Playground equipment for sand and water play

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MASTER THESIS

HAGS®

Playground equipment for sand and water play

Designed to encourage children's development

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Abstract

To many families and children, playground visits are an important part of the daily life. Playing there can offer benefits like physical activity as well as practicing skills such as social interaction or creative ability.

The purpose of the master thesis presented in this report, was to develop a new product line with playground equipment for HAGS Aneby AB. The playground equipment should allow the child to play with sand and/or water while encouraging different aspects of the child's development. The target group is children age 2-5.

The design process started off with a user study where theory and own observations were combined. The user study resulted in several product requirements. Based on these a large number of concepts were generated.

Concepts were evaluated and elaborated. Eventually there were three concepts left, which together constitutes the product line. The design process consisted largely of prototyping and model building. The prototypes were tested with children of suitable ages at various stages of the development process.

The product line consists of:

- Thirsty Monkey – a water system where the children are challenged to use their minds.
- Bug Race – a maze-like game where the children need to collaborate.
- Café Parrot – a play station which encourages pretend play in different forms.

The three concepts do as a whole encourage different aspects of the children's development and would complete HAGS existing playground equipment well.

Keywords: playground, children, stimulating play, product development

Sammanfattning

För många familjer och barn är lekplatsbesök ett viktigt inslag i vardagen. Att leka där kan bidra med fördelar som fysisk aktivitet såväl som att träna på färdigheter som sociala interaktioner eller kreativ förmåga.

Syftet med examensarbetet, som presenteras i den här rapporten, var att utveckla en ny produktserie med lekplatsutrustning för HAGS Aneby AB. Lekplatsutrustningen ska låta barnet leka med sand och/eller vatten samtidigt som den uppmuntrar olika aspekter av barnets utveckling. Målgruppen är barn 2-5 år gamla.

Designprocessen började med en användarstudie där teori och egna observationer kombinerades. Användarstudien resulterade i ett antal produktkrav. Baserat på dessa genererades sedan ett stort antal koncept.

Koncepten utvärderades och utvecklades. Till slut fanns tre koncept kvar, vilka tillsammans utgör produktserien. Designprocessen bestod till stor del av prototyp- och modellbygge. Dessa testades sedan med barn i lämpliga åldrar vid olika stadier i utvecklingsprocessen.

Produktserien består av:

- Thirsty Monkey – ett vattensystem där barnen utmanas att tänka till.
- Bug Race – en labyrintliknande lek där barnen måste samarbeta.
- Café Parrot – en lekstation som uppmuntrar till fantasilek i dess olika former.

De tre koncepten som helhet uppmuntrar till barns utveckling på flera olika sätt och skulle komplettera HAGS existerande produktutbud bra.

Nyckelord: lekplats, barn, stimulerande lek, produktutveckling

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Lund, June 2017

Julia Burgén and Hanna Börjesson

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1 Introduction

In the introduction the goal of the project and its delimitations are presented. These are accompanied with some background to the project and information about the company, HAGS Aneby AB, which is providing the task for the project. An overview of the stakeholders connected to the company's products is also presented.

1.1 Background

To play is every child's right according to Office of the United Nations High Commissioner for Human Rights (1989) and it makes up for between 3% and 20% of the child's time and energy (Pellegrini & Smith, 1998). Through play children are able to explore the complex world around them, practice using their body as well as being given opportunities to interact with other children and adults and develop a social understanding.

The first public playground in Sweden was built in 1899 in Stockholm as people had gained more time for leisure activities outside of work and children's play received higher priority (Ericson Wolke, 2000). Today playgrounds can be found everywhere and offer a space for children and adults to spend time together and receive physical activity while being outdoors.

Sand can be found on many playgrounds and provide both a tactile experience for the child and a medium to create and build things out of. Water is another medium that fascinates and entertains children of a large age span. Water parks, water fountains and water playgrounds are examples of places found today where children can play and learn about the way water behaves.

1.2 HAGS

HAGS Aneby AB is one of the leading producers of playground equipment and associated products. The company was founded in 1948 in Aneby, Småland and turn over about 400 million SEK every year. HAGS sells to over 60 countries worldwide and except for playground equipment the company also has park furniture, outdoor gyms and marine docks. The company is today a part of the PlayPower Inc family which holds several brands within the recreation field.

HAGS' playground product line contains climbing units, balance play, play houses, swings, sand and water play etc. The company wishes to expand the sand and water play category in the near future in order to stay competitive in this area.

1.3 Goal/Problem description

The objective for the project is to develop a series of playground products for sand and water play. The design should match HAGS existing design aesthetics. When designing the products the regulations in the standard SS-EN 1176 (Swedish Standard Institute, 2008) should be followed to ensure the products to be safe for children. The standard should be completed with HAGS internal regulations regarding water play.

The products should be designed with the goal to develop children's motor skills, creativity and cooperation skills. Accessibility is of high importance and should be kept in mind throughout the project. Batch size of the product line can be assumed to be 50 per year.

The project will start off with a user study and end up in a product concept, delivered through images and prototypes in a suitable scale. See more about the technical delimitations in section 1.4 below. In appendix A the expected and actual time plan of the project can be found.

1.4 Delimitations

The user study in the project is mainly focused on the child and the parents and to some degree on the caregivers at preschools. The customers, such as municipalities, landlords or other purchasers of playgrounds, are not in focus when designing. This means that the products are developed with a user focus, not a focus on the buyer.

The project is also delimited in a way that only the visual outer design is to be developed and delivered, not anchoring to the ground, water intake, drainage etc. Technical specifications will be limited to material selection and suggested production methods, leaving out construction calculations, cost calculations and technical drawings.

The products will be aimed towards children of the age 2-5 years, or with abilities corresponding to this age span.

1.5 Stakeholders

The stakeholders connected to the playgrounds sold by HAGS are shown in figure 1.1 below. According to the projects delimitations, described in section 1.4, the focus for the user research is primarily the child, secondarily parents and briefly caregivers or teachers. Even if this is the case, it can be valuable to have a brief understanding of the other stakeholders as well. With this information it might be possible to avoid a design that would go strictly against one stakeholder's agenda.

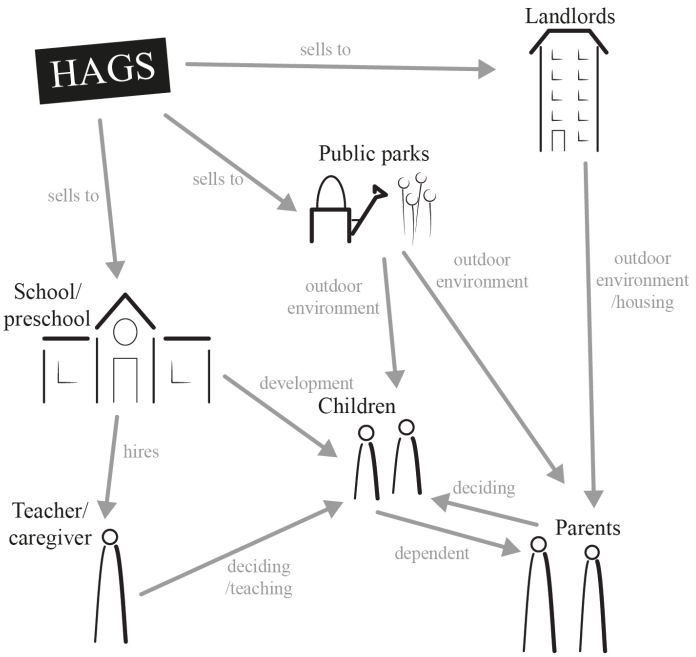


Figure 1.1 Stakeholder map.

2 Methodology

In this chapter the overall approach to the design process is explained. Except for using the Double Diamond design process, different design methods were used along the way and the resources for these are presented in this chapter as well.

2.1 Approach and design process

The approach to the project was very much inspired by the Design Council's Double Diamond design process (2007). The process contains four main stages called Discover, Define, Develop and Deliver and is graphically shown in figure 2.1 below.

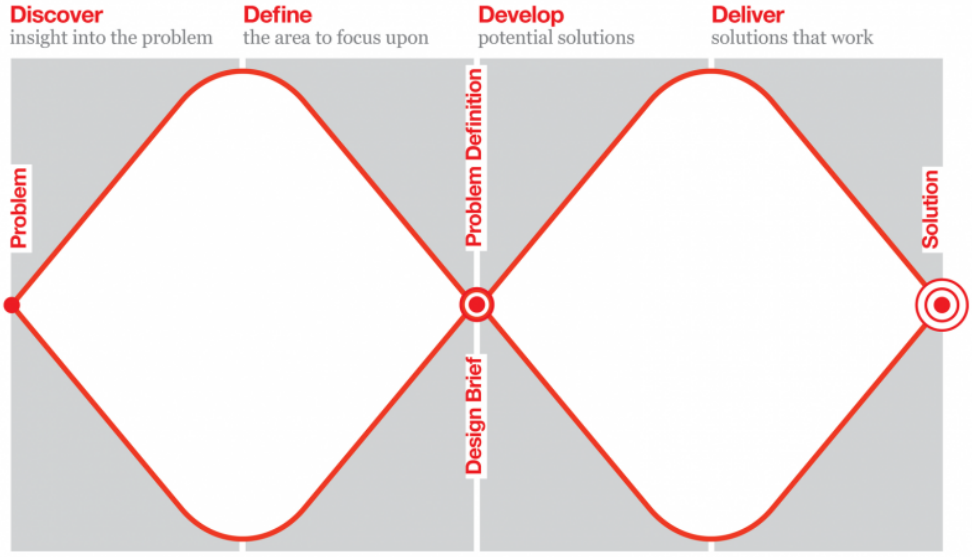


Figure 2.1 The Double Diamond design process (Design Council, 2015).

The Double Diamond process aims to clearly investigate and understand the problem (or the circumstances for the new design) in order to solve the right problem in the end. This is done through different types of research exercises in the Discover

phase. After this investigation and through this new understanding the design brief or problem definition can be more clearly defined in the Define stage. During the Develop phase the actual ideation and product development take place resulting in a wide range of ideas that are finally narrowed down to one solution. This solution is then described, presented and delivered (to the customer) in the Deliver stage.

2.2 Design methods

During the design process many different methods were used to collect insights, ideate, evaluate concepts as well as develop the concepts. These methods were mainly collected from the following four sources:

- Interaktionsdesign och UX (Arvola, 2014)
- Delft Design Guide (van Boeijen, et al., 2014)
- Universal Methods of Design – 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions (Martin & Hanington, 2012)
- Product Design and Development (Ulrich & Eppinger, 2012).

The methods are described in the sections of the report where they are used.

3 User study

To better understand the users and their needs a user study is usually performed. In this chapter the information gathered through literature study, interviews and observations is presented and then narrowed down into a number of key findings.

3.1 Methods

3.1.1 Literature study

With the goal to ascertain what aspects that encourages creativity, motor skills and collaboration skills, a secondary research was made. The secondary research aims to establish what is already known within the topic (Martin & Hanington, 2012). It was discovered that the research had to be completed with the areas cognitive development and different types of play.

3.1.2 Observations

For observing children playing, the observation method 'Fly-on-the-Wall' was chosen. This method differ from other through removing the researcher from the participants' actions. The researcher is only intended to watch. This method is less predetermined than others (Martin & Hanington, 2012).

3.1.3 Interviews

The interview method chosen was unstructured interviews, since this creates a comfortable environment for the interviewee, allowing for detours in the conversation (Martin & Hanington, 2012). Questions were prepared, but no strict script was followed. The questions were also developed and changed in between interviews when it was discovered which questions generated the most interesting

answers. This was possible since the answers would not be compared to each other afterwards.

3.1.4 Affinity diagramming

To collect and categorize all of the different findings from the research phase an affinity diagram was created. This is a common way to analyze qualitative data and the process consists of grouping information into groups which are perceived to belong together (Arvola, 2014).

3.2 Theory derived from literature study

3.2.1 Cognitive development

Around the age of two the child starts to develop an identity and express emotions. During the ages of 2-3 he or she is spending a lot of time exploring the surrounding (Grandelius, et al., 2010). The visual ability improves and the child can start to rely on what he or she sees when exploring (Alin-Åkerman, 1982). The child is very interested in learning how to use common objects, such as a telephone or cutlery (Lueder & Berg Rice, 2008). There is a constant need for doing new things and it is difficult to focus on one thing for a long time (Grandelius, et al., 2010).

During age 3-4 the child spends a lot of time observing the surrounding. He or she starts to develop a brief understanding of time and can distinguish soon from later. It is now possible for the child to solve a puzzle of six pieces, but can only concentrate on it for about ten minutes (Grandelius, et al., 2010).

At the age of 4-5 the child believes in their own ability (Grandelius, et al., 2011) and can start to motivate their opinions and actions. They can however quickly switch opinion and are not aware of doing so (Alin-Åkerman, 1982). The child can also categorize things and recognize relationships between a whole and its parts (Lueder & Berg Rice, 2008).

3.2.2 Different types of play

During the child's first eighteen months almost all type of 'play' that can be observed is so called functional play. In this type of activity the child tries out new body movements or actions by exploration (Piaget, 1962). Some examples of

functional play are a child pushing something back and forth, sweeping its hand over sand or spinning a ball on a pin.

Children of the age of 2-5 play symbolic play. The complexity of the play evolves with the child's age (Piaget, 1962). The stage of symbolic play can be divided into two sub-stages, which are further explained by Norén-Björn (1977). The first one lasts from age 2-4. Here, the child starts to pretend doing things or pretend that objects are other things. For instance, a rock can become a car. The child starts pretending to do things that they know (such as sleeping and eating), then transfers these actions on to their toys and finally the child will pretend to do things that he or she has never done themselves (for instance driving a car). In the second stage roles (such as mother, father and child) are introduced to the pretend play. The playing is now more advanced.

From the age of three construction play is also part of the child's play palette. This type of play consists of manipulation and organization of objects, which can be viewed as functional play with elements of pretend play (Isenberg & Jalongo, 2006). For the young child (age 3-4) this can mean building a hospital for stuffed animals or a block tower, while for older children of school age it can be constructing a model for a science project. Sand play is a good example of construction play, when it consists of building sand castles or making sand cakes.

3.2.3 Motor learning

During the age of 2-3 years old the balance improves quickly and the child is able to run, jump with both feet, stand on one leg and walk stairs with one foot on each step. During this time of the development the world is discovered through the hands of the child (Alin-Åkerman, 1982). The child can perform daily activities such as wash his or her hands and get drinks (Lueder & Berg Rice, 2008).

At the age of 3-4 years old the child can move his or her body parts more independently and therefore has improved motor skills, which come into use during climbing among other types of play. The hands are stronger at the age of four and the child has fully developed left or right handedness. This leads to building and shaping play (Alin-Åkerman, 1982).

As the child reaches the age of 4-5 the movement during play is more intense. There is a lot of running and playing over a large area but with a purpose, a game or play of some sort. The child can also do and undo buttons, cut on a line with scissors and copy simple designs and shapes (Lueder & Berg Rice, 2008).

Kurtz (2008) mentions some different reasons why some children will not meet these expected capabilities. It could either be because the motor skills are delayed or reduced. Examples of different reasons for delayed or reduced motor skills:

- A person with cerebral palsy[1] can have very uncoordinated motor skills.
- Mental retardation usually means that the child has some delays within all areas of development, resulting in that their motor skills are at the same level as a child younger than themselves. They can appear very clumsy.
- Children with visual impairments can have coordination problems due to the lack of visual feedback.
- Dyspraxia[2] (also called Developmental Coordination Disorder) can cause motor problems such as clumsiness.

A child with regular (or delayed) development will improve their motor skills when exploring and repeating movements (Kurtz, 2008). To encourage the child to do this, he or she should be provided with activities or materials that he or she finds interesting and challenging (Wang, 2004).

3.2.4 Creative ability

According to the Oxford Living Dictionaries (Oxford University Press, 2017) the word creativity is defined as the use of imagination or original ideas to create something. This definition could easily be imagined to be a description of a child's pretend play – the symbolic play.

The symbolic play is increasing the ability to think divergently. By using their imagination to let toys represent other things, children practice their divergent thinking skills (Russ, 2003). The ability to think divergently is important for the ability to be creative – implying that play enhances creativity.

When looking at the impact of play on creativity on a short-term perspective, it is clear that there is a connection between the two. It has been discovered in a few studies that playing freely has an instant effect on children's creative ability. Howard-Jones, et al. (2002) studied how certain activities immediately affect the creativity in children. Children were divided into two groups where one group got to play with dough and the other copying text. Afterwards both groups were asked to create collages using materials given by the research team. The children who played with dough had a more creative[3] outcome of their collage than the ones who

[1] Reduced mobility due to brain damage before the age of two (1177 Vårdguiden, 2015).

[2] Disorder affecting fine and/or gross motor (Dyspraxia Foundation, u.d.).

[3] According to Amabile's consensual assessment technique (Amabile, 1982).

copied text. A similar test was also performed by Berretta and Privette (1990). This time the forgoing activity was flexible play versus structured play and the evaluation method was the Torrance Tests of Creative Thinking (Torrance, u.d.). The result was that the free-playing children showed greater creative thinking than the ones playing more structured.

On a long-term perspective, such concrete examples are more difficult to find. There is one study where children (aged 6-7) were observed when playing. They were then contacted again in high school for further studies. It was then possible to see that the children playing with great imagination when they were younger now had a more divergent way of thinking (Russ, 2003).

The creative ability differs between children with typical development and for example children with Asperger syndrome and Autism. Catherine Best et al. (2015) found that children with Autism have a limited fluency when it comes to divergent thinking – generating fewer ideas to creative tasks. Some of these children however gave more unusual answers to the creative tasks which could be viewed as a positive aspect when it comes to creativity. The lower level of divergent thinking fluency does however suggest that there could be difficulties with pretend play, especially with other children of regular cognitive development.

With the goal of designing playground equipment that will nurture children's creative ability, diverse thinking and pretend play should be encouraged. Some ways to do this could be through flexible equipment that can be used in multiple ways, as well as equipment that sparks ideas of role play. Flexible equipment would leave it open for the child to decide how to play with it, and not only propose one certain type of use. Another positive aspect of equipment with multiple way of use is that the child will not lose interest in the play equipment as quickly (Norén-Björn, 1977).

3.2.5 Cooperation and social development

When looking at the child's social development Alin-Åkerman (1982) describes the two-year-old child as wanting to hold hands, be close to a parent and usually playing by itself or with the parent. If, however, the child at this age plays with another child it is usually through parallel playing, such as building with blocks next to each other. The children then watch and inspire each other but do not tend to interact. As the child grows older (age 3-5) it is less dependent on the parents and from the age of four usually prefer to play with other children.

Since the parent is the first role model and playmate for the young child the play between parent and child is of high significance in the development of the child. A study shows that a mother participating in play, as well as only communicating

prolongs the play session and raises the level of play (compared to the child playing alone) (Slade, 1987).

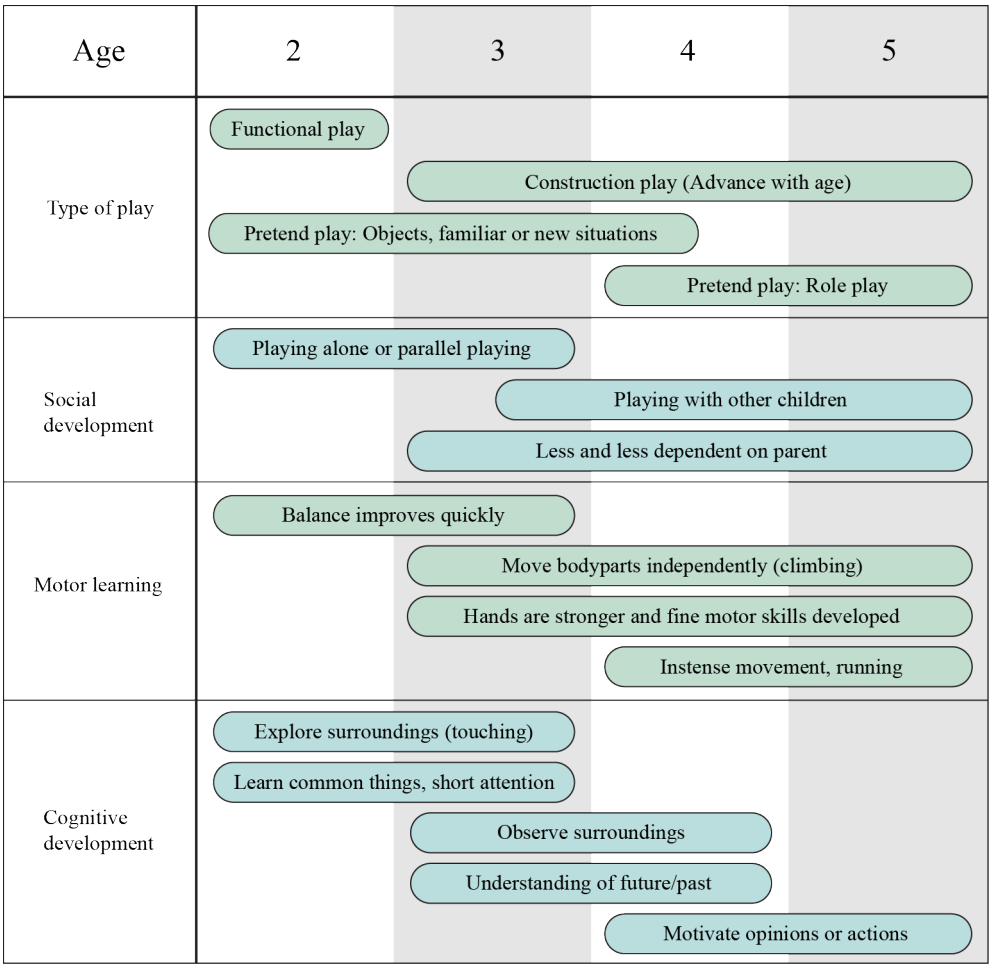
Similar discoveries have been made when looking at age-mixed play between younger and older children. A study showed that when two-year-olds were paired with five-year-olds to play they engaged in social, collaborative pretend play on a level higher than if two two-year-olds played together (Howes & Farver, 1987). The older child taught the younger what to do in his or her role and how to play in new more "advanced" ways than the younger did with a playmate of his or her own age. In return the older child learns to take on the mature role and to be a leader (Gray, 2011). Considering this, age-mixed play seems to benefit both children in their development of social skills.

The social skills needed for a child to be able to create peer relationships are ability to manage joint attention, regulating emotions, inhibiting impulses, imitating another's actions, understanding cause-and-effect relationships and linguistic competence. These skills span over many different aspects of the child's development including speech, motor skills and emotions (Hay, 2005). This implies that the social development of the child is very complex and could benefit from diverse playing and interaction with different people, including parents, children of the same age as well as older children.

3.2.6 Summary and conclusion

The insights gathered within the different themes are presented in table 3.1 on the following page.

Table 3.1 Summary of literature study.



3.3 Observations

From the literature a general view of children in different stages was generated, but it was necessary to supplement with 'real experiences'. What happens when not only skills, but also a personality is brought into the play? With the goal of gaining insights into how the different types of play are carried out and how children interact, observations of playgrounds were conducted. The playgrounds were of different types such as small neighborhood playgrounds, Stadsparken in Lund (largest playground in Lund) and a local preschool. The smaller playgrounds were

mostly deserted at the time of observation and as a result only the environment and play equipment was inspected. At Stadsparken, the children playing were varying in age and in what company they were there – some alone with one parent and some together with a preschool group. At the preschool the playground was very crowded with children of the ages 2 ½ - 5. More elaborate descriptions of all observations can be found in Appendix B.

The most rewarding observation was the first visit (out of two) to the preschool. The different types of play in the sand could be summarized as mainly construction play, such as digging, building, filling and emptying (buckets etc.) as well as moving the sand around. The play around a small 'shop stand' was observed as construction play but also pretend play as the children were baking 'cakes' and one girl (2-3 years old) was eating her 'pancake'. When the younger children (2-3 years old) were digging piles of sand or filling buckets they were sometimes observed doing this together, helping each other. The children seemed to enjoy digging together, however the play was considered rather unstructured, like parallel playing.

The different characteristics of wet and dry sand were noted when a girl of about three years was trying to make the (wet) sand flow through a funnel connected to a sand wheel. When no sand would flow through the toy, and the toy had been examined upside-down, she eventually threw it away. This toy would probably have worked perfectly with dry sand, but in this case the girl gave up because nothing happened.

When the children were playing in the sand, the majority of the time a shovel was used instead of just the hands. This indicates that the smaller, mobile toys are helpful to further develop the play around the fixed play equipment (such as the 'shop stand').

On the second visit a few personality types were discovered or confirmed from the previous visit. The 'needy' child who wanted to be close to the teacher, the 'troublemaker' hitting and throwing things at his peers and different examples of 'mini teachers' explaining things to their peers were all found on the preschool's playground. These were later used as inspiration for the personas that were later created (see sections 4.1.1 and 4.2).

3.4 Interviews

To get a more in-depth picture of what a playground visit really means, interviews were held with parents. The goal was to provide both a broader understanding of the parent's role as well as gathering underlying needs, concerns and attitudes which could lead to design consequences.

The four interviewees all volunteered to take part in the interviews after a post was made in a Facebook group for parents of young children.

All parents interviewed had one child in the ages 4-5 which was primarily in focus during the interviews. They all also had one or two more children which were sometimes discussed as a comparison regarding play habits or as a play partner. The four interviewees[4] were the following:

Elin: Son 1 year, daughter 5 years, son 13 years.
Camilla: Daughter 4 years, daughter 13 years.
Emilia: Son 4 years, daughter 7 years.
Knut: Daughter 4 years, son 10 months.

Transcribed parts from the interviews can be found in Appendix C.

3.4.1 Playground as a shared space

On a public playground there will most of the times be other people. In the case of Elin, the family knows most of the other people visiting their 'usual' playground, while Camilla and Emilia finds everyone else to be strangers. Knut prefer going with someone to a playground, primarily for his own sake.

Camilla said that her younger daughter assumes that everyone else on the playground would like to play with her, while her older daughter preferred her own space and playing alone when she was the same age. If she felt that someone intruded on her space she would want to go home. Camilla is working on an accommodation for handicapped children and she explained how the same can be applied to autistic children. Even though they lack social understanding, some want to play by themselves and some together. The difference is that they need a whole other level of supervision.

Elin said that children want to be where other children are playing, and that they inspire each other even if they are not playing together. On a deserted playground her children would tire a lot faster than if there would be other, perhaps older, children there to inspire the play.

With sharing comes conflicts, which was mentioned by all interviewees. For instance Elin likes a certain sand table because it offers every child their own space, which she said prevents fights.

[4] Names are changed due to privacy reasons.

3.4.2 Play habits

Emilia's two children are only three years apart and often play together, but sometimes the playground doesn't offer age mixed play – something also mentioned as a problem by Elin.

Most parents talked about that their children love climbing and using the swings and how their children like to challenge themselves. But also a lot of pretend play such as household, witches or knights. Elin talked about how the play house on her playground serves many different purposes besides just a playing house. Her children play Pippi Långstrump and pirates (a steering wheel attached to the house makes it a ship) there as well. She talked about how the game last longer the more broad-minded it is and less bound to something.

Camilla described the frustrations her daughter experience when facing a toy which she can't use – either because it is broken or because it is for older children and therefore too big for her.

3.4.3 Sand and water play habits

When talking about sand play, all parents talked about baking cakes and playing restaurant and café. Elin explained how the sand play is even brought outside the sandbox when her daughter is first baking there, but then selling her pastries in the play house. Knut said that his daughter's sand baking is rather advanced and that she is mimicking things she has seen at home when her parents are baking or cooking. All parents except Camilla said that they always keep sand toys in the stroller. Camilla instead said that her son doesn't like playing in the sand at all and that for him it is a too quiet type of play. But later she talked anyway about how he would play café, bake cakes and build sand castles with his sister in their neighborhood sandbox.

Water is without a doubt popular among all interviewee's children. Seeing water flowing, changing flow direction, splash, pour and play with boats are only a few of the mentioned activities.

3.4.4 Parent's role

Obviously, all parents said that their main role at the playground is to keep their children safe. Elin said that she wants to be very close, and a bench on the children's playhouse was perfect for her when she was breastfeeding. She also seems to be very involved in her children's play.

Camilla is less involved in the play, but she described her daughter as quite wild and that she needs active guarding so she doesn't hurt herself climbing.

Emilia enjoys to guard a little more on a distance with a coffee, playing a game on her phone or a talking to a play date-mother.

Knut said that he sometimes encourage his daughter to start playing with other children that she knows. He also talked about it sometimes being very boring for him at the playground and that he sometimes looks at his phone, but that he wish that he wouldn't. He mentioned a playground in Malmö where the parents have good possibilities to join in while playing because they offer seats. Then it is possible to join in without getting sand all over the clothes.

3.4.5 Gain or pleasure

All parents were asked if a playground visit is gain or pleasure. Elin said that it is both – her children get exercise, fresh air, get an outlet for their play needs and it is an easy way to meet others. Knut also said both, but that it is perhaps more pleasure for the children and gain for the parent. Emilia picked gain and Camilla said pleasure, but that a whole lot of gain comes as a bonus.

3.5 Key findings

From all the different kinds of background research important insights were extracted and with the method Affinity diagramming (see figure 3.1). They were compound into six themes. The key findings within each theme are presented in the following sections.

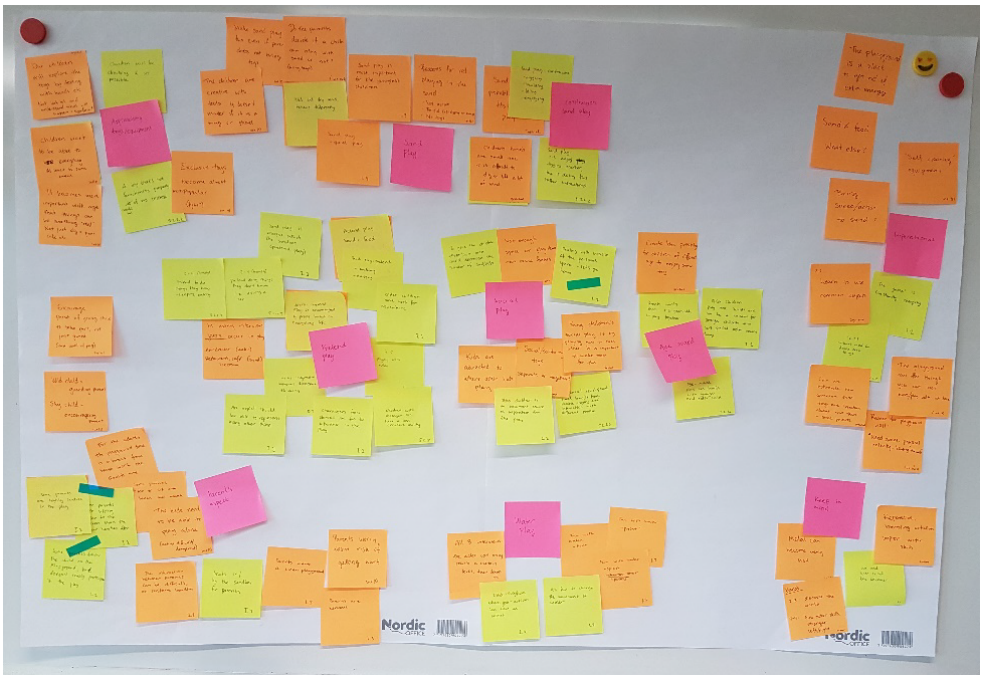


Figure 3.1 Affinity diagramming to find key insights.

3.5.1 **Social play**

Different children have different needs when it comes to playing with other children. There should be a possibility to either play together (with children or parent) or alone.

Promoting play between children of different ages is usually a positive thing. It has positive effects on the development of both children as well as help parents keep track of two siblings.

Conflicts between children usually arises due to not enough of the same toy or appearance preferences.

3.5.2 **Approaching toys/equipment**

Children of the selected age group will explore and test what they can do with the play equipment rather than looking at it and understanding.

It has been discovered that children can become frustrated when not being able to use a certain toy. They want to be able to use everything, at least to some extent. The child might not be able to use something if it is too big, too difficult or broken.

If possible, children will try to climb on the play equipment. Especially older children (age 4+).

A child's mental and physical development may not always be at the same level, so children of different sizes should be able to play with the same things.

3.5.3 **Pretend play**

The level of pretend play increases with the age of the child. Young children (age 2-4) might play what they know, such as eating or sleeping. Older children (age 4+), however, often play role play and might want more of an adventure.

Common themes for pretend play turned out to be different professions, house chores/cooking or fairytale/movie inspired role play. Sand is often pretended to be different types of food.

It is good if children are encouraged to play different things with the same play equipment. This prolongs the interest in the playground and is good for the child's imagination. The play equipment will also be appreciated by a wider range of children. A house can for example with small means become a pirate ship.

3.5.4 **Sand play**

The sandbox is the place on the playground that attracts a lot of younger children (age 1-3). Some older children (age 4+) prefer more action or challenge in their play.

Sand play usually consists of construction or pretend play. In both cases sand tools can raise the level of play. Shovels are also important for young children (age 1-5) since their hands are very small.

Dry and moist sand have very different physical properties. Moist sand lack the ability to flow (for example through a strainer) and dry sand is not moldable.

3.5.5 **Water play**

Most children find water play very exciting. It is fun to experiment and see the effects of the water.

Children will play uninhibitedly and get wet when playing with water. They might be cold during certain outdoor temperatures.

3.5.6 **Parent's aspect**

The safety of the child is a parent's top priority. Parents want to be able to see the child at all time and trust the safety of the playground.

Many parents experience the positive effect of a playground visit to be fresh air, exercise and calmer children. The children can get rid of excess energy.

Some parents join in the child's play. This can be facilitated by offering something fun for the parent in a comfortable position.

4 Problem definition

This chapter provides a clearer definition to the task of the project. A list of product requirements and a set of fictive children and parents are used to present the findings from the previous parts of the design process.

4.1 Methods

4.1.1 Personas

A persona is a method that can be used to create a meaningful and relatable profile based on the field research. To keep a manageable focus one should be careful not to create too many personas, about 3-5 personas are suitable for most projects (Martin & Hanington, 2012). The information in a persona should give an overview of the person and preferably fit on one page.

4.1.2 List of requirements

To ensure that no necessary aspects of the design were forgotten, a list of requirements was made. In this method a checklist is used to think about your design from all sorts of aspects and writing requirement related to these. The requirements are divided into demands and wishes, where demands must be fulfilled and wishes are optional (van Boeijen, et al., 2014). The checklist used and how it was adjusted to fit the scope of the project can be found in appendix D together with the list of requirements generated.

4.2 Personas

After gathering insights about different children and parents through the observations and interviews in the research phase, this information was narrowed

down into personas. Four fictive children and two parents with different ages and characteristics were created with the purpose to inspire and ensure that important needs were taken into consideration. One child (Noah, 4 years) was chosen as the main persona, meaning that if the different personas' interests would at some point be in conflict his 'opinion' would be prioritized. 'Noah' was selected because he is the type of child that was assessed to be less interested in the classic sandbox. All personas can be found in appendix E.

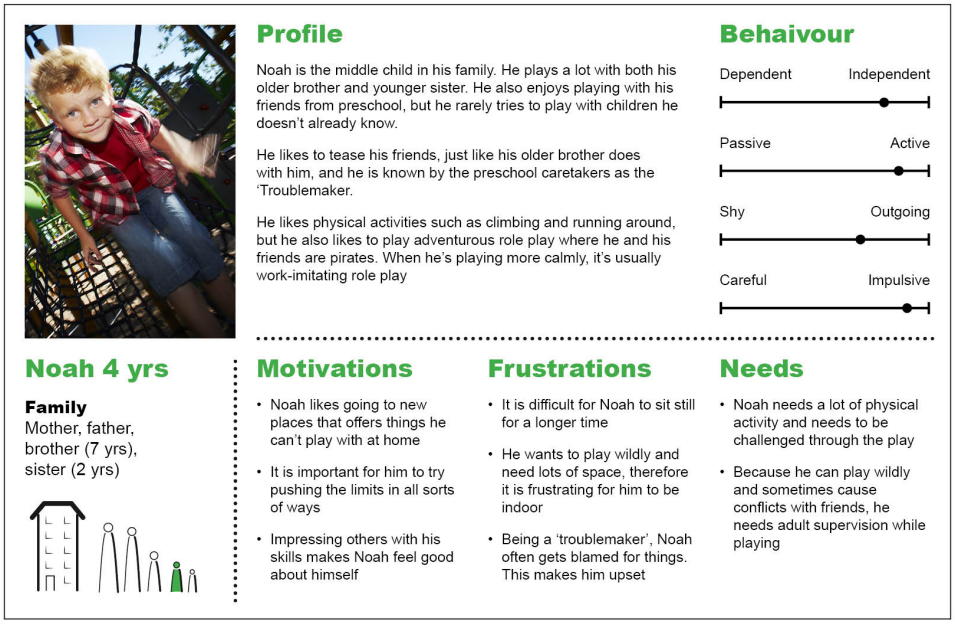


Figure 4.1 The persona profile of Noah.

4.3 Product requirements

The approach to the List of requirements was that at least one product in the line should meet the *desired* requirements while all the products should meet the *demands*.

Demands to be fulfilled by every product:

- Encouraging the child (age 2-5) to play with sand and/or water.
- Allowing children to play independently.
- Allowing children to play together.

- Can withstand all seasons' weather.
- The product can withstand use by an adult.
- The product should be durable enough to not require regular check-ups by janitor or similar person.
- Light contamination, such as sand, soil or leaves should be able to be removed by the user (adult rather than child).
- The product can be used by a child at the age of 2-5.
- The product should fit with the HAGS design aesthetics.
- All materials used should be non-toxic.
- Safety regulations mentioned in SS-EN 1176 should be applied.
- The depth of stagnant water should not exceed 150 mm.[5]
- Stagnant water should be possible to empty.[6]
- Visual contrast should be high, especially for items sticking out.
- No parts should require more than a child's force to be moved (if movable).
- The product should be perceived as robust and safe by parents.
- Use of water (when water is used) should not be experienced as wasteful.

Desires to be fulfilled by one or more products:

- Encouraging parent to join in play.
- Promoting play between children of different ages.
- Encouraging pretend play.
- Offering adventure and/or challenge in play.
- The product can (to some extent) be used from a wheelchair.
- The product can be used by a child with a mental development corresponding to a child age of 2-5.

[5] According to HAGS internal water play regulations

[6] According to HAGS internal water play regulations

5 Competitor research

In this chapter two main competitors on the global market are chosen and their corresponding product lines are examined. These are the French company Proludic and the Danish company KOMPAN.

5.1 Proludic

In the area of playing with sand and water Proludic's main focus seems to be water. The products generally consist of pools and flumes, bent pipes that can tilt and faucets that are pushed for water. See figure 5.1-5.3.

Figure 5.1 Proludic's water pit J1706 (Proludic LTD, u.d.).

Figure 5.2 Proludic's water pit J1703 (Proludic LTD, u.d.).

Figure 5.3 Proludic's water pit J1705 (Proludic LTD, u.d.).

Figure 5.4 Proludic's sandpit J130 (Proludic LTD, u.d.).

Figure 5.5 Proludic's Sensory play J123 (Proludic LTD, u.d.).

Within sand play Proludic offers sandboxes with features such as seats, molding boards and sun protections (figure 5.4) and a stand-alone molding board with a strainer and 'cookie cutters' (figure 5.5).

5.2 KOMPAN

KOMPAN's range of products within sand and water play is rather extensive with many different play functions. Beyond sandboxes with molding boards, they also have sandboxes with more figurative parts (figure 5.6) and stand-alone sand molding boards with built in buckets and funnels (figure 5.7).

Figure 5.6 KOMPAN's sandpit MSC541801 (KOMPAN Barnland AB, n.d.).

Figure 5.7 KOMPAN's sand and water stand MSC5419 (KOMPAN Barnland AB, n.d.).

For playing with water the products' functions are similar to Proludic's, but with some more features and greater variety (see figures 5.8 and 5.9).

Figure 5.8 The Water star M591 (KOMPAN Barnland AB, n.d.).

Figure 5.9 The Mermaid house M590 (KOMPAN Barnland AB, n.d.).

6 Ideation phase

This chapter covers the early stage of the design work, with the goal of developing a large amount of ideas to later evaluate and further develop. The work in this stage includes brainstorming, sketching, prototyping and a halftime feedback with the company.

6.1 Methods

6.1.1 **Brainstorming**

Brainstorming was the most used method to ideate throughout the Develop phase. It is a method where it is important to keep an open mind during the sessions in order to generate a large number of ideas (van Boeijen, et al., 2014). The brainstorming was primarily carried out through sketching. Ideas were evaluated and further developed.

6.1.2 **Parallel prototyping**

Parallel with sketching, many fast and low fidelity models were made and tested with sand and water by the team. This is a method stated to help the designer to not narrow down the design too early. It is used to evaluate and explore concepts (Martin & Hanington, 2012). In figure 6.1 some of the earliest test models are shown.

Figure 6.1 first paper models for testing concept ideas.

6.2 Generating ideas and concepts

Brainstorming exercises were held to generate a large variety of ideas. The aim was to not feel limited in any way by technicalities or the way playgrounds tend to look today, but rather concretize the concepts later on. The team worked with different types of inspiration to generate new perspectives in the brainstorming. These consisted of playground visits, inspiration from nature and architecture, focus on one persona at a time, focus on only water/sand, and more controversial methods such as imagining dangerous and not okay situations on playgrounds to spark unusual ideas.

Since water (and sand) are mediums behaving differently in different situations, it was important to build quick test models in parallel with the sketching. This way the team could easily sort out ideas that did not work or find new, really promising ideas when actually watching the water's behavior. For instance, it was realized that

water tend to run along a surface for as long as possible, even if this sometimes looks like the water is ‘breaking gravity’ (see figure 6.2).

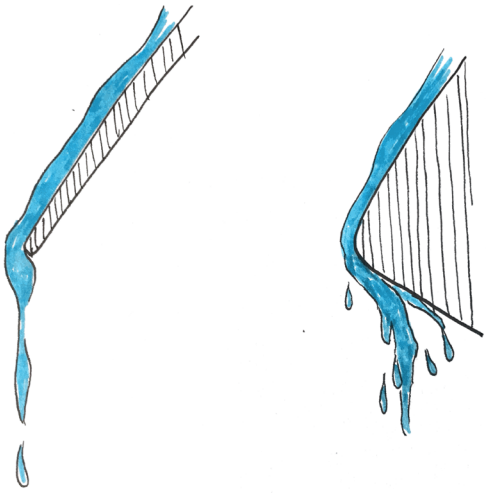


Figure 6.2 Sketch of water behavior.

Figure 6.3 Elaborating a concept with the use of paper models.

In addition to the different ‘toys’ or play systems that were generated the team also worked on different themes for the product series. This was found to be a good way to inspire new ideas. The themes were also created so that they would encourage

pretend play. Some early themes that were explored were ‘vegetable greenhouse’ and ‘under the sea’, which both work well with sand and water play.

Halfway through the Develop phase, the product ideas that showed most potential were sorted out. These were explored and elaborated a second time. For example one concept was a brush (tactile experience and fun tool), and it was explored how this could be incorporated in different ways (see figure 6.4).

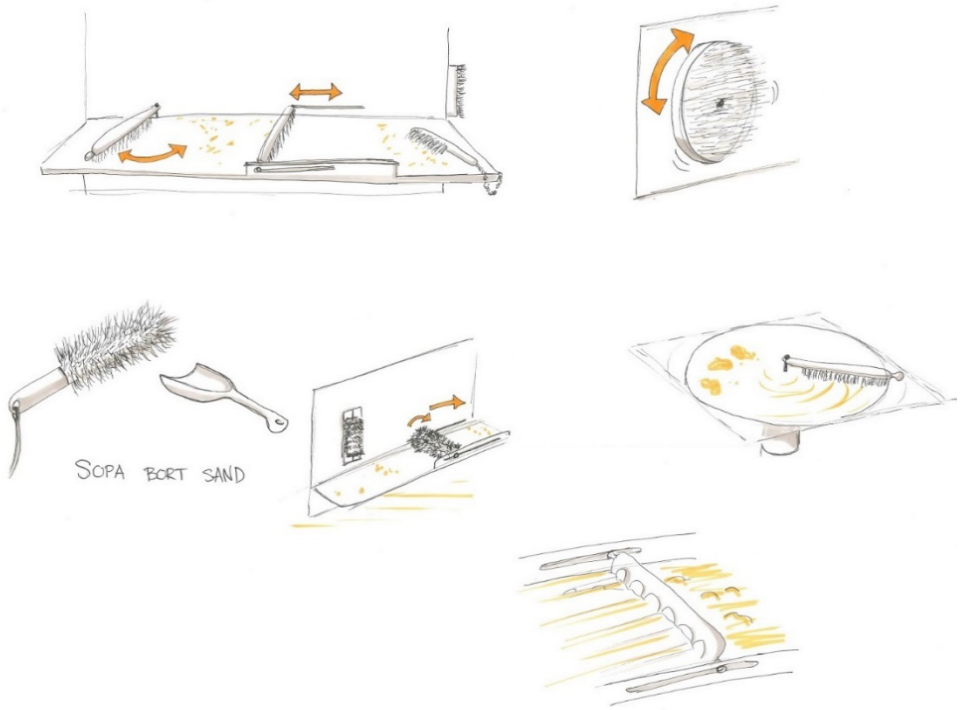


Figure 6.4 Different types of concepts for brushes.

6.3 Halftime feedback

After the development of the most promising concepts a halftime feedback visit to HAGS was made. The concepts were presented as play functions and shown through sketches (see example in figure 6.4) and for some of the concepts videos of the early test models were shown. In addition to the play functions the different themes were presented as well. The theme sketches also showed how the play functions could be incorporated into each theme (see example in figure 6.5). All sketches presented to HAGS can be found in Appendix F.

Figure 6.5 Sketch for the theme ‘green house/fruit market’.

The meeting at HAGS was held with the supervisor and one engineer experienced in accessibility and universal design. The feedback received was overall very positive. The team was left with the freedom to choose which concepts to continue working with.

7 Concept evaluation

The process of selecting three final concepts to move forward with is explained in the following chapter. Three different methods are used to evaluate the concepts in various ways to ensure that the selected concepts complement each other.

7.1 Methods

7.1.1 **Concept scoring matrix**

A concept scoring matrix can be used to rank concepts against each other by rating each concept towards different predefined criteria and then weighing the score (Ulrich & Eppinger, 2012). This method offers a ranking of high resolution because of weighed scores, meaning that the scoring takes into consideration the importance of each criteria. Each selection criteria is given a percentage of importance and one concept is chosen as a reference. All concepts are then rated on a scale of 1-5 for each criteria and the reference concept receives 3 for every criteria. After this has been done a weighed score for each concept will present a top ranked concept.

7.1.2 **VALUE**

Through the vALUe method (standing for Advantage, Limitation and Unique Elements) concepts can be evaluated by being expressed in common terms (van Boeijen, et al., 2014). For each concept the advantages, limitations and unique elements are listed making it easier to compare the different concepts. It is then up to the team to evaluate which of the points listed (positives or negatives) are the most important in the decision making.

7.1.3 **Persona's picks**

As a complement to the Concept scoring matrix and the vALUe method the team created another way to evaluate the concepts. This method consists of the team evaluating which concept each of the personas would pick as his or her favorite. This was done to make sure that the personas were taken into consideration in the decision making process.

7.2 The decision making

When evaluating using the Concept scoring matrix seven concepts presented at HAGS that could be stand-alone products were included. This means that concepts that could be included as a part of another product (such as a brush) were not included in the matrix. To summarize the results from the Concept scoring matrix, the top three were the following (full matrix in appendix G.1):

1. The canal system (figure 7.1)
2. The kiosk (example in figure 7.2)
3. Tilting table (figure 7.3)

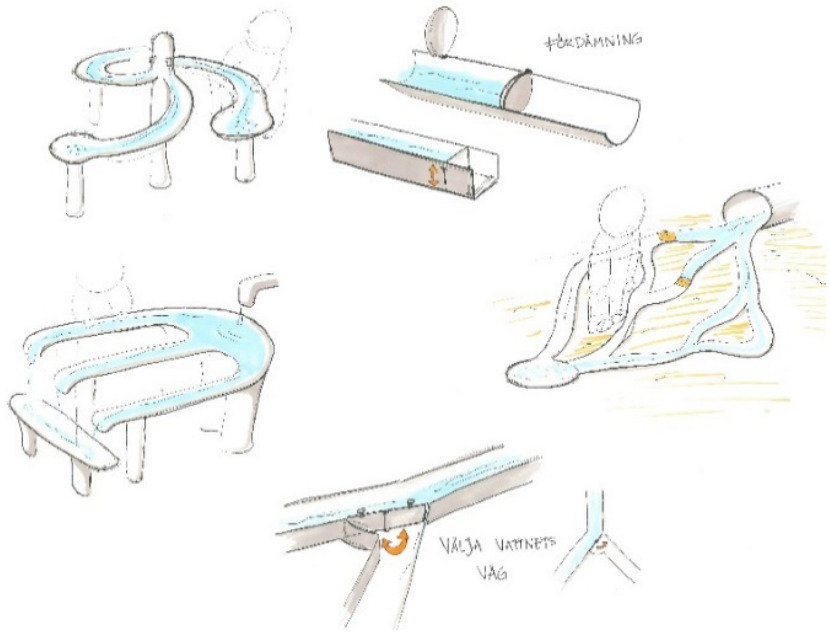


Figure 7.1 Canal system (top score in scoring matrix).

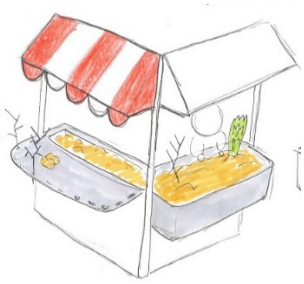


Figure 7.2 Example of the kiosk concept (second place in the scoring matrix).

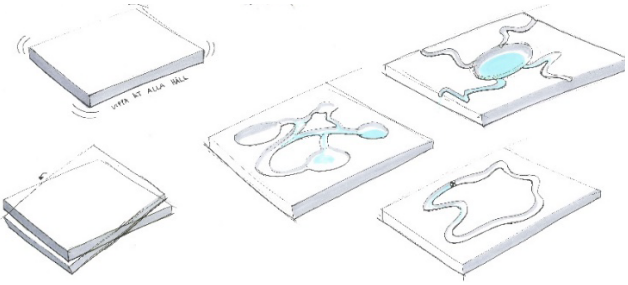


Figure 7.3 The tilting table (third place in scoring matrix).

The team felt convinced, both from previous interviews with parents and the evaluation results, that a kiosk of some sort should be a part of the product series. A kiosk could both promote pretend play through looking like a house or restaurant, as well as satisfy the popular play of cooking food with sand.

When it came to the rest of the concepts the team did not feel completely convinced by the scoring matrix results. The winner (the canal system) was a good concept however similar products were found in the competitor research. Since the other concepts were more unique when compared to competitors the team decided to eliminate the canal system. The 'tip over scoop' (figure 7.4) was also removed from the concepts before the next evaluation since the team considered it to be possible to include the scoop in another product rather than having it as a stand-alone product.

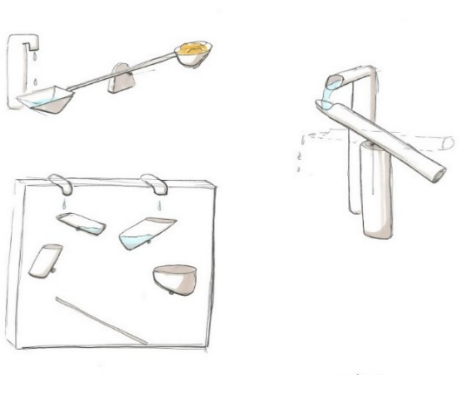


Figure 7.4 Tip over scoop.

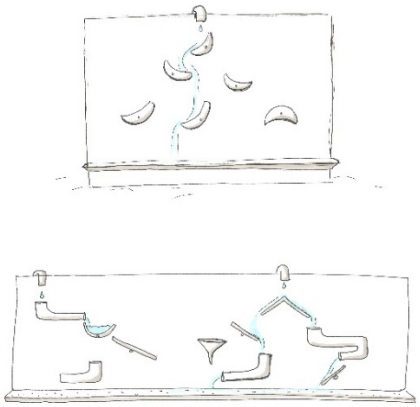


Figure 7.5 Water system on wall.

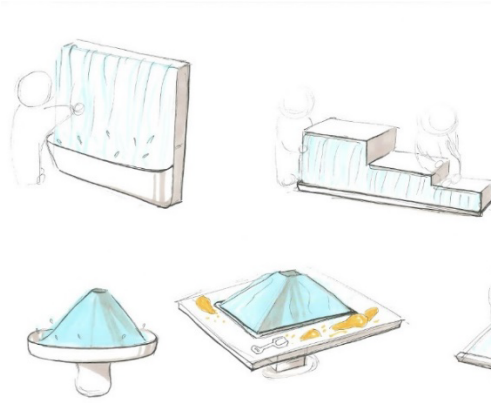


Figure 7.6 Waterfall.

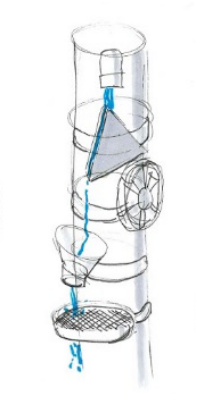


Figure 7.7 Water pole.

With the remaining four concepts (waterfall, water pole, tilting table and water system on wall) the evaluation method vALUe was used. This method was used to highlight the different concepts' advantages, disadvantages and unique points (see appendix G.2 for full vALUe evaluation). This method gave the team a better foundation for discussing the concepts rather than the scoring matrix's results which were very 'black or white'. Through this some exercise critique was raised against the waterfall concept for using an unmotivated amount of water. With the water pole the team felt that the concept at this point had a disadvantage of not promoting collaboration.

The team also evaluated which of the four concepts that would be the different personas' favorites. The personas' 'choices' were quite diverse since they all have different interests at the playground. The main persona, Noah, however was expected to prefer the tilting table since there would be possibilities for a lot of movement and action. The persona's picks can be found in appendix G.2.

After having performed the vALUe method and Personas' pick, the two last concepts chosen to accompany the kiosk in the series were the tilting table and the water system on wall. The team felt confident that this combination of concepts would complement each. The tilting table has the advantage of encouraging collaboration and combining water and sand play whereas the water system on wall provides water to the playground and can offer challenges when creating a water path.

8 Concept elaboration and detailing

In this chapter the three chosen concepts are further developed and detailed individually. This is done through prototyping for testing, developing play functions and development of graphic appearance. The concepts are presented one at a time, but in reality the development of all three concepts progressed in parallel with each other.

8.1 Methods

8.1.1 **Prototyping for testing**

When making a model for initial user testing it is beneficial to make a quick paper model where it is clear that the design team did not spend too much time on the model. This makes the test person feel more comfortable to give critical feedback on the concept (Arvola, 2014). Because the test participants were children, their feedback would be retrieved by observing their behavior rather than asking questions. The team assessed that it was important for the model to look fun and not be too fragile.

8.1.2 User tests

User tests were performed to evaluate whether the concepts were fun for the children within the target group. Due to time limitations, only the water system and the tilting table were tested. The kiosk concept facilitates a type of play that is very common among children and it can be assumed to be very well received.

8.2 Dimension considerations

When working with a target group so different in size from an adult, some methods were used to keep the proportions of a child in mind. From the DINED Anthropometric database (TU Delft, 2017) measurements for Dutch two- and five-year-olds were collected. Considered measurements (illustrated in figure 8.1) were stature (2), reach height (standing) (1), reach depth (20) and arm length (19). The data used is presented in Appendix H.

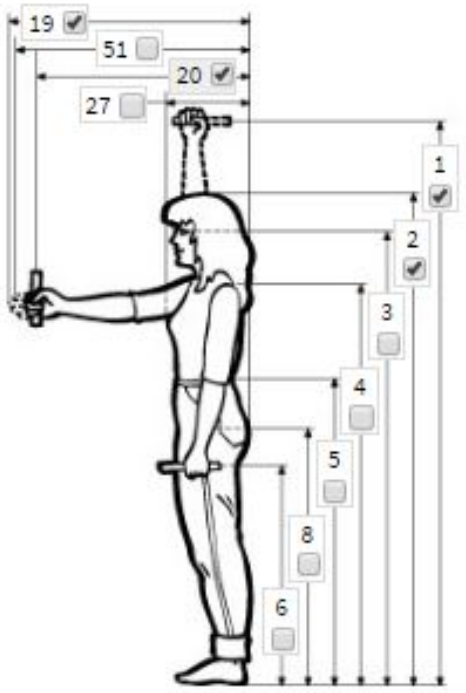


Figure 8.1 Measurements used from DINED Anthropometric database (TU Delft, 2017).

As previously mentioned, it is important to consider that the mental and physical development can be on a different level for some children, which means that the equipment should be possible to play with for a child bigger than a five-year-old as well.

A child in a wheelchair might want to play with sand or water on a table. To be able to reach from a wheelchair the table need to be about 70 cm high, 80 cm wide and 60 cm deep (Sveriges Kommuner och Landsting, 2006).

Full size silhouettes (figure 8.2) and scaled down print-outs (scale 1:10) of children (and adults) (figure 8.3) were used a lot in this phase to design with proper proportions. The print-outs were used when creating scale-models for exploring the concepts in three dimensions.

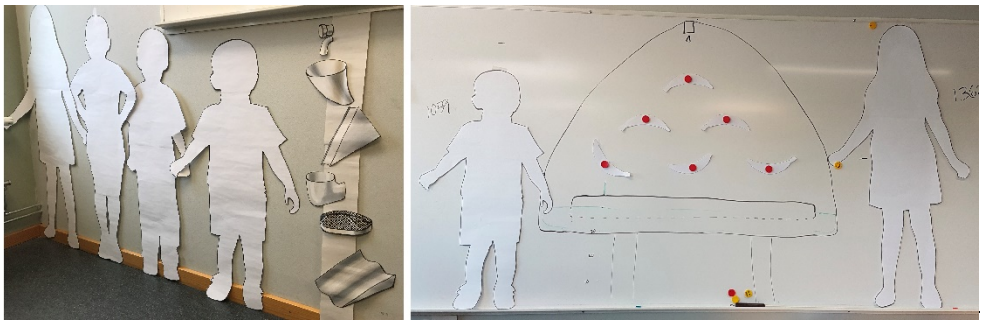


Figure 8.2 full-size silhouettes of children ages 2-5.

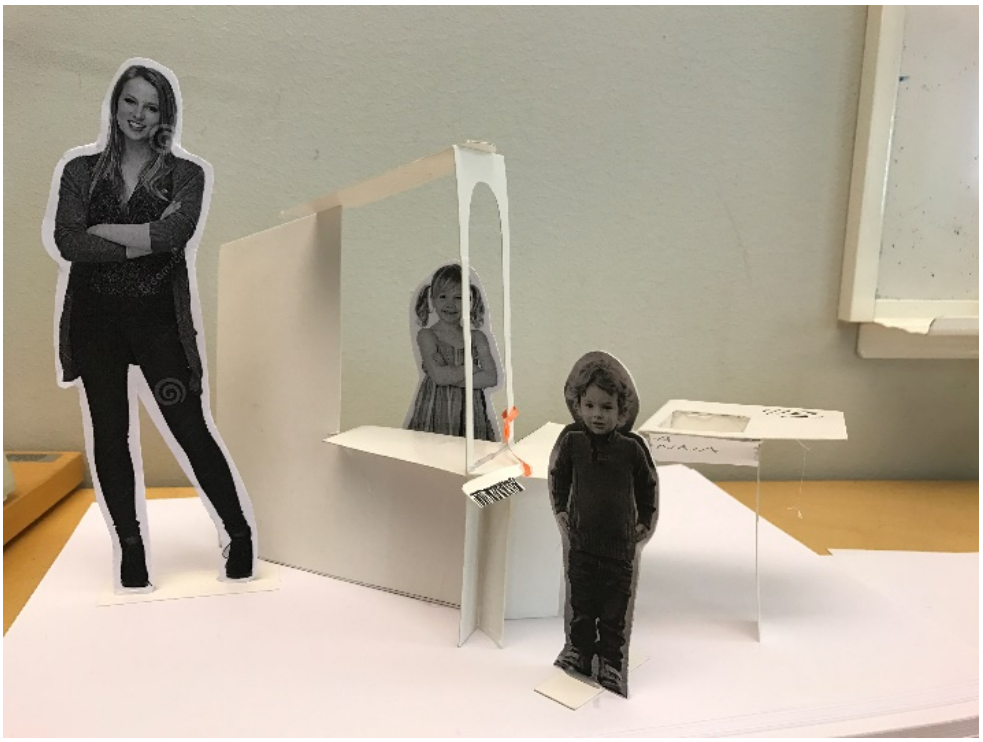


Figure 8.3 Scaled-down model.

8.3 HAGS' design aesthetics

To be able to design in accordance with HAGS' existing design aesthetics some characteristics were listed by closely examining the existing designs. The product lines chosen as the references were Uniplay, Unimini and the springers (see figure 8.4). These are some original HAGS designs (the company hosts designs previously belonging to other companies as well since becoming a part of PlayPower). HAGS also has some other designs such as the Solo Orbit (figure 8.5) which consist of other materials and more organic shapes. The team decided, however, that the new products should be in line with the products in figure 8.4. In the following sections are the design characteristics divided into color, shape and material.

Figure 8.4 Examples of HAGS' products (HAGS Aneby AB, u.d).

Figure 8.5 HAGS' product Solo Orbit (HAGS Aneby AB, u.d).

8.3.1 Color

The posts holding the construction are always either wooden or gray steel. All wall panels on the play units are in one color (or sometimes two in units with themes) and usually only one or two other colors are used for details. Common objects that appear in multiple play units, such as the steering wheel, the shop counter and the stove, are often yellow.

8.3.2 Material

The materials used for the posts are wood or steel, while all panels are made out of HPL sheets or colored wood. Other details are commonly made out of coated steel pipes or plastic.

8.3.3 Shape

The shapes tend to be simple rather than decorative and all animals or figures are two-dimensional, pictured from the front or side. The outer shapes of the figures are very simple and are complimented with thin black lines on the inside marking the eyes or other parts of the figure.

The shapes tend to be straight, rectangular or just slightly curved. Overall HAGS use few decorative details on the products, keeping a clean Scandinavian design.

When working with the design of the products in the project the shape was the most important point in the design aesthetics.

8.4 Water system on wall

During the entire concept elaboration phase, this concept was more deeply developed than the other two. It was decided to do more detailed work on one of the three concepts, instead of doing a more 'basic' development of them all. The water system on wall was selected because it seemed to be the concept with the most challenges.

The first question after choosing to go further with this concept was what the elements in the water system should be. One of the initial ideas was bananas with a built-in track for the water to flow through. Other possibilities discussed were pipes and funnels with hoses. Because it was important that the product would not clog (from sand, leaves etc.) the idea with the open, built-in track was chosen to go further with. Different possible objects and shapes were explored such as dolphins and boats but eventually it was decided to go further with the banana design. The bent shape of a banana had earlier showed to create a fun path for the water and compared to other bent shapes such as the dolphin and boat, a banana is more encouraging to turn upside-down as well. Turning a bent shape upside-down means that the water stream will divide in two – perfect when more children are playing at once.

8.4.1 **Test model**

The purpose of the first user test was to see if the concept was fun. To be able to transport the product for testing, it was decided to make it scaled-down. The bananas were made from cardboard and were painted with acrylic paint to somewhat protect the cardboard from the water. Instead of painting them white as Arvola (2014) suggests, the bananas were painted yellow to attract the children's interest. See model in figure 8.6.

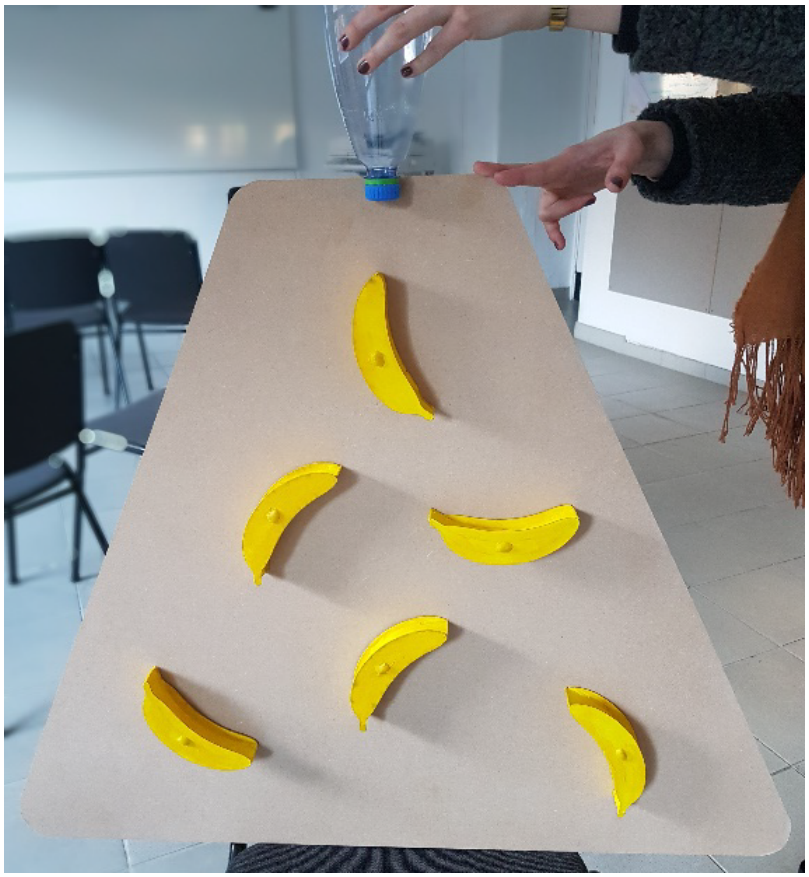


Figure 8.6 Model of water system for user testing.

8.4.2 User test 1

The test was conducted in mid-march with two participating children; one boy age three and one girl age six. Due to the cold weather and the need for the environment to be water enduring, the test was performed in a bathroom. It was a familiar environment for the children. The test setup is shown in figure 8.7. The test model was not able to stand alone and the children got some assistance from one of the team members. The execution of the test is presented more in detail in Appendix I.1.

Figure 8.7 Test set-up with participating child, the children's guardian and one design team member.

The test showed that this probably was a product a child would appreciate. It was also clear that it was a little more advanced for the child to understand than initially anticipated. This is however only a positive thing, resulting in a wider age span interested in the product. For a younger child (age 1-3) the water stream itself might be the most interesting thing, while for an older child (age 4+) it is the challenge of creating a path for the water.

8.4.3 Further development

With the confirmation from the first user test, the concept was broadened beyond only the water system. A gutter underneath the water system was added to keep the children from getting too wet. Now the water would be led to the sides and come

out as a stream possible to fill buckets with. If not collected it would drain down a drain in the ground.

When children are baking sand cakes or building things it is important that at least some sand is a little moist to be able to build things. The water supply that the water system contributes with is great for sand play, so adding a sand molding table near the water system could be very beneficial. The table was mounted on the back, with the room for a few children to play, a sink for sand or water and a brush rotating around an axis.

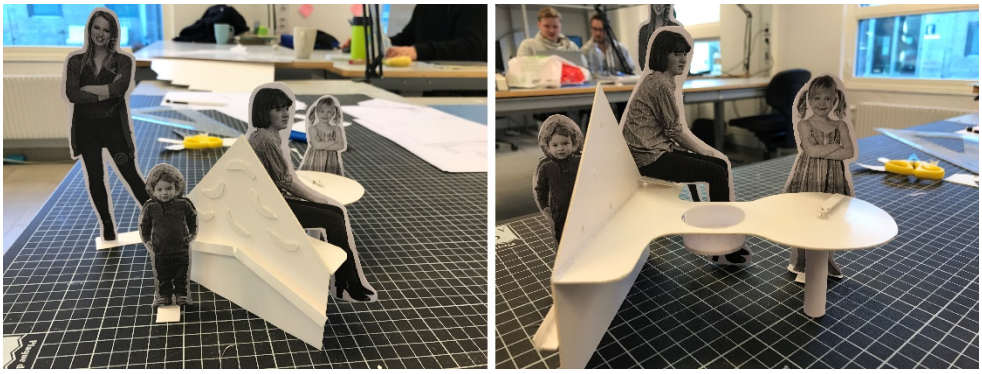


Figure 8.8 First paper model of the water wall with back.

The fact that the water can be used on the molding table as well was a good addition, but was in this case limited to the user having some sort of bucket or bottle to catch the water. Instead one of the six bananas was removed and replaced with a funnel and a hole. Now the water system had a ‘goal’ and it would be an easy way for the water to get through to the other side.

Figure 8.9 Adding an outlet to the other side.

With the design set to be bananas, the funnel was designed to be a gaping monkey. In figure 8.10 below the process of designing the monkey in HAGS-style is illustrated.

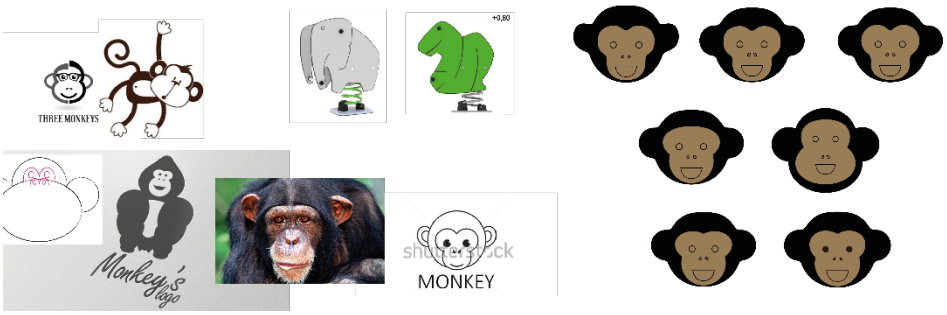


Figure 8.10 Designing the monkey.

For this concept to work, the water stream is very important. Both the one coming out from the tap and the one leaving the bananas. Many practical experiments were done. One crucial experiment was to test the influence of strong wind. The wind did of course move the stream a little, but with such short distance it would not have a remarkable impact (see figure 8.11).

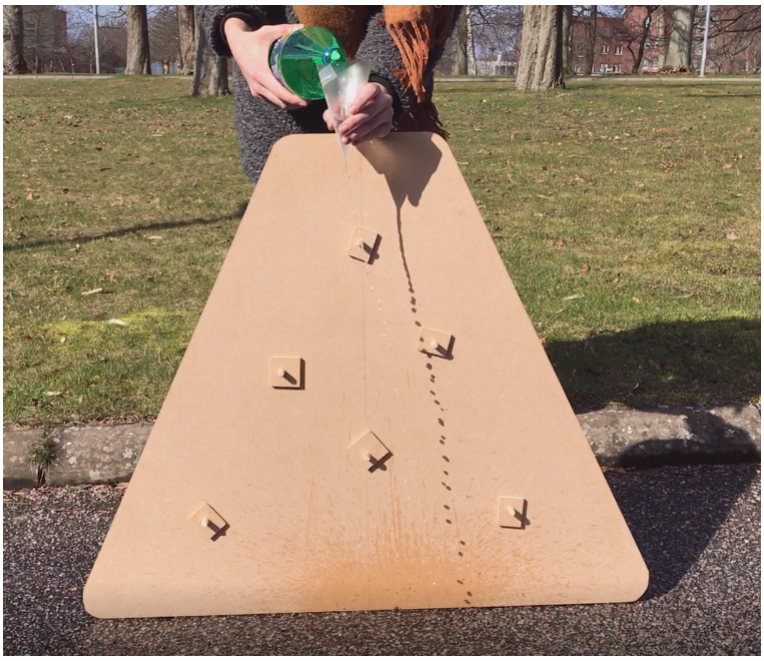


Figure 8.11 Influence of strong wind.

Previous models of bananas were made from cardboard pieces mounted with a glue gun, which affected the quality of the stream a little bit. To test the best possible stream, a 3D print was made of the built-in track that the water would flow through (figure 8.12). The quality of the stream coming out was very good and the team felt confident that the system would work perfectly.

To make a banana prototype for testing at a relatively low price, it was CNC-milled from poplar wood in three pieces which would then be glued together (figure 8.13). The first version did not create a water stream at all. Factors that played in were the wood itself instead of plastic, the edges were too thick and 'caught' the water stream (principle in figure 6.2) and the shape of the outlet was wrong. The shape was manually adjusted on the wooden bananas until it was working as expected and then the CAD-model was adjusted to resemble the manually adjusted model before milling a second batch.

Figure 8.12 Testing best quality of the stream leaving a banana.

Figure 8.13 CNC-milling of bananas in three pieces.

Figure 8.14 Adjusting design.

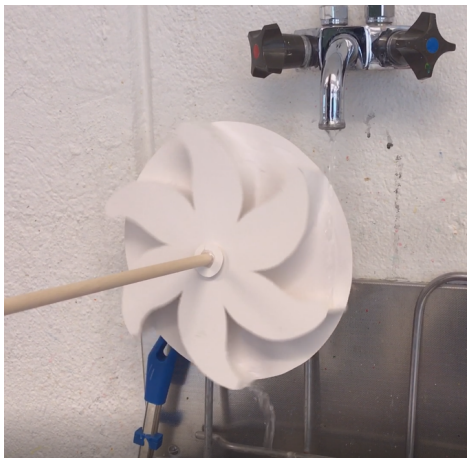


Figure 8.15 testing possible water wheel design.

One additional banana was decided to be replaced with something else, which would be a water wheel. In figure 8.15 the paper model of one is tested. This model did later, however, have to be redesigned a lot since it has to follow the regulations of SS-EN 1176 (Swedish Standard Institute, 2008).

The design of the main HPL-screen of the product (where the bananas attach) was decided to be a banana tree[7]. In figure 8.16 on following page is a sketch projected into full scale, to check with the size of a two and a five-year-old.

With the monkey addition there was now a stream coming out on the back, so the bucket in the molding table was moved nearest to the tree, so the water could be collected. The previous design did also force the children to stand baking towards the wall, which was improved as well.

[7] Bananas actually grow on a large herbaceous flowering plant, not a tree.

Figure 8.16 full-scale projection of drawing.

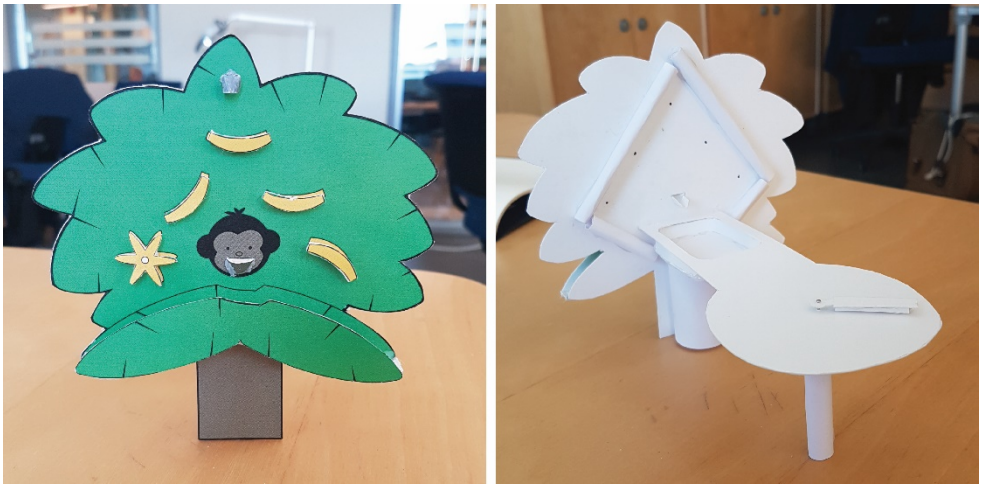


Figure 8.17 Scaled-down model.

8.4.4 Prototype

With most details set, the work began with creating a prototype for a more realistic test than the bathroom test. Due to time limitations, only the front part was built. This was where there was a greater need for testing. All parts were made as realistic as possible to the extent that it was possible. But for example, the water wheel had to be made flat instead of the more organic shape that was planned. The CNC-milling process was not justifiable for decoration purposes.

Figure 8.18 Making the tree silhouette.

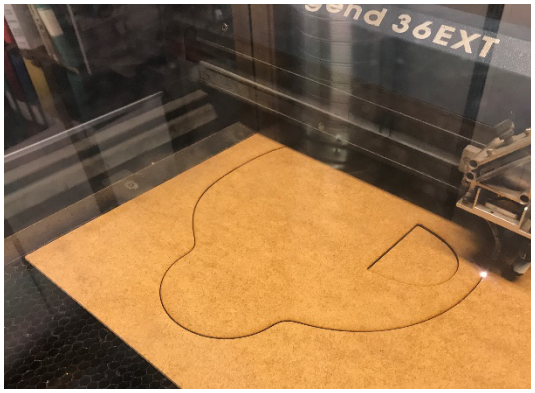


Figure 8.19 Laser cutting the monkey.

Figure 8.20 Making the water wheel.

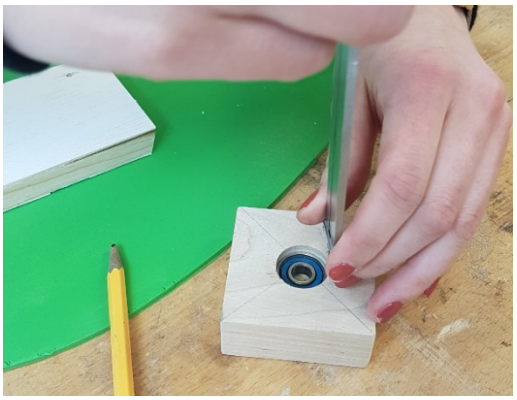


Figure 8.21 Fixing rolling bearings for water wheel.

Figure 8.21 Painting water wheel and bananas.

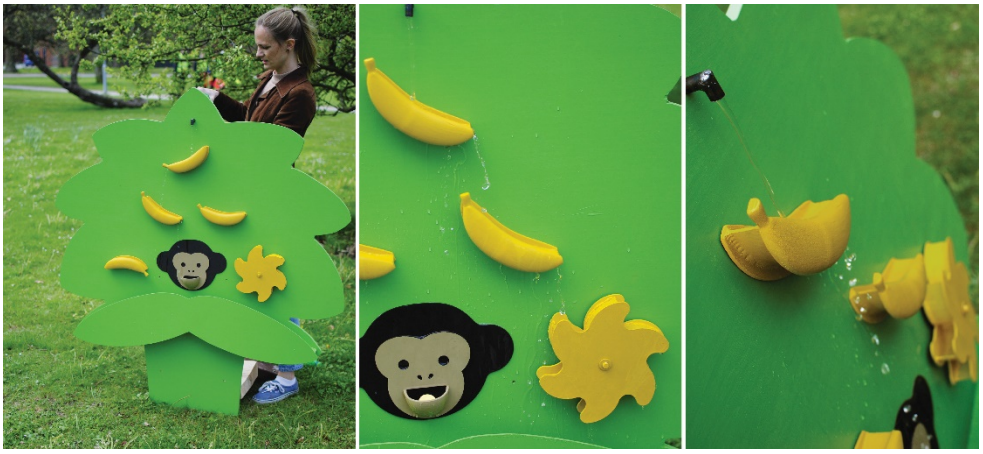


Figure 8.22 Model of water system on wall (front).

8.4.5 User test 2

A second user test was performed with a group of preschool children. Most of the children participating (age 3-5) had also been participating in a test with the tilting table a few weeks earlier (will be further explained in the section 8.5.2). The tilting table was out as well, but naturally the children were most interested in the new product. See the set-up in figure 8.23.

Figure 8.23 Set up test 2.

Instead of an actual tap with on/off switch, a bent pipe with a funnel was mounted to the tree (see figure 8.24). The water supply was controlled by a team member. When the tap was 'switched on' it only took seconds before the children started trying to make the water hit the monkey's mouth.

> *"The monkey should catch the water!"*

Buckets of water were set out, because the play area didn't have any water supply. Plastic cups were also put out to see what the children would do with them. The result was that everyone started pouring over the bananas and into the monkey's mouth with the cups as well.

Figure 8.24 The tap solution.

It was rewarding to watch the children set the bananas in the direction they wanted the water to flow. The wooden bananas did not create the optimal flow, but it was clear that this was not necessary for it to be a fun toy.

It was surprising how interested the children were by the back of the model and they spent lots of time trying to cover the monkey's mouth hole from the back and collecting the water coming out. This indicates that the planned design of the back will be well appreciated.

Especially some of the younger children (age 3) seemed to find it fun to twist or spin the bananas and water wheel even when there was no water. This is promising for the winter months when the water is switched off.

Figure 8.25 User test 2.

8.4.6 Design changes

The test was successful, but it was discovered that the children should be encouraged to notice the water running out on the sides. Not noticing it may result in unnecessary wet children. Perhaps putting a draining outlet under the gutter could make the children notice it better.

Finally, the prototype was controlled with the SS-EN 1176-1 standard regarding partially enclosed and V-shaped openings. All openings (areas between the leaves) above 600 mm over ground are tested with a test body (see figure 8.26) to ensure that no child can get stuck hanging in the throat or neck. All openings did pass the test and no adjustments were done. Full execution of the test in appendix J.

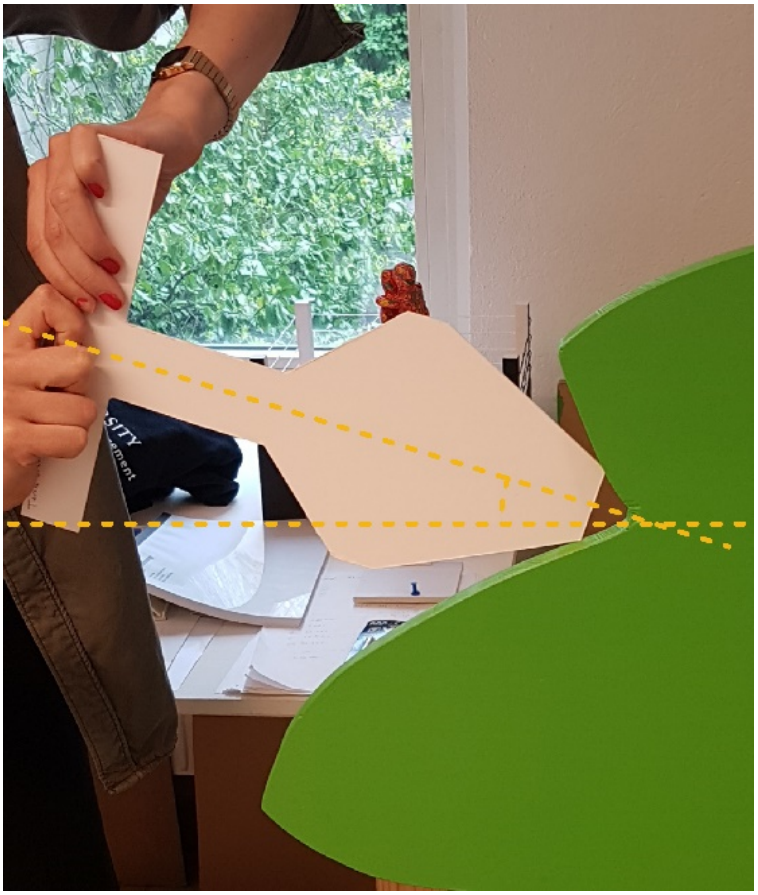


Figure 8.26 Second opening with test body.

8.5 Tilting table

In the internal tests with the very first model, made from duct tape (in figure 8.27), it was clear that a too complex path made it difficult to maneuver the water flow. Varying depth could make the water get 'stuck' and tight curves and/or intersections could make the water go a complete different direction. The path was instead decided to be a closed loop with no intersections and a constant depth. Initially the plan was to put handles on the table to use for tilting, but the easiest way to affect the table turned out to be to just push the table down. The handles were therefore not necessary and the product could be used more flexibly without them.

Figure 8.27 Model made from duct tape.

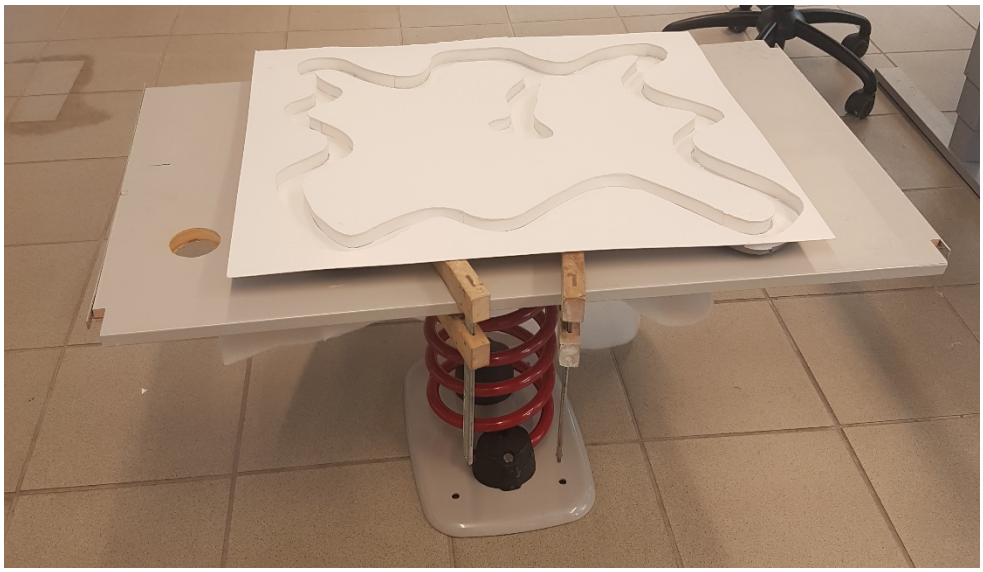


Figure 8.28 Exploring different sort of paths.

A spring was provided by HAGS and the height of the spring was alright for this purpose (approximately 410 mm), so no adjustments were made to the height.

The amount of water needed for the tilting table is rather small and it can be kept within the product, so the water supply was assessed to be undefined. It could come from rain, a water bottle or perhaps a water tap somewhere else on the playground.

8.5.1 **Prototype**

The prototype for testing the tilting table concept had to be able to endure some more physical force from the children, therefore the table itself was made out of MDF and screwed onto the spring.

The path was milled manually to a specific design. To somewhat protect the MDF from the water and to make the model look more like a finished product it was spray painted. The most exposed area, the path, was waterproofed with silicone. See prototype in figure 8.30.

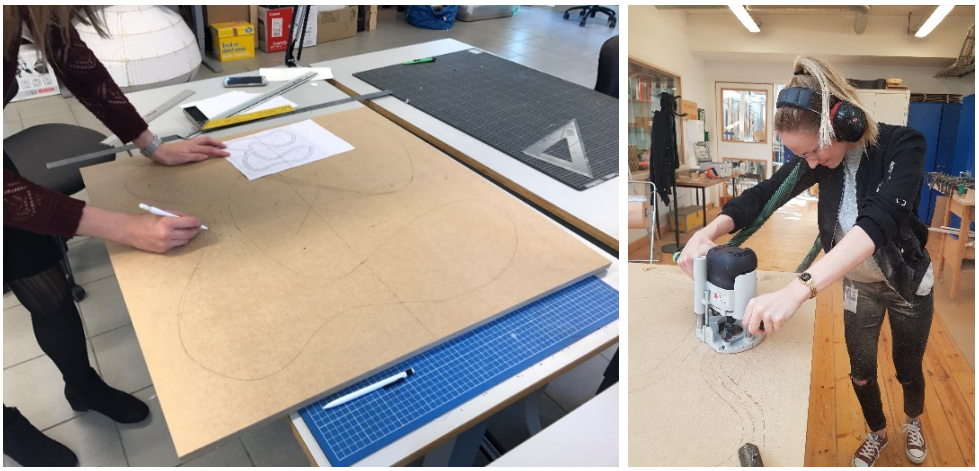


Figure 8.29 Making prototype.

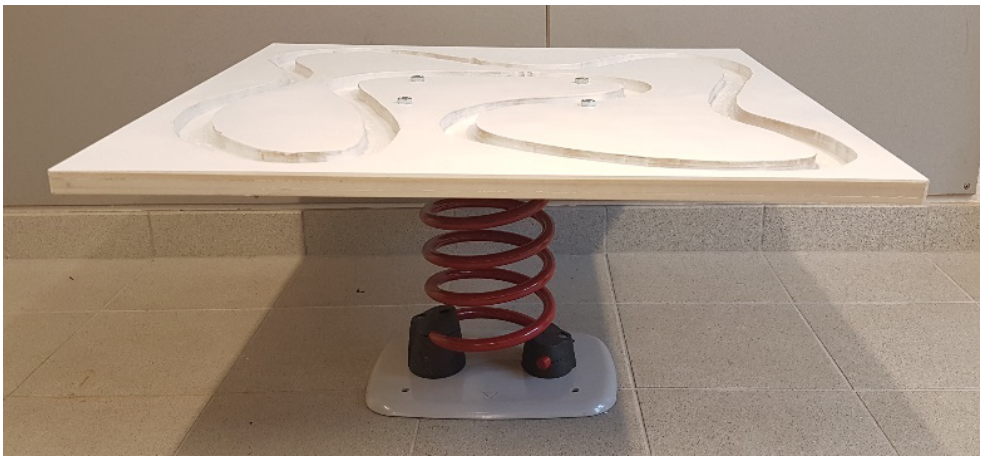


Figure 8.30 Prototype of tilting table for user testing.

8.5.2 **User test**

The test was conducted in the late March. Ten preschool children of ages 3-5 were participating accompanied by three caretakers. The test was performed outdoor in an area on campus where the preschool group sometimes go to play. The set-up of the test before the children arrived is shown in figure 8.31. When they arrived there was a small amount of water in the rail already. The children were not given any instructions at first, but were encouraged to try things gradually. The children were playing all over the area for one hour and not only with the tilting table. In appendix I.3 the execution of the test is presented in full details.

Figure 8.31 Set-up of the test before the children arrived.

The user test was a success and it was clear that this would be a popular product on a playground. The most satisfying thing to observe was the collaboration between the children. Some crucial areas for improvement were also identified; the older children played rather roughly and the table needs something to prevent it from tilting more than a certain level. After introducing sand to the table, it became very muddy. The team felt the need to further investigate the possibility to clean the track and the table.

Figure 8.32 Children playing during user test.

8.5.3 Design changes

Some redesign had to be made after the test. For instance the possibility to tilt the table had to be limited. By experimenting and measuring a maximum tilting angle of 11,2 degrees was calculated. This means a difference in 140 mm between the highest and lowest point. Chains are fastened under the table to prevent it from tilting more than this. According to the SS EN 1176-6 standard, rocking equipment is not allowed to have sudden stops. Instead they should gradually be reduced in speed until stop. This is to minimize the risk of back damage because of sudden pressure load. The tilting table is however not a rocking equipment intended to be sitting or standing on (although it naturally must be safe to do so), so the standard does not apply completely to this product. Since the rocking possibility is very limited due to the chains, the speed needed to create these pressure loads are never met.

The corners of the table were rounded to prevent any injuring if running around the table or leaning over it. The rounded corners are also there to make it more flexible for the children to be able stand on different sides.

When dealing with developing the graphic appearance the HAGS design aesthetics were considered as well as the already designed banana tree. A start/finish line, a centipede, butterflies and leaves were added to inspire the play and create a jungle theme.

Figure 8.33 Graphics of the tilting table.

To investigate the cleaning possibilities of the table and the track the team experimented with some mud (see figure 8.34). It was discovered that because of the rounded edges of the track it was easier than anticipated to remove the mud by hand. The team had another idea of attaching one or two brushes to the table and tested this by using a dish-brush (see figure 8.35). The brush has the advantage of adding a new play tool and also that the person cleaning the table can avoid getting dirty. A sketch of how the brushes could be implemented on the product is shown in figure 8.36.

The team decided in the end to keep the table as it is without adding the brushes. One of the advantages of the tilting table in contrast to the other two products is its simplicity and being very fun and exciting without any loose parts. To dig out the

track full of sand can be play in itself to a child. And the product is mainly thought to be for water play, meaning that it might be placed completely outside of the sandbox.

Figure 8.34 Creating mud and dirt to be removed.

Figure 8.35 Removing dirt with brush.

Figure 8.36 Brushes attached to the table through cables running through holes in the table.

8.6 The kiosk

The actual execution of the kiosk was not clear when starting the final development of the concept. During the early ideation some different paper models had been produced (figure 8.37), but before further developing a bullet list of important aspects to cover in the concept was made. This list was made with the knowledge of what the other two products would offer and the key insights from the user study.

The following points were to be included in the kiosk concept:

- Accessible for someone in a wheelchair
    - Consequence: needs to be placed on solid ground (to some extent)
- Offer a play experience for a child with impaired or without eyesight
    - Consequences: needs to be placed on solid ground (to some extent), offer tactile play experience
- Allow parents to sit nearby
- Providing the child with some type of sand tool
- Encouraging pretend play

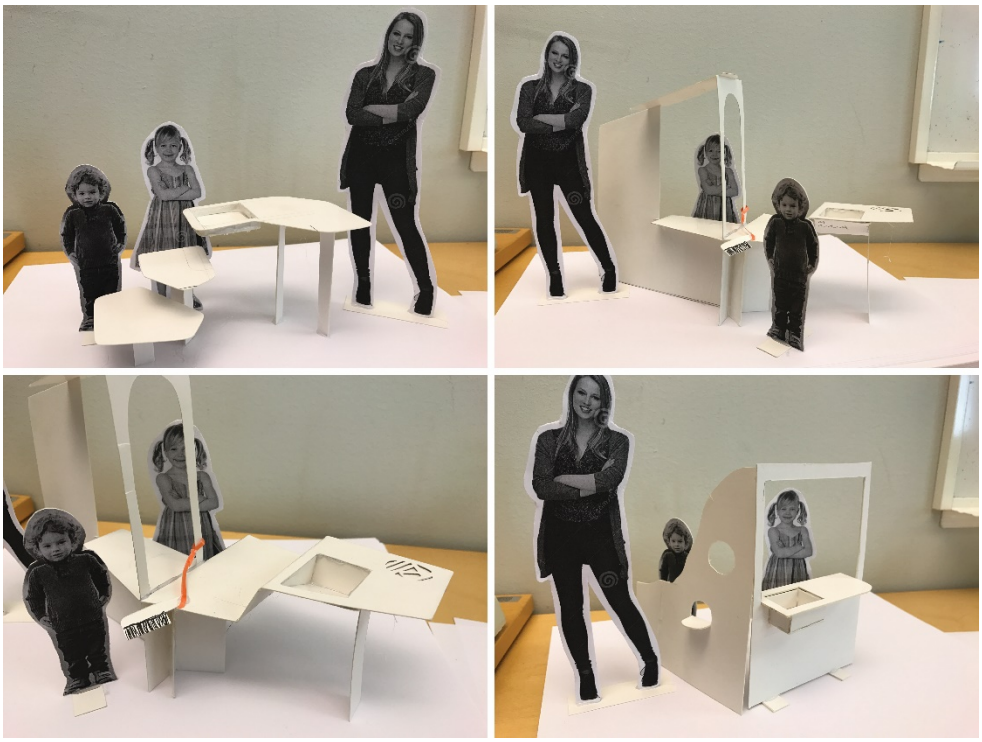


Figure 8.37 Early kiosk ideas explored through scale models.

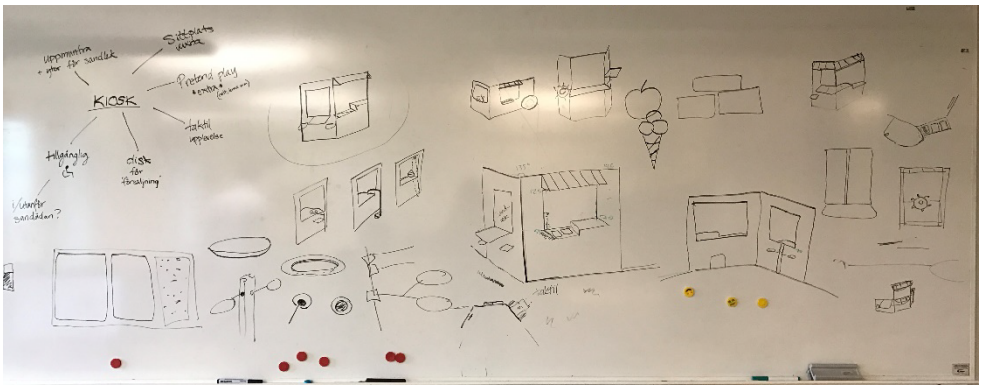


Figure 8.38 Brainstorming on kiosk.

Through a joint brainstorming on a whiteboard (figure 8.38) the team decided for the kiosk to be placed between the sandbox and the solid ground on the outside. This way any children preferring (or needing) to be on solid ground could still take part in the play. By having the kiosk open instead of a as house it would complement HAGS existing product line (which already include different play houses with roof).

The team decided to have three sides to the kiosk: One restaurant side which provides a higher table (wheelchair access) with a seat suitable for an adult, one shop side and one alternative side with a steering wheel to allow for the kiosk to be some sort of vehicle or ship as well.

The sales counter on the shop was elaborated on to add tactile experiences. A round rotatable brush was added as well as two submerged compartments. This way a child with impaired or no eyesight can play with sand and water in the compartments without having to enter the sandbox. On the side of the steering wheel a parrot with a rotatable wing with milled out pattern created both a tactile experience and connected the kiosk with the jungle theme of the series.

To create a way for children to bring sand up on the restaurant table and also a way to serve sand cakes two plates were attached through plastic covered wire.

As mentioned earlier, the kiosk was not built as a full size prototype for testing, instead a paper model in scale 1:10 was created (figure 8.39).

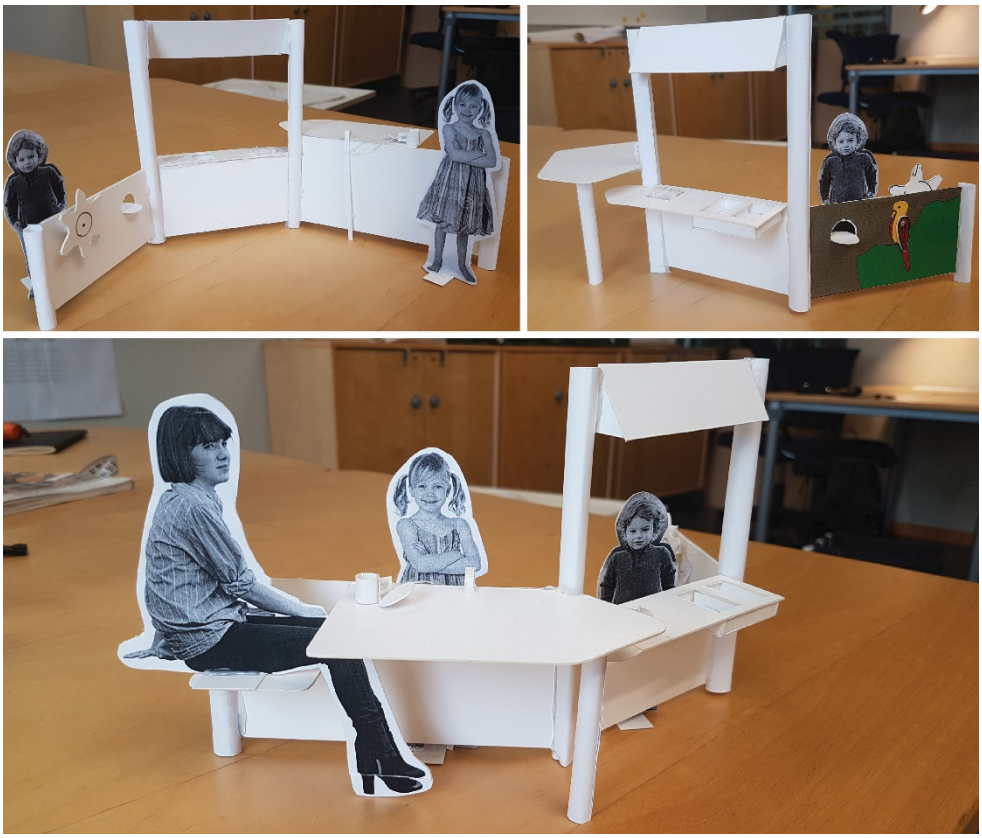


Figure 8.39: Scale model of the kiosk

8.7 List of requirement check

All demands and desires mentioned in the list of requirements in section 4.3 was controlled for all three products. The demands should be fulfilled by each product on its own and the desires should be fulfilled by one or multiple products. In table 8.1 and 8.2 on the following pages is the result presented. Fulfilment is marked with green and failure with red. Questionable results are marked with yellow. Questionable results in the demands-section are commented below the table.

Table 8.1 Result of the list of requirement check (demands).

	Water system on wall	Tilting table	Kiosk	Result
Demands to be fulfilled by *all* products				
Encouraging the child (age 2-5) to play with sand and/or water				
Allowing children to play independently				
Allowing children to play together				
Can withstand all seasons of European climate	(1)			
The product will be used by small children, but can withstand use from an adult	(2)			
The product expected to be inspected by procreator, but seldom cleaned and/or fixed				
Light contamination, such as sand, soil or leaves should be able to be removed by the user (adult rather than child)				
The product can be used by a child age of 2-5				
The product should fit with the HAGS design aesthetics				
All materials used should be non-toxic				
The product should follow the SS-EN 1176-1 standard		(3)	(4)	
The depth of stagnant water should not exceed 150 mm				
Stagnant water should be possible to empty		(5)	(6)	
Visual contrast should be high, especially for items sticking out				
No parts should require more than a child's force to be moved (if movable)				
The product should be trusted by parents				(7)
Use of water (when water is used) should not be experienced as wasteful	(8)		not applicable	

Table 8.2 Result of the list of requirement check (desires).

	Water system on wall	Tilting table	Kiosk	Result
Desires to be fulfilled by *one or more* products:				
Encouraging parent to join in play				
Promoting play between children of different ages				
Encouraging pretend play				
Offering adventure and/or challenge in play				
The product can (to some extent) be used from a wheelchair				
The product can be used by a child with a mental development corresponding to a child age of 2-5, but a higher actual age				

Comments to yellow demands:

1. Water supply might be switched off during colder seasons, but the Thirsty Monkey still offers other play functions.
2. Bananas, water wheel and monkey's mouth needs to be mechanically analyzed and dimensioned so that they can withstand a person climbing on them.
3. According to the standard for rocking equipment, the chains would not be allowed. They are however assessed to be of no harm. This was discussed more elaborate in section 8.5.3.
4. Has a fall height of 700 mm and need a foundation according to table F.1 in EN 1176-1 (the team suggest rubber tiles for easier wheelchair accessibility).
5. The water is not possible to empty completely because of the chains' limitations, but a large enough amount is possible to empty. Periodically the small amount of water will dry up.
6. The buckets' volume is very small and periodically the small amount of water will dry up.
7. This is not tested, but there is no reason to believe that parents would question the designs.
8. It is possible to collect the water for further play both through the two gutter outlets and the sink under the monkey mouth on the backside. Therefore the water use will hopefully not be considered wasteful.

9 Results

The result of the project is presented in this chapter. The product line consists of Thirsty Monkey, Bug Race and Parrot Café. The products' benefits to children's development and manufacturing methods are combined with product images to provide a complete summary of the project results.

9.1 The product line

Friends come together for fun adventures and exploration in the jungle. Come play with Thirsty Monkey, Bug Race and Café Parrot – regardless if you are a child or a parent. The product line is designed to encourage collaboration, pretend play, exploring, constructing and practice the motoric skills of children age 2-5.

Figure 9.1 The product line.

9.2 Thirsty Monkey

Among the yellowest bananas in the entire jungle you find two monkeys who love fooling around with water. The Thirsty Monkey has a thirst for water that never seems to fail and he will keep asking you for more. His rude brother on the other hand is not as delighted with the taste of water and keeps spitting it out.

The banana tree which the monkeys live in divide the product into two different play experiences. With the Thirsty Monkey the children are allowed to play with water streams on the wall mounted water system (see figure 9.2). Through pushing a button the children are able to start the water supply to the system. The water flows over the bananas, which are twistable. By twisting them, the child can set a certain path for the water to go. A gaping monkey and a water wheel are also part of the system.

Figure 9.2 Thirsty Monkey, water system.

On the other side of the tree there is a molding table for the children to play with sand on (see figure 9.3). A ‘sink’ is placed under the gaping monkey, which is connected to the monkey in the front. As water runs in on one side it runs out on the other. The sink has a plug in the bottom which is possible to open and close. The molding table ends with a circular table with a brush mounted on a vertical axis. The brush can rotate around the axis and sweep the table.

Figure 9.3 Thirsty Monkey, molding table.

9.2.1 Benefits

The Thirsty Monkey is well suited for social play. Multiple children can play at the same time and collaboration can be practiced when creating a certain path for the water. With the two outlets of the gutter multiple children can collect the draining water at the same time. The product offers challenge as well as less advanced play functions, resulting in attracting children of different ages and hopefully age mixed play. Most children should be able to reach at least some of the components of the water system.

The Thirsty Monkey offers many different ways of playing with both sand and water. Children living in colder climate countries, such as Scandinavia, might only be able to play with water for a few months of the year. During the colder seasons sand or gravel could be poured over the bananas instead of water and the molding table will still function excellent as a play or baking surface.

9.2.2 Technical specification

The bigger elements of the Thirsty Monkey are made from 10 mm HPL sheets, which is a very durable material and well suited for contact with water. The product is fixed through wooden posts which the tree is mounted on and through the support post under the table.

The two monkey faces are made from 8 mm HPL sheets of the Café color. The black parts are created by milling away the color to uncover the dark core of the HPL sheet.

The Thirsty Monkey consists of some additional plastic parts as well. Firstly the bananas, which will be rotationally molded, as a suggestion, from polyethylene. This manufacturing process is well suited for a smaller batch size. The axis which goes through the HPL sheet is cast into the banana when rotationally molding.

For the water wheel however, there is a greater need for an even thickness and the shape is more complex. For that injection molding from a polyamide could be used. The component will be made in two parts which are later assembled through a click function and a screw joint. The water wheel will be divided so that the front flower is one part and the back and the shovels are one part. The water wheel then needs to be mounted on an axis which is mounted to a rolling bearing. Preferably in plastic since its environment might be moist at times.

The mouths of the monkeys can be produced as one piece through vacuum forming plastic. Every vacuum formed piece will create monkey mouths for two products in the after processing (see figure 9.4). The fastenings on each side of the mouth can be attached through either plastic welding or gluing.

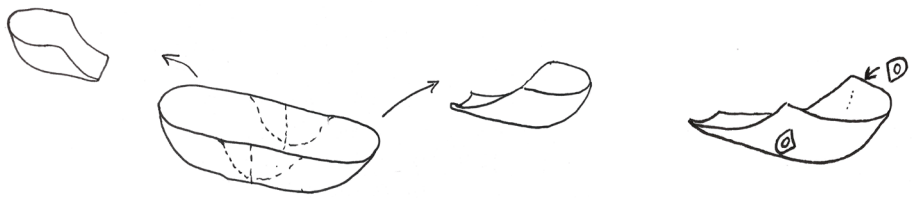


Figure 9.4 Manufacturing the mouths.

The ‘sink’ bucket can also be manufactured through vacuum forming. A plug which can open and close, but not be removed, is made from HAGS existing hand grips of the springer animals (see figure 9.5).

The water tap is placed at the top of the tree and the water supply comes through a pipe mounted on the back. The button is a self-closing pin valve which closes the flow after about 20 seconds.

The brush is bought from a brush manufacturing company and should be made out of plastic to increase the durability of the brush and preventing cracking.

Figure 9.5 Sink and plug.

9.3 Bug Race

On this mud path in the middle of the jungle anything can happen. One day all the bugs in the jungle race down the path, crossing difficult obstacles and mountains of sand. The next day the path might be a wild river with rafts trying to get across to the other side of the jungle.

This play experience consists of a play table attached to a spring (see figure 9.6) – making it possible to tilt it in any direction. There are also four chains attaching the table to the ground to prevent excessive tilting. The trail in the table is a continuous loop and can be filled with toys, sand or water – or everything at once.

Figure 9.6 Bug Race.

9.3.1 Benefits

Bug Race can be used in multiple ways depending on the child's imagination, goal and the available toys which makes it great for exploration. A parent can also engage and suggest challenges for the children.

Thanks to the possibility for movement and therefore more 'action', Bug Race may encourage older children (age 4+) to play with sand (and water) and for example use sand to block the water stream etc. Younger children (age 2-3) can explore the movement of the table and what happens to the sand or water when the table tilts.

Bug Race promotes collaboration and communication between children in multiple ways. It is easier to tilt and control the table if a group of children do it together rather that one child alone. Bug Race enables for younger children to watch the older children's game and hold on to the table without necessarily steering it, which allows for the younger children to learn from the older.

Thanks to the path in the table being a closed loop the children can keep the water on the table for a long period of time. This makes a bottle of water a sufficient amount of water to be able to play with for a while. Bug Race also collects rain, which can create fun play after bad weather.

9.3.2 Technical specification

The main table surface of Bug Race is made out of two sheets of HPL (due to the sheet thickness available). The top one with the milled trail is of the thickest kind (17,7 mm) and attached below it is a thinner sheet (suggestively 8 mm).

The trail, caterpillar, leaves and finish line are all milled from the thick HPL sheet. The two butterflies are made out of 8 mm yellow HPL sheets.

The spring is an existing HAGS' component and is attached with bolts to the table. Four chains in the corners are also attached with bolts underneath the table. The chains are covered by plastic tubes to prevent risk of pinching fingers etc.

9.4 Café Parrot

Serving the most incredible dishes ever imagined, Café Parrot attract people and animals from all over the world to the heart of the jungle. Every now and then the café takes off to a new location lead by its very own Captain Parrot and big adventures usually awaits the crew on their journey.

Café Parrot offers various opportunities for pretend play. The design is thought to be a divider between solid ground and the sandbox, with the sand being on the inside (figure 9.7 and 9.8).

Figure 9.7 Café Parrot (outside).

Figure 9.8 Café Parrot (inside with sand).

The table area (see figure 9.9) offers the possibility for guests to be served at the table. Two plates offer a way to serve sand cakes and to dig sand from the sandbox up to the table. The plates are attached to a pole with plastic covered wire strings so they will never be lost.

Figure 9.9 Café Parrot, the table area.

The center area of Café Parrot hosts the sales counter (see figure 9.10). Here two submerged compartments and a rotating brush can be used to create wonderful dishes, clean the shovels, serve ice cream etc. The third side of Café Parrot is the adventure side (see figure 9.11). The rotatable steering wheel inspires the children to set off on a journey. This side also has a small hole with a shelf to be able to pass through items and a parrot with a rotating wing sitting in a bush.

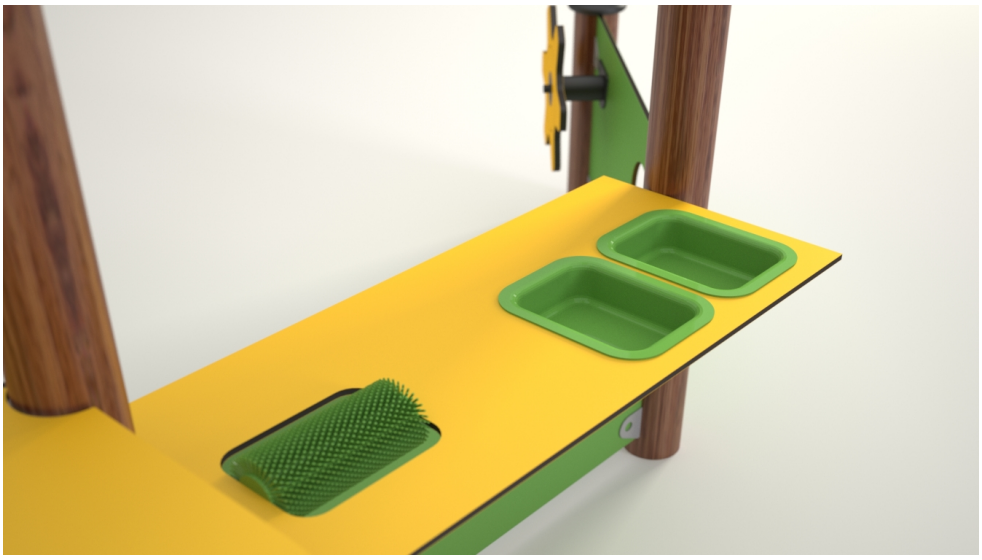


Figure 9.10 Café Parrot, the sales counter.

Figure 9.11 Café Parrot, adventure side.

9.4.1 Benefits

Café Parrot creates the perfect environment for the popular restaurant/shop type of pretend play. By including the steering wheel on one wall the café can become whatever vehicle or craft the children want it to be.

The design enables for everyone to find a part in the play. The table area has space for an adult to sit by the table as well as for a wheelchair. With the plates one or two children can bring sand up onto the table and everyone can play together with sand on the table, including a person in wheelchair. Tactile elements (the brush and the parrot wing) have been brought in to stimulate this sense and are accessible from the solid ground if Café Parrot is placed as intended. By accessing many different parts from solid ground children in wheelchairs as well as children with a bad eye sight can take part without having to be in the sand.

Café Parrot has many fun elements for younger children (age 2-3) to explore but leave room for the older children's (age 4+) imagination and creates a space for various types of advanced role play.

With a few different flat surfaces Café Parrot is perfect for sand play and creating different sand sculptures or food. When water is available the compartments in the counter are perfect for stirring up some mud or to store the water in.

9.4.2 Technical specification

All the panels as well as the table, seat, counter and sun blind are made out of 10 mm thick HPL sheets. These are fixed to the ground through wooden posts in between each section of panels. Below the table and the seat are two additional metal posts to strengthen the construction. On the back side of the table another smaller metal post is mounted for the plates to be attached to (see figure 9.8).

The plates are suggested to be rotationally molded from plastic. This could for instance be done using polyethylene. This due to the relatively small batch size. The plates are then attached to a metal wire covered in plastic.

The rotating brush could be bought and should have a plastic center and brush hair to last for as long as possible outdoor.

The submerged compartments can be made through vacuum forming.

The steering wheel is taken from HAGS existing components.

10 Discussion and conclusion

In this chapter the outcome and execution of the project is discussed. The areas mentioned are the design process, the scope of the project, the evaluation of the results and the time management.

10.1 Design process

The Double Diamond design process was used as a way to structure the time plan at the start of the project. The different phases of the process were given a certain amount of weeks each. However, we felt during the project that the model was a bit unclear as to what each phase would include in our case. The overall idea made sense; one should explore the problem, then redefine it and then ideate and finally narrow it down to the best solution. We tried to follow this structure but ended up changing the length of the different phases. In hindsight, we feel that it might have been better to work with different milestones and deadlines rather than deciding that four specific weeks would be dedicated to the Discover phase.

Another alteration to the design process that would have been interesting would be to do many quick iterations instead of one long process. This way the idea generation could have started earlier, maybe after only one week of background research. Further user studies could have then been done when needed depending on what questions would be raised along the process. The way we did things resulted in somewhat 'unnecessary' reading regarding child development that never affected the final products.

A second way of working that could have been beneficial for this project is the CoDesign approach with involving the users in the development. When working with children, and especially such young children, this would have meant us doing additional research on pedagogics and interaction with children. It would no doubt have been an interesting method, but quite likely not rewarding without proper preparation.

10.2 Scope of the project

When looking back at the project one thing is clear to us – we should have limited the scope of the project a bit more. We are happy with the result of the project, however it is very much on a concept level. Some ways to limit the project could have been made: Focus on accessibility and children with disabilities, make only *one* product, water play *or* sand play, focus on creating social play etc. However, the reality is that the playground has to serve the needs of many very different children. So the approach that we had with many aspects is more realistic and highlights the challenges of universal design.

Technically, creating three product concepts means that some more work needs to be done on each part of the products to make it ready for production and making sure that a competitive price can be set. The question about price, however, is something that goes back to the delimitations set in the beginning. By focusing on the users rather than the purchasers the design was not created with the focus to be cheaply produced. Price only came into consideration when suggesting manufacturing methods in section 9 Results. Some of the parts might have to be redesigned or exchanged due to the fact that the batch size is 50 products per year.

10.3 Evaluation of the result

The evaluation of the result was done partially through user tests with children, but also through the List of requirement check. The check of these requirements was based on user tests and own evaluations, but also through some assumptions.

10.3.1 Parents

In the List of requirement there was a demand regarding that the products should be trusted by parents. On this, we argued that there would be no reason to believe that parents would question the designs. This was partially based on the feedback from the preschool caretakers during the two later tests. However, a first-time-parent can likely be more anxious than a preschool caretaker. It would have been very good to do a focus group of parents and hear their opinion about whether they would trust the equipment with their children.

10.3.2 Theory

The very foundation regarding all child development-aspects were retrieved from theory. What was found here then laid the ground for the concept generating and are the ‘selling points’ of the product. The prototypes are however only tested from a functioning/entertainment-perspective and not from a child development-perspective. To some extent it was possible to see how the different researched aspects were happening in front of our eyes, such things as collaboration, sharing and cognitive challenges, but not to what extent our products would encourage this. Testing the products from a child development-perspective would have been really difficult for us, but the result could have been better evaluated through consulting experts within different relevant fields. By working according to a more iterative process as discussed in section 10.1 this might have come more natural.

10.3.3 Durability and materials

The durability of the products were without any further calculations assumed to be safe. The HPL sheets together with the pillars has in the previous products proven to be a very strong construction. This was concluded in collaboration with coworkers at the company. For a person not familiar with these materials/constructions it would have been more convincing if a simple stress/force analysis was presented to prove (or control) the durability.

The materials of the plastic parts need some more research and definition regarding its additives to make them temperature independent (both cold and warm) and the UV protection.

The shape of the bananas are here presented to be with a ‘stick’ on one end. We were always aware that this would mean a durability risk for the banana, but we assumed that with an appropriate thickness it would be able to resist the force of a child. We did not want to remove it because that would affect the similarity to a real banana. After some discussion it was concluded that in its context it would probably still be seen as a banana regardless of the stick. Then the bananas would be even less fragile and the rotating radius would be smaller. With a smaller radius the bananas could be placed closer to each other and there would be a greater chance of hitting the monkey’s mouth with the water stream. The advantages with no stick are too great to justify it, and we would recommend a design without it.

10.3.4 Global success

With HAGS selling to over 60 countries, it was important that the result would be globally viable. Despite this, the interviews and observations were focused on Lund. The share of inhabitants with a higher education (at least three years of university studies) in Lund is the second largest in Sweden (Statistiska Centralbyrån, 2017). This mean that the participating interviewees and observed children might have a different standard of living and a different relationship to the playground than others in Sweden. Even if not so, it is somewhat assumed that all children and parents behave like the ones in Sweden. It should be further investigated which other behaviors and needs of parents and children in other countries and cultures that could have an impact of the design.

An example of a direct consequence of the Lund based user study is the fact that we felt a need for the children to not become too wet. In a warmer country it could have been a desire to let the children become wet and cooled down.

10.4 Time management

The Define phase was shortened because we felt ready to move on to the Develop phase after only one week. The Develop phase, however, needed two more weeks than planned. This was because the prototype building of the Thirsty Monkey took much more time than expected, especially problems with CNC-milling and many small details that had to work. If the prototyping had not taken up so much time, we would have wanted to spend more time on really working through the manufacturing of the products.

If the project would run for a longer period of time we feel like the next steps would be:

- Finnish prototypes of all the products to let children play with. This would include connecting running water to the Thirsty Monkey to see how everything would work then.
- Evaluate the products with parents.
- Bring all the CAD models into an analyzing software to check the construction and find weak points.
- Contact some experts in child development in areas such as cognitive development, physical development etc. to find out their thoughts on the products.

10.5 Conclusion

The goals for the project, which were presented in section 1.3, are considered to be met. The products are developed based on an extensive user study and can be assumed to encourage the skills that were mentioned. The European standard as well as the internal regulations are followed and the products should be of no harm for the children.

We are happy with the result and believe that it could be a good contribution to the HAGS product line.

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Appendix A Time plan

The planned and actual time plan can be seen through the colors yellow and pink.

Table A.1 Time plan

Project week	1	2	3	4	5	6	7
Dates	9/1-13/1	16/1-20/1	23/1-27/1	30/1-3/2	6/2-10/2	13/2-17/2	20/2-24/2
Events		**Aneby Monday**				**Critical review (being opponents)**	
Phase	PLANNING	DISCOVER				DEFINE	
Planned activities		Literature about child development Who are the users HAGS design aesthetics Playground observations				Define a clearer brief Child development, list of goals Personas Find test people Function analysis/requirements	
Actual phase							

Project week	8	9	10	11	12	13	14	15
Dates	27/2-3/3	6/3-10/3	13/3-17/3	20/3-24/3	27/3-31/3	3/4-8/4	10/4-14/4	17/4-21/4
Events		**Aneby Friday**					Easter	
Phase	DEVELOP					DELIVER		
Planned activities	Develop concepts Do tests Build prototypes					Final user tests Detailing Making changes due to tests		
Actual phase								

Project week	16	17	18	19	20	21	22
Dates	24/4-28/4	1/5-5/5	8/5-12/5	15/5-19/5	22/5-26/5	29/5-2/6	5/6-9/7
Events					**Vacation**		Swedish National Day
Phase	Buffer		Write report			Prepare	**Presentation**
Planned activities						presentation	
Actual phase							

Appendix B Observations

Observation notes and pictures.

B.1 Neighborhood playgrounds

The smaller playgrounds was visited on several occasions during January - March 2017 and they were always deserted, resulting in in no notes being made. Some pictures of the product range was made.

Figure B.1 Playground in central Lund.

Figure B.2 Playground in Karlshamn.

Figure B.3 Neighborhood playground northern Lund.

Figure B.4 Water play in Lund.

B.2 Stadsparken in Lund

Stadsparken in Lund was visited at two times also on workdays, firstly at 9:30 and the second day at 10:00. Both times parents with young toddlers (around one year) and preschool classes was there playing. The observation was made from a bench not too far from the sandbox, and no notes were taken at the time to avoid the caretakers to feel uncomfortable. All notes were made after the observation.

When arriving to Stadsparken the first time, a preschool group of children was already there playing. The group was international (English speaking) with children of age 2-5. They played in two segments, first with the sandbox and the houses and secondly at the slide.

The sand play was naturally of special interest and three girls (around two years old) playing there were especially observed. The sandbox contained two sand tables from HAGS and a small sand rake (which someone probably had left behind at an earlier occasion). The distance was too long to be able to hear what they were saying,

but the play seemed to be to shove sand around on the table. One of the girls used the rake to shove with. After all the children had left the playground the molding tables were inspected and it was clear that the strainer in one of the tables did not work with the moist sand. All the sand was packed over it, hiding that it was even existing.

The attention of the observers was caught when a new, Swedish, preschool group of the same age arrived to the playground. The children were observed sharing all the playground equipment without problem, but did not really interact. Perhaps because they did not speak the same language.

A girl in the international group was standing out from the crowd. She seemed to be one of the oldest children and she was taking a rather 'bossy' role in the group. First she was playing with another boy in the sandbox (the previous mentioned girls had left at this point) and the only thing she did was telling him what to do. 'You have to sleep', she said. 'But I'm not tired', he replied rather whiny. 'Lay here!'. Later when all the children were playing at the slide she just sat on the top of the slide, telling the rest of the children when they could go down or not. Children of the other group used the slide as well while she was sitting there, but she did not interfere with them going down or not. It was clear that she only considered herself to be the boss over the children she already knew.

Two days later another observation was made at the same playground, this time at 10:00. The playground was less crowded this time and when a group of preschool children finally arrived they did not play in the sandbox which was the hope. Observing was not as rewarding this time, but a brief conversation with a mother was. Her child was 16 months old and they often visited playgrounds. He was very interested in other children, which was clear when the preschool group arrived. He immediately started following the other children. He did not play in the sand and the mother confirmed that he was not really interested in that. Water on the other hand was fun and especially the shower head.

B.3 Preschool visit

To be able to do more time efficient observations a preschool in Lund was contacted for an observation of their outdoor play. This way a large group of children was playing at the time of the observation. The group of children that were observed were of the ages 2 ½ - 5.

Two observations were carried out on two different days with a week passing in between. Both observations were performed during the after lunch outdoor playtime, but were started at different times; Thursday February 2 at 12.30-13.15 and Wednesday February 8 at 13.00-13.40. During both observation sessions the observers were sitting at two separate picnic tables with views of different parts of the playground. Interesting activity, play behavior or interaction between the children were written down.

The weather during the first visit was cold with a cloudy sky. The night before the second visit a 10 cm layer of snow had fallen resulting in quite different play conditions.

The children showed some interest in why the observers was sitting there writing, but largely the observation could be made accordingly to the Fly-on-the-wall principle.

During the first (and snow free) visit a better understanding of children's play pattern was established. Due to the observers little previous experience with young children, just watching the children play was of great importance. The different play patterns found in the literature study were recognized on the playground. Young children digging in the sand next to each other (parallel playing) as well as café role play and cooking food in the sand (pretend play) were observed.

Except for these general observations a few new insights were gathered that could be of importance for the design. The different characteristics of wet and dry sand were noted when a girl of about three years was trying to make the (wet) sand flow through a funnel connected to a 'sand (power) wheel'. When no sand would flow through the toy, and the toy had been examined upside-down, she eventually threw it away. This toy would probably have worked perfectly with dry sand, but in this case the girl gave up because nothing happened.

The different types of play in the sand could be summarized as mainly constructive play, such as digging, building, filling and emptying (buckets etc.) as well as moving the sand around. The play around a small 'shop stand' was observed as constructive but also pretend play as the children were baking 'cakes' and one girl (2-3 years old) was eating her 'pancake' from a small plastic frying pan. When the younger children (2-3 years old) were digging piles of sand or filling buckets they were sometimes observed doing this together, helping each other. The children seemed to enjoy digging together, however the play was considered rather unstructured, like parallel playing.

During the whole time of the (first) observation many children were walking around with shovels, even when they were not working on something in the sand. And when the children were playing in the sand, the majority of the time a shovel was used

instead of just the hands. This indicates that the loose toys are good tools to develop the play around the fixed play equipment (such as the ‘shop stand’).

Because of the weather change for the second visit to the daycare center different play conditions were observed. The first and most obvious difference that was seen was the different mood of many of the children. Some children were crying and saying that they were cold and wanted to go inside. This could be due to that the observation this time was started half an hour later meaning that the children had been out playing for a while already.

The snow day observation was not as rewarding in terms of understanding the sand or the regular play patterns. In general much less structured and ongoing pretend play was observed. The children were instead sledding down a small slope, going on the slide, swinging on the ‘birds nest’ swing or walking around. A few (younger) children were observed walking around seemingly daydreaming or just observing things in the surroundings. Interesting was however to see how fascinating or fun the children found eating snow. A few different personality types were also discovered or confirmed from the previous visit. The ‘needy’ child who wanted to be close to the teacher, the ‘troublemaker’ hitting and throwing things at his peers and different examples of ‘mini teachers’ explaining things to their peers were all found on the preschool’s playground.

It was noted that the caregivers mostly stayed in the background but emerged when someone was crying or screaming to help out in solving the problem. ‘But he did it first’ or ‘I played with it first’ were uttered at a few different occasions when the caregiver was trying to understand the problem.

Appendix C Interviews

Transcribed extracts from interviews. Things discussed during the interviews which are completely off-topic are excluded. Interviews are transcribed in Swedish.

C.1 Interview 1 (extracts)

"Elin"

Monday 6/2 9.15-9.50, took place on a playground.

Family: Husband and three children: son 13yrs, daughter 5yrs, son 1yr.

Vi börjar med att gå runt och hon berättar vad hon tycker om lekplatsen. Det första hon säger är att det är dumt att gungställningarna är på varsin sida av lekplatsen (för de stora vs små barnen). Mannen säger långt senare i intervjun att det kanske beror på att man velat sprida ut lekplatsen över hela det stora området.

(4:32) Vad gör du när du är här från 14-18? (Elin har just berättat om att folk kommer och går så barnen kan leka och leka hur länge som helst).

Allt möjligt. Pratar givetvis med andra vuxna. Men vi brukar göra sandkakor, och vi brukar leka café borta i sandlådan. Vi har med oss lite egna sandleksaker som vi leker mycket med. Här *(syftar på Kompan-lekhuset)* är perfekt att leka kiosk sen och sälja det man har gjort borta i bageriavdelningen, så här leks det mycket kiosk. Den är jättepopulär. Och den är smart. Jag kan sitta ner här en stund när jag ammar. Jag kunde sitta här och amma, men ändå vara med och leka. Någon gång när det har regnat har vi sprungit in här när det bara har varit dottern och jag.

(5:12) Hoppa studsmatta gör man ju litegrann och i det nätet kan man sitta litegrann som vuxen också.

(8:53) *Vilken är favoriten på lekplatsen?*

För femåringen är det nog den *(syftar på Kompankiosken)*..

(9:30) Vi pratar om vad som händer när det är flera barn på lekplatsen samtidigt.

De som är lite mindre tycker om det här att gunga tillsammans. Och sen så tycker jag att gungar en på den ena så inom fem minuter kommer någon och sätter sig på den andra för att vara tillsammans och sen börjar liksom lek. … Det är så fort en är på en plats så kommer andra. … Men här *(syftar på Kompan-kiosken)* kan det ju bli en del konflikter också. Sandlådan är ju så pass stor och man har gjort det här *(syftar på hags blombakbord med tre blad)* bra för man har delat in bordet i tre delar så alla kan få en egen flygel på den. …. Men här *(syftar på lekhuset)* blir det lätt konflikter för man vill sälja och man vill leka med den här lilla grytan och röra om och så. Det får man försöka hjälpa dem med. Att turas om liksom. Men den här är väldigt inbjudande. …. Man har rätt bra koll på området och barnen här. Vi känner ju nästan alla liksom. Så ser man att de *(alla barnen i området)* springer glatt dit.

(13:20) Sen har vi på sommaren en kolonilott. Där är vi jättemycket. Då kan vi vara här först en stund och sen så kan man bjuda hem folk. Jag har till exempel bjudit hem familjer som jag har sett ofta här men som jag kanske inte riktigt känner - men dom kan ju ändå komma och dricka saft på kolonilotten och leka där med lite vatten. För det är väl det man känner om barnen skulle leka här med vatten så är man ju inte så glad. Barnen springer ju oftast nakna eller underbyxorna. Känns inte riktigt bra. Där *(på kolonilotten)* är de ju mer skyddade.

Men vad gör ni när ni leker med vatten? Vad innebär det?

Det är allt. Jag och min dotter vi har det senaste lekt frisörsalong när vi har lekt med vatten. Nu är det ju inte alltid att vattnet är så rent beroende på vart man är. Men när vi har gjort sån vattenpool så har vi lekt frisör och hon har blött håret på mig längst ned och frisörtvättat. Men annars vattenlek - alla ungar älskar att leka med vatten. Vi har lekt en del på kulturens lekplats. Inne på kulturen så har dom en pump med vattenränna och det är ju också roligt. Och det är smart. Man är ju som förälder lite rädd - hur mycket vatten står det? Kan det hända någonting? Men med den blir det väldigt svårt *(för en olycka att hända)* för det finns en brunn. Visst dom kan samla på sig hinkar, men de orkar ju inte bära mer än en sandhink. Nej så att mycket med vatten är ju bra här för att till exempel om du ska bygga sandkakor och så, så behöver du ju vatten. Göra geggamoja är ju fantastiskt roligt. Det har man ju gjort i alla år tycker jag. Vad mer gör vi med vatten? *Dottern* är rätt glad över att tvätta saker. Det kan vara att diska sina sandlådeprylar. Det är ju inte helt fel. Till exempel när vi har vattenlekar på kolonilotten. Och även när vi har varit på ställen där det har funnits vatten på lekplatsen. Det finns ju få lekplatser som har vatten. Jag tror det ska finnas en ny i Hyllie som vi har blivit tipsade om.

(16:45) På frågan om barnen (1 och 5 år) leker något tillsammans pratar de först om gungorna ett tag. Sedan säger hon:

Den här lekplatsen, den är ju svår för olika åldrar tror jag, att leka med varandra.

(18:15) Pratar fortfarande om stora och små barn

Små barn, 1-5, man vill ju gärna att de ska leka tillsammans. Sen när det är lite större barn som kanske har lite häftigare lekar, och barn som har svårt att ge hänsyn till de mindre. Och de mindre (1,2,3 år) kanske kravlar rakt in i de storas vilda lek, det kan ju bli lite tokigt liksom. Så man har nog försökt attrahera gruppen 0 till 5-6 åt här. Därefter kanske man ska göra någonting annat. Det kanske hade varit smartare att dela upp det så att på andra sidan så är det för lite större barn, så att man som vuxen har lättare att hålla undan de små på en sida.

(19:00) Vad tror du att barnen har för lekbehov?

Framför allt (i de här åldrarna) att få kladda, skapa och greja med fingrarna... Men också kunna springa och röra sig… Större barn har ett behov av större äventyr. Det får vara något som är mer fartfyllt och har en annan form för fantasin… *(Pekar på motorcykelvippan)*: "Ja men det är en motorcykel och den leker jag med", det är kanske den basala grejen man behöver i den åldern… mer konkret. Men att det behöver ett större utrymme för att en sak ska kunna vara flera olika när man är äldre. Behöver mer utmaning.

20:20 Är det nytta eller nöje att besöka lekplatsen?

Både och. Det är fler barn idag än när vi var mindre som lider av övervikt. Det är ett ämne som ligger oss varmt om hjärtat i vår familj. Vår dotter har en övervikt, men har som sagt aldrig varit så jättemotorisk. Hon har varit nöjd med att sitta. Medan han *(sonen)* är jättefysiskt aktiv. Så för henne blir det ett sätt att komma ut och röra på sig ute. Vi är begränsade att röra på oss inne. Vi behöver röra på oss. Och att få frisk luft och vara ute. Och det är ett lättare sätt att träffa andra. När jag bodde i Malmö så gjorde vi ofta så på sommarkvällarna att vi tog med oss kvällsmaten ut på en lekplats där det fanns gräsmatta i ansutning. Och så tog med med oss allt ut och så fick barnen leka och vi satt och åt och barnen lekte och kunde sätta sig på filten sen igen och ta en frukt. Flera timmar kunde vi hänga där. Så där har du ju både nöje och nytta. Det finns nog hur många sådana exempel som helst. Det kan vara allt från att det är en solig dag och jag vill vara ute. Och barnen behöver vara kreativa. Detta är det som finns. Här finns inte mer. Det är inte bara att plocka fram nya saker ur leklådan. Kreativiteten är annorlunda här än hemma på ett helt annat sätt.

(22:00) Vad erbjuder lekplatsen?

Utrymmet. Och sen att de inspireras de av varandra (i leken). Ju fler barn här är ju mer inspirerade blir de.

Berättar om ett lekland de besökte härom dagen och var nästan själva:

Efter en stund så blev det att "jaha, nu har vi gjort det här". Hade det funnits lite större barn hade de kanske nyttjat på ett annat sätt. Och de hade blivit inspirerade av varandra. Det tror jag att man blir här (lekplatsen).

(22:48) Tar ni alltid med leksaker till sandlådan?

Jag har gjort så här på sommaren att vi har haft saker i hans vagn… Ska man åka längre bort så får man fråga "ska du ha sandlådeleksaker med dig?" så blir det ja eller nej.

(24:35) Vi frågar om vilka slags lekar barnen leker när dom är här.

De brukar leka att de här gungsakerna är hästar. Framförallt där uppe vill dom gärna ha en pinne och antingen vara häxor eller trollkarlar eller riddare. Oftast får jag då vara Gargamel eller nåt annat och pappa får vara ett troll. Sedan leker vi med glassarna också. Och bageri när vi gör tårtorna där (i sandlådan). Det kan vara väldigt många olika lekar på en dag och ibland är det bara en enda lek som varar jättelänge eller så kan det vara hundra smålekar.

Vad tror du gör att en lek varar längre?

Det beror på hur rolig den är och hur mycket den kan ge utrymme för att ha flera vinklar. Är det bara "kom vi går och gungar" så är det gungar vi gör medan det andra kan ge massa olika infallsvinklar som man kan utveckla. Ju mer frisinnad den är och ju mindre bunden den är till något desto längre kan den vara.

(26:00) Vi frågar om hon har sett dem leka annat än kiosk i det lilla huset.

Oh, ja. Här (vid ratten) så leker de pirater och Skepp och hoj. Och Pippi, då sitter nån på taket och så är det Kling och Klang som inte kan komma upp på taket. Och en koja i skogen. De bygger även en del här *(pekar på en koja av pinnar).*

(27:10) Hur ser det ut när din dotter börjar att bråka med ett annat barn?

Det händer väldigt sällan. Det har hänt typ en gång. Då är det oftast att man vill ha den andras saker. Då är det att "jag vill ha din hink". Det är sällan de bråkar om andra saker.

(29:16) Elin börjar självmant tala om vatten igen.

Ja och vatten här är ju annars svårt. Här finns ju ingen naturlig vattenkälla på något sätt. Utan då är det ju också så på sommaren om man tar med sig en vattenflaska att "får vi låna vattenflaskan?". Det vill de ju oftast faktiskt. Det kan vara så att dom vill spola rent något. Min dotter är väldigt noga med att det ska vara rent och städat och blir rätt frustrerad om det inte är det. Då vill hon spola rent där. Det är ju en sån sil där (i mitten av hags bakbord) till exempel. Eller att det är för torrt i sanden. Då går det inte att göra kulorna eller tårtorna. De har ju fattat det att det måste vara fuktigt. Oftast är det skugga under bordet och då är det helt urkarvat där under för de vill åt den fuktiga sanden. Men de vill också tvätta ruschkanan eller bara skvätta på varandra.

(30:55) Pratar avslutande en sista gång om HAGS bord:

Vi tycker att det är jättesmart. För det är lite så när man står och leker och så (puttar Julia åt sidan). Där har de väldigt tydligt sin avdelning. Det är pedagogiskt.

C.2 Interview 2 (extracts)

"Camilla"

Monday 6/2 13.30-14.20, took place at a café

Family: Two daughters: 13 yrs and 4 yrs.

(2:50) Vi börjar med att prata om lekplatserna i närheten av deras bostad och om det finns någon favorit.

Ja, den stora lekplatsen vid *stadsdel*. … Den är rätt stor och där finns ganska mycket. Sen är det en i närheten av … Skola. … Jag har ganska vilda barn så de tycker om när det händer lite. … Jag tror att de är roliga för att de känns utmanande. Och de känns ändå säkra för mig som förälder.

(03:20) Vad gör du på lekplatsen?

Jag är med och leker. Sen klättrar inte jag och så mycket. Men min fyraåring är lite vild och galen. Så därför får man vara med. Hon klättrar så högt hon bara kan och hoppar rakt ut i luften.

(04:00) Leker hon annan, mindre vild lek?

Hon tycker om att sitta i sandlådan också. Om man har hinkar och så med så har hon varit ett sådant barn som tycker att det är roligt i två timmar, inte bara en liten stund utan hon tycker verkligen att det är kul. Hon gör alltid affär och bakar kakor och leker restaurang och café. Hon är en duktig lekare. Och då får jag ju vara med. Då blir jag alltid kund. Men det är rätt aktiv lek.

Vi frågar om andra barn i sandlådan också får vara med i leken.

Ja, om de vill så är de med i samma lek. Det handlar väl om att jag inte är blyg så mina barn är inte heller blyga och bjuder gärna in andra. Vi har alltid hela kassen med sandleksaker med oss så då är det ofta barn lånar och så leker dom tillsammans. Det är ju bra för alla tänker jag, att man lär sig att dela med sig och så.

(08:22) Leker hon mycket själv på lekplatsen eller är du med?

Jag är indirekt med. Hon leker mycket själv. Oftast är det så att hon klättrar överallt där hon kan … och så brukar jag stå bakom henne så att hon inte halkar med vantarna. Så leker hon lite med hästarna, cyklar på cyklarna, hoppar hage, balansgång älskar hon. … Men hon klarar av allt. … Ibland kan jag känna att nu når

hon snart upp till en ålder då hon kommer tycka att lekplatsen blir tråkig eftersom hon är som hon är.

(11:20) Är det nöje eller nytta att gå till lekplatsen?

Jag tycker att det är mest nöje. Men det ingår ju en hel del nytta. Nu jobbar jag med barn så jag vet ju lite vad det …

Vad jobbar du med?

Omsorg, korttidsboende för barn med psykiska funktionshinder. Vi har barn där i alla åldrar upp till 13. Och det är ju både fysiskt och psykiskt utvecklande att leka. All typ av lek. Och en lekplats är ju mycket typ av motorik …

(12:27) Storasyster är en mycket lugnare unge och det har hon alltid varit. Hon har alltid tyckt att det har varit roligt att gå till lekplatser och leka och så också, men på en helt annan nivå. Hon har alltid tagit det lugnt, varit lite försiktig och lyssnat på sin mamma framförallt. …

(13:05) Var din andra dotter annorlunda tillsammans med andra barn?

Hon har inte tagit en lika självklar plats. Hon är mer hänsynsfull och försiktig. Kom det andra barn så lekte hon gärna för sig själv i alla fall, medan min lilla nästan tar för givet att alla vill vara med på det som hon tycker är roligt.

Hur reagerade andra barn på det?

Vissa barn är ju så, de brakar in. Då kunde hon vara ganska tydlig "nej detta är mina saker. Jag vill vara här" och som mamma försöker man ju säga att du kanske kan dela med dig när du är på lekplatsen, men samtidigt så är det ju rätt - man måste få sätta gränser också. Det är en svår balans. Och sen kunde hon till och med säga "nej, nu vill jag gå hem" när hon tyckte det var för jobbigt.

(16:30) Vad leks i sanden?

Göra sandkakor, sandslott, ja tillverka saker av sanden. Och det funkar lika bra om man har en tom pappersmugg och flaska som om man har hela kassen med leksaker med sig. Dom använder det som finns. Och har man inget så använder man händerna. Men ja, det är mycket tillverka, bygga och fixa.

Vad för saker brukar du ha med?

Mycket hinkar, spadar, formar och nån sån mölla. Jag har samlat allt i en kasse sen den stora tjejen var liten, så det har fyllts på. Vattenkannor och allt möjligt. Där är flera uppsättningar, så det är också tillåtande att barn kan vara med för där är säkert tio spadar i den kassen. Där är till kompisarna och alla andra. Sen det är ju kul att hälla, fixa och så.

Hur har sandleken ändrats?

Ja, den har ju ändrats eftersom hon har blivit större. Nu fixar hon ju det mesta själv. Hon har tyckt om att sitta i sandlådan sedan hon kunde sitta. Och då fick man vara mycket mer aktiv som vuxen och fixa och dona. Sen vet jag inte om det var något som hon frågade efter egentligen, utan det är väl mer som man är att "men kolla här vad man kan göra". Och nu är det mycket rollekar, så därför blir det ofta restaurang och café som hon leker. Det gör dom på dagis också. Det brukar hon berätta att "idag gjorde vi chokladkakor". Dom hittar på liksom. Det händer ganska mycket i den åldern - man tar ett rätt så stort kliv i förståelsen för omvärlden överlag. Innan var det mer gräva och hälla och det var roligt då. Nu ska allting ha en funktion på ett annat sätt. Vara nåt riktigt eller så.

(22:40) Är det en lek som varar över hela lekplatsen eller byter hon lek?

Nej, hon byter lek. Klättrar hon så kan det mycket väl vara så att då är jag en haj, som hon ska akta sig för. Men gungar hon så gungar hon bara. Det är lite beroende på vad hon gör, men hon byter lek. Det hinns med mycket.

(23:24) Leker ni med vatten?

Ja, det gör vi. Inte nu när det är vinter. Nu bor vi ju vid fina grönområden, så det blir en del vattenpistoler, vattenballonger och så. Jag vet inte om ni har varit där, men det finns ju en vattenlekplats i Kristianstad där vi kommer ifrån. … Den är rolig. Men det gäller att gå dit när det är varmt, för man blir blöt.

På vilket sätt är vatten med i bilden?

Det är byggt en sån ränna så att man får lite koll på hur vatten rör sig. Där kan man stå och ösa och stänga av och på och sånt. Sen är det nåt där det sprutar vatten ur marken. Sen är det lite så vattentema med sjörövarskepp. Sen kan dom väl inte ha, jag tror att det är säkerhetstänk, att man inte har något där vattnet samlas, utan vattnet rinner alltid bort.

Vad tycker hon om att göra där?

Den här där vattnet sprutar ur marken, om man ställer sig på utgångshålen så blir de andra strålarna starkare. Och då kan man ju spruta vatten på de som sitter på bänkarna runt omkring. Nu är det länge sedan vi var där, eftersom dels är vattnet avstängt på vintern och så kräver det att det är lite varmt. Men då (i somras när dottern var 3,5) var det mycket hälla och ösa för då var hon mindre.

(27:50) Vilka andra typer av föräldrar ser du på lekplatsen?

De föräldrar som jag kan reta mig lite på är de som sätter sig en hörna med sin kaffekopp och sen är barnen överallt. Och det ska dom vara, men barn klarar inte av alla situationer själva. Och då behöver de vägledning. Jag är inte alltid superaktiv i lekandet, men att man ändå alltid är i närheten och har lite koll.

(30:40) Känner du igen familjer på lekplatser?

Det är en familj på den där vanliga lekplatsen som det känns som att vi träffar varje gång vi går dit. Jag tror de bor väldigt nära. Annars är det olika.

(34:00) Vi pratar om vad hon känner kan vara problem med lekplatserna i sig.

Jag tycker att ganska ofta så riktar sig lekplatsen till en åldersgrupp. Antingen så är det en småbarnslekplats eller så är det för större barn. Och jag tycker att kombon, nu har jag ju barn i rätt stor åldersgrupp, men jag tycker kombon är bättre. Sen får man vara med som vuxen istället. För kommer man till en lekplats med ett mindre barn så kan det vara så att de gör första trappsteget lite längre upp för att de inte vill att barnen ska klättra upp, ja då får man ju stå där och lyfta hela tiden istället. Det finns inget barn som nöjer sig med att "du kan inte åka rutschkana idag för du är för liten för att komma upp". Sånt kan jag känna att då får man hellre vara med när de klättrar upp och se så att de inte står på huvudet ner.

Så det är viktigt att barn i flera åldrar ska kunna använda samma leksaker, ja. Sen är det en omöjlighet ibland. Men det är ju önsketänkande.

Vad tror du när olika åldersgrupper möts på samma leksaker? Vems nivå leker man på då?

Det kan nog vara olika. Jag tror att mindre barn kan härma större barn och att större barn kan sjunka till en lägre nivå, om man nu kan kalla det det, när det behövs. Barn är ju fantastiska på att anpassa sig om man bara ger dem en chans. Ibland känner jag att det är vi vuxna som styr in väldigt mycket att "såhär måste det vara", men varför då? Jag tror att det kan nog variera. Sen blir det nog att det kanske är majoriteten som avgör vem som styr mest. Är det många större barn så blir det de som styr mest och så får de mindre barnen hänga på så gott de kan. Så får de väl vara en lillasyster eller en katt eller något.

(36:50) *Är det något på en lekplats som gör din dotter arg eller upprörd?*

Alltså det är ju när hon inte kan använda saker som hon vill använda. Cyklarna på den där karusellen som jag pratade om, där har hon ju inte nått ner till tramporna. Och det är ju en frustration och det finns ju inget att göra åt det, så där har jag ju fått stå och knuffa så att hon har kunnat åka ändå. Men nu är hon så stolt för nu når hon äntligen ner och kan trampa. Eller som i stadsparken, den lekplatsen är helt underbar, men det är ingen som har tänkt på att där blir så jädra varmt på sommaren när solen står på, för den är helt öppen. Då kan man inte använda vissa saker för du bränner dig på rutschkanan till exempel. Och det är ju också så att det är frustration. Ja, det är väl mest om saker inte fungerar eller om man inte kan använda det. Då blir det ju lite så att "men varför är där nåt sånt som man inte kan göra".

(41:00) Vi börjar tala om hennes jobb

Vi går en del till lekplatsen i stadsparken … Vi var där senast i helgen. Och det är en bra lekplats för där finns möjlighet till lek för alla. Sedan tycker jag att den kräver mycket av en som vuxen, men jag köper det. Vill man inte det så behöver man inte gå dit. …

Har du något vi ska tänka på när vi designar lek för alla barn?

Det är väldigt skönt att gå till en lekplats där du kan köra ända fram till saker med rullstolar. För alla barn kan du inte lyfta ur och sitta och hålla eller vissa barn kan inte sitta själva över huvud taget och när dem då börjar bli 8-9 år gamla är de ganska tunga. Så det är väl en sådan aspekt.

Och hur är det med till exempel autism och sådant?

Vi har jättemycket autism hos oss, men även sådana som är multihandikappade. … Vi har allt.

Hur leker de på lekplatsen om det är autism då?

Det är lite olika, vissa autistiska barn vill inte leka med andra barn, för de uppfattar inte varandra. De kan inte förstå varför man ska ta hänsyn till varandra. … Men sen har vi även barn som leker tjuv och polis - som leker tillsammans. Och då är det ännu mer så att vi vuxna måste hela tiden vara närvarande och styra upp, för annars smäller det. De har inte det förhållningssättet till andra som vi andra har. Nu har vi ju en handikappanpassad så att du kan köra upp men rullstol till rutschkana, med en riktig trappa upp med räcke så att i princip alla kan gå upp själva. Men den är ju specialbeställd till oss. Vi har även ett sandbord så att de som sitter i rullstol också kan gräva, för det är inte alla barn som man kan sätta ner i sandlådan. …

(50:50) Hur många skulle du uppskatta har med sig saker till lekplatsen?

Inte jättemånga med tanke på hur många barn som lånar saker av oss.

Så om det är fem stycken andra familjer där?

Då är det jag och en annan familj som har saker med sig.

C.3 Interview 3 (extracts)

“Emilia”

Thursdat 9/2 13.40-14.50, took place at a café with the son present

Family: Husband and two children: daughter 7yrs and son 4yrs

(1:56) Hur ofta går ni till lekplatser nu för tiden?

Det är lite säsongsberoende. Ibland så stannar vi om lekplatsen på vägen hem. Säg en gång i veckan på vår och sommar… När vi har semester så är det nog 2 gånger i veckan. Nu: 1-2 gånger i månaden när det är vinter.

(2:50) Brukar du ha med dig båda barnen?

Ja. Antingen är det för att man har hämtat och så stannar man lite på vägen hem. Ibland om det är fint väder så kan man hämta lite tidigare … så kan man köpa en glass och sitta i solen.

(3:50) Hon pratar om att hon ibland har play dates med en annan familj.

Och har man en bra lekplats så kan båda barnen leka och tycka att det är kul och så kan vi sitta ner och snacka lite och ingen behöver städa eller fixa fika eller nåt. Och de allra bästa lekplatserna ligger så att man också kan äta lunch eller handla glass. För de här äter ju var 3:e timme.

(09:48) Vad tycker dina barn är roligast?

Gungbrädan är rolig. Jag förhörde dem lite i förväg vad de tycker att det ska finnas. *(Hon tar fram en lapp).* Gungor av olika sort, gärna sån dubbelgunga som man sitter två på, men inte bara för det är inte alltid man är två. Och sen en fågelbogunga där man kan vara flera. Sen gärna karuseller och olika saker man kan klättra på. Jag gillar sådant där man kan klättra på olika sätt. Och även för större barn. Klättergrepp eller rep man kan hålla i eller så.

Vi talar om vad det är som lockar med ovan nämnda saker. Så då är det något som inte finns hemma som man kan få på lekplatsen?

Ja. (Sonen ber om mammas uppmärksamhet). Så det är ju roligt. Sen är ju allting med fart kul - gungor, rutschkanor och även klättra. Nu har de ju vuxit ifrån sandlådor. Det är ju superviktigt när man är ett eller två, men är man mer än det så är det lite (tråkigt?), men det är ju också en sådan grej som jag är lite dålig på att ta med sandlådesaker. Det blir en sådan tröskel.. Då gör vi inte det, då åker vi hellre rutschkana. … Det fungerar bra på lekplatsen på gården. Då är ju alla husen runt och så finns det en liten lekplats på gården. Där fungerar det bra att ha sandlådegrejer, för de är ditlagda och alla vet att de är allas. Det är ingen som tar dem därifrån och det är hus som är runtom, så även om det inte är låst eller så, så försvinner de inte. Då kan man gå dit och leka med något och så kan man gå därifrån.

(13:30) Händer det att de leker med sandlådan hemma då?

Näe. Asså, om vi går dit så leker dem med det. Där finns ju inte så mycket annat att leka med och rutschkanan är för ettåringar. Det är mer om man går ut med återvinningen så kan man gå det hållet… Så har man varit ute en stund.

(14:05) Men om han hamnar i sandlådan, vad är det han leker då?

Oftast är det ju baka kakor eller bygga slott med såna formar som man vänder upp. Ibland så blir det café och så säljer de och så får man köpa på små löv.

(15:15) Hur fungerar det när det är andra barn på lekplatsen?

Alltså det är egentligen en av de klurigaste situationerna, för oftast är det både barn och föräldrar. Om det bara är barnen och de springer runt och leker så är det någon slags standard att det är dagisregler som gäller. Den som hade spaden har spaden tills den har släppt spaden. Man får liksom inte knycka grejer av varandra eller slåss och bitas och sådär.

(17:55) Men leker han tillsammans med andra barn (om storasyster inte är med)?

Då brukar han se ut någon som han tycker är rolig ut och så går han fram och säger "Hej jag heter Ola". Eller så vill han att de ska åka pulkan samtidigt. Men det är ju inte när man är yngre än såhär. Lite mer blir det ju som den i Stadsparken där de har en sån jättestor snurra, där man får plats typ 5-6 barn uppepå och det behövs någon som snurrar den runt. Då blir det lite mer så "Var det nån som ville gå av", "Är alla med nu", "Är det lagom fort?", "Nej, jag vill lite långsammare".

(19:15) Varför går ni till lekplatsen?

Asså oftast så går vi till lekplatsen för att vi behöver lite mer plats än hemma. Vi behöver liksom sprida ut oss lite mer, springa av oss lite. Att vi klättrar på väggarna inne. Ibland för att vi tycker att vi har sett lite för mycket på TV eller sådär. Vi behöver komma ut och det behöver hända nåt liksom.

(20:05) Är ett lekplatsbesök nytta eller nöje?

Det är nog nästan mer nytta än vad det är nöje. Det blir en skönare känsla i kroppen, det blir en trevligare stämning - lite som man kan känna sig efter att man har tränat. Man har varit ute, man har fått lite sol och man har också gjort något tillsammans. Det är ju alltid en massa måsten hemma. Man ska diska, man ska laga mat, det ska ätas jämt och det är lätt att den ena roddar barnen och den andra gör något praktiskt. Så lite grann är det en microutflykt. Och så kan man bestämma tillsammans "vilken lekplats tycker ni idag?". … Ibland på sommaren kan det vara så att, ja vi har åkt till safarilekplatsen i Malmö utan att vi skulle göra något annat den dagen. Utan för att vi har en ledig dag och behöver hitta på någonting, så då kan vi ju åka till en lekplats. Vi kan cykla till lekplatsen vid Höje(?)å och ha med oss picknick. Då kan man ta en pyssla-och-fixa-dag innan och en efter och så har man gjort en utflykt. De är små, det behöver inte vara större än så.

(21:56) Vad tror du att barnen lär sig på lekplatsen?

Dels så är det ju mycket balans och sånt. Och klättra runt och balansera och klättra på olika stubbar. Sen så är det ju lite turtagning och så. Men det är det ju mera på

förskolan än på lekplatsen. Sen tror jag också, att bli lite modigare. Att man klättrar lite och ser nån annan som gör det och så vill man testa och så vågar man det.

(23:15) Vad är din sons relation till vatten?

Han älskar vatten. Han tycker det är jätteroligt med vatten. Han vill gärna plaska, tycker om att stå vid diskbaljan och slabba med olika hushållsgrejer medan man är i köket. Vi har en koloni, så då gjorde vi en sådan balja så att man kan känna på olika stenar och hälla vatten och flytta båtar och sånt. Det låter som att jag överdriver, men en och en halv timme utan vidare.

Har ni varit på en lekplats som har vatten i anslutning?

Ja, vi har varit någon gång på Pildammen i Malmö. De har på sommaren olika vattenfall med luckor som man kan sätta i och dra upp. Men annars skulle jag säga att det är en outforskad nisch.

Vad är det du tror att han tycker är spännande med just vatten?

Jag vet inte. Jag tror att det är lite som eld - alla blir fascinerade egentligen. Men sen är det nog lite, om ni tänker att ni vill jobba med lekplats och vatten, att föräldrar är ganska nojiga. Är det stillastående vatten som är djupare än så *här (visar ett par cm med fingrarna)*.. Det kan ju vara lugnare att ta barnen till en lekplats där man själv kan sitta ned och dricka kaffe. Så att det är nog en utmaning om man vill göra en lekplats som folk väljer att gå till. Speciellt om man har med sig mer än ett barn så är det omöjligt att ha koll på dem på den nivån som krävs nära vatten.

Om man skulle sätta dit en kran på en av de vanliga lekplatserna, vad tror du är det första som skulle testas?

Först vill man ju plaska under. Sen om man tänker att man vrider den så att vattnet landar på olika material så att det blir olika när man plaskar så är ju det hysteriskt kul. Att man kan plaska på olika saker. Och sen vill man ju känna, och sen gärna se hur det blir om det kommer på byxorna så byter ju det färg. Det är ju jätteroligt. Sen vill man ju fylla olika saker med vattnet, och så vill man hälla. Kan man då hälla så att något snurrar eller låter så är ju det timtal *(av lek)...* Jag tycker att det verkar jättekul...I konsthallen i Malmö har de ju såna fontäner.. Som liksom bubblar upp, då ser man ju alltid småbarn som lämnar kläderna i vagnen och springer runt.

(31:10) *Vad föredrar du som förälder - att det finns flera likadana så att det blir mindre bråk eller att det finns mycket olika saker att utforska?*

Jag tycker nog att det är idealt om det finns 2-3 av varje kanske. För då kan man leka ihop med sin kompis eller några stycken och då kan man göra samma sak. Men det finns också andra saker att göra. Finns det tio gungor bredvid varandra så har man gungat färdigt så har man. … Gärna bra gångar mellan olika saker så att det är enkelt att komma runt och upptäcka, för en del barn är jätteblyga och börjar att leka

på ett ställe och tittar liksom inte vidare om det finns något annat. Så gärna bra ingångar till lekplatsens olika delar.

(32:26) Hur är de blyga barnen?

De vill ju gärna leka så att de ser föräldrarna. Sen vill ju jag som förälder kunna retirera lite, speciellt om man är föräldraledig och man har varit hemma (hjälper Oscar) kanske uppmuntra att leka med någon annan eller leka lite själv och se vad som händer.

(33:18) Vad brukar du som förälder göra på lekplatsen? (Senaste gångerna)

Senaste gångerna har vi varit i Stadsparken och där brukar jag spela Pokémon. Så då brukar jag stå bredvid och hålla ett öga på det hela och så fångar jag Pokémon samtidigt. Nu får jag väl inga "föräldra-awards" men det är så jag gör.

Och då springer de runt och leker eller?

Ja, då springer man med. Och så om han klättrar upp i något hus då ska jag stå och vinka när han tittar ut med jämna mellanrum.

(37:55) Vad ser du för skillnad i vad dina olika barn har intresserat sig för?

Ja, Ola är mycket mer sugen på grejer som är piratiga eller biliga. Om det är grejer som ser pritaiga ut eller om det finns att det ser ut som att man kan styra någon del, så tycker han att det är roligare längre. Men Anna är egentligen klättrigare. …

(39:30) Sonen får telefonen för att hålla sig sysselsatt

(42:10) Vad jag tittar på när jag väljer lekplats det är lite gränser kring och gärna inte för många utgångar kring lekplatsen. …

Så när du väljer lekplats så tänker du mycket på trygghet och säkerhet?

Ja, av de som är roliga. …

(45:30) *Vad är det som sandlådan inte har som andra, roligare, leksaker har?*

Jag tror att det är mycket fart. Det är roligt med saker som snurrar, med saker som man kan klättra och rutscha på. Också gungor. Sandlådelek är lite lugnare. Just nu känns det som ett mellanläge. Han tycker inte att det är roligt att leka där själv, men det kan vara roligt att leka med någon annan där. Att göra café eller nåt sånt. Att bara gräva är inte så roligt. Då skulle det nog behövas något annat som händer. Att man kan bygga slott eller torn eller att det fanns mera hint om sånt. Det plockas lätt upp om det är några kompisar som har med sådana byggsatser som är hörn som man kan sätta ihop och göra fyrkantiga borgar och så kan man göra torn. …

(47:45) Lite oklart om fortfarande hon pratar om sandlådan eller något annat här:

Själv tänker jag mest på att det lätt blir lite äckligt. Att det står och så blir det fimpar och gamla löv. Det behöver vara en väldigt robust och lite självrengörande.

(49:00) Vad ser du för andra typer av föräldrar?

Det första jag tänker på är sådana här jättesportiga föräldrar, som genast måste visa att de kan hoppa högre än barnen eller gå armgång. Det är nog mest för att jag retar mig mest på sådana...

Sen finns det alltid en hög med rätt så sjåpiga föräldrar "Oj slog du dig? Hur gick det? Aaah".

(53:55) Är det många pappor som brukar vara på lekplatsen?

Ja, men de brukar interagera mycket mindre med andra föräldrar än vad mammor gör.

(55:15) Är lekplatsen mer aktivt eller vila?

Jag tycker att det blir mer vila även om vi gör något, så gör vi något annat. Det är skönt att komma ut och det är skönt att göra något annat än att gå hemma. Om man kommer ut lite så får man lite frisk luft och man behöver inte titta på saker som man hade tänkt att man skulle hinna hemma. Och så tycker jag att det blir en paus rent mentalt. Nu är ju mina barn så stora att de kommer och säger till om de slår sig och så. Det gör det ju jättemycket lättare. När de var mindre kunde det ju vara så att man fick gå bakom hela tiden och när som helst vara redo att fånga upp dem.

C.4 Interview 4 (extracts)

"Knut"

Wednesday 15/2 10.00-10.35, took place at a café and son 10 months was with

Family: wife and two children: daughter (almost) 4yrs and son 10 months.

(1:25) Hur ofta går ni till en lekplats?

4-5 dagar i veckan på vintern och på sommaren är det i princip varje dag.

(1:45) Går ni till den närmsta lekplatsen?

Vi går väl oftast till den som är närmst, för det är också den som är i anslutning till att man hämtar på förskolan. Och då har man inte så mycket tid och energi. Så då är det lättast att gå till den som är närmast. Men det påverkas också av en sån sak som att våra kompisar, eller bekanta på förskolan, som man slår följe med…. Så slår man följe åt ett håll... Så det är inte bara det praktiska utan även det sociala påverkar

valet. Man går hellre till en lekplats där en familj befinner sig som man känner, speciellt vuxna som man kan konversera med jämfört med att gå till en lekplats där slumpmässiga personer befinner sig eller kanske inga alls.

(04:26) Vi pratar om vilken som är favoriten av lekplatser

Om det är så att "nu ska vi vara på lekplatsen i två timmar" då går vi gärna till den som är nybyggd och är vid kommunhuset i Bjeredsparken vid kommunhuset Kristallen. Den är väldigt väldigt öppen och man kan springa därifrån när som helst, men det händer nästan aldrig för det finns så mycket att göra. Man tröttnar inte på det utan man springer liksom till nästa sak istället för att springa ut på gatan. Så det är bra.

(05:50) Vad tror du att din dotter tycker är det roligaste med att gå till lekplatsen?

Ja, det är ju jättesvårt att svara på. Men det är ju ett litet äventyr. Och så är det ett avbrott från där hemma. Jag tycker att man kan se det på beteendet hemma. Om det är eftermiddag och man inte har varit på lekplatsen så ser man det på att hon är mer vildsint och springer omkring och slänger sig och… Det beteendet som hon utövar, som hon behöver göra, hon gör det hemma fast om hon har varit på lekplatsen och klättrat i två timmar. Det är liksom något grundläggande behov av att vara fysisk. … Det som jag tror att hon ser fram emot det är de grejerna att klättra, att utmana sig själv och vara lite fri från föräldrarna. När man kommer upp där så är ju inte jag med. Jag ser ju vad hon gör, men är inte med och jag styr och kontrollerar inte henne, utan hon får frihet. Sedan tror jag att hon känner att hon står inför en utmaning och klarar hon av den utmaningen så tror jag att hon på någon nivå tycker att det känns skönt. Hon kan ju inte uttrycka det själv, eller varför skulle hon annars vilja klättra i två timmar och sedan inte vilja gå hem när jag säger att nu ska vi gå hem. Det måste ju vara något som hon tycker om med det. Det är ju inget grupptryck som säger åt henne att nu ska vi vara här och klättra på den här klätterställningen i två timmar. Det är ju nånting som hon uppenbarligen gillar. Sen vet jag inte om det är något som jag har planerat eller så, men jag upplever inte att det är så.

(07:54) Hur möter din dotter andra barn?

Om det är många andra barn så känns det inte som att hon tar någon särskild notis, då håller hon sig för sig själv. Men om det är ett fåtal andra barn som är i hyfsat samma ålder och som verkar vara lite intresserade av samma sak eller rör sig i närheten, då kan hon närma sig dem lite försiktigt. Om det är någon hon känner tex från förskolan då är hon ju mycket mer kontaktsökande med dem, vill vara med på vad de håller på med. Då frågar hon mig "Vad gör han?" Vad vill han?". Den stora skillnaden är om det är många eller få eller någon som hon känner sedan tidigare.

(08:55) Kan hon tycka att det är jobbigt om det är många andra där?

Näe, hon bryr sig inte om det så särskilt mycket. Det ska vara väldigt väldigt många barn på en väldigt liten lekplats i så fall. Och om de kanske är tre år äldre eller så. Jag tänker att om det är en skolklass på en liten lekplats med två gungor och en rutschkana. Men annars bryr hon sig inte om det liksom.

(9:35) Uppstår det konflikter mellan barnen?

Det gör det. Jag skulle säga att mest konflikter är det om en person tex vill åka ner för rutschkanan och så vill en annan person klättra upp för rutschkanan nerifrån. Så kan det bli konflikter. Alla grejer som är begränsade…. Om det finns en lian och fem gungor så är det ju tävling om lianen för då blir den ju väldigt åtråvärd eftersom det bara finns en… Det som är exklusivt blir åtråvärt.

(11:10) Min dotter är knappt 4 och hon är inte direkt den mest socialt utåtriktade personen.

(12:10) Brukar ni ha med er sandleksaker?

Ja, det brukar oftast ligga i vagnen lite granna. Nu på vintern är det ju inte så mycket, för ibland är det ju fruset och sådär, men det ligger i princip en spade i vagnen året runt. Det är alltid bra att kunna ta fram.

Vad mer för saker har ni med er?

I lekväg så brukar man ha med sig en hink och en spade. Det är inte mycket mer än så. På sommaren kanske det är tre hinkar och tre spadar.

Hur många andra skulle du säga har med sig saker? av fem

Av fem andra familjer.. På sommaren är det säkert tre av dem som har med sig sandleksaker om barnen är i den åldern. Men på vintern är det inte många som har det. Det förväntar man sig inte att kunna använda så mycket.

(13:10) Leker din dotter något med sanden nu? I den åldern hon är i nu alltså, inte nu som i vintern.

Jaja, absolut. Och det händer även på vintern. Om hon kommer till ett ställe och hon inte har något att göra och så har någon glömt en spade så prövar hon ju sanden, men ja hon leker absolut. Och det är mycket mer det här att hon härmar matlagningen hemma och det blir liksom inte bara såhär att "nu ska vi göra en kaka" utan hon är mer "nu ska vi göra en sån här grej och ska vi först ha socker och sen ha mjöl" och sådär. Det blir mer seriöst liksom. Om hon har varit med och lagat i köket eller om hon har tittat på. Då härmar hon ju mer detaljerat.

(14:05) Varför besöker ni lekplatser?

Det känns som att det behövs. Det känns bra. Dels är det något man kommer ihåg från när man själv var liten och dels känns det som att barn behöver aktiveras. De

kan inte bara sitta inne. Det blir väldigt lätt Barnkanalen. Då känns det bättre att man är ute och rör på sig. Det är friskare och hälsosammare att göra det. Och om man är föräldraledig och inte har folk att hänga med så kan det vara en social grej för föräldrar att träffa andra. Men framför allt är det ju för barnens skull.

(15:10) Skulle du säga att ett lekplatsbesök är nöje eller nytta?

Det är både och. Det kan man ju inte dra någon gräns liksom. Det är kanske mer nöje för barnen och mer nytta för föräldern. Barnet tycker att det är väldigt roligt att vara där. För föräldern finns det eventuellt någon att prata med. Det är trevligt. Och dels så blir barnet lugnare när man kommer hem än om man bara sitter hemma och tittar på tv, bygger med klossarna och läser en bok och ritar lite. Då kan det komma rastlöshet framåt eftermiddagen om man inte har varit ute och rört på sig. Så det blir lugnare för alla där hemma om man har rastat av barnet.

(16:12) Vad kan barnet tänkas lära sig på lekplatsen då?

Det kan vara precis vad som helst… Sociala interaktioner, vänta på sin tur, man ska vara försiktig så man inte klättrar längst upp och trillar ner…. Kroppskontroll… Om man ser en fågel, man ska inte jaga en fågel, man ska vara snäll mot djuren… Sol och regn och snö och naturen… Klimat.

(17:20) Vad gör du som förälder när ni är på lekplatsen?

Jag brukar ju först och främst se till så att mitt barn inte skadar sig. man övervakar dem så att de inte så.. Sen så försöker man ibland tutta ihop barnen så "se där är Kalle från förskolan" om hon inte upptäcker det för att hon är helt inne i något. Så vet man ju att hon tycker ju om att leka med den personen. Sen ibland så får man ju liksom styra bort konflikter eller, det är inte så särskilt vanligt eller så, men om det är några som håller på och gruffar och knuffar eller så, så får man kliva in. Men det är ytterst sällan. Det brukar oftast räcka med att man säger "på den här lekplatsen får man vänta på sin tur" och då brukar dom rätta sig efter det. Sen gör man ju alla möjliga typer av bestyr, man byter blöjor, matar, serverar vatten. Och sen kan man ju medge att man ibland kollar på mobiltelefonen. Om jag är på lekplatsen med äldsta barnet och mamman är hemma med yngsta barnet, då sms:ar man ju om vad man ska gå och handla och planerar måltider eller sådana grejer. Man försöker ju inte stå och glo ner i mobilen hela tiden, men ibland måste man göra det och ibland är man väldigt uttråkad och då händer det att mobilen åker upp även om det inte är så praktiskt. När barnet blir äldre känns det som att det är lättare att man gör det för att barnet klarar sig själv. Men samtidigt känns det som att riskerna är större med ett äldre barn. Ett äldre barn kan, om man kan klättra upp fem meter i klätterställningen eller om man kan klättra upp tio meter i klätterställningen, då blir det väldigt allvarligt om någonting händer. Med ett litet barn händer det inte så mycket. Där

kanske de skadar sig oftare istället. Jag vet inte. Men framförallt så håller man ju koll på barnen och sköter saker och ting så att det ordnar sig.

(19:44) Finns det något tillfälle som du har varit med i leken?

Det finns det. Man försöker engagera barnet. Om hon sitter för sig själv och gör sandkakor så försöker man ställa lite frågor: "Hur tänker du nu?" "Vad ska vi göra där?". Eller om man jagar varandra. Om man åker pulka så kanske man åker båda två på en pulka.

(21:24) Vad har din dotter för relation till vatten?

Hon tycker det är fantastiskt roligt. T.ex. efter maten så säger jag att hon ska gå och tvätta händerna, då kan hon lätt gå in och ställa sig i badrummet och bara plaska med vattnet som kommer från kranen. Det kan hon stå och plaska med i 45 minuter utan problem. Och stå och hälla med olika muggar och hinkar. Hon älskar att bada till exempel, på sommaren om man åker till stranden.

I vilka sammanhang leker hon med vatten?

Hon leker i badkaret. Där har hon olika hinkar, figurer och båtar. Hon leker gärna med duschslangen. Hon har en uppblåsbar pool… Hon hoppar gärna i vattenpölar. Allt där man gör något som kan få någon effekt.

(28:27) *Om det fanns en kran på en lekplats, vad tror du skulle hända då?*

Jag tror att den skulle vara igång, väldigt, väldigt, väldigt mycket. Och jag tror att barnen skulle tycka att det var jätteroligt och jag tror att föräldrarna skulle tycka att det var jättejobbigt, för det skulle vara många blöta barn. Vintertid skulle det leda till många blöta kläder som sen skulle vara väldigt kalla. Sommartid skulle det nog va lite kul, men ja, det är svårt.. Det, nja.. Det skulle gå väldigt mycket vatten. Det kan man ju diskutera såna grejer, som ska man lära sig att slösa med vatten? Men barnen skulle tycka att det var jättekul.

(31:33) *Hittills har vi bara pratat med mammor, tror du att det finns något som du har ett annat perspektiv på?*

Det är mycket, mycket, mycket möjligt. Det här är andra gången som jag är föräldraledig och nu är han 10 månader. Min fru har ju sett ett helt annat perspektiv för hon har varit på lekplatsen med barn som är mycket yngre. Då får man ett slags annan syn på behov, interaktioner och sådant antar jag. Man är nog mer aktiv i leken när man har ett yngre barn. När man sitter och gör kakor med ett litet litet barn än när man har en treåring som vill bestämma allting själv. Sen vet jag inte. I vårt samhälle är det ganska tydligt att män och kvinnor präglas olika, så det är många grundläggande grejer som skiljer sig antar jag utan att specificera närmare.

(35:00)

I Bjeredsparken i Lund som är en av de nyare lekparkerna i Lund, i alla fall i centrala Lund, där finns det till och med en skopa. Den är väl i storleken av en termos eller något sånt som sitter fast så man kan inte ta bort den. Så om man kommer dit tomhänt eller fattig, så finns det alltid nånting som man kan använda. Det är något väldigt positivt upplever jag.

Även om den är så stor som en termos, känns det som att barnen kan använda den bra?

Inte jättebra, men alltså min dotter är 3, ska snart fylla fyra. Hon kanske inte använder den jättemycket. Hon använder mer nättare spadar. Men barn som är lite äldre än vad hon är, alltså en femåring använder den utan problem. Det känns som något nyskapande som absolut inte fanns när jag var liten. En spade i en kedja eller vad man ska säga.

(36:19) I Folkets park i Malmö så finns det väldigt bra möjlighet för vuxna att sitta och leka tillsammans med barnen, typ små pallar och bänkar. Så det är hyfsat bekvämt men man behöver inte sätta sig med kavajbyxorna i sanden.

Appendix D List of requirements

List of requirements: checklist for generating requirements

D.1 List of requirement: Structure (step 1)

Pugh's checklist for generating design requirements is used, but adjusted to fit the project delimitations.

1. **Performance:** What main functions does the product need to fulfil? What functional properties should it have?
2. **Environment:** What kind of environmental influences does the product need to withstand during use?
3. **Life in service:** With what intensity will the product be used?
4. **Maintenance:** How will it be kept functioning?
5. **Size:** Are there boundaries to the size of the product due to use?
6. **Aesthetic, appearance and finish:** Which preferences do buyers and users have? Should the product fit a house style?
7. **Materials:** Should certain materials (not) be used (because of safety or environmental reasons)?
8. **Standards, rules and regulations:** What standards, rules and regulations (nationally and internationally) apply to the product? Should standardization within the company or within the industry be taken into account?
9. **Ergonomics:** What requirements result from observing, understanding, handling, operating (etc.) the product?
10. **Safety:** Should specific precautions be taken with regards to the safety of users and non-users?
11. **Societal and political implications:** What opinions are currently in society concerning the product?

Areas not applicable within the project scope:

- Target product cost
- Transport

- Packaging
- Quantity
- Production facilities
- Size and weight (related to production and transport)
- Product life span
- Reliability/failure
- Storage
- (Quality)Testing
- Product policy
- Product liability (mistakes)
- Installation and initiation of use
- Reuse, recycling

D.2 List of requirements

Requirements that must be fulfilled by *all* concepts are marked with (demand). Requirements that must be fulfilled by *at least one* concept are marked with (desire).

Performance: What main functions does the product need to fulfil? What functional properties should it have?

- Encouraging the child (age 2-5) to play with sand and/or water (demand).
- Allowing children to play independently (demand).
- Allowing children to play together (demand).
- Encouraging parent to join in play (desire).
- Promoting play between children of different ages (desire).
- Encouraging pretend play (desire).
- Offering adventure and/or challenge in play (desire).

Environment: What kind of environmental influences does the product need to withstand during use?

- Can withstand all seasons of European climate (demand).

Life in service: With what intensity will the product be used?

- The product will be used by small children, but can withstand use from an adult (demand).

Maintenance: How will it be kept functioning?

- The product expected to be inspected by procreator, but seldom cleaned and/or fixed (demand).
- Light contamination, such as sand, soil or leaves should be able to be removed by the user (adult rather than child) (demand).

Size: Are there boundaries to the size of the product due to use?

- The product can be used by a child age of 2-5 (demand).
- The product can (to some extent) be used from a wheelchair (desire).
- The product can be used by a child with a mental development corresponding to a child age of 2-5 (desire).

Aesthetic, appearance and finish: Which preferences do buyers and users have? Should the product fit a house style?

- The product should fit with the HAGS design aesthetics (demand).

Materials: Should certain materials (not) be used (because of safety or environmental reasons)?

- All materials used should be non-toxic (demand).

Standards, rules and regulations: What standards, rules and regulations (nationally and internationally) apply to the product? Should standardization within the company or within the industry be taken into account?

- The product should follow the SS-EN 1176-1 standard (demand).

Ergonomics: What requirements result from observing, understanding, handling, operating (etc.) the product?

- Visual contrast should be high, especially for items sticking out (demand).
- No parts should require more than a child's force to be moved (if movable) (demand).

Safety: Should specific precautions be taken with regards to the safety of users and non-users?

- Safety regulations mentioned in SS-EN 1176-1 should be applied (demand).
- The product should be trusted by parents (demand).
- Follows HAGS internal water safety regulations (demand).

Societal and political implications: What opinions are currently in society concerning the product?

Use of water (when water is used) should not be experienced as wasteful (demand).

Appendix E Personas

Personas portraying four children and two parents.

E.1 William

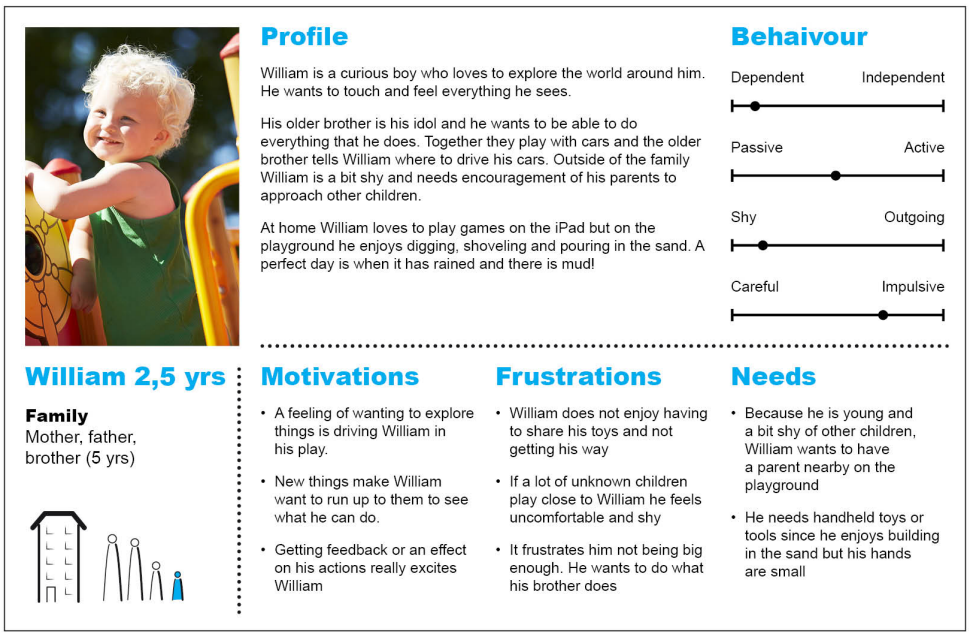


Photo provided by HAGS Aneby AB.

E.2 Alice

Profile

Alice loves going to the playground. There she can play with all sorts of different things and there is a lot of new children to play with.

She can play for hours - either with other children or by herself, but the play itself is constantly changing. Her favorite thing to play is to mimic everything she sees her mother doing in their daily life - cooking, cleaning and taking care of Alice. The dolls usually has to be the children in Alice's play.

Alice also enjoy playing in the sand. It's perfect for creating things or baking cakes.

Behaivour

Dependent — Independent

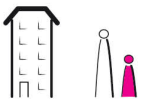
Passive — Active

Shy — Outgoing

Careful — Impulsive

Alice 3 yrs

Family
Mother



Motivations

- Alice feels proud when she can show that she has mastered something new
- Seeing other children play creates a spark in Alice to try herself
- The chance to play with other children makes her curious

Frustrations

- Not being able to use or understand a toy because it is too difficult
- Having to wait. Either for her turn or for something to be ready
- Not getting her way or someone breaking 'her rules'

Needs

- Alice sometimes needs alone time. She can get tired of interacting with a lot of other children
- She needs the attention from her mother and other adults. She is not used to sharing the attention with others

Photo provided by HAGS Aneby AB.

E.3 Noah

Profile

Noah is the middle child in his family. He plays a lot with both his older brother and younger sister. He also enjoys playing with his friends from preschool, but he rarely tries to play with children he doesn't already know.

He likes to tease his friends, just like his older brother does with him, and he is known by the preschool caretakers as the 'Troublemaker.

He likes physical activities such as climbing and running around, but he also likes to play adventurous role play where he and his friends are pirates. When he's playing more calmly, it's usually work-imitating role play

Behaivour

Dependent — Independent

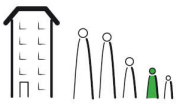
Passive — Active

Shy — Outgoing

Careful — Impulsive

Noah 4 yrs

Family
Mother, father, brother (7 yrs), sister (2 yrs)



Motivations

- Noah likes going to new places that offers things he can't play with at home
- It is important for him to try pushing the limits in all sorts of ways
- Impressing others with his skills makes Noah feel good about himself

Frustrations

- It is difficult for Noah to sit still for a longer time
- He wants to play wildly and need lots of space, therefore it is frustrating for him to be indoor
- Being a 'troublemaker', Noah often gets blamed for things. This makes him upset

Needs

- Noah needs a lot of physical activity and needs to be challenged through the play
- Because he can play wildly and sometimes cause conflicts with friends, he needs adult supervision while playing

Photo provided by HAGS Aneby AB.

E.4 Elsa

Profile

Elsa loves playing by herself with no one or nothing interfering. At preschool or the playground her autism makes it difficult for her to understand the other children. For this reason it is necessary for Elsa to have an adult around at all times.

She likes building things and she sets up a goal or a purpose. For instance she wants to build as high as possible or as long as possible. She also enjoys organizing things such as lining up or sort based on appearance.

Elsa's favorite animal are bunnies and she loves everything with bunnies on it.

Behaivour

Dependent — Independent

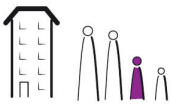
Passive — Active

Shy — Outgoing

Careful — Impulsive

Elsa 5 yrs

Family
Mother, father, brother (1 yr)



Motivations

- Getting feedback or an effect from doing something is fun. She wants to experience it again
- She loves the swings and the feeling in her stomache
- Playing with toys that can move, and do so in a repetitive way makes her feel happy and peaceful

Frustrations

- Situations with other children are difficult since she does not understand how or why they do things
- She does not like when something is too big for her to use or reach
- Other children playing with something she wants to use. Then she stays away

Needs

- Elsa needs to feel like she has control, nothing or nobody random will interfere. She knows what will happen
- She needs her own personal space. That is when she can truly engage in the play without distractions or other children

Photo provided by HAGS Aneby AB.

E.5 Sara

Profile

Sara is the mother of a three year old boy. She is working at Cervera as a saleswoman and she loves her job.

She spends a lot of time playing with her son. Both at home and at the playground. At the playground she even prefer to join the playing more than sitting on a bench. Partially because she's not very interested in small talk with other parents, but mainly because she's always a little nervous that his son is going to hurt himself while playing.

Behaivour

Worrying — Calm

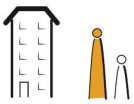
Passive — Involved

Socialize — Alonetime

Troubled — Happy

Sara 28 yrs

Family
Son (3 yrs)



Motivations

- After a visit to the playground Sara's son is much calmer at home
- Getting fresh air is something she finds important for both her son and herself
- Sara wants her son to be around other children as much as possible, to develop his social skills

Frustrations

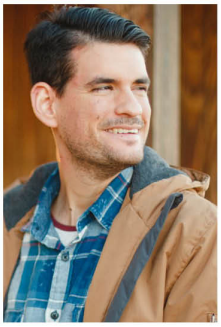
- Sara is always afraid that her son will get hurt. She wouldn't go to a playground where he doesn't feel safe
- A dirty playground makes her feel uncomfortable

Needs

- Living in a small apartment is important for Sara and her son to go outside and get more space
- Sara is often very involved in her son's play and she need space for that to be possible

Photo collected from StockSnap.io. Photographer: Jay Wennington.

E.6 Emil



Profile

Emil is working as an engineer, but is currently on parental leave with his daughter. It is his second time on parental leave and this time it was not as overwhelming the first few weeks.

He often takes his children to the playground after picking up the son from the preschool. When his daughter is with him at the playground he has to follow her around all the time, but when it's only him and his son, Emil prefer to sit on a bench and watch him on a distance.

Behaivour

Worrying — Calm

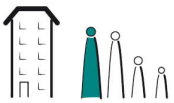
Passive — Involved

Socialize — Alonetime

Troubled — Happy

Emil 34 yrs

Family
Whife, son (4 yrs), daughter (1 yr)



Motivations

- Emil likes to take his children to the playground so they can get some exercise
- Being on the playground feels like a break
- He appreciates the chance to socialize with other parents

Frustrations

- It's not possible for Emil to relax when his children can't play independently
- A playground which is not suitable for age mixed play is not one that he would visit

Needs

- Emil finds it important that there's somewhere for him to sit down and watch his children
- He needs to know that his children are safe on the playground

Photo collected from pexels.com. Photographer: Adrianna Calvo.

Appendix F Ideation Drawings

All drawings brought to HAGS for the half time feedback

F.1 Play functions

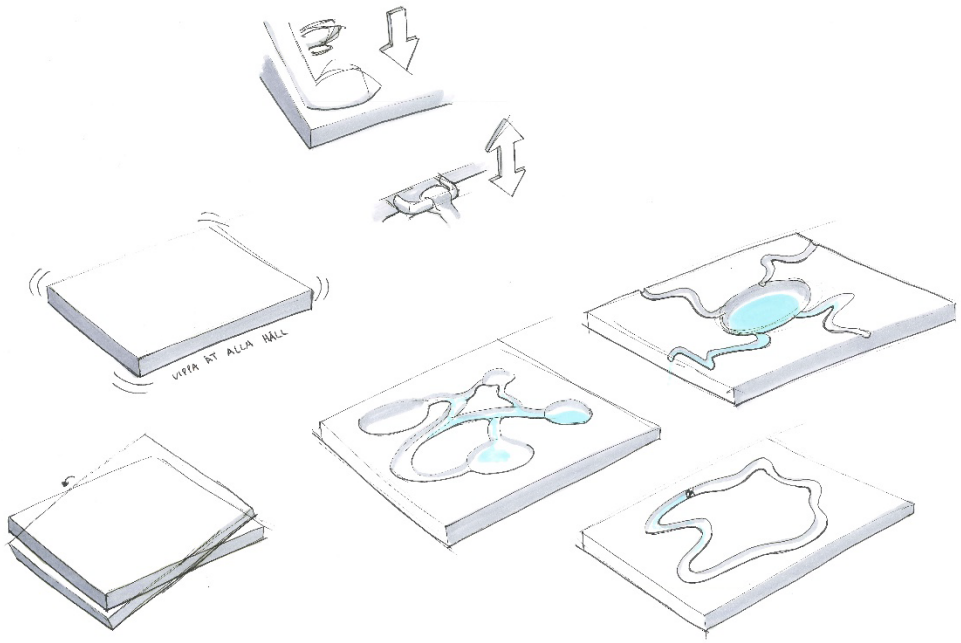


Figure F.1 Tilting table.

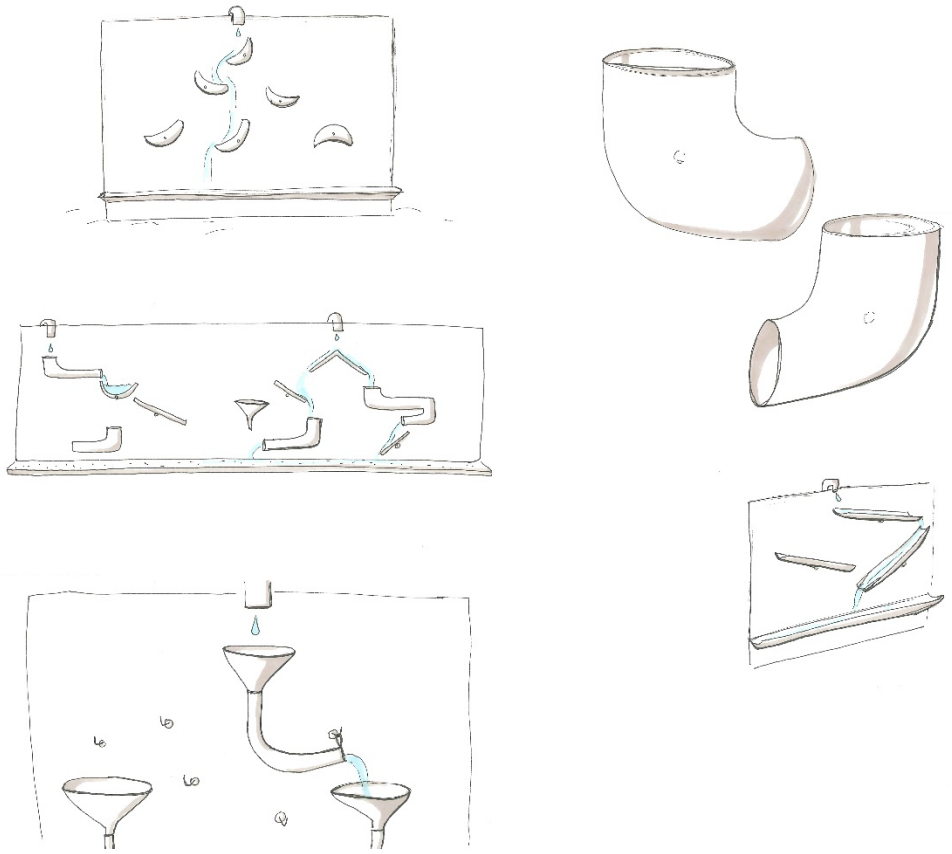


Figure F.2 Water system on wall.

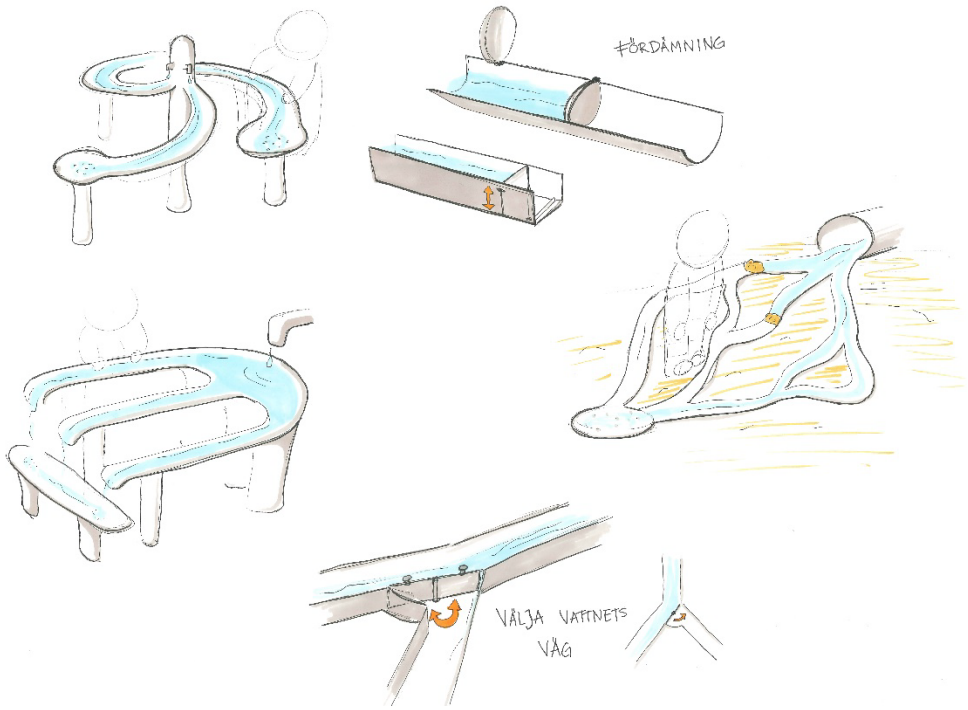


Figure F.3 Canal system.

Figure F.4 Digging for hidden objects.

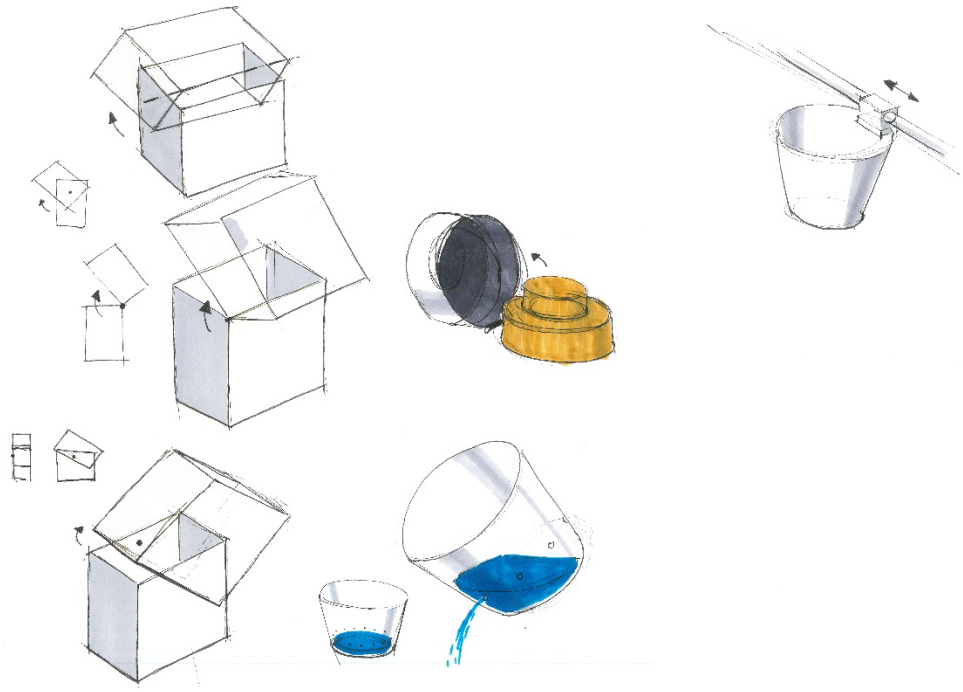


Figure F.5 Ways to move/empty buckets.

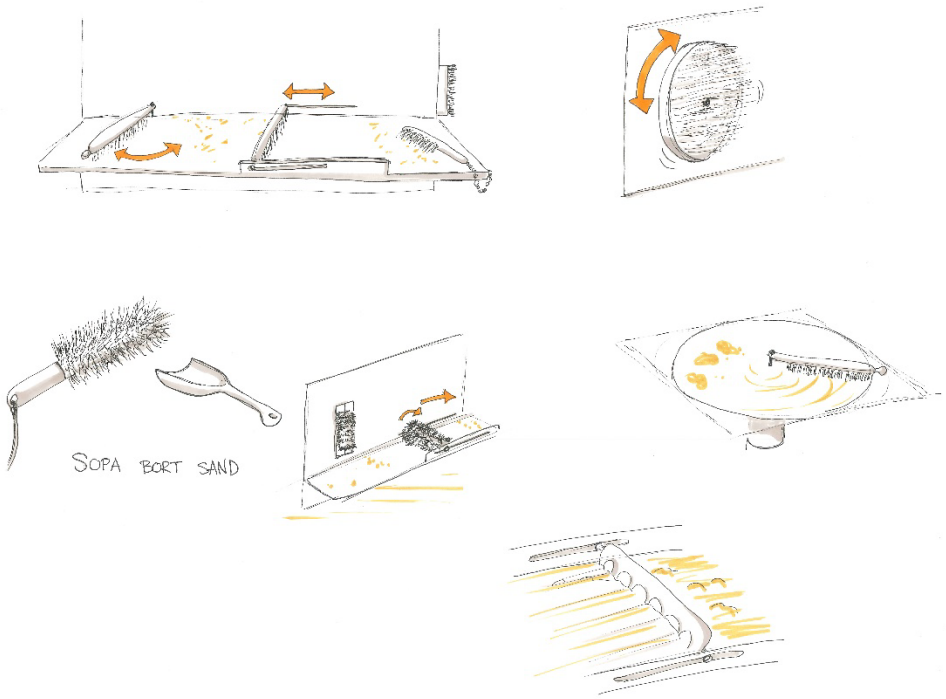


Figure F.6 Brushes.

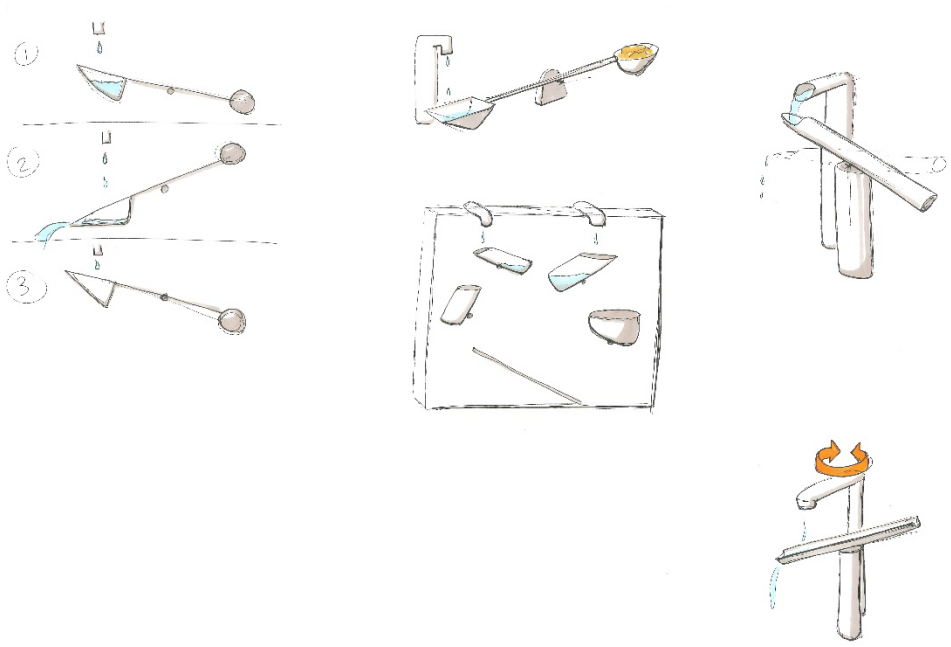


Figure F.7 Self-tilting scoop.

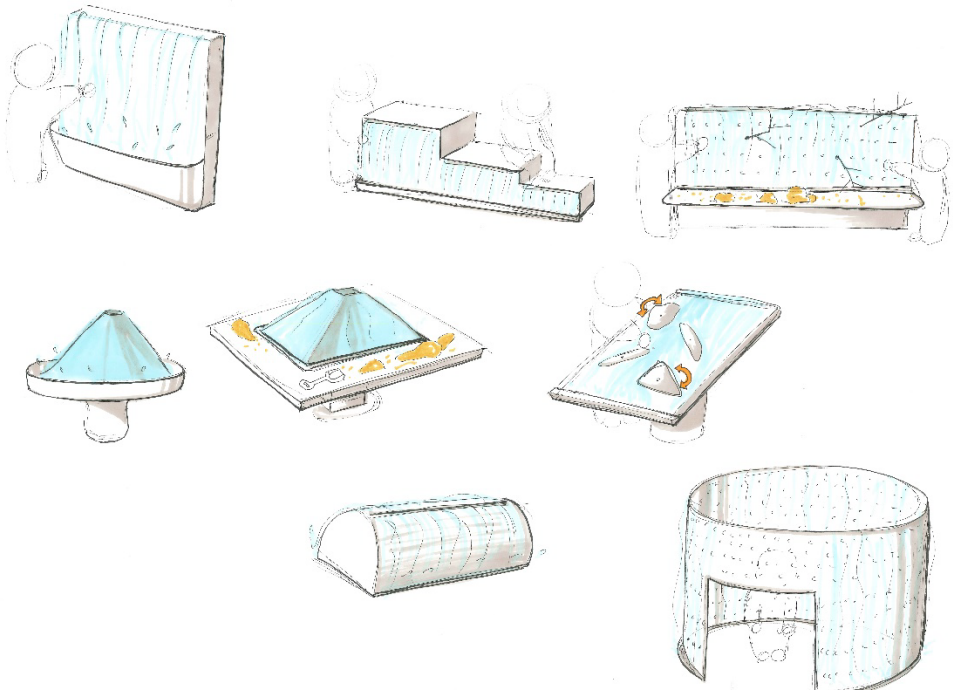


Figure F.8 Waterfall.

Figure F.9 Mixed play functions such as funnels, adult seats, weighing equipment.

F.2 Play themes

Figure F.10 Garden/fruit market theme.

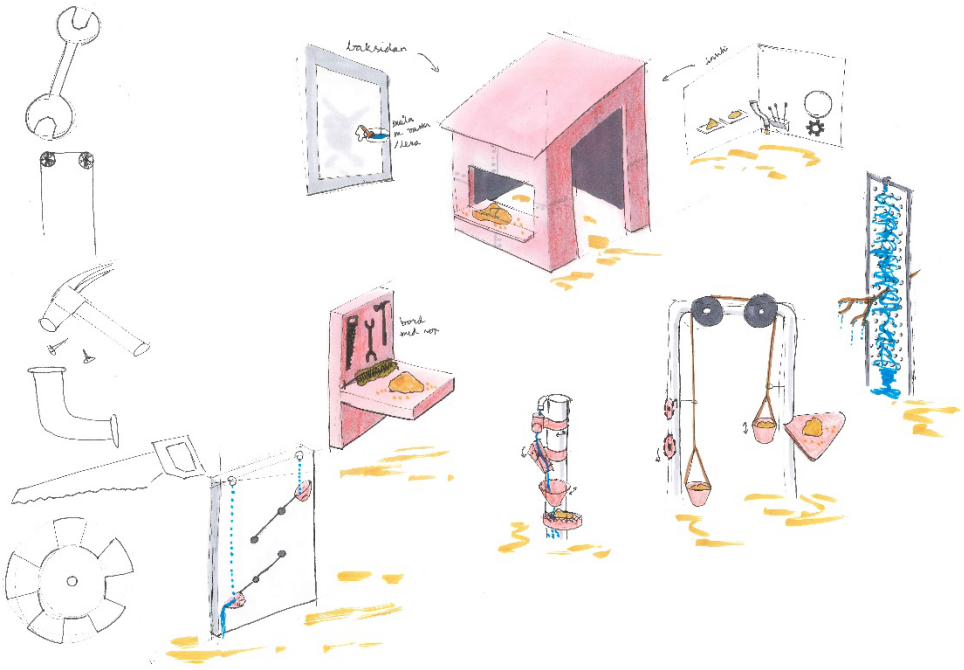


Figure F.11 Workshop/inventor theme.

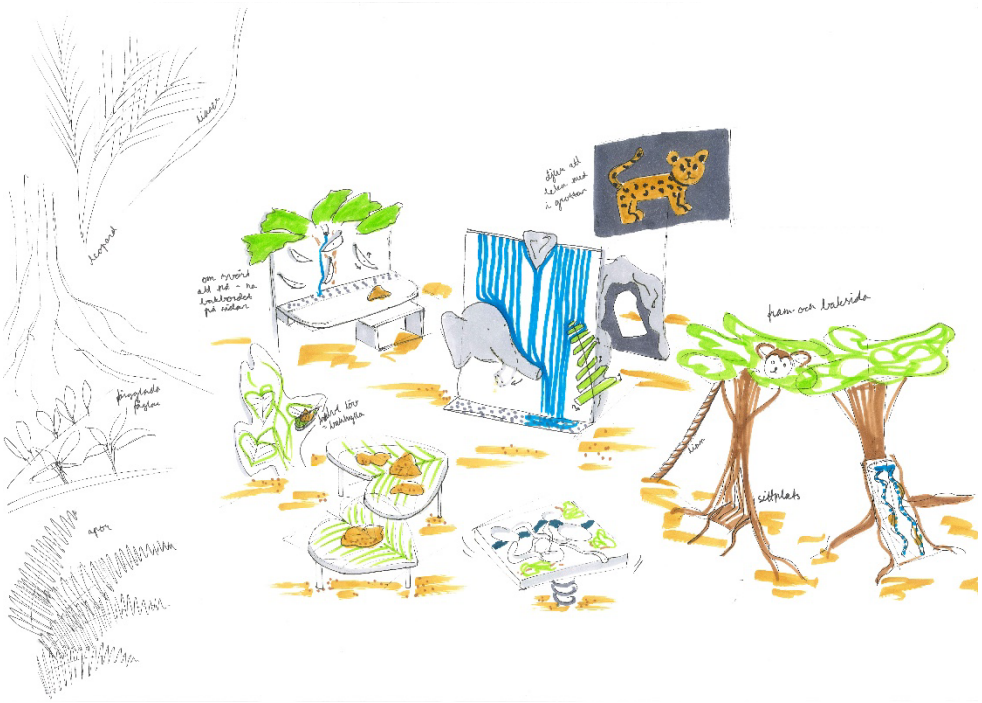


Figure F.12 Djungle theme.

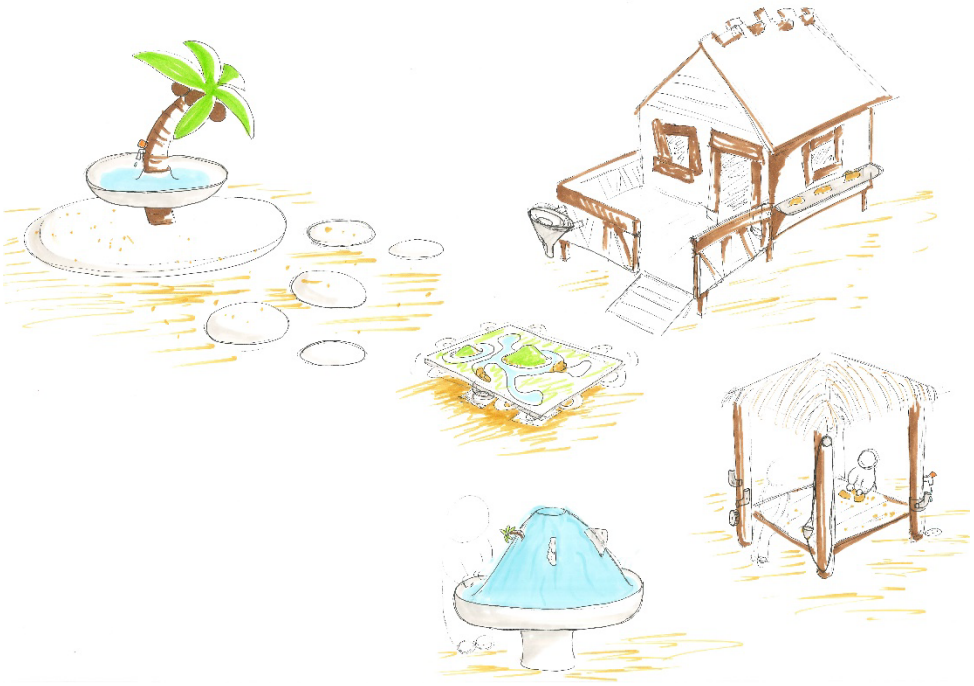


Figure F.13 Deserted island theme

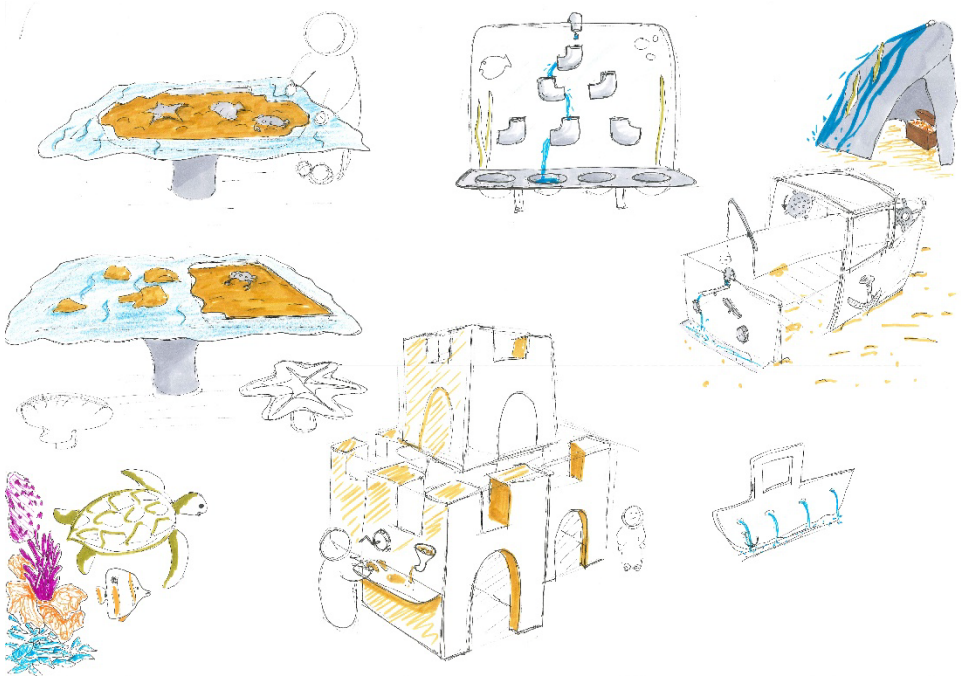


Figure F.14 Under the sea theme.

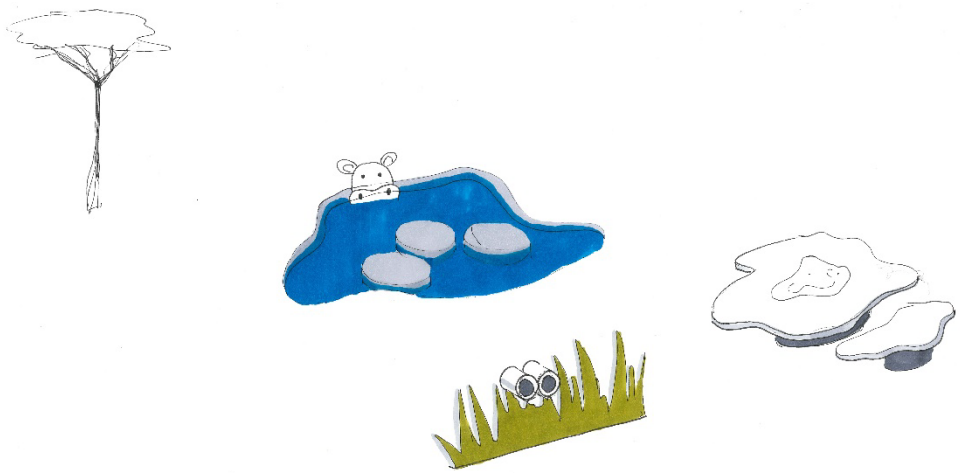


Figure F.15 Safari theme.

Appendix G Concept evaluation

Concept evaluation matrix, vALUe evaluation and persona's picks

G.1 Concept evaluation matrix

Table G.1 Concept evaluation matrix

		Importance	Reference: Water pole		Tilting table	
			Poäng	poäng	Poäng	poäng
Social play	Promoting social play	*0,12*	2	0,24	3	0,36
	Allowing playing alone	*0,04*	2	0,08	1	0,04
	Attracting children of different ages (within age 1-5)	*0,13*	2	0,26	3	0,39
	"More than one"	*0,1*	2	0,2	2	0,2
Pretend play	Possibility to play different things	*0,11*	2	0,22	3	0,33
	Promoting pretend play, "part of scenario"	*0,1*	2	0,2	2	0,2
Sand play	Offer action or physical challenge	*0,05*	2	0,1	3	0,15
	Allowing construction play	*0,03*	2	0,06	3	0,09
	Offer sand tools	*0,05*	2	0,1	1	0,05
Parent's aspect	Allowing the parent to see the child at all times	*0,05*	2	0,1	2	0,1
	Offer something fun for the parent	*0,03*	2	0,06	2	0,06
	Comfortable for the parent	*0,07*	2	0,14	2	0,14
Water play	Promotes experimenting with water	*0,07*	2	0,14	1	0,07
	Provides fun water effects	*0,05*	2	0,1	1	0,05
		1		2		2,23
				6		3

		Tip over scoop		Water system on wall		Canal system	
		Poäng	poäng	Poäng	poäng	Poäng	poäng
Social play	Promoting social play	2	0,24	2	0,24	3	0,36
	Allowing playing alone	2	0,08	2	0,08	2	0,08
	Attracting children of different ages (within age 1-5	2	0,26	2	0,26	3	0,39
	"More than one"	2	0,2	3	0,3	3	0,3
Pretend play	Possibility to play different things	2	0,22	2	0,22	3	0,33
	Promoting pretend play, "part of scenario"	2	0,2	2	0,2	3	0,3
Sand play	Offer action or physical challenge	2	0,1	2	0,1	3	0,15
	Allowing construction play	2	0,06	2	0,06	2	0,06
	Offer sand tools	2	0,1	1	0,05	1	0,05
Parent's aspect	Allowing the parent to see the child at all times	2	0,1	1	0,05	2	0,1
	Offer something fun for the parent	1	0,03	2	0,06	2	0,06
	Comfortable for the parent	2	0,14	2	0,14	2	0,14
Water play	Promotes experimenting with water	1	0,07	2	0,14	1	0,07
	Provides fun water effects	1	0,05	3	0,15	1	0,05
			1,85		2,05		2,44
			7		5		**1**

		Waterfall		Kiosk	
		Poäng	poäng	Poäng	poäng
Social play	Promoting social play	2	0,24	3	0,36
	Allowing playing alone	2	0,08	2	0,08
	Attracting children of different ages (within age 1-5)	3	0,39	3	0,39
	"More than one"	3	0,3	3	0,3
Pretend play	Possibility to play different things	3	0,33	3	0,33
	Promoting pretend play, "part of scenario"	2	0,2	3	0,3
Sand play	Offer action or physical challenge	2	0,1	2	0,1
	Allowing construction play	3	0,09	3	0,09
	Offer sand tools	1	0,05	2	0,1
Parent's aspect	Allowing the parent to see the child at all times	1	0,05	1	0,05
	Offer something fun for the parent	2	0,06	2	0,06
	Comfortable for the parent	2	0,14	2	0,14
Water play	Promotes experimenting with water	1	0,07	1	0,07
	Provides fun water effects	1	0,05	1	0,05
			2,15		2,42
			4		**2**

G.2 vALUe evaluation and Persona's picks

The hearts symbolize the personas who are expected to choose each concept (W=William, A=Alice, N=Noah and E=Elsa). Se appendix E for the persona profiles.

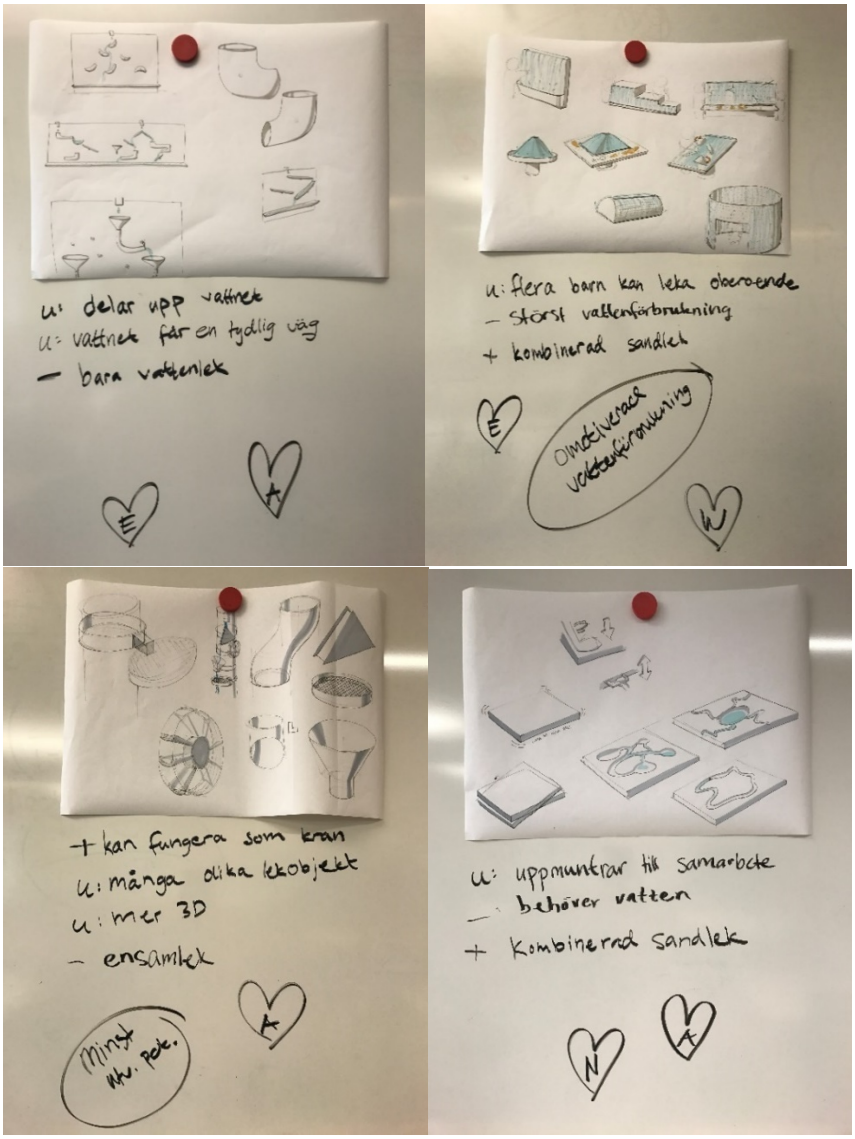


Figure G.1 vALUE evaluation and Persona's picks

Appendix H Anthropometric data

Anthropometric data used.

Collected from: http://dined.io.tudelft.nl/en/database/tool

Table H.1 Anthropometric data used (2-3 yrs)

Populations	**Dutch children 2yr, female**				**Dutch children 2yr, male**				**Dutch children 3yr, female**			
Measures	*mean*	*sd*	*p5*	*p95*	*mean*	*sd*	*p5*	*p95*	*mean*	*sd*	*p5*	*p95*
Reach height, standing (mm) (#1)	1053	61	953	1153	1065	65	958	1172	1160	60	1061	1259
Stature (mm) (#2)	929	46	853	1005	939	45	865	1013	1004	45	930	1078
Reach depth (mm) (#19)	647	58	579	769	680	65	573	787	741	49	660	822
Arm length (mm) (#20)	387	31	336	438	401	35	343	459	420	32	367	473

Table H.2 Anthropometric data used (3-4yrs)

Populations	**Dutch children 3yr, male**				**Dutch children 4yr, female**				**Dutch children 4yr, male**			
Measures	*mean*	*sd*	*p5*	*p95*	*mean*	*sd*	*p5*	*p95*	*mean*	*sd*	*p5*	*p95*
Reach height, standing (mm) (#1)	1180	67	1070	1290	1248	59	1151	1345	1262	59	1165	1359
Stature (mm) (#2)	1021	44	949	1093	1082	40	1016	1148	1085	47	1008	1162
Reach depth (mm) (#19)	760	48	681	839	749	59	652	846	764	66	655	873
Arm length (mm) (#20)	432	36	373	491	443	36	384	502	450	33	396	504

Table H.3 Anthropometric data used (5yrs)

Populations	**Dutch children 5yr, female**				**Dutch children 5yr, male**			
Measures	*mean*	*sd*	*p5*	*p95*	*mean*	*sd*	*p5*	*p95*
Reach height, standing (mm) (#1)	1354	68	1242	1466	1370	68	1263	1477
Stature (mm) (#2)	1159	49	1078	1240	1170	48	1091	1249
Reach depth (mm) (#19)	812	69	699	925	812	76	687	937
Arm length (mm) (#20)	474	31	423	525	486	32	433	539

Appendix I User tests

Observation notes from user tests

I.1 User test 1 water system

Date: Saturday March 18th

Location: Bathroom in apartment

Test people: Girl 6 yrs, boy 3 yrs, and older cousin

Figure I.1 Test model.

Figure I.2 Test set-up.

When unpacking the prototype, the girl was guessing what the "secret item" could be. After showing that a water bottle with a hole in it would sit on top, she guessed that it was a water fountain.

The prototype was installed in the shower and water was later added through a water bottle.

In the beginning both children were curious. Before pouring any water, we suggested that they would touch the prototype and see what it could do. The boy began trying to twist the bananas.

When Julia started pouring water the girl said "it's a waterfall". Since the children were not actively approaching and playing with the prototype we asked what would happen if they twisted the bananas. At least the girl seemed to understand that the water would go a different way.

About this time the boy left the bathroom to play with something else.

We then let the girl continue to experiment with the prototype by encouraging her to test other things. "Can that banana become wet as well?" "What happens if we turn all bananas upside down?". We also let Viola pour the water from the bottle which she found fun.

Towards the end we said that we would soon have to take the “toy” with us, so they should try some last things. The girl than said “Can’t you leave it here?”.

The girl seemed to view the prototype as our thing, and therefore was polite and careful with it. And therefore needed our permission or suggestions to try things.

The boy probably felt less comfortable with us being there than the girl, and that was probably the main reason why he didn’t want to participate.

We got indications that water systems might be more complex to understand than we thought - therefore suiting a higher age (rather 5-6 than 2-3). Younger (2-3) might just play with the water coming down, and “randomly” twist the bananas.

Due to the above, the product might be positive in encouraging mixed age play, as well as parents taking part. Parents might raise the level of play by suggesting or showing how to do (like we did).

The prototype was a bit poorly constructed. The water went a bit everywhere and at the end the bananas were hard to twist. Paper bananas were not ideal for a longer test.

It is important that the bananas are seen as twistable, so the children interact with them. Not just a waterfall.

I.2 User test 2 water systems

Date: Friday 5/5 10.00-10.45

Location: outside the A building at LTH.

Participants: 9 preschool children of the ages 3-6 and 2 caretakers.

Figure I.3 Set-up before the children arrived: banana tree and tilting table.

Most of the children participating had also been participating in the tilting table. When they arrived they came running, curious of what was there to play with this time.

The tilting table was out as well, but naturally the children were most interested in the new product.

The children wanted to explore everything about the new product and started pulling things on the back (where they were not intended to play).

Once they had got their look, the team ‘started’ the play. Instead of an actual tap with on/off switch, a bent pipe with a funnel was mounted to the tree (see figure below). The water supply was controlled by a design team member. When the tap was ‘switched on’ it only took seconds before the children starts trying to make the water hit the monkey’s mouth.

“The monkey should catch the water!”.

Figure I.4 The 'tap' solution.

Buckets of water was set out, because the play area didn't have any water supply. The children recognized the buckets from last time and knew that they were filled with water. Plastic cups was also put out to see what the children would do with them. The result was that everyone started pouring over the bananas and into the monkey's mouth with the cups as well. Perhaps because the stream from the bananas didn't hit the monkey's mouth perfectly.

Figure I.5 Children filling the monkey with water.

The stream out on the sides increased with the increased amount of water flowing down. One of the children noticed it.

"Look! It's flowing out here"

Then he started filling his cup from there. Some children even tried to pour water over, for instance, the water wheel and then collect their own water as it came flowing out.

The monkey's mouth was a success and the children spent a lot of time helping the thirsty monkey drink.

The play shifted between the team 'starting the tap' and children pouring themselves with cups. It was rewarding to watch them set the bananas in the direction they wanted to flow. At least children of the ages 4-5 was observed doing so, but perhaps some younger children as well.

Figure I.6 Setting bananas.

The wooden bananas did not create the optimal flow, but it was clear that this was not necessary for being a fun toy.

It was surprising how interested the children were by the back and they spent lots of time trying to cover the monkey's mouth hole from the back or collecting the water coming out. This indicates that the planned design of the back will be well appreciated.

Especially some of the younger children seemed to find it fun to twist or spin the bananas and water wheel even when there was no water. This is promising for the winter months.

Based on the children in this group the height at which everything was placed seemed very good.

I.3 User test tilting table

Date: Friday 31/3 10.00-11.00

Location: outside the A building at LTH.

Participants: 10 preschool children of the ages 3-5 and 3 caretakers.

Figure I.7 Set-up before the children arrived.

All the children seem very excited and curios when they arrive. Teachers tell them to wait, but we tell them that they can try and use the product however they want.

All the children start tilting the table together. (There was some water in the trail before they arrived).

One child finds the water bottle in the sandbox. The rest of the children quickly become interested in the sandbox and the items in it.

At the tilt table: “Here! No, here!” “It should go there”. The children are disagreeing on where to tilt the water, but try to coordinate. They soon start tilting a LOT.

At this point it’s about four children left playing by the table and they are the oldest one in the group.

When they open the water bottle (after Julia’s permission/suggestion) all the water is poured in at once. Start tilting more.

Most of them can reach from one side to the next, being able to tilt two ways sideways.

Sometimes the children use their entire body weight to tilt the table, trying to get the water to get out. It is also fun to shake the table and make the water bounce.

After a while one child picks up a lead and says “we can make a boat”. The leaf gets stuck because the rail is too narrow and they try with other things. One child figures out that there is too little water in the rail and says that they need to gather all the water in one place. They soon pick up grass to be the “boats” instead.

One child in particular seems to love to pour in new water: “It’s missing here” (talks about one side of the trail). He constantly asks for new water.

The children plays with other things in the area and the number of children playing with the table is constantly changing. At one point the table is completly deserted and one of the caretakers asks if we can put something inside that will float. We put in three bottle caps of different colors and when the children comes back they enjoy the new element.

One child puts a small bit of moss and puts it in the trail: “I’m stopping the water”. Another child notices that the product now is getting “dirty”.

After a while Hanna tells the children that it is alright to put sand in the rails as well. The children start with making dams, but soon starts to pour water on the dams, making everything turn into mud. This is when they start to dig along the track with a stick and a water bottle.

Figure I.8 Children playing

When the water is about to run out one of the older discovers that he can re-collect the water from tilting a corner. He collects it in a small bucket. The younger "water-loving" boy copies and sits with a water bottle and waits for the drops to slowly fill his bottle a few centimeters.

One boy discovers that it is possible to sit on the table, but surprisingly that doesn't happen very long.

The game we observe by the table is not really a specific game, but more exploring what will happen and just enjoy playing with water.

When there was sand everywhere and no water left to pour in, the table seemed a bit less interesting. Although when about to leave two children start digging along the trail with sticks.

Figure I.9 How the table looked after they had left.

How would it have affected the play if the table looked like this when arriving?

Could it be fun to have small balls of cars running in the tracks? (Teacher's comment)

Appendix J V-shaped openings control

The control of the V-shaped openings on the tree according to the SS-EN 1176-1 standard.

The SS-EN 1176-1 states that partially enclosed and V-shaped openings which are placed above 600mm from the ground needs to be designed accordingly (depending on what angle it is oriented in):

- The test body's center line is ± 45° from the vertical: when the outermost tip of the test body touches the base of the opening, should the opening be less than the test body's length to the bottom of the shoulder part.
- The test body's center line is between the horizontal and +45°: When the outermost tip of the test body touches the base of the opening, should the depth be less than the test body's part 'A'. If the openings depth is larger than the test body's part 'A', should all parts of the opening above part 'A' also allow that the test body's shoulder part can be inserted.
- If the test body's center line is below the horizontal: No requirements of testing with a test body.

Uppermost opening (figure J.1) is approximately 30° from the vertical and the first condition should be fulfilled, which it is.

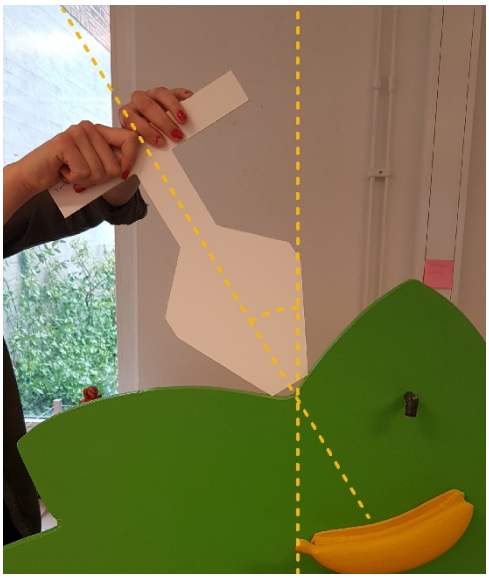


Figure J.1 Uppermost opening with test body.

Second opening (figure J.2) is approximately 17° from the horizontal line and the second condition should be fulfilled, which it is.

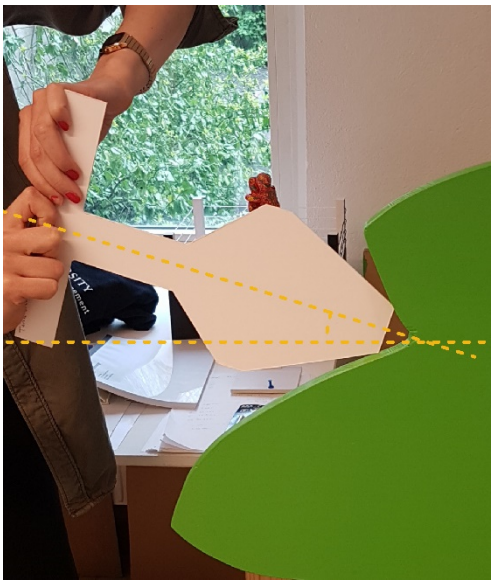


Figure J.2 Second opening with test body.

The two lower openings are both under the horizontal plane, which mean they are alright.

Figure J.3 The two lower openings.

Appendix K Work division

Work division throughout the project

The master thesis was to the greatest extent a team effort where most tasks was performed in collaboration. Even if not every task was performed by both team members simultaneously, both team members have been involved in every part throughout the project – therefore it is impossible to point out who did what. Below the collaboration of the main parts of the projects are explained. The time spent working is equal between both team members.

K.1 User study

The literature study could be performed more separate than other parts of the process. With the many research topics the team could work in parallel on different topics. The interviews and observations were performed together in order to be able to pay attention to more details. For example, during the interviews one team member would ask questions and the other would take notes, while during the observations the team members would sit on different locations.

K.2 Ideation and concept development

The ideation phase was mainly conducted through selecting an inspiration theme in common, individual ideation session, presenting the generated ideas for each other, selecting a new theme and so on. Similar method was used later on in the development process, but more focused on discussing together how to improve ideas.

K.3 Prototyping

Both team members were involved in building all prototypes and work was for instance divided so that one team member would paint while the other would saw. When working with such large prototypes it was often useful to have four hands.

K.4 Visualization

Since there were three products to work on the cad models, rendering and Photoshop editing could be performed in parallel on two computers.

K.5 Report

The report was written in parallel on two computers, and since all chapters were processed many times it is impossible to point out who wrote what.