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Master Thesis | Wilke de Jong
Industrial Design Engineering

EXPLORING THE DESIGN SPACE OF LOSS OF INITIATIVE FOR PEOPLE WITH DEMENTIA

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Exploring the design space of loss of initiative for people with dementia
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Summary

The World Health Organization (WHO) estimates that within the next decade there will be 78 million people with dementia worldwide. People with dementia experience many cognitive impairments and symptoms. Loss of initiative is a symptom of dementia. People that experience loss of initiative could forget to eat or drink, they forget to take medication, start a conversation, clean the house, etc. This can affect their independence and feeling of autonomy.

A product can be developed to support people with dementia. A commonly used method is designing for dementia. Design for dementia focuses on usability, safety, and keeping the user's autonomy and independence. Design for dementia takes into account the difficulties people with dementia can experience. The 10 design principles this method uses, does take this into account. Loss of initiative is not taken into account. There is a lack of knowledge on how to design for loss of initiative.

In this thesis two questions will be answered: what the design space for loss of initiative is, and how does this relate to people's experiences. There are more than 50 types of dementia. This assignment will focus on the four most common types. Alzheimer disease, vascular dementia, frontotemporal dementia (FTD), and Lewy body dementia (LBD), respectively. In the late stages of any type of dementia, everyone will experience one or more forms of loss of initiative.
Music can help people with dementia to become more active, relaxed, and help to reminisce. It can stimulate and motivate. Furthermore, music can enhance social well-being. Therefore, music can help to counter loss of initiative.

This research is divided into two phases, the research phase, and the designing phase. In the research phase the answers of how to design for loss of initiative is explored. This is done through a literature and field study. Through literature it becomes clear that there is a link between a lack of interest, a lack of motivation, and a lack of initiative. People that are not interested will not take initiative. Therefore, it is important to motivate someone. Moreover, having a product with a low threshold makes it easier to use for someone with dementia. In the field study, several visits to meeting centres and day care facilities for people with dementia are made. The visits give an insight into how people with dementia experience loss of initiative and in what ways the caregivers already try to solve the problems that arise. From these visits, it was made clear that to increase initiative it is also important to stimulate and use social interaction. The results from this phase are four design directions: motivation, low threshold, stimulation, and social interaction, respectively.

To show how a new product can be designed with these design directions, the concept music buttons is created. A network of music players that can be placed throughout the house. This network consists of one hub and multiple stations. Each station and the hub have a radar sensor which detects motion. When motion is detected the music player lights up and plays a sound. This to attract the user's attention. Any button can be pressed to turn on the music. When there is no interaction for more than five minutes the music player will turn off. With the network comes a smartphone app. This app can add music to the music players and the network can be expanded. Each music button has three music choices which can be added via the app, volume buttons, and the option to skip or go back a song.
The lights and sound are used as stimulation. Pressing any button on either the hub or a station will start the music. This keeps the threshold to use the product low. On the top of each music player is a smiling face. This could give an incentive to talk to the product, making some use of social interaction.

The four design directions can be used as a tool to design products that help with loss of initiative for people with dementia. They are part of the design space together with the ten design principles of design for dementia.

Preface

In September 2021, I, Wilke, was ready to start looking for a master's graduation assignment. My mastertrack Human-Technology Relations (HTR) offered assignments conducted at the university (more research oriented) and at companies (more design oriented). At first, I wanted to do an assignment at a company. Because, I had not done that during my bachelor's final assignment.

Luckily, I was not alone in the search for a graduation assignment, my friend and fellow student Ellen also was searching. Together we had meetings at my home, her home, the university, Stoet, and other cafes. Here we explored what we wanted to do and caught up on each other's lives. Sometimes spending more on the latter than on searching.

In late 2021, I found an assignment I liked. However, it was not at a company so I was doubting whether I should do it. After a meeting with Wouter Eggink about my doubts, where he assured me that these doubts were unfounded, I emailed Rik Wesselink to show my interest.

After the first meeting with Rik, I was enthusiastic about the assignment (even though I did not show it), about designing for loss of initiative, and I found myself already thinking about ideas and solutions. Therefore, I accepted the assignment and in February of 2022, I started working on it.

It started slow but steady, exploring the research question, different methods, existing products, and gaining knowledge about the subjects. But a month or two in I started to get stressed about whether I could finish it on time, and what I will do after graduating. The master assignment occupied my mind almost 24/7 for more than a year. Having sleepless nights, I sometimes lost the motivation to keep going and which in its place cause procrastination of the assignment.

However, a hobby I started during my bachelor helped me to relax from time to time: crochet! Though, it also caused me more stress sometimes because the time spent on crocheting could also be spent on working on the assignment. I should be focusing on graduating and putting the crochet to the side. This was sometimes easier said than done, see Fig. 1 for a collection of the finished crochet projects during this master assignment. In total 66 projects are finished.

Fig. 1. A selection of the finished crochet projects during this master graduation assignment.

Contents

Chapter 1 Introduction

The World Health Organization (WHO) estimates that there are around 55 million people with dementia worldwide, and that this number will increase to 78 million in the next decade [1]. People with dementia experience many cognitive impairments and symptoms. Loss of initiative is a symptom of dementia. It can be anything form forgetting to stay hydrated, or wanting to do something but not initiating to actually doing it. People with dementia can experience loss of initiative in one or multiple ways, they do not clean the house, start a conversation or keep it going, forget to take in medication, or forget to take care of themselves. This can affect their lives and feeling of autonomy. The gradation and the type of dementia differ from person to person. The experience of loss of initiative can, therefore, also differ. This research focuses on the four most common types of dementia, Alzheimer's disease, vascular dementia, frontotemporal dementia (FTD), and Lewy Body dementia (LBD).

The place in the brain where taking initiative is situated is in the frontal lobes. This is also where executive functions take place. Therefore, people who experience loss of executive functioning will also experience loss of initiative. People with FTD have a bigger chance of experiencing loss of initiative because the deterioration in the brain starts at the frontal lobes. In the late stages of any type of dementia, everyone will experience one or more forms of loss of initiative.

Another symptom of dementia is apathy, it is the "diminished motivation not attributable to decreased level of consciousness, cognitive impairment, or emotional distress" [2]. Apathy is also caused by a deterioration in the frontal lobes, therefore, a symptom of apathy is loss of initiative.

On the market there are already products designed for people with dementia. Such as the Spiqle, and plant robot Tessa. Spiqle consists of a computer screen which is connected to an app for a smartphone that the (in)formal caregiver has. The agenda of the person with dementia can be loaded into the app. The computer screen at the house of the person with dementia shows in a concise way what the activities of the day are. Plant robot Tessa, is also a sort of digital agenda. The (in)formal caregiver can load in the agenda of the user. Tessa then helps to remind the user when each activity will happen, she 'says' it out loud. The user then does not have to remember themselves when they need to prepare for an activity. Both of these products are designed to be easy in use, and easy to understand. They take into account the problems people with dementia can experience. Such as problems with what the time is, how much time has passed, and memory problems.

Design for dementia is a designing method, which focuses on usability, safety, and keeping the user's autonomy, and independence. Wesselink et al. [3], found ten design principles, however, none of these principles take into account loss of initiative. Even though, it is a common symptom of dementia. So, how do you design for loss of initiative, what are requirements when designing for loss of initiative. Esposito, et al. [4], argue that a lack of interest is connected to a lack of motivation, and therefore, a lack of initiative. That is why it is important to motivate someone, because then they are more inclined to take initiative. Furthermore, Fogg [5] shows that motivation and ability are important to change behaviour in the Fogg behavioural model. As can be seen in Chapter 2.2, products that are designed for people with dementia are all designed to be easy in use and easy to understand. However, they do not help with loss of initiative.

Music can help people with dementia to reminisce [6], become more relaxed, more active [7, 8], improve social well-being [8], and improve speech [9]. Furthermore, music therapy helps to slow down the deterioration caused by dementia [10]. In the documentary Alive Inside [6], a participant in the documentary has dementia and does not communicate with people. He is depressed, and introverted. When listening to his favourite music he is able to answer questions and talk with (in)formal caregivers. This shows the importance of music for people with dementia. In addition, music could be used when designing for loss of initiative.

In this thesis four design directions come forward, these are motivation, stimulation, low threshold, and social interaction. All four of these should be taken into account when designing for loss of initiative.

This leads to the following main question: What is the design space of designing for loss of initiative, and how does this relate to people's experiences?

The assignment of this thesis will focus on people with dementia that live at home and who experience one form or more of loss of initiative, but especially losing the initiative to listen to music.

1.1 Outline

The research is divided into three phases, research, designing, and reflection, respectively.

In the **research phase**, it is explored what dementia is and what loss of initiative can entail. To do this literature research is done, about existing methods and products. The methods that are researched are design for dementia, persuasive design, and Fogg's behavioural model. On top of that, the links between loss of initiative, apathy, and executive functioning is researched. Furthermore, several visits to meeting centres and day care facilities for people with dementia are made. The visits give an insight into how people with dementia experience loss of initiative and in what ways the caregivers already try to solve the problems that arise. The findings of this phase are four design directions, motivation, stimulation, low threshold, and social interaction.

These four directions are taken into the next phase, the **design phase**. In this phase the ideation is done. The ideation consists of several brainstorms to get as many ideas as possible. Taking one or more design direction(s) as a starting point. From all ideas three concepts are created, the music buttons, a companion robot, and the music club. These concepts all contain in one way or another listening to music. With a concept choice the music buttons was selected to design further. The design is elaborated on and made into a SolidWorks model. On top of that, an accompanying app for a smartphone is prototyped.

In the **reflection phase**, the final product design, and the relation to the design directions is discussed. Finally, it will be discussed how and if the main question is answered.

Phase 1: Research
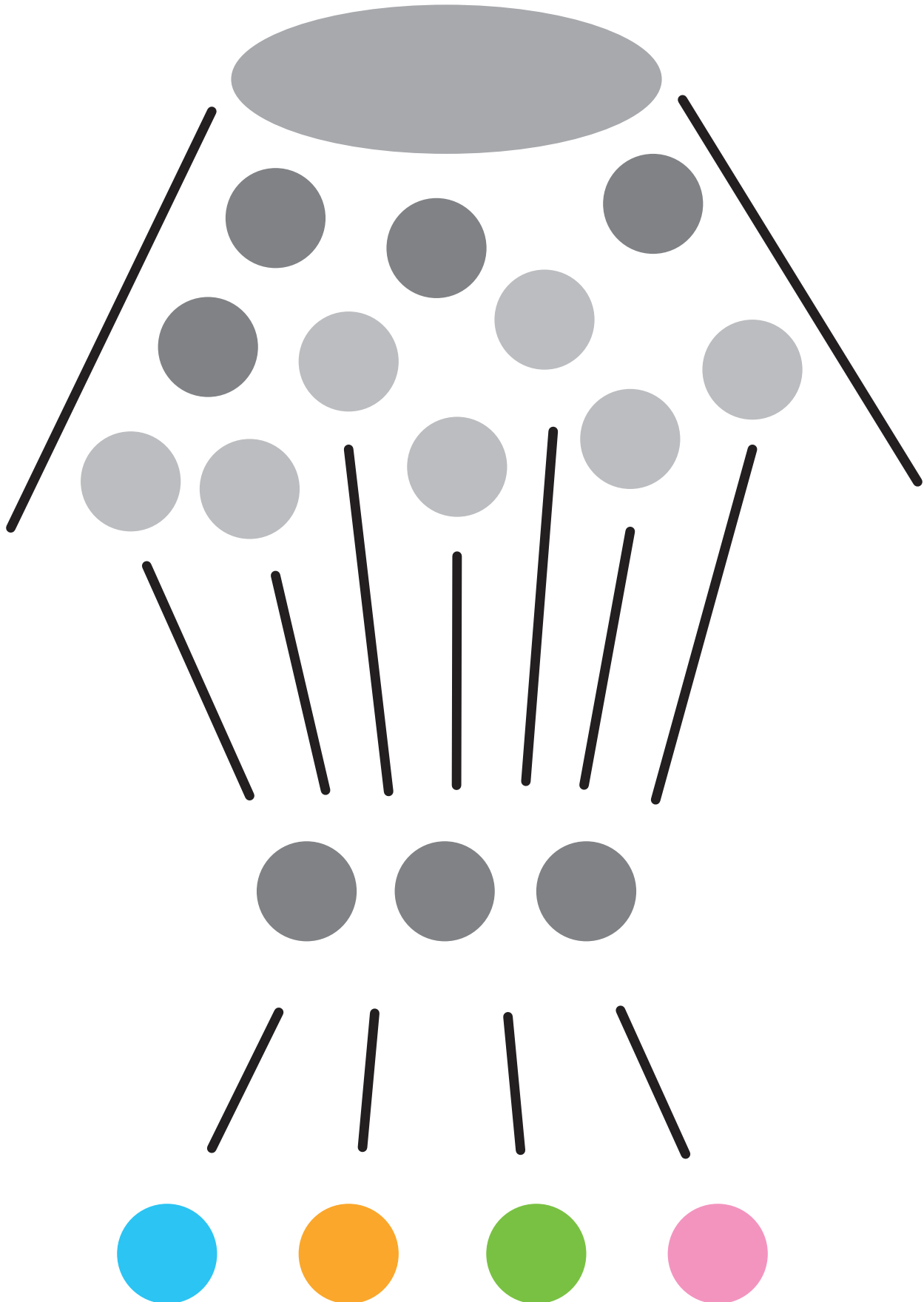
Chapter 2 Design for people with dementia

In this chapter different ways of designing for people with dementia are explored, design for dementia, persuasive design, and the Fogg's behavioural model. These methods are not primarily used for designing for dementia or loss of initiative. However, they could be used for this purpose as well. Furthermore, products both designed for people with dementia and without that are available on the market are discussed. These products can give an insight in how products designed for people with dementia are designed. In addition, some of the elements that these products could also be used for a product specifically designed for loss of initiative.

2.1 Ways to design for people with dementia

There are different existing ways in which one can design for people with dementia. These ways can possibly be used to design for loss of initiative, as well. In this chapter, three different ways are discussed. These are design for dementia, persuasive design, Fogg's behaviour model, and nudging.

Design for dementia

Design for dementia is about safety and keeping the autonomy and independence of people with dementia. Products designed for people with dementia should be easy in use and easy to understand. Wesselink et al. [3], give the wheel of design principles for designing for dementia [3]. The ten design principles are connected with each other, and influence one another, Fig.2. Therefore, designing for one specific principle can mean that you have to use other principles as well. Or disregard others because they cause a conflict. When looking at the design principle 'equitable use' (non-stigmatizing), an example of the conflict that can arise can be seen with the OER radio, see Chapter 2.2. The OER radio has a familiar look, an old radio. Uses simple colours and has very few buttons. This makes the OER radio easy in use and easy to understand, users are familiar with the shape. However, the radio also looks like a toy for children and the very simplistic design can make it feel stigmatizing for elderly people. So, there is a conflict between the principles equitable use and familiar.

The wheel of design principles does not take into account loss of initiative. Wesselink [11], adds another design principle which is focussed on loss of initiative, which is inviting. A product should invite the user to use the product.
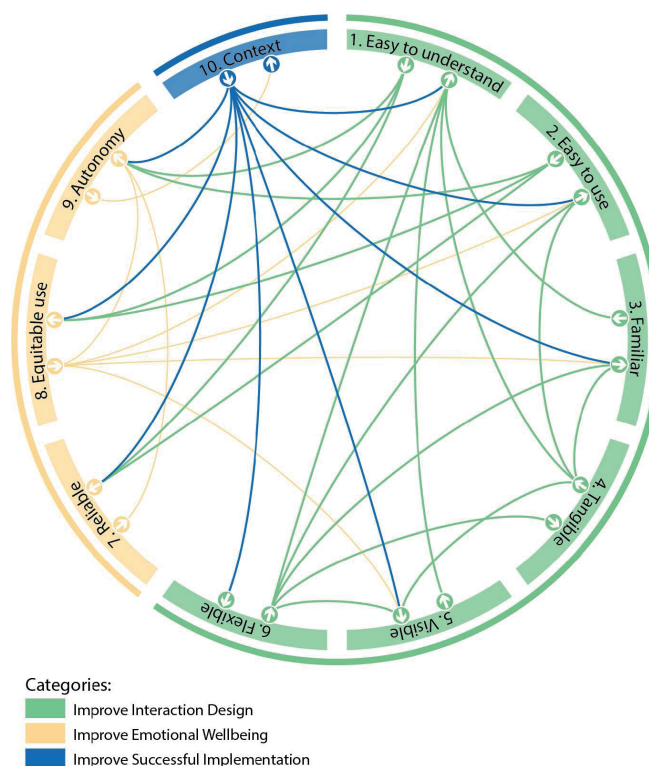

Fig. 1 Wheel of design principles for designing in the context of dementia [3, Fig. 1].

Persuasive design for people with dementia

Persuasive design in the broadest sense of it, can be explained as all technology or all products around us. Because everything is designed with an intent of how to use it and it influences us. In a more specific definition persuasion is "an attempt to change attitudes or behaviors or both (without using coercion or deception)." [12]. There is research of the effects of persuasive technology for people with dementia. Yamazaki et al. [13], focuses on robotic media as persuasive technology in care settings. They argue that robots which help with the social needs of people with dementia work and succeed in there intend. Teleoperated androids create a sense of affinity, especially in older adults with dementia, and can promote positive attitudes while evoking imagination. They held two tests with two huggable communication media, Telenoid and Hugvie. Telenoid is a minimalistic human-designed teleoperated robot with the ability to let the operator move its head and arms while talking. The older adult residents with dementia "developed prosocial behaviors and increasingly positive attitudes towards Telenoid." [13]. When responsive movements increased of Telenoid, the participants became more positively engaged. Moreover, "Telenoid's utterances and movements are effective in extracting stronger reactions from older adults with dementia" [13].

In the other field study, they used Hugvie, a huggable communication medium which provides opportunities for tactile interaction and has the effect of reducing anxiety. It has a human-like shape, and enables users to feel a human presence, as well as talking and listening to the Hugvie medium.

Participants showed the most emotions when using Hugvie for reminiscence work, however, it depends strongly on the individual whether this reaction is prolonged or not.

Participants reacted more to the Telenoid which could show interaction to the conversation and the participant. It can also initiate a conversation lowering the threshold for the participant. The participants therefore became more willing to talk.

Products that use persuasive technology influence the user(s) to use the product with a possible extended goal to enhance or improve living. The use of persuasive technology for loss of initiative could be to make people show more active behaviour, without taking away their autonomy and independence. As Yamazaki et al. [13] researched, the Telenoid was better at persuading the user to talk, lower anxiety, and to use, because of more ability in showing interaction than the Hugvie. Some of the participants smiled and saw the Telenoid as a friend when interacting.

Fogg's behavioural model and nudging

Fogg's behavioural model is designed for behaviour change, Fogg argues that to change behaviour you need to have the ability to do it and motivation. There is a line of action, when you are above the line behaviour change will occur, see figure x, both the motivation and ability need to be as high as possible for a behaviour change to occur. To increase the motivation or ability three types of prompts can be used: signal, spark, or facilitator. Caraban, et al. [14] describe twenty-three ways of nudging and categorize them to these three types of prompts, see Fig. 3.

When looking at loss of initiative, the initial behaviour is passive which needs to be changed into active behaviour. People with dementia, can lack motivation because they lack the ability. So, using the nudges as described by Caraban, et al. [14] can help to see what can be done to change people's passive behaviour.
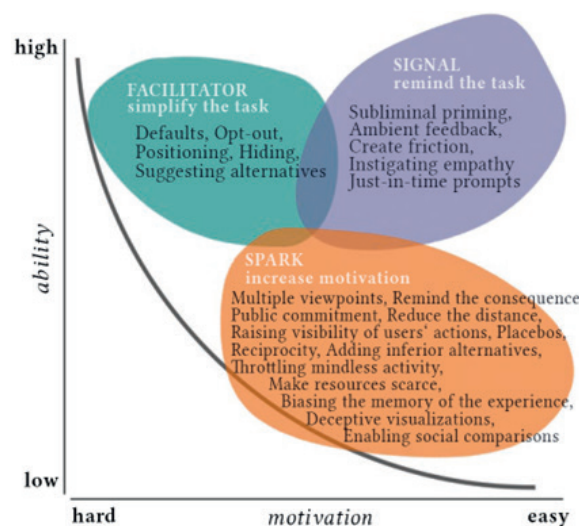

Fig. 2. Fogg's behaviour model and the 23 ways of nudging [11, Fig. 4] according to each type of prompt.

2.2 Existing products for people with dementia

In the previous chapter, the ways in which to design for people with dementia are discussed. On the market there are already products for people with dementia. These products mostly make use of the design for dementia method. They are easy in use and easy to understand. They are not exclusively designed for loss of initiative. However, they can help to see what is already there and whether elements of those products could or even should be used in a product to help with loss of initiative. Furthermore, there are concepts of products that can help people with dementia. These product can also give ideas for a specific product to counter loss of initiative. Other products that are not designed for people with dementia can also give new ideas for this research. Below, twelve products are explained. The first five products (1-5), are products which are specifically designed for people with dementia. These products are readily available on the market. The next four products (6-9), are concepts of products that are not all designed for people with dementia. The last three products (10-12) are on the market. However, they are not designed for people with dementia.

Fig 3. From left to right, up and down, care robot Alice [12], Lua smart planter [13], OER radio [14], Spiqle agenda [15], iDog [16], Robot Tessa [17], and the Canairi [18].

1.   Memory clocks and digital reminders
Memory clocks show more than just the time, they also show the date, which season it is and the day in full. Some also have additional functions which makes it work more like a digital agenda. Many different kinds of memory clocks are available. An example of a digital agenda is the Spiqle [18] it consists of a computer screen which is connected to an app for a smartphone that the (in)formal caregiver has. The agenda/calendar of the person with dementia can be loaded into the app, the computer screen at the house of the person with dementia shows in a concise way what the activities of the day are.

2.   Plant robot Tessa
Plant robot Tessa [20] is some sort of digital agenda. Tessa has the shape of a being with a face and can speak, in the top a plastic plant is placed. Tessa gives verbal guidance to the user with daily activities. She talks to the user to help them remind when they can get ready to go somewhere. Or when to take medication. She can also play music, the (in)formal caregiver can record sentences which can be send to Tessa, and she then says it out loud. Even though, the plant in Tessa is made of plastic, some users try to take care for the plant by giving it water.

3.   OER radio
The OER radio [17] is a simple radio, it only has a few buttons to keep the usability easy. There is one main button which is to turn it on/off. Music can be put in via a cable via your computer or smartphone. It is to make it very easy to listen to music, the design of the music player is to look like an old radio.

4.   Hug
Hug [22] from the Laughproject is a sensory device and looks like a big cuddly toy with long arms and legs, and a smiling face. It can play music such as a favourite playlist and it has a beating heart. It is designed to bring pleasure and joy to people with dementia. When people cuddle with Hug it can reduce anxiety. Users could be inclined to talk to Hug because of its face and beating 'heartbeat', it can feel like a doll.

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5. Care robot Alice

Alice is a care robot [15, 23] to help against the loneliness that the elderly can experience. Alice can hold simple conversations, reacts to the participants, and turns her head towards the participant. In a documentary made by Sander Burger [23], it can be seen that the participants loved Alice in their home, one of the participants shared memories from a photo album with Alice. The researchers were first questioning whether it is morally right to replace a human with a robot against social isolation. However, at the end they were wondering whether it is right to take away the company of the robot from the participants.

6. MeMoTray

The MeMoTray [24] is a tray where objects such as keys, wallet, agenda, etc. can be stored. It is placed near the front door. The tray is connected to a smart home system. When you open a door and the key to that door is still in the tray the system will remind you to grab the key. Adding more smart home applications can expand the systems usability. The system tries to learn the activities of the user and guides with haptic, audio, and visual reminders to accomplish the activities. It helps people with dementia to keep their independence.

7. RainMinder

RainMinder [24] is a smart doormat that responds to the weather outside. When it is raining, and you step on the doormat it makes it sound like you are stepping in a puddle. Reminding you to take an umbrella with you.

8. Drinking reminder

The Drinking reminder [25] is a jar which helps to remind to drink enough during the day, or in a specific amount of time. The jar is not specifically designed for people with dementia. However, it makes use of reminders which could also help with products for people with dementia.

9. Breakaway

The breakaway [26] is an accessory for on your desk, it is connected to the chair you are sitting on. When you sit for a prolonged time, the Breakaway will start to cave in, mimicking your posture. Reminding you to stand for a while or moving away from your desk. It uses the nudging technique, more specifically the ambient feedback nudge.

10. Canairi

The Canairi [21] is a wall decoration which can sensor the CO_2 level in your room. It is placed near a window to help to remind that opening the window will help to reduce the CO_2 level. When the CO_2 level is too high the Canairi will drop 'dead'. When a window is opened the Canairi will come back to life. It uses the same nudge as the breakaway, ambient feedback.

11. Lua smart planter

Lua [16] is a plant pot which can help you to take good care of real plants. Lua has a small interactive face that can show several emotions which indicate what you need to do to take good care of the plant. Such as giving water, putting it in the sun or shade, when it is too cold or warm. The use of a face makes the product seem friendly and can give an incentive to take care of Lua and keep it happy.

12. iDog or E-dog

The iDog [19] is a toy for children. When placed next to a speaker that plays music it will 'dance' to the music, by wiggling its head and ears to the beat of the music. On its head is a LED display consisting of seven LEDs. The patterns show the type of music and can show how iDog feels. Moreover, the type of music iDog listens to creates the personality of iDog. It is also possible to plug-in your iPod, then iDog functions as a speaker itself.

Conclusion

As mentioned in Chapter 2.1, design for dementia is about usability, safety, and keeping people's autonomy. Products that are designed for people with dementia, should be easy in use and easy to understand. In addition, the products should take into account the physical and cognitive impairments people with dementia can experience.

All twelve products are easy in use, there are little to no buttons and feedback during use is often given via audio and/or visual. However, products 7-12 may be difficult to understand for people with dementia. These products rely on the ability to make the correct connection between the reminder and what should be done accordingly. None of the 12 products is designed to take loss of initiative into account. Though, some of the

products can invite the user to use the product by attracting the attention of the user.

For example, the drinking reminder uses both sound and lights to remind the user to drink water. Furthermore, both plant robot Tessa and care robot Alice do take over the initiative themselves. They can talk to the user and start a conversation. Robot Tessa helps to remind through speech which makes it easy to understand what needs to be done. Robot Alice also uses speech control, with her the user can hold actual conversations. This makes the interaction with the product easier. It can also be easier to understand since the product can tell the user what it wants, means, or needs. However, it is unknown how far the speech control of robot Alice reaches.

The products with only visual feedback, RainMinder, Canairi, Breakaway, and Lua, often are abstract in feedback. It can be difficult for someone with dementia to make the connection between what needs to be done when the feedback is given. For example, the face of Lua gives feedback on how to take care of a plant with different faces. However, it can be difficult to understand what each face means. It may also be difficult to remember what each face means without reading the manual. Moreover, Lua only gives visual feedback, it cannot talk back. Audio feedback could make it easier to understand what needs to be done. Especially when the product says what it wants or needs.

The face on Lua can give an incentive to speak to it. This can invite the user to talk to the product and use it. The connection between visual feedback and meaning should be clear, easy to understand, and intuitive for people with dementia.

The products that are designed for people with dementia take into account the impairments the users can experience, such as memory loss, or losing track of time. Both the Spiqle and plant robot Tessa help with those impairments. Such products help people to keep their independence and autonomy.

In Table 1, elements that can be incorporated into a product that takes into account loss of initiative are shown.

Table 1. Elements that can be used in new products when designing for loss of initiative.

Element	Product examples
Visual feedback	MeMoTray, iDog, Lua, Canairi
Take into account the physical and cognitive impairments of dementia	Spiqle, Robot Tessa, OER radio, Hug
Simple interface such as speech control	Robot Alice
Feedback through speech	Robot Tessa
Use of visual and/or audio reminders	RainMinder, Drinking reminder, MemoTray, Spiqle

2.3 Summary

Fogg describes that you need motivation and ability to change behaviour or to be able to do more activities. To persuade people to do something, one could use nudges [14] or social interaction [13]. Care robot Alice [15], plant robot Tessa [20], Lua the smart planter [16], and iDog [19], all make use of social interaction in one way or another. Where Alice and Tessa talk to you, Lua can show emotions in a non-verbal way, and the iDog makes use of abstract lights which symbolise emotions.

The physical and cognitive impairments people with dementia can experience should also be taken into account when designing for loss of initiative. The wheel of design principles [3] could be used. It is important to preserve the autonomy and independence of the person with dementia. As mentioned in Chapter 2.1, design for dementia does not take into account loss of initiative. However, some elements that could be taken into consideration can be seen in Table 1. In Chapter 3, what loss of initiative is will be explained. How people experience loss of initiative and current ways of countering loss of initiative are explored, as well.

Chapter 3 What is loss of initiative

Loss of initiative is the loss of self-initiated behaviour or switching of tasks and engaging in a new behaviour [27]. Loss of initiative is connected with executive control and function, which has to do with planning, sequencing, and executing of goal-directed activities [27, 28].

The forms in which loss of initiative can be expressed, can be categorized in routine, also called habitual, and non-routine, also called occasional forms. The routine forms could be house cleaning, eating, doing the groceries. The non-routine forms could be staying hydrated, engaging in social activities, organizing (social) activities.

The place in the brain where taking initiative and executive control happen, is in the frontal lobes. It develops the latest but is the first to deteriorate [29] due to dementia. Because most of the damage that causes loss of initiative and apathy occur in the frontal lobes, most people with FTD will lose their initiative and can get apathy sooner than people with another type of dementia.

In literature, the link between loss of initiative and apathy/loss of executive functioning is often made. However, how people with dementia experience loss of initiative is not something that can be found in literature. Moreover, different ways in which people already counter loss of initiative cannot be found as well. Therefore, several visits to day care facilities were made to gain knowledge about these problems.

3.1 Loss of initiative in dementia

Loss of initiative is a symptom that can occur with dementia. Most people with dementia will experience loss of initiative to a lesser or greater extent at some point. However, not everyone that is diagnosed experiences loss of initiative and they might never do. This research focusses on the four most common types of dementia. Alzheimer 60-70% [30] of cases, vascular dementia 5-10% [31], Lewy Body dementia (LBD) 5-10% [32], and frontotemporal dementia (FTD) up to 10% of cases [33].

To gain a better understanding of the differences between the four types and the possibilities in how loss of initiative can occur in these types of dementia will be discussed separately.

Alzheimer disease

Alzheimer disease is the most common type of dementia making up 60-70% of diagnosed cases [30]. The cause of Alzheimer is a clumping of amyloids and Tau protein balls inside the hippocampus. It spreads through the brain when the disease progresses. The hippocampus is important for the storage of information, orientation, and the controlling of one's behaviour.

The first symptoms that occur are memory problems and when the disease progresses other skills and functions will be lost, see Table 2. The impact of loss of initiative is not big in the early stages of the disease. When the disease progresses people may experience apathy and therefore loss of initiative.

Vascular dementia

Vascular dementia is the second most occurring type of dementia, being diagnosed in 10-15% of cases [34]. Vascular dementia is caused by transient ischaemic attacks (TIA) and cerebrovascular accidents (CVA) in the brain. These can be small but when too many have taken place damage will ensue. The symptoms that will appear depend on where the infarcts have taken place, see Table 2.

Vascular dementia starts with slowness in thinking, doing, and speaking. Then the concentration will degrade, and people will get difficulty with multitasking. It will take more effort to do something. People with vascular dementia have clear and confused moments.

The impact of loss of initiative depends on where the TIAs or CVAs take place. People may be discouraged to do something, because of the increased effort to partake in activities.

Frontotemporal dementia (FTD)

FTD makes up 5-10% of all diagnoses [33], the cause of this type is a precipitation of protein in the frontotemporal part of the brain. This part is responsible for the executive functioning, memory, impulse control, and emotion regulation. This also shows what kind of symptoms people with FTD will show. There are different types of FTD of which the behavioural type is the most common. This type also has its own subtypes: stereotypic, apathetic, and disinhibited, respectively. Depending on where the precipitation of protein starts either in the frontal lobe or temporal lobe. The symptoms of the dementia can differ in the beginning. Eventually, all types will show the same symptoms and will deteriorate the memory as well.

Symptoms include both overactive and very passive. People may be disinhibited, fatuous, easily distracted, socially inappropriate, and lacking concern. Or on the other extreme, people are bland, apathetic, inert, experience loss of initiative, lacking volition and mental effort, mentally rigid, and perseverative.

The impact of loss of initiative is the biggest in FTD of all four types. Because the precipitation of protein starts in the frontotemporal part of the brain, and this is where initiative is situated. Especially, if people are very passive they can be apathetic which can cause loss of initiative, see Chapter 3.2.

Lewy Bodies dementia (LBD)

Lewy Bodies dementia is caused by "Lewy bodies" which are encapsulated protein inside the brain. The deviations occur mostly in the cerebral cortex but starts in the brainstem. This causes a slowness in movement causing difficulty in performing tasks. The first symptoms are problems with concentration, visual hallucinations, and difficulty with movement which can look like Parkinson disease.

The impact of loss of initiative is less than with FTD. The slowness in movement can make it more difficult to perform tasks. Therefore, people with LBD may still be able to take initiative but will not because it takes too much effort.

Table 2: The four most common types of dementia with the respective symptoms.

Alzheimer disease	Vascular dementia	Frontotemporal dementia	Lewy Body dementia

• Memory problems
• Agitation
• Making errors of place and time
• Apathy
	• Slowness in thinking, doing, and speaking
	• Concentration degrades
	• Difficulty with multitasking
	• Problems with concentration
		• Behavioural problems
		  - Loss of executive functioning
		  - Loss of impulse control
		  - Loss of emotional regulation
		  - Apathy
		  - Loss of initiative
		  - Socially inappropriate
		• Memory problems
		• Language problems
			• Language problems
			• Visual hallucinations
			• Slowness in movement

Summary

The impact of loss of initiative is the most severe for people with FTD. The deterioration starts in the frontotemporal part of the brain where taking initiative is situated. Especially people with the behavioural type can experience apathy and loss of executive functioning, which are both linked to loss of initiative, see Chapter 3.2.

The impact of loss of initiative on the other three types of dementia has more to do with the fact that people have more difficulties in performing tasks. The threshold to do something increases, which leads to people not doing it.

3.2 Causes of loss of initiative

In literature, loss of initiative is described as a symptom of apathy [35]. Or is linked to loss of executive functioning [4]. Apathy can be described as a "a lack of motivation that persists over time and causes identifiable functional impairment" [35], or as "diminished motivation not attributable to decreased level of consciousness, cognitive impairment, or emotional distress." [2, 36].

Executive functioning is the cognitive process that enables people to plan, focus attention, remember, and manage multiple tasks [28]. Impairments in this area can affect one's ability to follow along or complete several tasks simultaneously [28]. It refers to the higher cognitive activities in situations that require the simultaneous operation of several cognitive processes.

In this chapter, the link between apathy, loss of executive functioning and loss of initiative is explained to see what the impact is on loss of initiative.

Apathy

Robert, et al. [35], describe four prerequisites for a diagnosis of apathy, see Table 3. The dimensions of criterion B are behaviour and cognition, emotion, and social interaction. In both the behaviour and cognition, and the social interaction dimensions loss of initiative comes forward [35]. The dimension of behaviour and cognition contains two symptoms one of which is loss of self-initiated behaviour, and the other is loss of environment-stimulated behaviour.

Table 3. The four criteria for apathy diagnosis described by Robert et al. [35].

Criterion	
A	Quantitative reduction of goal-directed activity in comparison to the patient's previous level of functioning
B	The symptoms must persist for at least four weeks, and affect two of the three apathy dimensions • Behaviour and cognition • Emotion • Social interaction
C	It should cause identifiable functional impairments
D	Should not be fully explained by other factors, such as effects of a substance or major changes in the patient's environment

Esposito et al. [4] discuss two of the three apathy dimensions, lack of interest and lack of initiative. They discuss that when people are not interested in doing certain activities they will initiate fewer actions to do these activities. Moreover, people who have difficulties initiating activities will become uninterested in these activities [4]. They also give several reasons people could have to not show interest, and therefore initiative. These are executive difficulties, poor self-esteem, low self-efficacy, and inability to project themselves into the future. Another reason to not show initiative may be because of cognitive problems (e.g., memory problems), or physical problems (e.g., reduced mobility). People with such problems, with or without dementia, will not stop certain activities because they lack interest but because they have other difficulties prohibiting them from executing the activities. In addition, some individuals may try to conceal their disabilities. They avoid initiating these activities because of fear of failure, or to prevent others from discovering their disabilities.

Loss of executive functioning

Executive functions control the planning, sequencing, and execution of complex goal-directed activities. For example, cooking, dressing, shopping, and housework. These functions are highly dependent on the short-term working memory which allows information to be held and manipulated in the mind during effortful tasks including learning, reasoning, and comprehending [28].

In the book principles of cognitive neuroscience [27], executive control is described as control processes that overtake automatic or 'default' behaviour. Which can be done with three different processes, inhibition, initiation, and/or simulation. Inhibition is when you suppress unimportant or distracting information or behaviour.

Initiation can also be called task switching. It is the selection of desired information or behaviour, engaging in new behaviour instead of the automatic behaviour. Initiation is the opposite of inhibition. Simulation is the ability to create mental models of the world around us, to be able to decide what to do, it is thought to be fundamental to human cognition [27].

Conclusion

Apathy can be described as a "diminished motivation..." [2] and a criterion of the diagnosis of apathy contains loss of self-initiated behaviour. Therefore, the impact of apathy on loss of initiative is big. People that will experience apathy will experience loss of initiative.

Looking at what executive functions are and that they are dependent on a short-term working memory. People with Alzheimer disease will experience loss of executive functioning and, therefore, loss of initiative. Moreover, the symptoms of the other types of dementia, such as slowness in movement, thinking, doing, and speaking, will also obstruct executive functions. Therefore, people with vascular dementia, FTD, or LBD can also experience loss of initiative. However, for these types of dementia it will depend on where the deterioration starts, as mentioned in Chapter 2.1.

Besides, as Esposito, et al. [4] describe, loss of initiative is linked to a lack of interest and, therefore, a lack of motivation. So, it may not be that someone experiences loss of initiative, but that someone simply lacks interest.

3.3 How do people experience loss of initiative

The impact of loss of initiative on people with dementia is difficult to find in literature. Therefore, several visits to meeting centres and a day care for people with dementia in the early stages were made, three in total. See Appendix A. All of them are in or near Enschede. This research focuses on losing initiative to listen to music. Therefore, questions were asked about whether people like to listen to music, and if so when they do it.

The goal of the visits is
- To experience/observe how and if participants experience loss of initiative
- To get into contact with people with dementia and their (in)formal caregivers
- Asking whether participants experience loss of initiative themselves

At the day care facilities semi-structured interviews were held in a convivial setting. The questions were asked in a general sense and every participant had an opportunity to talk or not. The group supervisor (NL: groepsbegeleider) sometimes helped the participants to answer. Restructuring the questions, or giving possible answer options. This to help participants with thinking of possible answers. Not all questions were asked at each visit. After all the participants left at each visit, a small conversation about the experience and observations was held with the group supervisor and if they were present, the volunteers. Questions that were not asked towards the participants during the day were asked to the group supervisor.
At one of the visits, some of the informal caregivers of the participants were present after the lunch. The same questions were asked to them in a convivial setting as well. The participants were also present, see appendix A.2.

Questions

- Do you ever experience loss of initiative
- How could you be helped to take more initiative
- Do you sometimes not feel like doing something you have to do, but then you still do it?
- What is a reason for you to not do something
- Do you like to listen to music

Table 4. Number of participants during each visit.

	't Ribbelt	Glanerbrug	Bruggerbosch
Number of participants	10	7	6
Men	5	4	5
Women	5	3	1

Outcomes

Some participants say that they do not experience loss of initiative and still are able to take care of themselves. However, according to the group supervisor it should be questioned whether this is true.
Other participants admit that they sometimes do not do certain things because they lack a motivation or are not interested. Furthermore, there can be something that obstructs them to do it. Such as physical impairments or lesser range of motion, likely caused by aging. Because of the physical impairments people get demotivated to do it, they think they are unable to do it. Or it takes too long to make it work so they do not do it. On top of that, cognitive impairments caused by dementia may also obstruct them.

One participant from 't Ribbelt gave an example of how his impairments caused him to lose initiative in his daily life. The participant used to go to a singing group, but due to his dementia he sometimes has difficulty with speaking. After the singing session they often stay longer and chat with each other. However, the participant does not stay and goes home, because he feels a bit embarrassed for his difficulties with speaking. This can have negative effects on his social interactions, possibly losing friends, and decreasing his social world. Which in return could deteriorate his dementia faster, and could increase his loss of initiative [4].

Other examples of lack of initiative from the visits are:
- Not starting conversations or keeping a conversation going, the caregivers have to stimulate the participants to keep the conversation going
- Some do undertake activities outside the house, grocery shopping, going to meeting centre (NL: ontmoetingscentrum) but they do not undertake activities inside the house
- Cooking meals
- Cleaning the house
- If caregivers do not suggest an activity they will not start an activity by themselves the day care
- Forgetting to drink or eat
- When calling the bank (or governmental agencies, customer service) and a pre-recorded instructions tape is used, people will hang up the phone

3.4 How people with dementia deal with loss of initiative

How people with dementia deal with loss of initiative is also not mentioned in literature. From the visits to the meeting centres several observations are made about how people with dementia deal with loss of initiative. Talking with the group supervisor gave insight in how people at home may counter loss of initiative.

People that live with a partner or family, experience less loss of initiative than people that live alone. The partners of people with dementia help them with undertaking activities. They help with the planning and execution of activities. They give their partner or family member tasks in the household to keep them active. Thereby, potentially slowing down the process of decline caused by dementia. Moreover, the visits to a meeting centre or day care help people with dementia to retain a routine and slowing down the process of dementia. On top of that, the day care visits help the informal caregivers to be able to care for their relative longer. If the informal caregiver has time to decompress, they can likely take care of their family member for a longer amount of time. Making it possible that the person with dementia could live longer at home.

Some people that live by themselves still undertake certain activities. One woman from the visit to 't Ribbelt is aware of the dementia and the consequences of the disease. It is important for her to pursue as many activities as possible by herself. She sometimes does not want to do a certain task, such as grocery shopping. However, she does it anyways, because "it keeps me healthy, and active". She gives herself 'een schop onder haar kont' (kick in the butt).

The group supervisor from the meeting centre in Glanerbrug said that when making a suggestion to do a certain activity can give an aversive/disinterested reaction. The participants do not want to do it, have no motivation, or think they are unable to do it. However, when the activity is suggested in a different way, they may want to do it and actually enjoy it. It depends on how its presented to them whether they are interested and willing to do it. Furthermore, at the meeting centres participants will mimic each other. When people are eating, other's will be more inclined to eat too.

Whether people with dementia show or experience loss of initiative, differs from person to person, it can depend on
• What do they like to do,
• What are they used to, and
• What they need based on what they were used to in a former stage of life

A good example of what people need based on what they were used to in a former stage of life. A participant from 't Ribbelt lives in a new apartment close to a meeting centre. He can walk to it. He used to live closer to nature but does not mind living in the middle of a neighbourhood looking out on a nice road/looking at people going past his apartment. However, he does not like the meeting centre because it is in the middle of the neighbourhood and looks out on a road. He wants to be more in nature and surrounded by nature. Therefore, he goes to 't Ribbelt, which is surrounded by nature but still in a neighbourhood. The downside is that he cannot walk there anymore and has to take a taxi. However, he is willing to give that little bit of autonomy up to be able to enjoy more nature.

3.5 Conclusion

Loss of initiative is both habitual and non-habitual. Habitual forms are taking medication, cleaning, cooking, shopping. Non-habitual forms are listening to music, taking a walk, playing a game. There is a link with apathy, as one of the criteria to diagnose apathy is loss of self-initiated behaviour [33]. Moreover, loss of initiative is linked with loss of executive functioning, both processes are situated in the frontal lobes of the brain. Therefore, people with FTD experience the biggest impact of loss of initiative. Eventually, all types of dementia will experience loss of initiative.

Esposito, et al. [4], argue that a lack of initiative is connected to a lack of interest and motivation. To counter loss of initiative one can, therefore, look at the person's interests. At the meeting centres this is also done. Participants can spend their time at the meeting centre doing what they are interested in. If someone does not want to do something, that person could be persuaded by asking in a different way. Or setting the example, such as when someone is hungry, and they see someone else eat. It creates an initiation to also start eating.

At the meeting centres, the role of stimulation and social interaction is important. Participants are stimulated through the environment and talking and engaging with others is encouraged.

Chapter 4 Design directions

In Chapter 2, the connection of motivation with taking initiative, and the importance of someone's ability to be able to take initiative are described [4]. From the visits to the meeting centres, it becomes clear that both stimulation and social interaction are important to take initiative. At the meeting centres, participants are stimulated to participate in activities, and the importance of social interaction plays a big role. Most of the ways in which loss of initiative is countered at the meeting centre is through a form of social interaction. Moreover, Yamazaki et al. [10] describe the importance of social interaction when designing products for people with dementia. When looking at the wheel of design principles and the Fogg's behavioural model, a low threshold or high ability is important. The higher the ability is, the easier it is to take initiative.

From this four design directions can be summarized, motivation, stimulation, low threshold, and social interaction. All four of these help with taking more initiative.

To see more clearly how the design directions fit in the design space, they need to be explained. Moreover, to be able to design products of methods with these design directions it is necessary to know what each direction entails. Each design direction will be briefly described by itself. For a more detailed description, mind maps are made, see appendix B. After the description of each design direction, the connection between the design directions and other design methods will be explained. At last, the design directions will be placed into the design space to see how they fit in it.

4.1 Four design directions

Motivation

Motivation is about people's own will to do things. People that lack initiative or show less initiative possibly lack motivation to do so. However, it may not be that they lack motivation but lack an interest in the activity proposed [4]. Which causes them to have no motivation to participate and therefore take initiative. Not only the interests of people matters, also their ability. If a task becomes too cumbersome people will try to avoid doing it. This can cause the dementia to deteriorate faster. Or someone completely loses the ability to do it. Motivation can be divided into intrinsic and extrinsic motivation.

Stimulation

When losing initiative, getting stimulated to be active and do activities can help to become more initiative taking. Stimulation can be divided into physical and cognitive stimulation. Physical stimulation can be through the environment, having products in sight can make you remember it existing and therefore be more likely to use it. Also having products in arms reach or easily reached can help to use the product more often. One way that formal caregivers do to help people to be more active, is offering activities. When people do not respond they try to propose something else or the same thing only in a different way. By doing that they try to stimulate people to do a certain activity. This is an example of cognitive stimulation.

The difference between motivation and stimulation can be a grey area. When something is stimulating or motivating differs from the perspective on the situation. However, in general the difference is that motivation can come from oneself. You can motivate yourself, this is also called intrinsic motivation. Whereas stimulation is something that always comes from the outside or environment. An environment can be stimulating, or the people around stimulate someone. Intrinsic motivation is the interests, inspirations, or aspirations people have. Also, when someone wants to stay fit, or is aware of the consequences and want to avoid them they are motivated by themselves. Motivation is triggered by something external (extrinsic motivation) this is when people inspire someone to do something. Or others tell something on which they reflect themselves and this in return creates a motivation. For example, to be more active, avoid negative consequences, etc.

Low threshold

Even if someone is stimulated and motivated to do something there can still be something that holds them back from actually doing it. Such as a physical inability, or disability. When people get older they often lose physical mobility. It can take longer to get up from the sofa, to dress, or to walk. This will raise the threshold to actually do something. Moreover, people can have cognitive disabilities. This can be caused by the dementia

which will make it harder to reflect on previous done tasks, perform a series of tasks that requires the ability to remember previous tasks, concentrate, and focus on what needs to be done. Therefore, a product should have a low threshold to use it. However, that does not necessarily mean that it needs to have the simplest interface possible, or an easily recognizable interface. Having a really simple interface with familiar buttons or just one big button will make it easier to use but not easier to initiate the use of the product. To help with initiating, the use of other ways of interaction with the product should be considered. For example, speech control, reacting on movement or sounds or the lack there of.

When people have cognitive impairments it could help to decrease the number of choices. Or to propose the same thing in a different way. Someone may react better to a certain way of asking. Which could depend on the time of the day or their mood. Offering more ways in which to do an activity at certain times can help people do more activities. This was also observed during the visits to the meeting centres. The group supervisor asked participants in various ways whether they wanted to do an activity. Sometimes proposing the activity in a different way made the participant want to try the activity, even though the initial response was aversive.

Social interaction

Social interaction is about any interaction with either another human, a pet, a robot, or an inanimate object. This interaction can be verbal, as through a telephone, video calling, or face-to-face. But also, non-verbal such as hugging or through facial expressions. Another way could be by taking care for each other, or a pet. When people with dementia lose initiative they undertake fewer activities with others. If they also live by themselves and family cannot visit often they often lack a lot of social interaction. Their world will shrink which can increase the deterioration of the dementia. More social interaction will therefore be beneficial for people with dementia. Because of the effects of the dementia people could get physical impairments that will hinder them to partake in activities such as going to a sports club, choir, or other group activities. Therefore, going to a meeting centre will help to enlarge their social lives.

4.2 Connections

The design directions can be seen as something on their own. However, there are connections between the directions. Some of the definitions are shared between them. The connection between motivation and stimulation is already explained. Where stimulation can only come from outside, motivation can come from both outside as well as inside. However, there are more connections. Some ways of increasing stimulation require social interaction. Speech control could, therefore, also be seen as a form of social interaction.

Motivation is linked to ability, having the ability to do something increases the motivation to actually do it. Increasing ability is also part of low threshold. In general, when something is easier to do people will be more inclined to do it.

Because the end goal is to help with taking more initiative or to take over a part of taking initiative, all the design directions could be connected to each other. Since, taking initiative is linked to being

motivated and having an interest [4]. One could argue that stimulation, social interaction, and low threshold should all lead to motivation, and that therefore, motivation is the end goal, see Fig. 5.
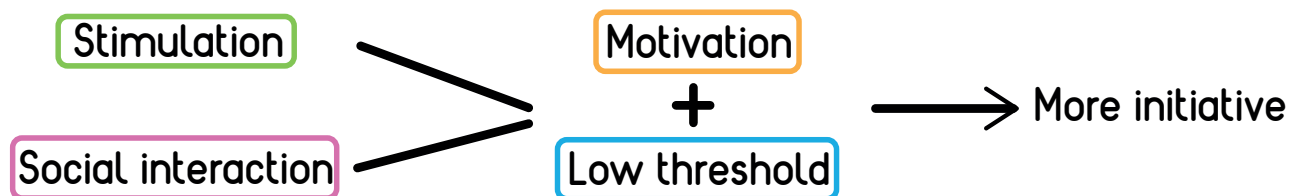

Fig 4. the connection between the design directions and loss of initiative.

However, when looking at the Fogg's behaviour model [14] it can also be argued that stimulation and social interaction increase motivation. On top of that, the threshold to use the product should be low, to create more initiative. Therefore, the connection between the design directions can also look as in Fig. 6. Embedding stimulation and social interaction in the design can lead to motivation. When this is combined with a low threshold to use the design, this could lead to a higher level of initiative.
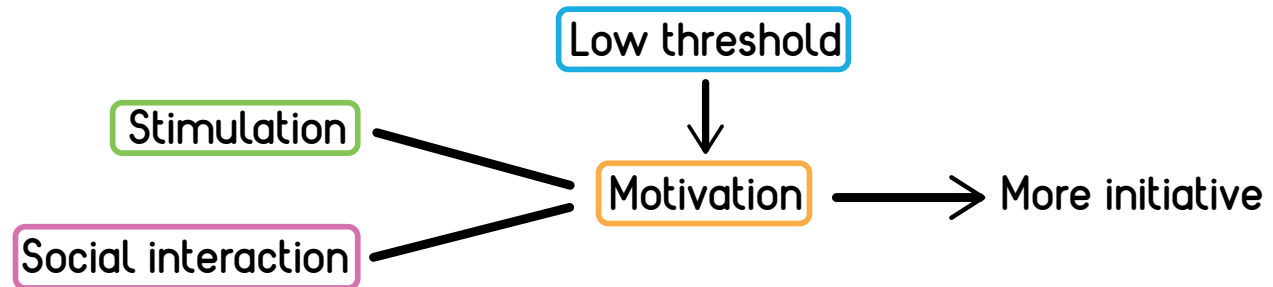

Fig 5. Connection between design directions and loss of initiative as in Fogg behaviour model.

4.3 Design directions in the design space

The design directions can be placed in the design space, there are two options, Fig 7. The four design directions from this research are only a small part of the design space. Or they are a big part of the design space. If they are a big part within the design space, it means that most product ideas utilize one or more design directions.
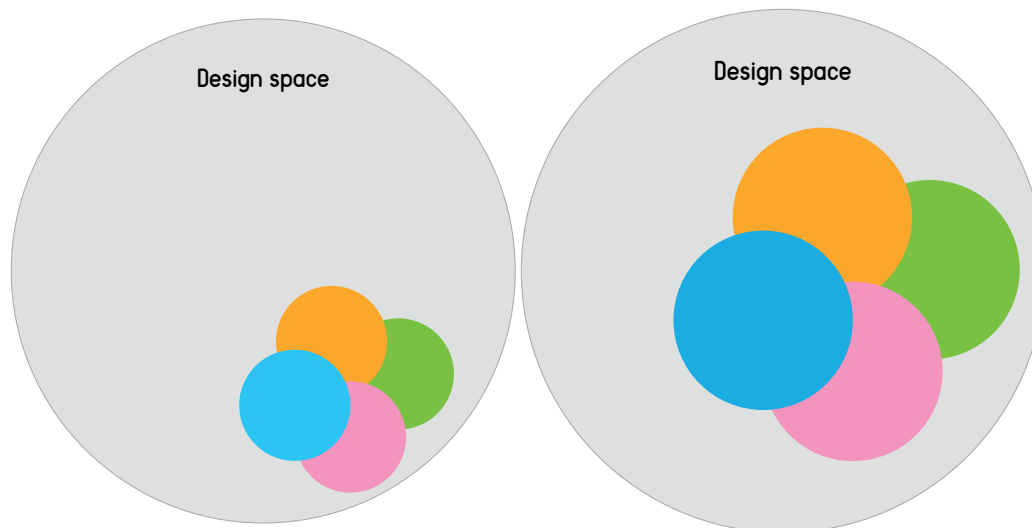

Fig 6. The two options of the placement of the design directions in the design space for loss of initiative.

4.4 Design directions vs. nudging

Nudging is a way to help people to change their behaviour in a certain way to a desired behaviour. It is a method used for behaviour change. As mentioned in Chapter 2.2, nudges can be used inside the Fogg behavioural model.
One could say that the design directions as defined in this research could be subdivided into the nudges, and that they are therefore the same in principle. To most if not all nudges one can add one or more design direction, see Fig. 8. The figure can be used by selecting a design direction for which to design. Or choosing a prompt type and seeing which design directions can be fulfilled by each nudge. For example, when designing a product and social interaction should be included. When looking at Fig. 8, social influence nudges can be used. Or instigating empathy, suggesting alternatives, or reminding of the consequences.
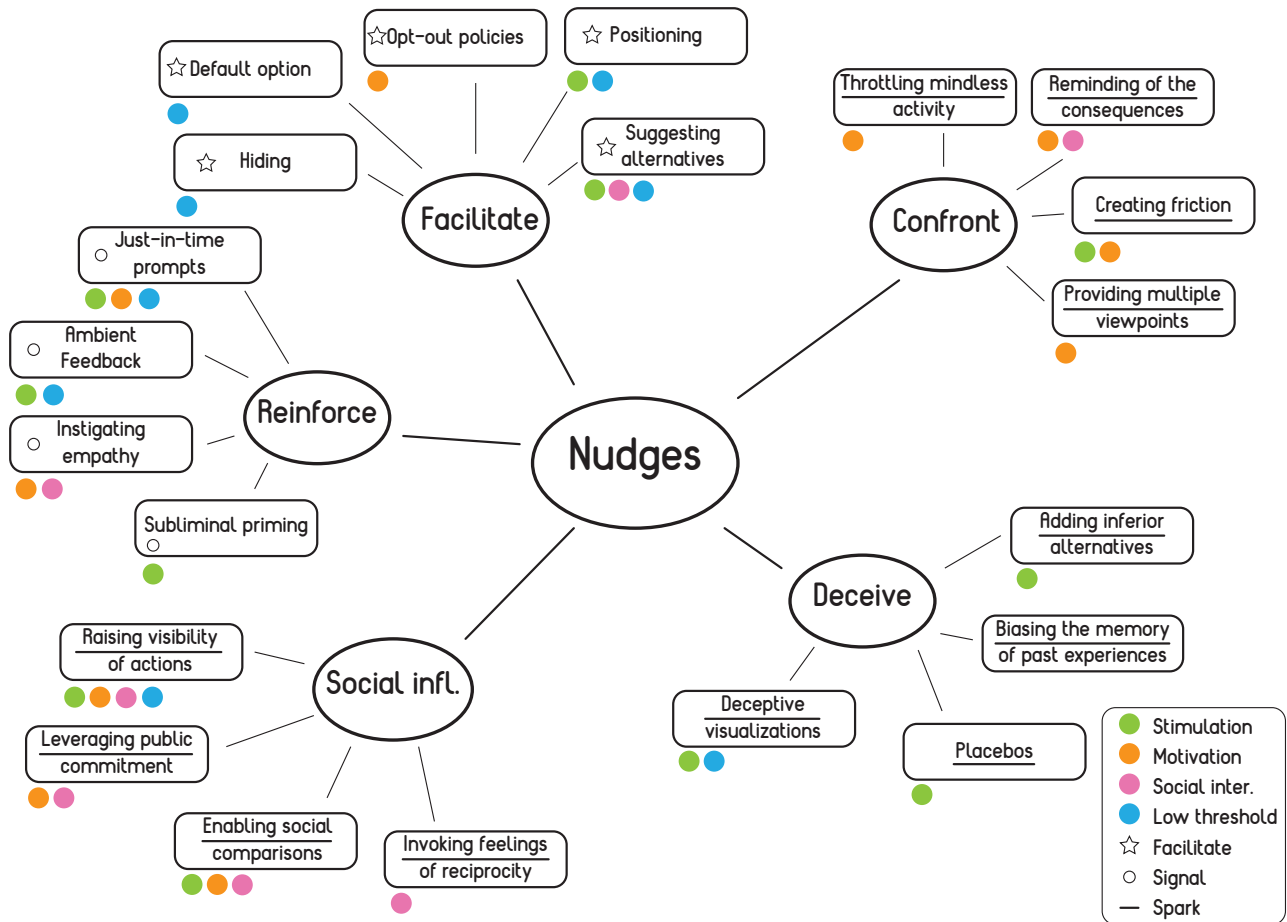
Fig. 7. The connection between the nudges and the design directions.

4.5 Conclusion

Using the design directions can improve taking initiative. It can be used as a tool that guides to taking more initiative. To make the most use of the design directions it is necessary to make a good definition of what each design direction means. Or to focus on a specific aspect of a design direction. For example, when stimulation needs to be used, one could focus on either cognitive or physical stimulation. It is better to choose beforehand on which to focus first. Later other features from the other aspect and other design directions can be added. The design directions embedded in the 23 nudges can help when using the Fogg's behavioural model to improve initiative.

Phase 2: Designing
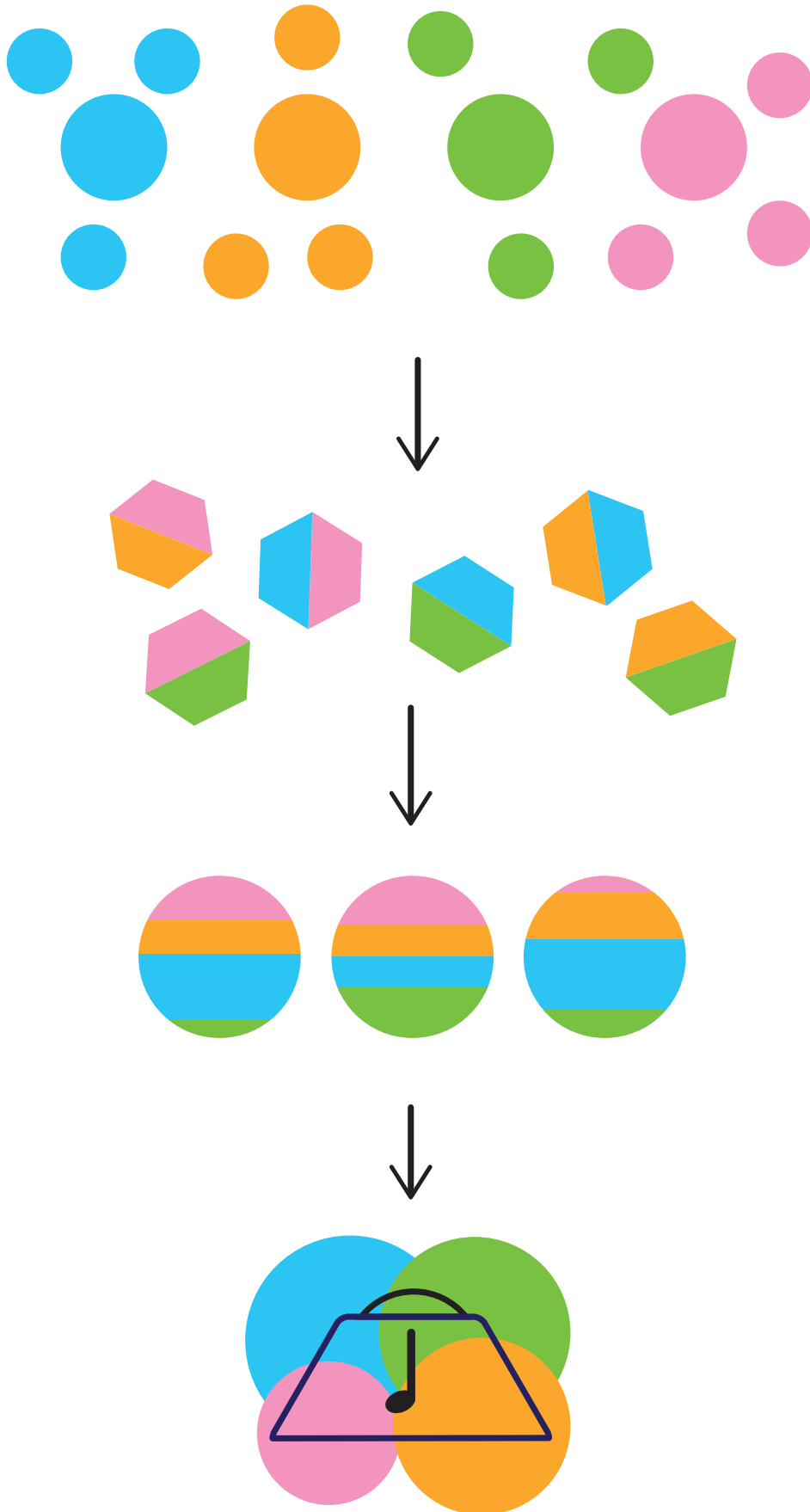
In Chapter 2, we have shown that there are ways to design for people with dementia. Namely, design for dementia, persuasive design, and nudging. However, these design methods do not take loss of initiative into account. In this phase, a design method for loss of initiative with the design directions is explored. The first chapter, starts with brainstorming of ideas. In Chapter 4, the design directions have been explained briefly. To get a better understanding of what each design direction entails, mind maps are created. See Appendix B. These mind maps serve as a basis for brainstorming.

All the ideas are put into a quadrant, arranging each idea in relation to the four design directions. Which are motivation, stimulation, low threshold, and social interaction.

According to two criteria, focussed on music and the relation to the design directions, three concepts are created: the music buttons, a companion robot, and the music club.

In Chapter 6, these three concepts are explained. In Appendix C, the concept boards for each concept can be seen. For each concept a simple design is created and a general use scenario. Moreover, the connection with each design direction is provided. In Chapter 6.4, a concept choice is done with the use of a basic decision matrix. Here, the concepts are weighed against the use of the design directions, the ten design principles [3], and the added design principle of inviting [11].

The concept of the music buttons is chosen to design further. In Chapter 7, the final chapter of this phase, the final design of the music buttons is explained. All the choices that have been made are explained. Such as the overall shape design, the placement of buttons, use of radar sensor, and the functions it has. In addition, a simple prototype for a smartphone application is also provided. This prototype shows all the pages the app will have and how the app will look.

To help understand what could go wrong and should be fixed, use scenarios are created, see Chapter 7.4 and Appendix D.
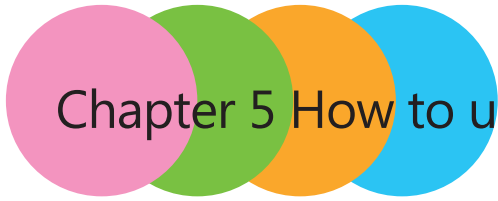
Chapter 5 How to use the design directions to design

In the previous phase the design directions are established, motivation, stimulation, low threshold, and social interaction, respectively. In this chapter, it is explored how you can design products with these four design directions. To get a more in depth understanding of each direction several mind maps are made, the mind maps are used as a basis for brainstorming. In this chapter different brainstorms are shown. For these brainstorms two different methods are used. First, ideas are generated only focussing on one design direction at a time. Then, to generate more ideas two design directions are put on a scale, having one design direction per axis. After the brainstorms, all the generated ideas are put into a quadrant. Where each idea is placed in relation to the design directions. Finally, an idea selection is done, here three concepts are chosen to explore further in the next chapter.

5.1 Designing per design direction

To get a better understanding of what each design direction means several mind maps are made. The mind maps guide to what the design directions mean for loss of initiative, see Appendix B. Thus, helping in getting a better overview for the next step, creating ideas. Only one design direction was focussed on per mind map to prevent confusion. The focus for this brainstorm is broadened to include more forms of loss of initiative.
After the first brainstorm another brainstorm is done with another product designer, a joint brainstorm. This person had some knowledge about dementia but lacked knowledge about loss of initiative. Both the ideas from the mind maps and the ideas from the joint brainstorm are explained per design direction.

Social interaction

Social interaction is about all the interaction you can have with people, the environment, and inanimate objects, both verbally and non-verbally. The ideas belonging to this design direction are either focussed on having social interaction with someone else or with the product itself, see Fig. 9.
Some of the ideas that come from the mind map are the family music player. A music player to which anybody in the family can add songs to and play them on the player. The music player is located at the house of the person with dementia. You can enjoy the same music simultaneously.
Another idea is the plant robot for which you have to care. The pot of the plant can tell you whenever the plant in it needs water, light, shade, etc. It has an interactive face to which you could talk, like Lua or the plant in robot
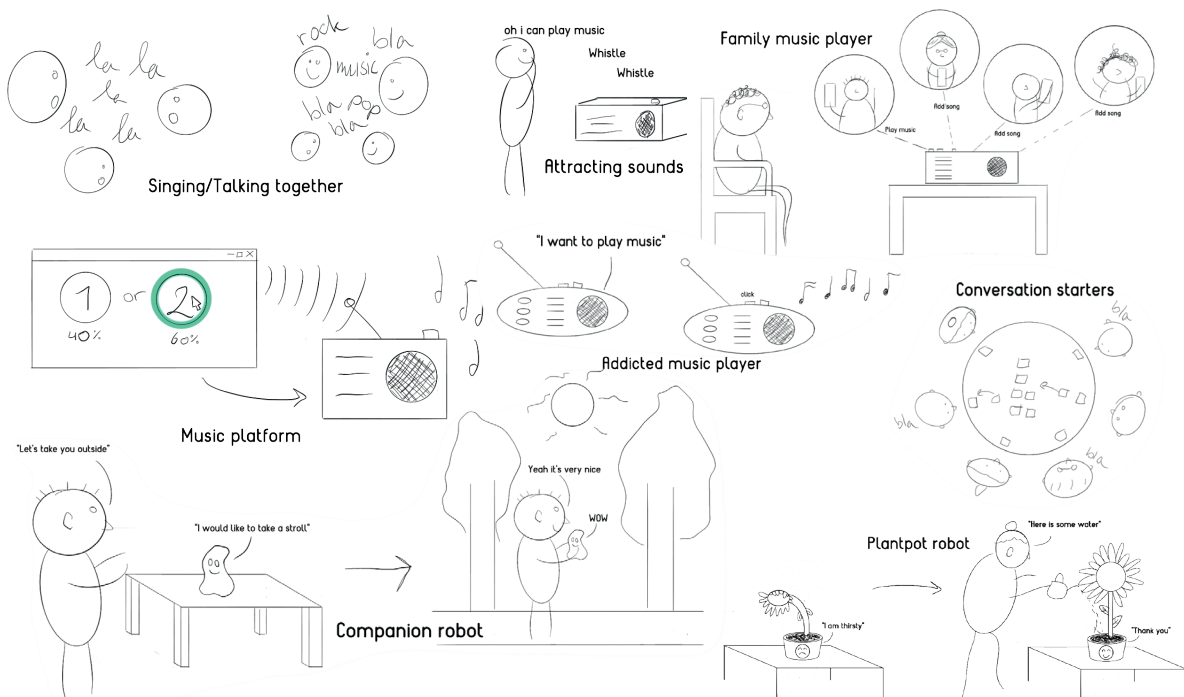

Fig 8. social interaction focussed ideas.

Tessa. It connects to the taking care for each other aspect of social interaction. The pot will tell you in words when it needs what. Simple responses can be given back.

Other ideas that came from the joint brainstorm is active asking. Asking someone whether they want to listen to music. Or putting multiple cards with the question 'music?' around the house. In this way people will get reminded that they could listen to music. Another idea is a platform with music. On the platform everyone can choose between two types of music and most votes decide which music everyone will listen to. The music is sent to all music players connected to the platform. This could help people who have difficulty with making choices, see Fig. 9. Also, talking about music together or singing together is another way of listening to music in a social setting.

Stimulation

The ideas for this design direction are divided between cognitive and physical stimulation. Cognitive ways in which one can be stimulated is when something is familiar or the easy choice. Physical ways in which one can be stimulated are when a product is in sight or in arms reach.

An example of cognitive stimulation is shown with the booklamp. Fig. 11, It brings focus to the activity of reading, making it an easy choice to go read. This idea is also physically stimulating because of the light bringing attention to the book. When the booklamp would be connected to other lights in the house. It could even turn off other lamps making it even easier to stimulate the user to read.

Another way to stimulate is to have products in sight. When seeing something people may be more inclined to do it. Such as with a vacuum cleaner that is laying on the living room floor. Or when it is placed at a designated spot. When the vacuum cleaner is in sight it may be more stimulating to go clean the house than when it needs to be grabbed from the closet.

Another idea for this design direction is the 'aware' music player, Fig. 10. It 'listens' when the user cannot listen. The user can be listening to the music via headphones and cannot hear surrounding noises. When the music player notices someone is talking to the user and they are not responding. The player lowers the volume, making the user aware something is happening. Then they can listen to the person speaking to them. It adjusts the volume to the needs of the people around it. Or when the user is listening to the music player and people start talking it will notify them that they can listen with the headphones on undisturbed.

From the joint brainstorm other ideas are, having special buttons on products that when pressed or interacted with start music. Or as a light switch having an additional flip which turns on music, see Fig. 11. Or instruments takeaway, being able to order instruments to be delivered at home, something like a home concert. This idea can also fit with the social interaction design direction. See Fig. 11 for an overview of the other ideas.
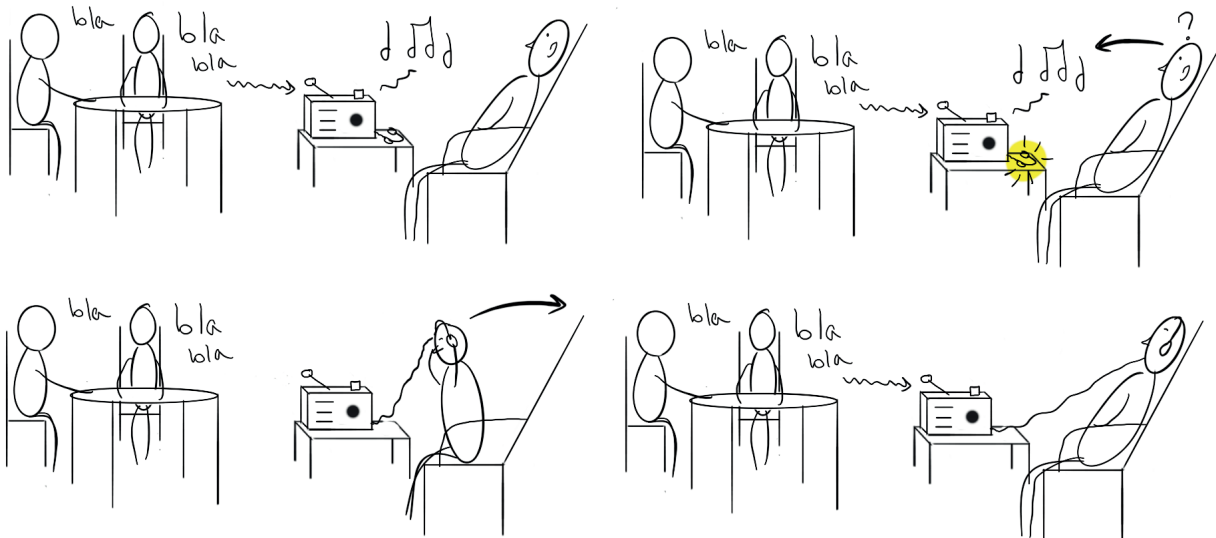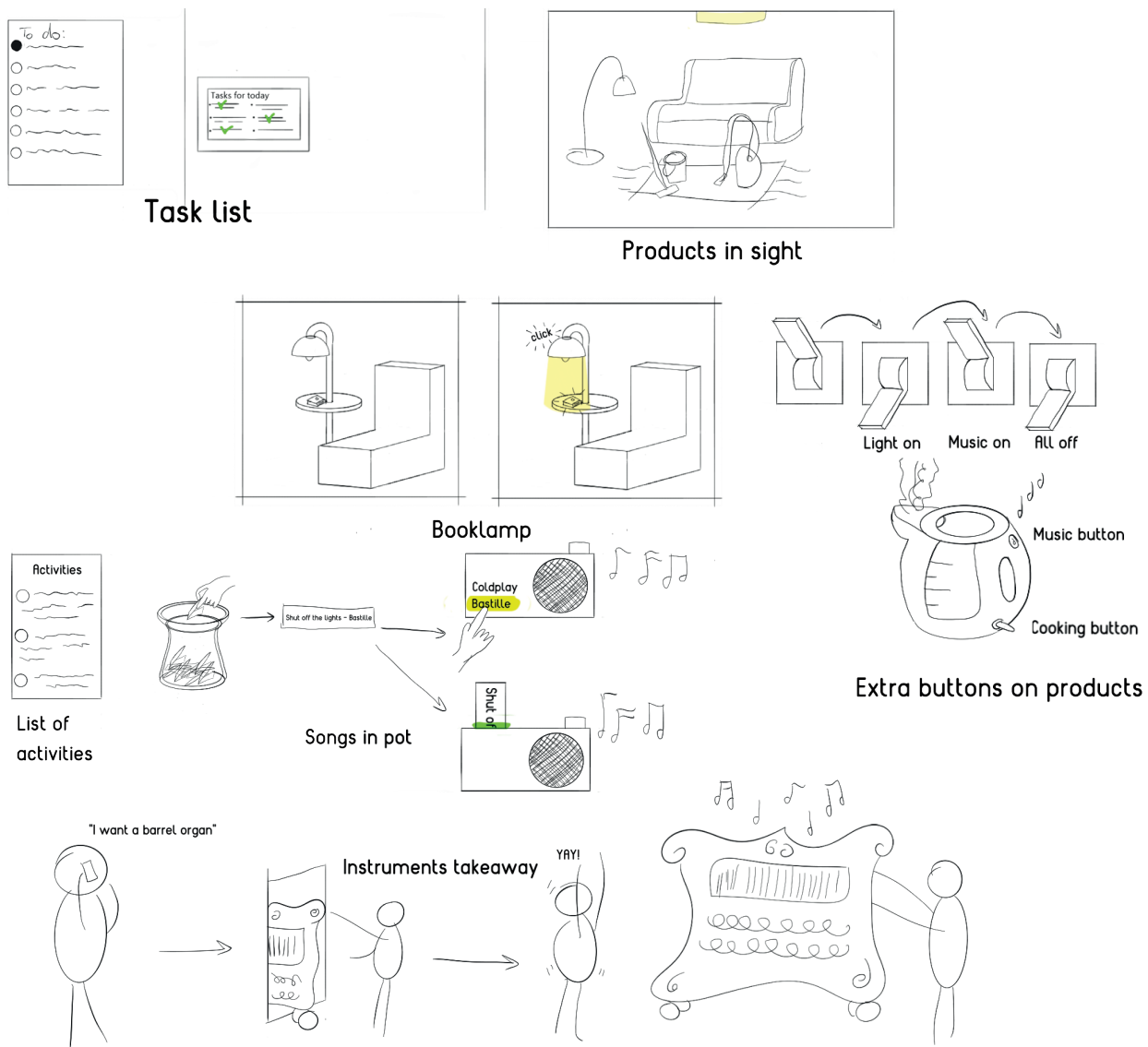

Fig 9. Aware music player.

Task list

Products in sight

Booklamp

Light on   Music on   All off

Music button

Cooking button

Extra buttons on products

Activities

List of
activities

Shut off the lights ~ Bastille

Coldplay
Bastille

Songs in pot

Shut of

"I want a barrel organ"

Instruments takeaway

YAY!

Fig 10. Stimulation focussed ideas.

Low threshold

The ideas for low threshold are divided between cognitive and physical ways to lower the threshold. Physical ways which can lower the threshold of the product can be the use of pictograms. They will help guide the user to use the product in the correct way. For example, a product could help with following the recipe, when cooking, showing which ingredient to add when. Or with a music player, where the player shows which buttons should be pressed to be able to listen to music, Fig. 12. Another physical way is the use of speech control, this does not require to press any buttons, remembering sequence of buttons, or learning the order of operation. However, people with FTD may have problems with language and speaking, for them it is more suited to have an alternative to using speech control, such as hand gestures, or buttons.

Cognitive ways which can lower the threshold are decreasing the number of options/choices. As with the idea of an electric board, that helps to take away the difficulty of losing track of what you need to do. Proposing simple alternatives to do and not giving too many options. For example, when needing to clean the house, the amount of tasks can be difficult to remember, the product can give two options between which you can choose. In this way you will still have the option to go for the easier tasks first, and keeping track of what needs to be done and what has been done. It does not require the use of short-term memory.

From the joint brainstorm the ideas are not only focussed on low threshold. One of the ideas is working on schematic times, having a music player that only plays on pre-programmed times. This takes away the need to think about listening to music. Another idea which consists of both low threshold and stimulation is buttons placed around the house. The user can press to play music, the button is the music player. It lights up to attract your attention, the stimulant. When you want to play music just press the button and the music will start. See Fig 13. Other ideas are more focussed on the way to interact as can be seen in Fig 12.
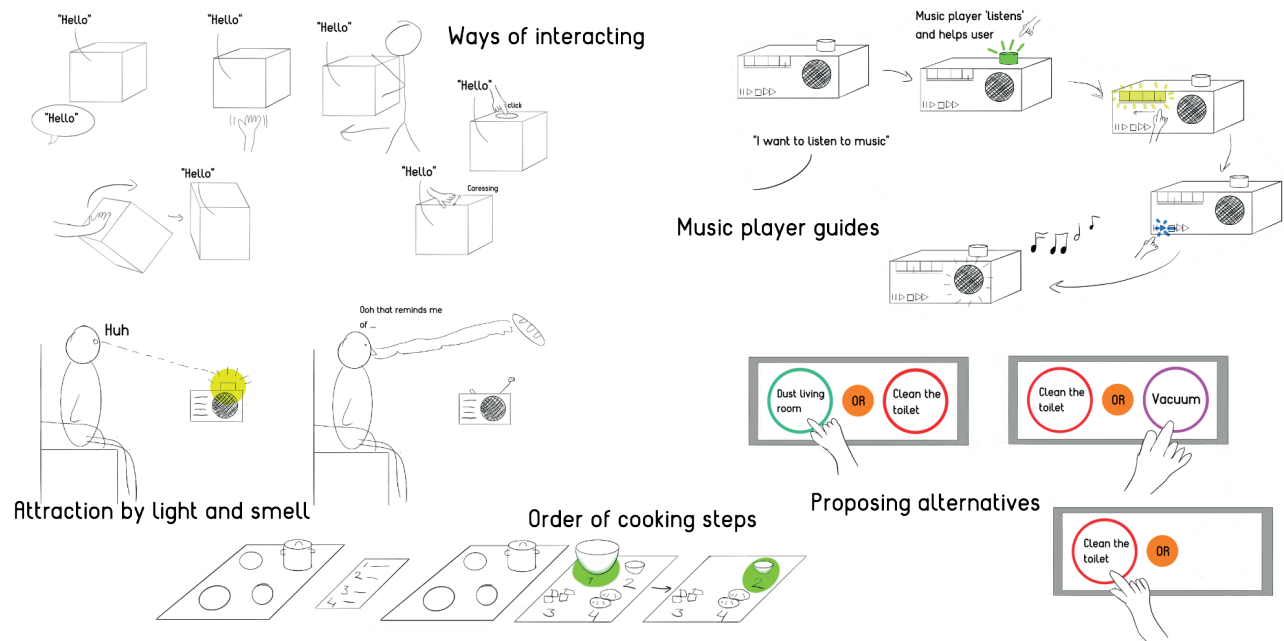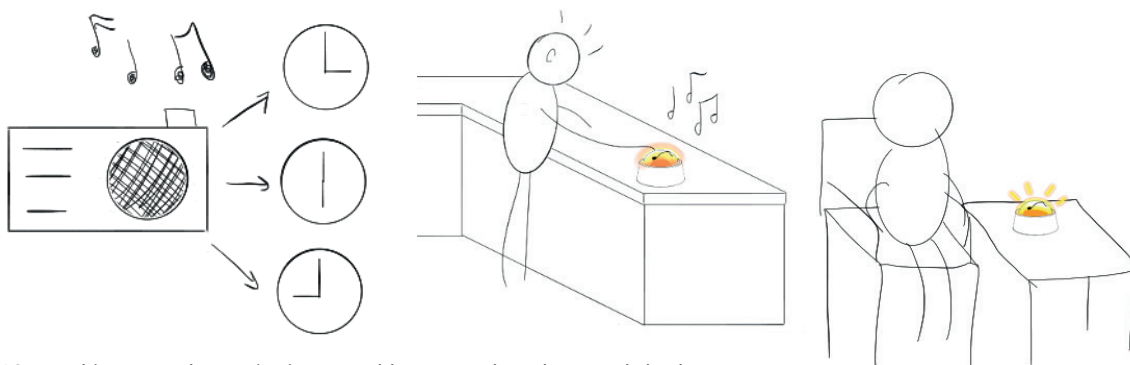
Fig 11. Low threshold ideas.

Fig 12. Working on schematic times and buttons placed around the house.

Motivation

The motivation design direction can be divided between intrinsic and extrinsic. The ideas are more focussed on intrinsic motivation because extrinsic motivation is similar to stimulation. Intrinsic motivation is sparked by validation, knowing you can do it, aspirations, or reaching a goal. A product that gives feedback on how you are doing/progressing can help give validation. It can show that you are on the right track. If you know you can do it, you will be more inclined to continue. Another way this sense can be created, is when bigger tasks are divided into smaller tasks. Such as with the electric board of 'proposing alternatives' in Fig. 12. The bigger task of cleaning the house is subdivided into smaller cleaning tasks. Being able to cross them of when finished can give a sense of accomplishment, and make you motivated to keep going.

Other ideas are to ask actively, this also makes use of social interaction. Asking someone whether they would like to listen to music. For example, can help to remind someone to reach a goal of listening more to music. Another idea is to play games which involve music, such as musical bingo or trivia, see Fig. 14. This motivates to listen to more music, the listening to music part is incorporated into playing games.
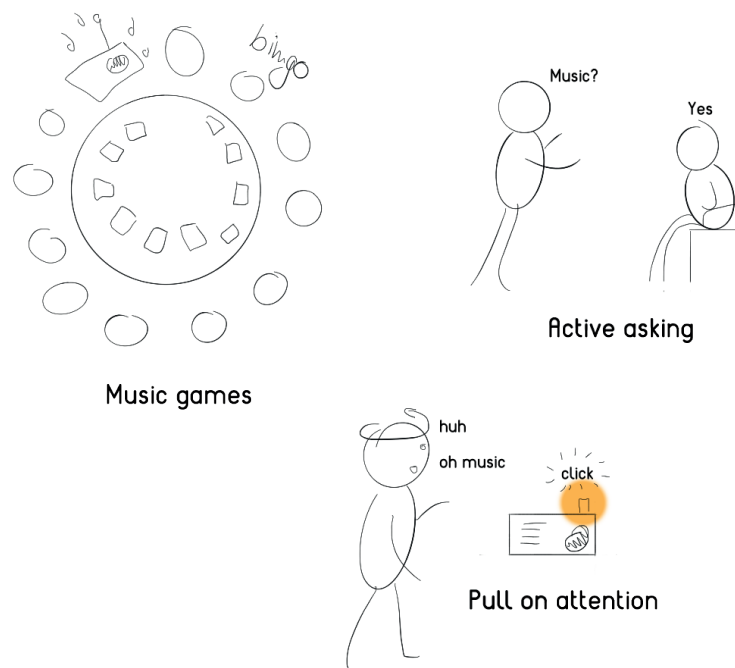
Fig 13. Motivation focussed ideas.

5.2 Analysis of different scales

To get more ideas the design directions are set against each other on a scale. Each one of them contains social interaction on the x-axis which goes from alone to together. It could be argued whether it is helpful to look at the alone side since there may be no social interaction. However, when looking back at the mind map of social interaction, there is also the interaction towards inanimate objects and pets. Even though, the interaction is not reciprocated one could argue that there are still some forms of social interactions taking place. Such as hugging, talking to, and smiling. Which can help decrease loneliness.
Also keep in mind social interaction is not only about the verbal interaction, but also about the non-verbal interaction.

Low threshold vs. social interaction

Low threshold against social interaction see Fig. 15. Going from alone to together on the x-axis and from a high to a low threshold on the y-axis. No difference is made between cognitive or physical ways of lowering the threshold. They are either combined in the ideas or taken separately. Some of the ideas that came out of this graphic are a brain implant which is connected to a music player, Fig. 15. This has a low threshold because the user does not need to do anything to be able to listen to music. The implant will detect when the user wants to listen to it and will turn on the music player for them. Thus, making it very easy. There is no social interaction involved. Another idea is the use of speech control, which is also an idea from the first brainstorm of low threshold. The speech control is lower on the y-axis than a brain implant because while speech control is rather easy to use, there may still be difficulties. The speech control has to recognize the user's accent and language/dialect. Moreover, people with FTD may have difficulties with speaking. Making it harder to use speech control. A smart self-learning music player that plays when mood/setting is fitting. It adjusts genre, sound, songs to mood and setting on its own, and it learns the needs and wants of the user(s). This idea is placed somewhere in the middle of the x-axis because there may be social interaction involved. When there is company, the player can adjust the sound/songs to the people that are present. It could also adjust the volume to the surrounding sounds.
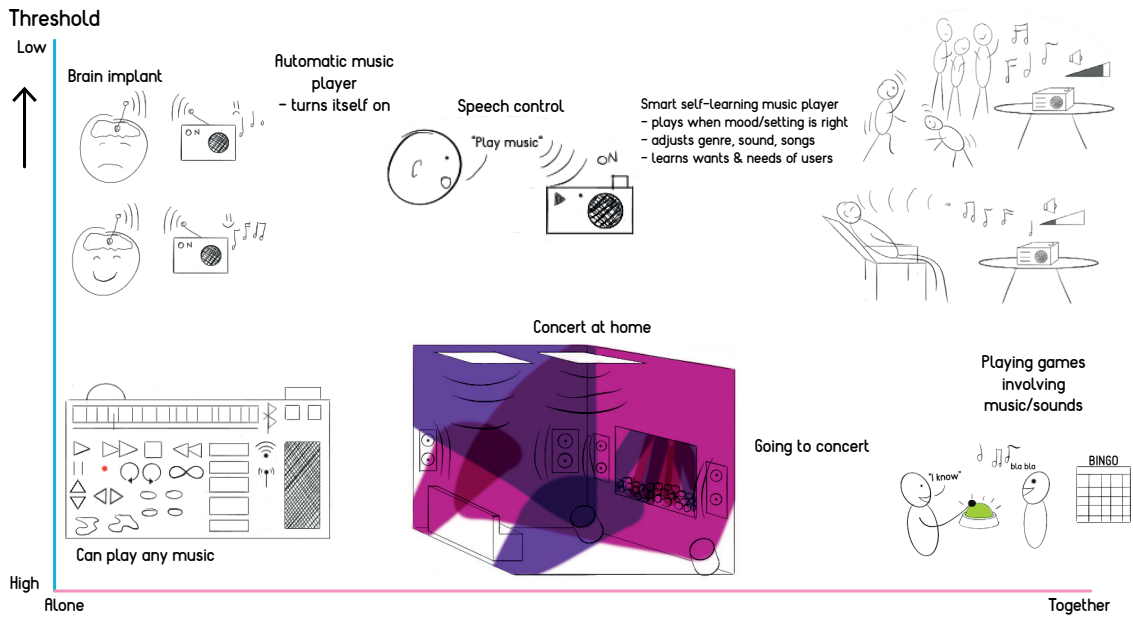
Fig 14. Threshold vs. Social interaction graphic.

Stimulation vs. social interaction

For this graphic social interaction is placed on the x-axis again going from alone to together. The stimulation level goes from low to high on the y-axis, Fig. 16. Here is also no difference made between the cognitive or physical ways of stimulation as in the low threshold vs. social interaction one. Several ideas from the graphic are all products make sound in rhythm of use. For example, when using a washing-up brush to clean plates, the brush will make sounds in the rhythm to the going back and forth of the brush. This stimulates a lot to listen to music. A downside is that it could become annoying or unpleasant when using it for a prolonged time. There is no way of shutting it off. Another idea is the cloud of sound, which is floating in the room and when you stick your hand inside it will make sounds. You can play it together or alone. The cloud of sound is mostly an unrealistic idea, however, it can give new ideas and perspectives on how to incorporate sound and music in a product. Another idea is the sentient music player, it is a player with an abstract form, however, it could also have the shape of an animal or humanlike shape. The sentient music player can listen to you and talk back, it likes to listen to music. This, therefore, can stimulate the user to listen more to music. This idea is placed on the lower end of stimulation because you need more stimulation to use the product. The user needs to care for the well-being of the music player. On the x-axis it is placed more to the left side, this because the product is meant to be used by one person but because the product can talk it can be seen as listening to music together.
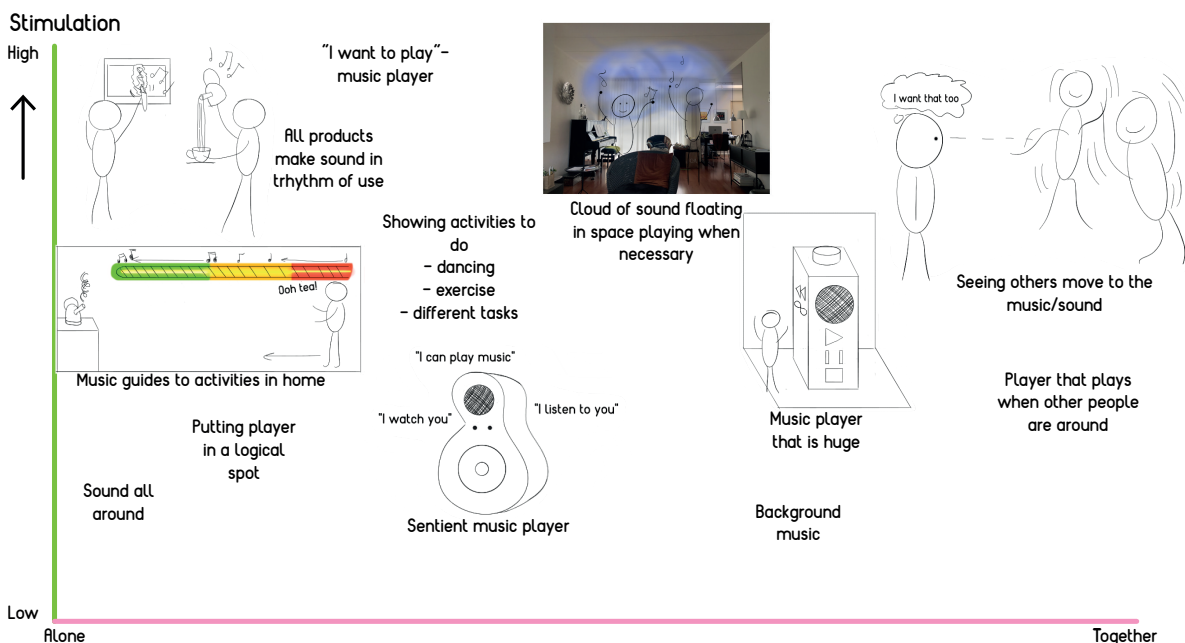

Fig. 15. Stimulation vs. Social interaction graphic.

Motivation vs. social interaction

For this graphic motivation is put on the y-axis going from requiring no motivation to use the product to requiring a lot of motivation to use the product. There is a difference made between the use of extrinsic or intrinsic motivation, each idea uses either one of these. Since people with dementia can lack motivation, the ideas that tend to require less motivation to use the product may be considered better than the ones higher up in the graphic, Fig. 17. Such as a brain implant that senses your mood and activates a music player to play music when you need it, and it adjusts the music to your mood. This idea requires little to no motivation. You do not have to do anything to get to listen to music. It, however, is low on the social interaction, because it makes no use of any kind of interaction let alone social interaction. Another idea is a music club, which is like a book club, where people with an interest in music can talk about music with each other. The level of social interaction is higher, but is still in the middle of the motivation axis. This is because it requires more motivation to do it. There already needs to be an interest in music and the need to be willing to talk about it with others.
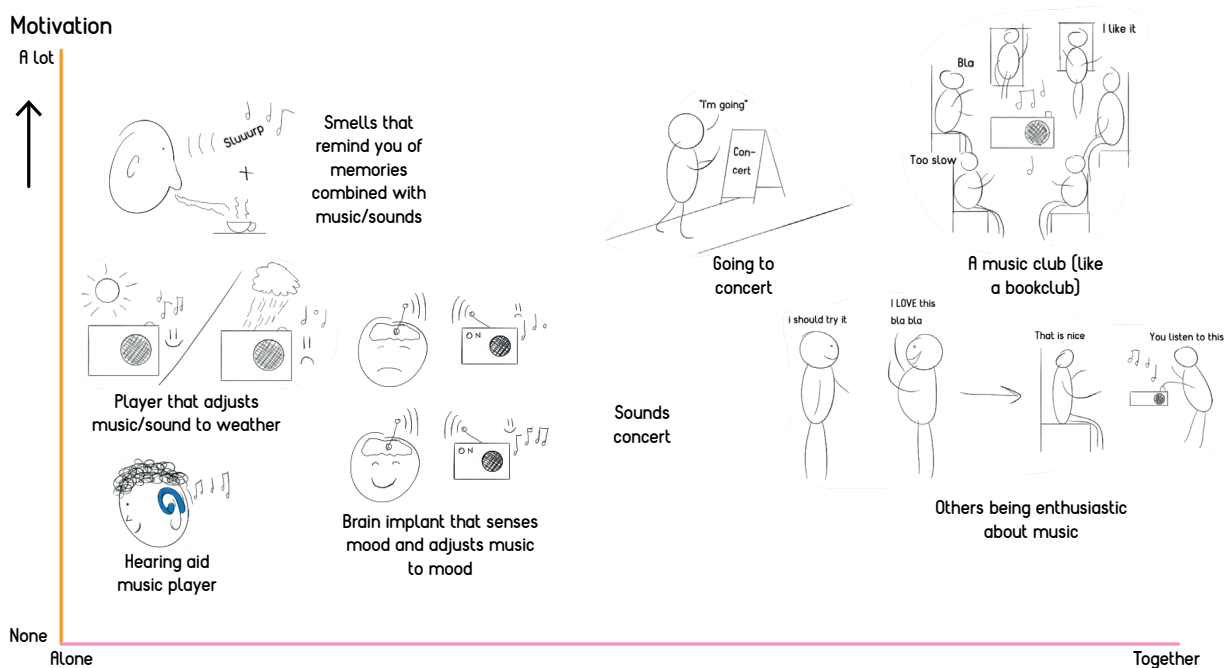
Motivation

A lot

Sluuurp

Smells that remind you of memories combined with music/sounds

"I'm going"

Con-cert

I like it

Bla

Too slow

Going to concert

A music club (like a bookclub)

Player that adjusts music/sound to weather

ON

I LOVE this bla bla

i should try it

That is nice

You listen to this

Sounds concert

Hearing aid music player

ON

Brain implant that senses mood and adjusts music to mood

Others being enthusiastic about music

None

Alone

Together

Fig 16. Motivation vs. Social interaction graphic.

5.3 Quadrant of design directions and ideas

After the brainstorms all the ideas are drawn to get a better understanding of what each idea looks like. Even though, most ideas were created with only keeping one design direction in mind. Some ideas can be classified to other design directions as well. To get a good overview of all the ideas and where they are in relation to the design directions. The ideas are put in a quadrant, dividing them between each design direction, see Fig. 18. Placing the design directions in this way, does create an impossibility to have ideas that only use motivation and a low threshold. Because, in the middle there should be ideas that make use of all four of the design directions. However, it could be argued whether there are ideas that only make use of low threshold and motivation. Moreover, in Chapter 4 it is argued that the connection between the design directions is that both stimulation and social interaction lead to motivation, and to get more initiative a low threshold should be added. Therefore, most of the ideas in this quadrant that are between social interaction and/or stimulation and motivation, do not have a high threshold. The threshold could be lowered for some ideas, such as going to a concert, or instruments takeaway. However, these ideas do not have such a high threshold that it is impossible to do, but the threshold could definitely be lowered when designing for someone with dementia.
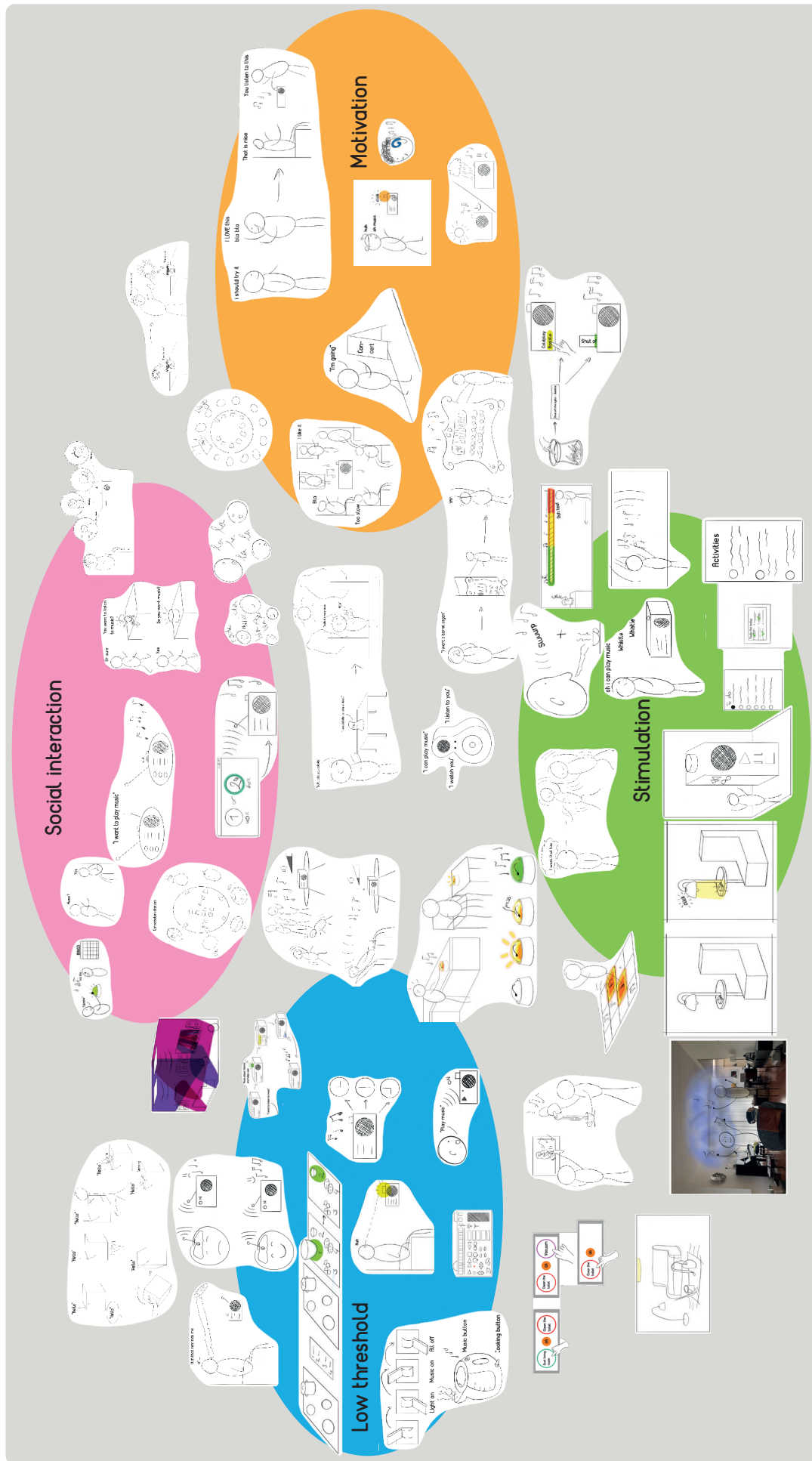
Fig. 17. Quadrant of ideas laid out between the design directions.

5.4 Idea selection

The focus of this thesis is loss of initiative, and more specifically listening to music. The ideas that are created in the brainstorms are all about countering loss of initiative. However, not all ideas are focussed on listening to music. Therefore, all the ideas that did not have anything to do with listening to music or a focus with music are discarded. Some ideas were grouped together, these ideas already looked more or less like each other and could be combined into one idea. Another criterium on which the ideas are chosen for a concept is the combination of the design directions. From the ideas that are left, three groups are made.

These groups are developed into three concepts. The concepts are music buttons, companion robot, and the music club, respectively. See Fig. 19. They will be elaborated on in Chapter 6. For each concept, a concept board is created, see Appendix C.
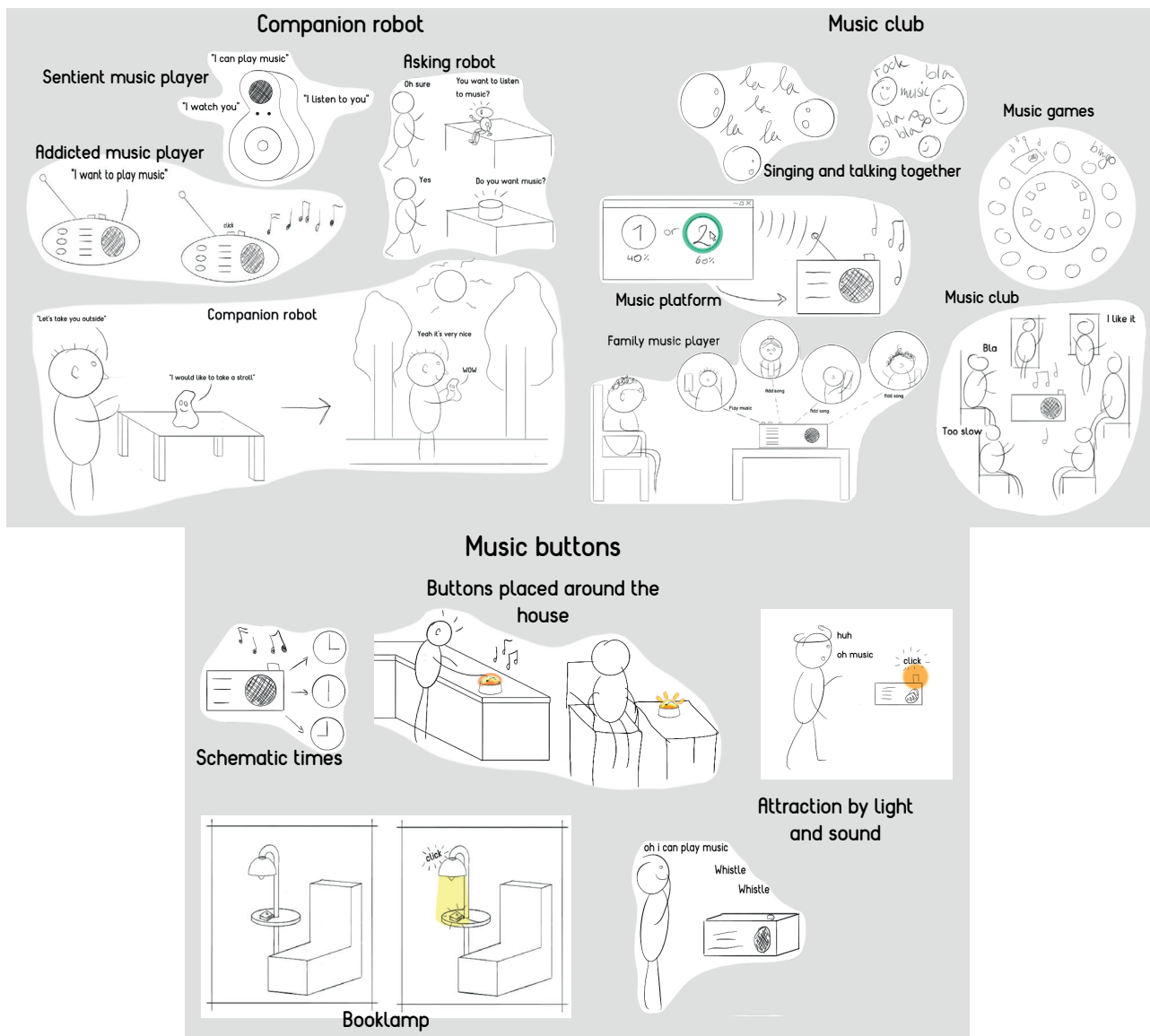
Fig. 18. The ideas that comprise each concept from left to right: the companion robot, the music club, and at the bottom the music buttons.

Chapter 6 Concepts

In the previous chapter three concepts were chosen: the music buttons, the companion robot, and the music club. In this chapter, all three concepts will be explained in more detail. For each the general functions and a use scenario will be explained. Furthermore, the relation to the four design directions and the place of each concept in the design space will be explained. There are five sizes for each design direction, see Fig. 20. Size 1 means the design directions has a small part in the concept. Size 5 means the design direction is used a lot in the concept.

In Chapter 6.4, a concept choice is made for which concept to design further. Each concept will be scored on the eleven design principles [3, 11] and the design directions from Chapter 4.
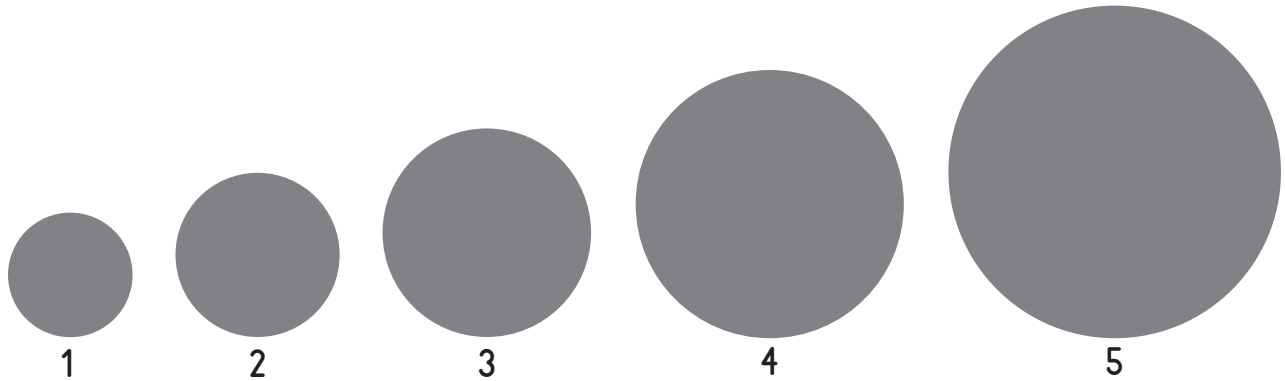
Fig. 20. Sizes of circles for each design direction.

6.1 Music buttons

The music buttons consists of multiple buttons that each act as a music player. These buttons are spread around the house and are all connected to each other. When walking past a button the motion sensor will detect the user. The button will light up and make a small sound to attract the user's attention. When the user is in the mood for music they press the top and the music will start. If the user is not in the mood for music either do not interact for 5 minutes or press it twice. After 5 minutes of detecting no motion it will turn off. This can be either the attention attracting mechanism, or the music when it is playing.

The music is put into the buttons via Wi-Fi or Bluetooth, via a smartphone application. There is an option to put in different types of music in different buttons. For example, putting more relaxing music into the button that is standing on the nightstand, and more upbeat music in the kitchen. The shape of the product is like a button. This because it should help guide the user to press the button.

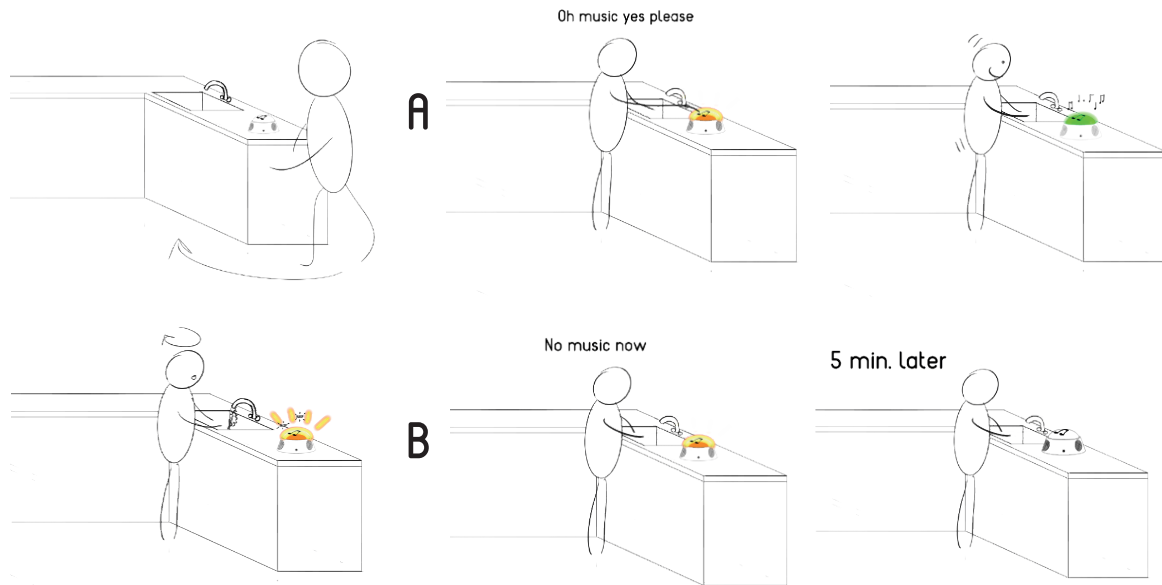Fig. 21. First design of the music buttons concept.

Fig. 22 General use scenario for the music buttons.

The general use scenario, Fig. 22, shows a music button in the kitchen. It detects motion and therefore lights up and makes a noise. There are two options for the user. In option A, the user presses the music button, and the music starts to play. In option B the user does not want to listen to music. Therefore, the user does not touch the music button. After five minutes the music button turns off its light.
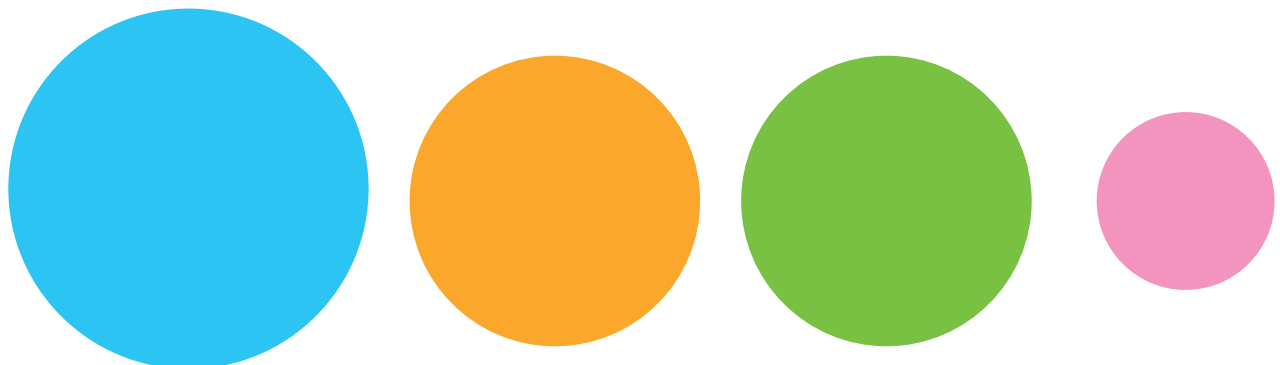

Fig 23. The four design direction circles for the music buttons concept.

The social interaction circle (the pink one) is very small it is still there because there may be social interaction when someone talks about the buttons. For example, when someone visits, and they see a button lighting up they may start a conversation about it.
The threshold circle is big because the only thing you have to do is pressing the big button and music starts playing. The fact that there are multiple buttons placed around the house makes it easier to listen to music no matter where you are in the house. The music is easily accessible. The idea is that there is always a music player within reach, and that there is no need to press multiple buttons to get to listen to music.
The concept is stimulating in the way that it attracts your attention. With the light and sound the button will try to get your attention. When you see the button lighting up you may think about playing music and therefore pressing the button. It tries to remind you that you can listen to music at this moment. Moreover, because the buttons will be in arms reach it is easy to take the initiative to listen to music.
All these factors try to help with the motivation to listen to music. The music buttons make music more present into your daily life. It is possible to add a schedule of listening a certain times during the day. This will mean that the buttons will light up only when the schedule allows. It has been proven that listening to music is beneficial for people with dementia [7, 8, 9]. Research has shown that it can slow down the deterioration of the dementia [10]. This can give people with dementia an extrinsic goal to stay fit longer and the intrinsic goal to listen to more music.

6.2 Companion robot

The second concept is the companion robot. It is small being in the shape of a human like creature. It has a simple face which can show three different emotions, happy, sad, and mad, Fig. 25. The robot has an indication of limbs which cannot move. The companion robot is a conversational partner and music player in one. It is addicted to conversation and listening to music together with the user. It will get sad or even mad when the user does not listen to enough music. The robot has a docking station where it recharges. The robot can be carried around, taken outside, or held when walking around the house. The interaction with the robot is through speech, which makes it easy in use. Music can be added via Bluetooth. The user can always ask the companion to play music. It will happily oblige and start to wiggle. Also, the other interactions such as changing the music and changing the volume are done via speech control. The companion will initiate interaction with you when it detects the user through its motion sensor. It will greet them and start conversation. When the user leaves the companion robot alone, and the motion sensor does not detect them anymore. The companion robot will automatically go to 'sleep'. Turning off the music and stops talking. This will also happen when the user is silent for too long or does not respond for more than 5 minutes. Its face will light up in different colours to show the different state it is in, pink for conversation, green for playing music, and blue for Bluetooth connection, see Fig. 25.
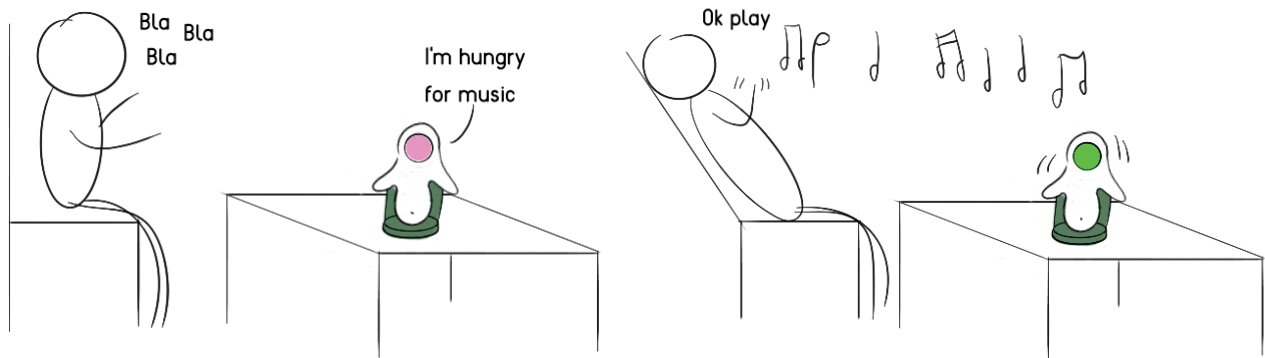

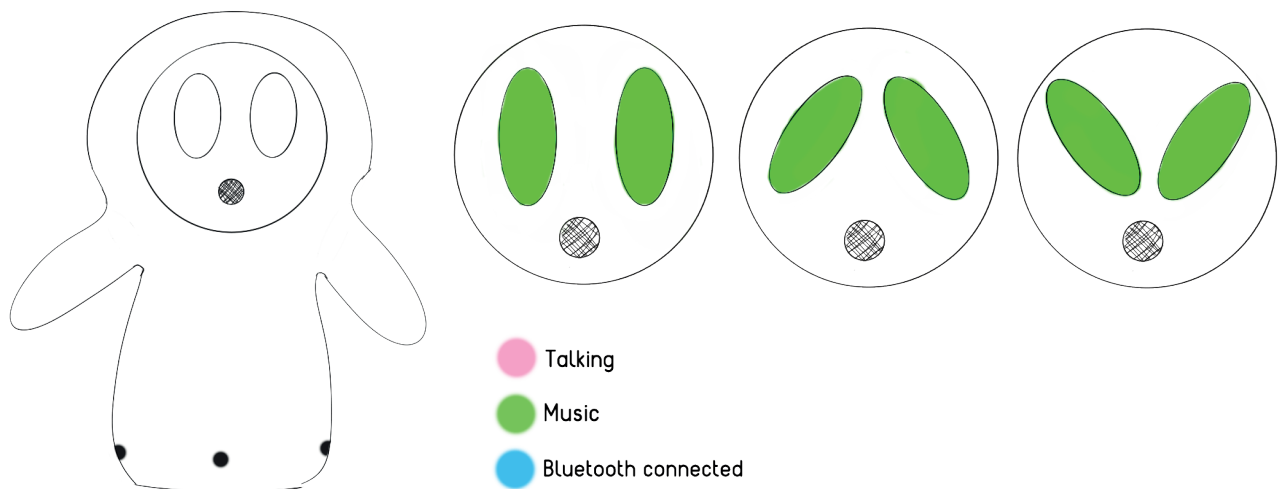Fig. 24 First design of the companion robot concept.

Fig. 25. Design impression of the companion robot (left). Three different emotions it can show, happy, sad, and mad (right).

In the use scenario, Fig. 26, the user and companion robot are talking with each other, at some point the robot asks to play music. The user answers 'yes' and the robot starts playing music and dances. While the user lays back and taps along to the music. The user gets up and the robot detects this motion and turns off. Then the user requests to go outside, the robot turns on and starts conversation. It makes a remark during the walk and the user responds. While being outside the companion robot can still hold a conversation. It is also possible to stop conversation by asking the robot to be quiet. When you start talking again the robot will respond and tries to hold a conversation again.
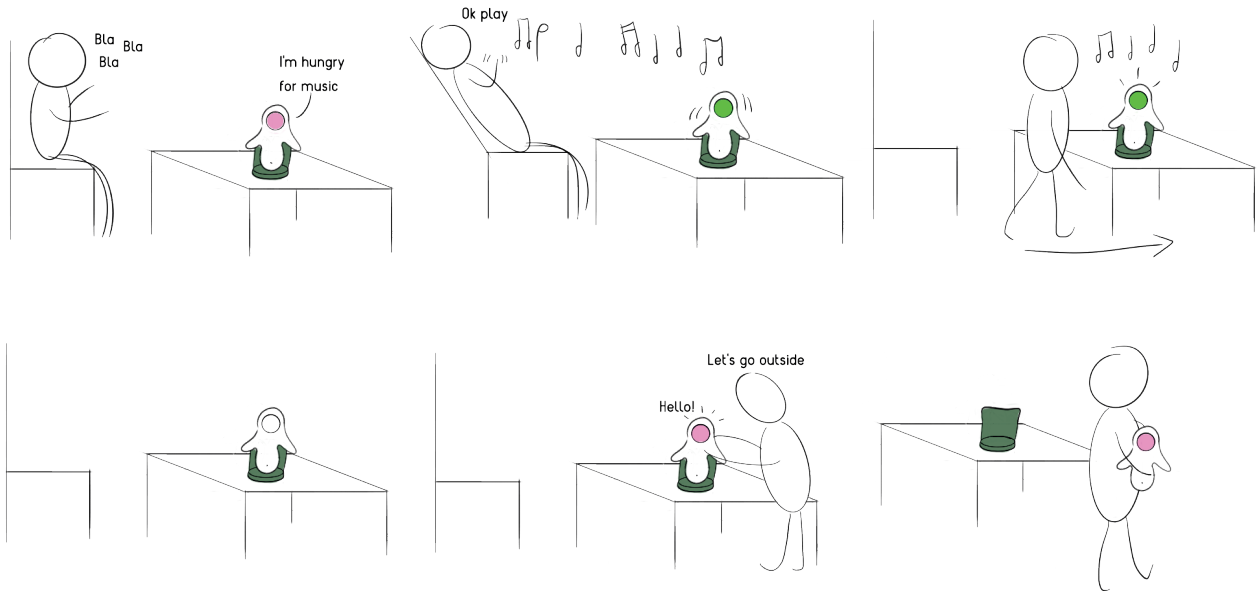

Fig. 26. General use scenario for the companion robot.

When looking at the use of design directions, Fig. 27, it can be seen that the social interaction circle is the biggest because the concept uses a lot of social interaction. Mostly verbally but also non-verbally. The face that can show simple expressions is a form of non-verbal interaction. The 'wiggling' the robot can do can be seen as dancing and also a non-verbal interaction. The user may associate its dancing as in that the robot is happy. Another non-verbal aspect is the fact that you are taking care for the robot by trying to keep it happy. The concept has a low threshold because of speech control, being in sight, and in arms reach. The robot initiates the interaction and the willingness to play music. Though, it is still possible to initiate it yourself.
The stimulation circle is the same size as the social interaction circle. The product stimulates through active asking, and the user's willingness to take care for the companion robot. This is also why the motivation may not be as much present as the other design directions. Because people need to have the understanding that they are taking care of this robot. There needs to be the goal to keep it happy.
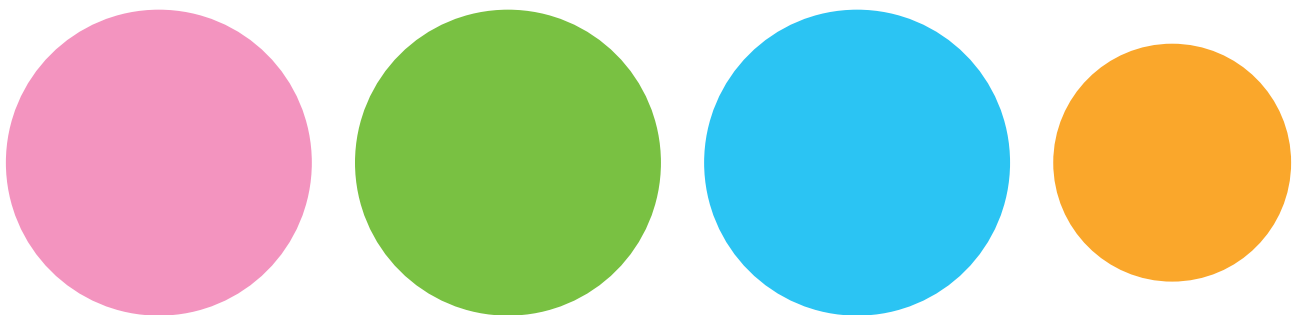

Fig. 27 Four design direction circles.

6.3 Music club

The music club, like a book club, where weekly or monthly people come together to talk about music. The product consists of a platform where anyone can find people, music, and things to do during a gathering. On top of that, each participant will own a music player which is connected to the platform. At each gathering participants talk about the music they have been listening to. During a gathering participants can simply discuss the music, or do games with the music. At the place where everyone gathers one of the included music players is used to play the chosen music again. The place of gathering can be anywhere, as long as there is a wall outlet. So, this can be at one the group members house or at a public place, such as the library or a meeting centre. The groups can also consist of anyone. It is for all ages and anyone with an interest in music.
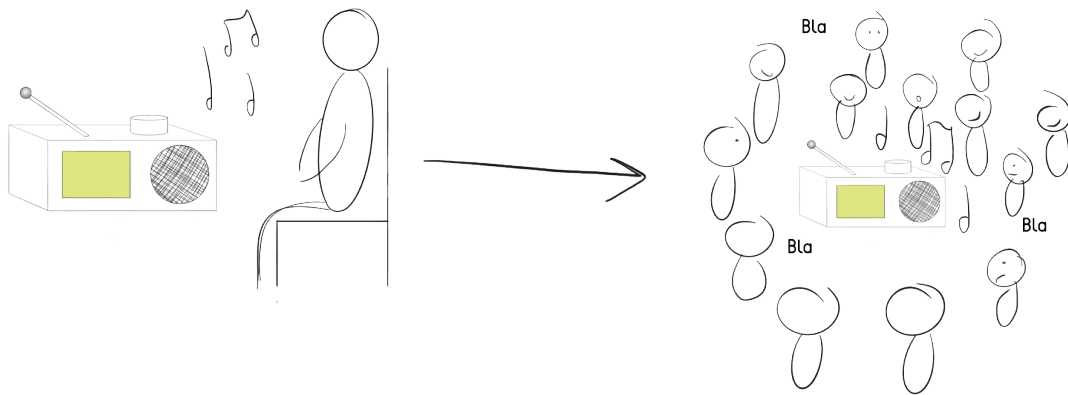

Fig. 28. Initial design for the music club concept.

The use scenario shows the general usage, Fig. 29. A participant goes to the place of gathering where you listen together and discuss/talk about the music. They may even play a game or two. At the end of the gathering the group logs in at the platform and chooses a new kind of music, song, artist, or genre. This will be sent to all the music players in the group. Everyone goes home and listens to the music whenever they want and come back together at the new gathering two weeks later.
The music player of each member is connected to a group login via the platform. The music players are therefore connected to Wi-Fi at all times. Any member of the group can login on the platform and use the platform. It is, however, better to assign one person who is digitally able to use the platform to send the music to each music player.
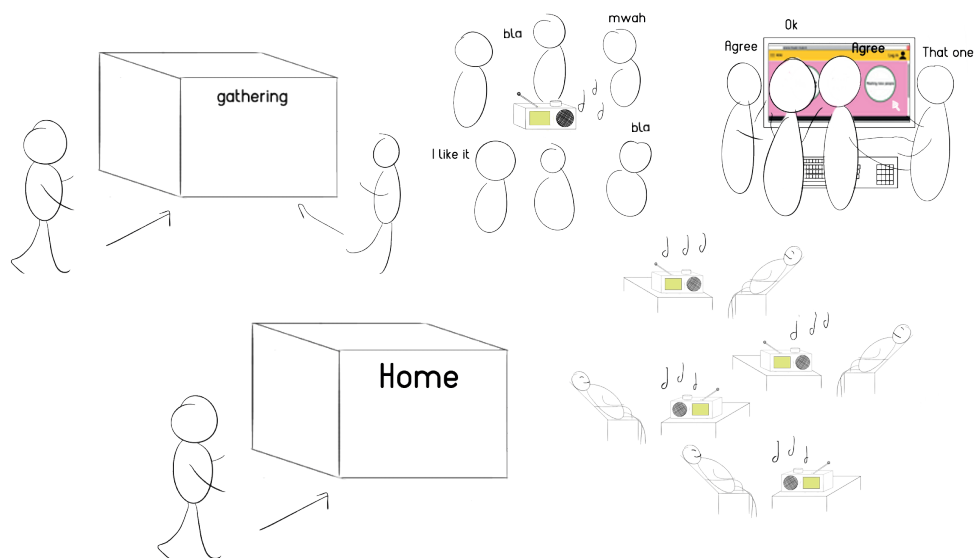

Fig. 29 General use scenario for the music club.

For this concept there is less stimulation and a higher threshold than the other concepts, see Fig. 30. For the threshold the music player itself is easy to use. However, the platform which is the other part of this concept is more difficult to use for someone with dementia. This means that there has to be at least one person without dementia in each group.

The stimulation is less than the other two concepts. The music player itself does not help with stimulation the user has to turn on the music player by themselves. However, there is stimulation through the enthusiasm of others. Besides, the familiarity or comparison one could make with a book club can help to stimulate to participate.

The motivation in this concept comes from the goal to listen to and talk more about music. Additionally, people need to have an interest in music to be able to have motivation to use the product. Users can become inspired to listen to more music, because of others' enthusiasm.

The social interaction is less than the companion robot but more than the music buttons. It is less than the companion robot because only a part of the concept makes use of social interaction. Only when you are at a gathering you have interaction with others. The occurrence of these gatherings can vary because each member of the group needs to be available. Also, if a group only gathers once a month than the social interaction is way less than when it happens every week, for instance.
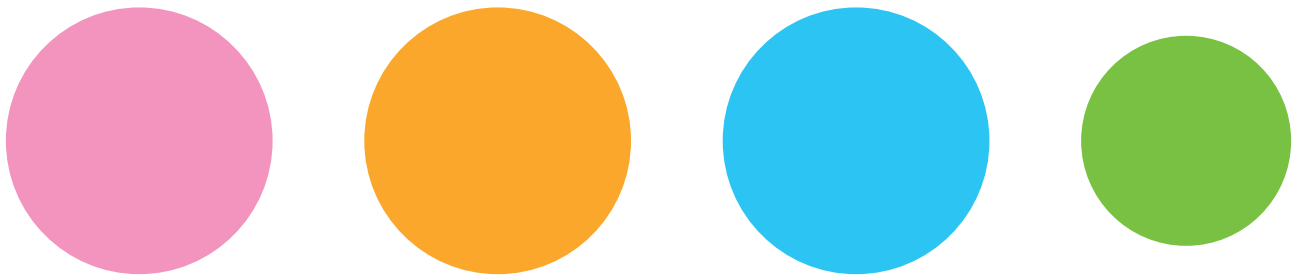

Fig. 30. Four design direction circles.

6.4 Concepts in the design space

To give a good overview of each concept's place in the design space. The concepts are placed according to the relations to each design direction, see Fig. 31. Here, it can be seen that the music buttons does indeed have the lowest relation to social interaction. The companion robot concept sits between low threshold and social interaction, it also touches stimulation and motivation. The music club sits between motivation and social interaction. It is placed further away from low threshold because of the higher threshold when compared to the other two concepts.

The limitations of presenting the design space in this way, causes that no concept touches every design direction. Which is not true when looking at Chapter 6.3, there all concepts make use of each design direction, to a lesser or greater extent. In Fig. 31, the design directions take up a lot of room in the design space. In Chapter 4.3, it was already argued whether the design directions are only a small part of the entire design space for loss of initiative. Or whether they are a big part. Here, it was chosen to go for the latter option, because the focus here is specifically on designing with the design directions. Therefore, in this case the design directions are a big part of this design space.
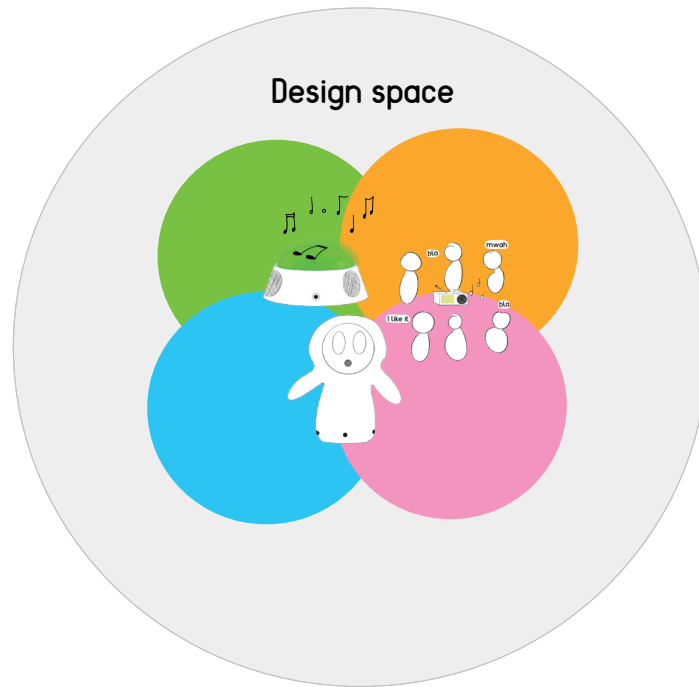
Fig. 31. All three concepts placed into the design space.

6.5 Concept choice

To make the choice of which concept to design further, a basic decision matrix is made. To get a simple overview of which concept is the best. The results are added together and put into a radar plot. The criteria that are used are the ten design principles from the paper of Wesselink et al. [3] and the inviting principle from Wesselink [11]. The four design directions from this research are also included in the decision matrix, Fig. 32. Each criterium is scored from 0-5 points. A score of 0 means that it is not present/used in the concept and a score of 5 it is always present/used in a concept.

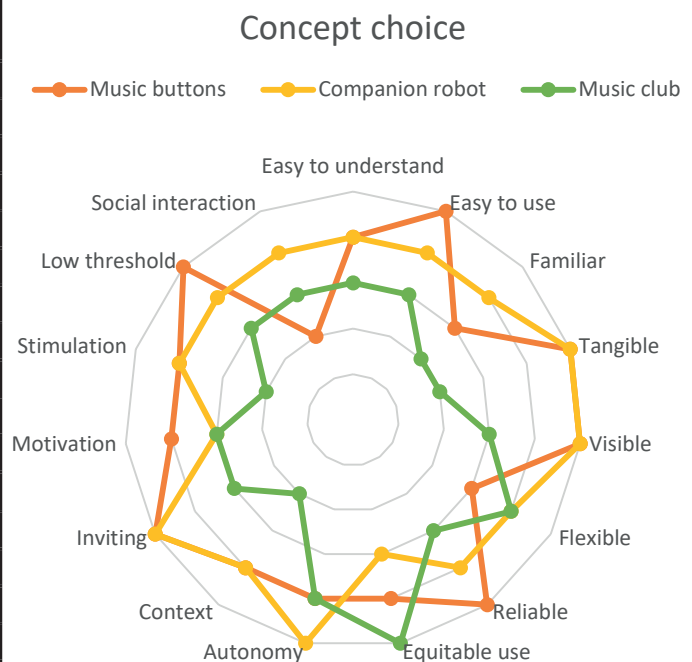|	Design principles	Music buttons	Companion robot	Music club
1	Easy to understand	4	4	3
2	Easy to use	5	4	3
3	Familiar	3	4	2
4	Tangible	5	5	2
5	Visible	5	5	3
6	Flexible	3	4	4
7	Reliable	5	4	3
8	Equitable use	4	3	5
9	Autonomy	4	5	4
10	Context	4	4	2
11	Inviting	5	5	3
	Design directions			
1	Motivation	4	3	3
2	Stimulation	4	4	2
3	Low threshold	5	4	3
4	Social interaction	2	4	3
		62	62	45

Fig. 32. The concept choice matrix and the radar plot.

45

A few requirements may need to be explained. For example, equitable use which by the dictionary means fair, or non-discriminatory. In this thesis means that it is not stigmatising. The product should not look or feel only to be used by people with dementia. This can be then confused with flexible, which in this sense can also be meant that many people can use it. However, here it is specifically meant that the interaction with the product is flexible, so there is an option to personalize the product.

For the requirement context, the context in general was specified in which the concepts would be used. The general context is people with dementia who have lost the initiative to listen to music. But who may also experience other impairments of dementia. Such as operating buttons, operating the music player, or fulfilling the steps to turn on the music. For the concepts of the music buttons and companion robot this context is fulfilling. Additional points that could be added for the companion robot. The companion robot is for people that live by themselves and may feeling lonely, and/or people that feel the responsibility to care for the robot. For the music club the context would lean more to people who are very interested or even passionate about music and who would like to share their passion with others. These contexts are considered for the scoring of this requirement.

As can be seen in Fig. 32 the concept of the music club scores the lowest of the three. The concept has four scores of 2. The tangible requirement scores a 2, because a big part of the concept is the club itself. Here, is not a lot of tangible interaction. The music player is tangible, however, this does not play a big role in the concept. On the context part it also scores a two. This is mainly because it deviates a lot from the general context that is chosen, and needs an added bit of context. Which could be seen as an additional requirement for this concept to work. On the design direction's part, it scores mostly in the middle except for the stimulation direction it scores a 2. This is because there is not of lot of stimulation involved. The music player in the concept does not try to attract the attention to make the user listen to music. They would need to have their own incentive to want to listen to it. It is more that someone would love to listen to it and have the interest in sharing it with others. Which then requires more motivation from within yourself than stimulation from the outside world. For this concept one can also argue that it could simply be an added activity at the meeting centre. This is done already to some extent, see Appendix A. However, in this concept there would be specific tailored activities to do with music each gathering. Such as games, sports, or other activities, which will be done at every gathering.

The music buttons and companion robot have the same total score. Both concepts look therefore similar, however, both have a different reasoning for pursuing. The music buttons is a new idea, something like this does not exist yet. It is therefore interesting to design further. It is challenging to see whether the lesser points can be upgraded to a higher score.
The companion robot, on the other hand, is similar to already existing products/robot. This is why it could also become an add-on to existing robots. Moreover, robots that help people with dementia exist already, see Chapter 2. There is a lot of knowledge and thus a higher chance that the companion robot concept will work. But because it could become an add-on or additional function for existing products it is less challenging to design. As an added problem is that people do need to feel the responsibility to care for the robot to be able to use it for a long time. Otherwise, it could become annoying to have this robot. The companion robot may therefore be more suitable for a more specific target group.

Because of these reasons the choice is made to continue with the music buttons. Because both concepts scored the same amount of points they could be considered equal. However, the reason of the companion robot being easily turned into an add-on for existing products makes it less interesting to develop further for this research.

In the concept version, the music buttons has an overall high score. The principles that score the lowest are in the social interaction, familiarity, and flexibility. It should be researched how and if these could be improved upon.

Chapter 7 Final design

When designing a product for people with dementia that takes into account loss of initiative, five design principles from the designing for dementia method will be focussed on. These are inviting, easy to use, easy to understand, equitable use, and autonomy. All eleven design principles should be taken into account when designing for people with dementia. However, it is better to put focus on a few and use the wheel of design principles [3] to see what affects what design principle.

When looking at the basic decision matrix scores for the concept music buttons, Chapter 6.5, it can be seen that this concept scores high on all five of these principles. It scores lower on flexible and familiar.

In the original concept design, the music player only has one big button, see Chapter 6.1. Via a smartphone music can be put into the player. However, only one type of music can be chosen. This makes the design inflexible. In addition, only someone who is digitally skilled is able to change the music. Which makes it harder to use by someone with dementia.

The concept also scores a three for familiarity. People with dementia may recognize that it is a button that should be pressed. However, they may not recognize that music will play. The familiarity could be increased by making it look more like a music player or radio. Though, its design should not become stigmatizing. The musical notes on top of the button can increase the recognizability that it plays music.

In this chapter, the design of the concept will be improved upon. The first design was kept simple, here the design will be explained in more detail. Both the shapes of each component and old and new functions will be explored and explained. On top of that, a preliminary design for the app that belongs to the concept is made.

7.1 Design of hub and stations

In Chapter 5, the design of the product itself was left simple. Mostly the functions of the concept are established. The functions of the music player itself are limited. The music can be only turned on or off. However, other functions should also be implemented to give the person with dementia more autonomy over the product. Such as changing volume, music choice, skipping a song or go back one.

The concept consists of a network of multiple music players. The hub is the main music player, the app on the smartphone can connect to this. With the app the music can be changed. The other music players in the network are called stations. Both the hub and each station have the same functions on the product itself. The difference is that the app can connect via Wi-Fi with the hub. The hub is connected through Zigbee with the stations in the network.

Shape of the base and top button

The shape of the base decides where the buttons, speakers, and sensor can be placed. Therefore, the general shape of the base should be chosen first. The intention is to make the top button look like a big button that can be pressed. Such as in game shows on television. This to attract and stimulate the user(s) to press the button to listen to music.

The general shape can be round, oval, square, or triangular. The squared shapes make it look like a little box especially when the button is also square, see number 2 in Fig. 33. When the button is more spherical this association is removed but it will still look big or bulky, which is not ideal. A cylindrical shape gives the best impression of a button to press. However, a straight tall cylinder will lose some of this impression Fig. 32. Moreover, when pressing another button on the side the player might be toppled, it is not as stable as a more conical shape.

Different conical shapes were explored, both conical from the top and the reverse. Additionally, making the cylinder more bulging in the middle is explored Fig. 34. However, the bulging shapes give an association of a vase or bowl which is not desirable. The inverse conical shape has a higher centre of mass, and a smaller base making it less stable than the conical from the top. Pressing on the main button may topple it. Therefore, a conical from the top shape is chosen as the best shape. Also, to give the base a softer feel the bottom edge is rounded.
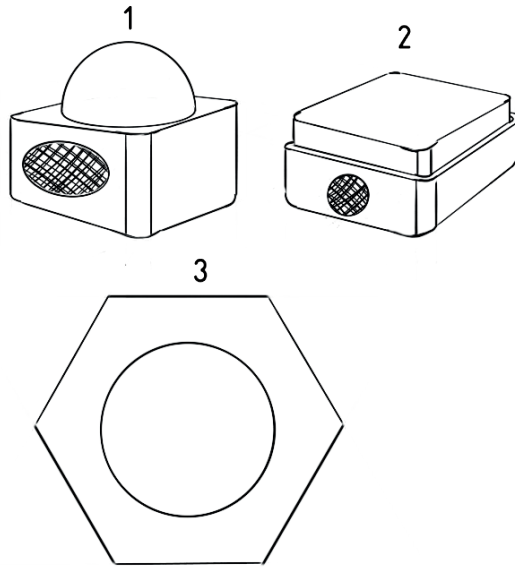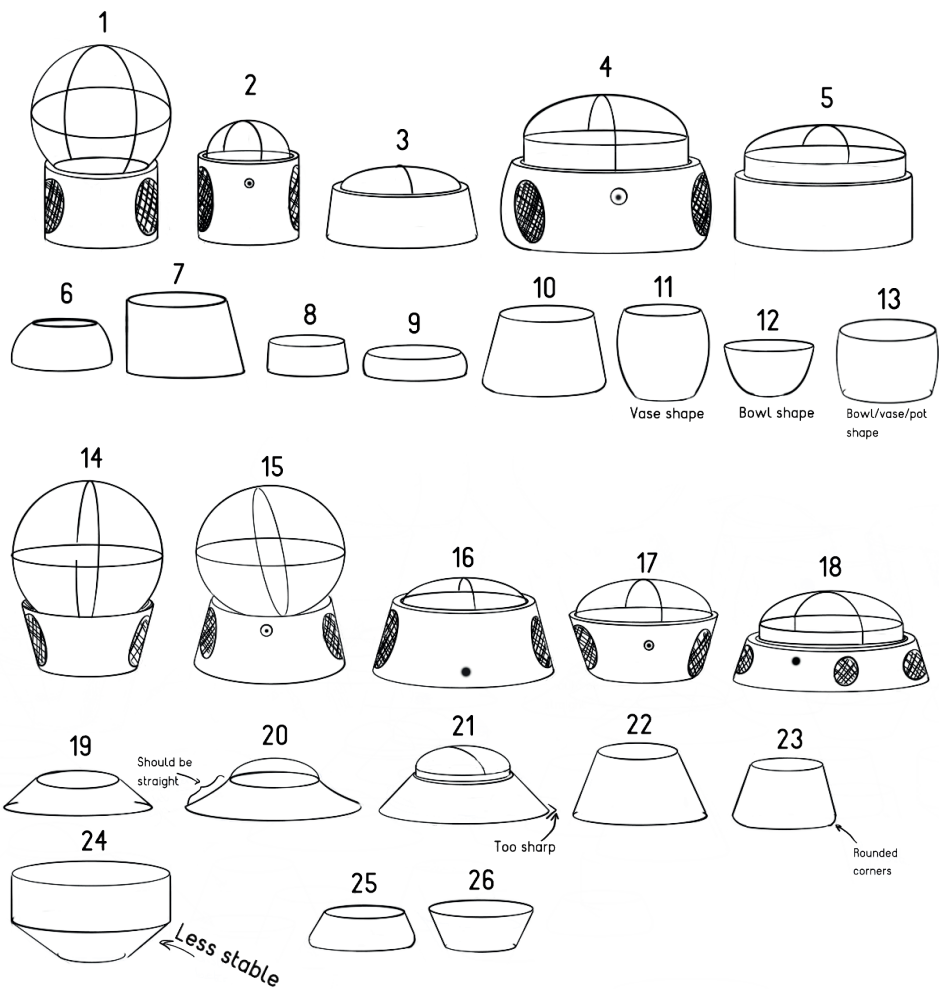
Fig. 33 Shape exploration square.

Fig. 34. Shape exploration top (numbers 1-13) cylindrical, bottom (numbers 14-26) conical.

The slope of the base, or the angle between the base and ground, should be decided. The size of the angle will decide how the relation between the size of the upper and lower diameter of the base is. Moreover, it decides the height of the base. If the angle is too small the bottom diameter will be too big. This will also remove some of the impression of a button. Another reason to choose a sharper angle is the ability to press on buttons without causing the music button to slide away. Because the product is a music player it needs to have speakers. The angle of the base decides where these can be placed. The shape and the angle of the speakers itself dictate the quality of the sound. All these considerations lead to the decision to make the base only a bit slanted. However, this is quite vague, to give a more precise dimension several paper prototypes were made, Fig. 35.
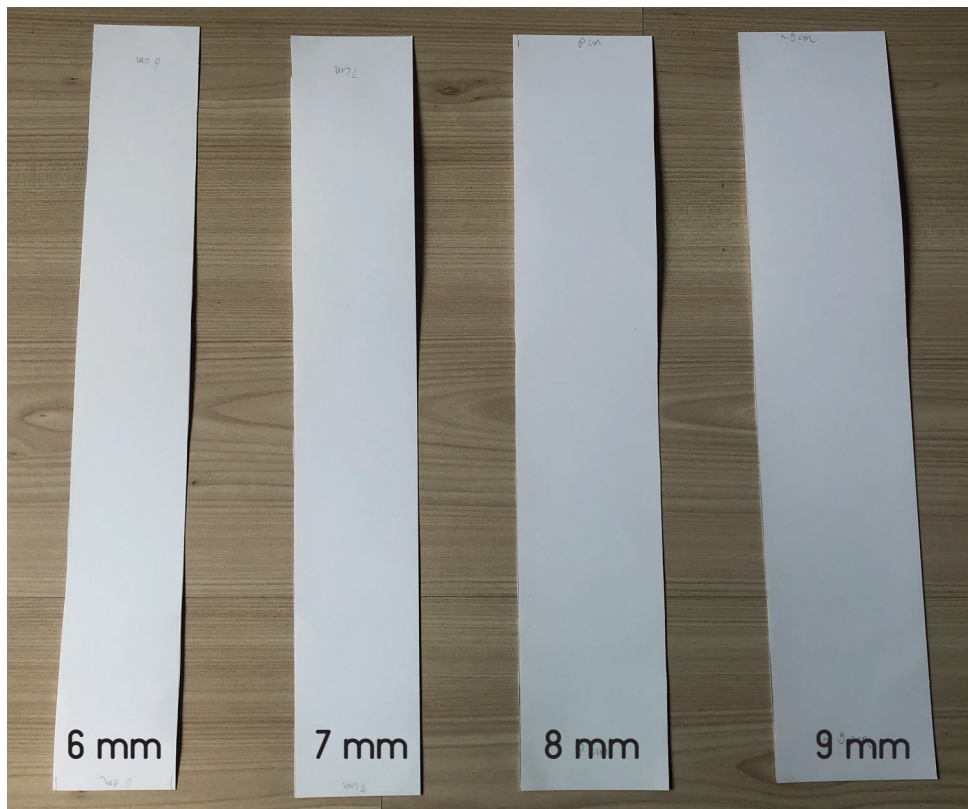
Fig. 35 Paper prototypes. Top; size for the bottom diameter of the base. Bottom; base height comparisons.

After creating the paper prototypes, the size of the upper diameter was set to 11 cm this is a good size for an adult hand to fit nicely on the main button. With the first paper prototypes the angle could not be changed. This also resulted in a too big bottom diameter. The next steps were to make different bands of different widths. They were rounded to a top diameter of 11 cm and slanted a bit to see which height was the best. Which is 7 cm, Fig. 36. The angle is set to 16 degrees. This will make the bottom diameter around 15 cm. The stations will be smaller than the hub, around 0.8 times smaller.
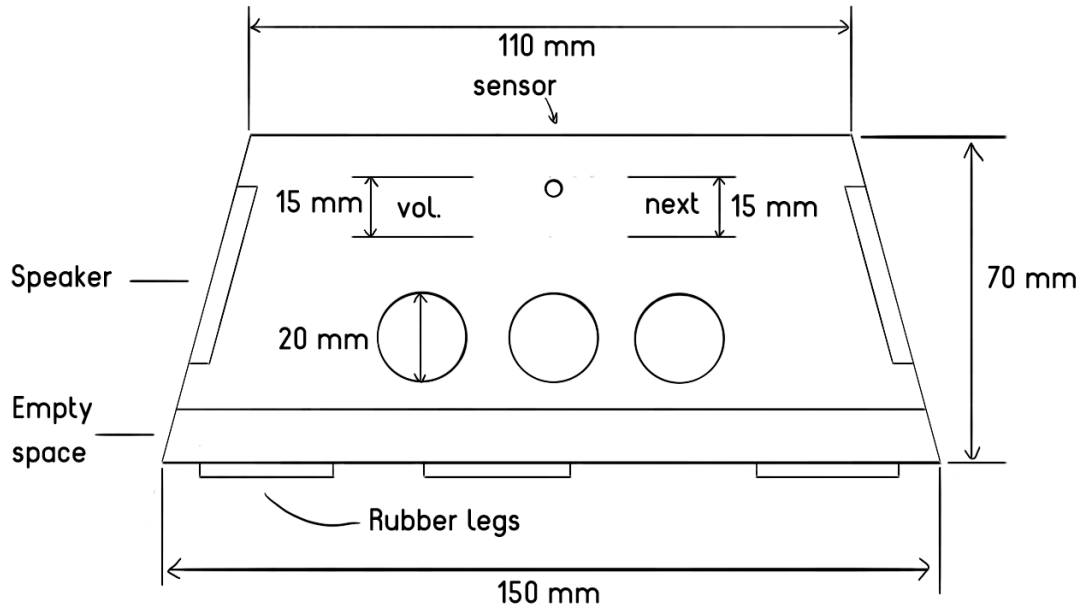
Fig. 36. Rough dimensions of the chosen design. These dimensions belong to the hub.

Simultaneously, with the design of the main button is explored. There are two ways of how the button can look. As a sphere, or a part of a sphere sunken into the base. Several combinations of buttons and bases are drawn Fig. 37. The sunken part of a sphere looks the best like a button. The detailed shape will be a bit straight and then rounded, see Fig. 37 number 3.
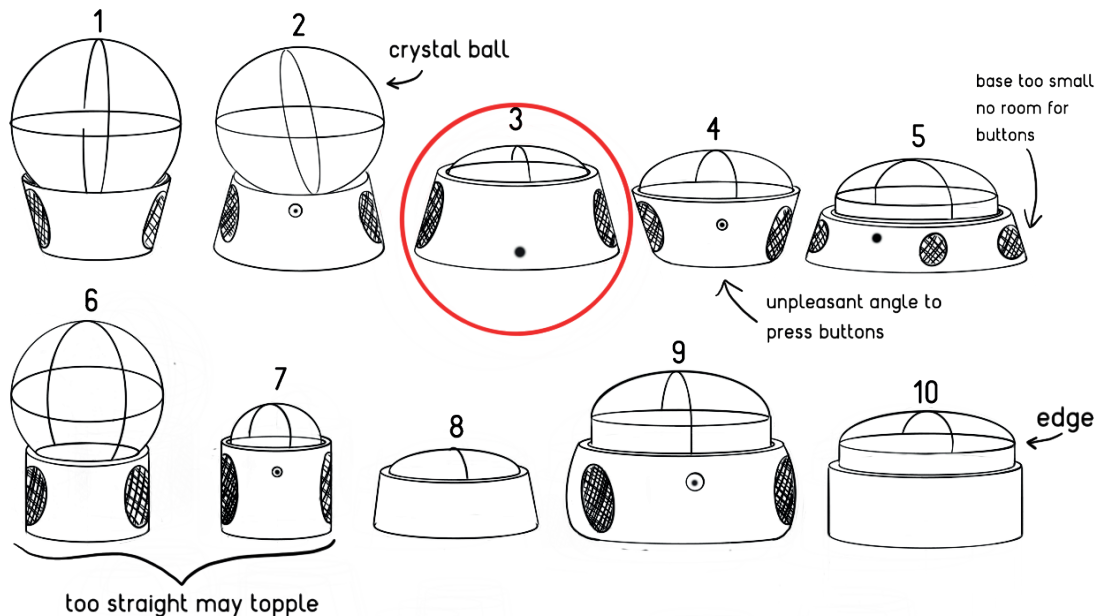

Fig 37. Button ideation of sphere and part of sphere the red circle indicates the chosen design.

Additional buttons

In the first design, the music player only has one button, a motion sensor, and two speakers. However, it is better to have more functions on the music player to give the user more autonomy over the product, namely volume regulations, music choices, and the possibility to skip songs. Fig. 38 shows several figurations and different types of button interaction. Such as a turning button, a slider, or capacity touch buttons. Moreover, the shape of the buttons is explored, e.g., icon, round or square shaped.

For the interaction, it is decided to go for regular buttons that can be pressed in. To keep it simple and easy to understand all the buttons will be like this. The different functions are grouped. The groups of buttons will be spaced out in such a way that pressing two buttons at once, or the wrong button is less likely to happen. In addition, grouping the buttons can give a good overview of each group.

To make it easier to understand what each button does in each group, text will be added.

Touch buttons such as in touch screens will most likely not work. For those buttons to work well-blooded fingers are needed. Older people have less well-blooded fingers. Moreover, regular buttons that can be pressed in increase the tangibility of the product. Which in return make it easier to use for people with dementia [3].
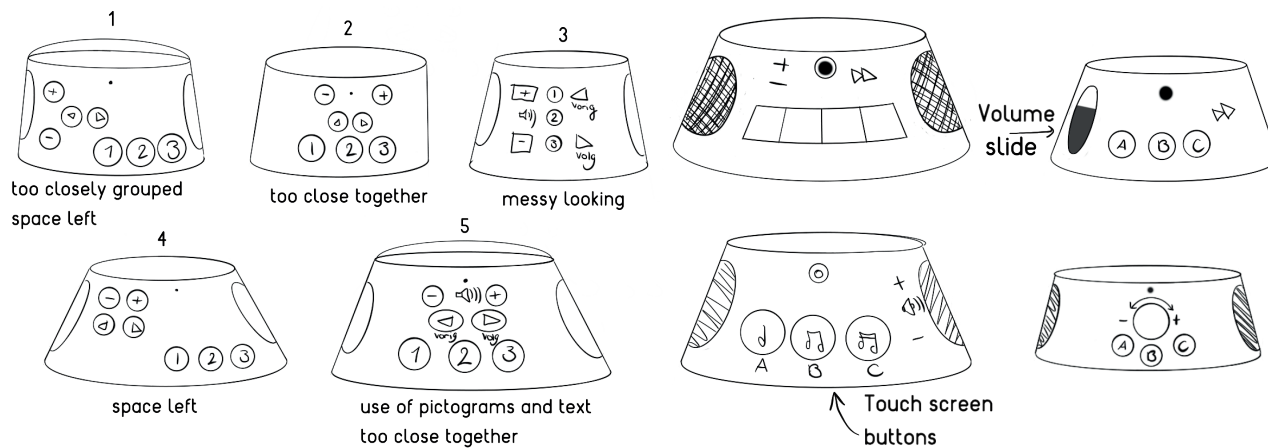

Fig. 38. Ideation for button placements and different types of buttons.

Speakers

In the design of Chapter 6.1, there are two speakers on either side of the player. However, it is explored whether this is the best looking and feeling for this product. One big one could be added at the back, Fig. 39, or two or three evenly spaced.

For stereo sound at least two speakers are needed. Putting two speakers on either side makes the music player more symmetric. It also gives the player a distinguished front and back. To make the speakers fit and blend in more with the other shapes on the player they will be round Fig. 39.
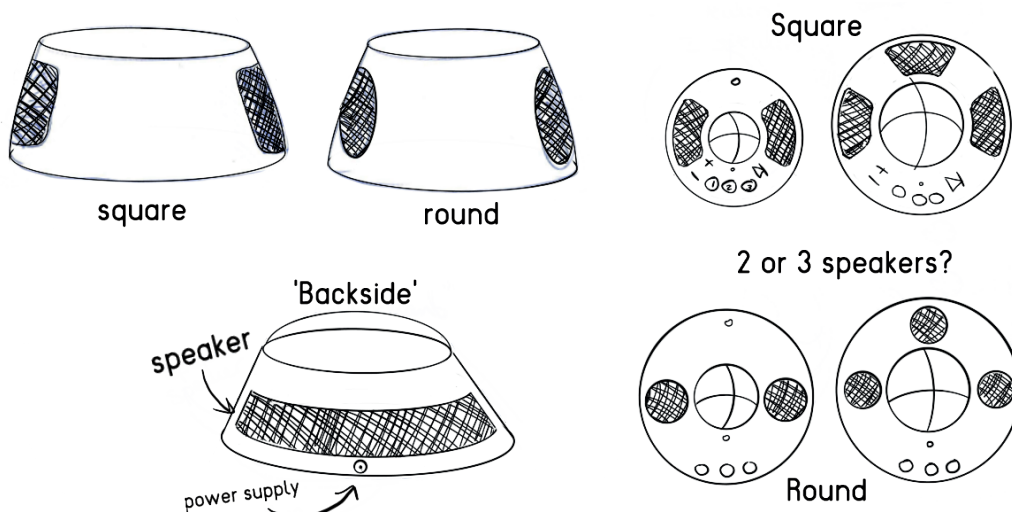

Fig. 39. Ideation of speaker placement and shape.

Functions

Most of the functions that are in the original concept are kept in the final design. Several stations are spread around the house. All these stations will be in their own network via Zigbee. The network is split into a Hub and multiple stations. The hub will be bigger and a different colour than the stations, see Fig. 44. With this hub music can be added to the network, and both the colour of the light and sound can be changed. These changes can be made in the accompanying app which will be explained in Chapter 7.3. The network works with the Zigbee protocol. The hub is connected via Wi-Fi and the stations are connected to the hub via Zigbee.

Pressing on any button when a player is not playing music will turn the music on. When you walk past the hub or a station. The main button will light up and give a small sound. If you want music you can press the main button or any other button to play music. If you do not engage with the product for 5 minutes the light will turn off. If the music is playing and you want it to stop press the main button to turn off the music. See Fig. 40 or Appendix B.

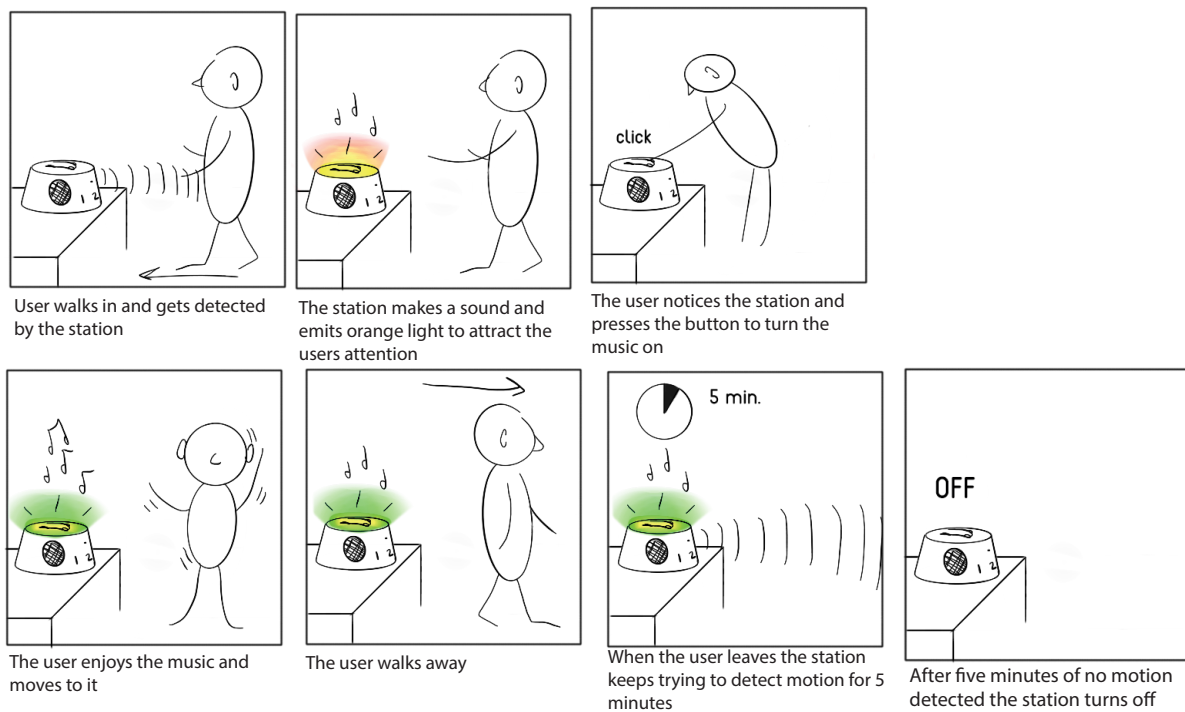|		
User walks in and gets detected by the station	The station makes a sound and emits orange light to attract the users attention	The user notices the station and presses the button to turn the music on
The user enjoys the music and moves to it	The user walks away	When the user leaves the station keeps trying to detect motion for 5 minutes
		After five minutes of no motion detected the station turns off

Fig. 40. General use scenario, where the user wants to play music.

In Fig. 41 it can be seen that objects could be placed in front of an ultrasonic or infrared motion sensor. This could render the motion sensor useless. Therefore, the choice is made to use a radar sensor. A radar sensor can still work when an object is placed in front of it and the sensor can be placed behind the plastic base. To make it easier for users to know whether the hub or station has 'seen' the user. A little LED will light up.
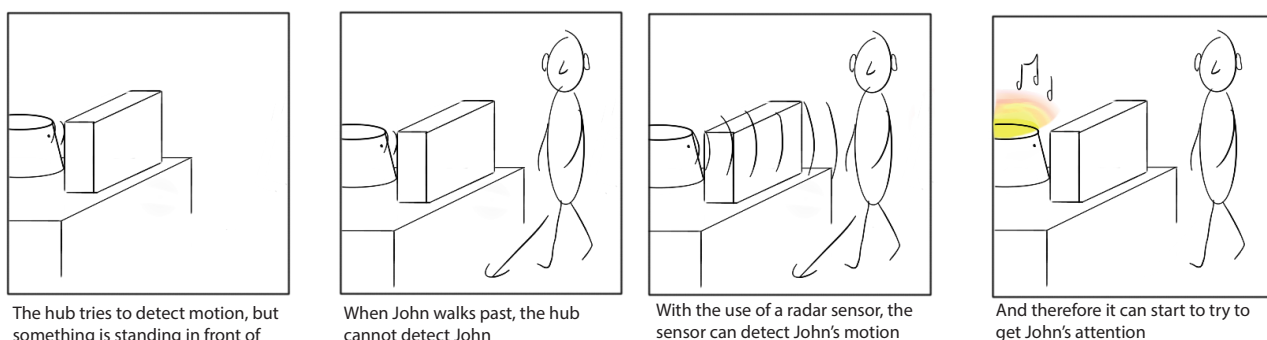

The hub tries to detect motion, but something is standing in front of the sensor	When John walks past, the hub cannot detect John	With the use of a radar sensor, the sensor can detect John's motion	And therefore it can start to try to get John's attention

Fig. 41. Scenario of an object in front of the motion sensor. Left two pictures, the problem. Right two pictures, the solution.

Power

In the original concept there was no decision made on how the player will be powered. This could be wireless, with a wire, or a hybrid version, see Fig. 42. If the music player would be wireless it could become less reliable. The battery needs to be recharged from time to time. Moreover, the network consists of multiple music players in the house. Therefore, it could be argued whether it is necessary to be able to move the music players around. The decision has, therefore, been made to have the player always be plugged in into a power socket via a cable that is attached to the music player, Fig. 42.
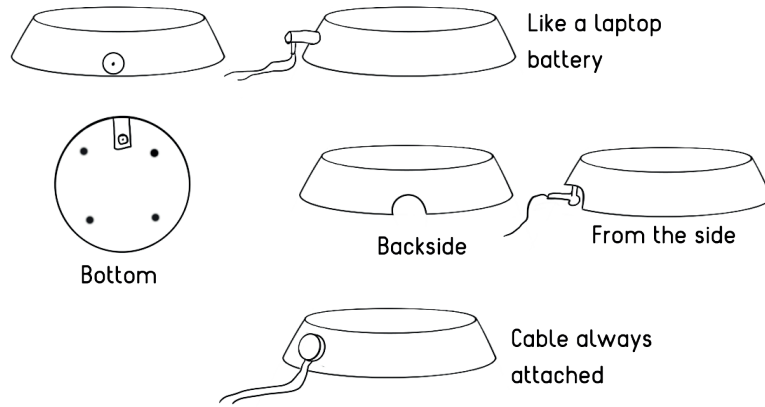
Fig. 42. Powering options.

Embossing

On top of the main button, a little face made from musical notes is added. Several options are explored, Fig. 43. The chosen design is a combination of 6 and 9.

The face can create more possible social interaction with the music player. Users may be more inclined to engage with the player due to its little happy face. The face is embossed on the dome of the main button, so you can feel the face with your fingers.
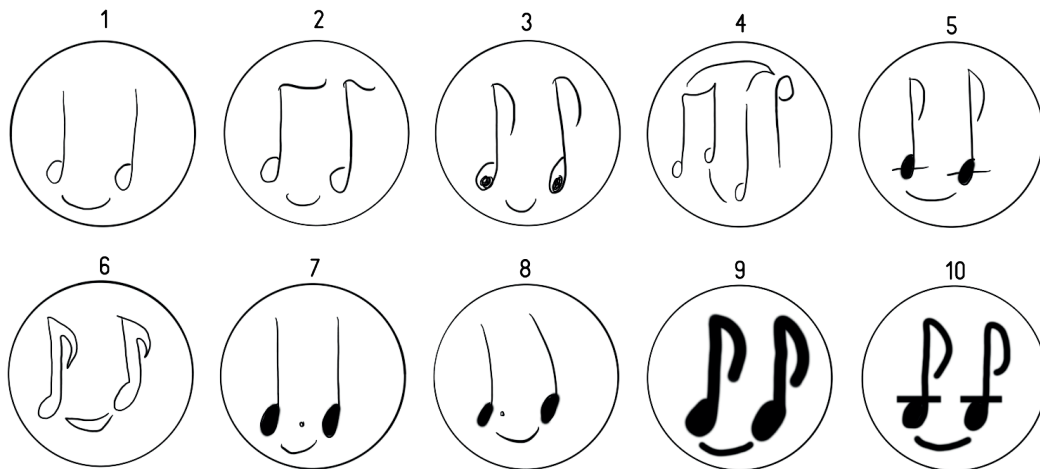

Fig. 43. Musical notes face options.

7.2 3D model

This chapter describes the 3D model made in SolidWorks. The 3D model gives an impression of what the concept could look like, Fig. 44 and Fig. 45. When making the 3D model in SolidWorks it was found that the main button should have a smaller diameter than the upper diameter of the base. This gives it a better impression that you can press it in. On the bottom there are three rubber feet. This to keep the player from sliding when pressing the buttons.
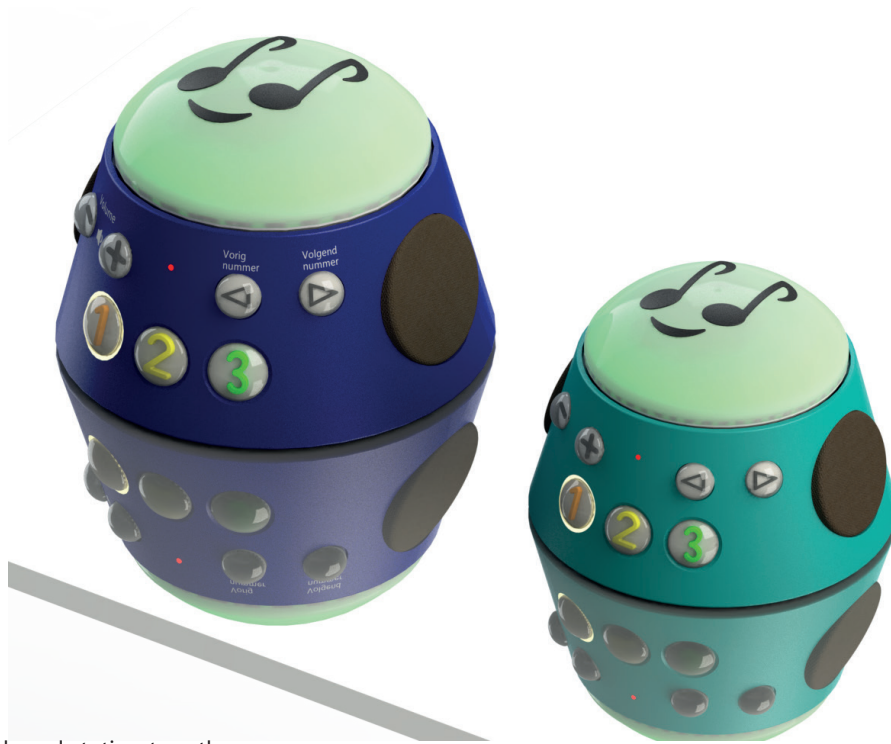

Fig. 44. The Hub and station together.

Fig. 45. A network consisting of the hub and three stations, the hub is turned on and playing music choice 1.

The buttons on the side of the have a clear plastic dome on them. The icons are behind the dome and unlike the smiling face, cannot be felt when moving one's fingers over it, see Fig. 46. The three music choice buttons have a different colour each. This to make it easier to distinguish between the options. However, the choice of colour could give the impression that the product is meant for children. When the music is playing, the LED ring around the corresponding music choice button is turned on. To indicate which choice is playing, as can be seen in Fig. 44.

Fig. 46. Side view music choice button 2 and the plus button.

In the 3D model the speakers protrude on the sides. The speakers here are flat. When the product will be tested, they should be rounded. In such a way that the speakers are flush with the base.
On the back a hole can be seen this is to indicate where the power cable is supposed to be. The text on the base is in Dutch, because the product will most likely be tested in the Netherlands. On the bottom of the stations there is a serial number. In the app, the serial number can be seen when a station needs to be added, see Fig. 47.

Fig. 47. The Hub (left) and the station (right).

7.3 App design

An accompanying app for a smartphone or tablet is part of the concept. In this app, the (in)formal caregiver can add music to the Hub and station(s), and turn several options on/off. In the app you can add music via Spotify, YouTube, radio, or URL, add different types of music to each music choice button (muziek keuze knop), expand the network with more stations, see usage data, operate the turned-on hub/station, set up options, etc. see Fig. 48.

The people that may use the app are (in)formal caregivers, such as a group supervisor at a meeting centre, or other people that are part of the household.
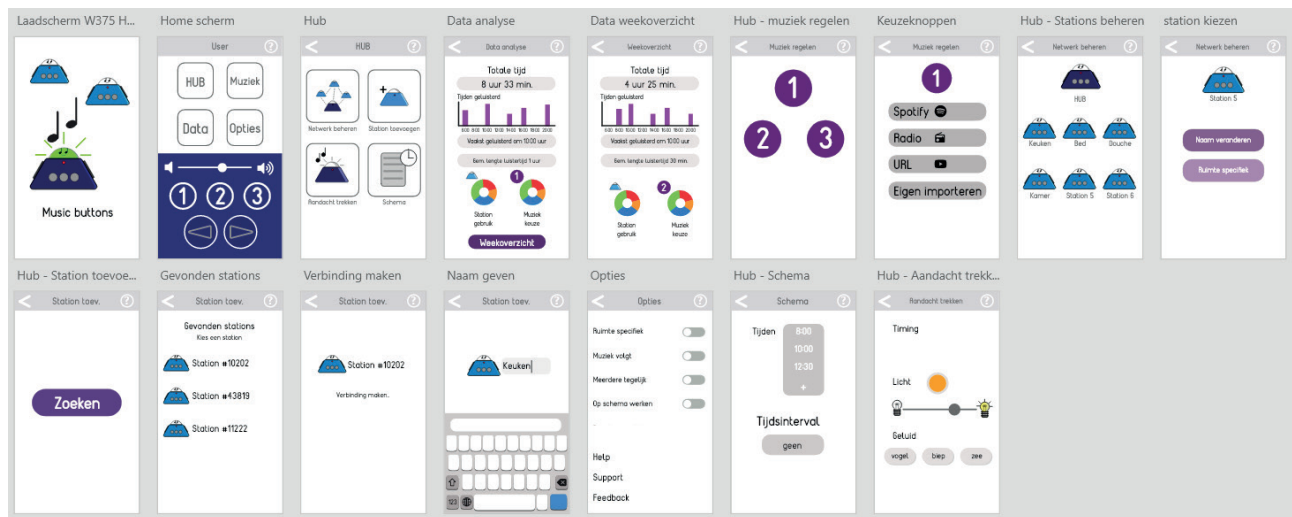
Fig. 48. Overview of all the pages that are currently in the smartphone application.

The options include to change the colour and brightness of the light that helps to attract the user. Additionally, the sound that helps to attract the user can be changed. There are also several options which can be turned on/off. Some will allow new functions to pop-up that can be used, see Fig. 47 'station kiezen'. The button 'ruimte speficiek' (room specific) is unavailable due to the option being turned off. These options are room specific: music follows, multiple music players at once, and schematic. With room specific, different types of music per station can be set. Music follows is where the music will follow the user wherever they go. When walking from one station to another. The motion sensor detects the user and will automatically turn on the new station, and turn of the other one. Multiple music players allows to turn on multiple stations simultaneously. This can be helpful when there are multiple people wanting to listen to music in different rooms in the house. The last option is working on a schematic. When the music players are only used at certain times and always at the same time each day. It can be better that the music players only attracts attention at set times. When the schematic is turned on, the music players start attracting the user's attention or starts playing music only at set times.

At data analysis several kinds of data can be found. These are, the amount of music listened to in hours and minutes, which station is used the most, which choice of music is listened to the most, at which times during the day music is listened to the most, and the average length of time music is listened to, and how long the players are turned on before they turn off can be seen, Fig 47. There is also the option to see the data of one week. This can help to inform if it would be useful to work on a schematic, and whether the music choice is right or could be changed. When testing the concept, it can be used to see whether the concept is good and works. Something else that during testing could be added is to see which specific buttons are used the most. Informing whether some buttons could be removed or if new buttons/functions should be added.

In Fig. 47 it can be seen that when new stations are added and found each station has a number next to it. This number is a sort of serial number and can be found on the bottom of each station or hub, Fig. 46. The name of the station can be changed to be more specific of the placement.

7.4 Use scenarios

Of the most important functions of the concept use scenarios are made. These scenarios can help to explain how the product should be used and to see whether some functions should be improved upon. These are the general use scenarios. On top of these, negative use scenarios are made. These scenarios help to see where problems may arise and how or if they could be solved. In Appendix D the scenarios are enlarged which can be better for reading. In Chapter 7.1, two scenarios can be seen, the general use and an object in front of the sensor.

Another problem that can arise is when multiple stations can be turned on simultaneously it could be a problem to turn them all off. To turn the entire network off each station needs to be turned off individually. A solution could be to press the top button for at least three seconds. Which then turns off the entire network.


Several stations are playing music in the house

John is laying in bed and wants to sleep

He presses the main button on the station next to him. It turns off

Only the station in the bedroom turns off

John needs to go to all the other turned on stations to turn each one off

As a solution, John presses a button for 3 seconds

All the turned on stations in the network turn off at the same time

Fig. 48 Turning off the entire network.

7.5 Conclusion

In Chapter 6.5, the scoring of two design principles was a three, flexible and familiar. In this chapter a new design for the concept is created. It should be looked into whether the two design principles have been improved. Flexibility has increased, these is now the option to personalize the product. However, as Wesselink et al. [3] argue when the dementia deteriorates. A product designed for people with dementia should be able to automatically change with the new impairments of the dementia. The music buttons cannot do this yet.

The familiar design principle has not been changed. The design still looks like a big button. This was the intent because this can give the incentive to press on it. The musical notes face could give the impression that it does play music.

The social interaction design direction had the lowest score of the four design directions. In the final design the generic musical notes on top of the big button have been changed to a musical notes face. This could evoke an interaction to talk to the product. However, the interaction is not reciprocated through the product.

Phase 3: Reflection
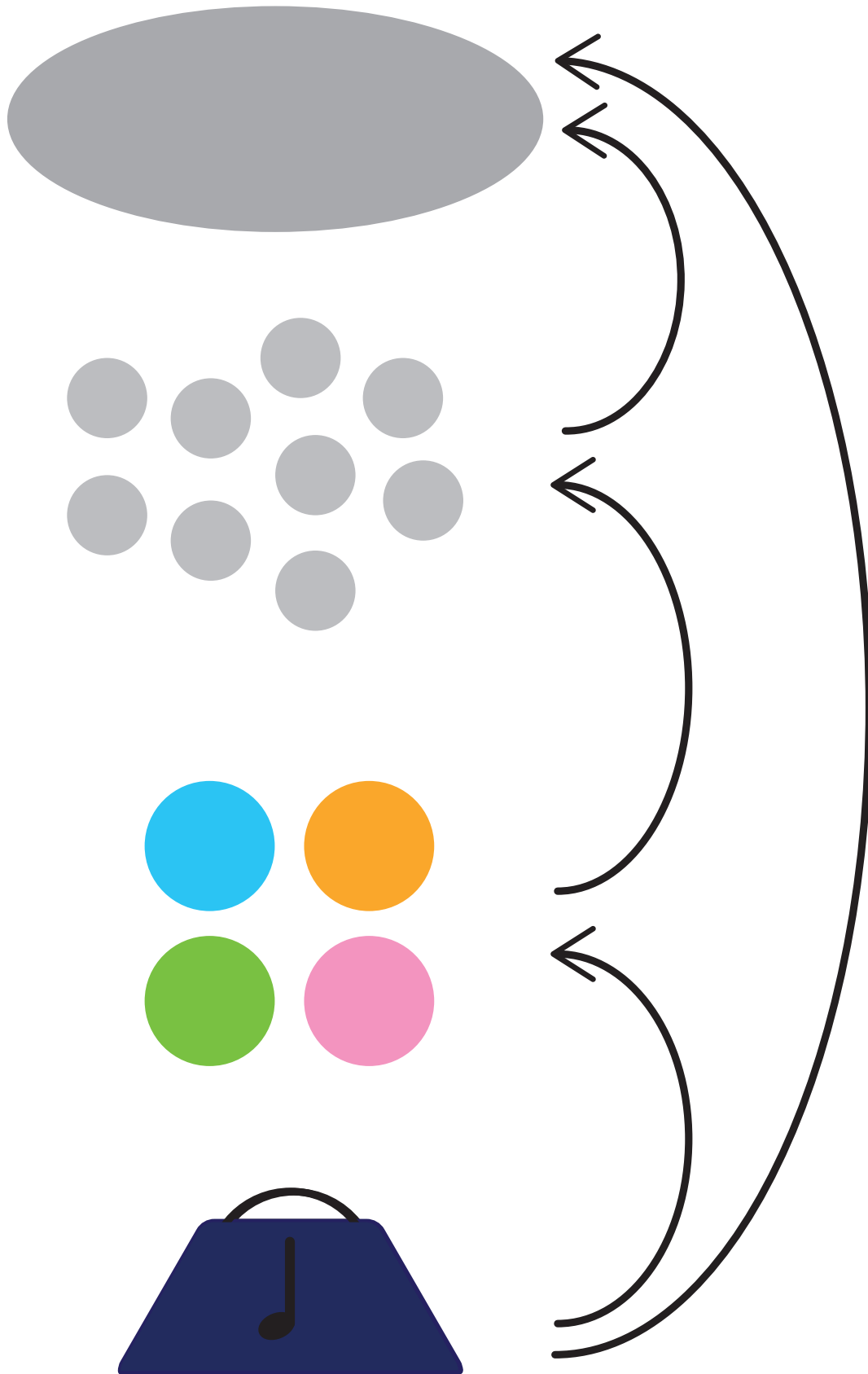
Chapter 8 Discussion

8.1 Reflection

Reflection on concept design

In Chapter 7, the design for the music buttons was finalised. Several functions and shape designs are altered in comparison to the initial design of Chapter 6.1. The design can be reflected upon in two ways, the design directions, and the 11 design principles [3, 11].

First, the design directions, in Fig 50. the picture of Chapter 4.2 is filled in for the new design. As can be seen the social interaction is still small in comparison to the other design directions. It is not required to use both social interaction and stimulation in a product design, since both lead to motivation. However, this product could benefit from more social interaction. The embossed face can evoke an interaction of talking to it. However, this interaction is not reciprocated through the product. This could be changed if the face is more interactive. It then could show simple emotions and respond in a non-verbal way. Another way to increase the social interaction is to add speech control. In this way people can actually talk to the product and the product will respond. It should be considered in what way this is preferred. Whether an actual albeit simple conversation can be held with it. Or whether it is to turn it on/off, play certain music, adjusting the volume, etc. Another way in which social interaction is present is when visitors start a conversation about the product. When the hub or a station detects motion and starts to attract the user. Visitors may be curious about the music players.

If the product had speech control it would be easier to use. However, people with speech disabilities, such as people with FTD, may have no use for this feature. Though, it is still better to have multiple interaction options. This could also help when the dementia progresses. People can get impairments that obstruct the use of the buttons. If speech control would also be an option, then these people could still use the product. This also applies vice versa.
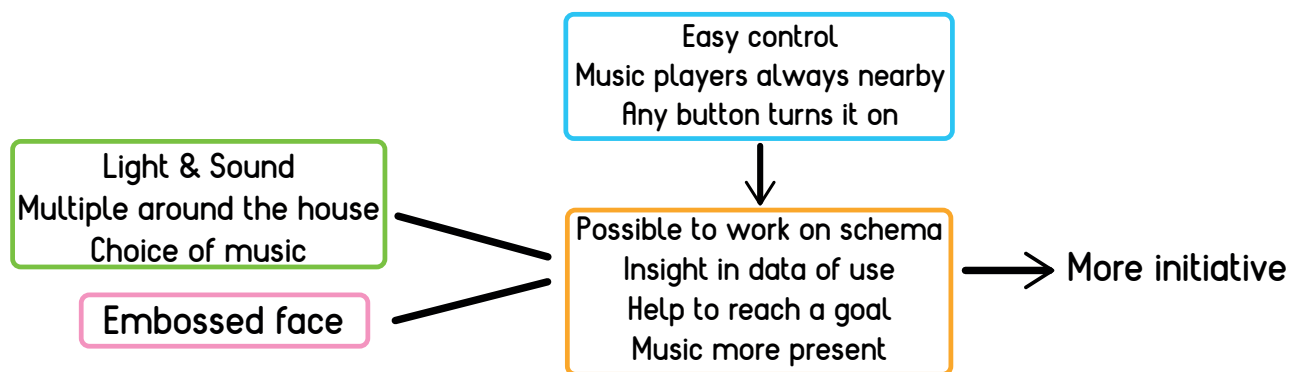

Fig 50. The figure of Chapter 4.2 filled in according to the new design of the music buttons.

The concept stimulates the user through the sound and light when the sensor detects motion. The music players are in sight and arms reach which makes it easy to access. The availability of the product is high because there are multiple placed around the house. In the initial design, there was only one type of music inside the music player. In the new design there are three options for either the entire network or three options for each station. This allows for more personalization, people could be more stimulated to use it because of this personalization.

The concept has a very low threshold. It is easy to make the player play music. Pressing any button will turn it on. It does not matter whether the motion sensor has detected someone. The button can be pressed at any time. The tactile buttons that need to be pressed in make it easier for someone with dementia to control the product [3]. As with the stimulation direction the fact that the music players are always nearby makes it easier to use as well.
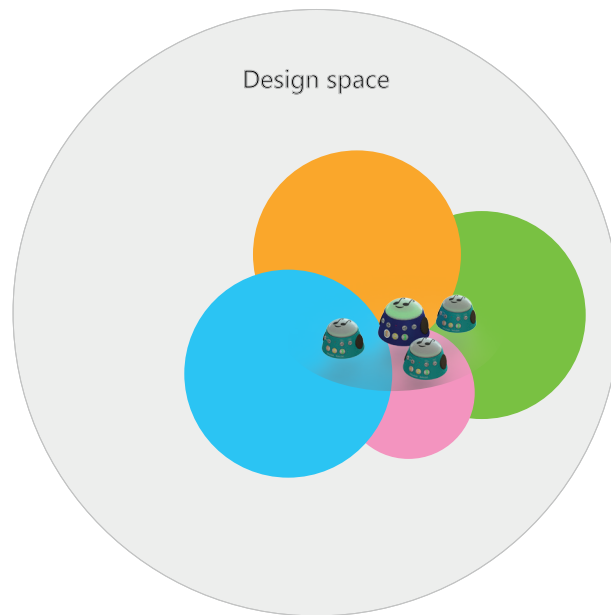
Fig. 51. The concept placed inside the design space.

All these factors lead to motivation, additional ways in which the motivation in itself can be increased are through the ability to reach a goal. This can be done when working with a schematic. Moreover, the insight into data from the usage can also help to see whether a set goal is reached.
In Fig. 51, the concept is placed inside the design space. The sizes of each design direction circle is based on the score of 0-5, see Fig. 20 in Chapter 6. As can be seen the concept focusses mostly on low threshold and stimulation. Social interaction has increased, however, not much since the social interaction cannot be reciprocated by the product as it is now.

11 design principles

As mentioned in Chapter 7 the familiarity is lower than the other design principles. This is because the product does not look like any other music player or radio. However, it can be argued that it is not necessary to make the product look like a radio. People with dementia can still learn new things. They can learn that the product is a music player.

Another low scoring principle was flexibility. The initial design could only play one type of music. In the new design there are more options to personalize. Each music player has three different music choices. Which could be the same three options for each player. Or each station could have its own three choices. However, choosing

Fig 52. An impression of what personalized buttons could look like.

the latter option could make the product more complex to use. A solution could be to have the buttons itself be personalized. Offering a range of images to put on the buttons. In this way people can see which music will play when pressing each button, Fig 52.

The ability to change the light colour and sound to attract attention makes it more flexible, as well. However, these changes can only be made in the app. This decreases the visibility. However, if these options would be placed on the hub or station. The amount of buttons or interactions would become too much. Which will make it more difficult to use. The options and personalization should be done together with the person with dementia. The installation of the product, the first use, could be seen as a form of social interaction.

The idea of the music buttons is that the user can place music player at any place they want. However, the music players are powered through a cable that is always attached to a power socket. This makes that the music players have to placed somewhere in the vicinity of a power socket and that they may not be able to stand wherever the user chooses. A solution could be to have a rechargeable battery in each music player. However, if the user forgets to recharge then the reliability of the product decreases. This could be solved by means of giving a notification in the app, the (in)formal caregiver can then make sure the music player will be recharged. Though, this could become a hassle or too much work, especially when the person with dementia lives alone. Therefore, it should be tested whether an attached cable is good enough or whether it would be better to have a rechargeable battery.

The product makes the user aware of the possibility to listen to music. It does not start playing music by itself. Therefore, the autonomy of the user stays in place.
A negative feature could be the app. The app as it is now can only be used by someone who is digitally skilled. Which is most likely to be the (in)formal caregiver. It should be looked into whether the app can be made more user friendly for people with dementia. In addition, it should be explored or tested whether it is desired that people with dementia also use the app.

Feedback from care professional

The final concept design was given to three care professionals that work at Bruggerbosch in Enschede, a day care facility for people with dementia. These care professionals each supervise a group of people with dementia, see appendix A. There are four groups in total, A to D. Each group consists of 6-8 participants. In group A the participants have the most severe dementia, and in group D the lightest. Participants 1 and 2 supervise group D and C, respectively. Participant 3 supervises group A.

The goal of this feedback session is to see whether care professionals understand the benefit of this concept. On top of that, whether they think it could indeed help with loss of initiative.

To give an impression of what the product will look like. The concept board of the music buttons, an A3 sheet with renders of the final concept and the app lay-out was given to them. An explanation of how the concept works and a general explanation of the research was provided as well.

Questions that are asked:
- What do you think of the concept
- Could this help with loss of initiative
- Do you recognize this as a music player
- Are there things that need to/should be improved

First, participant 1 gave their feedback in a one-on-one conversation. After their feedback the other two participants were also asked for their feedback. The same explanation was given, and the same questions were asked. Here, the first participant was present, as well.

The general feedback is that the participant were optimistic and enthusiastic about the concept. They could definitely see it being beneficial. One of the participants actually would like to test the concept if they could. If it was on the market they would definitely buy it to use at the day care facility. People in a caring home may also benefit from the product. It invites people to listen to more music and therefore will help people who experience loss of initiative. These people need triggers to be able to do something, which this concept does in their opinion.

To the question whether they recognize this as a music player, the answer was yes, they do. Mostly because

the musical notes on the main button on top. A follow-up question that was asked was, whether they think someone with dementia can also recognize this as a music player. Or if they could be taught to understand it as a music player. To this the answer was yes. Participant 1 made a comparison to other new products people use. Here they have to learn what certain products do and what those are used for, which is possible. Therefore, it does not really matter for participant 1 if the music player does not instantly remind of a standard radio or other music players. The other two participants agreed that people with dementia can get used to the shape of the product and learn that it plays music.

Points of attention which could be looked further into or improved upon. When there is no movement for a long period of time or when no station detects any movement for a very long time. It may be an idea to still try to turn on the attraction light and sound. Maybe the user is sitting somewhere, or they have fallen over. The hub could then, for example, send a message to the app and someone can then check in on the user. To see if something is wrong.
If the product would be used at a day care facility it could be nice to listen to the music on your own. Via a headphone which can be connected via Bluetooth or plugged into the hub/station.

8.2 Discussion

The insights of this thesis are the four design directions, stimulation, motivation, low threshold, and social interaction, respectively. Moreover, the relation between these design directions and taking initiative, Fig 53.
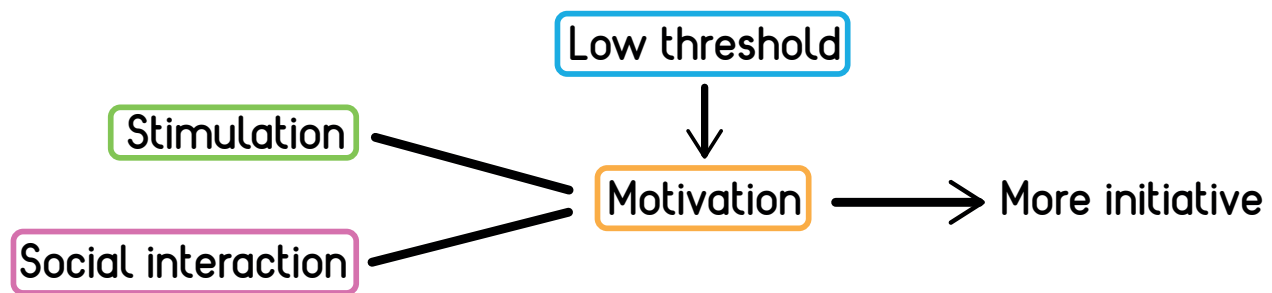
Fig 53. Relation between the design directions and taking initiative.

One can either use stimulation or social interaction, or both to try to increase motivation. To increase initiative a low threshold should be implemented. Through social interaction one can be stimulated. Therefore, social interaction can also be seen as a form of stimulation.

In this thesis a product was designed by first looking at each design direction individually. For example, if you only look at stimulation, what functions does the product get. Then other design directions were implemented. When designing a product for people with dementia it is important to keep the wheel of design principles [3] in mind. These are specifically made for products for people with dementia. When designing for loss of initiative both the four design directions and the 11 design principles should be used simultaneously.

8.3 Recommendations

The testing of ideas is important, however, it takes a lot of time. For a research through design approach, it is important to test the ideas or concepts that you come up with and to test existing ideas. Furthermore, it is important to generate ideas quickly so that testing can be done as soon as possible. This could be an extension to this research. The testing of the concepts from this research and possibly the other generated ideas. Test them to improve or adjust the design and test them again.

The testing takes time but also finding participants that represent the end user of the product takes time. The time for all of this was not available in this research. This is because there was a lack of knowledge about dementia from the start. Which may be necessary to have to be able to select ideas for testing. Therefore, this thesis could be used to gain some understanding of dementia and how to design for loss of initiative, especially Chapters 2 to 4.

A follow-up research could test the final design of the music buttons. Questions that should be answered are:
• Is it necessary that all the stations have the same functionalities as the hub or could some buttons be removed,
• Which buttons are used the most,
• Are people always triggered or do they sometimes miss the triggers.
• Also, looking at the overall functionality of the concept, does it function as intended.
• What works better an attached power cable or a rechargeable battery.

This research only focussed on one form of loss of initiative, listening to music. However, it should be explored whether these design directions can also be used for other forms of loss of initiative.

Chapter 9 Conclusion

People with dementia can experience loss of initiative. However, products on the market and design methods do not take into account loss of initiative. Wesselink [11] has suggested an eleventh design principle, inviting. But what he fails to explain is how to make a product inviting.
This thesis provides a tool to design for loss of initiative, Chapter 4, Fig. 6. To design a new product, one could either use the design directions tool on its own. As in this research, find out what each design direction can mean and entail, see Appendix A. Then look at how to incorporate that into a new product. Or one can use this tool together with Fogg's behavioural model [5], and the nudges [14], to change a passive behaviour into an active one, see Chapter 4, Fig. 8. When designing a product for people with dementia the 10 design principles of Wesselink, et al. [3], and the inviting design principle of Wesselink [11] should also be taken into account.

This thesis also provides a concept that shows what can be designed when using the new tool. This resulted in the concept the music buttons. The concept uses the four design directions, mostly stimulation and low threshold. As mentioned in Chapter 8.3, the concept needs to be tested to see whether it works as intended. Moreover, it should be looked into how the concept can be improved upon, especially the social interaction. The considerations from Chapter 8.1 can be used, however, there may be more ways to improve the social interaction.

In this research, the focus was on loss of initiative when listening to music. It should be looked at whether the tool can also be used for other forms of loss of initiative. Such as forgetting to eat or drink, cleaning the house, taking medication, etc.

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Appendix

A: Observations/Evaluations of the visits to the meeting centre, and day care facility in Enschede

A.1 Bezoek ontmoetingscentrum 't Ribbelt op 17 Maart 2022 van 9:00-16:00 uur

- Doel van het bezoek:
    - Ervaren hoe het erbij een ontmoetingscentrum aan toe gaat,
    - In contact komen met mensen met dementie,
    - Ervaren hoe de deelnemers verlies van initiatief ervaren,
    - Wat voor verschillende vormen van initiatief bestaan er, en waar hebben mensen last van
- Mensen met een lichte vorm van dementie, soms nog niet gediagnosticeerd met dementie.
- Mensen komen zelf of worden gebracht door partner of mantelzorger, of ze regelen zelf een taxi
- Sommigen hebben wel verlies van initiatief
    - Geen gesprekken starten of in standhouden, een reactie eruit moeten 'trekken'
    - Wel actief buiten dingen ondernemen, boodschappen doen, naar ontmoetingscentrum, enz. maar thuis niet veel meer ondernemen
    - Verschilt per persoon
        ~ Wat vinden ze leuk om te doen?
        ~ Wat zijn ze gewend?
        ~ Wat hebben ze nodig?
            ° Gebaseerd op oude situatie van vroeger
    - Gebreken die ervoor zorgen dat je dingen niet meer makkelijk kan doen
        ~ Demotiverend -> steeds geconfronteerd worden met de gebreken die je hebt
        ~ Uitstellen
    - Geen zin -> "als ik thuis blijf zitten, dan hoef ik het niet te doen"
        ~ Kost te veel moeite
            ° Te veel nadenken, maakt dat het te veel moeite kost
        ~ Gevoel dat je lui wordt -> eerder ben je moe
    - Af en toe zelf een schop onder de kont geven, en het dan wel doen
        ~ Dan blijf je actief, en kun je langer door
- Dingen die ze zelf nog wel soms doen
    - Zelf koken
    - Zelf afstoffen -> 1x per week, niet zin om het vaker te doen
    - Partner helpt met dingen ondernemen
        ~ "maar soms wil ik ook wel even alleen zijn" -> ga maar alleen weg wordt er dan tegen de partner gezegd
        ~ Andere partners/mantelzorgers geven hun dementerende partner opdrachten in het huishouden, voor snijden van groenten, stofzuigen, afstoffen.
    - Telefoonbandje aan de lijn -> "dan hang ik op"
- Ze zitten rond de tafel vaak 10 deelnemers -> vandaag 8
    - Koffie- of theedrinken bij binnenkomst
        ~ Wordt ingeschonken door begeleiders of nog best mobiele deelnemers, of ze doen het zelf
        ~ "wil er iemand nog koffie" vraagt een deelnemer
    - Sommigen hebben een 'vaste' plek rond de tafel, af en toe onenigheid over op welke plek moet ik zitten
    - Samen lunchen, boodschappen worden gehaald door 1 begeleider en een deelnemer die zin heeft om mee te gaan
    - Geheugenspel
        ~ Kletspot, vragen stellen aan de groep
    - Na lunch rummikub of andere spellen of kletsen
        ~ Kennisquiz over Enschede en omstreken
- Dag eindigt om 15:30 uur

Evaluatie van 17 maart
- •Deelnemers kunnen binnenlopen vanaf 9:30 uur
  - - Sommigen komen lopend -> die wonen in de wijk of in de buurt
  - - Anderen worden met de taxi gebracht -> moet zelf geregeld worden door de deelnemers op eigen kosten
  - - Er waren 2 afwezig
    - ~ Eén was ziek
    - ~ Eén ging aan het begin alweer naar huis, voelde zich niet goed
  - - 1 man had zijn hond mee
  - - 5 mannen en 5 vrouwen in de groep
  - - 8 komen zowel dinsdag als donderdag
  - - 4 komen maar 1 van de 2 dagen
  - - Geen mantelzorgers en familieleden aanwezig
    - ~ Zijn wel vrij om even langs te komen
- •2 begeleiders op de groep
  - - Diana (mijn contactpersoon) en Harry
  - - Soms is er ook een casemanager bij
    - ~ Vooral 's ochtends
  - - 's Middags is er een stagiair
- •Mijn onderzoek werd in het algemeen behandelt
  - - Ik werd voorgesteld door Diana
  - - Zij stelde de vraag 'ervaar je weleens verlies van initiatief?' aan de groep
  - - 1 voor 1 gingen we bij iedereen langs
  - - Andere vragen:
    - ~ Doe je nog weleens iets waar je geen zin in hebt
    - ~ Doe jezelf de boodschappen nog
    - ~ Waarom doe je het niet meer
      - ° Te veel gedoe
      - ° Kan het niet meer
  - - 1 vrouw zei dat ze zichzelf ertoe zet om het te doen ook al heeft ze geen zin, omdat het moet en omdat het haar goed houdt.
- •Boodschappen voor lunch werden doorgenomen
  - - De deelnemers werd gevraagd wat ze wilden
    - ~ Een eitje, wat vlees, etc.
- •Verder kletsten de deelnemers met elkaar, deelnemers waren geïnteresseerd in mijn bezoek en dat ik notities maakte
  - - Een man was gefascineerd over het feit dat ik met links schreef, het zette hem aan om een verhaal te vertellen over vroeger, het schrijven met links mocht niet en je moest met rechts schrijven
- •Harry ging met één van de deelnemers naar de supermarkt om de hoek
  - - Verder iedereen samen gekletst
  - - Diana nam de krant door met iedereen, ze las de 'headlines' van artikelen en nam het weer en wat erop tv komt door.
- •Een spel voor de lunch, kletskoppen
  - - Diana ging bezig met de lunch, ik en Harry deden het spel met de deelnemers
  - - Kaarten met aan weerszijden een vraag of een dilemma
  - - Eerst in het algemeen de vraag stellen, en dan per persoon erlangs voor een antwoord als niet iedereen zelf al een antwoord gaf
  - - Bij sommige vragen bleef het bij een simpel antwoord, bij andere kwam er een gesprek op gang tussen alle deelnemers
    - ~ De vraag 'had je vroeger een bijnaam' gaf een simpel antwoord
    - ~ De vraag 'hecht je veel waarde aan tafelmanieren' en een vraag met een scenario bracht meer een gesprek op gang
- •Tafel werd gedekt door mobiele deelnemers
  - - Gebakken ei met ham
  - - Met z'n allen geluncht
  - - Iedereen toonde initiatief om te eten, zelf brood klaarmaken, meer pakken of vragen aan iemand voor nog een stukje brood, etc.
  - - Wel vroeg Diana aan het eind aan sommigen of ze genoeg hadden gehad
    - ~ Sommigen eten minder dan dat zou moeten, of hebben een verleden van uitdroging/ondervoeding
- •Rummikub met 3 deelnemers (2 mannen, 1 vrouw, en ik)

- De mannen waren nog best wel goed, fit. Je zag niet gelijk dat ze wellicht dementerend zijn
- De vrouw was het minst qua gesteldheid, ze heeft ook last van Parkinson
- Ze won wel meerdere potjes (soms met hulp van de anderen)
- Ik mocht meedoen
- Het was zeer gezellig, er werden grapjes gemaakt over vergeetachtigheid en verkeerde stenen neerleggen. Té lang nadenken, enz.
- Ze corrigeerden elkaars fouten
- Gespeeld tot het einde van de dag 15:30 uur
•Anderen deden een kennisquiz toen wij aan het Rummikuben waren
- De rummikub deelnemers gaven soms ook antwoorden op de vragen van de kennisquiz
•Al wachtend op de taxi nog wat gekletst met z'n allen, 1 vrouw werd eerst weggebracht want de taxi was een gewone auto ipv een busje, dus met z'n vieren werd krap. Sommige deelnemers moesten daar vaker aan herinnerd worden.
•Sommige deelnemers waren al eerder weggegaan, want die hadden andere afspraken met de huisarts, of fysiotherapeut.
- Daar herinnerden ze de begeleiders zelf aan

A.2 Bezoek ontmoetingscentrum Glanerbrug 8 April 2022 van 9:00-16:00 uur

Doel van het bezoek:
•Ervaren/Observeren hoe en of de deelnemers daar verlies van initiatief ervaren
•In contact komen met dementerenden en hun mantelzorgers
•Vragen hoe men verlies van initiatief ervaart, en of ze er al wat aan doen

Algemene info:
•Elke week op woensdag en vrijdag
•Begeleider is Britt Ebeltjes-Scheffmann
•Bij een ontmoetingscentrum mag iedereen langskomen, deelnemers mogen geen WMO-indicatie hebben om mee te doen -> het is de eerste stap in dagbesteding
•Deelnemers moeten zelf vervoer regelen
•Deelnemers moeten zelf nog dingen kunnen doen
- Naar de wc kunnen
- Eten
•De mantelzorgers zijn voor vanmiddag uitgenodigd
- De eerste mantelzorgerbijeenkomst sinds de pandemie

Vragen om te stellen:
•Ervaart u weleens verlies van initiatief (bij uw partner/familielid)?
•Hoe zou u geholpen kunnen worden om meer initiatief te tonen?
•Heeft u ook weleens ergens geen zin in maar dan doet u het toch?
- Jezelf een schop onder de kont geven
•Wat is een reden voor u om iets niet te doen?
- Dingen doen zoals de boodschappen, het huishouden, op bezoek bij familie/vrienden, muziek luisteren
- Mogelijke redenen: te veel moeite, geen zin, het is moeilijk/lastig
•Luistert u graag naar muziek?
•Doet u weleens zomaar de radio aan om naar muziek te luisteren, of voor achtergrondgeluid?

Observaties
•Cliënten komen vanaf 9:30 uur tot 15:30 uur
•Glanerbrug de harde kern, ons kent ons
- Deelnemers hebben kennis van vroeger over elkaar
~ Ze kennen elkaar en hebben dezelfde kennissen
- Ze weten alle achternamen van elkaar
•Casemanager, Mariëtte Mensink, is iedere vrijdag aanwezig in de ochtend van 9:15-10:30 uur
- Ze bespreekt met Britt de cliënten die problemen hebben en de mogelijke oplossingen
•Deelnemers hebben woensdag en de week ervoor paasversieringen gemaakt
•Per kwartaal moet er een verslag worden ingeleverd bij de gemeente om de subsidiegelden te verantwoorden

•De krant wordt hier niet gezamenlijk gelezen
  - Keuze van Britt, want de oorlog in Oekraïne roept bij mensen herinneringen op van de 2de wereldoorlog
    ~ Brengt een negatieve sfeer mee en dat wil je niet
•De meeste deelnemers komen beide dagen, 2 à 3 komen maar 1 van de dagen
•Twee vrijwilligers aanwezig, Marijke en Roy
•De radio staat aan als achtergrondmuziek, en is uitgezet tijdens de lunch
•Deelnemers zijn nog zeer mobiel, en weten nog aardig wat zelf. Kunnen zich dingen goed herinneren
•1 Man komt alleen 's ochtends even langs, hij is een paar keer langs geweest. Maar hij vindt het hier niet zo leuk en hij heeft een ergens anders een groep gevonden waar die heengaat, een jeu de boules club.
  - Hij wil netjes gedag zeggen en daarvoor heeft hij een taart meegenomen
  - Na de koffie vertrekt hij
•Mensen zijn heel vrolijk en maken grapjes met elkaar
•Mevr. 1 heeft zich ergens geschaafd en een bebloede hand, wil zelf haar handen wassen
  - Staat op en zoekt/vraagt naar waar ze haar handen kan wassen
  - Ze wast ze zelf
  - Weet alleen niet meer hoe en waar het is gebeurt
•Mensen schenken zelf koffie bij als ze willen, en doen melk en suiker/zoetje erin
•Mevr. 2 die weet en herinnert zich nog veel
  - Helpt ook anderen (vooral Mevr. 1) met dingen herinneren
•Een vrouw is van de week overleden, die kwam al een tijdje niet meer, maar de meeste deelnemers weten wel wie het was
•Ze beginnen zelf met kletsen
  - De vrouwen meer dan de mannen
•In totaal 6 deelnemers vandaag, 2 zijn ziek
  - 's ochtends waren er 7
  - Benny de beheerder van de speeltuin is er ook
•Vanaf 14:00 uur is er een mantelzorgbijeenkomst
  - De casemanager is er ook bij
•Mevr. 1 weet de namen van haar kinderen nog wel, maar van de aanhang en kleinkinderen, en iedereen hier kan ze niet zo goed meer onthouden
  - Ze is zich hier wel van bewust
•Spel gespeeld voor de lunch, soort van pimpampet
  - Een voorwerp/plaats/naam moet beginnen met een getrokken letter
  - Iedereen doet goed mee
  - Boodschappen worden gedaan door Marijke, en 2 deelnemers Mevr. 2 en Mevr. 3
  - Mevr. 1 zit te puzzelen
•Dhr. 3 weet ook nog veel, kan goed verhalen navertellen en dingen zich herinneren
•Boodschappen vrouwen zijn terug, nu gaan de mannen Roy met Dhr. 1
•Mevr. 2 snijdt de preien en wortel
•Niet alle deelnemers komen uit Glanerbrug
•De deelnemers dekken de tafel en ruimen af
  - Vooral de dames
  - Er wordt samen gegeten -> soep vooraf en brood met beleg
  - Vooraf werd gewaarschuwd dat er 's middags nog meer lekkers komt, dus neem niet te veel -> werd gehoor aangegeven
•Vlak na de lunch werd er een cd opgezet, maar tijdens het rust moment zette Britt hem weer uit, om de deelnemers niet te overprikkelen
•Na lunch rust moment
  - Mevr 1. gaat puzzelen
  - Dhr. 3 en Dhr. 2 lezen een boek
  - Mevr. 2 en Mevr. 3 tekenen/kleuren, ze halen mij ook over om ook te kleuren
  - Roy en Dhr. 1 "prutsen" met Roy z'n auto -> een voorlamp moet vervangen worden
•Om 14:00 uur komen de mantelzorgers
  - Niet iedereen hun mantelzorger komt -> sommigen moeten werken of zijn op vakantie
•De deelnemers zijn wederom zeer geïnteresseerd in wat ik hier doe
  - Notities maken
  - Waarom ik hier ben
  - Ze starten zelf het gesprek
  - Ook vertellen ze het aan hun familielid/mantelzorger
•Ook starten de deelnemers met gemak een gesprek met de mantelzorgers van anderen

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- Mariëtte Mensink casemanager van Liberein
    - De algemene casemanager, want de deelnemers hebben vaak hun eigen casemanager
- Mevr. 1 vroeg of ik ook een man heb?
    - Mevr. 1 vertelt vaak hetzelfde verhaal, maakt ook soms wat foutjes maar Mevr. 2 helpt haar met verbeteren.
    - Ze maakt veel grapjes
    - Mevr. 1 is wel opzichtig
        ~ Ze ziet 'alles'
        ~ "ik onthoud alles, en niks ontgaat mij"
    - Haar kinderen houden haar agenda bij
    - "ik kom uit Losser, en ik weet van niks"
    - "ik ken niemands naam"
    - Ze vindt het heerlijk om soms alleen te zijn
        ~ Krantlezen, tv kijken
- Mevr. 3 wil wel helpen met allemaal dingen
    - Sportdag op de speeltuin, moestuin
    - Kan ook nog van alles
    - "ik mag graag wat doen"
    - Het lijkt niet of ze dementie heeft, maar ze heeft wel Alzheimer
- Roy leest zijn gedicht over het ontmoetingscentrum voor
- Mevr. 2 werkt zelf nog in haar tuin
    - Ze woont alleen, haar man is ~3 jaar geleden overleden -> hij ging naar dit ontmoetingscentrum, zij kwam dan ook als vrijwilliger
    - Ze heeft geen dementie maar als ze niet zou komen dan zou het niet zo goed met haar gaan volgens Britt, ze heeft de bezoeken aan het ontmoetingscentrum wel nodig
    - Ze woont nog in het huis waar ze met haar man woonde
    - Ze doet nog veel zelf in het huishouden en dergelijke
- De deelnemers hebben een licht tot milde vorm van dementie
- Dhr. 2 gaat kijken bij Hoge Boekel, hij vindt het hier niet meer leuk
    - Hij gaat achteruit
    - Hij houdt ervan om een beetje te provoceren -> dit kan de groepsdynamiek verstoren waardoor hij niet meer in de groep past
- Om 15:30 uur gaat iedereen naar huis
- Op het ontmoetingscentrum zijn veel deelnemers actief, daar worden ze geprikkeld om dingen nog zelf te doen.
    - Thuis doen ze niet zoveel meer -> vooral als ze alleenstaand zijn
- Dhr. 3 is nog vrij jong en heeft dementie,
    - Vindt het moeilijk om zich erbij neer te leggen, vindt het moeilijk om het te verwoorden
    - Moet zichzelf er vaak aan herinneren dat hij dementie heeft
        ~ Vertelt vaak verhalen over zijn ziekte
            º Vandaag niet gehoord
- Er is de mogelijkheid om nog een keer langs te komen, en om misschien een soort van co-design te houden. Of individuele activiteiten met de deelnemers als ze er zin in hebben dan kan ik Britt weer contacteren

Fig. 54. Table lay-out during the visit.

A.3 Bezoek dagbehandeling Bruggerbosch 6 April 2022 van 9:00-16:00 uur

Doel van het bezoek:
- Ervaren hoe het erop een dagbehandeling aan toegaat,
  - Is er een rooster voor activiteiten of is het vrij voor de deelnemers?
    - ~ Antwoord: geen rooster, deelnemers verschillen per dag. Hangt ook af van de gemoedstoestand, waar hebben ze zin in. Elke dag is anders.
- Hoe en/of de deelnemers verlies van initiatief ervaren
- In contact komen met de deelnemers
- In contact komen met de verzorgers/begeleiders
- Meer te weten te komen over wat een dagbehandeling inhoudt

Algemene info:
- Begeleider huiskamer C Karin Knobbe
- Er zijn 4 huiskamers, A t/m D
  - In huiskamer A zitten mensen die meer begeleiding nodig hebben, die ook vaak naar de fysio of ergotherapeut gaan, en die hulp nodig hebben met het eten en naar de wc gaan
  - In huiskamer C en D lijkt het wat meer op het bezoek aan een ontmoetingscentrum, activiteiten zijn vrijer. Krant lezen, bijkletsen.
- Er zijn ook specialisten aanwezig waaronder een muziektherapeut, ergotherapeut, psycholoog, maatschappelijk werkende, etc.
- 5 dagen per week geopend
- WMO of WLZ-indicatie nodig
- Vervoer naar de locatie is geregeld vanuit Liberein

Vragen om te stellen:
- Ervaart u weleens verlies van initiatief?
- Hoe zou u geholpen kunnen worden om meer initiatief te tonen?
- Heeft u ook weleens ergens geen zin in, maar dan doet u het toch?
  - Jezelf een schop onder de kont geven
- Wat is een reden voor u om iets niet te doen?
  - Dingen doen zoals, boodschappen, het huishouden, op bezoek gaan/op de koffie gaan bij vrienden/familie, muziek luisteren
  - Mogelijke redenen: te veel moeite, geen zin, het is moeilijk/lastig
- Luistert u graag naar muziek?
- Doet u weleens zomaar de radio aan om naar muziek te luisteren?

Observaties
- Geen rooster voor activiteiten, het was ooit wel meer een rooster een soort van modulair rooster. Toen waren er meer werknemers of vrijwilligers, die iets konden organiseren. Als iemand een bingo wilde doen dan werden uit de verschillende huiskamers mensen 'geplukt' die zin hadden in de activiteit. Toen was het wat meer persoonsgericht.
- Vandaag in totaal 6 deelnemers
  - Samengestelde huiskamers C & D, want anders waren er te weinig deelnemers (3 per huiskamer), en nu kunnen ze samen kletsen
- 2 à 3 begeleiders per huiskamer
  - Werknemers van Liberein en vrijwilligers
  - Vandaag 2 begeleiders (1 van huiskamer C en 1 van huiskamer D)
  - En 1 vrijwilliger (later op de dag kwam er ook nog een stagiair)
- Deelnemers komen binnen vanaf 9:30 uur
- Voorbeelden verlies van initiatief
  - Meneer die niet meer zelf eet of wil eten, door een medicijn werd hij misselijk en nu wil hij soms niet meer eten
  - 3 Rokers als deelnemers, nemen zelf wel het initiatief om te gaan roken
- Eerste activiteiten
  - Koffie en thee met een koekje
  - Vrijwilligster die kookt is ziek, dus zelf kiezen wat er 's middags gegeten gaat worden
  - Boodschappen opnemen, vrijwilliger gaat het kopen
  - Headlines van de krant Tubantia doornemen
    - ~ Sommige mensen doen mee, reageren op de koppen

- ~ Anderen zijn stil
- ~ 1 iemand is aan het slapen
- ~ Een rustige relaxte sfeer
  - Radio wordt aangezet (door begeleider) voor achtergrond geluid
    - ~ Rokers gaan roken
    - ~ 3 deelnemers en 1 begeleider
  - 2 deelnemers lezen de krant zelf nog even door
- •Meeste/alle deelnemers wonen nog thuis (alleen of met partner).
  - 1 deelnemer zit nu even in de respijtzorg, in het verzorgingshuis van het Bruggerbosch
- •Deelnemers zijn geïnteresseerd in wat ik hier kom doen
  - Ook hier een opmerking gekregen over dat ik linkshandig ben
  - Ze nemen zelf het initiatief om mij ernaar te vragen
- •Deelnemers helpen met snijden van groente voor de macaroni
  - Wel na aandringen of aanvraag van de begeleiders
  - Er wordt wel gemokt/gezeurd over het werk, dat niet iedereen wat doet
  - De enige vrouwelijke deelnemer geniet van dat zij niks hoeft te doen (bijna alle mannen waren aan het werk) -> normaal in huiskamer C helpt zij altijd mee met het bereiden van eten
- •Iedere huiskamer heeft
  - een grote ovale eettafel met stoelen,
  - een keukentje,
  - tv en radio,
  - groepje ligstoelen,
  - een kast waar de jassen opgehangen kunnen worden, en met een voorraadkast
  - een pui die naar een afgesloten buitenterras leidt
    - ~ De deelnemers kunnen zelf naar het terras wanneer ze willen
    - ~ In huiskamer D waar we vandaag zaten, staat ook nog een kleine ronde tafel met 3 stoelen
    - ~ Huiskamer D is het grootst
- •Als het binnen handbereik ligt of op de tafel (de krant, koekjestrommel), dan hebben sommige deelnemers meer initiatief
- •Een kruiswoordpuzzel wordt met z'n allen opgelost
  - Niet iedereen doet mee
    - ~ Sommigen zijn niet geïnteresseerd in de activiteit
- •Lunch om 12:00 uur
  - Iedereen eet aan tafel
  - Tafel wordt gedekt door vrijwilliger
  - Zien eten = doen eten
- •Tussen 13:00-14:00 uur rustmoment
  - Slapen, dutje doen
  - Spelletjes doen (Triominos, Rummikub)
  - Theetijd
- •De vrouw van een deelnemer komt langs
  - Doet mee met koffietijd
  - Door het bezoek wordt hij iets socialer
- •Middag activiteit: muziek bingo met dieren
  - De dochter van een deelnemer is er ook bij
    - ~ Die wilde zien/meemaken hoe het eraan toe gaat in de huiskamer

Algemene evaluatie
- •2 deelnemers zijn gedurende de dag naar de fysio geweest
- •Begeleiders krijgen medicijnen voor man in de respijtzorg en geven de medicijnen aan de deelnemers wanneer het nodig is
- •Als er niks wordt aangeboden om te doen, dan doen ze ook niks
- •Er is een bioscoopzaal waar de muziektherapeut lichtconcerten houdt
  - Worden mensen rustig van en ze ontspannen
  - Vooral voor mensen die bedlegerig zijn en de hele dag in een rolstoel zitten
- •Het doel van de dagbehandeling is om de bestaande vaardigheden zoveel mogelijk te behouden
  - Niet veel nieuwe dingen leren, of actiever worden
- •In huiskamer C zitten de meest fitte mensen,
  - 1 vrouw helpt vaak zelf met dingen, koken, tafeldekken
  - Die deelnemers beginnen ook zelf eerder een gesprek, ook tijdens mijn bezoek

B: Mind maps of design directions

Several mind maps were made to get a better understanding of what each design direction entails. The first mind map shows a first exploration of each design directions' meaning. The following mind map shows the different ways of verbal and non-verbal ways of social interaction.

The last four mind maps B.3-B.6 are in the form of a top-down map, starting with the direction itself and diving deeper and deeper into the meaning of each design direction. The mind maps end with product ideas (see coloured blocks), these ideas are about activities where initiative could be taken over by a product. Not all ideas are focussed on listening to music.

B.1 First exploration of design directions mind map
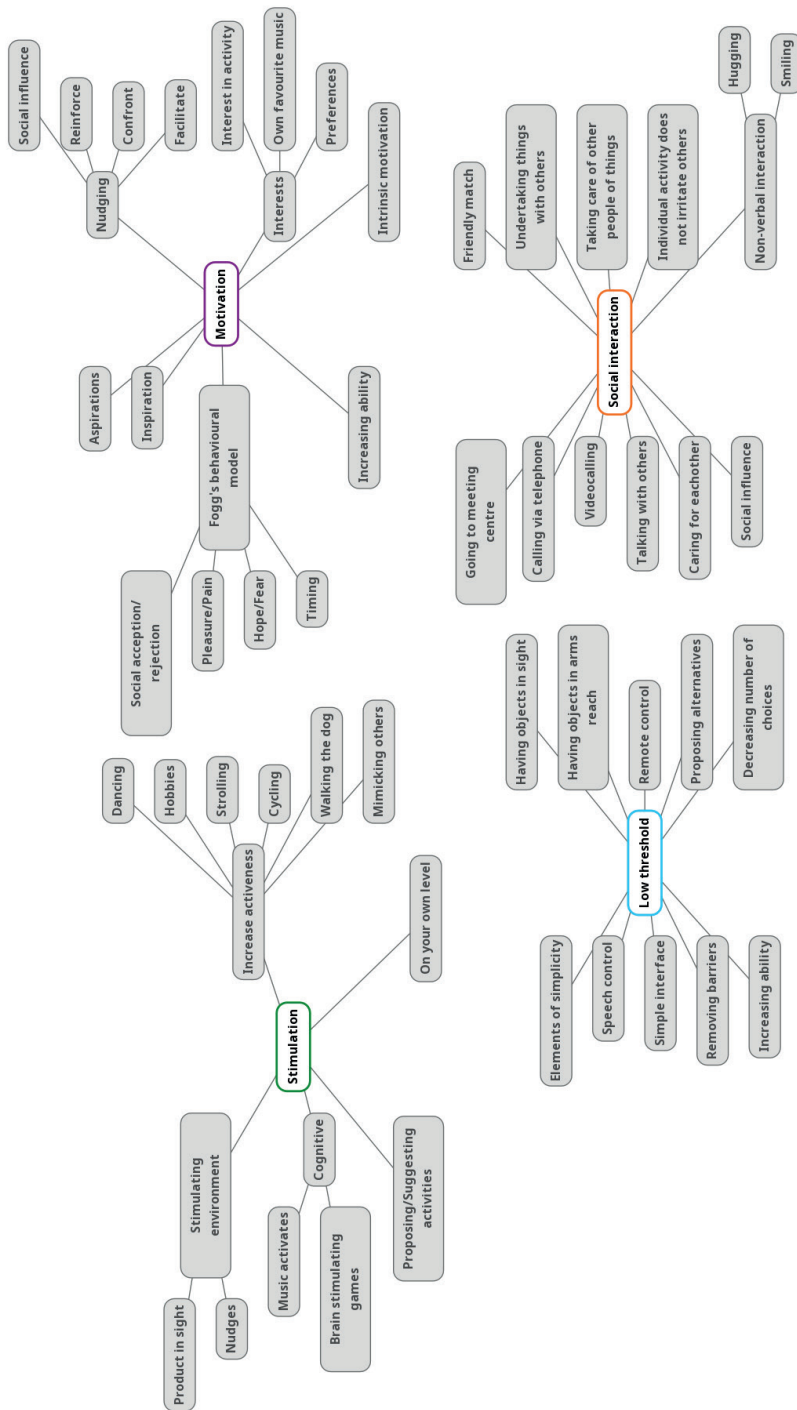
Fig. 55. First exploration of the design directions.

B.2 Verbal and non-verbal mind map
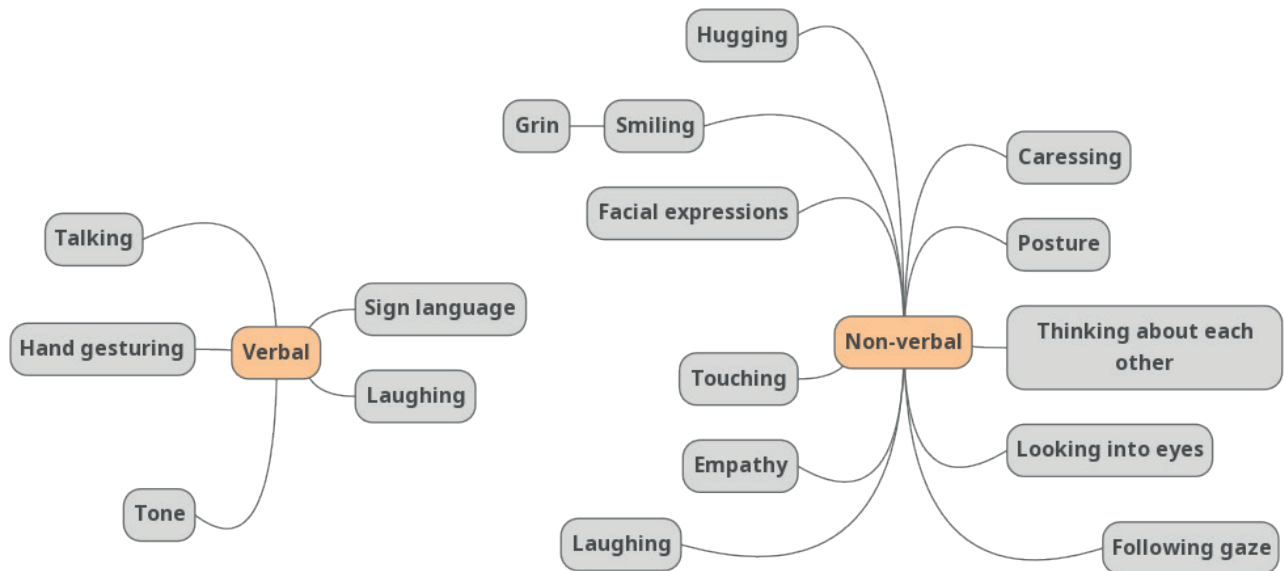
Fig. 56. Mind map of verbal and non-verbal ways of interaction.
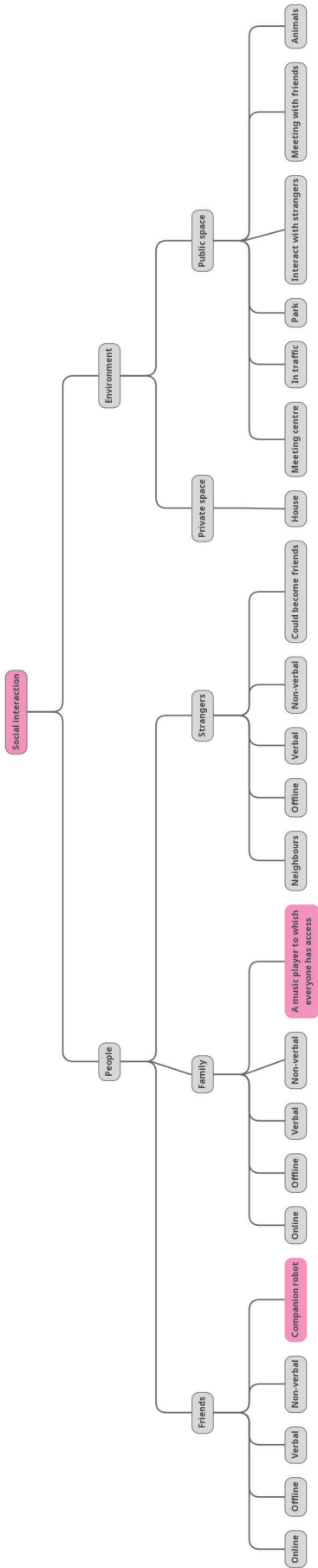
Fig. 57. Mind map Social interaction level 1-4.
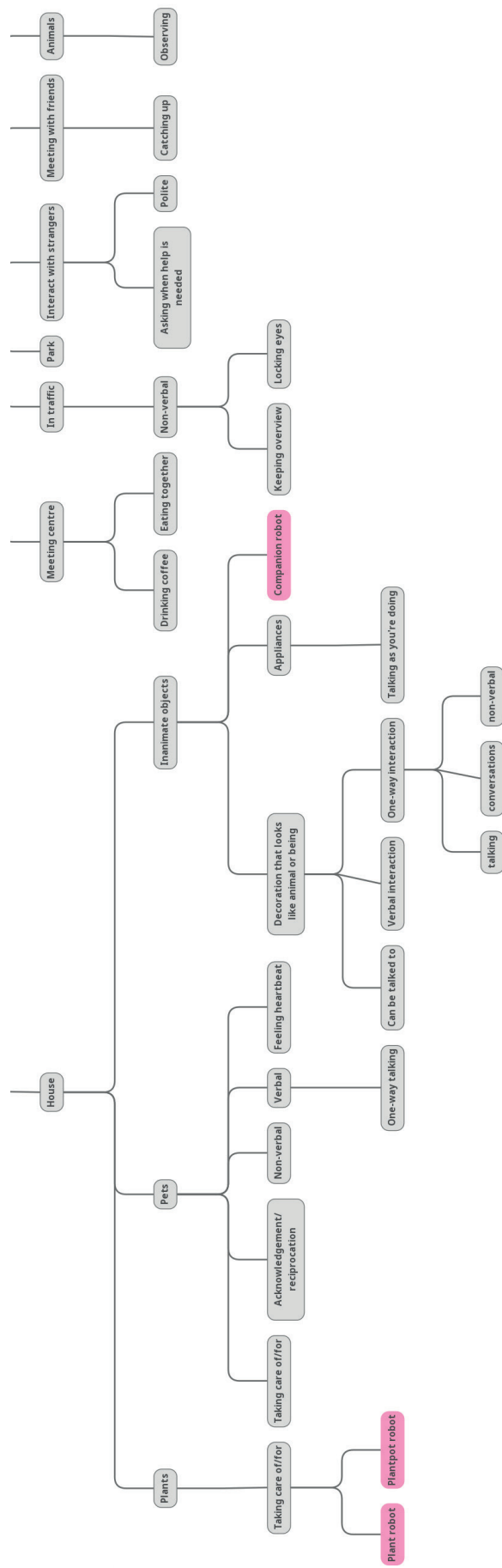
Fig. 58. Mind map Soical interaction Enivronemnt sub-tree.
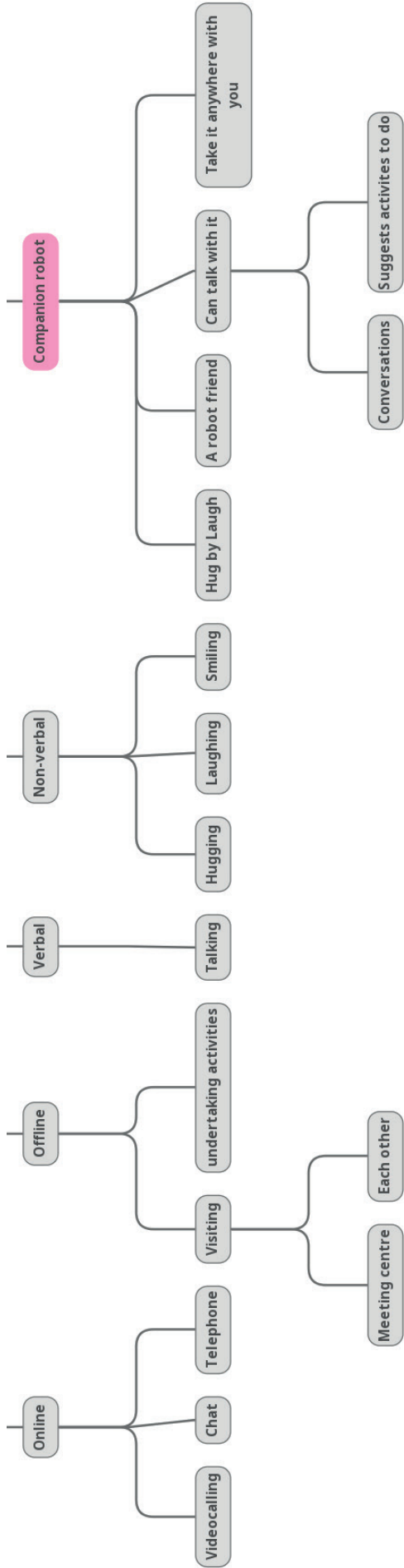
Fig. 59. Mind map social interaction People levels 3-6, Friends sub-tree.
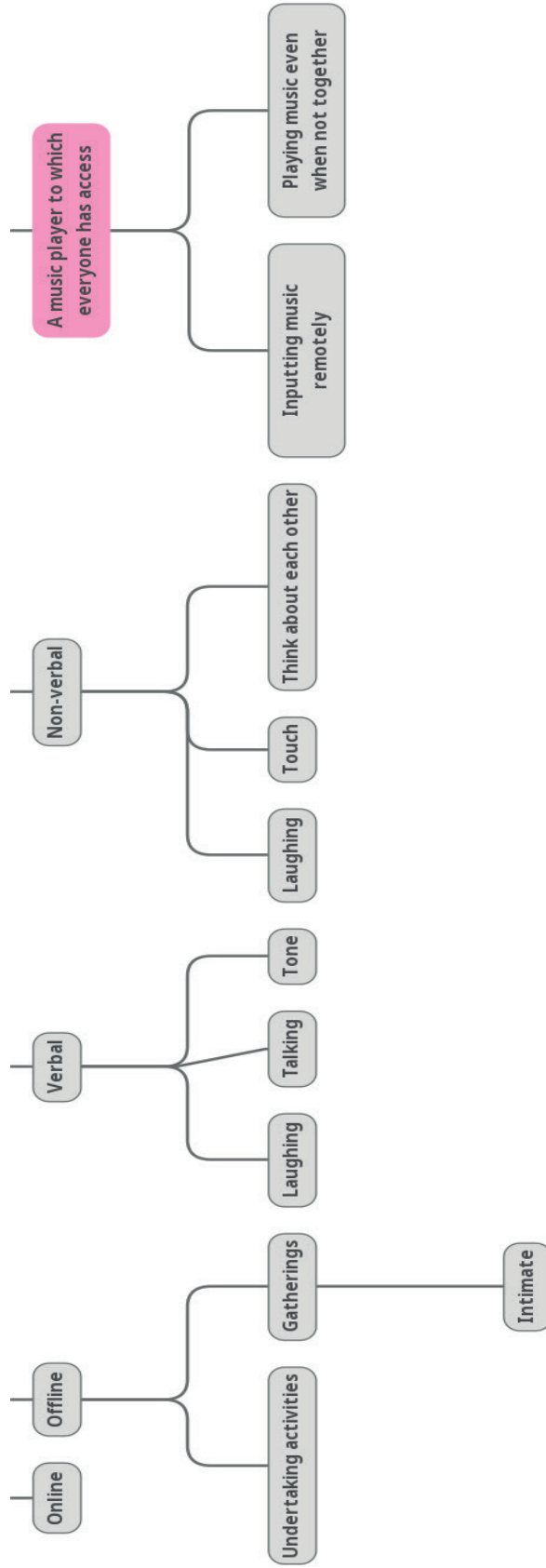
Fig. 60. Mind map social interaction People levels 3-6 Family sub-tree.
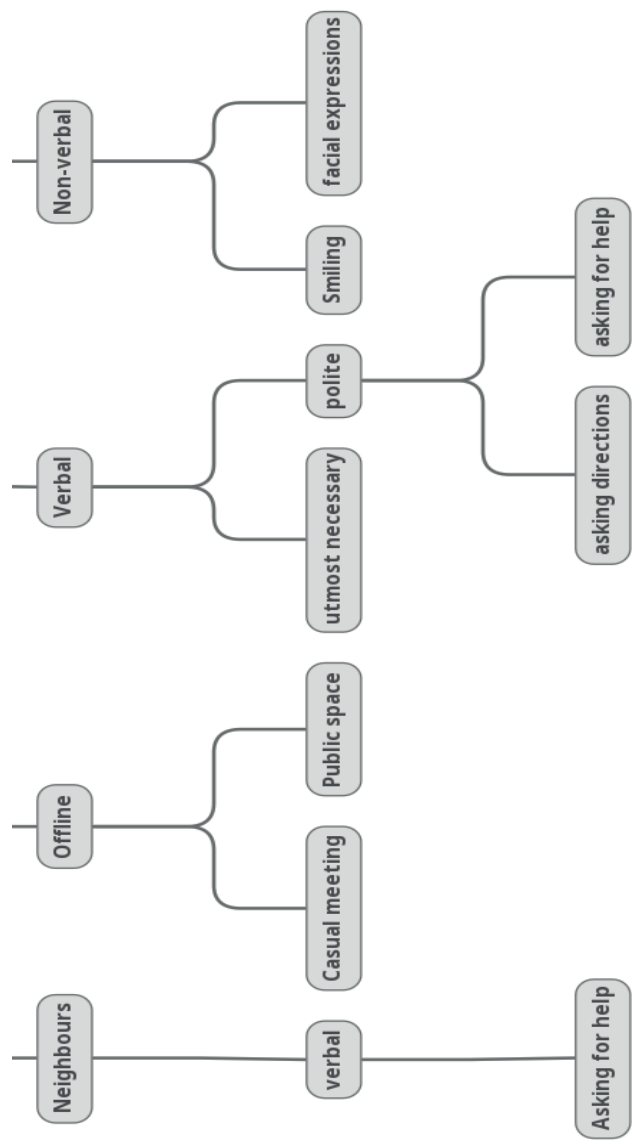
Fig. 61. Mind map social interaction People levels 3-6 Strangers sub-tree.
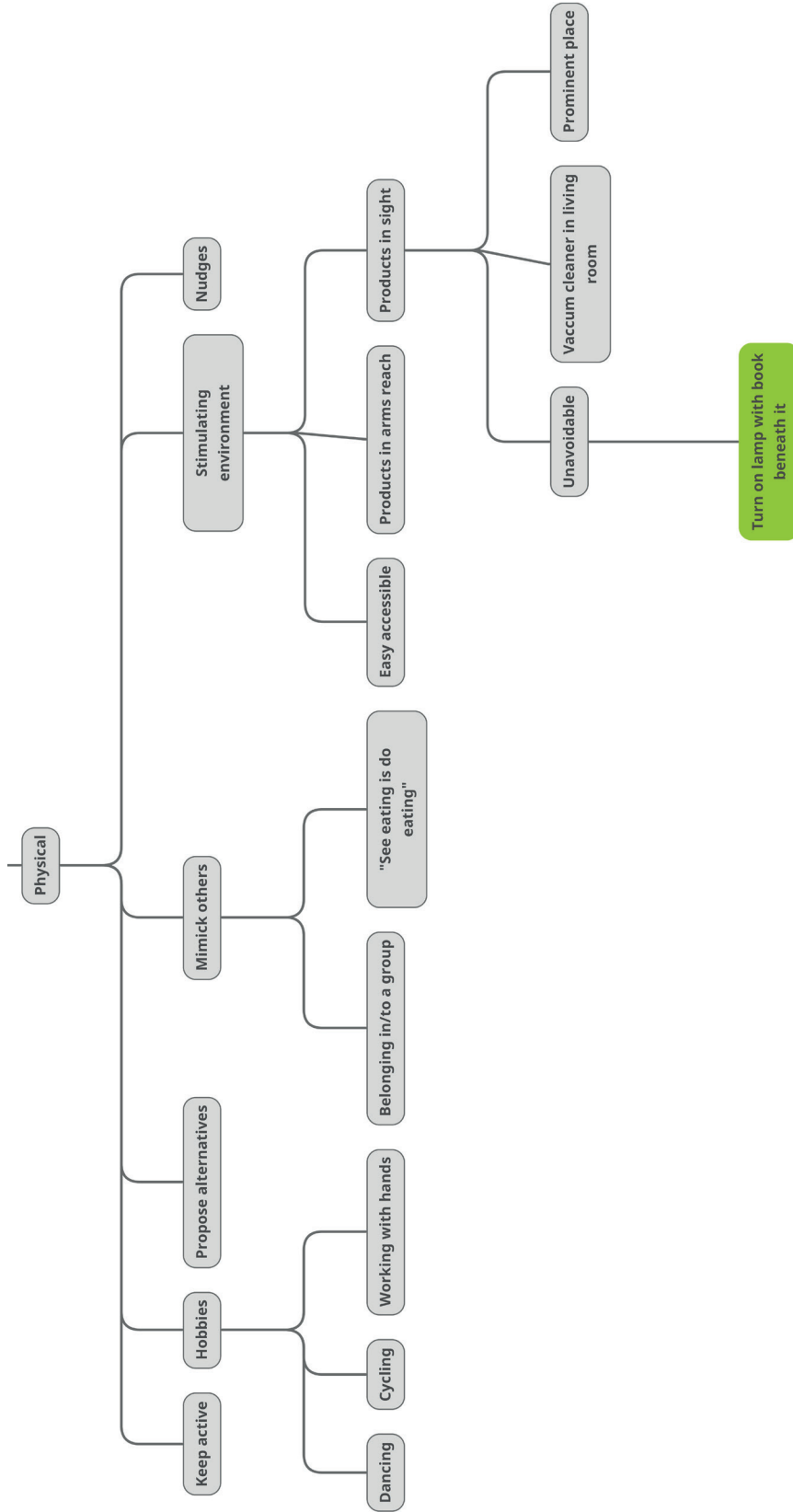
Fig. 62. Mind Map Physical stimulation.
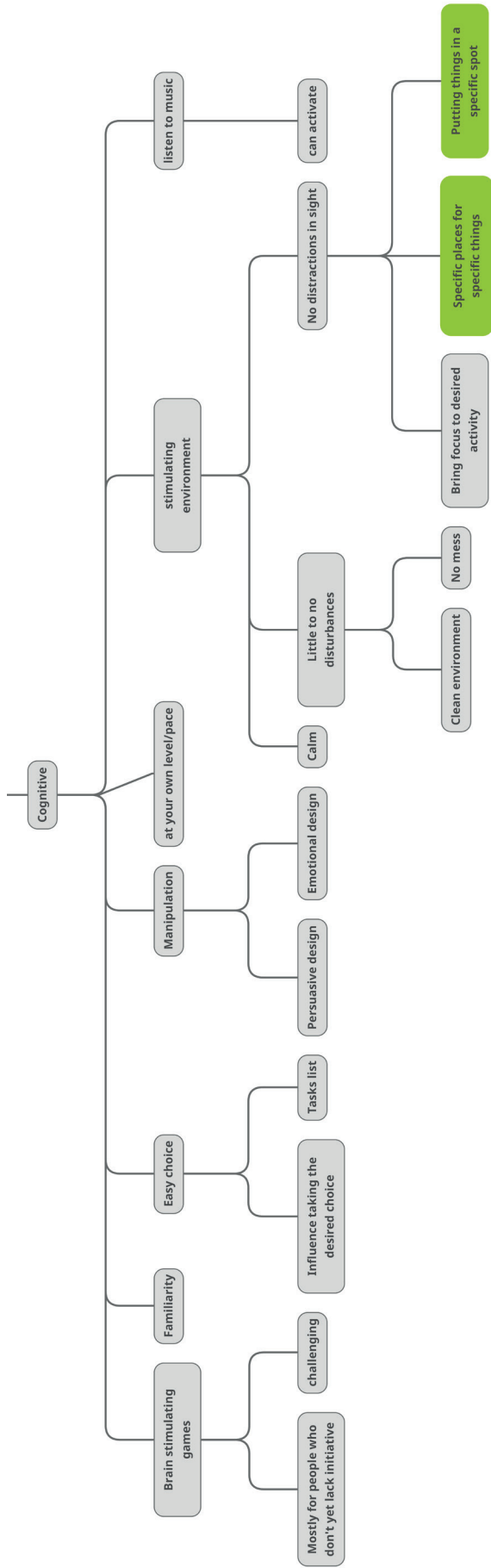
Fig. 63. Mind map Cognitive stimulation.
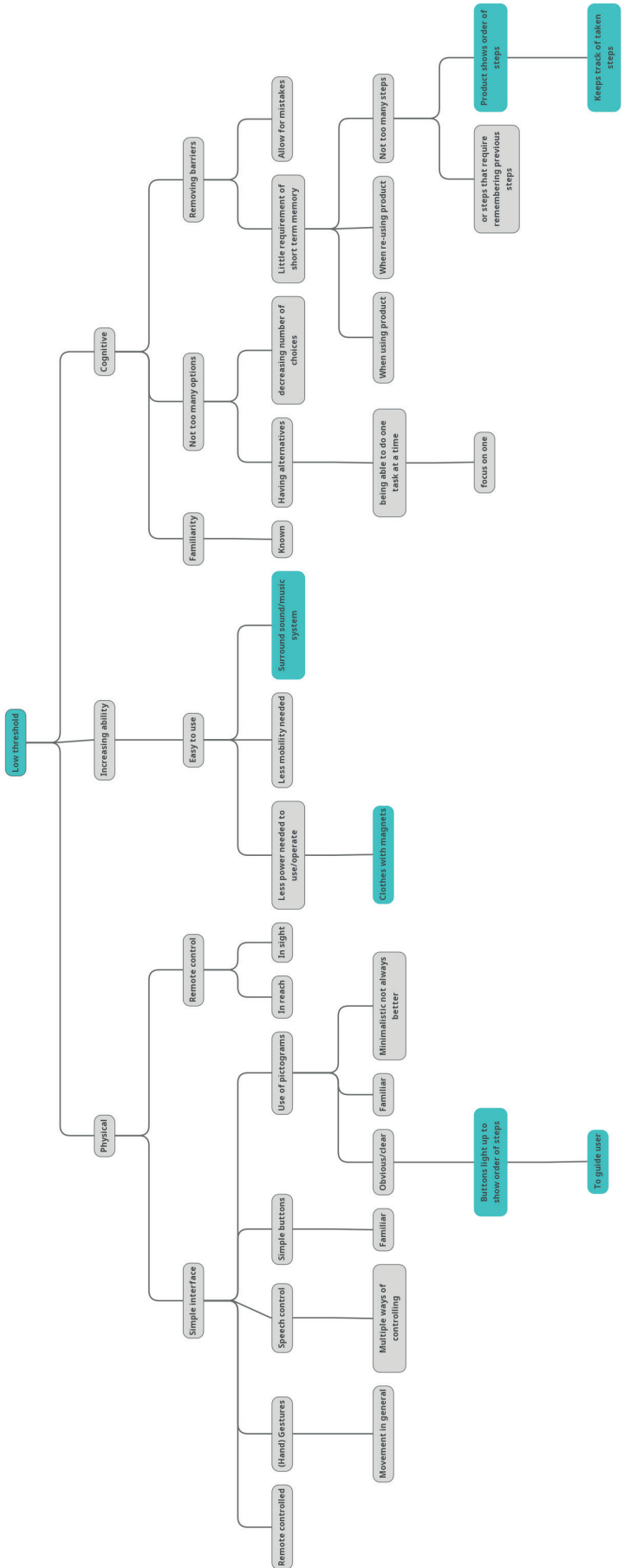
Fig. 64. Mind map Low threshold.

B.5 Low threshold
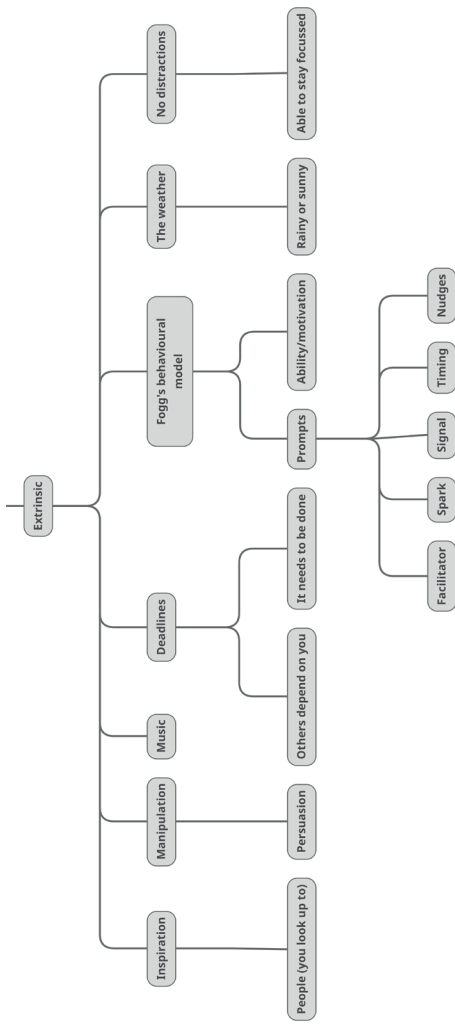
Fig. 65. Mind map Extrinsic motivation.
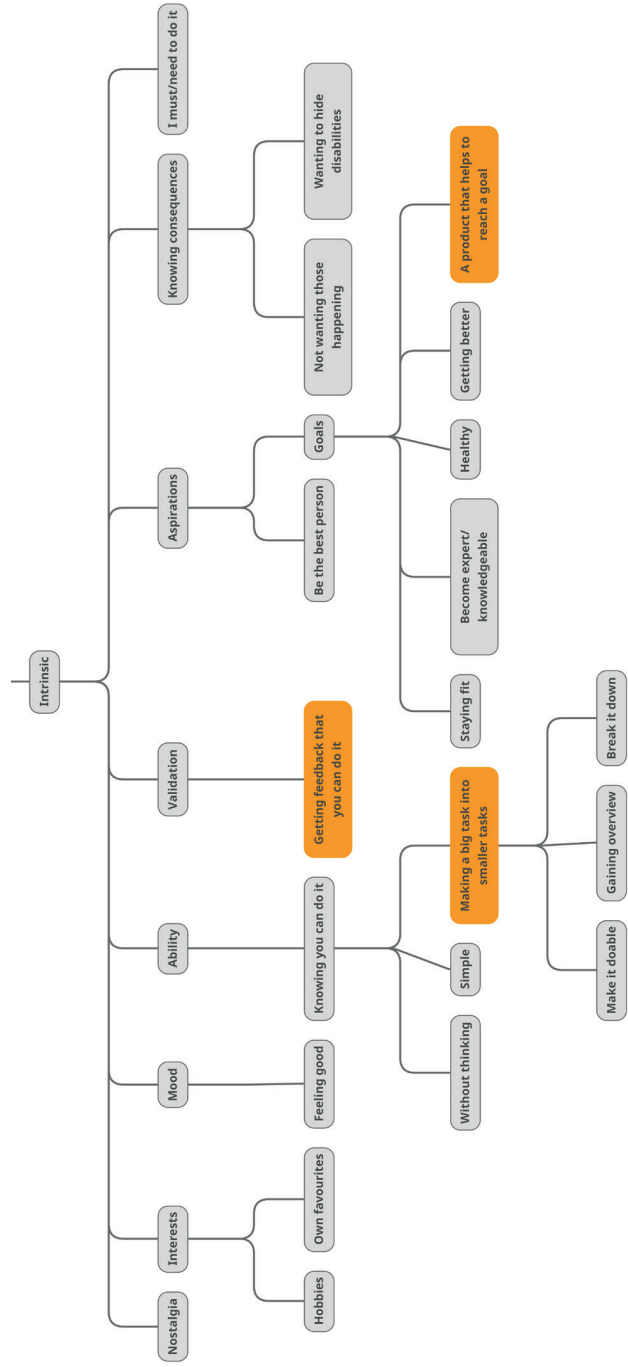
Fig. 66. Mind map Intrinsic motivation.

C: Concept boards

For each concept a concept board is made, on this board a general explanation, a scenario of general use, highlighted functions, and their correlation to the four design directions are shown. Also, a simple design of each concept is shown, to give a general idea of what it could look like. The four coloured circles on the concept boards represent the four design directions from this research, the size of each circle shows how much the concept uses of each design direction. The concept boards help to get a quick and clear understanding of what each concept is and means.

Music buttons

Play music anywhere in your home

Music buttons consists of several buttons that are placed around the house and plays music when you press it. The button lights up and makes a small noise to attract your attention, if you don't want to play music don't press it, after 5 minutes it will stop.
If you do want to play music press the button. Also pressing the button again will stop the music.
You always have the possibility to turn it on, just press it.

BLEEP
BLEEP

Low threshold

Easy control
Nearby

Motivation

Music more
present

Stimulation

Lights & sound
In arms reach
In sight
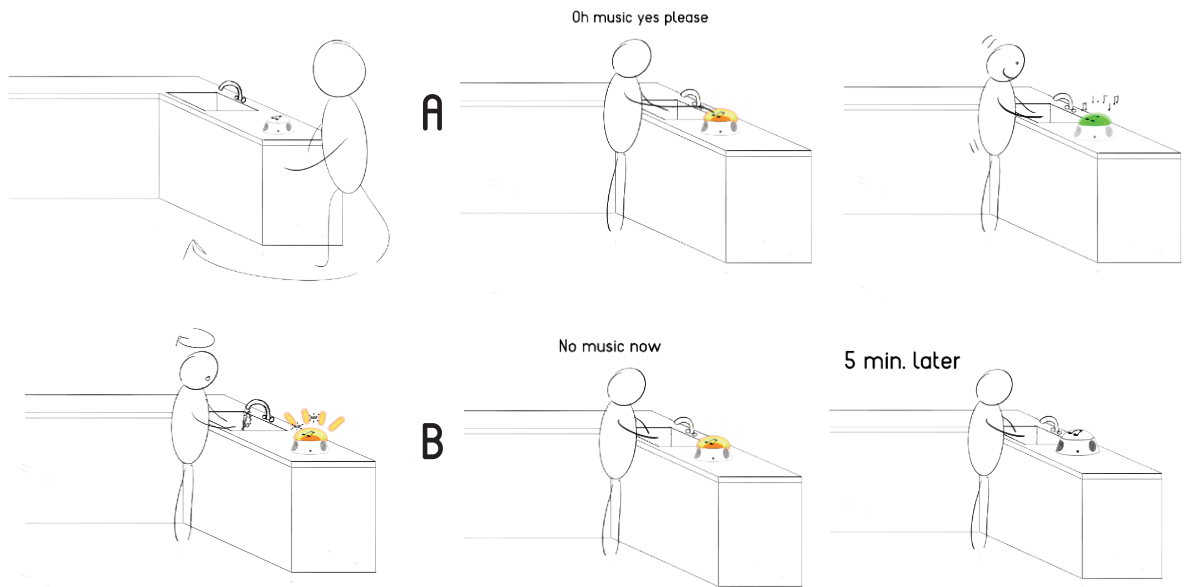
Scenario of use, with option A to play music and B to do not

Every button has a motion sensor that detects whether you are in the vicinity. If you stay close the button will light up, when you leave it will turn the music off. When one button is on and you press another the music switches to the new button.

There is the possibility to set different types of music per button, calm music next to the bed, and upbeat in the kitchen. The music can be imported via Bluetooth or Wi-Fi.

Another possibility is to play music on schematic timing, the buttons will then only light up when the schema allows
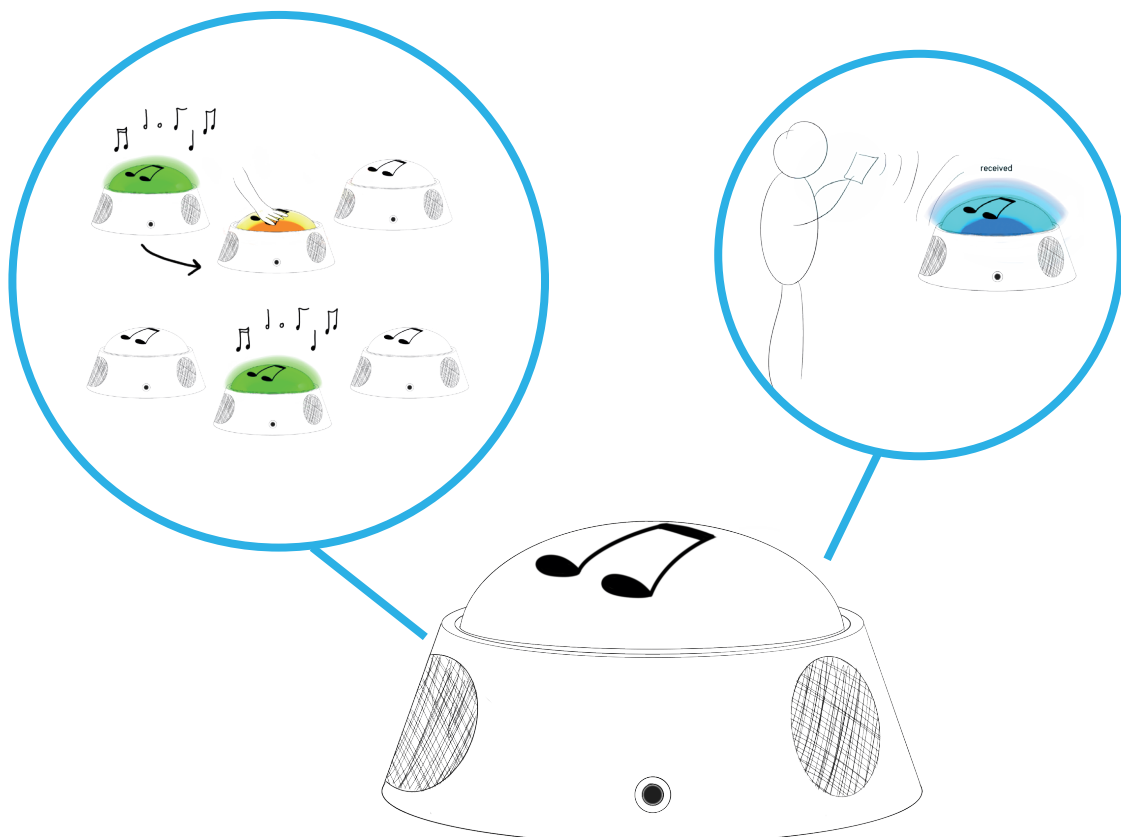
Companion robot
"I like to listen"

The companion robot is a little being that loves to listen to music and have conversations with you. When you talk and listen to music it is happy and wiggles, but if you don't listen enough it will become sad.

Low threshold

Easy to use
Speech control
Close by

Motivation

Keep robot happy
Extrinsic goal

Stimulation

Active asking
Taking care for
In sight

Social interaction

Alone or together
Taking care
Non-verbal
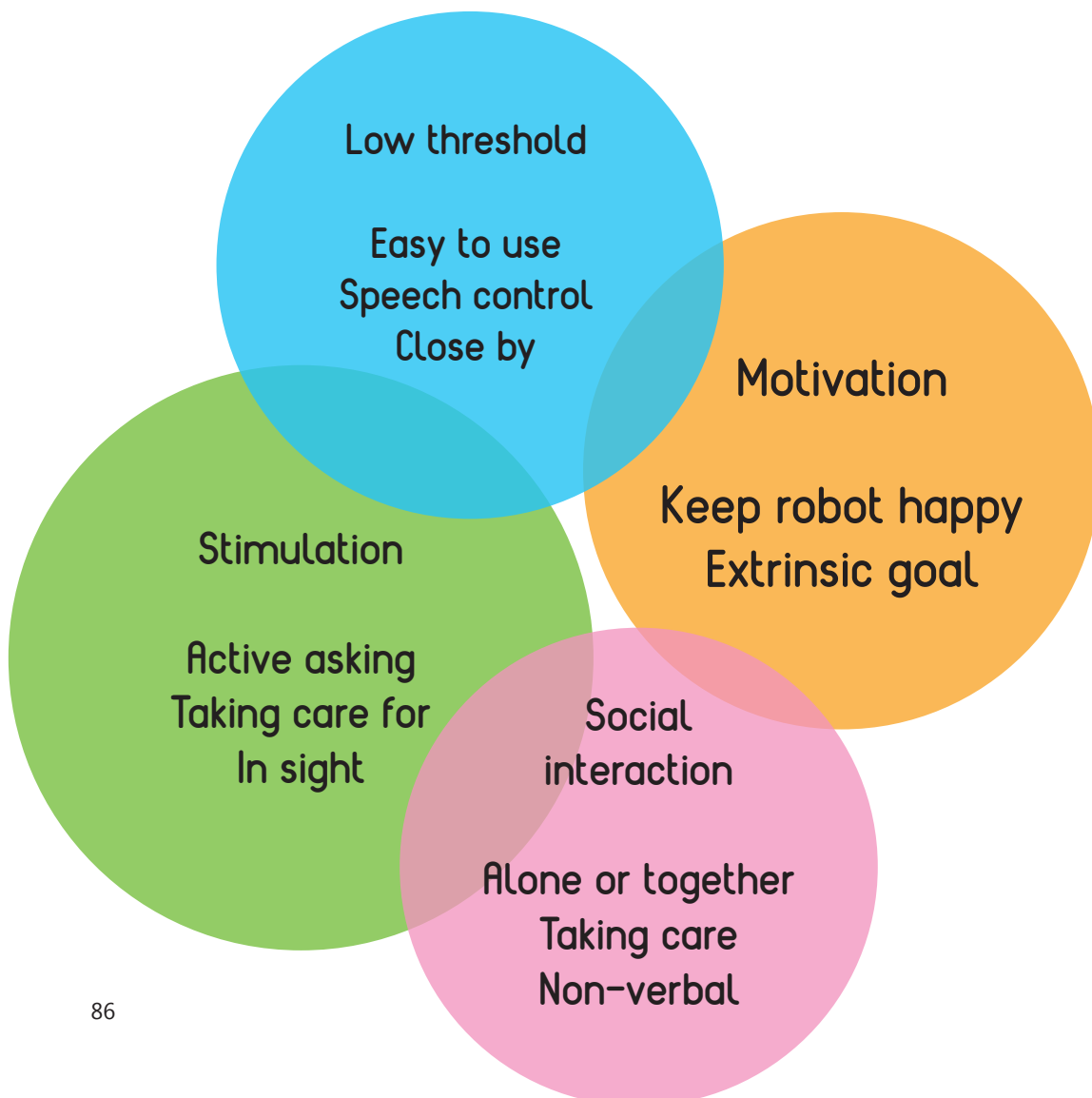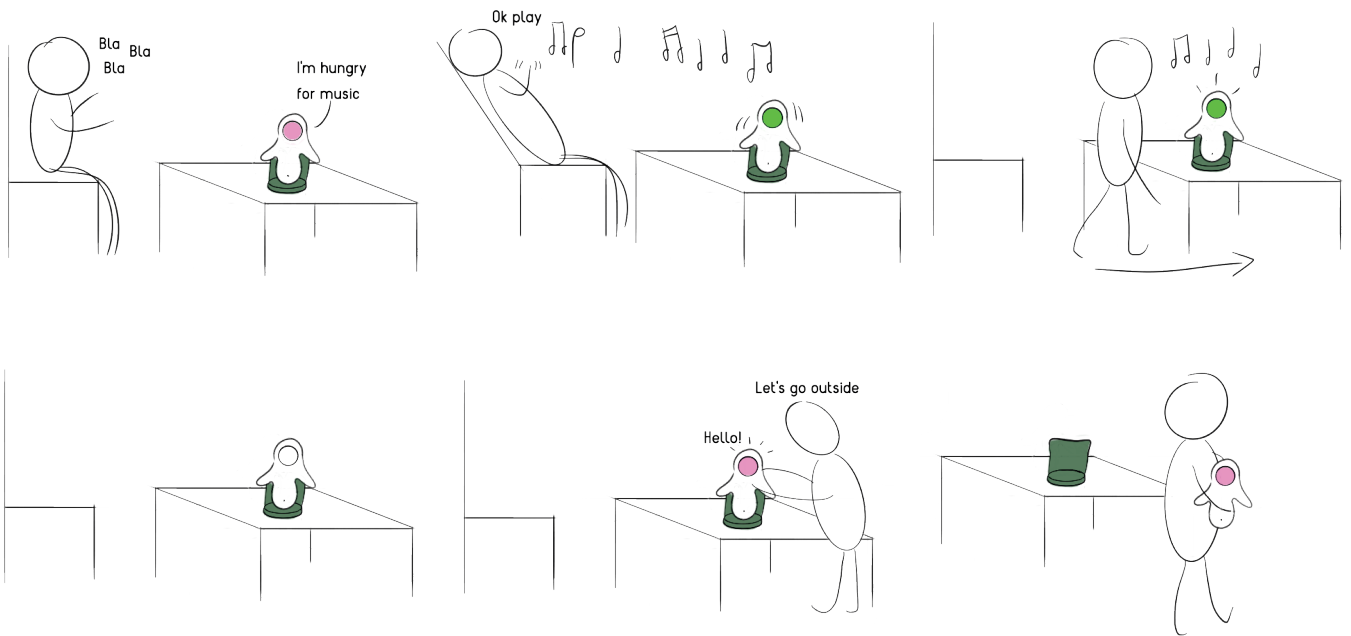
The companion has four motion sensors to detect whether you are around and thus has someone to talk to. When it detects motion it will start to talk to get your attention. It asks whether you want to talk, if you answer no it stops, but if you say yes it will make conversation. At any time you can talk or ask for music and it will obey you (happily). The companion has a simple face and can change expression. The companion is small and light enough to carrry around. At home the companion is placed in its docking station to charge, and to add music.
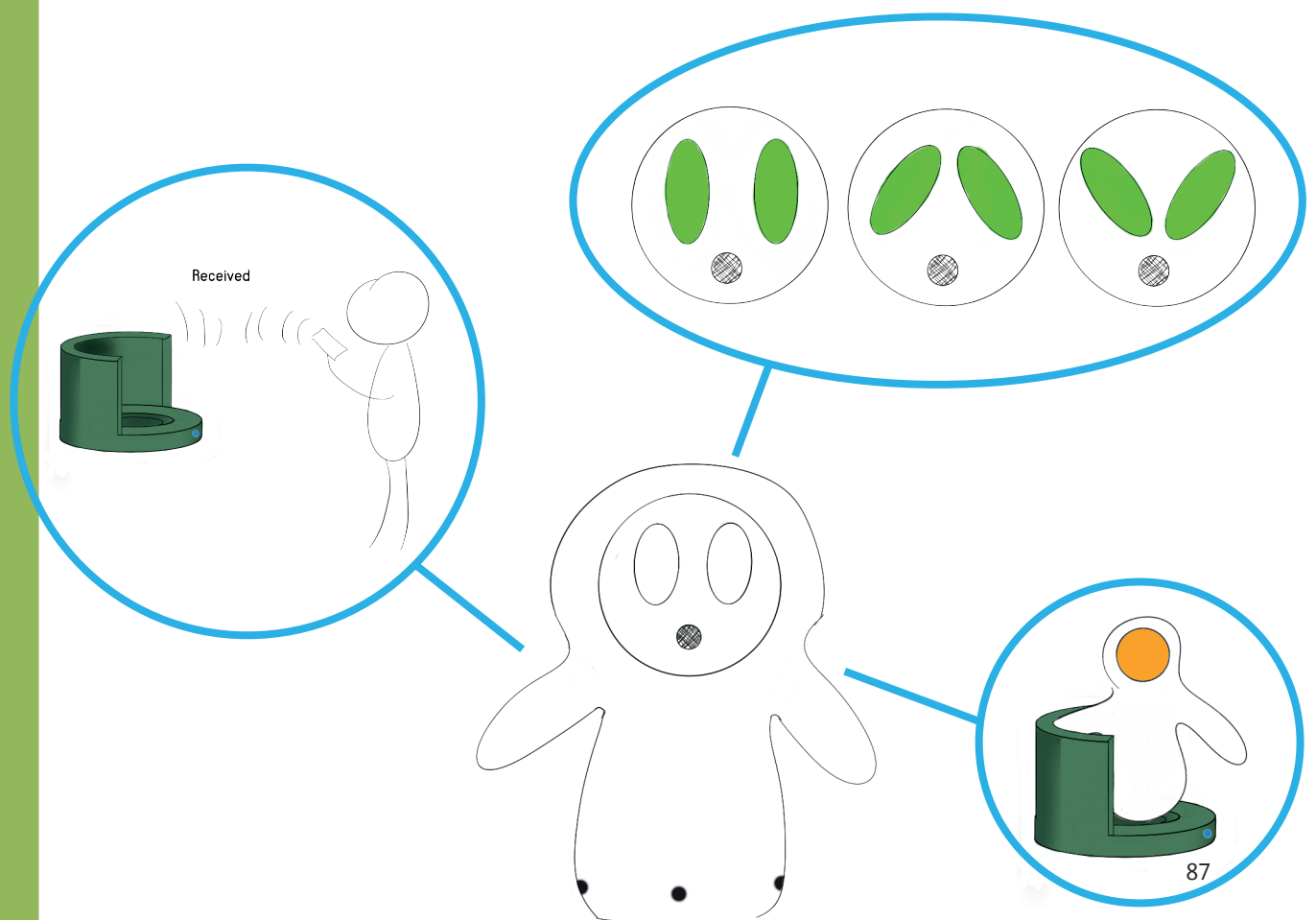
Music club

Meet – Choose – Listen – Discuss – Repeat

Every (other) week a group of people gather that like to listen to music and discuss said music. This group can consist of anyone (family, friends, like-minded, etc.) Everyone has a music player at home, they choose the genre/artist to listen to and discover more on the online platform, together.

Low threshold

With anyone
Easy to do

Motivation

Inspiration
Validation
Others'
interests/goals

Stimulation

Gatherings
Others' enthusiasm
Familiarity

Social
interaction

Talking
Being together
Discussions
Connecting
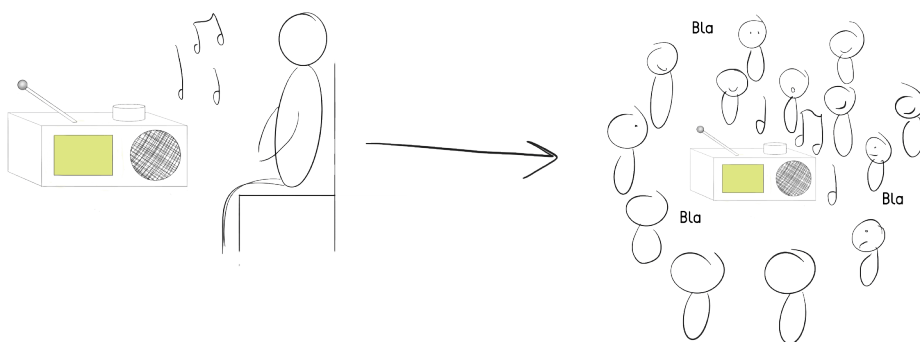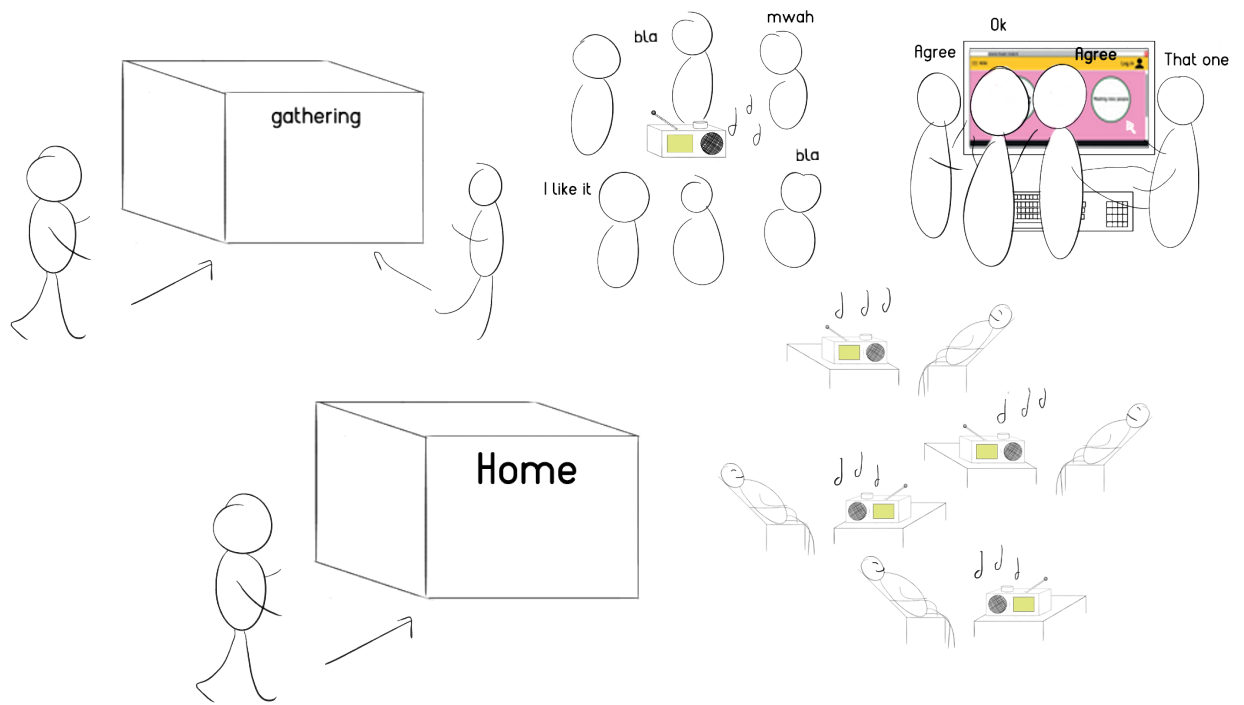
Every member of the group owns the same music player, they are connected to each other and the platform, so that you can listen to the same songs/genre.

The online platform is a website where you can choose the next genre/artist, get inspiration for what to do during gatherings, meet new people/groups, and see what other groups are doing.

During a gathering several activities can be done, for example, you can listen and discuss, sing together, dance, play music games, etc. as long as music is involved.
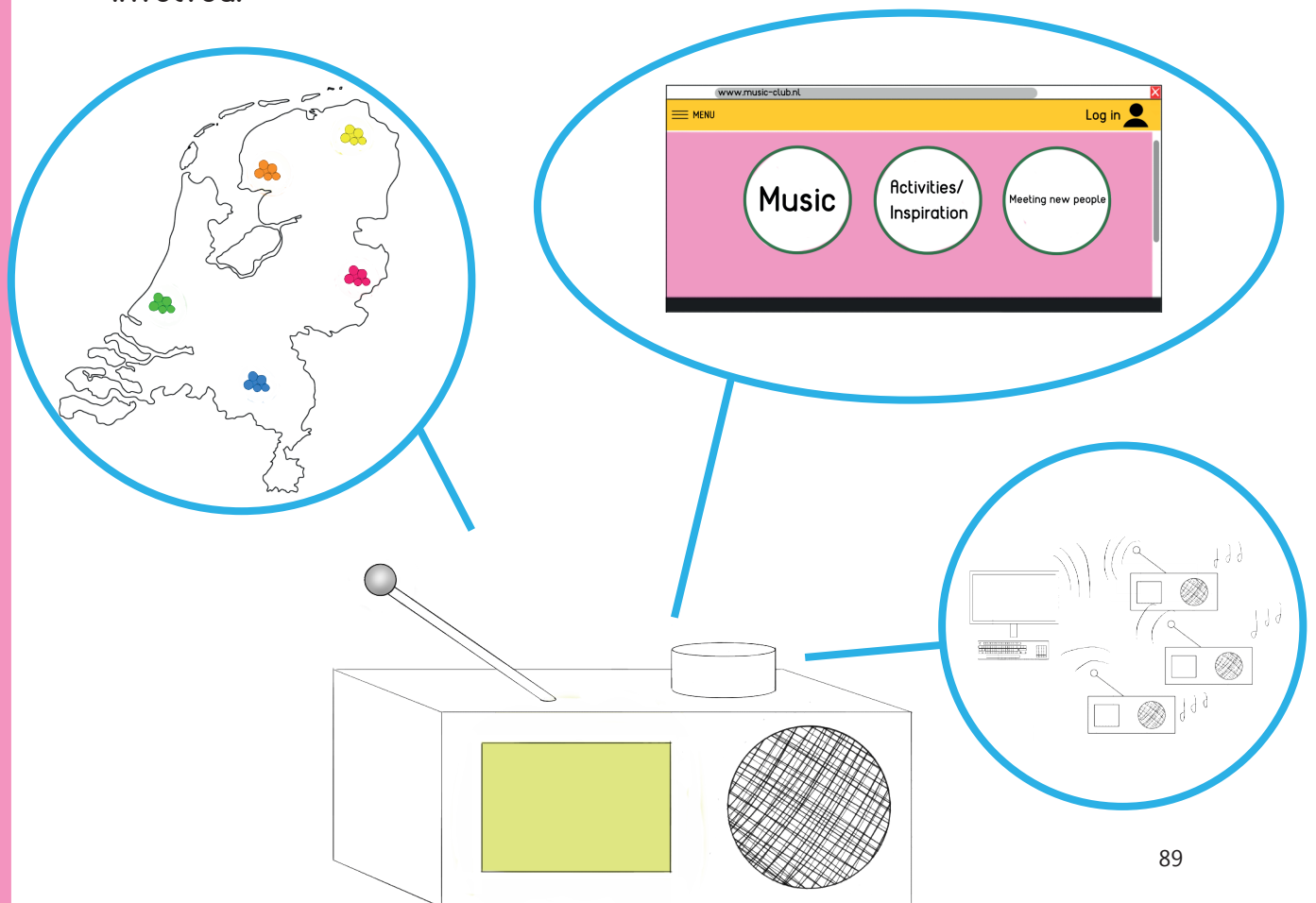
D: Use scenarios and problem scenarios with solutions

D.1 General use scenario

Option A: When wanting to listen to music

User walks in and gets detected by the station

The station makes a sound and emits orange light to attract the users attention

The user notices the station and presses the button to turn the music on

The user enjoys the music and moves to it

The user walks away

When the user leaves the station keeps trying to detect motion for 5 minutes

After five minutes of no motion detected the station turns off

Fig. 67. General use scenario option A.

Option B: When not wanting to listen to music

User walks in and gets detected by the station

The station makes a sound and emits orange light to attract the users attention

The user does not want music and walks away

5 min.

After five minutes of no interaction the station turns off

OFF

After five minutes of no motion detected the station turns off
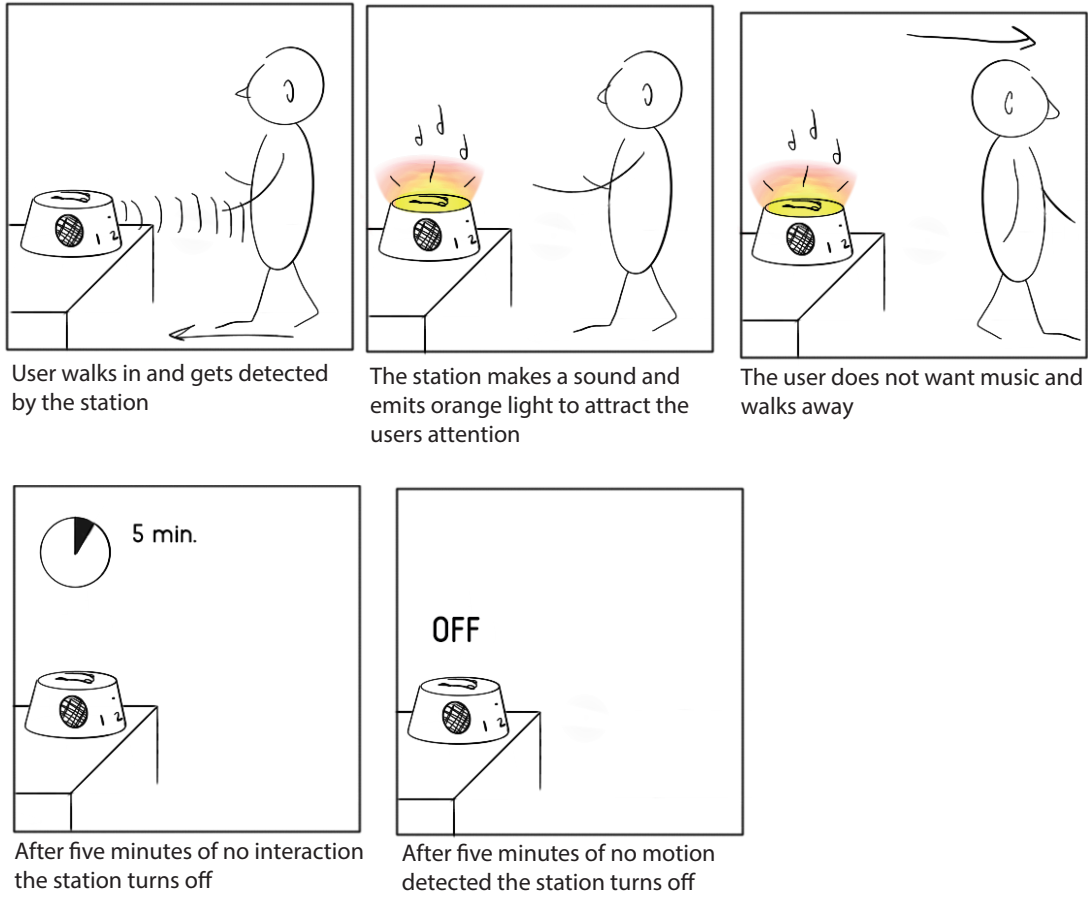
Fig. 68. General use scenario option B.

D.2· First use

let's install the app

Take the hub out of the box and install the app

Plug the hub into the power socket

The hub starts to light up blue to indicate it needs to be added to a network

HUB | Station toev.

Station toevoegen

Netwerk beheren

Schema

Aandacht trekken

Zoeken

In the app go to HUB -> Add station and press search
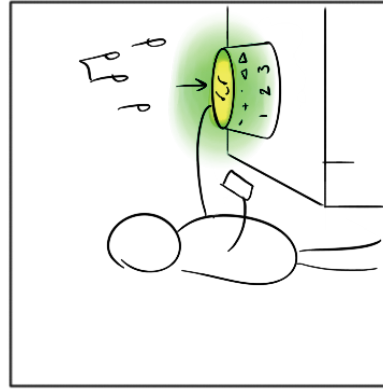
You are all set, press any button to start the music, and add other stations to expand the network

Station toev.

Gevonden stations
Kies een station

Station #10202

Station #43819

Station #11222

Station #10202
Verbinding maken..

Keuken

123

Muziek regelen

1

2

3

Muziek regelen

1

Spotify

Radio

URL

Eigen importeren

When unconnected stations are found press the one you want to add -> make connection -> fill in Wi-Fi password. When connected you can change the name of the HUB/station. After a connection has been established the app will instantly move you to the the place to set the music

Choose for which button you want to set the music -> choose from where you want to listen from

Fig. 69. First use scenario.

D.3 Object in front of the sensor
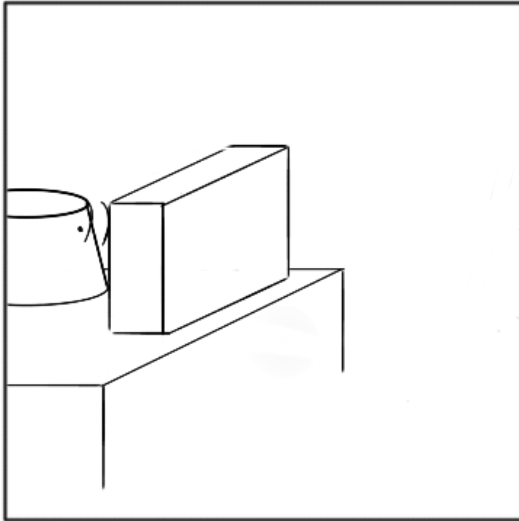
The hub tries to detect motion, but something is standing in front of the sensor
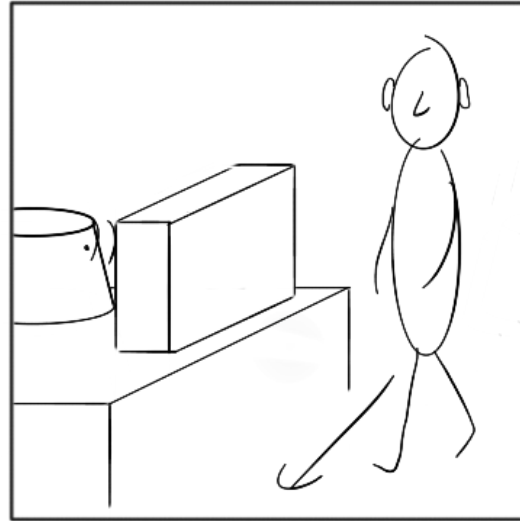
When John walks past, the hub cannot detect John

Solution
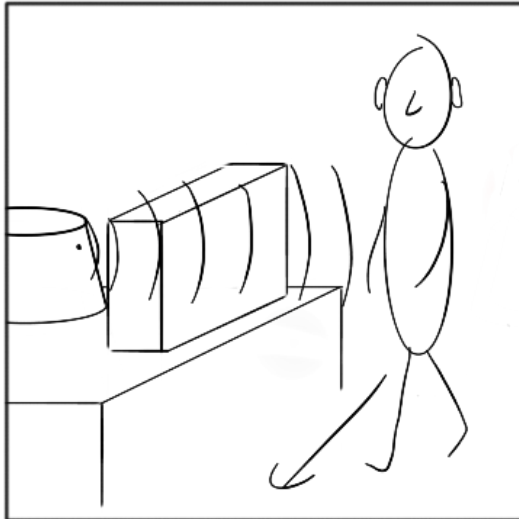
With the use of a radar sensor, the sensor can detect John's motion
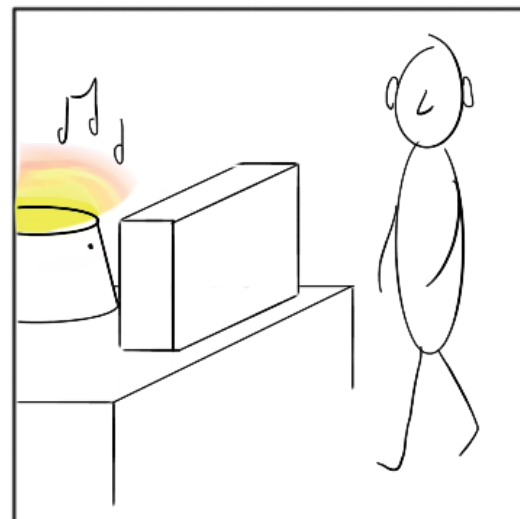
And therefore it can start to try to get John's attention

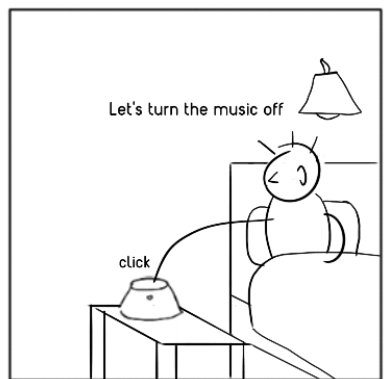Fig. 70. Problem scenario with solution. Object in front of the sensor.
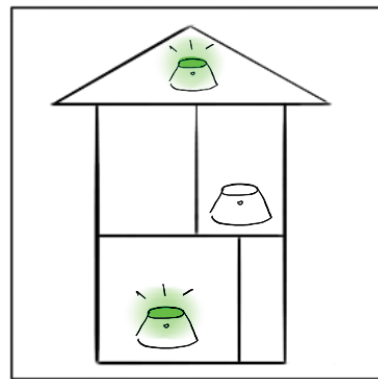
D.4: Turning off multiple music players
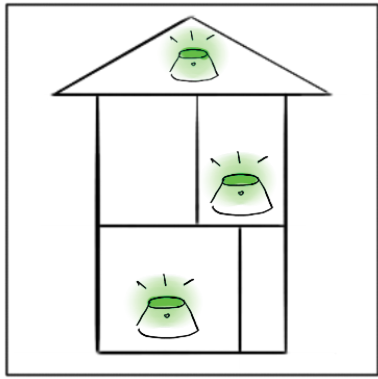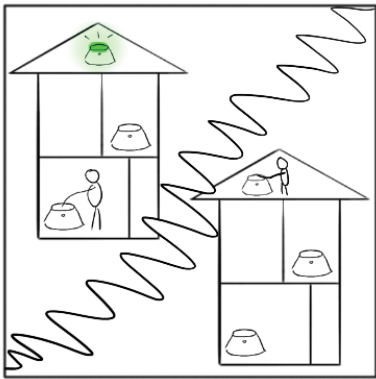

Several stations are playing music in the house
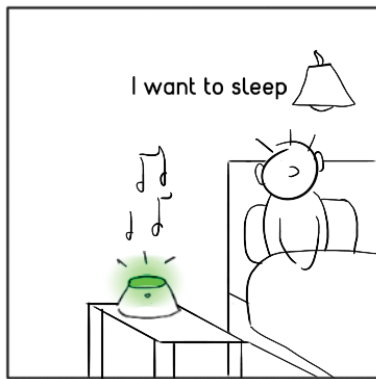
John is laying in bed and wants to sleep

He presses the main button on the station next to him. It turns off

Only the station in the bedroom turns off

John needs to go to all the other turned on stations to turn each one off

Solution
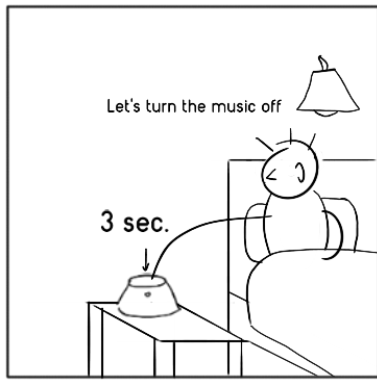
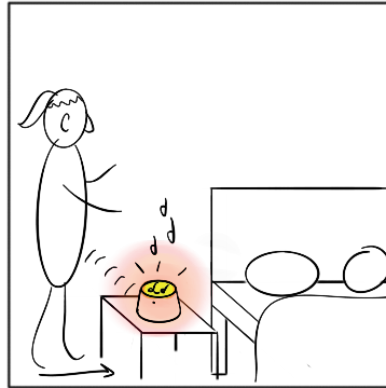As a solution, John presses a button for 3 seconds
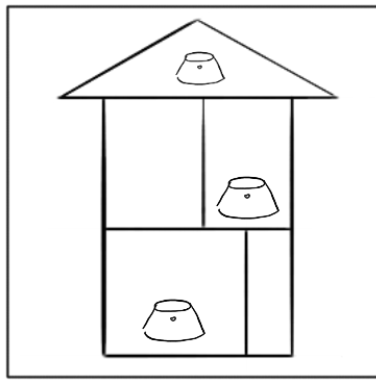
All the turned on stations in the network turn off at the same time

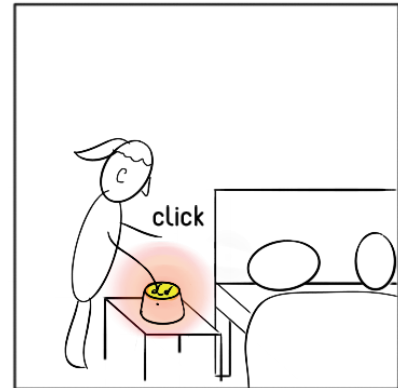Fig. 71. Problem scenario with solution. Turning off multiple music players.
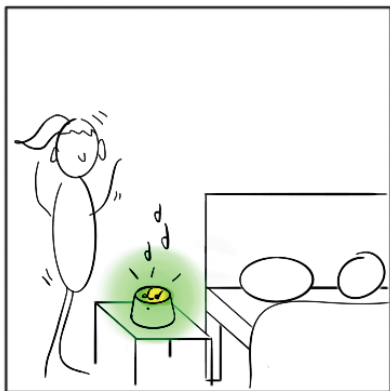
D.5 Another person detected

John is listening to music coming from the hub in the living room
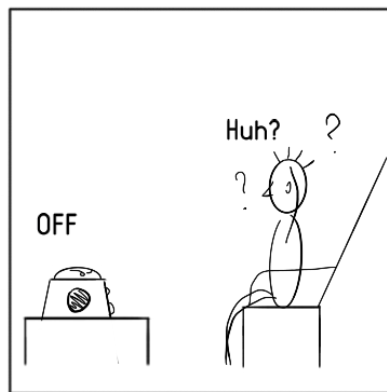

Linda walks into the bedroom, the station notices her and tries to get her attention

Linda presses the button on the station to listen to music in the bedroom

The music now starts to play in the bedroom

The hub turns off because another button in the network is turned on. John doesn't understand what has happened

As a solution there should be the option to be able to turn on multiple devices in the network

Fig. 72. Problem scenario with solution. Another person detected.