5 years now, especially during the night I

have almost no vision left, which was also the reason why I did not instantly recognize you'. Derek responds in an understanding and relieved manner, and I can tell that my message must have clarified a lot for him. This again makes me wonder which other awkward things I must have done in these few minutes, for him to feel so relieved after my announcement.

I walk toward Rosa, I hope to walk toward Rosa. Happy me, she sees me approaching and calls me 'Hey Lisa, please join us, I am chatting with Erica and Sophie'. Erica and Sophie are also friends of ours, a little less close but still friends. They know about my visual impairment, which is a big relief. Although I am standing in the open space, which makes me feel disoriented, at least I can be myself around these people.

Improved Social Navigation

The taxi stops, it is 21:30 and I arrived at a bar named Sundance. Tonight I am meeting up with three of my friends. We planned to go out, just like we used to in the past. Only now, my vision further deteriorated and I am fully night blind. But it is Sara's birthday, so whatever she wants...

The taxi driver is kind enough to help me out of the car, of course, I can do this on my own as well, but I decided not to make a big deal out of it, he is trying to be friendly that is all. I don't want to use my cane tonight, first of all, it is this local bar where there is a high chance of bumping

into people that I know, or actually that recognize me, and I probably won't recognize them. Anyway, I do not feel ready for everyone to know, if they approach me I will tell them about my vision loss, but otherwise, they don't have to know. Secondly, a cane won't really help me in a crowded environment full of dancing and chatting people.

But, the moment I get out I realize I should have taken it with me, of course, it is already getting dark and I don't know the place as I used to anymore. At this point, my vision is so low that I cannot see where the entrance is.

But, I already texted one of my friends and she is waiting for me outside. I know where she is, and therefore (along with the increased noisiness in that direction) I also have a strong feeling about where the entrance is.

So slowly and carefully I try to walk towards Loes, and in the noisy direction. I feel like an idiot, people must see how weird I am walking right now, but I decided not to let these thoughts dominate my mind and continue walking.

Loes is walking towards me as well, and says 'Hey Lisa, you arrived!'. I am relieved, and I grab her elbow while she guides me inside. It must look weird to others that I am holding her, but at least less weird than walking with my cane I guess...

The other two of my friends are already inside. Thank god, they are standing at the bar. We greet and hug each other and start chatting. It requires a lot of energy for me to focus on the conversation, as the background noises are quite dominating.

I want to get myself something to drink, and as we're standing at the bar, I decide I can do this myself. I turn towards the bar and try to get the waiter's attention. Only, I can barely see him, let alone see if he is helping someone else or actually making eye contact with me... So I... I wave, clumsy as it is, it works. He walked towards me and asked me what I wanted to drink. I ordered a coke. When he is about to serve it, I ask him if he can put it into my hand, I do so to make sure I won't knock over it.

Happy with this successful move, I turned back to my friends. **But it turns out that Loes is talking to a guy I do recognize but do not fully remember anymore. Rosa is at the back of the bar chatting with Erica and Sophie, two other friends, and Sara I guess is outside for a smoke. Okay, what to do now..., I could go directly towards Rosa, but that might feel a little strange towards Loes. Unfortunately, Loes is too busy to notice me standing there.**

After a minute or so, I collected the guts needed to say 'Sorry to butt in, but Loes, I am gonna go have a chat with Rosa, Erica, and Sophie'. 'Oh Lisa, wait, this is Derek, you know, we used to have mathematics

together'. My brain is cracking... Mathematics class... Derek.... and before this awkward moment takes too long I say 'Oh Hiii Derek!' and embrace the guy of whom I slowly start to get a clue of who he is.

I chat a bit with Loes and Derek, but I am still not too engaged in the conversation. So I say 'It was nice to talk to you again Derek, gonna have a chat with Rosa now, but see you guys later'.

I walk towards Rosa. She sees me and is happy that I approach her. 'Hey Lisa, please join us, I am chatting with Erica and Sophie'. Erica and Sophie are also friends of ours, a little less close but still friends. They know about my visual impairment, which is a big relief. Although I am standing in the open space, which makes me feel disoriented, at least I can be myself around these people.

Improved ability to initiate interaction

The taxi stops, it is 21:30 and I arrived at a bar named Sundance. Tonight I am meeting up with three of my friends. We planned to go out, just like we used to in the past. Only now, my vision further deteriorated and I am fully night blind. But it is Sara's birthday, so whatever she wants...

The taxi driver is kind enough to help me out of the car, of course, I can do this on my own as well, but I decided not to make a big deal out of it, he is trying to be friendly that is all. I don't want to use my cane tonight, first of all, it is

this local bar where there is a high chance of bumping into people that I know, or actually that recognize me, and I probably won't recognize them. Anyway, I do not feel ready for everyone to know, if they approach me I will tell them about my vision loss, but otherwise, they don't have to know. Secondly, a cane won't really help me in a crowded environment full of dancing and chatting people.

But, the moment I get out I realize I should have taken it with me, of course, it is already getting dark and I don't know the place as I used to anymore. At this point, my vision is so low that I can only guess where the entrance is based on the increased sound of chatting people in a certain direction. So slowly and carefully I try to walk in the noisy direction. I feel like an idiot, people must see how weird I am walking right now, but I decide not to let these thoughts dominate my mind and continue walking.

I already texted one of my friends that I arrived, therefore Loes is supposed to be outside already, but of course, I do not see her. When I am close to the entrance (or at least I think I am), I feel someone tapping on my shoulder. Luckily it is Loes 'Hey Lisa, you arrived!'. I am relieved, and I grab her elbow while she guides me inside. It must look weird to others that I am holding her, but at least less weird than walking with my cane I guess...

The other two of my friends are already inside. Thank god, they are standing at the bar. We greet and hug each other and start chatting. It requires a lot of energy for me to focus on the conversation, as the background noises are quite dominating.

I want to get myself something to drink, and as we're standing at the bar, I decide I can do this myself. I turn towards the bar and try to get the waiter's attention. **He is busy with helping someone else, but the moment he is done with that I say 'Hi, can you help me?'. Hmm, no reaction, probably did not say it loud enough. I wait a little longer, the moment he is looking in my direction, I briefly wave my hand. It works, he walks towards me, and I tell him what I would like to drink.** When he is about to serve it, I ask him if he can put it into my hand, I do so to make sure I won't knock over it.

Happy with this successful move, I turned back to my friends. But it turns out that Loes is talking to someone else that I do not seem to know, and Rosa and Sara are both gone. I guess Rosa is visiting the toilet and Sara is outside smoking. So there I am, standing next to my friend who is talking to someone I don't recognize, I only see a blur of people, no clue who they are. Loes is too busy to notice me just standing there.

At a certain point, the conversation between Loes and the guy stops for a second, and I feel that that is my moment to butt in. I tap Loes's shoulder 'Hi Loes, quick

question, where is Rosa?’ Loes responds ‘Oh Lisa, wait this is Derek, you know, we used to have mathematics together’. My brain is cracking... Mathematics class... Derek.... and before this awkward moment takes too long I say ‘Oh Hiii Derek!’ and embrace the guy who I actually still do not know who he is.

I chat a bit with Loes and Derek and slowly remember who he is. Still not being too engaged in the conversation, I ask Loes again where Rosa is, and as it is hard to explain in an environment where I can barely see, she grabs my hand and points it into the direction where Rosa is apparently chatting. I know it was necessary for her to help me in this way... but still, I feel humiliated. The conversation with Derek has now even more obviously been spoiled (added to the fact that I did not recognize him).

So just before I am gonna attempt to walk towards Rosa, I feel the need to set things straight, and say ‘By the way Derek, just to clarify for you, I am visually impaired for 5 years now, especially during the night I have almost no vision left, which was also the reason why I did not instantly recognize you’. Derek responds in an understanding and relieved matter, and I can tell that my message must have clarified a lot for him. This again makes me wonder which other awkward things I must have done in these few minutes, for him to feel so relieved after my announcement.

I walk towards Rosa, I hope to walk towards Rosa. **Happy me, when I get closer, I see that she turns around, and looks at me. ‘Hi Rosa! Haha, you were gone all of a sudden!’.** she responds ‘Hey Lisa, please join us, I am chatting with Erica and Sophie’. Erica and Sophie are also friends of ours, a little less close but still friends. They know about my visual impairment, which is a big relief. Although I am standing in the open space, which makes me feel disoriented, at least I can be myself around these people.

Ability to perceive non-verbal cues during the interaction

The taxi stops, it is 21:30 and I arrived at a bar named Sundance. Tonight I am meeting up with three of my friends. We planned to go out, just like we used to in the past. Only now, my vision further deteriorated and I am fully night blind. But it is Sara’s birthday, so whatever she wants...

The taxi driver is kind enough to help me out of the car, of course, I can do this on my own as well, but I decided not to make a big deal out of it, he is trying to be friendly that is all. I don’t want to use my cane tonight, first of all, it is this local bar where there is a high chance of bumping into people that I know, or actually that recognize me, and I probably won’t recognize them. Anyway, I do not feel ready for everyone to know, if they approach me I

will tell them about my vision loss, but otherwise, they don't have to know. Secondly, a cane won't really help me in a crowded environment full of dancing and chatting people.

But, the moment I get out I realize I should have taken it with me, of course, it is already getting dark and I don't know the place as I used to anymore. At this point, my vision is so low that I can only guess where the entrance is based on the increased sound of chatting people in a certain direction. So slowly and carefully I try to walk in the noisy direction. I feel like an idiot, people must see how weird I am walking right now, but I decided not to let these thoughts dominate my mind and continue walking.

I already texted one of my friends that I arrived, therefore Loes is supposed to be outside already, but of course I do not see her. When I am close to the entrance (or at least I think I am), I feel someone tapping on my shoulder. Luckily it is Loes 'Hey Lisa, you arrived!'. I am relieved, **Loes looks very happy to see me.** I grab her elbow while she guides me inside. It must look weird to others that I am holding her, but at least less weird than walking with my cane I guess...

The other two of my friends are already inside. Thank god, they are standing at the bar. We greet and hug each other. **I see that Sara is looking very excited, and I say 'I see you have been having a nice birthday'. Sara,**

indeed very energetic and excited, responds 'OMG, yes, because Tom gave me this amazing ring', and she holds her hand close to my face. I see some reflection of light but nothing more than that. I ask her if she can send me a picture of that ring tomorrow during the day. I see her face being like 'Of course, so stupid, I could have known better, I know she cannot see this right now... '. I tell her 'Oh please, don't worry about it'. She looks relieved again, and we continue chatting. The background noises are highly distracting, but being able to know how my friends feel enables me to follow the conversation quite well.

I want to get myself something to drink, and as we're standing at the bar, I decide I can do this myself. I turn towards the bar and try to get the waiter's attention. Only, I can barely see him, let alone see if he is helping someone else or actually making eye contact with me... So I... I wave, clumsy as it is, it works. **He walks towards me and asked me what I wanted to drink. He smiles, in a cute manner, really? Did he just flirt with me? I smile back, as nice as I can, and order a coke.** When he is about to serve it, I ask him if he can put it into my hand, I do so to make sure I won't knock over it. **We smile towards each other, and thereby end our interaction.**

Happy with this successful move, I turned back to my friends. But it turns out that Loes is talking to someone else that I do not seem to know, and Rosa and Sara are both gone. I guess Rosa is visiting the toilet and Sara

is outside smoking. So there I am, standing next to my friend who is talking to someone I don't recognize, beyond that I only see a blur of people, with no clue who they are. Loes is too busy to notice me just standing there.

After a minute or so, I collected the guts needed to say 'Sorry to butt in, but Loes, do you know where Rosa is?'. Loes responds 'Oh Lisa, this is Derek, you know, we used to have mathematics together'. My brain is cracking... Mathematics class... Derek.... and before this awkward moment takes too long I say 'Oh hiii Derek!' and embrace the guy whom I actually still do not know who he is.

I see how Derek does recognize me and is confused by the fact that I did not recognize him. I decided to set things straight, and explain to him that I have been visually impaired for a couple of years now, and how that also makes that I struggle to recognize him. I can tell by his face that he feels sorry for me, but also that he feels relieved that I clarified things for him. I ask him if he can just give me a few more hints to help me remember. He does so, which really helps me.

After a little while I decided to still go over towards Rosa. I asked Loes again where Rosa is, and as it is hard to explain in an environment where I can barely see, she grabbed my hand and pointed it in the direction where Rosa is apparently chatting. **I know it was necessary for her to help me this way, I am not liking it, but at least I**

am happy that Derek now knows so he does not react weirdly to this event.

I walk toward Rosa, I hope to walk toward Rosa. Happy me, she sees me approaching and calls me 'Hey Lisa, please join us, I am chatting with Erica and Sophie'. Erica and Sophie are also friends of ours, a little less close but still friends. **I can tell that they are happy that I joined their conversation.** They know about my visual impairment, which is a big relief. Although I am standing in the open space, which makes me feel disoriented, at least I can be myself around these people.

Increased feeling of control

The taxi stops, it is 21:30 and I arrived at a bar named Sundance. Tonight I am meeting up with three of my friends. We planned to go out, just like we used to in the past. Only now, my vision further deteriorated and I am fully night blind. But it is Sara's birthday, so whatever she wants...

The taxi driver is kind, and I decided to ask him for some help. 'Sorry sir, could you possibly open the door for me and he asks me if I need any help, and I tell him that if he would just open the door for me, and would explain to me where the entrance is, that would help me a lot. of course I can do this on my own as well, but I decided not to make a big deal out of it, he is trying to be friendly that is all. I don't want to use my cane tonight, first of all, it is this local bar where there is a high chance of bumping

into people that I know, or actually that recognize me, and I probably won't recognize them. Anyway, I do not feel ready for everyone to know, if they approach me I will tell them about my vision loss, but otherwise, they don't have to know. Secondly, a cane won't really help me in a crowded environment full of dancing and chatting people.

But, the moment I get out I realize I should have taken it with me, of course, it is already getting dark and I don't know the place as I used to anymore. At this point, my vision is so low that I can only guess where the entrance is based on the increased sound of chatting people in a certain direction. So slowly and carefully I try to walk in the noisy direction. I feel like an idiot, people must see how weird I am walking right now, but I decided not to let these thoughts dominate my mind and continue walking.

I already texted one of my friends that I arrived, therefore Loes is supposed to be outside already, but of course, I do not see her. When I am close to the entrance (or at least I think I am), I feel someone tapping on my shoulder. Luckily it is Loes 'Hey Lisa, you arrived!'. **I am relieved, I follow her without holding on to her, while she guides me inside towards my other friends.**

The other two of my friends are already inside. Thank god, they are standing at the bar. We greet and hug each other and start chatting. It requires a lot of energy for me

to focus on the conversation, as the background noises are quite dominating.

I want to get myself something to drink, and as we're standing at the bar, I decide I can do this myself. I turn towards the bar and try to get the waiter's attention. Only, I can barely see him, let alone see if he is helping someone else or actually making eye contact with me... So I... I wave, clumsy as it is, it works. He walked towards me and asked me what I wanted to drink. I ordered a coke. When he is about to serve it, I ask him if he can put it into my hand, I do so to make sure I won't knock over it. Happy with this successful move, I turned back to my friends. But it turns out that Loes is talking to someone else that I do not seem to know, and Rosa and Sara are both gone. I guess Rosa is visiting the toilet and Sara is outside smoking. So there I am, standing next to my friend who is talking to someone I don't recognize, beyond that I only see a blur of people, with no clue who they are. Loes is too busy to notice me just standing there.

After a minute or so, I collected the guts needed to say 'Sorry to butt in, but Loes, do you know where Rosa is?'. Loes responds 'Oh Lisa, this is Derek, you know, we used to have mathematics together'. My brain is cracking... Mathematics class... Derek.... and before this awkward moment takes too long I say 'Oh hiii Derek!' and embrace the guy whom I actually still do not know who he is.

I chat a bit with Loes and Derek and slowly remember who he is. Still not being too engaged in the conversation, **I ask Loes again where Rosa is. She points in a certain direction, and says ‘She is over there’. I thank her and say goodbye to Derek. Subsequently, I walk in the direction Loes pointed me to.**

I walk toward Rosa, I hope to walk toward Rosa. Happy me, she sees me approaching and calls me ‘Hey Lisa, please join us, I am chatting with Erica and Sophie’. Erica and Sophie are also friends of ours, a little less close but still friends. They know about my visual impairment, which is a big relief. Although I am standing in the open space, which makes me feel disoriented, at least I can be myself around these people.

Story 2: A friend’s BBQ birthday party

Original story

It is July, and summer finally seems to kick in in the Netherlands. It is 27 degrees, 3 pm and I am sitting in my garden enjoying the warmth of the sun. In a bit, I will have to dress up, as I have a birthday BBQ party for a friend this afternoon. My friend, Jasmine, recently turned 30 and she is celebrating her birthday with her boyfriend who will turn 31 next month.

They decided to throw a BBQ party and both people from her friends’ group, as well as his, are invited, which in total adds up to around 30 people. As Jasmine is one of my

best friends, I cannot afford not to go, though I feel quite anxious about the event. There are many people I don’t know, mixed with many people I do know, and all those people will see me turn from relatively independent to relatively dependent when the sun goes down, and I am not sure if I am prepared for that reveal.

I convinced myself to get up and get dressed. In half an hour Sammy, another friend will be waiting in front of my door to pick me up. We used to visit each other by bike, but as my vision decreased those things became impossible. Luckily I already decided what to wear for the event, a nice long summer dress with a jeans jacket to keep me warm during the evening. I put in some nice jewelry, put on some makeup, and put on my amazing sunglasses, and I am ready to go!

I grab the present from the counter, it’s a gift card Sammy and I give her together, for a small holiday weekend with the three of us. I hear a car honking in the street, it must be Sammy. Right in front of my door, there is a car waiting, I can hear the engine. I walk towards the car and open the door on the passenger’s side. I try to open it, but it is locked... Why is it locked? Then the window goes down, and a male shouts annoyed at me ‘What are you trying to do!? Get away from my car!’. I am in shock, pull my hands off the car and try to say ‘I am so sorry sir, but you know... I am bli....’, but the man already hits the gas and takes off.

He leaves me behind confused, and tense. I don't understand why someone would be waiting with his car in front of my house anyway...

I am standing in the middle of the road when another car is coming closer, again honking. A window opens and now Sammy is calling me, 'Hey Lisa, are you okay? Why are you standing in the middle of the road?!'. She stops the car and I get in as fast as I can, fighting against tears. Not that this event was that special or that shocking, but I guess it just added on top of the nerves I already had for the party. I explain what just happened, and Sammy hugs me. The original ride toward Jasmine only takes 3 min. at most, but I notice Sammy takes a small detour, I guess to give me some more time to calm down.

We arrived at Jasmine's place. When I get out of the car, I notice other voices in the front yard. One of them, a male which I do not recognize, says 'Did you guys come by car?! It is 27 degrees outside, are you guys insane?!', and right at that moment I turn around the car, and my white cane becomes visible. 'Ohh, oh, uhmm, I am sorry, I did not know you were....', I respond 'No worries,' (thinking: of course, bring it on, be rude before taking a look...) 'yes, I am visually impaired, so riding a bike is not the safest thing to do for me you know'. If only, they would know how much I miss cycling.

We take the backdoor towards the garden, I hear many people have already arrived. I have no clue where

Jasmine is located, but luckily I arrived together with Sammy. Together we walk toward Jasmine, and her boyfriend Marc. We hug and I give the present to Jasmine, which in reality means I am putting forward my hand with the present and hope that Jasmine takes it off my hand. She unpacks it, while I realize I hope I did not put Christmas wrapping around it, 'Oh how nice!'. I can hear that she is happy with the present, though I would have loved to see her initial facial expression.

'And I cannot join?', Marc asks. I don't know Marc that well, and therefore I struggle to decide what percentage of his message is a joke and what percentage is jealousy. Luckily Sammy takes over the conversation 'We're sorry Marc, but this is a girl's weekend only'. All are laughing, and I can laugh as well. Jasmine explains the setting, there is a buffet with drinks and cold dishes at the front of the garden, against the walls of the house. The BBQ is in the middle, and the seats and standing tables are at the very end. Inside, I start to panic. It is a really long garden, with many strange paths, flower patches, and stairs in the way. Having to get me food and drinks is a challenge on its own, having to bring it all the way to the back of the garden is basically dramatic.

Other people arrive that want to wish Jasmine and Marc a happy birthday, so Sammy and I decide to get something to drink. When we arrive at the drinks table Sammy kindly explains to me what is displayed on the table. Now it is still light outside. I am luckily able to

get my own drink. When we walk back to the end of the garden, Sammy sees Wanda, a friend of hers and, Jasmine, which I don't really like. She mentions it to me, luckily way in advance so that I can simply walk through and don't have to talk to her. But where to go now? I decide to continue my walk toward the benches at the end of the garden, and just sit down at one of them. I believe there are about seven people already sitting in that area, and they are intensively chatting.

When I get closer I frown to see where a free spot is. Ah, there! I put my hand up and say 'Hi guys, is that seat over there already taken?', luckily it isn't. I sit down and am silent for a while. I try to listen very closely if I hear any voices that I have already heard before. I think I do... but as everyone is talking over each other I am not exactly sure.

They are talking about plans for the summer holiday, and at some point, someone asks 'And you, what are your plans?'. I think I recognize this voice, someone from the sports club Jasmine is a member of, and I used to be. It remains silent, which makes me realize that they might be talking to me, stupid, I should have responded faster. 'Oh, sorry, are you talking to me?'. The (sports?) woman responds 'Uhm, yes haha'.

Okay, I need to set things straight, it is time for me to introduce my VI. 'Oh sorry, yes, Sammy and I just gave a girl's weekend out as a present to Jasmine. The

destination is a secret, but I can tell you it is gonna be sunny. Anyway, before we continue this conversation, I would like to tell you a small thing about myself. I have a VI, and have had it for years but recently my vision started to deteriorate very quickly, and I now only see about 15%. Therefore, I cannot really see when you guys are looking at me, or talking to me, and also I actually struggle to recognize everyone, since I am still getting used to using voice recognition only instead of visual recognition. I hope this explains my previous reaction a bit.' I try to laugh a bit at the end, to lighten things up, but I can sense that people feel quite impressed with my story.

'But no worries guys! I will be fine. It would only be amazing if people could tell me if we have already met or not?'. 'Lisa, yes I am Laura, we met at the sports club you know, actually, all of us are sports friends of Jasmine but I don't think you have met the rest of us. Thanks for sharing your brave story, if there is anything we can do to help please let us know!'

The party continues, and luckily I feel more at ease after exposing my VI, and after a few drinks. People tend to offer me a lot of help, for getting drinks or food or anything, but I am used to that happening when I tell people about my VI for the first time. I feel slightly guilty for taking up so much attention, but Jasmine reassures me not to worry about it.

The conversations are chaotic, but I am enjoying them. I like this spot on the couch. Moving around would be a

struggle, but luckily there are always people back here. At 21.30 Sammy walks towards me, 'Hey Lisa, I feel quite tired, I want to go home'. Oh, that sucks, I was really having fun and now Sammy wants to go, which means I will have to go as well. 'Sure you want to go? It is so much fun here' I try, but that was not the best move as I notice it makes Sammy grumpy. I stand up, and together (have to hold her in the dark) we say goodbye to Jasmine and Marc and leave the party.

Once in the car, Sammy explains that her ex suddenly showed up, and started to talk to her and that she felt very frustrated and upset about that. I feel sorry for her, if only I would have noticed that she needed some support because her ex arrived, I could have joined the conversation and helped Sammy out.

Improved Social Navigation

It is July, and summer finally seems to kick in in the Netherlands. It is 27 degrees, 3 pm and I am sitting in my garden enjoying the warmth of the sun. In a bit, I will have to dress up, as I have a birthday BBQ party for a friend this afternoon. My friend, Jasmine, recently turned 30 and she is celebrating her birthday with her boyfriend who will turn 31 next month.

They decided to throw a BBQ party and both people from her friends' group, as well as his, are invited, which in total adds up to around 30 people. As Jasmine is one of my best friends, I cannot afford not to go, though I feel quite

anxious about the event. There are many people I don't know, mixed with many people I do know, and all those people will see me turn from relatively independent to relatively dependent when the sun goes down, and I am not sure if I am prepared for that reveal.

I convinced myself to get up and get dressed. In half an hour Sammy, another friend will be waiting in front of my door to pick me up. We used to visit each other by bike, but as my vision decreased those things became impossible. Luckily I already decided what to wear for the event, a nice long summer dress with a jeans jacket to keep me warm during the evening. I put in some nice jewelry, put on some makeup, and put on my amazing sunglasses, and I am ready to go!

I grab the present from the counter, it's a gift card Sammy and I give her together, for a small holiday weekend with the three of us. I hear a car honking in the street, it must be Sammy. **Right in front of my door, there is a car waiting, I can hear the engine. Hmm, strange but it is not Sammy. Because I have no clue who it is but this person is waiting in front of my door, I approach the car and knock on the window. The window opens, and I say 'Hi, I noticed you are waiting in front of my home, can I help you with anything?'**

There is a man in the car and he responds 'Oh yes, I have been driving around town for ages, but I can't seem to find Anderson street 42'. 'I know that street,

and yes it can be hard to find, what you will have to do is turn around here, drive ahead for about 20 meters, go left, and directly go right twice. The man thanks me and drives away.

I am standing in the middle of the road when another car is coming closer, again honking. **A window opens and now Sammy is calling me, 'Hey Lisa, are you okay? Why are you standing in the middle of the road?!'. She stops the car and I get in, 'No worries, I was helping this man to find a certain street'. 'If only I could remember maps as well as you do...'** Sammy responds.

We arrived at Jasmine's place. When I get out of the car, I notice other voices in the front yard. One of them, a male which I do not recognize, says 'Did you guys come by car?! It is 27 degrees outside, are you guys insane?!', and right at that moment I turn around the car, and my white cane becomes visible. 'Ohh, oh, ehmm, I am sorry, I did not know you were....', I responded 'yes, I am visually impaired, so riding a bike is not the safest thing to do for me you know'. If only, they would know how much I miss cycling.

We take the backdoor towards the garden, I know Jasmine is standing on the right side in the middle of the garden. Sammy and I walk toward Jasmine, and her boyfriend Marc. We hug and I give the present to Jasmine, which in reality means I am putting forward my hand with the present and hope that Jasmine takes it off

my hand. She unpacks it, while I realize I hope I did not put Christmas wrapping around it, 'Ohhh how nice!'. I can hear that she is happy with the present, though I would have loved to see her initial facial expression.

'And I cannot join?', Marc asks. I don't know Marc that well, and therefore I struggle to decide what percentage of his message is a joke and what percentage is jealousy. Luckily Sammy takes over the conversation 'We're sorry Marc, but this is a girl's weekend only'. All are laughing, and I can laugh as well. Jasmine explains the setting, there is a buffet with drinks and cold dishes at the front of the garden, against the walls of the house. The BBQ is in the middle, and the seats and standing tables are at the very end. Inside, I start to panic. It is a really long garden, with many strange paths, flower patches, and stairs in the way. Having to get me food and drinks is a challenge on its own, having to bring it all the way to the back of the garden is basically dramatic.

Other people arrive that want to wish Jasmine and Marc a happy birthday, so Sammy and I decide to get something to drink. When we arrive at the drinks table Sammy kindly explains to me what is displayed on the table. Now it is still light outside. I am luckily able to get my own drink. When we walk back to the end of the garden, Sammy sees Wanda, a friend of hers and Jasmine, which I don't really like.

As I recognized Wanda on time, I can easily just greet her and walk past her before things get awkward. I decide to continue my walk toward the benches at the end of the garden, and just sit down at one of them. There are about seven people already sitting in that area, and they are intensively chatting.

When I get closer I frown to see where a free spot is. Ah, there! I put my hand up and say 'Hi guys, is that seat over there already taken?', luckily it isn't. I sit down and am silent for a while. **I see that there is one person I know, or vaguely know, I know from the sports club where I used to be a member, just like Jasmine.**

They are talking about plans for the summer holiday, and at some point, someone asks 'And you, what are your plans?'. It remains silent, which makes me realize that they might be talking to me, stupid, I should have responded faster. 'Oh, sorry, are you talking to me?'. The (sports?) woman responds 'Uhm, yes haha'.

Okay, I need to set things straight, it's time for me to introduce my VI. 'Oh sorry, yes, Sammy and I just gave a girl's weekend out as a present to Jasmine. The destination is a secret, but I can tell you it is gonna be sunny. Anyway, before we continue this conversation, I would like to tell you a small thing about myself. I have a VI and have had it for years but recently my vision started to deteriorate very quickly, and I now only see about 15%. Therefore, I cannot really see when you guys are looking

at me, or talking to me, and also I actually struggle to recognize everyone, since I am still getting used to using voice recognition only instead of visual recognition. I hope this explains my previous reaction a bit.' I try to laugh a bit at the end, to lighten things up, but I can sense that people feel quite impressed with my story. 'But no worries guys! I will be fine. It would only be amazing if people could tell me if we have already met or not?'. 'Lisa, yes I am Laura, we met at the sports club you know, actually, all of us are sports friends of Jasmine but I don't think you have met the rest of us. Thanks for sharing your brave story, if there is anything we can do to help please let us know!'

The party continues, and luckily I feel more at ease after exposing my VI, and after a few drinks. People tend to offer me a lot of help, for getting drinks or food or anything, but I am used to that happening when I tell people about my VI for the first time. I feel slightly guilty for taking up so much attention, but Jasmine reassures me not to worry about it.

The conversations are chaotic, but I am enjoying them. I like this spot on the couch. **However, at some point, I notice that Sammy's ex-boyfriend also joined the party, and is walking towards Sammy for a chat. I know the breakup has been rough for Sammy, think she could use my help here. So I get up, and walk towards Sammy and her ex, 'Hi John, nice to see you' (lying), 'Sammy, so nice, I have just been chatting with Laura, you know**

from the sports club, please come over'. Sammy is clearly happy with the escape option and ends the conversation with John.

Even though I came in for help quite quickly, half an hour later Sammy mentions that the sudden appearance of John still pulled her off, and asks if I might be okay going home already.

Once in the car, Sammy lets out all her frustration and upset feelings. I feel sorry for her, give her a hug, and chat for a bit longer. When Sammy put herself together we drove home.

Improved ability to initiate interaction

It is July, and summer finally seems to kick in in the Netherlands. It is 27 degrees, 3 pm and I am sitting in my garden enjoying the warmth of the sun. In a bit, I will have to dress up, as I have a birthday BBQ party for a friend this afternoon. My friend, Jasmine, recently turned 30 and she is celebrating her birthday with her boyfriend who will be 31 next month.

They decided to throw a BBQ party and both people from her friends' group, as well as his, are invited, which in total adds up to around 30 people. As Jasmine is one of my best friends, I cannot afford not to go, though I feel quite anxious about the event. There are many people I don't know, mixed with many people I do know, and all those people will see me turn from relatively independent to

relatively dependent when the sun goes down, and I am not sure if I am prepared for that reveal.

I convinced myself to get up and get dressed. In half an hour Sammy, another friend will be waiting in front of my door to pick me up. We used to visit each other by bike, but as my vision decreased those things became impossible. Luckily I already decided what to wear for the event, a nice long summer dress with a jeans jacket to keep me warm during the evening. I put in some nice jewelry, put on some makeup, and put on my amazing sunglasses, and I am ready to go!

I grab the present from the counter, it's a gift card Sammy and I give her together, for a small holiday weekend with the three of us. I hear a car honking in the street, it must be Sammy. Right in front of my door, there is a car waiting, I can hear the engine. I walk towards the car and open the door on the passenger's side. I try to open it, but it is locked... Why is it locked? **Then the window goes down, I notice it is a man I don't know, and he is making eye contact with me.**

Realizing I have been trying to open the doors of the wrong car, I say 'Oh I am sorry, I am blind and I thought you were a friend that was coming to pick me up'. I was right on time with my message, the man responds a bit annoyed 'Oh well maybe next time you can knock first instead of pulling on the door!'. I take a deep breath 'Yes, you're right, I could have better

done that. Anyhow, as you are standing in front of my house, is there anything I can help you with'. The man stumbles, and says 'Well, I am looking for a certain street, Anderson street 42, I cannot find it, but I am sure I cannot ask you to help me with this...'. There it was... stigma again, oh well, this man is already annoyed and probably doesn't know any better. 'Well, I am certainly visually impaired, but you know I have a sixth sense, called memory' I laugh, 'you should turn around, go left in 20 meters, and turn right twice directly after that.' The man doesn't say a word for a bit, I assume he feels ashamed of his behavior. 'Well, thank you.' he says and then he drives away.

I am standing in the middle of the road when another car is coming closer, again honking, A window opens and now Sammy is calling me, 'Hey Lisa, are you okay? Why are you standing in the middle of the road?!'. She stops the car and I get in and explain to her what just happened. 'People...' she responds, sighing.

We arrived at Jasmine's place. When I get out of the car, I notice other voices in the front yard. One of them, a male which I do not recognize, says, looks at me. I don't know why he is looking at me, but I feel like I can therefore just start an interaction 'Such lovely weather today right'. I walk around the car, and I notice how the eyes of the guy drift off to my cane. 'Yes it is,' he responds, 'I was already wondering why guys came by car, but now I see your cane...'. Aha, so that was the reason he was looking at me,

I decided to not get annoyed about it 'Yes, riding a bike wouldn't be the safest thing to do for me, but maybe you can take me on the back of your bike next time?' The guy laughs, 'Sure, that shouldn't be a problem', and so the interaction ends.

We take the backdoor towards the garden, I hear many people have already arrived. I have no clue where Jasmine is located, but luckily I arrived together with Sammy. Together we walk toward Jasmine, and her boyfriend Marc. We hug and I give the present to Jasmine, which in reality means I am putting forward my hand with the present and hope that Jasmine takes it off my hand. She unpacks it, while I realize I hope I did not put Christmas wrapping around it, 'Ohhh how nice!'. I can hear that she is happy with the present, though I would have loved to see her initial facial expression.

'And I cannot join?', Marc asks. I don't know Marc that well, and therefore I struggle to decide what percentage of his message is a joke and what percentage is jealousy. Luckily Sammy takes over the conversation 'We're sorry Marc, but this is a girls' weekend only'. All are laughing, and I can laugh as well. Jasmine explains the setting, there is a buffet with drinks and cold dishes at the front of the garden, against the walls of the house. The BBQ is in the middle, and the seats and standing tables are at the very end. Inside, I start to panic. It is a really long garden, with many strange paths, flower patches, and stairs in the way. Having to get me food and drinks is a

challenge on its own, having to bring it all the way to the back of the garden is basically dramatic.

Other people arrive that want to wish Jasmine and Marc a happy birthday, so Sammy and I decide to get something to drink. When we arrive at the drinks table Sammy kindly explains to me what is displayed on the table. Now it is still light outside. I am luckily able to get my own drink. When we walk back to the end of the garden, Sammy sees Wanda, a friend of hers and Jasmine, which I don't really like. She mentions it to me, luckily way in advance so that I can simply walk through and don't have to talk to her. But where to go now? I decide to continue my walk toward the benches at the end of the garden, and just sit down at one of them. I believe there are about seven people already sitting in that area, and they are intensively chatting.

When I get closer I frown to see where a free spot is. **They are very focused on their conversation, and they do not notice me getting closer, so I wait for a bit before introducing myself. Once the conversation becomes more silent, I put my hand up and say 'Hi guys, is that seat over there already taken?', luckily it isn't.**

As the conversation naturally silenced, I decided to just open up immediately, to prevent awkward moments, 'I am not sure if we have all met before, but first of all congratulations to Jasmine! Secondly, I just quickly want to tell you guys, I have very low vision

and therefore I might struggle to recognize what you are noticing when you are talking to me. Please let me know if we've already met, to prevent awkward moments (:, but other than that don't worry about my visual impairment, I am managing myself, and it's all okay.

'Lisa, yes I am Laura, we met at the sports club you know, actually, all of us are sports friends of Jasmine but I don't think you have met the rest of us. Thanks for sharing your brave story, if there is anything we can do to help please let us know!'

'We were talking about summer holidays, do you have any nice plans as well?' Lisa asked me. 'Yes, Sammy and I just gave a girls' weekend out as a present to Jasmine. The destination is a secret, but I can tell you it is gonna be sunny.

The party continues, and luckily I feel more at ease after exposing my VI, and after a few drinks. People tend to offer me a lot of help, for getting drinks or food or anything, but I am used to that happening when I tell people about my VI for the first time. I feel slightly guilty for taking up so much attention, but Jasmine reassures me not to worry about it.

The conversations are chaotic, but I am enjoying them. I like this spot on the couch. Moving around would be a struggle, but luckily there are always people back here.

At 21.30 Sammy walks towards me, 'Hey Lisa, I feel quite tired, I want to go home'. Ohw, that sucks, I was really having fun and now Sammy wants to go, which means I will have to go as well. 'Sure you want to go? It is so much fun here' I try, but that was not the best move as I notice it makes Sammy grumpy. I stand up, and together (have to hold her in the dark) we say goodbye to Jasmine and Marc and leave the party.

Once in the car, Sammy explains that her ex suddenly showed up, and started to talk to her and that she felt very frustrated and upset about that. I feel sorry for her, if only I would have noticed that she needed some support because her ex arrived, I could have joined the conversation and helped Sammy out.

Ability to read non-verbal cues

It is July, and summer finally seems to kick in in the Netherlands. It is 27 degrees, 3 pm and I am sitting in my garden enjoying the warmth of the sun. In a bit. I will have to dress up, as I have a birthday BBQ party for a friend this afternoon. My friend, Jasmine, recently turned 30 and she is celebrating her birthday with her boyfriend who will turn 31 next month.

They decided to throw a BBQ party and both people from her friends' group as well as his are invited, which in total adds up to around 30 people. As Jasmine is one of my best friends, I cannot afford not to go, though I feel quite anxious about the event. There are many people I

don't know, mixed with many people I do know, all those people will see me turn from relatively independent to relatively dependent when the sun goes down, and I am not sure if I am prepared for that reveal.

I convinced myself to get up and get dressed. In half an hour Sammy, another friend will be waiting in front of my door to pick me up. We used to visit each other by bike, but as my vision decreased those things became impossible. Luckily I already decided what to wear for the event, a nice long summer dress with a jeans jacket to keep me warm during the evening. I put in some nice jewelry, put on some makeup, and put on my amazing sunglasses, and I am ready to go!

I grab the present from the counter, it's a gift card Sammy and I give her together, for a small holiday weekend with the three of us. I hear a car honking in the street, it must be Sammy. Right in front of my door, there is a car waiting, I can hear the engine. I **walk towards the car, but when I get closer I notice there is a man inside, and he does not look very happy.**

I gently knock on his window, and it opens. I say 'Hi, I noticed you are waiting in front of my home, can I help you with anything?'. There is a man in the car and he responds 'Oh yes, I have been driving around town for ages, but I can't seem to find Anderson street 42'. 'I know that street, and yes it can be hard to find, what you will have to do is turn around here, drive ahead for

about 20 meters, go left, and directly go right twice. The man looks relieved, thanks me, and drives away.

I am standing in the middle of the road when another car is coming closer, again honking. **A window opens and now Sammy is calling me, 'Hey Lisa, are you okay? Why are you standing in the middle of the road?!'. She stops the car and I get in, 'No worries, I was helping this man to find a certain street'. 'If only I could remember maps as well as you do...' Sammy responds.**

We arrived at Jasmine's place. When I get out of the car, I notice other voices in the front yard. One of them, a male which I do not recognize, says 'Did you guys come by car?! It is 27 degrees outside, are you guys insane?!', and right at that moment I turn around the car, and my white cane becomes visible. 'Ohh, oh, uhmm, I am sorry, I did not know you were....', I respond 'No worries,' (thinking: of course, bring it on, be rude before taking a look...) 'yes, I am visually impaired, so riding a bike is not the safest thing to do for me you know'. If only, they would know how much I miss cycling.

We take the backdoor towards the garden, I hear many people have already arrived. I have no clue where Jasmine is located, but luckily I arrived together with Sammy. Together we walk toward Jasmine, and her boyfriend Marc. We hug and I give the present to Jasmine, which in reality means I am putting forward my hand with the present and hope that Jasmine takes it off

my hand. She unpacks it, while I realize I hope I did not put Christmas wrapping around it, 'Ohhh how nice!'. I can hear that she is happy with the present, though I would have loved to see her initial facial expression.

'And I cannot join?', Marc asks. I don't know Marc that well, **but from his face, I can clearly tell he is joking.** Sammy responds 'We're sorry Marc, but this is a girls-only weekend'. All are laughing, and I can laugh as well. Jasmine explains the setting, there is a buffet with drinks and cold dishes at the front of the garden, against the walls of the house. The BBQ is in the middle, and the seats and standing tables are at the very end. Inside, I start to panic. It is a really long garden, with many strange paths, flower patches, and stairs in the way. Having to get me food and drinks is a challenge on its own, having to bring it all the way to the back of the garden is basically dramatic.

Other people arrive that want to wish Jasmine and Marc a happy birthday, so Sammy and I decide to get something to drink. When we arrive at the drinks table Sammy kindly explains to me what is displayed on the table. Now it is still light outside. I am luckily able to get my own drink. When we walk back to the end of the garden, Sammy sees Wanda, a friend of hers and Jasmine, which I don't really like. She mentions it to me, luckily way in advance so that I can simply walk through and don't have to talk to her. But where to go now? I decide to continue my walk toward the benches at the

end of the garden, and just sit down at one of them. I believe there are about seven people already sitting in that area, and they are intensively chatting.

When I get closer I frown to see where a free spot is. Ah, there! I put my hand up and say 'Hi guys, is that seat over there already taken?', luckily it isn't. I sit down and am silent for a while. I try to listen very closely if I hear any voices that I have already heard before. I think I do... but as everyone is talking over each other I am not exactly sure. **Though I do see that one of the girls recognizes me.**

They are talking about plans for the summer holiday, and at some point, someone asks 'And you, what are your plans?'. I think I recognize this voice, someone from the sports club Jasmine is a member of, and I used to be. **The person talking is looking at me, so I respond** 'Yes, Sammy and I just gave a girls' weekend out as a present to Jasmine. The destination is a secret, but I can tell you it is gonna be sunny.

Anyway, before we continue this conversation, I would like to tell you a small thing about myself. I have a VI, have had it for years but recently my vision started to deteriorate very quickly, and I now only see about 15%. Therefore, I cannot really see when you guys are looking at me, or talking to me, and also I actually struggle to recognize everyone, since I am still getting used to using voice recognition only instead of visual recognition. I

hope this explains my previous reaction a bit.' I try to laugh a bit at the end, to lighten things up, **but I can see how others are quite impressed with my story.**

'But no worries guys! I will be fine. It would only be amazing if people could tell me if we have already met or not?'. 'Lisa, yes I am Laura, we met at the sports club you know, actually, all of us are sports friends of Jasmine but I don't think you have met the rest of us. Thanks for sharing your brave story, if there is anything we can do to help please let us know!'

The party continues, and luckily I feel more at ease after exposing my VI, and after a few drinks. People have the tendency to offer me a lot of help, for getting drinks or food or anything, but I am used to that happening when I tell people about my VI for the first time. I feel slightly guilty for taking up so much attention, but Jasmine reassures me not to worry about it.

The conversations are chaotic, but I am enjoying them. I like this spot on the couch. Moving around would be a struggle, but luckily there are always people back here. At 21.30 Sammy walks towards me, 'Hey Lisa, I feel quite tired, I want to go home'. Ohw, that sucks, I was really having fun and now Sammy wants to go, which means I will have to go as well.

But I can tell from her face that something is off, she really wants to get out of here. I also can sense that

she does not want to talk about it right here at the moment, so I respond ‘Ah, yeah it is getting late’, I stand up and turn my head towards the people at the bench ‘Sorry guys, I will have to go, but I enjoyed chatting with you! Have a nice evening’. I can see others are a bit confused by my sudden leaving, but right now the mood of Sammy is more important. Together (have to hold her in the dark) we say goodbye to Jasmine and Marc and leave the party.

Once in the car, Sammy explains that her ex suddenly showed up, and started to talk to her and that she felt very frustrated and upset about that. I feel sorry for her, if only I would have noticed that she needed some support because her ex arrived, I could have joined the conversation and helped Sammy out.

Increased feeling of control

It is July, and summer finally seems to kick in in the Netherlands. It is 27 degrees, 3 pm and I am sitting in my garden enjoying the warmth of the sun. In a bit, I will have to dress up, as I have a birthday BBQ party for a friend this afternoon. My friend, Jasmine, recently turned 30 and she is celebrating her birthday with her boyfriend who will turn 31 next month.

They decided to throw a BBQ party and both people from her friends’ group as well as his are invited, which in total adds up to around 30 people. As Jasmine is one of my best friends, I cannot afford not to go, though I

feel quite anxious for the event. There are many people I don’t know, mixed with many people I do know, all those people will see me turn from relatively independent to relatively dependent when the sun goes down, and I am not sure if I am prepared for that reveal.

I convinced myself to get up and get dressed. In half an hour Sammy, another friend will be waiting in front of my door to pick me up. We used to visit each other by bike, but as my vision decreased those things became impossible. Luckily I already decided what to wear for the event, a nice long summer dress with a jeans jacket to keep me warm during the evening. I put in some nice jewelry, put on some makeup, and put on my amazing sunglasses, and I am ready to go!

I grab the present from the counter, it’s a gift card Sammy and I give her together, for a small holiday weekend with the three of us. I hear a car honking at the street, it must be Sammy. Right in front of my door, there is a car waiting, I can hear that by the engine. I walk towards the car and open the door on the passenger’s side. I try to open it, but it is locked... Why is it locked?

Then the window goes down, and a male shouts annoyed at me ‘What are you trying to do!? Get away from my car!’. I am in shock, pull my hands off the car and try to say ‘I am so sorry sir, but you know... I am bli...’, but the man already hits the gas and takes off. He leaves me confused, and tense. I don’t understand why someone

would be waiting with his car in front of my house anyway....

I am standing in the middle of the road when another car is coming closer, again honking, A window opens and now Sammy is calling me, 'Hey Lisa, are you okay? Why are you standing in the middle of the road?!'. She stops the car and I get in as fast as I can, fighting against tears. Not that this event was that special or that shocking, but I guess it just added on top of the nerves I already had for the party. I explain what just happened, and Sammy hugs me.

The original ride toward Jasmine only takes 3 min. at most, but I asked Sammy if we can take a small detour, to give me enough time to calm down. I give her road instructions. Sammy is always amazed by my ability to remember maps. We drive past our old elementary school, which stimulates us to talk about our lovely memories together.

We arrived at Jasmine's place. When I get out of the car, I notice other voices in the front yard. One of them, a male which I do not recognize, says 'Did you guys come by car?! It is 27 degrees outside, are you guys insane?!', and right at that moment I turn around the car, and my white cane becomes visible. 'Ohh, oh, uhmm, I am sorry, I did not know you were....', I respond 'No worries,' (thinking: of course, bring it on, be rude before taking a look...) 'yes, I am visually impaired, so riding a bike is not the safest

thing to do for me you know'. If only, they would know how much I miss cycling.

We take the backdoor towards the garden, I hear many people have already arrived. I have no clue where Jasmine is located, but luckily I arrived together with Sammy. **Together we walk next to each other, and without me holding her arm, she is able to guide me toward Jasmine**, and her boyfriend Marc. We hug and I give the present to Jasmine, which in reality means I am putting forward my hand with the present and hope that Jasmine takes it off my hand. She unpacks it, while I realize I hope I did not put Christmas wrapping around it, 'Ohhh how nice!'. I can hear that she is happy with the present, though I would have loved to see her initial facial expression.

'And I cannot join?', Marc asks. I don't know Marc that well, and therefore I struggle to decide what percentage of his message is a joke and what percentage is jealousy. Luckily Sammy takes over the conversation 'We're sorry Marc, but this is a girls' weekend only'. All are laughing, and I can laugh as well. Jasmine explains the setting, there is a buffet with drinks and cold dishes at the front of the garden, against the walls of the house. The BBQ is in the middle, and the seats and standing tables are at the very end. Inside, I start to panic. It is a really long garden, with many strange paths, flower patches, and stairs in the way. Having to get me food and drinks is a challenge on its own, having to bring it all the way to the

back of the garden is basically dramatic.

Other people arrive that want to wish Jasmine and Marc a happy birthday, so Sammy and I decide to get something to drink. **Earlier that day Jasmine already sent me a picture of the drinks and food table, so I know where things are at. When it is still light I can just grab my own drink, when it will get dark I can ask others something like “Could you please help me out by getting a Fanta for me, it is on the right corner of the second table” Being able to give them proper instructions makes me feel more in control.**

When we walk back to the end of the garden, Sammy sees Wanda, a friend of hers and Jasmine, which I don't really like. She mentions it to me, luckily way in advance so that I can simply walk through and don't have to talk to her. But where to go now? I decide to continue my walk toward the benches at the end of the garden, and just sit down at one of them. I believe there are about seven people already sitting in that area, and they are intensively chatting. When I get closer I frown to see where a free spot is. Ah, there! I put my hand up and say 'Hi guys, is that seat over there already taken?', luckily it isn't. I sit down and am silent for a while. I try to listen very closely if I hear any voices that I have already heard before. I think I do... but as everyone is talking over each other I am not exactly sure.

They are talking about plans for the summer holiday, and at some point, someone asks 'And you, what are your plans?'. I think I recognize this voice, someone from the sports club Jasmine is a member of, and I used to be. It remains silent, which makes me realize that they might be talking to me, stupid, I should have responded faster. 'Oh, sorry, are you talking to me?'. The (sports?) woman responds 'Uhm, yes haha'.

Okay, I need to set things straight, it's time for me to introduce my VI. 'Oh sorry, yes, Sammy and I just gave a girls' weekend out as a present to Jasmine. The destination is a secret, but I can tell you it is gonna be sunny. Anyway, before we continue this conversation, I would like to tell you a small thing about myself. I have a VI, have had it for years but recently my vision started to deteriorate very quickly, and I now only see about 15%.

Therefore, I cannot really see when you guys are looking at me, or talking to me, and also I actually struggle to recognize everyone, since I am still getting used to using voice recognition only instead of visual recognition. I hope this explains my previous reaction a bit.' I try to laugh a bit at the end, to lighten things up, but I can sense that people feel quite impressed with my story. 'But no worries guys! I will be fine. It would only be amazing if people could tell me if we have already met or not?'. 'Lisa, yes I am Laura, we met at the sports club you know, actually, all of us are sports friends of Jasmine but I don't think you have met the rest of us. Thanks for

sharing your brave story, if there is anything we can do to help please let us know!"

The party continues, and luckily I feel more at ease after exposing my VI. I managed to make clear that I will ask for help when needed so that nobody has to offer it to me without me asking. It also gives me control over how much time and attention my VI steals on the event. The conversations are chaotic, but I am enjoying it. I like this spot on the couch. Moving around would be a struggle, but luckily there are always people back here. At 21.30 Sammy walks towards me, 'Hey Lisa, I feel quite tired, I want to go home'. Ohw, that sucks, I was really having fun and now Sammy wants to go, which means I will have to go as well. 'Sure you want to go? It is so much fun here' I try, but that was not the best move as I notice it makes Sammy grumpy. I stand up, **and together (while she guides me remotely) we say goodbye to Jasmine and Marc and leave the party.**

Once in the car, Sammy explains that her ex suddenly showed up, and started to talk to her, and that she felt very frustrated and upset about that. I feel sorry for her, if only I would have noticed that she needed some support because her ex arrived, I could have joined the conversation and helped Sammy out.

Appendix 8. Feedback Procedure on Generated Concepts

In this appendix I will elaborate on the procedure I used during feedback gathering on the concepts generated in chapter 11. The feedback gathering took place during an Envisioners day, and one separate session with a PBLV. The questions I asked were purposefully short, as the feedback sessions during the Envisioners day could not take long.

First I started with two general components:

1. Explain my project:

- TU Delft, master graduation project Industrial Design
- Focus on PBLV and social life
- In particular, designing a tool for social navigation

2. Asking consent

- Ask if they are willing to test (one of my) concepts with me
- Is it okay to make notes of this meeting and use the notes, and pseudonymized quotes in my report?
- Ask if it is okay to take pictures and used them anonymized in my report
- Ask if it is okay if I put one of my concepts around their wrist.

Subsequently, I explained and asked slightly different questions for each concept.

Questions concept 1, Location Watch

1. Before explaining anything, what do you feel right now?

Imagine this service to be used to help you find friends and family and other familiar people more easily around you in social settings, to help you socially navigate yourself.

The home screen includes a watch where you can feel where familiar people are relative to your own location, which is always the middle. Familiar people represent small dots.

2. Can you describe what you feel and how would you experience this?

Currently, it's on wide view, which means the distance from you to the edge of the watch represents 30 meters. Around the edges, you can feel an indication of the scale.

3. Can you find the indication of the scale? And, how do you interpret it?

You could also turn the watch into narrow view mode to get a better impression of the location of familiar people nearby. [change the screen]

4. At which scale do you think it is now?

If you tap a familiar person dot, an identity pattern will appear. There are two types of patterns

- *Shortcut patterns for a selection of familiar people, like your best friends, or your parents.*
- *Code patterns, by reading the code you can define the identity of the other person.*
- *[Let the person feel and experience the different ones]*

5. Can you describe what you feel about the different patterns?

Now for you to know the location of the familiar people, you would have to send them a link once via WhatsApp to ask them permission to share their location with you when they're nearby.

6. How would you feel about this?

Now I have some general questions about the overall concept

7. What are your first thoughts on this concept?

8. Do you think it could be of value to you, and if so how/when?

9. What do you like?

10. What do you dislike?

Questions concept 2, Presence Bracelets

Imagine this service to be used to help you find friends and family and other familiar people more easily around you in social settings, to help you socially navigate yourself.

For this to work, you have your own Notification bracelets, and you have a couple of identity bracelets that you would hand out to familiar people prior to the social situation.

In a social situation, your notification bracelet would give small vibrations to you when a familiar person you provided the identity bracelet to would enter the range of 1.5 m distance from you, or leave. [Let the person feel entry vibration]

1. How do you experience this?

When someone enters a 1.5 m distance from you, the bracelet would shortly vibrate.

When you want to know which person entered the 1.5 m distance from you, you tap the button on the bracelet.

The system works as follows, each identity bracelet is linked to one specific vibration pattern.

The identity vibration of that certain bracelet would be provided to you once you press the button. [Let the person tap the 'button', and let them feel an identity vibration]

2. How do you experience this?

When a person would leave, you would feel a slightly different small vibration to notify you about this. [Let the person feel an exit vibration]

3. How do you experience this?

Now I have some general questions about the overall concept

4. What are your first thoughts on this concept?
5. Do you think it could be of value to you, and if so how/when?
6. What do you like?
7. What do you dislike?

Appendix 9. Original Project Brief

See PDF on the next pages.

Design for Visually Impaired People in social situations

project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 01 - 03 - 2022

28 - 10 - 2022

end date

INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

This project will be executed in collaboration with Envision, a company settled in The Hague which develops apps for phones and smart glasses that help people with a visual impairment (from now on referred to as 'VIP') to gain access to visual information.

In the Netherlands, about 220.000 people deal with a visual impairment (VI), of which 75.000 are completely blind [2]. Being inventive and creative themselves, and by the help of some small adaptations, these people often manage themselves just fine in a world that is primarily visually oriented. Though VIP still experience some restrictions in their social life, they tend to have lower social roles [3], smaller social networks [4] and increased risks of experiencing loneliness which negatively influences their perceived quality of life [5], [6].

They often struggle taking part in socially busy situations [7] – [12], as those situations require a lot of energy and effort because of multiple reasons. VIP predominantly rely on audio and haptic input during communication with others [11], which easily gets overwhelming. They often miss out on non-verbal communication like body language, which complicates understanding the intentions of the other person.

In addition, people with a VI struggle to recognise others, especially in busy surroundings [7], [9] – [11]. They have to determine who is talking to who, whether people move around, join, or leave the room. A sighted person will obtain all this information more easily via visual input. Still, a visually impaired person desires to receive all this information as well.

Each situation brings along its challenges; birthday parties, going out in clubs or a bar, an office meeting, or having dinner with friends, etc. Because of the high amount of energy and effort these situations require, people with a visual impairment need to take a moment for themselves in the situation, take time off afterward, or they might even decide not to join social events [7] – [9].

There is a lot of literature that confirms the social challenges VIP experience, though there seems to be a research gap on why they experience these challenges, and how those challenges differ per situation. For example, what is the impact of having to process audio input while missing out on the visual input?

Furthermore, there are many devices (often referred to as 'assistive technology') on the market for people with a visual impairment.

Most of the assistive technology focuses on the following issues:

- Mobility
- Navigation
- Information access
- Communication
- Household
- Leisure

There are actually very few devices on the market that have a direct social focus. Such as a device that would help VIP to read body language.

Although every socially busy environment is different, there might be overarching elements for which a helping device/tool can be designed that make people with a VI feel more at ease in such situations.

space available for images / figures on next page

Personal Project Brief - IDE Master Graduation

introduction (continued): space for images



image / figure 1: Overview of some assistive devices/services available for VIP



image / figure 2: Difference of a sighted person being in a social situation (left) and a VIP being in a social situation (right)

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

The social needs of people with a visual impairment are no different than those of sighted people, though fulfilling these needs bring along extra challenges, especially in social situations including multiple people.

For people with a visual impairment participating in social (busy) situations is highly energy and effort intensive [7] – [12]. The challenges they face differ per individual and per situation, but there seem to be overarching challenges, such as:

- The ability to recognise people by their voice,
- Knowing whom others are talking to, and
- The ability to focus on one conversation in a cacophony of multiple conversations.
- Etc.

By mapping out the different kinds of social (busy) situations that are considered challenging by people with a VI and finding out what makes them challenging, similarities between different situations can be found. The insights can be translated towards a tool/helping device that makes people with a VI feel more at ease in social (busy) situations.

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Develop a tool/helping device that makes people with a visual impairment feel more at ease in social situations, with the emphasis on situations including multiple people.

To gather insights and feedback, I will do the following:

- Include the target group and apply elements of co-creation
- Seek contact with experts: doctors, Envision employees, etc.
- Take an inclusive design approach, possibly include co-design
- Simulate situations to get a better understanding and empathise with the target group.

The goal is to define overarching elements that create challenges in multiple situations. This is done by understanding the types of social situations that are considered challenging and why they are challenging. One of these overarching elements will be selected as a focus for designing a tool/helping device that makes people with a VI feel more at ease in social (busy) situations.

I want to improve my skills in designing for feasibility. Therefore I plan to spend the second half of my project iterating-, elaborating-, prototyping on, and testing (with the target group) my final concept.

Finally, if the time allows for it, at the end of my project I also want to take business aspects into account by taking a more detailed look on how my project can create value for Envision.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 1 - 3 - 2022

28 - 10 - 2022

end date



This graduation project concerns a double degree master, IPD and Dfl and therefore consists of 150 working days. Because of the long duration of the project (150 instead of 100 days), I suggest organising two midterm evaluation meetings, one around day 50 and the other around day 90. The two meetings will allow me to better evaluate the project on the go and keep track if I am heading in the right direction. The green light meeting can be scheduled around day 130.

The project consists of seven phases of which the transition between phase 5 and 6 is the most important, as during phase 6 I will spend about 50-60 days on elaborating and iterating on the final concept. Iteration will be executed also by means of prototyping. I planned such a great amount of time for this phase on purpose, as I want to increase my skills in making concepts feasible and realisable.

Planned milestones are:

- Kick-off meeting: 10-03-2022
- Mid-term evaluation 1: 18-05-2022
- Mid-term evaluation 2: around calendar week 31
- Green light: around calendar week 38
- Graduation: calendar week 43

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, Stick to no more than five ambitions.

I am passionate about medical design, in particular designing for people with disabilities. My passion for medical design started with my almost completely blind grandmother. I have always tried to expand her possibilities and enable her to have more fun. For example I created XXL games for her, like Scrabble and Triominos, that she still plays with my grandfather daily.

During my studies I have focussed on many different medical target groups, but unfortunately never blind/visually impaired people. I therefore think it is a nice opportunity for me to end my studies designing for this target group.

While designing for people with disabilities, I find it extremely important to not only design for them but also with them. Therefore I want to see if the method of co-creation is suited to use during my graduation project. In addition I always try to empathise with my target group as much as I can.

Prior to the start of my graduation, I had some explorative conversations with people with a VI and related stakeholders, and conducted short simulation sessions and some desktop research. Based upon the gained insights, I decided to focus on making people with a VI feel more at ease in social situations, emphasising on situations that include multiple people.

I am studying a double degree Dfl IPD with Medesign specialisation, by nature I tend to choose emphatical and interaction oriented assignments during my projects. However, during my graduation I want to make sure to turn this into a feasible end result. To achieve this I will have to use both my Dfl and IPD knowledge.

After my graduation I would love to design helping devices for people with disabilities. I have specifically attempted to cover different areas of designing for people with disabilities/vulnerable target groups during my study, to create a wide range of skills for my future career.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

References:

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Planning enlarged

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