EMPOWERING PARENTS WITH MILD INTELLECTUAL DISABILITIES THROUGH DESIGN

A MASTER THESIS BY MARIEKE DE PAAUW

Empowering parents with mild intellectual disabilities through design.

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Master thesis

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EXECUTIVE SUMMARY

In the Netherlands 1.5% of persons with an intellectual disability have children, most of these parents only have mild intellectual disabilities (Willems, De Vries, Isarin & Reinders, 2007). In practice this means that a few thousand children have parents with a mild intellectual disability (De Vries, 2005). Research shows that there is a limited system capacity to support parents with mild intellectual disabilities (MID). Whereas most other parents can rely on their social network when they need support with child rearing, parents with MID have to rely on the care system (McConnell, Matthews, Llewellyn, Mildon, & Hindmarsh, 2008) because of their limited social network. Given the likely increase in parents with MID (Feldman, 1994) and the increased risks for their children there is a need to empower these parents and stimulate their self efficacy.

This master thesis focuses on exploring different possibilities to empower parents with MID and stimulate their self efficacy through design. The thesis is divided into four different phases; exploration, ideation, conceptualization and concept validation.

In the exploration phase a focus group with experts, interviews with parents with MID, context mapping and home visits were conducted to get a better understanding of the target

group and the context. According to Oomen (2009) parents with MID have difficulties with applying new skills in new situations, therefore it is important to learn them new skills in the context of use. This emphasized the urge to conduct elaborate user research on context level. This exploratory research on context level has shown that there is a big support need for providing parents with structure during the eating routine. It is not uncommon for a person with an intellectual disability to have difficulties with everyday functional activities such as dressing and eating, which limits their independence in daily life. According to Wehmeyer et al (2012), technology could improve these functional abilities to perform everyday activities, to increase their independence in daily life.

The outcomes of context research and the insights gained from literature led to the focus of this project: providing parents with structure during the eating routine. The outcomes of this research lead to an interaction vision with the following desired interaction qualities: empowering, pro-active, magical and intuitive. The design should empower parents with a mild intellectual disability in a pro-active and intuitive way. It should motivate parents to structure the eating routine. Furthermore it should provide parents with a magical feeling.
An important conclusion drawn from the user research is that the table can be seen as an important object during the eating routine. This was the starting point of the ideation phase. The table is part of both the living room and the kitchen and it is the central point of the house. During the interviews care experts mentioned that parents with MID have troubles with having structure in their eating routine. The future design should embed perfectly into the context of use, therefore 'projection on the table' was chosen as ideation focus. During a creative session rough prototyping was used as a generative tool. Multiple ideas were generated in this creative session and brainstorms. In the conceptualization the conclusions from the exploration phase were used to develop these ideas into different iterations.

These iterations led to concept Luna. A design to empower parents with a mild intellectual disability by providing them with extra structure during the eating routine in a pro-active way.

At the end of the afternoon just before dinner time, Luna starts up by making a sound. A projection of plates and cutlery on the table at a given time is used as an intuitive way to motivate parents to set the table by imitating the projection. If a parent places a plate, Luna will make a positive feedback sound. Luna will make a positive feedback noise to confirm the good behavior

of the parent. When the table is fully set, the projections of the plates and cutlery will disappear supported by sound; providing the parent with extra visual and auditive positive feedback. Research that was conducted at the exploration phase of this project and several other studies emphasize the importance of positive feedback when supporting parents with MID (Het Nederlands Jeugdinstituut, 2014; Oomen, 2009).

The design enables parents to snooze the projection. The parent can decide to delay the time the projection starts. The snooze function provides the parent with a feeling of autonomy. The parent can decide to delay the time the projection starts. This feeling of autonomy is an important element in the design. The design fosters collaboration, which was one of the key insights of the research on context level conducted in this study. Parents should feel in control, they should feel like they could collaborate with the design like partners. (Oomen, 2009; Durinck & Racquet, 2003; Het Nederlands Jeugdinstituut, 2014). However, the actual amount of autonomy is limited. The design can only be snoozed for three times and with each snooze the snoozing time will decrease.

To evaluate the design goal, the effect and the intended interactions of this design concept a validation interview with a care expert was conducted. The main insight of this validation interview is that the intelligent support tool could empower parents with MID, but it is of big importance that these parents are motivated and willing to change their behavior.

The validation interview also highlighted the important role of the care giver. The design is not self learning yet, it does not adapt to the skills and knowledge of the parent. Therefore it is important that implementing the design into the house of a parent is a well-considered choice. In case of future implementation an elaborate introduction for care experts is necessary. If care experts are involved actively into the introduction of the design they can motivate and support parents in the process of changing their behavior. Future research is necessary to discover how the design should be implemented.

The results of this master thesis could be valuable for creating a behavioral change within the same target group for other activities, but for other target groups as well by teaching routine behavior through repetition and structure assisted by visual and auditive feedback in a pro-active way. With only little adjustments the design could empower any target group. The amount of possible applications is infinite.

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chapter 00

PROJECT INTRODUCTION

This first chapter of the master thesis presents the design brief. The design brief starts with a problem definition. Usually a problem definition is set up at the end of a problem analysis. In this project the problem was already defined through elaborate research by the initiators of this project, Garage2020. Therefore the design brief starts with a problem definition in which the problem and its social relevance are explained. Next the design goal is specified. The design goal describes the desired effect that the design should have on the target group and the interactions in the chosen situation. A research question is presented to explore the target group and the context of use. The design brief concludes with an overview of stakeholders that will be directly or indirectly affected by the design. Next the project partners will be presented. The chapter concludes with an overview of the design approach of this master thesis. The design brief is the starting point of the next chapter *01 exploration*.

1 DESIGN BRIEF

1 PROBLEM DEFINITION

According to the Diagnostic and Statistical Manual of Mental Disorders IV classification people with mild intellectual disabilities (MID) can be defined as people who have an Intelligence Quotient lower than 70, have deficient adaptive functioning and this should occur before the age of 18 (De Beer, 2011). Het Nederlands Jeugdinstituut defines a mild intellectual disability as having an IQ between 50 and 85 and having limitations in adaptive functioning (Nederlands Jeugdinstituut, 2014). So, only having a low IQ is not an indicator for having a mild intellectual disability. As can be seen in these definitions, different criteria are used to define mild intellectual disability. To include as much people in the target group for this design project as possible, the definition of het Nederlands Jeugdinstituut will be used as definition for the target group of this project. The limitations in intelligence level and social adaptability can have an impact on an individual's capacity to parent a child effectively (Coren et al, 2011). Parents with intellectual disabilities have a higher risk of contact with youth care institutions and on having their children removed (IASSID, 2008).

In the Netherlands 1.5% of persons with intellectual disability have children, most of these parents only have MID (Willems, De Vries, Isarin & Reinders, 2007). In practice this means that a few thousand children have parents with a mild intellectual disability (De Vries, 2005). Children of parents with a mild intellectual disability have a high risk on neglectful care, which could result in health, developmental and behavioral problems (Feldman, 2002) or increased risk of intellectual disability (Joha, 2004; James, 2004). Approximately 25% of these children has an intellectual disability. Some children were born with this disability, but most children will develop an intellectual deprivation in the first few years after they were born due to insufficient stimulation within the family (Joha, 2004). A strong foundation in early childhood increases the odds on positive outcomes whereas a weak foundation increases the chances on later problemacy (Center on the Developing Child, 2007). This highlights the importance of early interventions for the development of the child. According to a study of Willems, De Vries, Isarin & Reinders (2007), 51% of the parenthoods

2 DESIGN GOAL

TO DESIGN AN OBJECT WITH INTENT PRODUCT OR SERVICE THAT EMPOWERS PARENTS WITH A MILD INTELLECTUAL DISABILITY IN THE REARING OF THEIR CHILDREN

EFFECT

A COGNITIVE BEHAVIORAL CHANGE; PARENTS WITH MILD INTELLECTUAL DISABILITIES WILL BECOME MORE INDEPENDENT AND THEIR SELF-EFFICACY WILL INCREASE.

with intellectual disabilities in the Netherlands were regarded by caregivers as not-good-enough and 16% were doubtful.

Research shows that there is a limited system capacity to support parents with MID. Whereas most other parents can rely on their social network when they need support with child rearing, parents with MID have to rely on the care system (McConnell, Matthews, Llewellyn, Mildon, & Hindmarsh, 2008) because of their limited social network. Given the likely increase in parents with MID (Feldman, 1994) and the increased risks for their children there is a need to empower these parents and stimulate their self efficacy. Therefore the design goal of this thesis is defined as:

to design an Object with Intent product or service that empowers parents with a mild intellectual disability in the rearing of their children

This project was initiated by Garage2020 with the assignment to design a robotic device with humanoid characteristics to support parents with a mild intellectual disability in the rearing of their children. According to previous research of Garage2020 the desired effect of the design should either be improved development of the child of a parent with a mild intellectual disability (long term goal) or stimulation of self-efficacy of the parent with a mild intellectual disability (short term goal with long term effects). Since the effect of the design can only be measured on short term within the scope of this master thesis, it was decided to choose for the short term desired effect defined as:

to make parents with mild intellectual disabilities more independent by empowering them through stimulating their self efficacy

When designing a robot to support parents with MID it is not self-evident that this robot should be a physical robot. A robot's appearance influences people's expectations. Phillips, Ullman, Graaf, & Malle, 2017) The form of the robot should fit its purpose. If not, people will tend to overestimate the abilities of the robot. This will lead to unmet expectations and disappointment (Cha, Dragan, & Srinivasa, 2015). For physical tasks it is more obvious that a robot needs to have a physical body, but for less physical tasks this is not as obvious (Ligthart & Truong, 2015). For example if the robot only provides the user with mental support through speech, it is not necessary that the robot has a physical body to walk. Therefore - to decide whether to design a physical robot or a virtual

robot - it is important to discover the needs of the parents with MID and their care givers. Although the initial assignment as given by Garage2020 is to design a robot to support parents with a mild intellectual disability, the final form of the design is still to be decided. Using the term 'robot' could lead to prejudices; people tend to overestimate the abilities of a robot. The project could result in a physical or virtual robot, but the end concept should not by default be a robot. Hence from this point the term intelligent support tool will be used to describe the desired end concept of this project.

3 RESEARCH QUESTION

The insights from the design brief resulted in the main research question of this project, which can be defined as

"How can design empower parents with mild intellectual disabilities?"

Two sub research questions were composed to answer this research question.

- Which requirements should the design fulfill on future product level to increase the self-efficacy of the parent and to make them feel more independent?
- Which requirements should the design fulfill on interaction level to increase the self-efficacy of the parent and to make them feel more independent?

4 STAKEHOLDERS

The overview below identifies all people who are directly or indirectly affected by the design or have influence over it, see figure 1. The inner circle represents the parent(s) with MID. Most of the times the father left and the family does not have any contact with him. The second circle represents all people who have direct contact with the parent with MID, for example family members and care givers. The third circle represents all people who have contact with the parent with MID, but not on a daily basis. The fourth circle represents all people who are connected to the parent with MID, but rarely have direct contact with the parent.

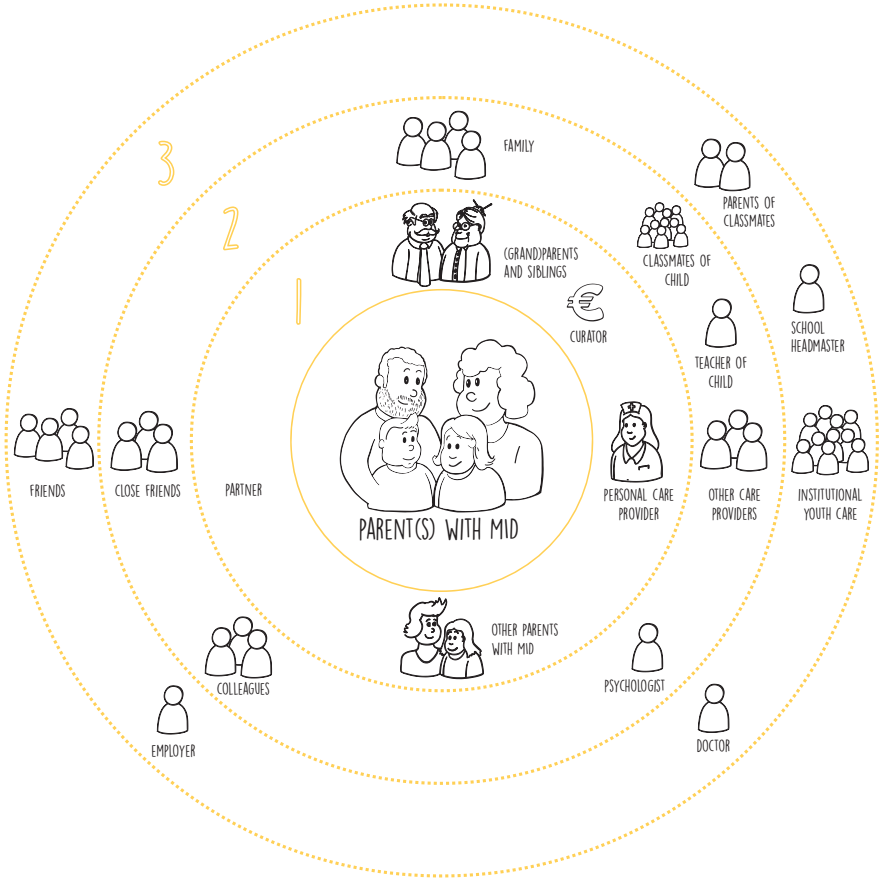


figure 1: Stakeholders overview

2 PROJECT PARTNERS

GARAGE2020 ROTTERDAM

The project took place in collaboration with Garage2020 Rotterdam. Garage2020 is a network of multidisciplinary teams in different cities with the mission to solve questions within youth care by thinking out of the box. Garage2020 defines and solves current problems within youth care and develops new products to make institution al youth care unnecessary. The project took place under supervision of company mentors Bastiaan Bervoets and Jacco Pols from Garage2020. During the project the Garage2020 had an active role in providing the student with opportunities to use their existing network of institutions in youth care for research purposes.

DELFT UNIVERSITY OF TECHNOLOGY

This master thesis is the final project of the student's Master Design for Interaction at the faculty of Industrial Design Engineering at the Delft University of Technology. During the master Design for Interaction, students learn to analyse, conceptualize and design human-product interactions in relation to the context in which the product is used. The final project gives the student the opportunity to demonstrate his / her design skills and knowledge.

3 DESIGN PROCESS OVERVIEW

According to a study of Hodes et al (2014) actively involving parents with MID in researching and developing study materials and explanations to support full consent for participating in trial design for interventions can be of positive influence on the success of the research. Therefore in this graduation project co-creation will play an important role. During the project parents with MID will be actively involved in the design process of an intelligent support tool to empower them.

The design process can be divided into four phases:

- exploration
- ideation
- conceptualization
- concept validation

In the exploration phase a focus group with experts, interviews with parents with MID, context mapping and home visits will be conducted in which parents could share their ideas and feelings regarding the implementation of an intelligent support tool into their house. Besides involving the direct target group in the exploration phase, the indirect target group - care experts - will also be actively involved. The results from these studies in the exploration phase will conclude in design requirements on both interaction and future product level. These design requirements will be used as input for the ideation.

In the ideation phase a creative session will be used as a generative tool to discover the context of use, the size, appearance, implementation and interactions of the intelligent support tool. During the creative session participants will enact the scenario and at the same time participants can react on the context by creating solutions through rapid prototyping.

The ideas of the creative session and the brainstorms will be developed through iterations into a concept proposal during the conceptualization phase.

At the final phase of this project, the concept validation, a care expert will be asked to validate the designed intelligent support tool through a demonstration and an interview. The results of this validation interview will be used to formulate an advise for future steps and implementation.

Figure 2 shows a schematic overview of the iterative design

process approach of this project. It is important to notice that the design process is not a linear process, but rather iterative at every stage of the project. This for example means that the context exploration does not end in this first phase, but it continues during the idea generation in the next phase. Same goes for the interaction vision and all other elements in this thesis, outcomes of the idea generation and rapid prototyping in the next phase could influence the future interactions.

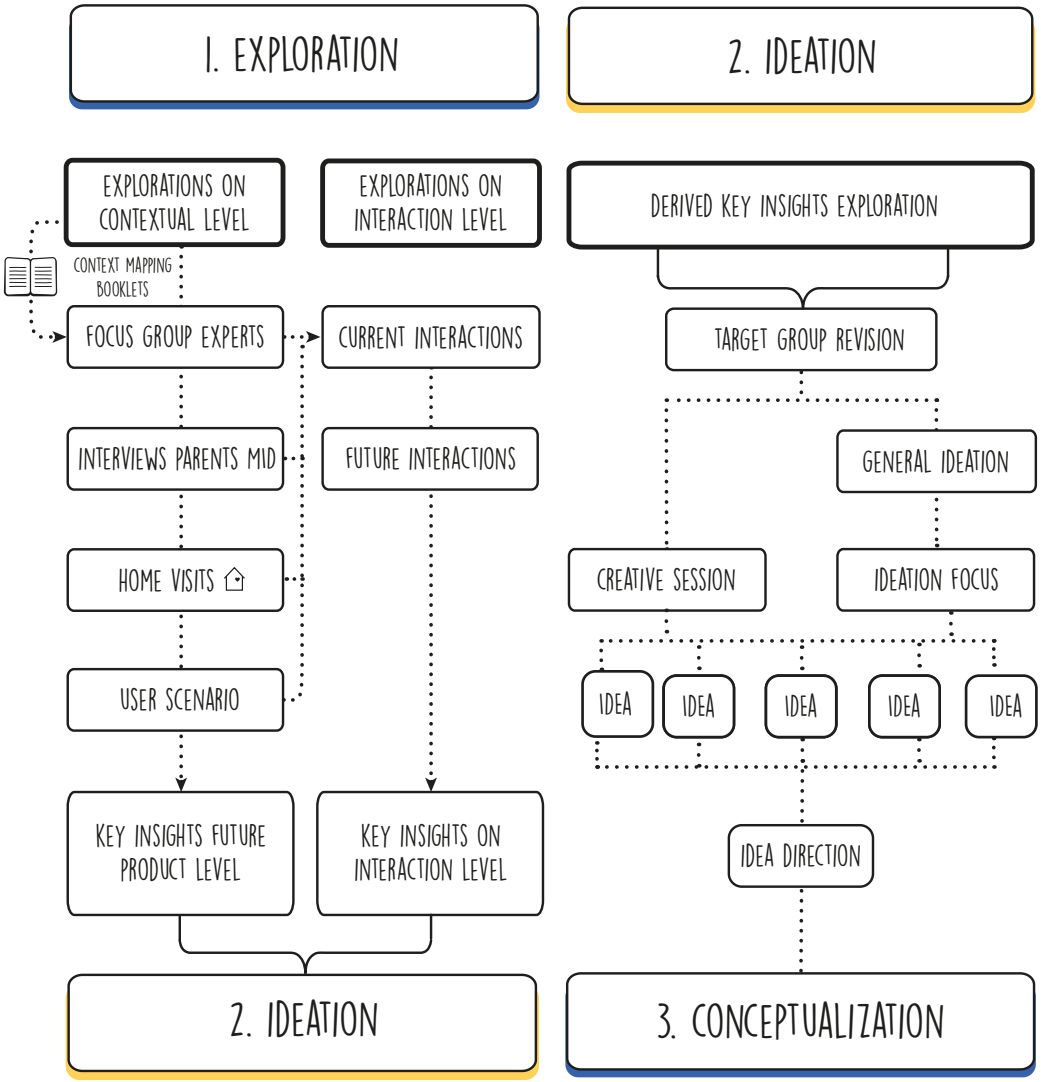
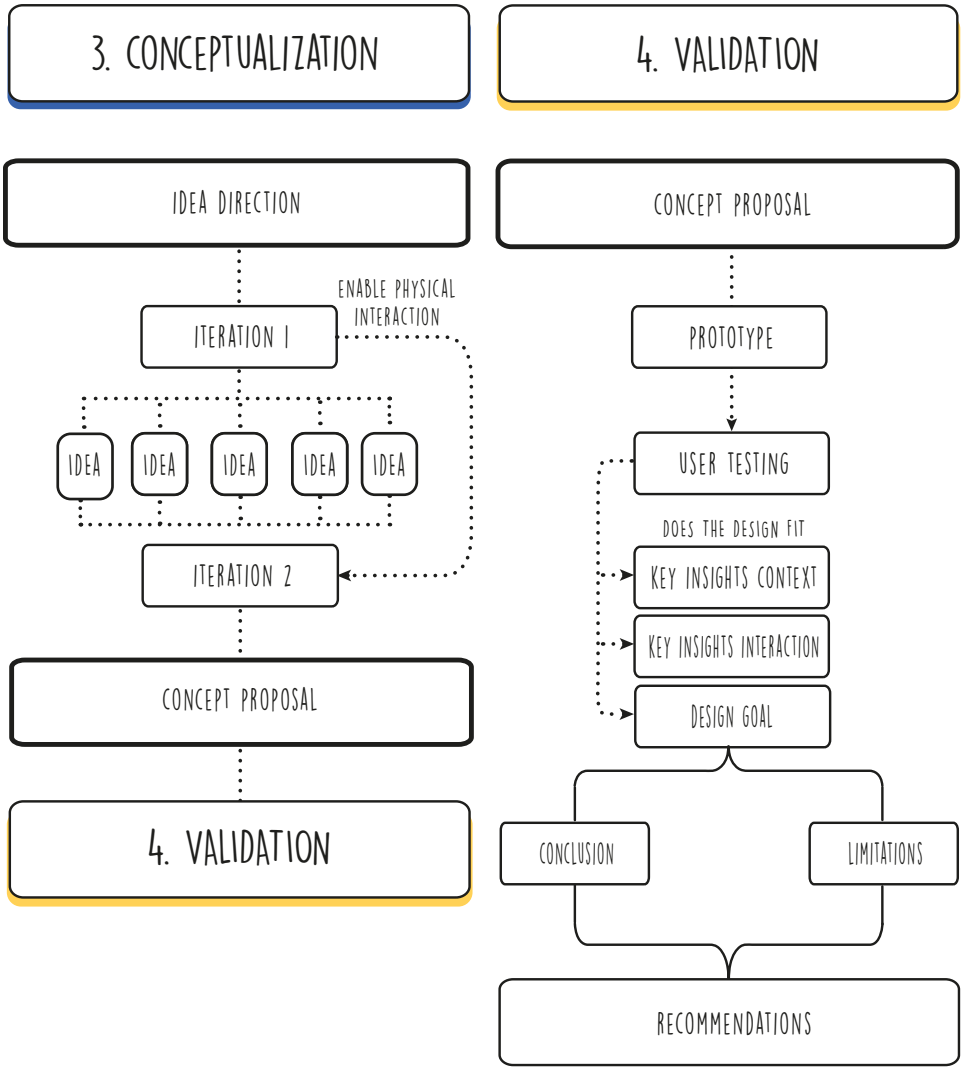


figure 2: Schematic overview of design process.


3. CONCEPTUALIZATION
4. VALIDATION
IDEA DIRECTION
ENABLE PHYSICAL INTERACTION
ITERATION 1
IDEA
IDEA
IDEA
IDEA
IDEA
ITERATION 2
CONCEPT PROPOSAL
4. VALIDATION
CONCEPT PROPOSAL
PROTOTYPE
USER TESTING
DOES THE DESIGN FIT
KEY INSIGHTS CONTEXT
KEY INSIGHTS INTERACTION
DESIGN GOAL
CONCLUSION
LIMITATIONS
RECOMMENDATIONS

chapter 01

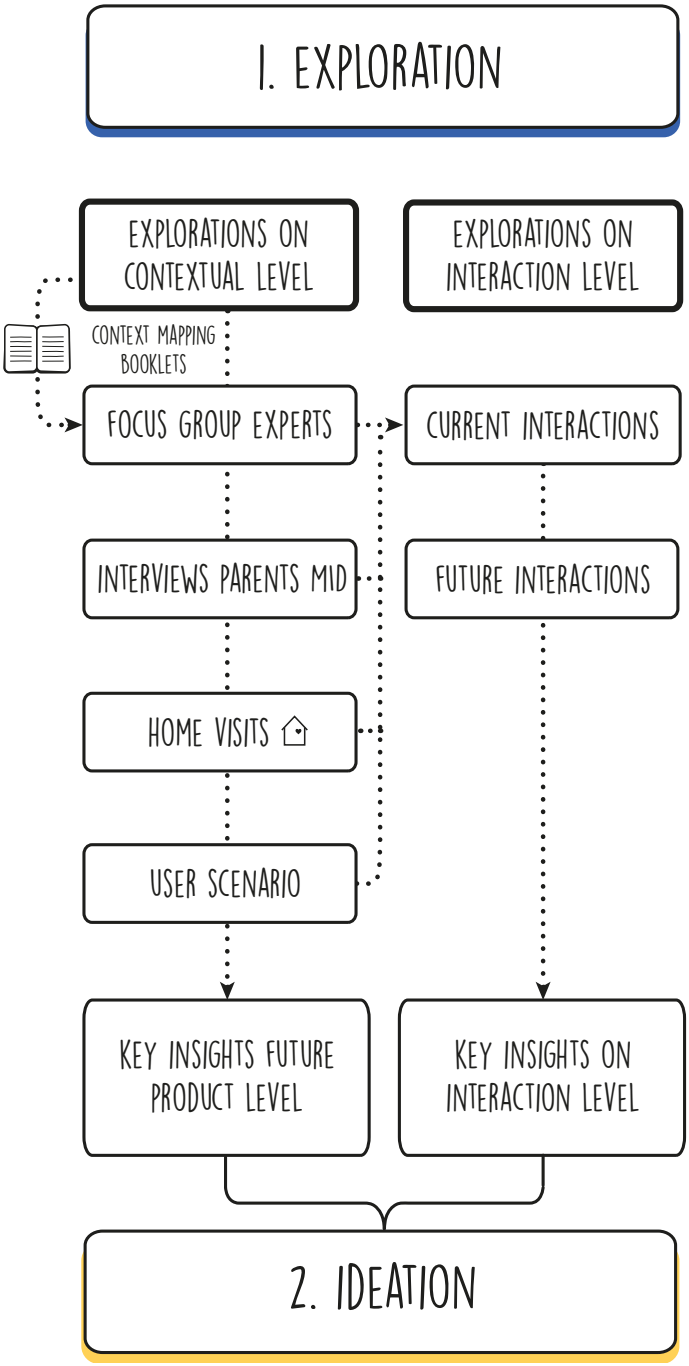
EXPLORATION

As industrial designers we always seek to design from a users' perspective; the needs and wishes from the target group are the starting point of a design. The first phase of this project focuses on exploring the context; discovering the needs and wishes of parents with MID and their care givers. To get a better understanding of the user and its context multiple small studies were conducted. This chapter will elaborate on the set up and the outcomes of each study.

The conclusions of this chapter will be used to answer the sub research question:

Which requirements should the design fulfill on future product and interaction level to increase the self-efficacy of the parent and to make them feel more independent?

In the next chapter *02 ideation* the insights of this chapter will be used to generate possible solutions.


1. EXPLORATION
EXPLORATIONS ON CONTEXTUAL LEVEL
EXPLORATIONS ON INTERACTION LEVEL
CONTEXT MAPPING BOOKLETS
FOCUS GROUP EXPERTS
CURRENT INTERACTIONS
INTERVIEWS PARENTS MID
FUTURE INTERACTIONS
HOME VISITS
USER SCENARIO
KEY INSIGHTS FUTURE PRODUCT LEVEL
KEY INSIGHTS ON INTERACTION LEVEL
2. IDEATION

2 EXPLORATIONS ON CONTEXT LEVEL

To answer the sub research question **Which requirements should the design fulfill on future product level to increase the self-efficacy of the parent and to make them feel more independent?** multiple small studies were conducted. This chapter will elaborate on the set up of each research, the results and conclusions. The chapter will conclude with an overview of requirements that the design should fulfill to increase the self-efficacy of the parent and to make them feel more independent.

1 FOCUS GROUP WITH EXPERTS

Research questions

The insights from the design brief led to the following research questions for the focus group with experts:

- What are important characteristics of parents with MID to take into account when designing an intelligent support tool?
- What kind of support do parents with MID currently get and which methods are effective?
- What possible applications for an intelligent support tool do these care providers see? And what do they think of such an intelligent support tool?

Procedure

Two pairs of two social care providers, each working with 11 families with a parent with MID participated in the semi structured interview. The interview was conducted at the care facility. Five different questions were asked:

- What does a normal day at your work look like? How do you support the parents with MID?
- Which problems do you experience during your work?
- What would the ideal care for this target group look like? How would you support the parents when there would be no restrictions in money and time?
- What possible applications for an intelligent support tool could you think of to support parent with MID in the upbringing of their children?
- Would you please fill in these booklets together with your clients?

During the interview the interviewer interrogated intensively to get a better understanding of the answers on the questions. A second person was present to assist the interviewer and to voice record the interview. During the interview the word ‘robot’ was not used in questions, because

this could create a bias. Therefore during the interview the end concept of this project was referred to as an intelligent support tool, not to replace care providers but to support them or providing them with extra time to support the parents. The interview was concluded with an assignment for the care providers. Care providers were asked to fill in a booklet together with the parents with MID. The goal of this booklet is to get a better insight into the daily life of the target group.

Results

The results of the interviews can be split into three different subjects, namely;

- the target group and their characteristics
- current effective support for this target group
- possible applications for an intelligent support tool

Figure 3 on the next page shows an overview of the results. The most important outcomes are in blue.

Conclusions

Characteristics of parents with MID

The care providers mentioned that the developmental environment of the parents in their past and their current social network have a big influence on their care needs. **The ability to care for their children is not only dependent on their limitations in intelligence level and adaptive behavior, but also on their past and their current social network**. Parents love their children unconditionally, but due to their limitations their own needs have priority. There is a conflict; **parents love their children unconditionally, but they are not aware of their responsibilities and the consequences of not being responsible**. This can result in very urgent situations, for example when parents forget to give their children diner. Previous studies have shown that it is not uncommon for a person with an intellectual disability to have difficulties with everyday functional activities such as dressing and eating, which limits their independence in daily life. According to Wehmeyer et al (2012), t**echnology could improve these functional abilities to perform everyday actitivities**, to increase their independence in daily life.

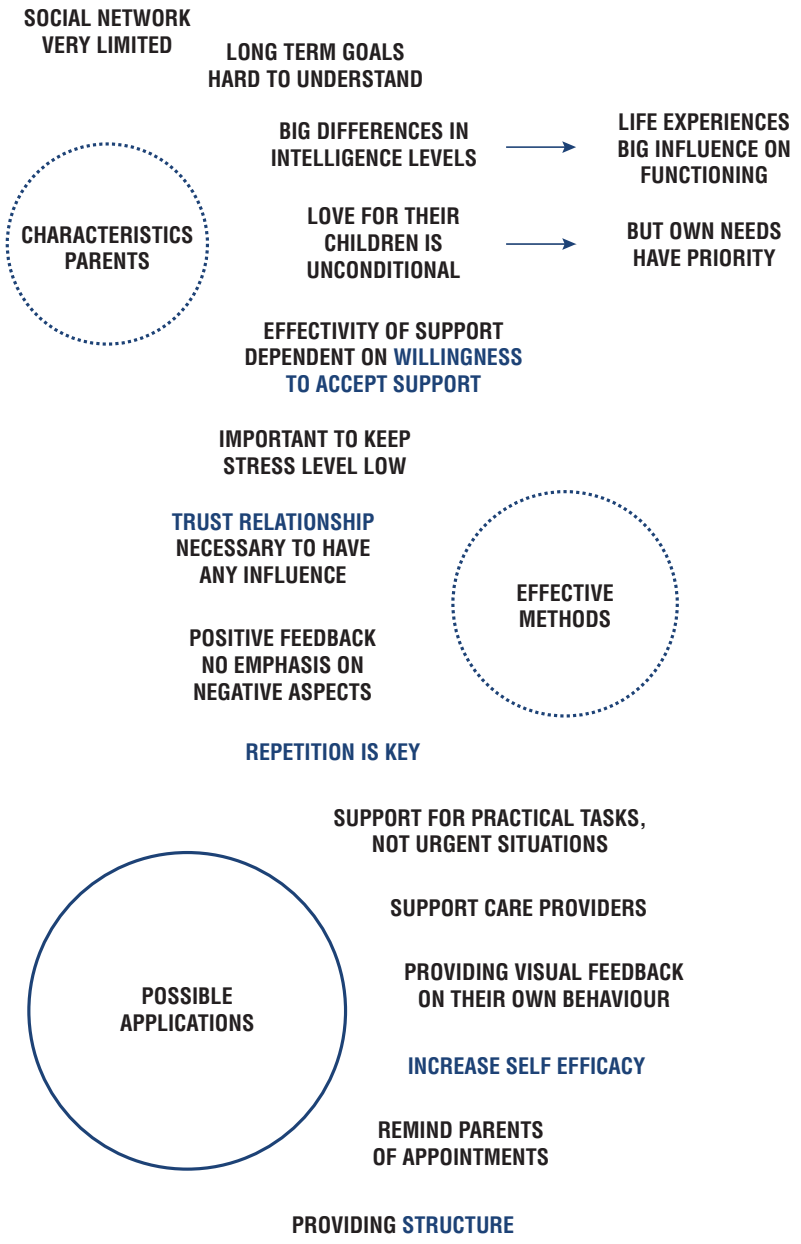


figure 3: Overview results focus group with experts.

As was also found in other studies there is **a threshold to ask care givers for help (Durinck & Raqcuet, 2003), among others because parents have a fear for having their child removed by youth care**. Unfortunately this fear is quite realistic. Furthermore it is hard for parents with MID to understand long term goals, because the result is not directly visible.

The effectiveness of support is dependent on the willingness of parents to accept support from care providers. **Care providers build on a trust relationship with the parents, this relationship of trust influences the willingness of parents to accept support**.

Care providers were enthusiastic about the idea of introducing an intelligent support tool for parents with MID. At first they were a little concerned about the idea, because the target group is very vulnerable. Once they were told that the intelligent
support tool will not replace the care providers, but just support them, they started to share their ideas for possible applications. It can be concluded that **not only the introduction of such an intelligent tool for the parents with MID needs good preparation but the introduction of such a tool to care providers as well.** In the end these care providers will also work with the tool daily. Since they already have a trust relation with the parents the acceptance of such a tool by care providers is very important. When talking about possible applications, care providers mentioned that the tool should be used for practical, simple support and not for support during urgent situations.

<u>Effective support methods and possible applications for an intelligent support tool</u>
Parents with MID have problems with remembering provided information and lessons, therefore repetition is very important. This can be frustrating for care providers at times and care providers are not always available to repeat the information. **An intelligent support tool could be useful to repeat information for the parents at any moment**. To help parents understand the information that is provided, care providers use visualizations.

Another possible application that was mentioned is that the intelligent support tool could provide parents with **structure**, for example by reminding parents of appointments or day schedules. One impressing example case was a situation that the care expert outlined. If a mother comes home with her child and they are both hungry, there will be a chance that the mother will first start

to have dinner. Once she is finished, she will give her child dinner. Even though the child is crying, the own needs of the mother have priority. Sometimes the mothers even forget to give their children food. This example case illustrates that there is a big support need for providing parents with structure during the eating routine. The eating routine is very important for the daily structure, because it is a situation in which a lot of actions and conflicts meet, for example deciding what to eat, grocery shopping, cooking, managing the different pans and make sure that everything is finished at the same time, setting the table, entertainment of the child, making healthy decisions, cleaning the table, doing the dishes. Furthermore this moment is a key moment to conclude the day; an important moment for parent-child interaction.

Therefore the focus of this project will be **providing parents with structure during the eating routine**.

PROJECT FOCUS

PROVIDING PARENTS WITH STRUCTURE DURING THE EATING ROUTINE

2 INTERVIEWS WITH PARENTS

A context mapping study and interviews with parents were conducted to gain knowledge about the context of use (Sleeswijk Visser, Stappers, van der Lugt, Sanders 2005) to end up with a good fit between the design and the use of the future design (Sanders, Stappers, 2012). Furthermore the context mapping study was used to sensitize parents with MID to prepare them for the upcoming interviews.

Research questions

To get a better understanding of the target group and their acceptance towards intelligent support tools the following research questions were formulated:

- What does a day in the life of a family with a parent with MID look like?
- Which problems do parents with MID encounter in daily life?
- Would they accept such an intelligent support tool?

Procedure

Context mapping before the conversations

Context mapping, a tool that involves the user as the expert regarding the context of use, was used to gain insights about the target group and the context of use (van Boeijen, Daalhuizen, Zijlstra, van der Schaar, 2013). A contextmapping study starts with collecting data from the target group by using generative tools. In this specific study a booklet was used as a generative tool to collect data about the target group. The booklet consisted of different time lines in which parents with MID could explain their day either through icons that were enclosed or through text. At the end of the focus group with care experts booklets were handed out. In the following weeks these booklets were filled in by eight parents with MID together with their care providers. Care providers were asked to support the parents, because it could be that the parents are not able to read. In the booklets parents could fill in their day structure in empty Dutch visual schemes that were split into part-times; morning, afternoon and evening. Parents could fill in their activities through the use of icons at the end of the book or by simply writing their activities down. The first pages were filled with an example. One week before the interviews took place eight booklets were returned by the care givers.

Recruitment of participants

All participants were inhabitants of a care facility that supports parents with MID in the upbringing of their children. Another student group of the University of Technology in Delft conducted a test with a Nao robot parallel to the interviews. A Nao robot is an autonomous, humanoid robot most often used for academic

purposes. Participants were invited to participate through a video invitation. In this video conversation a Nao robot invites the parents to participate. Some parents already participated in the test with the Nao robot before coming to the interview, others did not. The other student group decided about the invitation through a Nao robot.

Conversations

Besides using context mapping as a tool to gain information about the target group and their daily structure, context mapping was also used as a tool to sensitize these parents for the conversations. The information from the booklets was used as starter during the conversations with the parents. During the interview the following questions were used as conversation starter:

- How many children do you have?
- What does your day look like?
- Which things go very well in bringing up your children?
- Which problems do you encounter?

The conversations took place in an informal setting with a small group of parents and started with a short introduction of the interviewer to make the parents feel at ease. During the interview the interviewer interrogated intensively to get a better understanding on the answers on the questions.

“

IK GA DIE ROBOT ECHT NIET LATEN KOKEN, VRIEND. GA MAAR SCHOONMAKEN.

> IK GA ECHT SCHRIKKEN, METALEN MENSEN.

Results

Some of the booklets were filled in very extensively, others were only filled in with short words. One of the parents wrote a personal story in the booklet in which she elaborated extensively on her daily structure and life. At the end of her story she emphasizes that she hopes her story contributes to positive outcomes of this research project.

Most of the parents do not work. Their day structure is mainly based on caring for their children and the house. Families in this care facility have 1 to 3 children. Some children go to day care or school, which depends on their age and the situation of the family. All families within the care facility live without the father of the children. Some children within one family have different fathers. Most of the times the father has left early during the pregnancy of the mother or when the child was very young. Some mothers have new relationships. Clear appointments with the care givers are made regarding relationships to protect the mothers.

One mother wrote the elaborate introduction that was mentioned earlier in this report about her daily activities and her life as a mother in the booklet. One parent did not sign up to participate in the test of the other group of students on

forehand, but once she saw the robot she got enthusiast and decided to participate. Another parent decided to participate twice in the test with the Nao robot, because she was very enthusiastic. Parents explained they had problems with cleaning the house on a regular basis. Most of the times they forget to clean their house or they are not motivated enough. They ideated that it would be nice if the robot could help them remember that they have to clean the house. A robot could be a great support in the house, because it can offer help without judging. She mentioned that she would not let the robot cook, but she would definitely let it clean her house. “Ik ga die robot echt niet laten koken, vriend. Ga maar schoonmaken.”

Another parent explained that it was hard to take care of her child alone. She ideated that the robot could maybe assist her in the upbringing of her children, like a husband would do. Provide a helping hand, extra structure and give positive feedback.

One of the parents that first participated in the test with the Nao robot expressed her fear for the robot. She explained that she would have less fear if she knows what the robot does, the idea of a metal human scares her. “Ik ga echt schrikken, metalen mensen.”

Discussion

It was slightly difficult to have a normal conversation with the parents. Parents were easily distracted, answers were short and had little content. Interaction from parent to interviewer was limited. During the conversations most mothers were passive. Except for one mother, she seemed to have less limitations in adaptive functioning.

Furthermore the study of the other group of students, that conducted a study with the Nao robot, had a big impact on the interviews. Once the parents had seen the Nao robot, they had trouble with the imagination of other possible solutions to support them in the upbringing of their children.

Unfortunately not all research questions can be answered based on the outcomes of the interview due to the passive attitude of the parents, which was not on purpose but a direct result of their mental disability.

Conclusions

What does a day in the life of a family with a parent with MID look like?

To get a better understanding of the problems that occur in the current situation, an afternoon of the target group was summarized into a scenario. The scenario is based on the outcomes of interviews with the parents and care givers. The scenario emphasizes the problems that could occur, this does not mean that these problems occur everyday in every family with a parent with a mild intellectual disability. The scenario just illustrates the problems that could occur in daily life. Figure 4 shows the scenario.

figure 4: Scenario; a day in the life of a parent with MID.

The scenario presents a young family; mother Kelly aged 21 years and her 5 year old daughter Saar. Kelly has a mild intellectual disability, she has an IQ of 64 and she has significant problems in social adaptability. Saar has a delayed development as it comes to physical developments, but does not seem to have an intellectual disability (yet). The father of Saar left when mother Kelly was pregnant. Unfortunately Saar has never met her father. Kelly and Saar live in a small city near Rotterdam. They have their own house, but their house is part of a care facility for mothers with a mild intellectual disability. Kelly and Saar also have a cat named Tommie. Mother Kelly works part-time as cleaner at a hotel in Rotterdam. Saar goes to daycare three days a week.

The mother of Kelly, the grandmother of Saar, has a mild intellectual disability as well. Once a week she visits her parents or her parents visit Kelly and Saar. Since three months Kelly has a relationship with Ed. Ed lives in Rotterdam and is 23 years old. He works at the Rotterdam Harbor. From the care facility Ed has permission to visit Kelly during the weekends. During the week Kelly could visit Ed in Rotterdam, but Ed is not allowed to visit Kelly at the care facility. Kelly has to ask permission for every visitor, because the care facility wants to protect Kelly. Kelly's social network is very limited. She only has one friend, Lotte, who lives in Amsterdam. They do not see each other very often, because it is hard for Kelly to travel to Amsterdam with Saar.

The scenario describes an afternoon in the daily life of Kelly and Saar. This morning Kelly went to work in Rotterdam. At two o'clock she arrives home. Her house is a big mess; clothes and dishes are everywhere. But Kelly is not going to clean the house. Kelly is too tired, because Saar was awake a lot last night. Saar did not want to sleep, she was crying and she kept asking if she could sleep together with her mother. Instead of cleaning the house, Kelly starts shopping clothes at her computer. She does not have a lot of money, but she does not mind. While shopping, she forgets to keep an eye on the time. At 15:25 she discovers that it is already quite late, at 15:30 she has to get Saar from day care. Kelly walks to day care very fast and luckily she is just in time.

On their way back she gets a call from Lotte. Saar walks behind her mother, while Kelly is busy talking with Lotte. Saar does not get any chance to talk to her mother. At home Kelly is still calling with Lotte. Saar takes some dolls and starts to play. She is quite used to playing independently, because her mother is always busy doing other things.

Saar is thirsty and a little bit sad, but she does not recognize her feeling of being thirsty yet.

Kelly has finished talking with Lotte, therefore Saar has a chance to ask for something to drink. The kitchen sink is a big mess, but Kelly does not seem to mind. While Saar is drinking her lemonade, Kelly is getting hungry. She is searching for something to eat in her kitchen cabinets, but she can not find anything for dinner. Kelly is starting to get very hungry now and she is a bit grumpy as well. It is already quite late, 19:30, so Kelly decides to eat fries and snacks from the deep fryer. Saar is still playing with her dolls, while she watches her mother eating dinner. Kelly does not even think about giving Saar dinner, because Kelly is hungry. She is hungry as well and therefore she starts crying. She is not able to communicate that she is hungry, because she does not recognize this feeling as being hungry or she is not able to ask for something to eat.

It is nine o'clock and Kelly has finished her dinner. She gives Saar some fries and a snack as well. Saar is eating her dinner on the couch in the living room. Kelly and Saar are not used to eat together at a table, most of the times they eat separately. Saar has finished her dinner and is very tired. It is half past ten and Kelly decides to bring her to bed.

While Saar is sleeping, Kelly finally has some time for herself. She throws away some clothes from the couch and lies down. Within half an hour she falls asleep. She wakes up at eleven o'clock and decides to go to bed as well. Tomorrow a new day starts and Saar will wake up very early.

Would parents with mild intellectual disabilities accept an intelligent support tool to support them?

The enthusiasm of the parents to participate in the test with the Nao robot as explained in the results section, shows that parents are open to new technological developments. More specific it can be concluded that **parents are open to new technological developments that function as a personal agent**. One of the parents mentioned that they could imagine to ask a robot for help, without being afraid that the robot would judge them. **This means that using a robot to support parents could lower the threshold for parents to ask for help**. This could be of positive influence on the amount and quality of support and therefore indirect on the development and health of parents with MID and their children.

Which problems do parents with MID encounter in daily life?

Parents have trouble with cleaning their house on a regular basis. An intelligent support tool could **help them remember** that they should clean the house. But the quote "Maar als er een UIT-knop op zit, zet ik hem zo uit." explains the importance of **a strong character** in this intelligent support tool. The intelligent support tool **should not be fully autonomous**, because this would cause fear. But it **should have some autonomy in order to persuade parents** to for example clean the house. In order to accept support, parents should feel competent, they should have a feeling of having control over their situation (Oomen, 2009).

One of the parents ideated that the robot could assist her like a husband would do. Elaborating on this metaphor of a husband, it could be concluded that the intelligent support tool should be **a buddy, a partner for the parent**. Since these mothers care for their children alone, the intelligent support tool should provide mothers with **positive feedback** in order to act as a buddy. The value of positive feedback in supporting parents with MID can also be found in literature. The Nederlands Jeugdinstituut mentioned that special care for parents with a mild intellectual disability should among others focus on preventing these parents from overload. To prevent these parents from overload, especially **behavioral techniques such as positive confirmation seem to be effective** (Het Nederlands Jeugdinstituut, 2014; Oomen, 2009). Another way to prevent parents with MID from overload is to provide them with professional support en by learning them new skills. When it comes to professional support, participative support is considered to be an effective method. Within participatory support the parent is seen as a partner with who the care giver collaborates in the supporting process (Het Nederlands Jeugdinstituut, 2014; Durinck & Racquet, 2003). The parents also emphasized this importance of **having a buddy**, as explained at the beginning of this paragraph.

The fact that it was difficult to have a normal conversation with the parents, confirms the limitations in adaptive functioning that people with MID have. The interviewer had to interrogate very extensively to get more content during the conversation. This could mean that **an intelligent support tool should have a very pro-active attitude** in order to support parents in a successful way.

figure 5: Living and sleeping room of one of the families.

3 HOME VISITS AT CARE FACILITY

In order to get a better understanding of how the design or service could fit into the houses of the families, home visits were conducted.

Research question

In order to get a better insight into how the design or service could fit into the eating routine, the following question was used as foundation for the photographs. Which elements in the kitchen and living room play a role in the daily eating routine?

Procedure

When the interviewer felt that the mothers were at ease, the mother was asked if they could give a tour through their house. Actually all four mothers gave permission to visit their house and taking pictures was allowed as well. The home visits took place as part of the interviews with the parents. The kitchen and living room were photographed at a more detailed level, because of the focus on the eating routine.

Results

The families in this specific care facility all have their own homes. The houses are small and each room is on the same floor. The kitchen is located in the same room as the living, see figure 6. The table is located in the center of the kitchen and living room. In one of the houses the table was used as central point in the house, a mother was having a coffee with her mother.

The pictures on the previous and next pages (see figure 5, 6, 7, 8, 9 and 10) show different rooms of these houses. The photos of these home visits will be used as an inspiration for the ideation phase of this project. The fact that parents have trouble with keeping up with the cleaning of

figure 6: Overview of important elements in the kitchen.

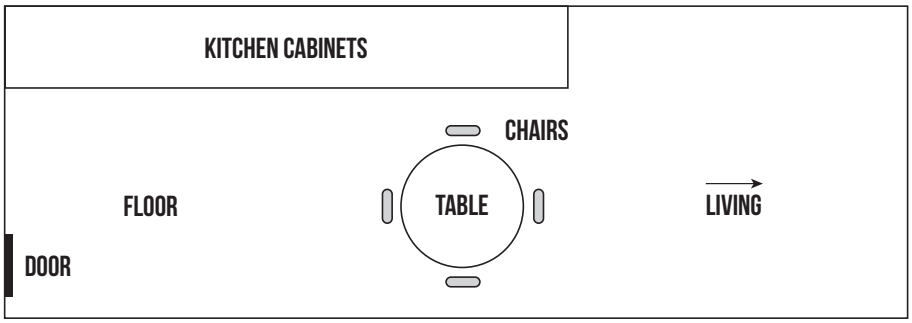


figure 7: Kitchen of one of the families

their home is something that stands out through this series of photos,. Only one out of three houses that participated in the home visits was tidy. The other houses were a big mess with clothes, dishes and toys all over. Some parents mentioned the mess, but none of them felt too ashamed to show their house.

The rooms of their children all were typical children sleeping rooms with lots of attributes, toys and cuddly animals. Some of the beds were clearly not clean, but overall the rooms were tidier than the living room.

Conclusions

The insights from the home visits led to an answer on the research question that was formulated at the start of this research:

which elements in the kitchen and living room play a role in the daily eating routine?

As can be seen in figure 6, the table is located in the center of the living room and kitchen. In some of the houses the table was used as coffee table. Because of the central location in both the living room and kitchen **the table plays an important role in the daily life of parents with MID.**

figure 8: Living room with kitchen of the only family with a clean house.

Figure 9 shows an overview of all elements in the kitchen. The kitchen cabinets are messy and unstructured. Parents have a lot of kitchen utensils that play a role in the daily eating routine. The main results of the home visits confirm that parents have a lot of **trouble with keeping their house tidy, structured and clean.** The figures confirm this, the figures show that the houses are not structured and tidy, but quite messy.

The conclusions of the explorations on context level were used for the construction of key insights in *chapter 1.1.5 derived key insights on future product level*.

5 DERIVED KEY INSIGHTS FUTURE PRODUCT LEVEL

Based on the insights of the previous studies, this paragraph will formulate an answer on the following research question: **Which requirements should the design fulfill on future product level to increase the self-efficacy of the parent and to make them feel more independent?**

To answer this research question and to design an Object with Intent that engages the user in a tactful way, the conclusions from the studies in the previous chapters are converted into key insights on future product level through the use of tactful guidelines

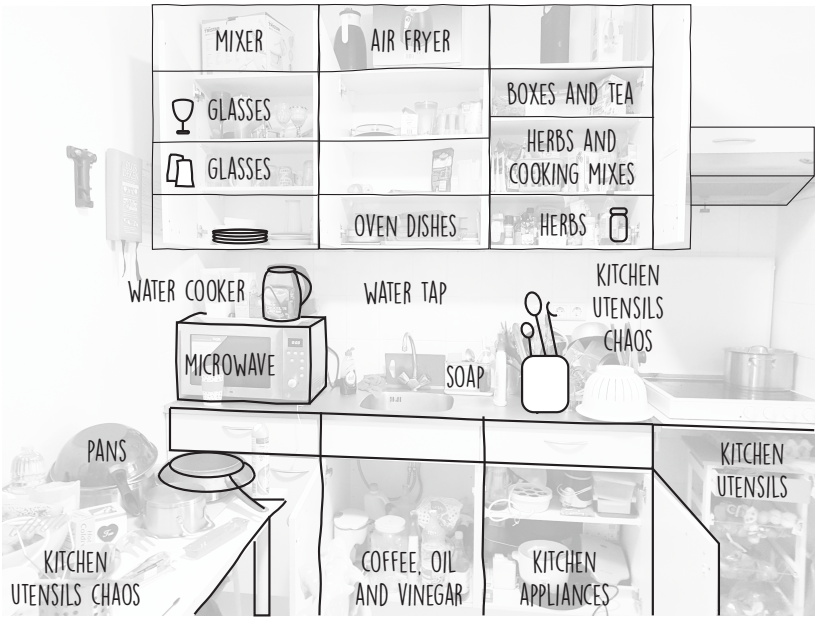


figure 9: Kitchen cabinet arrangement in one of the houses.

figure 10: Living room with kitchen of one of the families.

(D'Olivo, Rozendaal, Giaccardi, Grootenhuis, & Huisman, 2018). Each section starts with a new domain, starting with an explanation of important aspects of the domain followed by requirements that the design should fulfill. These requirements are based on the conclusions of the studies in the previous chapters. Some derived key insights are mentioned twice, because they cover multiple domains. The generated key insights will be used as requirements for the last part of ideation and for conceptualization and to validate the concept proposal.

IMPACT: Tactful objects **empower** people by helping them **change their behavior** in a **positive way, over time**.

- The product or service should empower parents with a mild intellectual disability by stimulating their self efficacy over time.
- The product or service should give parents feedback with an emphasis on positive feedback.
- The product or service should have a strong character / attitude. It should not be fully autonomous but it should have some autonomy in order to persuade parents to change their behavior.

EMBEDDING: Tactful objects **embed** in their context, i**nclude all people** involved and become **part of everyday life.**

- The product or service should fit in the physical living context of the parents with MID.
- The product or service should be introduced in an elaborate way for both the parents with MID as well as for care providers that work with these parents to create a feeling of recognition and trust.
- The product or service should have a proactive attitude.
- The product or service should be self learning.
- The product or service could provide structure during the day.
- The product or service could assist parents in remembering appointments and daily activities such as cleaning the house.

USE: Tactful objects foster **collaboration** in a **simple** and **enjoyable** way.

- The product or service should support parents in practical tasks.
- The product or service should not replace caregivers, but it should collaborate with them to enable them to spend their time more efficient.
- The product or service could repeat information of care providers at any moment.
- The product or service should not provide support for urgent situations.
- The product or service should have a proactive attitude.
- The product or service should not provide emotional care.
- Parents should understand the functions of the robot.
- The product or service should be self learning; it should adapt to the skills and knowledge of the parent.
- The product or service should enable parents and care providers to decide which information the product or service should link back to the care providers.
- There should be a clear difference between the support tasks of the robot and the support tasks of the care providers.

OBJECT: Tactful objects are **partners** that are **friendly** and that you can **trust**.

- The product or service could act as a buddy for the parent for example as extra support or by providing positive feedback.
- The product or service should be introduced in an elaborate way for both the parents with MID as well as for care providers that work with these parents to create a feeling of recognition and trust.
- The product or service should be trusted by parent, in order to make parents accept support from the product or service.
- The product or service should enable parents and care providers to decide which information the product or service should link back to the care providers.
- Parents should understand the functions of the robot.
- The product or service should be transparent as it comes to the data that will be gathered and linked back to the care providers.
- The product or service should respect the privacy rules as stated in the Algemene Verordening Gegevensbescherming.

EXPLORATIONS ON INTERACTION LEVEL

In order to get a better understanding of the needs and requirements that the intelligent support tool should fulfill, current and future interactions were explored. The conclusions of this chapter will answer the sub research question:

Which requirements should the design fulfill on interaction level?

1 CURRENT INTERACTIONS

The focus in this project is on the user-product interaction; the way people understand, experience and use products. In order to design the ideal user-production interaction it is important to understand the current interaction qualities; the feelings that the current situation evokes from the perspective of the parents with a mild intellectual disability.

To design the interactions on future product level, the current interactions were explored. The context explorations in *chapter 2 context explorations* resulted in an overview of the current interactions between the different stakeholders, see figure 11. The dotted lines show the mutual interactions, the continuous lines show the one way interactions. The current interaction qualities are shown in blue underlined text.

The current situation can be described as the parents having problems with structure during the eating routine. The parents are supported by care givers, but this support also results in fear for having their child(ren) removed by youth care. The current situation is described in more detail in the design brief and the explorations on contextual level.

The interaction qualities of the current situation are based on the outcomes of observational research and interviews with parents with MID and their care givers, as can be found in the previous chapters.

Current interaction qualities

Fearful - One of the most important qualities is that the interaction in the current situation is fearful. In general there is the threshold to ask care givers for help, because parents have a fear for having their child removed by youth care. Unfortunately this fear is quite realistic.

Impulsive - As can be concluded from the observational research and other explorations on context level parents are very impulsive and easily distracted. Parents do things spontaneously without considering the effects that their actions might have.

Passive - Having a conversation with a parent with a mild intellectual disability can be quite hard, as parents are passive in both talking as well as in their actions.

Loving - Despite their mild intellectual disability, the love between a parent and their child is unconditional. They might have troubles with the upbringing of their children, but they are willing to care for their child.

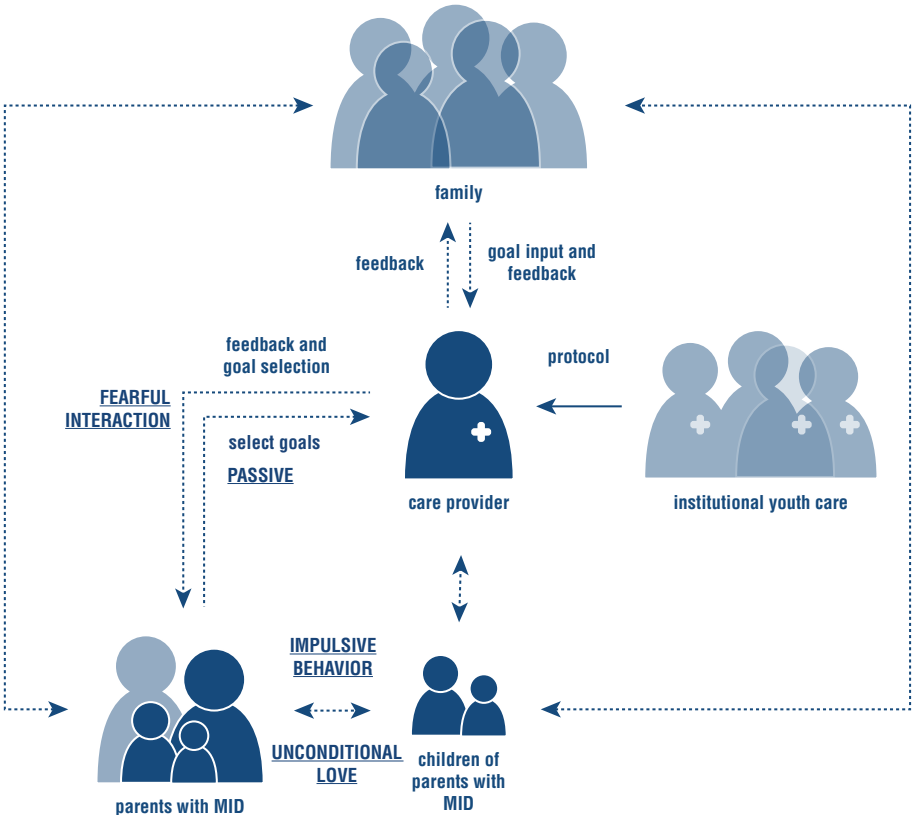


figure 11: Schematic overview of the current interactions between the different stakeholders.

2 KEY INSIGHTS INTERACTION

Based on the conclusions of the context explorations, an overview of future interactions was constructed, see figure 12. The direct interactions with the intelligent support tool are shown in yellow. The indirect interactions caused by the intelligent support tool are shown by not dashed arrows. The interactions of the current situation are shown by dashed arrows. The desired interaction qualities are shown in blue underlined text.

Desired interaction qualities

Which requirements should the design fulfill on interaction level to increase the self-efficacy of the parent and to make them feel more independent?

To increase the self-efficacy of the parent and to make them feel more independent the design should have the following interaction qualities:

Empowering - The design should empower parents; it should enable parents to live more independent and it should increase their self-efficacy.

Pro-active - In order to empower parents the interaction should be pro-active. Parents with MID are very passive and the design should motivate parents without a first input from the parents.

Magical - The design should provide parents and their children with a magical feeling. It should make them curious.

Intuitive - To empower parents, the design should be easy to understand and use. It should be very consistent and straight-forward and most of all not overwhelming.

Interaction vision

To describe the desired feeling that the user-product interaction should evoke an interaction vision is used. The interaction vision is described as a metaphor; an activity in a different situation that evokes the same feeling as the desired interaction qualities. The interaction vision will serve as a point of reference during the design process.

The design should feel like having a ride through “Symbolica; Palace of Fantasy” in the Efteling.

Symbolica is an attraction in theme park the Efteling in the Netherlands. On their website the Efteling describes Symbolica as a ride through magical rooms that **amazes time after time.** The next pages show pictures of the attraction Symbolica. Symbolica evokes a **magical** feeling. Visitors are divided over different vehicles. Each vehicle has its own route. During this route visitors can choose which way to

go. The options are limited and the interaction with the vehicles to choose a way is very **intuitive**. The vehicles are **pro-active**; they initiate the visitors to make a choice by making a sound and by lighting up the different choices. The fact that the visitors can choose from different

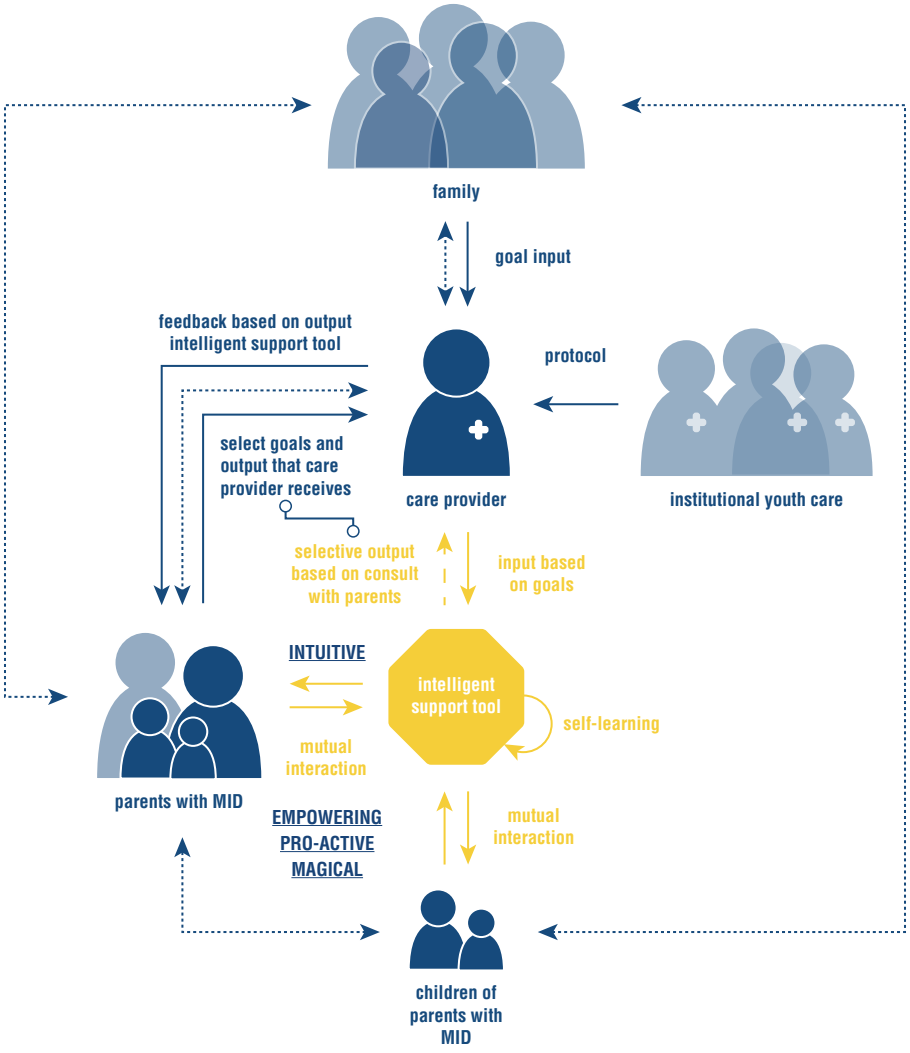


figure 12: Schematic overview of possible future interactions between the different stakeholders.

options **empowers** them; it provides the visitors with a feeling of autonomy. This feeling of autonomy is more important than the actual amount of autonomy. The actual amount of autonomy during the route is limited, but the visitors have the feeling that they can decide a lot. The route is structured, after every room a new room follows. (*Efteling, 2018*)

figure 13 shows a photo of the different routes of Symbolica, this picture illustrate the **MAGIC** feeling of the visitors that the attraction evokes. At the start of the attraction visitors can choose from three options which route they would like to go, which gives the visitors a feeling of **AUTONOMY**.

(*source photos Efteling, 2018*)

figure 13: Photo of the different routes of Symbolica (source photos Efteling, 2018).

figure 14: Photo of a ride through Symbolica (source photos Efteling, 2018).

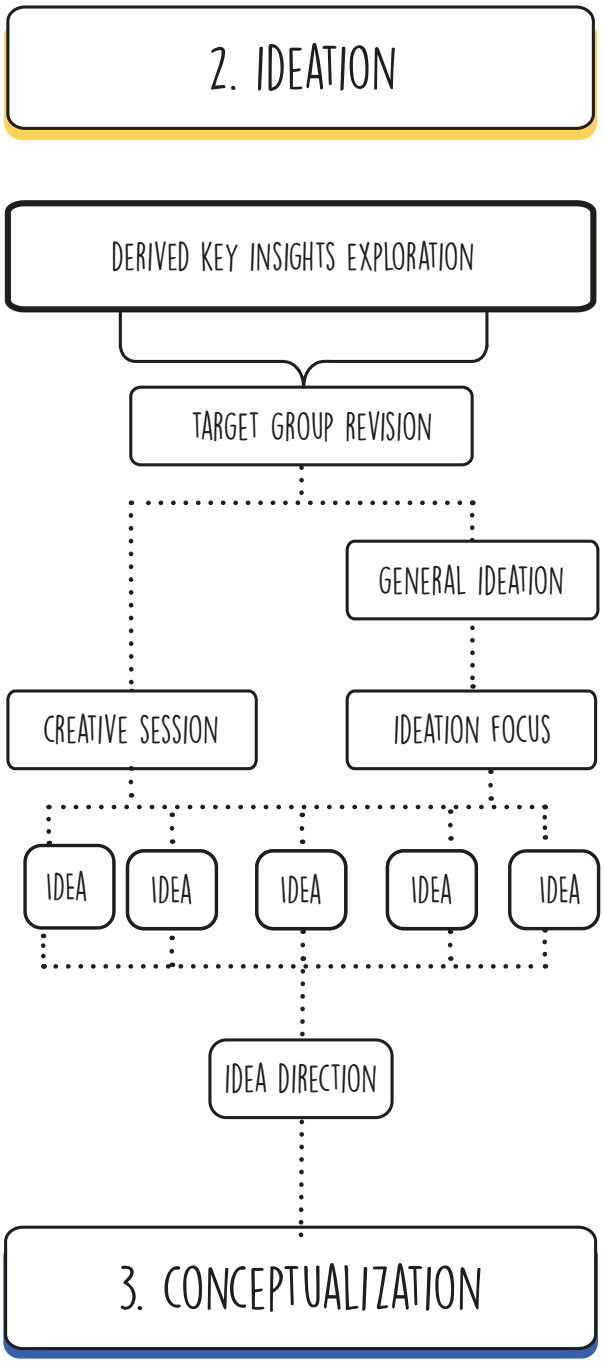
figure 14 shows a photo of a family ride through Sylmbolica. The magic ball at the front of the vehicle enables the passengers to make choices. Whenever the passenger has to choose something, the ball lights up and makes a sound. The interaction between the vehicle and the passengers is **PRO-ACTIVE**. The front panel of the vehicle has some buttons which also light up. These buttons **EMPOWER** the passenger; passengers can make choices which gives them a feeling of **AUTONOMY**.

(*source photos Efteling, 2018*)

chapter 02

IDEATION

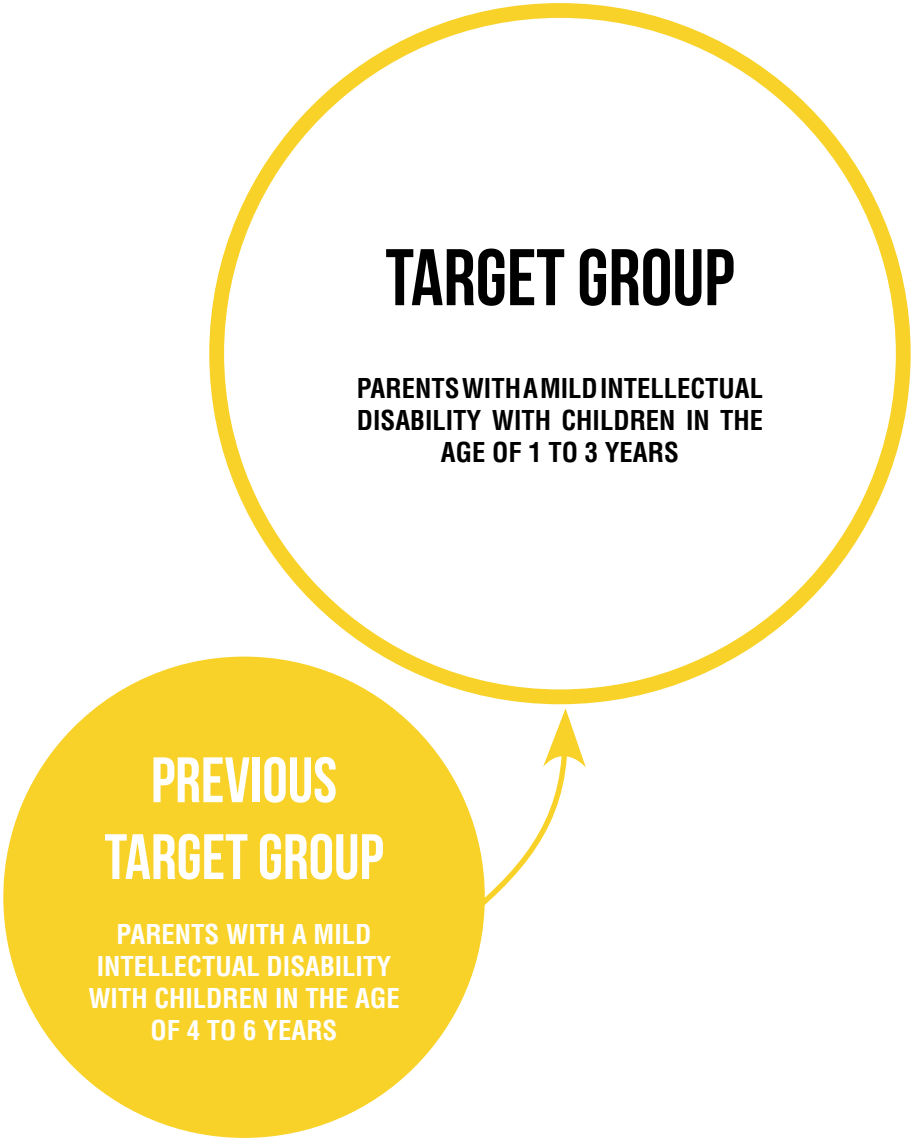
With the design goal, the explorations on both context as well as on interaction level in mind, the ideation phase started. Based on literature research and the conversations with care experts and Garage2020 it was decided to slightly adjust the target group to increase the impact of the design in the future. A creative session and multiple brainstorm sessions were used to generate possible solutions to discover how design can empower parents with MID in the rearing of their children. In the next chapter *03 conceptualization* a selection of these possible solutions will be developed into concepts.


2. IDEATION
DERIVED KEY INSIGHTS EXPLORATION
TARGET GROUP REVISION
GENERAL IDEATION
CREATIVE SESSION
IDEATION FOCUS
IDEA
IDEA
IDEA
IDEA
IDEA
IDEA DIRECTION
3. CONCEPTUALIZATION

1 TARGET GROUP REVISION

Based on the conversations with a care expert from Garage2020 it was decided to adjust the target group a little bit. The project started with a focus on parents with MID with 'children in the age of 4 to 6 years'. From a medical, neurobiological and psychological perspective the first 1000 days of a child (9 months during pregnancy and 2 years after birth) are critical for their further development. If a child is exposed to risk factors such as stress or bad nutrition this could be of big consequence for their physical,, mental and social development. Children with a bad start have a higher chance to get growth, (psychological) developmental and health problems. (Potrijk, Winter, Bos, Kerstjens, Reijneveld, 2012) In the first 1000 days of a child structure is extremely important and of big influence on future social development. To have a bigger impact with the design, it is crucial to focus on parents with children aged around 2 years old. Therefore it was decided to change the target group into

parents with mild intellectual disabilities with children in the age of 1 to 3 years.


TARGET GROUP
PARENTS WITH A MILD INTELLECTUAL DISABILITY WITH CHILDREN IN THE AGE OF 1 TO 3 YEARS
PREVIOUS TARGET GROUP
PARENTS WITH A MILD INTELLECTUAL DISABILITY WITH CHILDREN IN THE AGE OF 4 TO 6 YEARS

2 EXPLORATIONS ON IDEATION LEVEL

1 IDEATION FOCUS

Based on the explorations on context level in the beginning of this project, it can be concluded that the table can be seen as an important object during the eating routine. The table is part of both the living room and the kitchen and it is the central point of the house. During the interviews care experts mentioned that parents with MID have troubles with having structure in their eating routine. They have problems with planning when to do grocery shopping, at what time to start cooking, eating together and sometimes they even forget to give their children dinner. Usually families have dinner together at the same time, all sitting at a table. For families with a parent with MID this is not always self-evident.

The future design should embed perfectly into the context of use. Therefore the table is chosen as object to create an object with intent. From the first cycle of idea generation (see appendix C) one idea was chosen to iterate further; **a projection on the table**. The most important argument that lead to this decision is the fact that the table is a central, physical element in the living room. The eating table is a very important element in a normal eating routine. To explore this idea a generative creative session was organized.

IDEATION FOCUS

PROJECTION ON THE DINING TABLE

2 CREATIVE SESSION

With the ideation focus presented in the previous *chapter 2.2.1 Ideation focus* in mind, a creative session was conducted. In this creative session rough rapid prototyping will be used as a generative tool to:

- discover whether the combination of a table and a projector as intelligent support tool will be sufficient to stimulate the parents' self efficacy during the eating routine
- discover and examine context of use, size, appearance, implementation and interactions of the intelligent support tool

Method and materials

The intelligent support tool is designed from the user's perspective. The user is the expert as it comes to the context of use. In this project the users are the parent with MID, the child and the care provider, as can be seen in figure 10, *chapter 1.2 Explorations on context level*. During the session we will enact the scenario from both the perspective of the parent with MID as well as from the perspective of the child. Meanwhile we will create rough rapid prototypes that would fit into this scenario.

Enacting the scenario can help to get a better understanding of possible experiences of use of an intelligent support tool during the eating routine. Imagination will

figure 15: Rapid prototyping with different creative materials and generative tools during the creative session.

enable participants to enact what it will mean to engage with the context of use. The rough prototype can enter the stage and evoke new ideas and stimulate the improvisation of possible scenarios. (Halse, Brandt, Clark, & Binder, 2010)

Usually these sessions will take place with stakeholders, for example with the target group and their care givers. Due to the vulnerability of the target group, it was a conscious choice not to involve them in an enactment to generate ideas through rapid prototyping. Instead, the results of observational research of the target group and interviews with the care givers (see section 1), will be used as input for this creative session. During the session different objects will be used as theatrical props to support the scenario, for example plates and utensils. figure 16 shows a schematic overview of the set up of the creative session.

The previous chapter *1.2.3 Conclusions* summarizes the scenario that will be enacted during this creative session, but during the session we will focus on what happens when Kelly and Saar are at home. The session will take place at a dining table during lunch and it will start with the enactment of the scenario. The dining table is located in the same room as the kitchen and the living to create an environment that is quite similar to the future

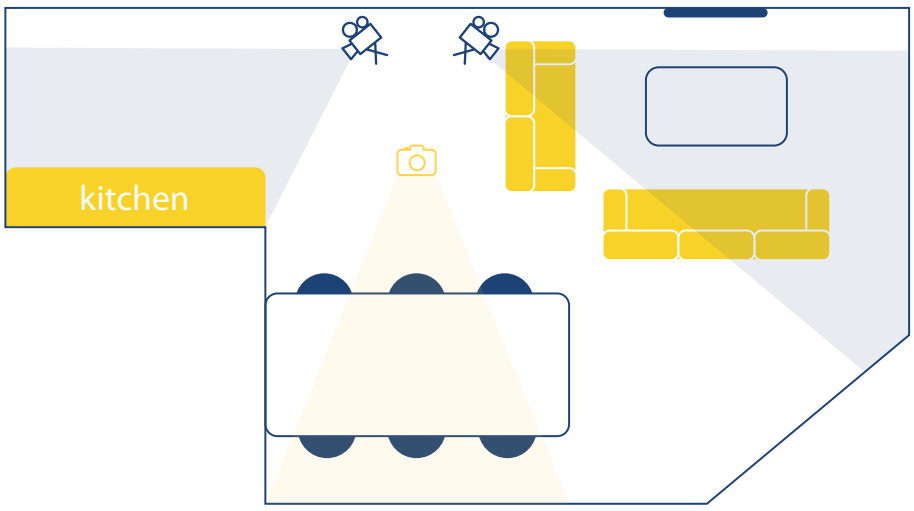


figure 16: Set up of the creative session.

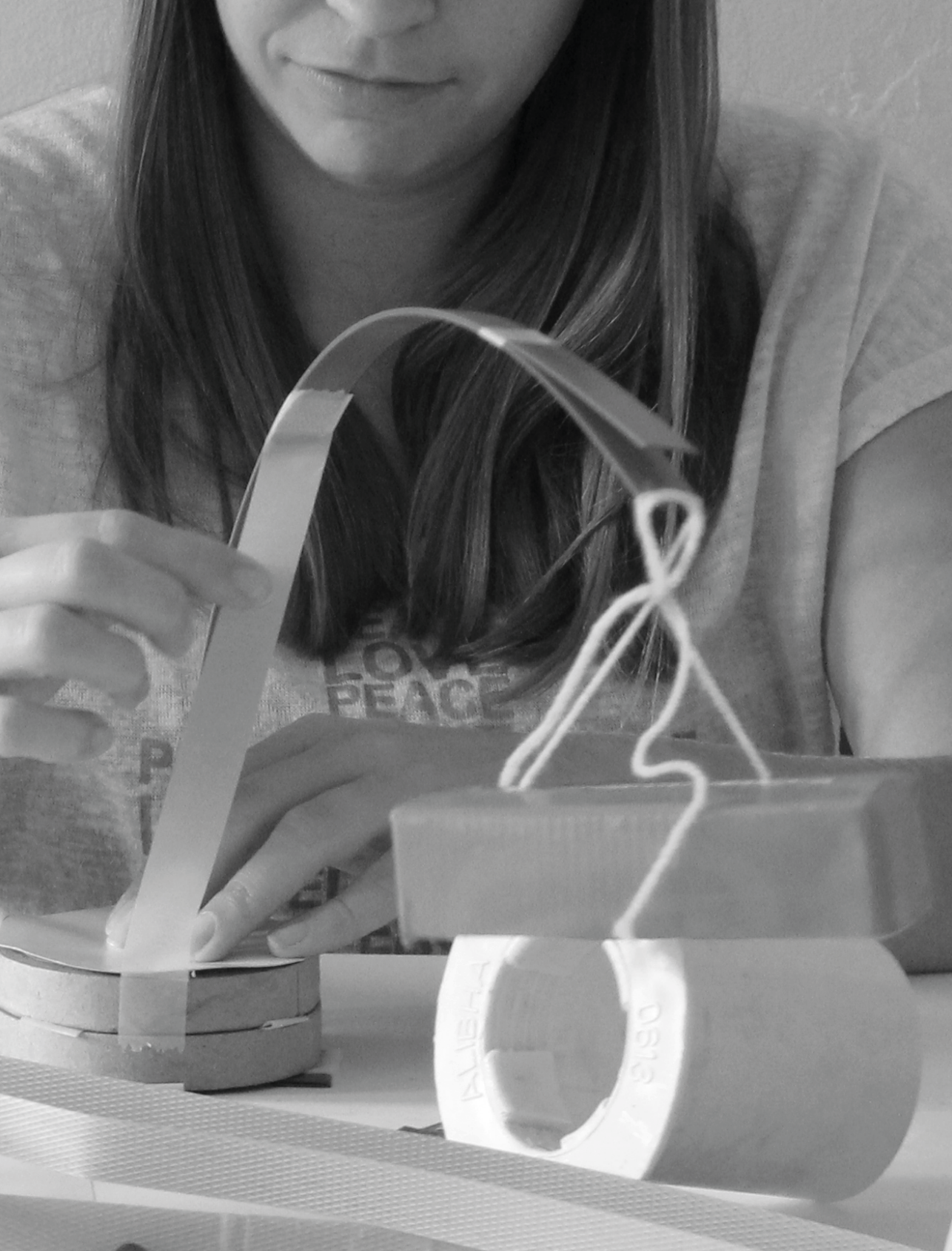


figure 17: Rapid prototyping with different creative materials and generative tools during the creative session.

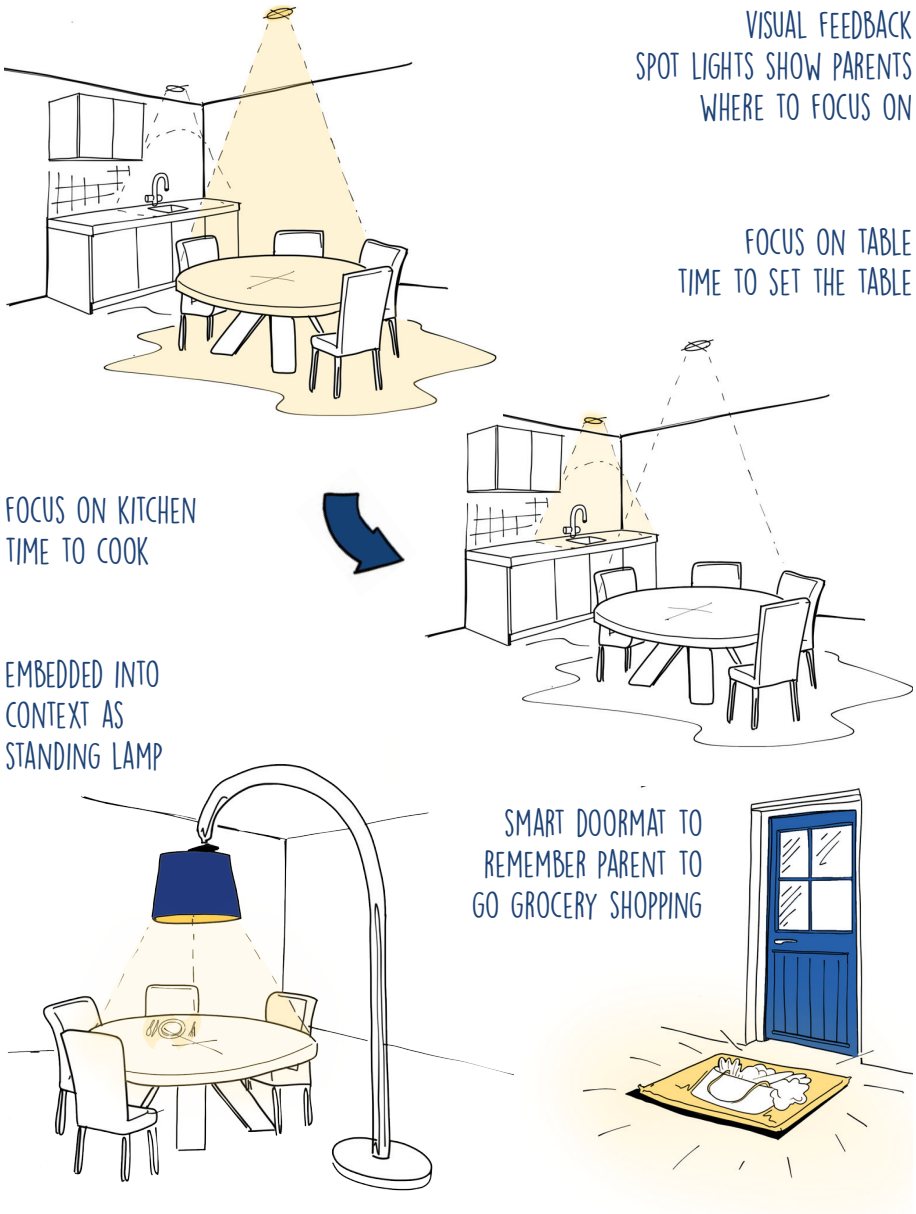


figure 18: Sketches presenting the ideas that were generated during the creative session.

context of use. Food will be provided to make it easier for participants to identify with the target group and the context of use, the participants have to cook while taking care of their 'child'. Participants will play the role of the child first, because this is a role that is easier to imagine without having knowledge of the target group. At this moment I will play the role of the parent with MID. Later the roles will reverse and the participants will play the parent with MID. During the enactment participants will be provided with crafting materials to make rapid prototypes. Participants will be introduced to the idea of projecting or displaying images on the table. Then they will be asked to imagine different shapes, materials or objects that could provide parents with structure during the eating routine and turn these imaginations into rapid prototypes. The table will be covered with white paper. This cover will serve as a big sketchbook. The session will be recorded by camera and another camera will be used to take photos.

Results

The enactment emphasized the fact that it is quite hard for parents with a mild intellectual disability to plan their dinner routine. While one participant played a child that needed attention, the other participant tried to bake a pancake and set the table. After the enactment the participant that played the role of the parent explained that it was very hard to set the table, while baking a pancake, while the child was crying. This information was used as input for the ideation during the creative session. The main ideas that were generated in this session are shown in figure 18.

Derived key insights

This creative session enabled the participants to sensitize for the context of use and the target group. Besides the ideas that are shown on the right page, this creative sessions also emphasized the importance of the following insights that were also found in previous research in the exploration phase.

- Most people with MID have **troubles with defining priorities in daily life**.
- Most people with MID have **troubles with planning and keeping priorities**.
- People with MID are **easily distracted**.

3 IDEATION SKETCHES

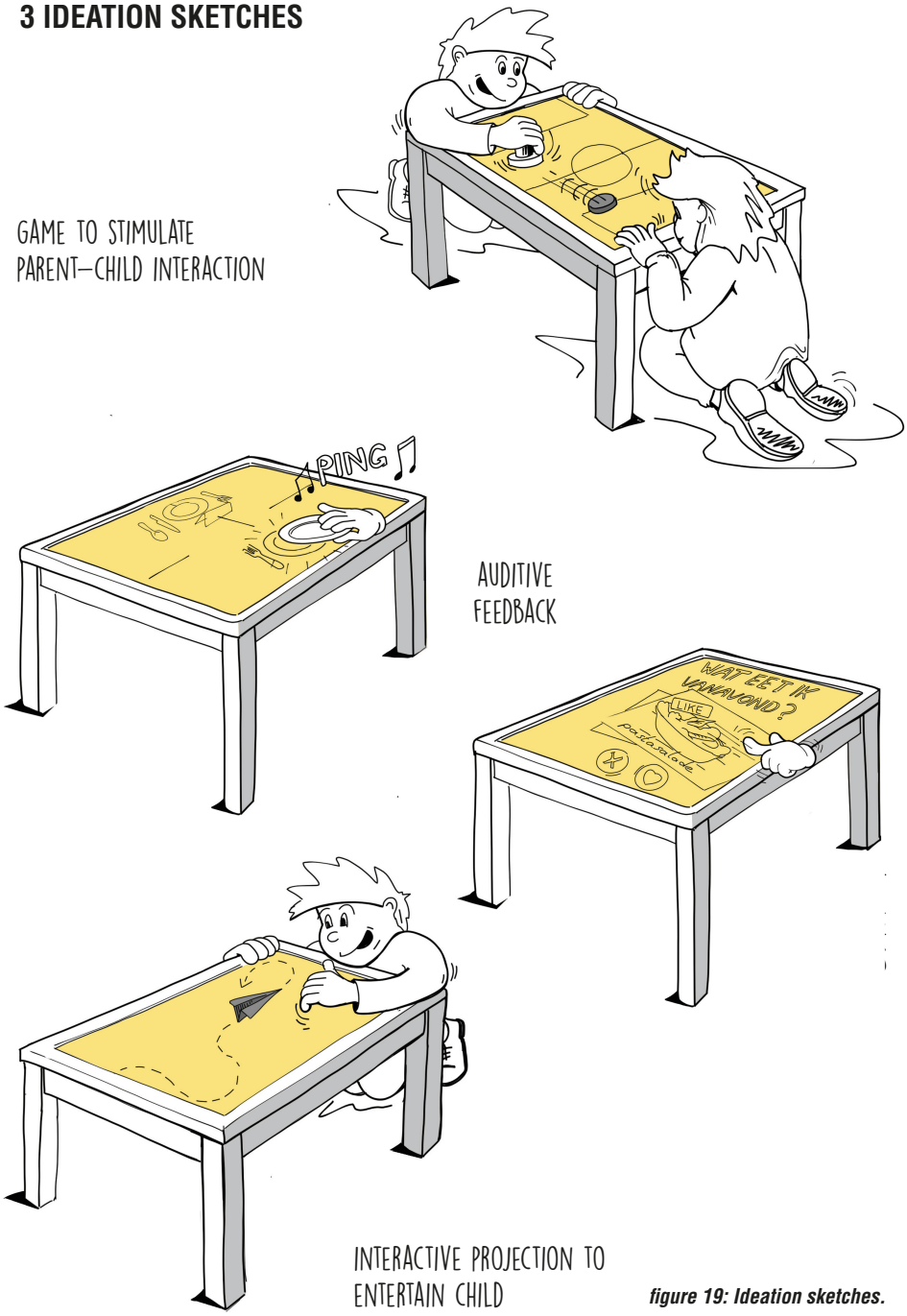
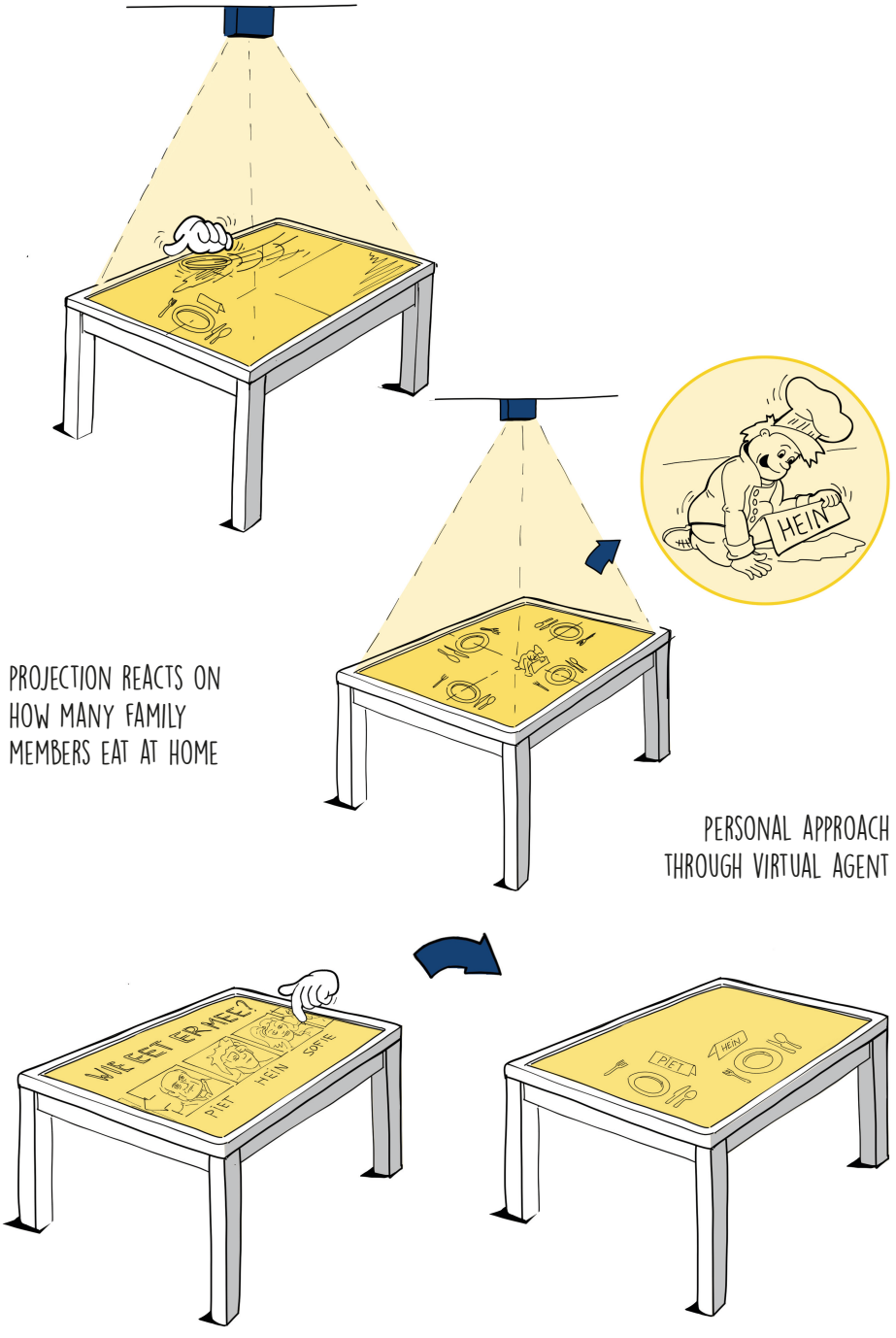


figure 19: Ideation sketches.



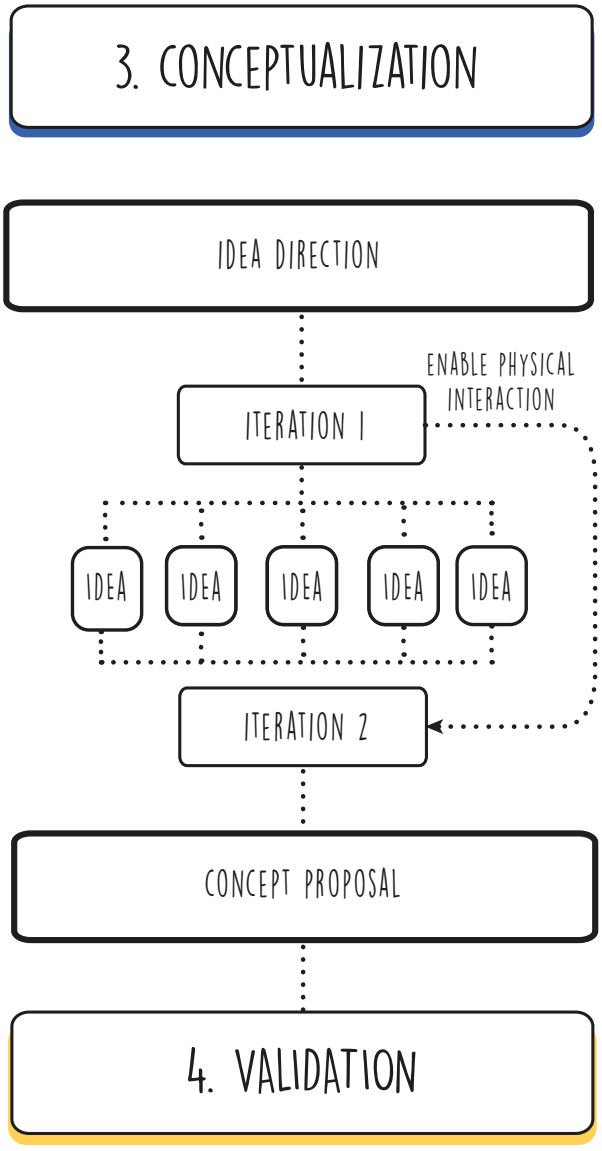
PROJECTION REACTS ON HOW MANY FAMILY MEMBERS EAT AT HOME

PERSONAL APPROACH THROUGH VIRTUAL AGENT

chapter 03

CONCEPTUALIZATION

In the previous chapter several ideas were generated to discover how design could empower parents with MID. This chapter will elaborate and iterate these ideas. The approach is somewhat different than usual; one idea was chosen to iterate instead of choosing some ideas to turn into concepts. Two rounds of iterations were conducted to conclude with a concept proposal. The concept proposal is explained by a user scenario. In the next *chapter 4 validation* this concept proposal will be validated through an interview with a care expert.


3. CONCEPTUALIZATION
IDEA DIRECTION
ENABLE PHYSICAL INTERACTION
ITERATION 1
IDEA
IDEA
IDEA
IDEA
IDEA
ITERATION 2
CONCEPT PROPOSAL
4. VALIDATION

1 FIRST ITERATION: BOW FLOOR LAMP

The insights from *chapter 01 Exploration* were used to develop the ideas from *chapter 02 Ideation* into two iterations. This chapter presents the first iteration.

1 ROUGH SKETCHES

The sketches below show the different ideas that were used to come to the first iteration. figure 21, figure 22 and figure 23 on the next page show the user scenario of the first iteration.

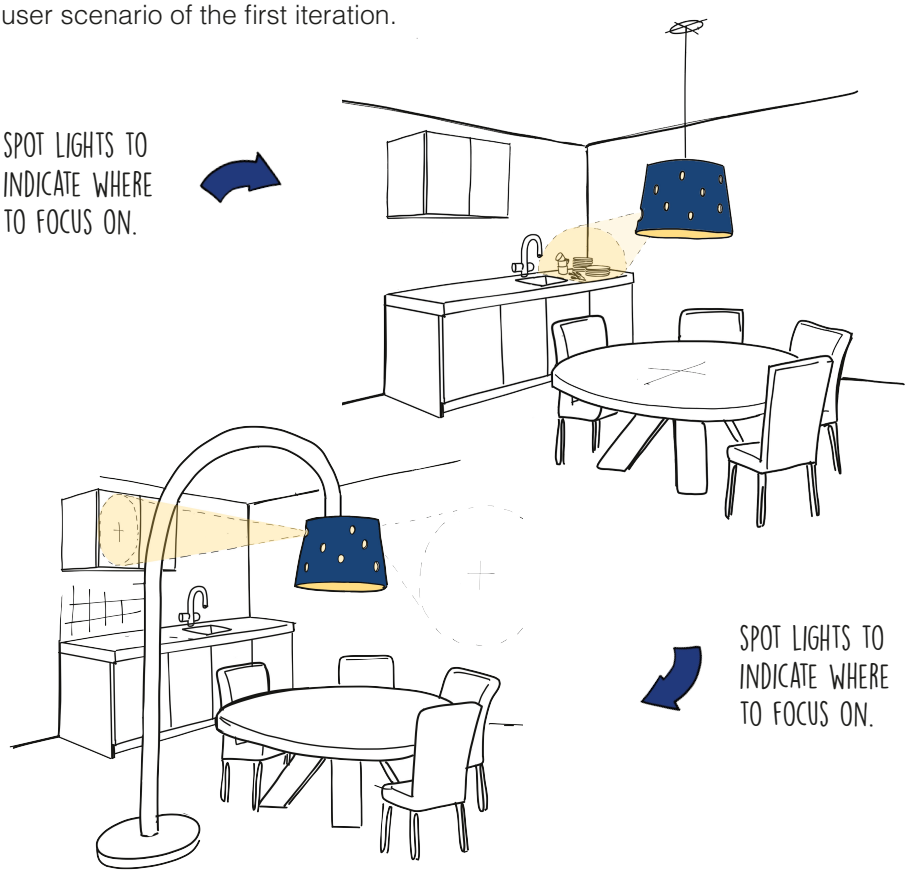
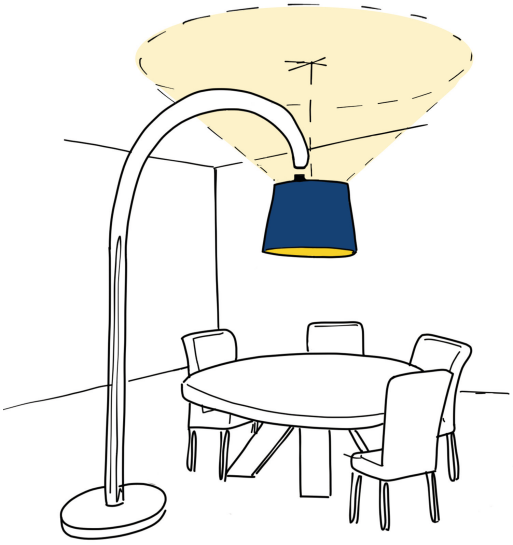
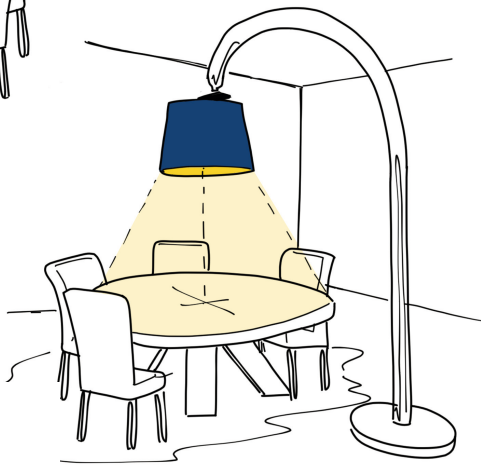


figure 20: Ideation sketches first iteration.



LIGHT PROJECTION ON THE CEILING TO GET THE ATTENTION OF THE PARENT AND CHILD, TO EMPHASIZE THAT IT IS TIME TO START THE EATING ROUTINE.



PROJECTION OF PLATES AND CUTLERY TO SUPPORT PARENTS IN THE ROUTINE OF SETTING THE TABLE ON TIME.

THE BOW FLOOR LAMP VIBRATES TO GET THE ATTENTION OF THE PARENT AND CHILD

2 USER SCENARIO

Figure 21, figure 22 and figure 23 show the user scenario of the first iteration.

The user scenario shows the story of mother Kelly aged 21 years and her 2 year old daughter Saar. Saar just came back from day care. Kelly is hungry and looking for something to eat. The bow floor lamp is located above the dining table. The standing lamp starts to make a magic sound; it is almost time to set the table and start cooking. At the same time a light shines on the ceiling, to indicate that it is time to start cooking. Meanwhile the standing light starts to project a plane on the table to get the attention of the child. After approximately half an hour it is time to set the table. The projector initiates this by projecting plates on the table. If a parent places a plate on the table, the standing lights gives a positive feedback sound and the virtual plates will disappear. The standing light turns off during dinner. After dinner a projection of cleaning the plates appears to indicate that the parent should clean the table. If the parent removes the plates, a positive feedback sound will be played. After dinner a interactive game appears to stimulate the parent-child interaction.

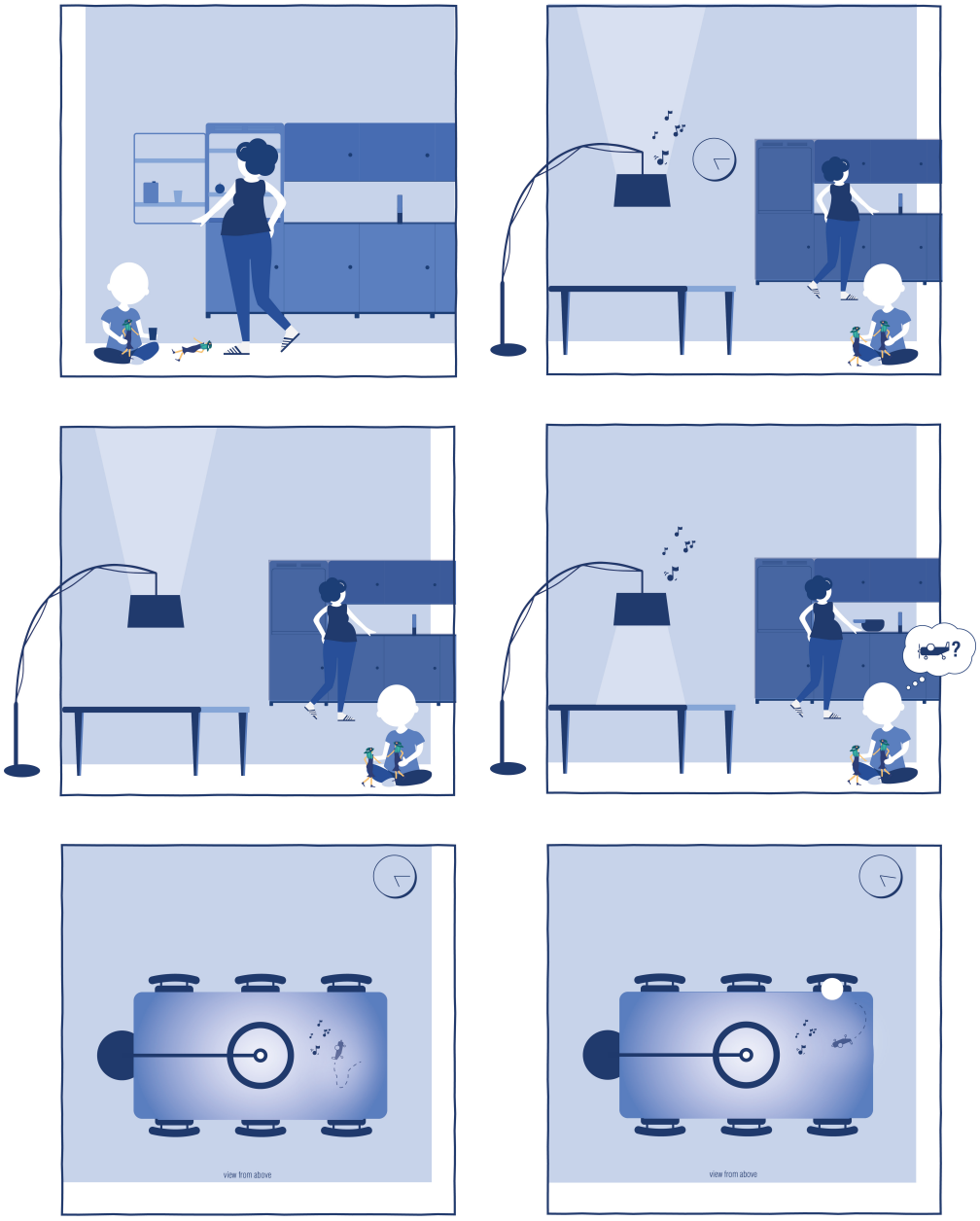


figure 21: Scenario context of use bow floow lamp part 1/3.

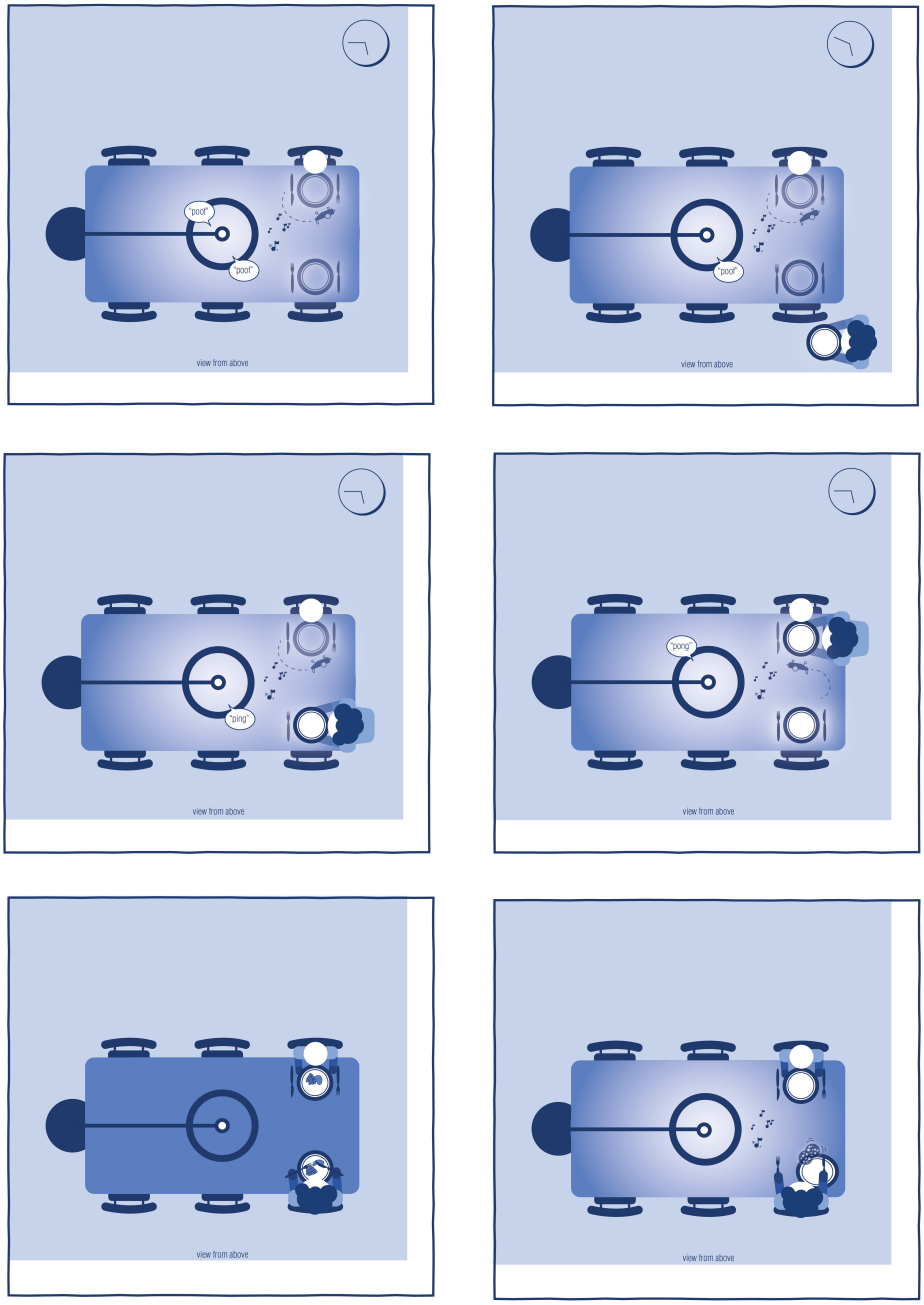


figure 22: Scenario context of use bow floow lamp part 2/3.

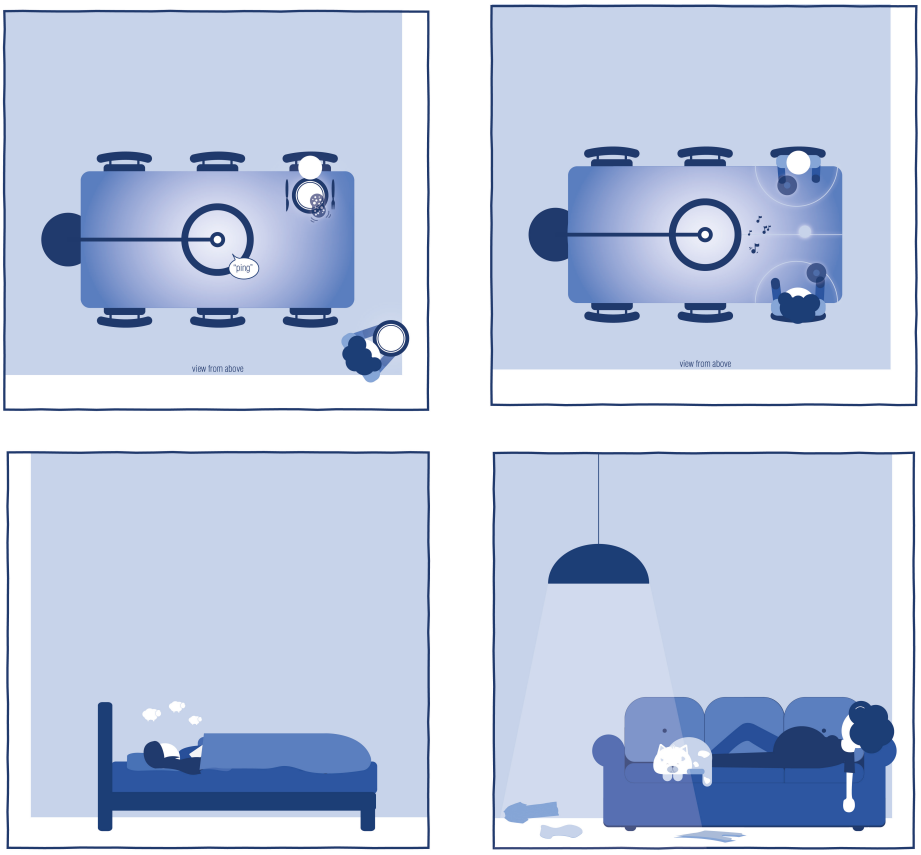


figure 23: Scenario context of use bow floow lamp part 3/3.

2 IN-BETWEEN ITERATIONS

The first round of iterations was focused on designing the interactions between the interactive table projector and the family. After the first iteration it was decided that a bow floor lamp is too static to embed into the context of use as explained in *chapter 2.1 Explorations on context level* of this thesis. Furthermore a floor lamp uses a lot of space in the small homes of the parents with MID.

User scenario sketches were made to explore the possibilities of a small table lamp, this scenario is shown in figure 24. The interactions in this iteration are only virtual interactions with the projection. There is no direct interaction with the lamp. Therefore the second round of iterations will focus on redesigning the shape to enable physical interaction with the design.

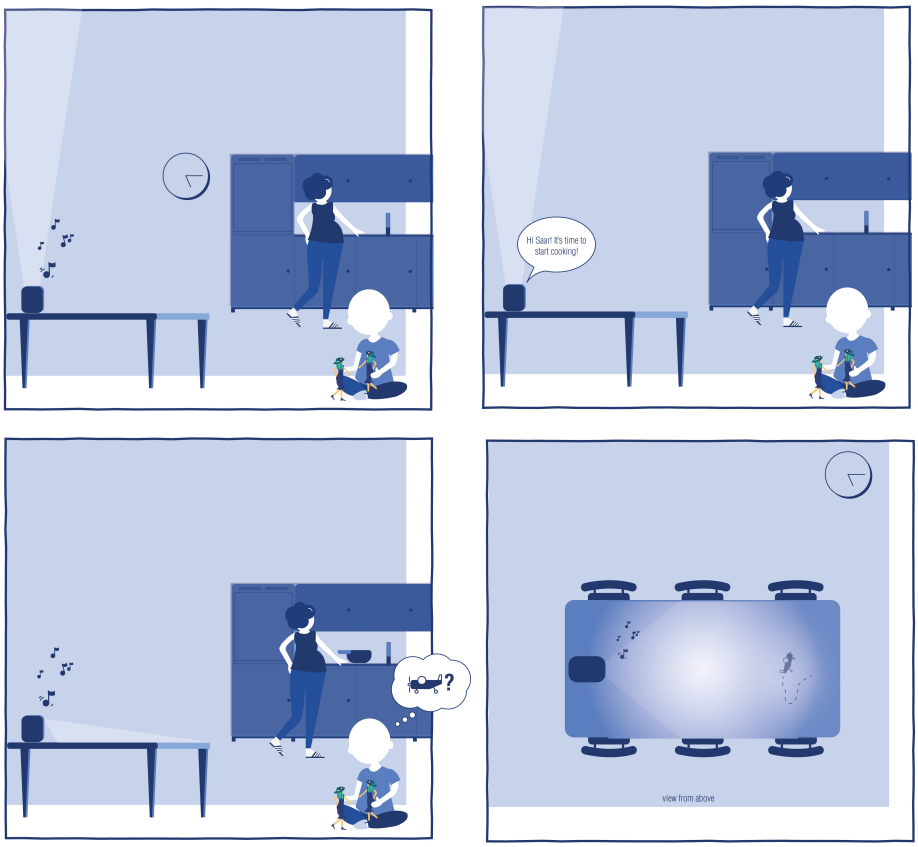


figure 24: Part of user scenario table light.

ITERATION FOCUS

ENABLE PHYSICAL INTERACTION

3 SECOND ITERATION: TABLE LIGHT

This chapter presents the second iteration. The second iteration is a variation on the first iteration but with a specific focus on enabling physical interaction.

1 ROUGH SKETCHES

To explore different shapes and interactions of the first iteration, a brainstorm session was conducted. The main goal of this brainstorm session was to create a shape that enables new ways to physically interact with the design. The pictures below show sketches of the outcomes of the brainstorm session.

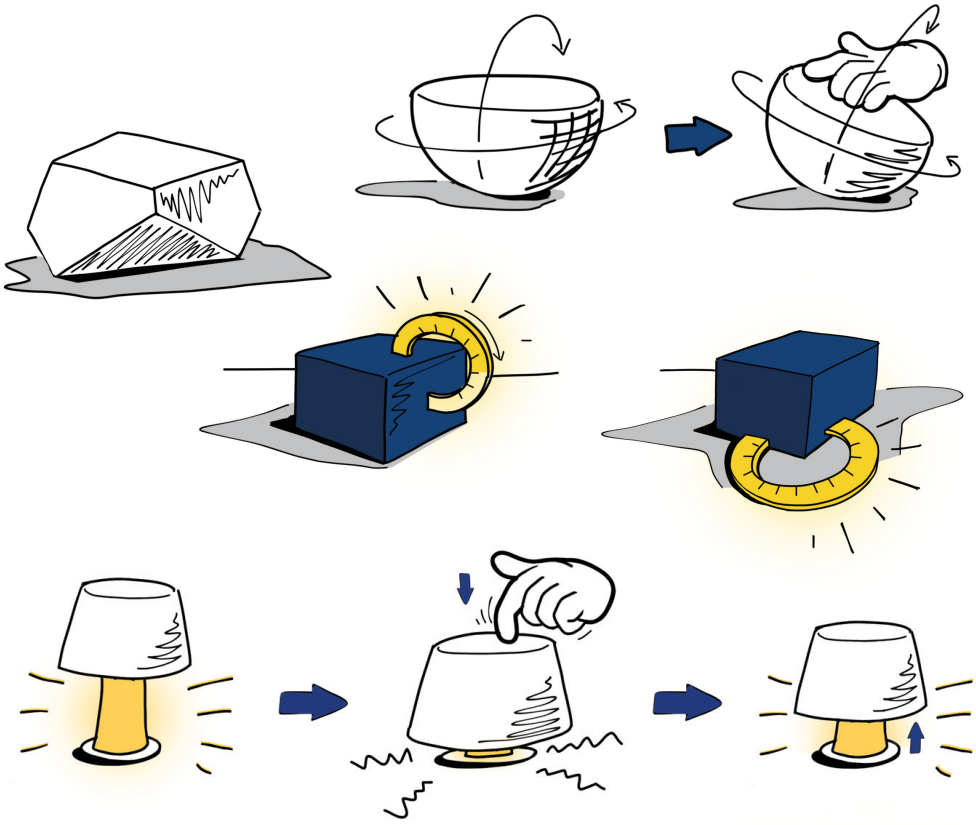
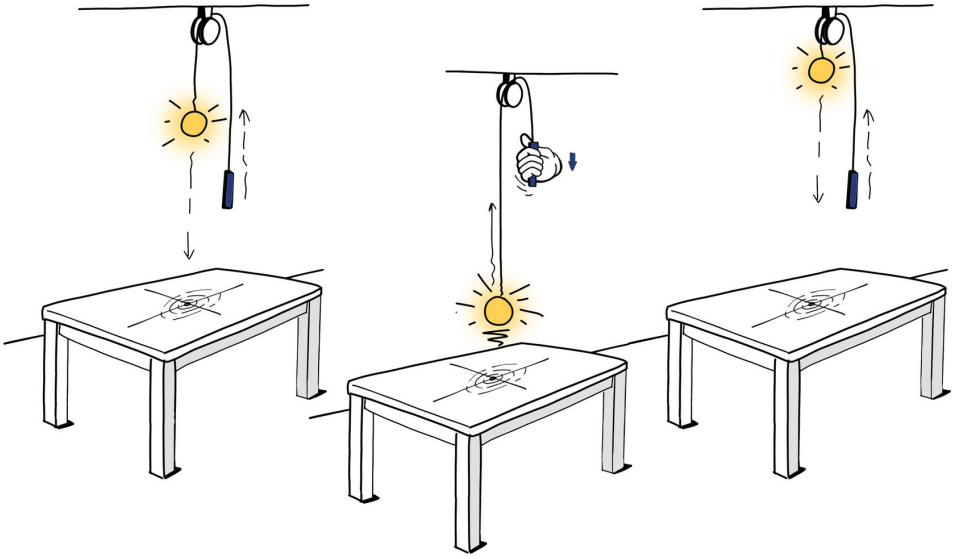
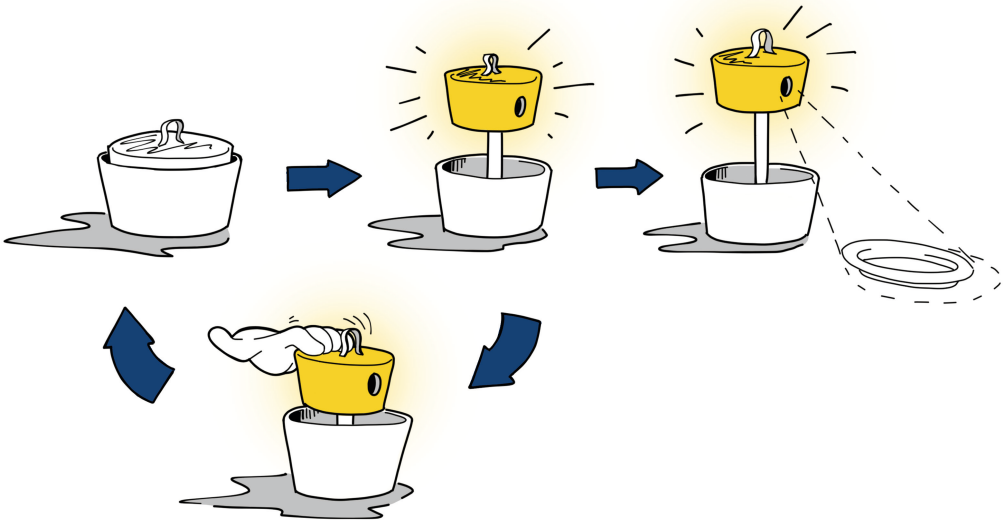


figure 25: Ideation sketches second iteration.





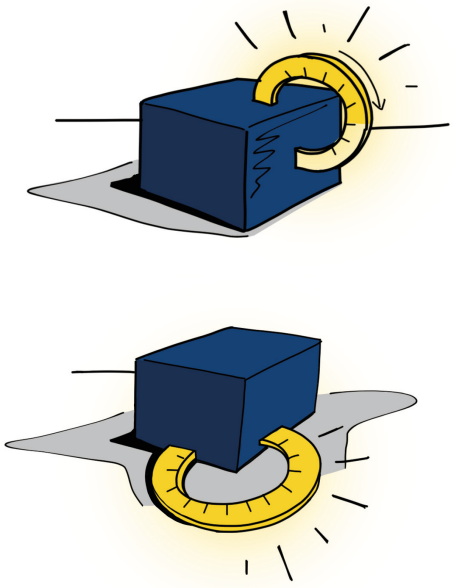


figure 26: Inspiration sketches user scenario.

2 USER SCENARIO

Two of the sketches on the previous pages were chosen to create a user scenario to explore the context of use, see figure 26. Only a small part of the user scenario is shown, because the other part is the similar to the previous user scenario of the first iteration.

The user scenario in figure 27 shows the story of mother Kelly aged 21 years and her 2 year old daughter Saar. Saar just came back from day care. Kelly is hungry and looking for something to eat. The interactive hanging light indicates that it is almost time to set the table by making noise and lighting up. The hanging light is actually a timer; it slowly drops down until it reaches the table. If the light reaches the table it starts to vibrate to make the parent aware that it is time to set the table. The parent can pull the rope down to snooze the light. The light will start to project plates on the table to support the parent to set the table. The user scenario continues in the same way as the previous scenario; the hanging light will also give a positive feedback sound. The light will also provide the parent with visual feedback; the virtual plates will disappear when the parent places a plate.

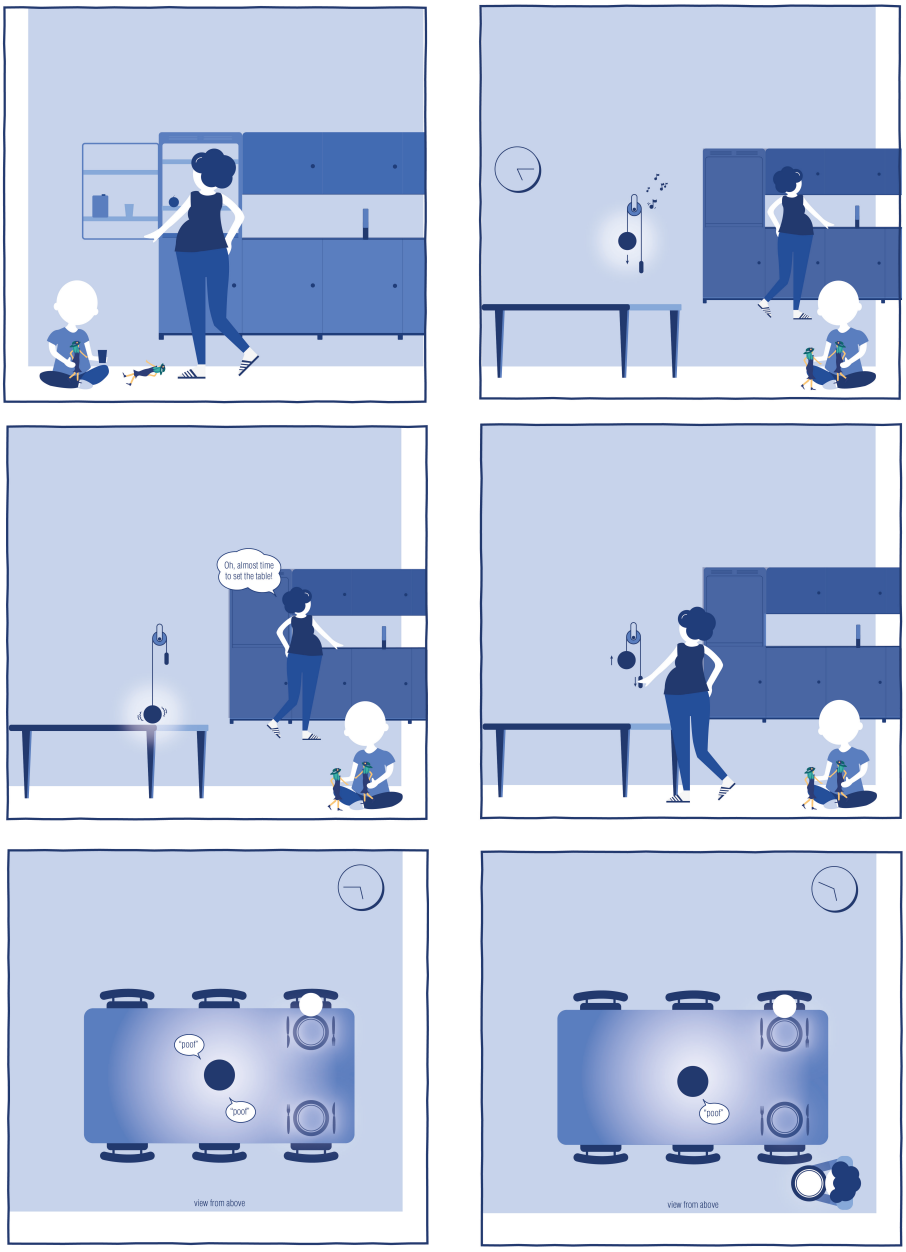


figure 27: User scenario second iteration.

4 CONCEPT PROPOSAL

The design goal, context explorations, tactful guidelines and the interaction vision in the exploration phase of this project resulted in different iterations as shown in the previous chapters. These iterations led to the concept proposal that will be presented in this chapter.

1 CONTEXT EMBEDDING

The design symbolises a table light. The context analyses in the first phase highlighted the importance of a design that embeds perfectly into the current context of use. Elaborate research was conducted through home visits and interviews with parents and caregivers to understand and anticipate to the context of use. The result is concept Luna; an interactive table light that fits on the dining table. Concept Luna support parents with a mild intellectual disability in their daily eating routine to prevent them from overload. Preventing parents from overload by learning them skills is an important aspect of effective support to parents with MID (Het Nederlands Jeugdinstituut, 2014). The table light consists of a cubic base form combined with a circular LED ring. A projector is located in the cubic base of the table light. Since parents with a mild intellectual disability have troubles with applying obtained skills in new situations (Oomen, 2009). An important element in this design is the fact that it is implemented into their own home.

2 USER SCENARIO

As stated in the design goal the concept focuses on empowering parents with MID by providing them with structure during the evening eating routine. The scenario in figure 28 and figure 29 shows the context of use of Luna. The concept provides parents with extra structure in a **pro-active** way; at the end of the afternoon just before dinner time, Luna starts up by making a sound. The interviews with care givers and parents with MID **highlighted the importance of visual and positive feedback.** A visual timer will be projected on the table, indicating that it is almost time to set the table. The visual timer is also visible in the LED ring, as can be seen in the scenario on the next pages. If the timer is done, the design will project plates and cutlery on the table indicating that it is time to set the table. This projection is used as an **intuitive way** to motivate parents to set the table by imitating the projection.

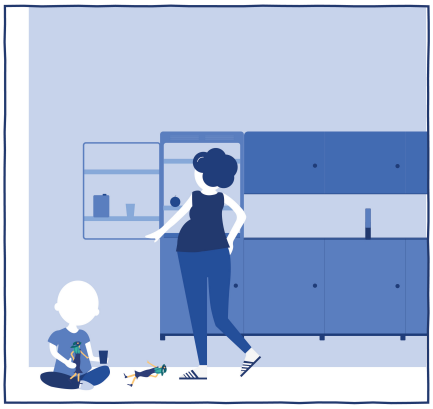
It is possible to snooze the timer by making a gesture waving left in front of the projection. The timer will

snooze as shown in the interaction flow on page 90 and page 92. The snooze function provides the parent with **a feeling of autonomy**. The parent can decide to delay the time the projection starts. This feeling of autonomy is an important element in the design. The design fosters collaboration, which was one of the derived key insights as explained in *chapter 1.5 derived key insights on future product level*. Parents should feel in control, they should feel like they could **collaborate with the design like partners**. (Oomen, 2009; Durinck & Racquet, 2003; Het Nederlands Jeugdinstituut, 2014). However, this autonomy is limited: the first time the projection can be delayed to the starting time. The second time the timer will be snoozed back to half of the time. The third and last time the timer can only be snoozed back to a quarter of the original time. The next pages present the scenario and the interaction flow of the concept. The small boxes in the upper left corner of the sketches show a detailed view of the design and it's interactions. The projection can only be snoozed for three times. The actual amount of autonomy is limited, but the snooze function provides the parent with the feeling that they can decide.

Visual feedback is provided by the projections and by the table light. If a parent mirrors the projection by placing a plate, Luna will make a **positive feedback noise** to confirm the good behavior of the parent. When the table is fully set, the projections of the plates and cutlery will disappear supported by sound; providing the parent with extra visual and auditive positive feedback. Research that was conducted at the exploration phase of this project *chapter 1 Exploration* and several other studies emphasize the importance of **positive feedback** when supporting parents with MID (Het Nederlands Jeugdinstituut, 2014; Oomen, 2009).

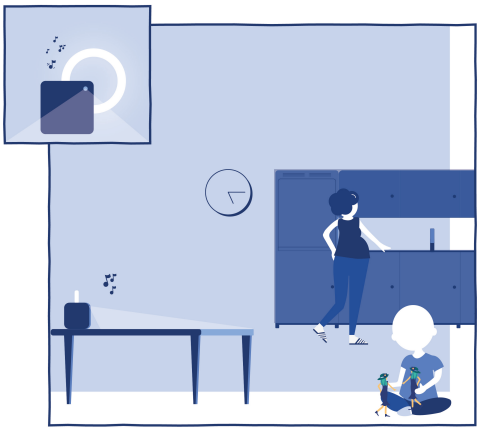
During dinner Luna projects a timer on the table that counts back to the moment of cleaning the table. The projected timer is supported by the LED ring. If the timer is done, it is time to clean the table. If needed, the parent can snooze this timer.

The partnership between the parent with a mild intellectual disability and Luna **empowers** the parent, because **it complements** the parent by helping her to structure and plan the eating routine.

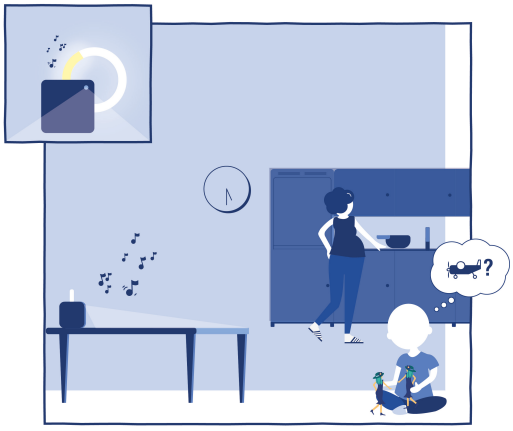


1. Kelly has just picked saar up from day care. at home saar is playing with her puppets, while kelly starts to get hungry.

2. It's 17:15h: time to start the eating routine. The concept projects a light on the ceiling and makes a magic sound to seek the attention of the parent.

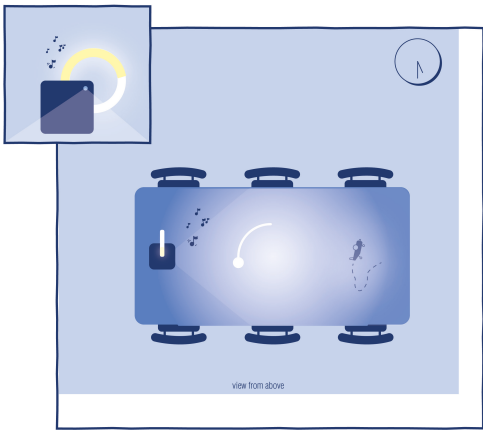


3. After seeking the attention of the parent, an airplane is projected on the table to seek the attention of the child.

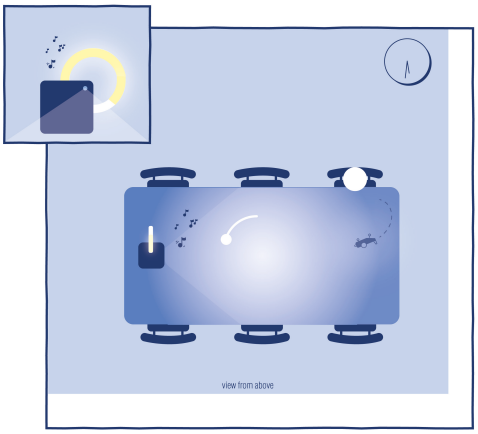


4. The projection is supported by the sound of an airplane. the child starts to get curious, the child wants to know where the sound comes from.

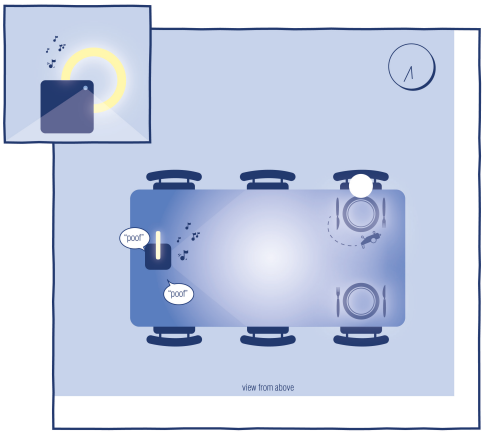
figure 28: User scenario concept proposal.



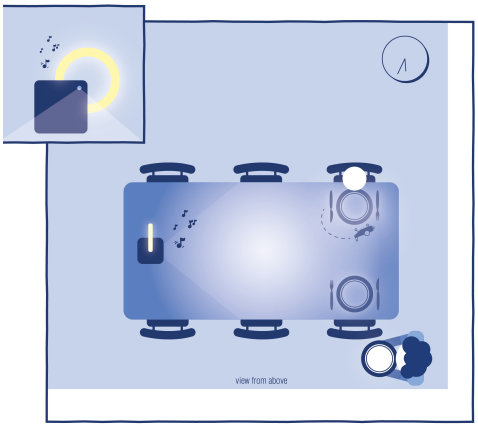
5. While the projection of the airplane flies over the table, a projection of a timer shows the time that is left until the projection of the plates starts.



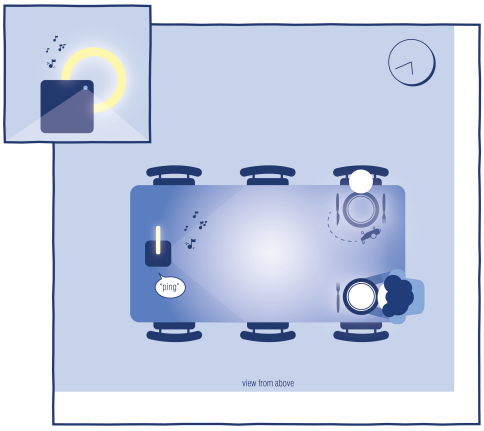
6. The parent placed the child on a chair. Projection of the timer is visually supported by the table light. The LED ring will gradually light up over time.



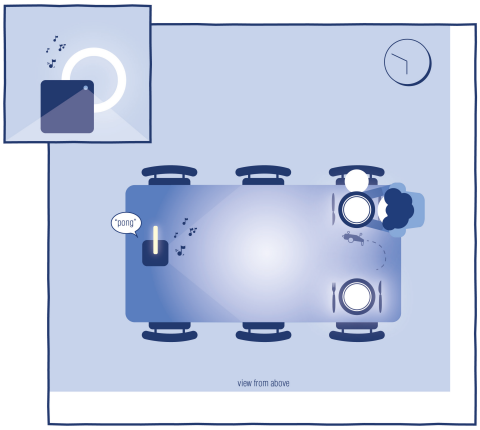
7. The timer is done: time to set the table. A projection of plates appears on the table, with audio. Possible to snooze. (see interaction flow)



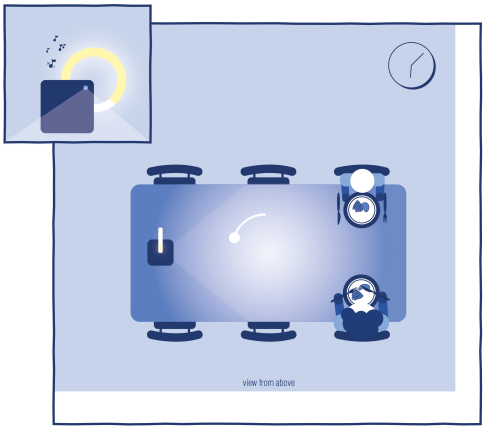
8. The mother starts to set the table, while the child is still entertained by the flying airplane.



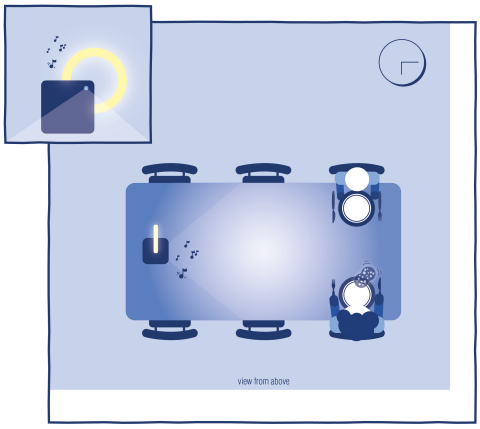
9. If the mother places a plate on the projected plate, the concept will provide her with a positive feedback sound.



10. If a plate is placed on the table, the projection of the plate and cutlery will disappear.

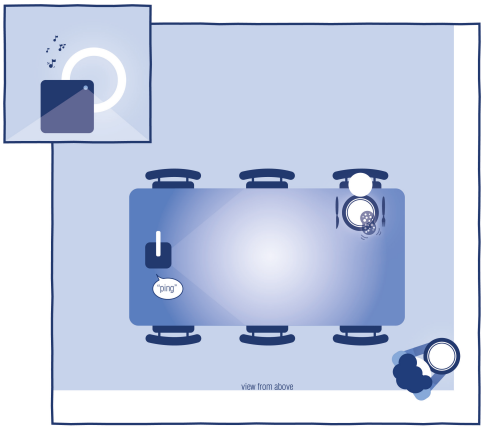


11. During dinner the timer indicates the time that is left to have dinner. The timer could be snoozed to delay the projection.

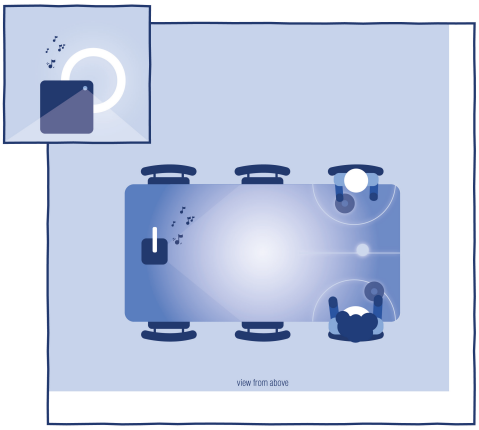


12. If the parent and child finished their dinner, an animation of a sponge will appear to motivate the mother to clean the table.

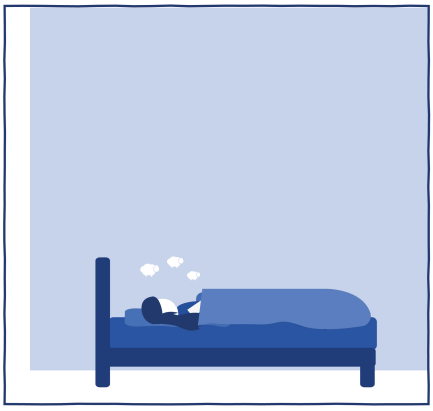
figure 29: User scenario concept proposal.



13. If the parents picks up a plate, there will be a positive feedback sound.



14. If the table is clean, the concept will start an interactive game to stimulate parent-childi interaction.



15. A structured and well planned dinner enables the parent to bring her child to bed in time.

16. End of the day, time to relax!

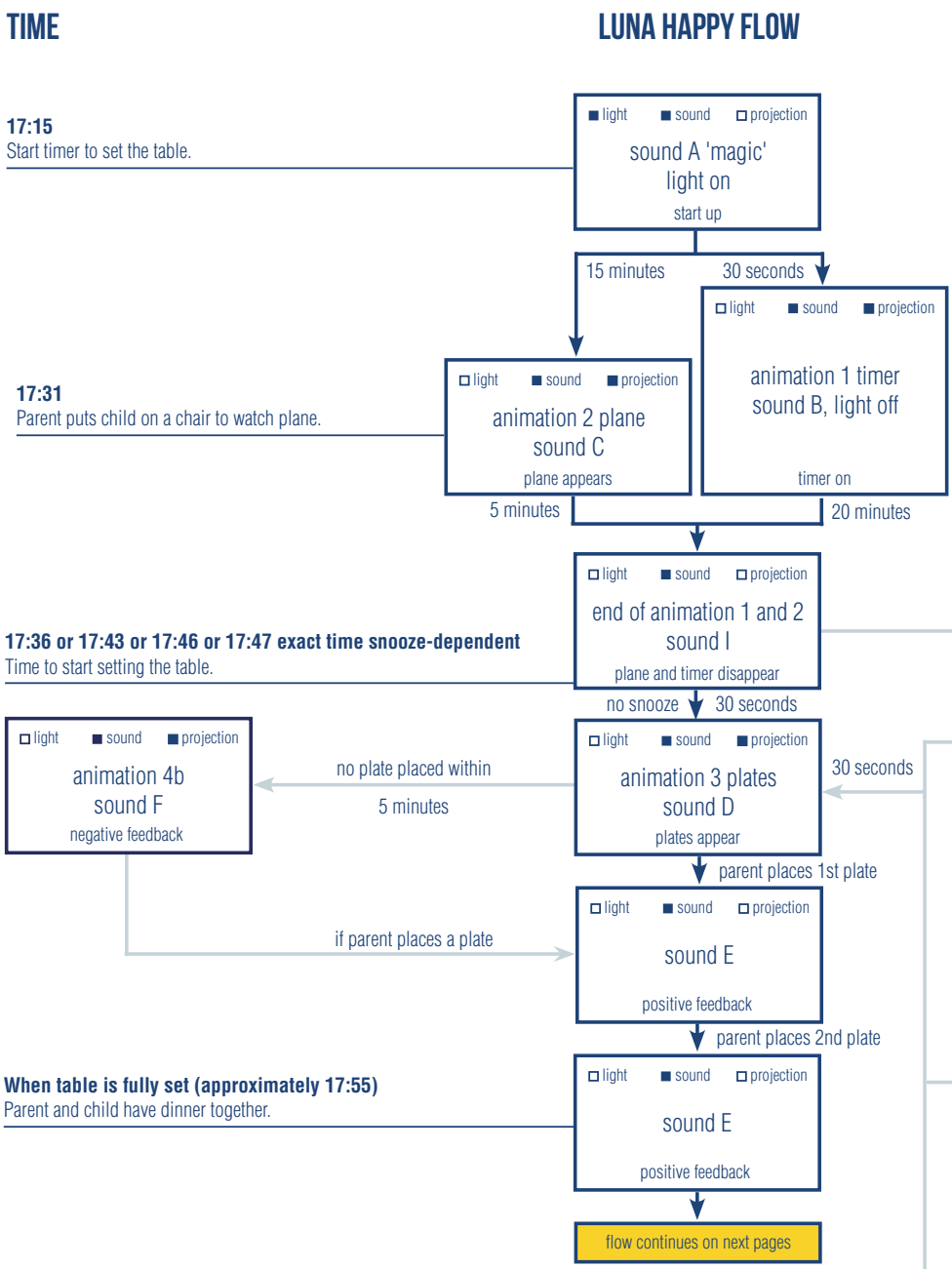


figure 30: Interaction flow concept proposal part 1/2.

3 INTERACTION FLOW

The schemes in figure 30 and figure 31 on the next pages show the interaction flow of the concept proposal. The left column shows an estimation of the time, the middle column shows the happy flow of the interaction and the right colomn shows what happens when a parent decides to snooze the interaction.

The overview of the interactions is split into two pictures. The interaction flow schemes explain the interactions between the parent and the design. As explained in the previous paragraph, the design can be snoozed by the parent. This interaction is explained in the right column of the scene 'the snooze flow'.

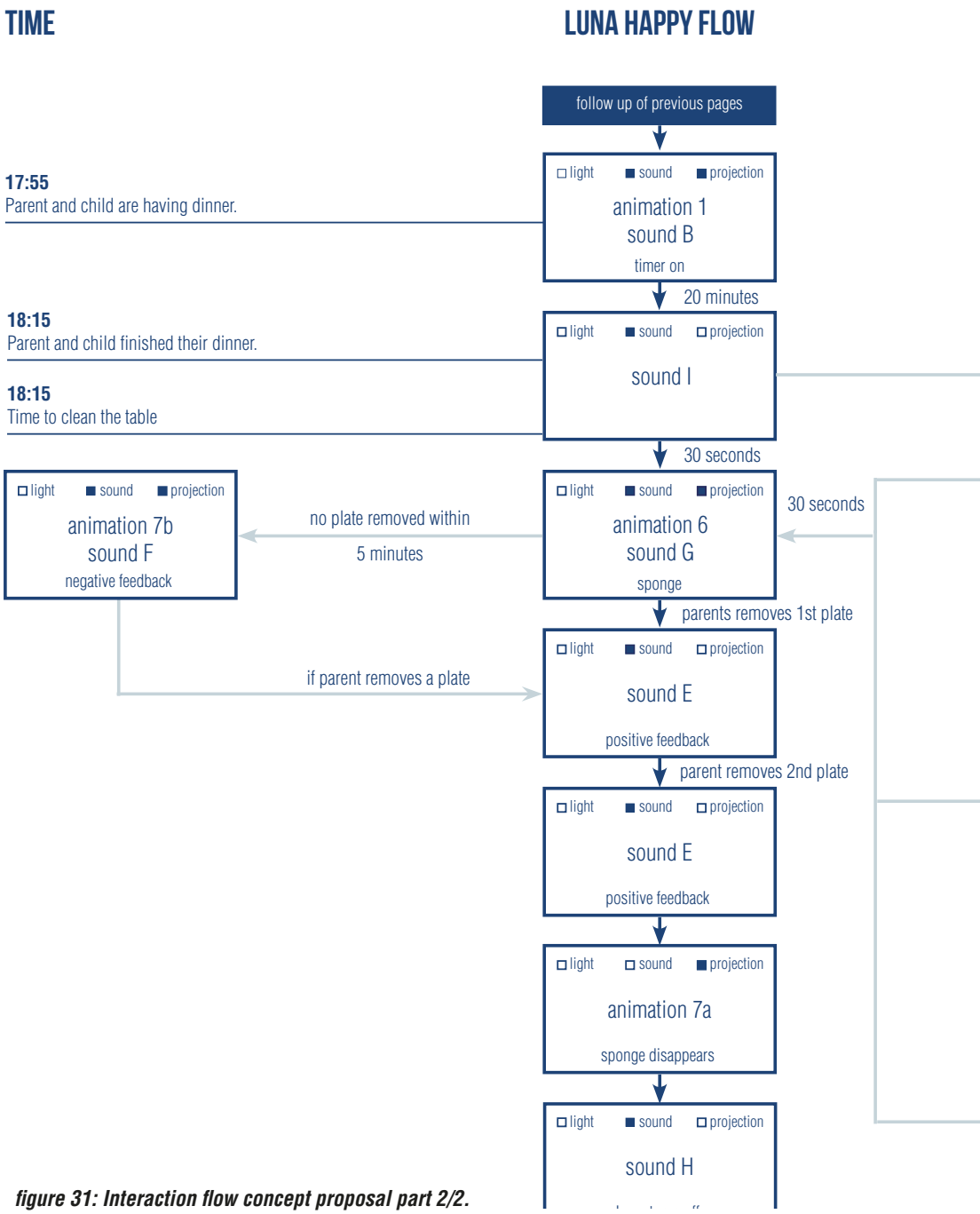
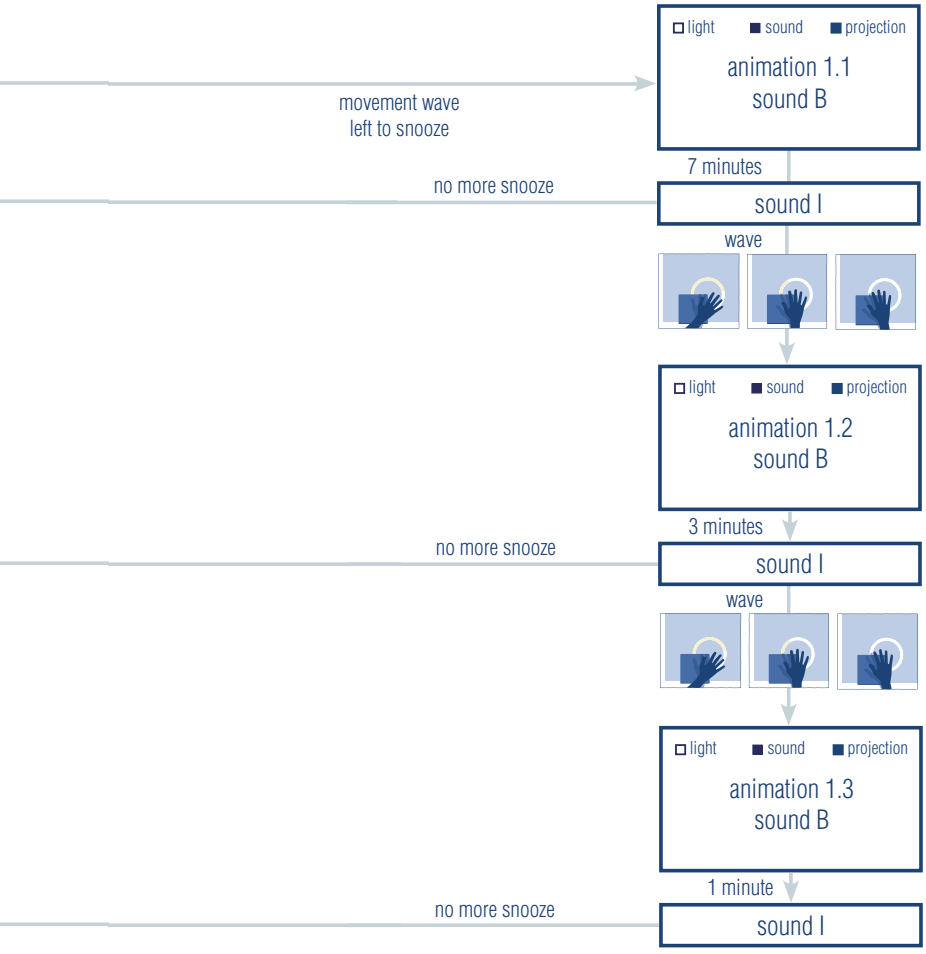


figure 31: Interaction flow concept proposal part 2/2.

SNOOZE FLOW

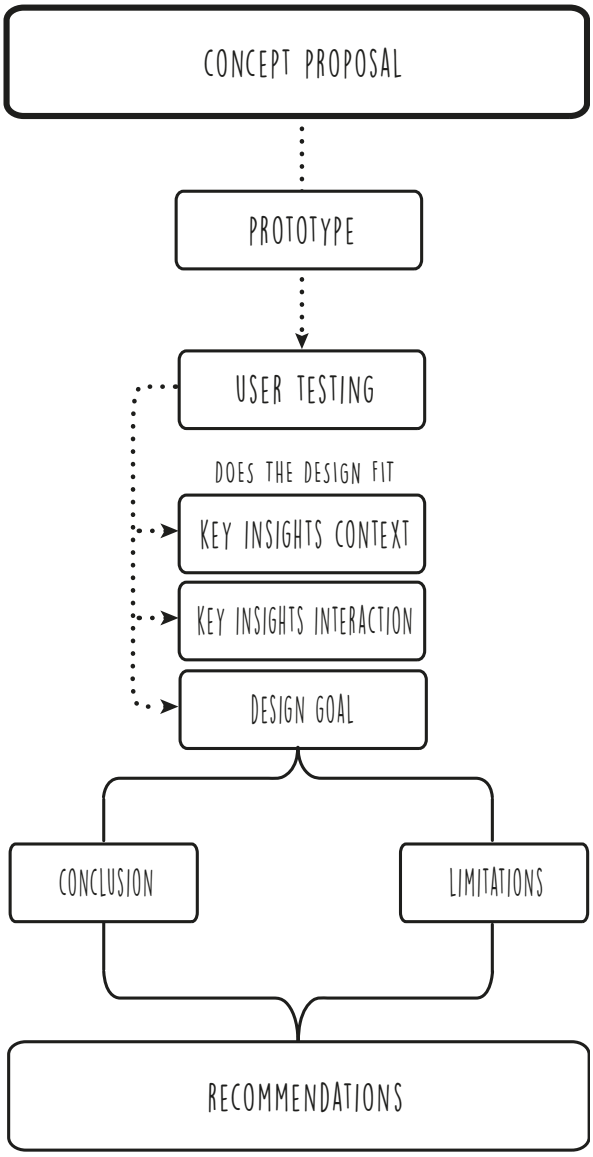

light
sound
projection
animation 1.1
sound B
movement wave
left to snooze
7 minutes
no more snooze
sound I
wave
light
sound
projection
animation 1.2
sound B
3 minutes
no more snooze
sound I
wave
light
sound
projection
animation 1.3
sound B
1 minute
no more snooze
sound I

chapter 04

VALIDATION

To discover whether the design fits the design goal, the desired effect and the derived key insights on both future product level as well as on interaction level an elaborate interview with a care expert from a care facility was conducted. This chapter presents the set up of this interview, the prototype, the results and the conclusions of the interview. The chapter concludes with limitations of the design and the concept validation and recommendations for future implementation.

4. VALIDATION



1 CONCEPT VALIDATION

In *chapter 0 project introduction* the design goal is formulated as "to design an object with intent product or service that **empowers** parents with a mild intellectual disability in the rearing of their children". The desired effect of the design is formulated as "a cognitive behavioral change; parents with MID will become **more independent** and their **self-efficacy** will **increase**". In *chapter 1.2 Interaction Analysis* the intended interaction qualities are formulated as "**empowering - pro-active - magical - intuitive**".

To evaluate the design goal, the effect and the intended interactions of this design concept an elaborate qualitative interview with a care expert was conducted.

1 VALIDATION INTERVIEW
Research questions
How do users and care experts perceive the design concept?

- Does the design fit the derived key insights on future product level?
- Does the design fit the interaction vision?

Procedure
The set up of this concept validation can be divided into two parts:

- demonstration of the prototype
- concept validation interview

VALIDATION FOCUS

INTERACTIONS BETWEEN PROJECTION AND USER WHILE SETTING THE TABLE

Within the scope of this project it was decided to focus this study on demonstrating the routine of setting the table. Evaluating the design concept as a whole would result in too much data to analyse during this project. This study is a follow-up of a study in the first phase of this project as reported in *chapter 1.1.2 Explorations on context level*. Care experts from the focus group were approached to participate in this follow-up validation interview to evaluate the design concept.

Demonstration of the prototype
The validation interview will start with a short introduction of the system to comfort the care expert. During this introduction the researcher will show an example projection on the table. The researcher will demonstrate the design concept through Wizard of Oz. The researcher will control the system via a laptop. The laptop will send the animations to the projector.

Concept validation interview
After the Wizard of Oz demonstration the researcher will conduct a semi-structured interview with the care giver. The semi-structured interview set up will enable the researcher to talk about first impressions, usability problems and possible improvements. The interview will start with the question:

- Do you think this design will increase the self-efficacy of parents with a mild intellectual disability?
- Do you think this design empowers parents with a mild intellectual disability by making them more independent?

By intensively interrogating on each question, the researcher will explore the answers on both sub research questions as mentioned earlier in this paragraph.

2 PROTOTYPING
To demonstrate the design concept a prototype was created. The prototype is a simplified version of the concept; it focuses on the evaluation of the projections, the interaction with the table light will not be evaluated. The prototype consists of:

- an interactive table projector from Sony
- a laptop to control the interactive projector

The researcher controlled the interactive projector through a laptop by hand via screen mirroring. A program was written to control the interactions with just one simple keyboard key per interaction flow. Figure 32 shows the sketches that were used as projections during the evaluation of the concept at the care facility. The sketches were drawn by Josien Verhoeckx. Figure 33 on the next page shows a photograph of the set up with the prototype.

figure 32: Sketches of plates for projection, drawn by Josien Verhoeckx.

3 RESULTS

The next paragraphs will give an elaborate explanation of the results.

The care expert mentioned that this design concept is definitely a good step forward to empower parents with MID and to make them feel more independent. It should be implemented at times, if necessary. The positive provides parents with enough stimulation to change their behavior. An interesting insight is that the care expert explained that it could be of big value for structuring the eating routine for both the child as well as for the mother. The child will recognize the visual and auditive feedback over time and link this to the eating routine. If the device turns on, this will be a sign for the child that it is time to eat. The child will start to understand that first the device turns on, secondly the mother will set the table and the third step will be that it is time to eat. This structures the eating routine for both mother and child. The mother knows how the eating routine should be, but the design will stimulate and support the parent. The positive feedback will make parents feel more independent, it will give them a feeling of 'I can do this'.

The answers of the care expert regarding the implementation of a controlling function were very clear. The device should not have a controlling function, because it

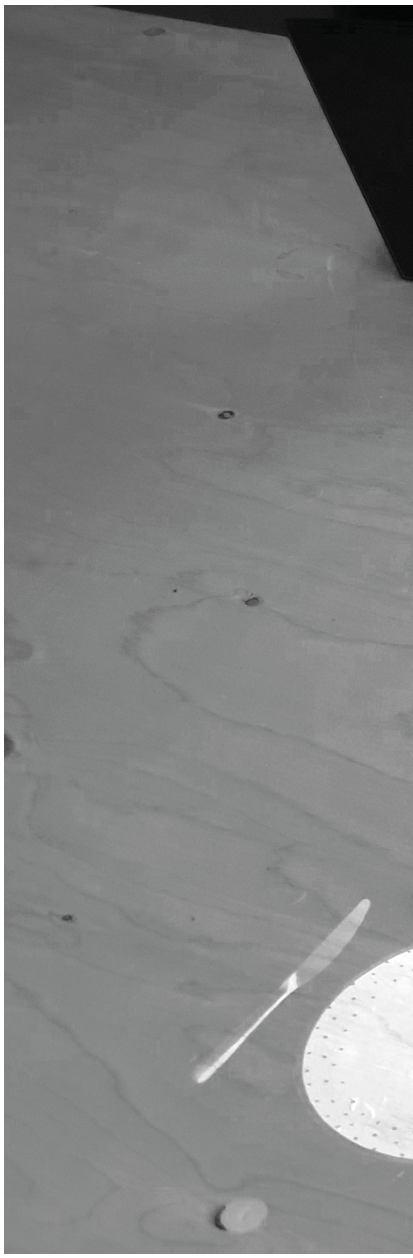


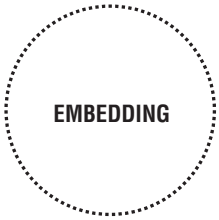
figure 33: Prototype set up validation interview.

would make them feel as if they are monitored. This will increase the threshold to ask for help. Parents should have the possibility to talk with care givers about their behavior, but this should always be their own choice. It is important that parents trust the device. If parents trust the device, they are more likely to collaborate with it. The care expert explained that there is a big difference between a robot and the current design in a positive sense. The design is visible and parents will understand the functions of the design. The design is transparent enough to trust and they will not be afraid of being recorded or monitored.

A part of the parents will be enthusiast, a part will not directly be enthusiast. Parents should be willing to participate. If they are motivated, this will be an enjoyable experience. Most parents will choose the easy way; eating a slice of bread in front of the television. It is very important to give attention to the eating structure. The design challenges parents to turn the eating routine into an inviting occasion. It also stimulates them to interact with their child during dinner, it turns the eating routine into a central moment to conclude the day with.

The care expert offered a different view on the embedding over time. She mentioned that it could be valuable to implement the design at random moments in the week, for example during four days. If the parent has a structured eating routine, the care expert could design to take the design away and introduce it again at a later moment when necessary. The design embeds perfectly into the living context, because of size and location.

The keywords from the tactful guidelines were used to categorize the results from the validation interview with a care expert. figure 34 shows an overview of the results of the validation interview that are described in the previous paragraphs.



PERFECTLY EMBEDS INTO THE CONTEXT OF USE, SMALL AND EASY TO IMPLEMENT

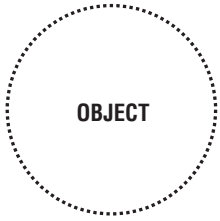
CONCEPT INTERESTING FOR MOTHER AND CHILD, BECAUSE OF AUDITIVE AND VISUAL FEEDBACK

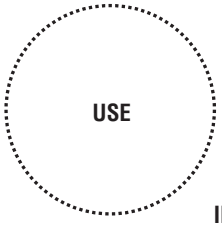
IT TURNS THE EATING ROUTINE INTO A CHALLENGING OCASSION

POSITIVE ASPECT THAT THE CONCEPT HAS NO CONTROL FUNCTION

THE CONCEPT IS TRANSPARENT ENOUGH ABOUT ITS FUNCTIONS AND THE INFORMATION IT GATHERS

PARENTS SHOULD DECIDE IF THEY WANT TO GIVE FEEDBACK TO CAREGIVERS ABOUT THEIR BEHAVIOR





INVITES PARENTS TO COLLABORATE

WILLINGNESS TO PARTICIPATE IS DEPENDENT ON THE MOTIVATION OF THE PARENT

IF PARENTS ARE MOTIVATED, THIS IS A GREAT SOLUTION

FEEDBACK WILL SUPPORT AND MOTIVATE PARENTS TO CHANGE THEIR BEHAVIOR

SELF-EFFICACY WILL INCREASE

CONCEPT WILL EMPOWER PARENTS AND MAKE THEM FEEL MORE INDEPENDENT

PARENTS WILL HAVE A FEELING OF 'I DID THIS'

CHILD WILL GET A BETTER UNDERSTANDING OF THE EATING ROUTINE

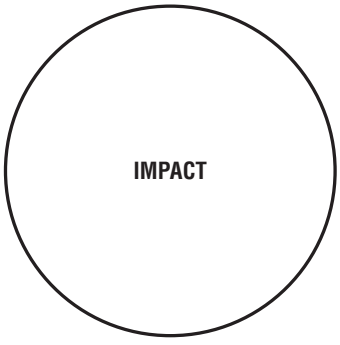


figure 34: Results validation interview.

2 CONCLUSION

To answer the research question of this project: **"How can design empower parents with mild intellectual disabilities?"** a design goal was formulated. Several key insights were composed to create a design that fits the design goal and embeds into the context of use. The outcomes of the validation interview in *chapter 4.1 Concept validation* will be used to answer the two different sub research questions:

- Does the design fit the derived key insights on future product level?
- Does the design fit the interaction vision?

The answers on the two sub research questions will be used to conclude this chapter with an answer on the research question.

1 DOES THE DESIGN FIT THE INTERACTION VISION?

The results from figure 34 were used to answer this sub research question. The desired interaction qualities that were positively validated in the validation interview will get a check sign √. If the concept proposal does not fit the desired interaction quality, it will get a cross sign x. If it was not possible to validate the concept on a specific key interaction quality, the interaction quality will get a neutral sign o.

√ **empower**
The design could empower parents with a mild intellectual disability, but it is important that these parents are willing to participate. It will **motivate parents to change their behavior and their self-efficacy will increase**. The design will provide the parent with a proud feeling of **'Yes, I did this'**.

√ **magical**
The concept turns the eating routine into **a challenging occasion for both parent and child**. Not like a party, but it certainly invites parents to collaborate.

x **pro-active**
The design is pro-active and it could motivate parents to collaborate, but **it depends on the willingness of the parent. An elaborate introduction of the concept could help to create loyalty towards the concept**.

√ **intuitive**
The design is intuitive to use, because it provides parents with **enough visual and auditive feedback**.

2 DOES THE DESIGN FIT THE DERIVED KEY INSIGHTS ON FUTURE PRODUCT LEVEL?

To design an Object with Intent that engages the user in a tactful way, a list of key insights on future product level was composed. To answer the research question, to validate the concept proposal and to discover points of improvements for future implementation, each key insight will be checked.

The list below shows the key insights on future product level. The key insights that were positively validated in the interview will get a check sign **v**. If the concept proposal does not fit the key insight, the key insight will get a cross sign **x**. If it was not possible to validate the concept on a specific key insight, the key insight will get a neutral sign **o**.

IMPACT: Tactful objects **empower** people by helping them **change their behavior** in a **positive** way, **over time**.

- √ The product or service should empower parents with a mild intellectual disability by stimulating their self efficacy over time.
- √ The product or service should give parents feedback with an emphasis on positive feedback.
- √ The product or service should have a strong character / attitude. It should not be fully autonomous but it should have some autonomy in order to persuade parents to change their behavior.

OBJECT: Tactful objects are **partners** that are **friendly** and that you can **trust**.

- √ The product or service could act as a buddy for the parent for example as extra support or by providing positive feedback.
- 0 The product or service should be introduced in an elaborate way for both the parents with MID as well as for care providers that work with these parents to create a feeling of recognition and trust.
- √ The product or service should be trusted by parent, in order to make parents accept support from the product or service.
- √ The product or service should enable parents and care providers to decide which information the product or service should link back to the care providers.
- √ Parents should understand the functions of the robot.
- √ The product or service should be transparent as it comes to the data that will be gathered and linked back to the care providers.
- 0 The product or service should respect the privacy rules as stated in the Algemene Verordening Gegevensbescherming.

USE: Tactful objects foster **collaboration** in a **simple** and **enjoyable** way

- √ The product or service should support parents in practical tasks.
- √ The product or service should not replace caregivers, but it should collaborate with them to enable them to spend their time more efficient.
- √ The product or service could repeat information of care providers at any moment.
- √ The product or service should not provide support for urgent situations.
- √ The product or service should have a proactive attitude.
- √ The product or service should not provide emotional care.
- √ Parents should understand the functions of the robot.
- X The product or service should be self learning; it should adapt to the skills and knowledge of the parent.
- √ The product or service should enable parents and care providers to decide which information the product or service should link back to the care providers.
- √ There should be a clear difference between the support tasks of the robot and the support tasks of the care providers.

EMBEDDING: Tactful objects **embed** in their context, **include all people** involved and become **part of everyday life**.

- √ The product or service should fit in the physical living context of the parents with MID.
- 0 The product or service should be introduced in an elaborate way for both the parents with MID as well as for care providers that work with these parents to create a feeling of recognition and trust.
- √ The product or service should have a proactive attitude.
- X The product or service should be self learning.
- √ The product or service could provide structure during the day.
- 0 The product or service could assist parents in remembering appointments and daily activities such as cleaning the house.

3 CONCLUSION

"How can design empower parents with mild intellectual disabilities?"

The first phase of the design project was used to discover which requirements the design should fulfill in order to empower parents with a mild intellectual disabilty. Requirements on both future product level as well as on interaction level were composed to create a design in the that fulfills the needs and wishes of parents with MID. This chapter will discuss if the design fits the requirements that were composed in the first phases of this master thesis. The chapter will conclude with an answer on the research question.

The interaction is an inviting occasion (**magical**) for both parent and child. The interaction between the parent and the interactive support tool could be described as a collaboration that **empowers** the parent in an enjoyable way. The design can be seen as a partner to collaborate with to structure the eating routine. The positive visual and audtive feedback motivates parents and the fact that they can achieve something with minimal support from care experts motivates them even more, it makes them feel proud. It gives them a feeling of 'I did this'. The care expert mentioned that the design is transparant enough for parent to trust the device.

The design includes all family members. The sounds of the concept are inviting for children. Hearing the sound of for example the airplane will make the child curious. The projections will entertain the child while the mother is preparing dinner. The child will get used to a structured eating routine and on the long term the sounds will learn the child when it is time to start the eating routine. On the long term this could mean that when the design turns on and makes a sound to initiate the eating routine, the child will start to understand that it is time to set the table. If the child is older, he or she could help the parent with the routine of setting the table. In this case the child will be an extra trigger to have a structured eating routine. Another possible use case is that one day the child starts to get hungry and notices that the concept did not initiate the eating routine in time. The child could start to ask for the airplane or animations, because he or she is hungry. For the parent this could be a trigger to start the eating routine in a structured way. If the concepts turns on and the parent does not set the table, the child could also support the parent by noticing that the projections are moving and the sounds get louder.

The concept is **intuitive** to use. The care expert mentioned that it is important that parents are willing to accept help to change their behavior

and it is important that they are open to new technologies. Insights from previous studies as can be seen in *chapter 1 Exploration* confirm that these parents with MID are open to new technologies. If they fully embrace the support of the new technology there is a possibility that these parents would start to try to fool the design over time, like they would also try to do with care givers. In *chapter 4.3 Limitations* different possibilities to fool the design will be explained. The design invites parents to come to the table and to set the table, it is simple to use and the projections teach the parent which steps should be taken.

The desired interaction quality '**pro-active**' is covered in the design, but further research will be needed to discover if the design is pro-active enough to stimulate parents to collaborate with it. Based on the validation interview with a care expert decisions regarding embedding over time were made. Before the validation interview it was decided to implement the design for a couple of months into the house of parent with MID. If the parent succeeded in structuring the eating routine for the duration of four successive weeks with the support of the design, the care giver could decide to remove the design to discover if parents are independent enough to have a structured eating routine by themselves. As a result of the validation interview it was decided to change the embedding over time. The care expert explained another valuable approach. Instead of letting the design initiate the eating routine every day over a time span of a couple of months, she would advise to let it initiate the eating routine on four random days in a week. It would stimulate parents in a more effective way to structure the eating routine and it decreases the chance that the design becomes less interesting. Besides being **pro-active** at the specific moment of initiating the eating routine, this different approach enables the design to have an extra **pro-activeness over time** by deciding on which days the eating routine is initiated. The unpredictability of initiating the eating routine at random days makes the design part of everyday life. This extra pro-activeness also strengthens the character of the intelligent support tool. The randomness of initiating the eating routine could surprise parents, it makes the experience for parents even more **magical**.

The extra pro-activeness as effect of randomly initiating the eating routine makes the design autonomous in some way. If the design initiates that it is time to start the eating routine, parents still have the possibility to postpone the eating routine up to three times. Each 'snooze' the eating routine will be postponed for a shorter amount

of time. The snooze function provides the parent with the feeling that they can decide, but the actual amount of autonomy of the parent is limited. The design is not fully autonomous, but it has some autonomy in order to persuade parents to change their behavior.

Most of the key insights on future product level were validated by the interview, as can be seen in the previous paragraph. Some key insights could not be validated, further research is needed. One key insight was not fulfilled by the design. **The product or service should be self learning; it should adapt to the skills and knowledge of the parent**. The current design is not self-learning. It is important that the design adapts to the skills and knowledge of the parent, because the design should not irritate the parents. The care giver could also play an important role as it comes to the adaptation to the skills and knowledge of the parent. If a care giver believes that the parent already has a structured eating routine, it can be decided not to implement the design into the house of the parent.

The concept proposal nearly fits all key insights on future product level and on interaction level and therefore this design could empower parents with MID to make them feel more independent and increase their self-efficacy.

3 RECOMMENDATIONS

In case of future implementation an elaborate introduction for care experts is necessary. Involving care experts actively into the introduction of the design could motivate and support parents in the process of changing their behavior. Future research is necessary to discover how the design should be implemented. Elaborate user research is necessary to find interaction and usability problems and to improve the design. Actively involving parents with MID and their care givers would enrich the results of future research.

Within the current design only one user scenario was explored. The design offers a lot of possibilities for different implementations over time depending on the abilities of the parent with MID. If a parent becomes more independent over time, the design could be useful to give feedback without initiating the eating routine. For example if a parent places a plate, the design could give a positive feedback sound without projection. In this way the design could still be useful to empower these parents, without becoming annoying over time.

The results of this master thesis could be valuable for creating a behavioral change within other target groups as well by teaching routine behavior through repetition and structure assisted by visual and auditive feedback in a pro-active way. With only little adjustments the design could empower any target group. The amount of possible applications is infinite, the design could for example motivate people to walk more, stimulate people to cook healthy, motivate young teenagers to do their homework and so on.

Besides applying this technique to create a behavioral change within other target groups, this technique could also be implemented within the same target group to structure other routines. Examples could be structuring and planning activities such as grocery shopping, cleaning up the house, having breakfast and so on. A big advantage of extending the activities in which the intelligent support tool supports parents is that the parents would have one device that could support them in different activities as an overarching intelligent agent. This overarching intelligent agent could focus on supporting practical tasks, which enables care givers to spend more time with parents regarding social-emotional tasks.

To conclude it can be said that the technique designed in this master thesis could be implemented within the same target group for other activities, within other target groups and on a bigger scale it could become an overarching intelligent support tool of great value regarding creating a behavioral change.

4 LIMITATIONS

1 LIMITATIONS OF THE DESIGN

The design is mainly based on the results of research within the care facility. One of the main pillars of the design is that the care givers mentioned that parents have trouble with structuring their daily activities and the fact that parents are not aware of their responsibilities. As mentioned before, one care expert emphasized that some parents even forgot to give their children dinner because their own needs always have priority. Obviously not all parents with MID will have troubles with structuring their eating routine and with feeding their children. Care givers should firstly discover whether a parent needs help in structuring their eating routine and if they need help, care givers should still weigh pros and cons if this design would help.

The validation interview also highlights the important role of the care giver. The design is not self learning yet, it does not adapt to the skills and knowledge of the parent. Therefore it is important that implementing the design into the house of a parent is a well-considered choice.

Within the time span of this project it was not feasible to design

an intelligent agent as needed (according to the derived key insights on future product level). The design only focuses on the eating routine, but this concept could become part of an overarching intelligent agent.

As mentioned in the previous *chapter 4.2 Conclusion* if parents with MID fully embrace the support of the new technology there is a possibility that these parents would start to try to fool the design over time, like they would also try to do with care givers. Parents could for example place a plate on the table without having the intention to start a structured eating routine, they could place an empty plate to mute the design. The design could for example react on this in a playful way by notifying the parent that the plate is still empty. This would give the parent a sign that the design is intelligent enough to tackle their game. It would strengthen the character of the intelligent support tool. The conducted validation interview was not elaborate enough to discover ways to fool the design yet.

2 LIMITATIONS OF THE VALIDATION

The validation test was focused on demonstrating the interactions between the user and the projections. The physical interactions with the design and the projections to entertain the child were dropped out of the demonstration. Within the scope and time span of this design project it was not feasible to conduct a user research to validate the concept proposal.

Another limitation of the validation test is the duration of the test. The concept proposal was only demonstrated once to the care expert. To validate the concept as a whole, an intensive user study should be conducted for a longer period of time. Testing the concept proposal over a long period of time would result in more valuable results and conclusions, since this would decrease likeliness of a novelty effect.

Furthermore the design was only demonstrated to one care expert. The conclusions of the concept validation are based on the argumentations of only one care expert from a specific care facility. Introducing the concept to a group of care experts and conducting an interview with multiple care experts to validate the concept will result in more valuable conclusions.

chapter 05

PERSONAL REFLECTION

PERSONAL REFLECTION

The first part of this evaluation originates from an essay that I wrote as an assignment for the course 'Reflection on Design'. It summarizes the learning process that I went through during my bachelor and the beginning of my master. This master thesis is the final assignment of the master Design for Interaction. Besides that it is also my last assignment as a student. Therefore I decided to not only reflect on the graduation assignment, but also on my individual learning process during the study as a whole.

When I started with the bachelor Industrial Design Engineering I was a real perfectionist. Every little thing that I did, had to be perfect. During high school this perfectionistic view enabled me to structure all courses. For every exam I wrote an elaborated summary of the required subjects. But this also took a lot of unnecessary time. Time that could have been spend way more efficient. My perfectionism was caused by a fear of failure. For example if I already knew the matter of a specific chapter, I could not simply skip that chapter to summarize, I felt the need to have a complete summary including all chapters. Even though I knew that this was a waste of time.

It was during the first year of my bachelor that I started to realize it was a personal 'obsession' to strive for

perfectionism. Where most students were too chaotic in their design process, I was too structured. I thought that I had to change to another study, because I thought that this study simply did not fit my personality well enough. Structuring the whole design process from begin to end was impossible, due to its iterative character. After each iteration I felt the need to change the report into a linear process documentation, refusing to describe all the little changes. At the end of the first design course the teacher gave me a negative study advice, he strongly advised me to think again if I was doing the right study. The problem was that I did not really understand what caused this feeling of not fitting into this study. After this course I learned to let go a little little bit of my perfectionism and to allow myself to be a little more chaotic. This was a very big struggle that I encountered during the whole bachelor. On the one hand my perfectionism was very useful when working in teams. I believe that there is a link between being chaotic and being creative. During team work I encountered that the urge that I felt to structure everything was very useful to plan the whole design process, to build a report and to keep the overview. Structuring everything was a unique skill, most students were very chaotic. But during individual courses I discovered that my perfectionism hindered me in being creative. Feeling the urge to structure everything disabled me to think in a free way. Winnie the Pooh (A.A. Milne) once said: “One of the advantages of being disorganized is that one is always having surprising discoveries.”

At the bachelor final project my design coach asked us to use a dummy to report the design process. Using a dummy meant that I was not able to restructure the documentation of the design process into a linear process. There was simply a chronological order of notes in the book that could not be changed. Although I knew that it was a waste of time, I tried to rewrite everything that was in my dummy into a new dummy each week. This was impossible, but I even felt the urge to deliver a perfect dummy. Ugly sketches were redrawn and pages were thrown out. It was at the end of this course that I started to understand how to use my dummy. Instead of using my dummy as a perfect document, I had to use my dummy as a work in progress for fast notes and sketches. As a reflection of my thoughts. Although this insight came way too late to pass the course, using a dummy during the design process learned me to become more chaotic.

Although I had a lot of struggles during the bachelor with letting go this perfectionistic view to enable

myself to be more creative, I passed the bachelor. For me this was a big milestone, because at the second chance of my bachelor final project I finally felt that I had made the right decision to continue with Industrial Design Engineering. The teacher of my first design course in the first year told me I could not, and that's why I did!

During the master I discovered what really makes me happy as a designer. I have a passion for helping people, I believe this is a result of growing up with a disabled sister. As a little child I always used to help my mother to clean up all little toys, to make sure that my sister would not put them in her mouth. Although my parents never forced my younger brother and me to care for our sister, we obviously did. So as a result I like to help people, on a small scale in daily life as well as on a bigger scale when designing products. Caring for people and designing products that make other people happy gives me a lot of positive energy.

In my master I seemed to have found a better balance in being a chaotic perfectionist. Instead of structuring everything, I use to think in a more visual way now. During a design process I discover a lot of little puzzle pieces of which I do not always know their final direction, but at the end of the project most of these little pieces will fit together into one coherent story or solution. Changing my view from being perfectionistic in being a chaotic perfectionist also decreased my fear of failure.

The graduation project had a fuzzy start. The first explanation of the assignment was to design a robot to help parents with MID. For me it was the first time that I experienced the feeling of having a different view as a designer. Although previous research was conducted to come to this assignment, I felt the urge to discover and analyse the target group and the context of use before defining a more specific design goal. This turned out to be an important choice with big influence on the rest of the project. Instead of focusing on designing a robot (form of solution known in advance), I decided to focus on designing from a users' perspective (form of solution unknown). The skills I learned earlier in the bachelor and master, as described in the previous paragraphs, were crucial and indirectly lead to this decision. Among other skills I learned to design from a users' perspective and that accepting and allowing chaos often leads to new creative valuable insights. Although it would have been a safe option to take 'design a robot' as a starting point, I decided to take a different and more chaotic path to start this project. As Interaction Designer this graduation project taught me to adapt to the

target group. Conducting a research with people with mild intellectual disabilities requires different skills compared to user research with people without intellectual disabilities. The care facility offered me a unique chance to discover the target group and the context, I felt very welcome.

One of the learning goals I set at the start of this project was to improve my digital visualisation skills. During previous courses and projects I had troubles with visualizing and explaining scenarios, ideas and concepts. I tried to focus on improving my hand drawing skills in previous projects, but this stays problematic. Therefore in this project I focused on improving my digital visualisation skills. Although there is still a lot to improve, I am proud to say that I feel that I developed my digital drawing skills to such a level that I am able to communicate my ideas and concepts in a clear way.

An important lesson this graduation project taught me is to actively take ownership of a project. It is important to keep control during the whole project even though you are dependent of other people. Especially during the first months of the project it was hard to keep the ownership of the project. If I needed something from another person I tended to wait patiently and passively, because I thought this was respectful. But at times this approach resulted in nothing, I ended empty-handed without the things I needed. This taught me the importance of clear communication, being pro-active and setting deadlines if you need something.

Contrary to the communication when it comes to ownership of the project, the general communication with project partners was more successful. During this graduation project I learned to collaborate with different project partners. This project was the first significant design project for me. At first I felt a bit insecure regarding the communication with project partners, but after the first meeting this feeling disappeared. The project took longer than expected, the duration of the project was unpredictable because of personal health issues. The fact that the project took longer than expected, made it even more important to clearly communicate with all project partners. Project partners were updated through e-mail and telephone during the course of the project. To discuss important decisions, meetings were planned.

To conclude I can tell that this graduation project taught me a lot. During my master I was a little insecure that I would not be able to deal with a design project of this size. This graduation project made me realise that I actually can.

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