What is the meaning of a sandbox

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Vad har en sandlåda för betydelse

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Abstract

This thesis project uses various Industrial design methods to create a concept that will evolve a sandbox into a more versatile and interesting playing area. By using parts that can be attached to the frame of the sandbox many different versions can be built to suit different demands and needs. The concept also uses lights and decorated panels to make the sandbox more interesting and visible in today's colorful playgrounds.

The project is based on the meaning different stakeholders could have in the product. Research has shown that products made with the help of stakeholders has a better chance to be realized. The findings from research by interviews, fieldtrips and library studies were used as reference when sketching and building sketch-models. Sketching is used both for ideation and for explanatory pictures and has been a big part of the project. Many of the sketches and photos can be seen in the report and in the attachments.

Keywords: industrial design, product design, thesis, stakeholders, sandbox, toy, illumination, ideation, sketching, Hags.
Summary

What is the meaning of a sandbox? In this industrial design thesis I have used the different meaning of stakeholders to evolve the sandbox into something that gives more people meaning. By using design methods depending on the different stakeholders that are affected by the product a design that strives to meet as many expectations as possible can be made.

The report contains research on existing products for finding trends and/or possibilities for improvements. Research is also done by studying children play in playgrounds. Interviews of parents and kindergarten teachers were conducted to get their ideas and experience using their meaning in the design. Library studies for books and articles describing how children in the age 1-7 play shows that children have very different needs for stimulation depending on their age.

A lot of work was put into establishing what product Hags wanted to develop. The design methods used in the report was; brainstorming, functional analysis, sketching, benchmarking, observation studies, model building and Pugh's decision matrix. The research was used as guidance for developing concepts by sketching and building models. The report has many sketches and photos, some are placed in the text and some in the attachments. The sketches are both used to describe functions for partners but they are also a tool used by the author to visualize ideas and to find solutions and problems before too much work is put into the product. The concepts are measured against each other and evolved into a final concept.

The result is an accessory that can be mounted on the frame of ordinary sandboxes. This gives the opportunity to customize a sandbox based on the customer's needs and wishes, creating many possible sandboxes. By making the accessory easy to replace, the customer can have several different attachments that can be mounted depending on the current need. By using lights to illuminate parts of the sandbox during the darker hours of day a new look of the sandbox at the playground is achieved. This concept creates a new market for Hags with products not available on the market today (2012).
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Introduction

1 Introduction

This project has been a concept study to evolve sandboxes. By using methods that explore the different meanings stakeholders can have of a sandbox a product that can be appreciated and accepted by many can be made. The thesis is done together with Hags AB who are a manufacturer of playground equipment. Research on existing sandboxes in different environments are used to see existing solutions. Attention to children with disabilities have been taken. Several design methods is used to guide the process of designing the concept.

This is a master thesis project that was conducted at Jönköping university at the master program of product development with industrial design.

A special thanks for support and guidance. Marcus Söderström, Olle Claesson, Lars Eriksson and my family.

1.1 Background

Hags AB was founded in 1948, the main office is located in Aneby in southern Sweden. It is a global company that is owned by the American company PlayPower inc. Hags is a manufacturer of playground equipment, park/urban equipment and outdoor sport and fitness equipment. Together with their sister company EZ-docks they also sell marine floating docks. Today they are one of the larger companies that manufacture playgrounds in Sweden.

To keep their customers they have very high demands on safety and in children's satisfaction. They also provides products in a broad price range from public playgrounds to homeowners. To make this a product that is meaningful for as many as possible design-methods suitable for each stakeholder group are used.

Children have enjoyed sandboxes for a long time, but not much has changed in the design of the box itself. Sandboxes is a great playing area since it stimulates children’s creativity without the need for expensive toys. Today issues like litter and the fact that the sandbox looks very plain compared to the rest of a playgrounds equipment threatens the existence of the sandbox. The projects ambition is to solve this with fresh thinking and new design.
1.2 Objectives

The concept will be made by creating a meaning for the different stakeholders that come in contact with the sandbox and to reinvent the sandbox. This is done to make the sandbox more similar to playground equipment that today have more color and advanced appearance. By developing the frame of the sandbox to give it a more interesting shape or to make it possible to use attached accessories. This should be done without removing the opportunity for children to use their own imagination when playing and learning. By making it possible for upgrades and expansion of the sandbox more sales for Hags will be possible. There will also be possible for customers to improve their sandbox bit by bit to not strain their finances too much at once.

1.3 Delimitations

The concept will not supply detailed drawings. It won't have a full scale model and the model won't be made from the material suggested for the final product.

1.4 Disposition

In the theoretical background design theories and suggested manufacturing methods and materials are explained. This is followed by the methods that have been used in the project. Approach and implementation is the largest part of this report. It describes how the project has been conducted and shows the findings from the research and how the methods have been used to reach a design that is described in the chapter result. In the results the final design is explained with text and renders together with photos of the presentation model. This is followed by conclusions and a discussion made by the author. The reference chapter shows where information gathered for the project can be found for further reading or review. The last chapter is attachments, in this the reader can find more sketches, photos and research notes that are referred in the report but because of the amount isn't included in the text.
2 Theoretical background

2.1 Design theories

This chapter shortly describes the theory about using the meaning of stakeholders to make a successful design and a brief explanation of why Industrial design should be used.

2.1.1 Meaning for stakeholders

A stakeholder is someone who is affected by a product, for example it could be someone who is working in manufacturing, assembly, the sales-department, transport companies, municipalities or the person buying and/or using the product. Everyone who in some way are affected by the product is a stakeholder and has their meaning of the product [1, s 180-183]. The meaning for a stakeholder can change after the user has interacted with the object or by other means have gotten more information about the product [1, s 52-58].

To create a product that is good not just for the end user but also for the rest of the stakeholders the designer needs to see the product from the stakeholders view. Second order of understanding is when a designer can understand that a product can have a different meaning for all stakeholders. To understand someone’s understanding is called second order of understanding [1, s 65-67]. The designer uses this and incorporates it into the design to create a product that can give meaning to the persons affected. It is important to give meaning to others as well as to the end user. Example, if the sales department won’t make a profit from the product, it doesn’t matter how good it is for the end user. More designers are starting to use this method to increase the chance for a successful product. This is to ensure that the product gets more people supporting it. When they can feel that they are part of the product it is more likely for the design to be realized [1, s74]. There is also a good opportunity to have many different stakeholders in the design process because they can contribute with their ideas and solutions.
2.1.2 Why design

"Design is making sense of things" (Krippendorff.1969) [1, s xv] 

Benefits from using industrial design to develop a product can be increased product appeal and customer satisfaction by additional and better features. By making a product that differentiates from competitors and follow the same form language as earlier products helps build the companies identity. This makes the customers more faithful and more likely to come back for more. Industrial design can also help reducing the production cost in manufacturing by minimizing production time and materials used. A product that has little user interaction requires less work by industrial designers compared to a product that is very visual and interactive. The cost for using industrial design varies depending on the product but the expense is very low compared to the total cost from developing a new product. The payback can be significantly larger than the expense [2]. According to a survey made 2008 by the foundation for Swedish industrial design (SVID) shows that companies that use design actively exports more and the rate of innovations is five times larger compared to companies that don't use industrial design[3]

2.2 Manufacturing and material

In this part a suggested manufacturing method and material selection is explained

2.2.1 Rotational molding

Rotational molding is used for big hollow plastic components. A split mold is filled with the calculated amount of granulated thermoplastic. The mold gets heated while the mold is rotating, this makes the plastic stick to the walls of the mold and makes the product hollow. After a certain time the heat is removed and the plastic gets to harden whit the mold still is rotating. The mold is then split and the component have gotten the shape of the mold. It is possible to put inserts and preformed parts in different colors into the mold.[4]

2.2.2 Polyethylene

Polyethylene is a thermoplastic and is suitable for rotational molding. It has high capabilities to be welded. It can be translucent, transparent or opaque and can be colored in most colors. It is biological inert and often used in household products, example Tupperware. It is a good insulator and it is recyclable.[4]
3 Method

This chapter describes the different design methods that have been used in the project.

3.1 Mood board

Is also called inspiration board. By collecting pictures and putting them on a collage the feeling and purpose for what the product wants to express is shown. It can also act as inspiration in the sketch phase later in a project. It is especially useful in the beginning of a project to get the imagination started. [5]

3.2 Brainstorming

Brainstorming is a fast and simple way of getting many different ideas and suggestions of a product based on a topic. The session is guided by one person who preferably have prepared the session by letting the users know what topics that are going to be discussed. It is important that no negative response is given to sometimes weird ideas, these ideas can generate new ideas that are good. The ideas should be documented during the session and be evaluated afterwards. [5, 6]

3.3 Brain-Writing

This is similar to brainstorming but it is used to separate the ideas from being too similar in the group participating. You start the session by writing ideas on notes and then show and explain them to the others. After this you start brainstorming around these ideas. You have the same rules as in brainstorming that you can't give negative feedback and all ideas are welcome. Before you start the activity it is a good idea to give the persons participating information about what the topics you will discuss, this is to give the participators a chance to reflect before the session. Brain-writing can also be called 6.3.5 and this is when you are 6 people writing on a paper each with 3 headlines for 5 minutes. This is then passes on to the next person who evolves those ideas, this continues under silence until the papers have passed everyone. [5, 6]

3.4 Competition benchmarking

This is a version of benchmarking used to identify what solutions or products that already exists, but also to see the opportunities for developing already existing products [6]. "To steal from one person is plagiarism, to be influenced by many is good design"(Ullman. 2010p.158)
3.5 Function analysis

This is a way to find out what functions a new product should have. The functional analysis can be made for several different stakeholders to get a better understanding of a product. By organizing possible functions in a list with adjectives that describes what the function should solve instead of describing the solution. This leaves an open mind to solve the desired function. The functions are ordered by one main function and the rest are divided as necessary and desired functions. When this is done different solutions to the functions can be discovered.[7]

3.6 Design brief (ten point brief)

The design brief is a written description of the specifications and an explanation on what the project should contain without stating the solution. The ten point design brief is a way of structuring the writing of the brief, making it easier to get the correct information into the brief.[8]

3.7 DFM/DFA

Design for manufacturing and assembly is when you try to make products that are easy to assemble and has few different parts. It should make the product as simple as possible both for manufacturing and handling. Evaluation of manufacturing methods is part of this.[7]

3.8 FOW

Fly on the wall (investigation by observation) is a method that is used to study people's behavior without interfering or guiding them in their activity. This can be a good way to find out what people actually do instead of asking them, because sometimes the answer given doesn't describe what actually takes place. [9]

3.9 Sketching

To use pen and paper making sketches is a very fast way of evaluating ideas. While sketching it is possible to make many different solutions based on the same idea giving the client the possibility to choose and discus the idea involves them in the project. The more sketches that are made the more solutions and problems are found. The sketches is a good way for the designer to describe what he/she has thought to others. When the sketches are presented to a client it is possible to establish an agreement if the design should be continued with or not.[10]
3.10 Sketch modeling

Instead of sketching on paper a model can be built with materials that are easily shaped. The model can then be used for testing out size and form in a 3D view. It can also be used for solving problems that are hard to see in a sketch. The model can be a good way of discussing ideas with people who isn't used to interpret sketches. [7, s234]

3.11 Pugh decision matrix.

The Pugh matrix is a way for comparing different concepts to each other. This is a simple way of determine what concept that should be continued working on. Criteria’s get a value of importance and the concepts are compared to a reference object. If the concept is better it gets a +, if it is worse a - and similar a 0. These are later summarized and a the top score is the best choice. This is not a truth but a guidance to make selections.[6]
4 Approach and Implementation

This chapter describes how the project was conducted using different design methods. It contains many of the sketches and photos that were made/taken during the project.

4.1 Research

At the first meeting at Hags together with Marcus Söderström we had a discussion about what the project should include (Attachment 1). I recorded this meeting to make sure I didn't miss anything for my project description. From this a project specification was made (Attachment 2). I made a project plan to divide the different stages of the project (Attachment 3). We also had discussions about what material I could use and a suggestion was to use recycled plastic. Hags is making a slide today by rotational molding and this could be a good solution for the sandbox as well.

The mood-board (pic 1, mood-board) was made from pictures found on internet to get inspiration for the children that I was making the project for. The goal I strived for was to let all kids use their creativity and to make the sandbox more interesting and modern. Because of copyright the picture has been blurred out.

Pic 1 Mood-board
Research for existing sandboxes online made both by Hags and their competitors was done to find what could be missing and to investigate if there was any solutions that could be improved to make the sandbox more modern. The research was also important for establish what already exists to not do already produced products. By doing the research online I found a lot of different products and solutions. From these the sandboxes similar to Hags were chosen and a competition-benchmarking was made (Attachment 4).

The findings from the analysis was summarized and put in a list. I used this list to come up with better solutions for the project.

**Findings from competition benchmarking**

+ It could be good to be able to vary the shape of the sandbox.
+ I could use the corners for kids with disabilities.
+ It could be nice to be able to sit and play, without having to sit in the sand (if a table is used it needs something to keep the sand inside the sandbox).
- Most frames today are med from raw wooden boards, these can be hard and slippery when wet there is also a chance for splinters. Plastic material could solve these issues.
- A high edge/frame can make it hard for children to get into the sandbox.
  This could be solved with a lower entrance.

Notes.
I should consider the risk of getting stuck and getting squeezed between parts.
Round corners makes it easier to make different shapes of the sandbox.
Too many accessories with a certain technique of using them restricts the possibility for children to use their own fantasy.
4.2 Design brief

The design brief was made based on the first meeting at Hags. It was made using a ten-point-brief. As the project has proceeded the brief was modified to better match the current conditions. The initial brief and the ten-point-brief can be read in the attachments (Attachment 5).

The sandbox is for play in a safe, fun and developing manner. All kids should be able to play here either by them self or together with friends. Children should be able to develop their skills and imagination based on their present needs. The sandbox should be customizable. Different materials and textures can give a sensation of safety and quality. The sandbox should be easy to maintain both in repairs as in expansion. To fit the rest of Hags demands for safety and quality, parts and details need to be made with care and good materials. Usage of sustainable materials has tomorrows children in mind. Last but not least the box should keep the sand in the right place.
4.3 Stakeholders

In an early stage I made a list of stakeholders that could be affected by the sandbox. This was done to make sure that I could get the different meaning from the stakeholders. The outcome I got was used to create a product that has good value for more people than it would have if they weren't involved in the process, to create a whole. (pic 2, Create a whole)

Stakeholders:

Children in different ages at kindergartens, in public playgrounds and at home.

Production and concept department at Hags. These were represented by my contact Marcus Söderström who is working at the concept department in collaboration with production.

Kindergarten teachers.

Parents to children.

Me as the designer.

Pic 2 Create a whole
4.4 Create meaning for stakeholders

This section describes the result from the methods used to collect information from selected stakeholders. The information gathered were used throughout the project.

4.4.1 Functional analysis

A functional analysis based on children in different environments and on Hags concept and production. The importance of the functions were decided on the findings in the studies of selected stakeholders. Sandboxes in different environment has different needs and demands and this results in different choices of function for children.

MF= Main function NF= Necessary function DF= Desired function

<table>
<thead>
<tr>
<th>Functions</th>
<th>Children at playground</th>
<th>Children in kindergartens</th>
<th>Children at home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer happiness</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
</tr>
<tr>
<td>Offer difference</td>
<td>DF</td>
<td>DF</td>
<td></td>
</tr>
<tr>
<td>Offer excitement</td>
<td>DF</td>
<td>DF</td>
<td>DF</td>
</tr>
<tr>
<td>Contain sand</td>
<td>MF</td>
<td>MF</td>
<td>MF</td>
</tr>
<tr>
<td>Enable digging</td>
<td>NF</td>
<td>NF</td>
<td>NF</td>
</tr>
<tr>
<td>Offer hygiene</td>
<td>DF</td>
<td>NF</td>
<td>DF</td>
</tr>
<tr>
<td>Offer quality</td>
<td>NF</td>
<td>NF</td>
<td>DF</td>
</tr>
<tr>
<td>Offer weather protection</td>
<td>DF</td>
<td>DF</td>
<td></td>
</tr>
<tr>
<td>Offer space</td>
<td>DF</td>
<td>NF</td>
<td></td>
</tr>
<tr>
<td>Offer playing-tools</td>
<td>DF</td>
<td>DF</td>
<td></td>
</tr>
<tr>
<td>Offer disabled access</td>
<td>NF</td>
<td>DF</td>
<td></td>
</tr>
</tbody>
</table>
4.4.1.1 Children

Observations of children playing
When children were asked questions regarding how they play in sandboxes I only got short answers, this made it hard to get useful information. Because of this other methods of gathering information was needed. Instead the observation study FOW was used to study their play in the sandbox. (Pic 3, kids playing)

<table>
<thead>
<tr>
<th>Functions</th>
<th>Hags Concept</th>
<th>Functions</th>
<th>Hags Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offer innovation</td>
<td>DF</td>
<td>Admit handling</td>
<td>NF</td>
</tr>
<tr>
<td>Admit sustainability</td>
<td>DF</td>
<td>Admit sustainability</td>
<td>DF</td>
</tr>
<tr>
<td>Offer development</td>
<td>DF</td>
<td>Offer simplicity</td>
<td>DF</td>
</tr>
<tr>
<td>Attract attention</td>
<td>DF</td>
<td>Admit storing</td>
<td>NF</td>
</tr>
<tr>
<td>Emit technology</td>
<td>DF</td>
<td>Minimize operations</td>
<td>DF</td>
</tr>
<tr>
<td>Suit customers</td>
<td>DF</td>
<td>Emit Quality</td>
<td>DF</td>
</tr>
<tr>
<td>Extend product range</td>
<td>MF</td>
<td>Give Pride</td>
<td>DF</td>
</tr>
<tr>
<td>Inspire future</td>
<td>NF</td>
<td>Minimize toxins</td>
<td>DF</td>
</tr>
<tr>
<td>Offer ideas</td>
<td>DF</td>
<td>Enable manufacturing</td>
<td>MF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Admit recycling</td>
<td>DF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minimize assembly</td>
<td>DF</td>
</tr>
</tbody>
</table>
Notes from the observation study.

- Likes to dig holes.
- Digs with a shovel and pours it into a bucket and the empties the bucket into a pile.
- Digs in the sand with bare hands and feels it.
- Builds piles of sand and makes holes in it, probably tries to make a house or similar.
- Shapes sand with shovel.
- Sits on the side of the sandbox.
- Walks on the edge and jumps from it.
- Using the side of the sand box to pour sand on.
- Collects twigs in the sand.
- Shakes the shovel to see the sand disperse by the wind.
- Digs with the backend of the shovel.
- Does something in one place and then gets interested in something else and goes there to play instead, (easily distracted).
How do kids in different ages play
Everything is exciting for a 2 year old child, water, sand or anything that can be explored. Kids learn about objects by using all their senses, when they investigate sand it can be warm or cold. If it is mixed with water it gets a different texture. By doing experiments they learn what different possibilities an object has.

In the age of 3-4 years children need more space for playing. They practice the different movements they have learnt. By realizing what they can perform it gives them a better self-confidence. Kids like to play doing real things like sweeping, do dishes or to cook food. By playing children get to know real life [11].

Children in the age of 4-5 likes to build and to construct things, they convert the reality into pictures of their own. By using their imagination they step in and out of reality. A box can easily become a plane, boat or a car. Friends become important in this age [11].

The imagination is very strong between the age 5-7, anything can be turned into a game. Objects/toys with many possibilities are specially suitable [11].

4.4.1.2 Hags
On meetings at Hags together with Marcus Söderström suggestions and improvements on my ideas where discussed. I got feedback on what he thought could be interesting for me to continue working with.

To understand how Marcus would rank the importance of the functions in the product I made a questionnaire that was a modified function analysis were Marcus had to rank 16 different topics between 1-5 where 5 is the most important.(Attachment 6) The four most important functions was.

- It should be made from recyclable material.
- It should be useable for disabled children.
- It should have a new type of frame.
- Use the frame for attaching accessories.

4.4.1.3 Parents
I had a focus group together with two parents discussing sandboxes and what they would like to see in a sandbox. We also talked about their memories from their childhood.
Compared to other activities at a playground the sandbox gives the sensation of having less chance of being injured. They felt they could be more relaxed compared to when their children where climbing, running and sliding down slides. Another appreciated aspect was that they could see their kids playing and trying to create something, even though digging holes in the sand seemed to be a favorite. A problem they had come across was when they went to a playground and didn't bring any toys for playing in the sandbox. This made the sandbox less interesting to be in, resulting in the kids running around the rest of the playground making it harder to keep a watchful eye on them.

Memories from their childhood was that they liked to pour water on the sand to make it more sticky, making it easier to build things and to splash around in. A favorite was at the beach, here they could make paths and holes in the sand where they poured water making dams and rivers.

4.4.1.4 Kindergarten teachers

I asked kindergarten teachers about their experience when the kids were playing outside. I also asked them if they had any problems or wishes regarding sandboxes. When the teachers gave children toys that could be used in the sandbox the children usually spent their time playing in the sandbox. But if no toys were handed out the children played with other things like swings, slides and climbing-houses (pic 4, Empty sandbox).

A problem kindergarten teachers has is when their children wants to use bigger toys in the sandbox. Some toys like a mechanical sand digger needs a foundation to be able to stand in the sand. The digger is attached to a plate that is big and bulky. This makes it difficult when moving the digger from the storage shed to the sandbox. If it is left outside the risk of it to get stolen is too great. This problem could be solved by having holes in the frame as fixation instead of having it attached to a plate.
4.4.1.5 Competitors

I found five competitors that had products similar to Hags. These were Playdale, Kompan, Lekofritid, Lappset and Leika. Their products were compared to Hags using competing benchmarking (pic 5, competitors) the benchmark can be seen in attachment 4.

Most sandboxes today are very flat, and the frame are mainly used to keep the sand inside the box. This is of course its main feature, but there is an opportunity to do something different here as well as containing sand. Sandboxes are often placed in a location together with other playground equipment and compared to these the sandboxes look very plain and simple resulting in children playing elsewhere.
4.5 Concept generation and concept selection

4.5.1 Brainstorming

I had a brainstorming session together with Charlotta Lind, Fowad Iqbal and Jordi-hans Casadesús Balduresson. Topics for the brainstorming was,

- How to protect the sandbox from foreign objects.
- Shape of the sandbox.
- Accessories that can't be easily stolen.

Since it was a brainstorming many ideas that didn't match the topic came up. I organized these under new topics.

- Inspiration.
- Play.
- Other.

The input was summarized (Attachment 7) and used as inspiration for me in the concept generation.

4.5.2 Ideationsketching

Sketching has been a big part during the project as a way of developing ideas that have come up during the research but also for visualizing the ideas for others (pic 6, Cat-protection)(pic 7, Double protection).
Pic 6, Cat-protection
Pic 7, Double protection
4.5.3 Fieldtrips

I made visits to different playgrounds to study what equipment that already existed (Attachment 8), but also to observe children using them. When researching different playgrounds I saw that most of them were different except for the sandboxes that looked the same. Most sandboxes today are very flat and dull compared to the rest of the playground. Since it was winter in the beginning of the project not many kids were outside playing in the playgrounds. Instead I visited an indoor fun-park called Monkey Town. They didn't have any sandboxes or similar but they had a lot of other activities where children was playing. (Pic 8, MonkeyTown)

I noticed that parents who came there could sit and talk to other parents while having a cup of coffee or just sitting by themselves reading without having to supervise their children.

I went to K-rauta (a construction market) to find inspiration in other fields different from children’s toys and playgrounds. I shot photos of different items that I felt was inspiring (Attachment 10). It was very good to go somewhere that didn't have focus on children, it gave me many new ideas and a chance to reflect on the research I had done before.

I also went to toyshops to look at toys of today and compared colors, textures, materials to see if I could find any trends or special features that was frequently used (Pic 9, Toy stores).
I saw that most toys had bright colors with high contrast, this makes the toys easy to see and could maybe catch children's attention. A lot of the handheld toys are made from plastics which is cheap to produce compared to other materials such as wood which demands more operations in production.

4.5.4 Project suggestions presented at Hags

Concepts on different projects was presented for Marcus at Hags these where a combination of several ideas from the brainstorming. The first concept was to have several different sandboxes connected with each other (Pic10, Connected sandboxes). This makes it possible for children with different interests and age-groups to have their own section of the sandbox. The first concept wasn't interesting so it didn't go any further than this sketch.

The second concept was a house that is built on top of the sandbox. This could be used as weather protection but also to act as a kiosk or whatever a child's imagination could come up with. (Pic11, Playhouse) The backside of the roof could have a slide and a climbing wall attached to it taking advantage of that space for playing as well.
The Playhouse had some good solutions but also some problems, we had a discussion on how we could make it better. One problem was that the house had walls that could act as a trap for trash and debris that the wind could blow into the house. Instead an open solution without a roof but with walls that have openings where kids could run in and out through where suggested (Pic 12, Just walls). But in the end this was a product that they didn't want to go any further with and we canceled this concept as well.

I also presented concepts on how to prevent cats from using sandboxes as their litter-box. By researching what deters cats in different situations I found that cats walk on their toes which are very sensitive [12]. One solution could be to have the same kind of plastic grass that is usually used for wiping dirt from your shoes on. This might repel cats since the plastic straws could irritate their toes. This solution could also be used for wiping sand off kids shoes when they are leaving the sandbox. Another concept was to use water-spray to surround the sandbox during evenings and nights when the sandbox isn't used by children. The water spray should keep cats away by spraying around the sandbox. Together with lights illuminating the water-spray this could also be a beautiful sight at night. A third option could be to use a scent that cats don't like, a problem with this is that the sent needs to be refilled from time to time and this requires maintenance. It was decided to not continue with any of these concepts. The actual function needs to be tested if the solution is to be used at a different time (pic 6, cat-protection).
The existing solution for stopping cats and litter is to have a tailor-made canvas that covers the sandbox at night or when children doesn’t play in it. Instead of just having this as a separate part I suggested a second purpose. If it could be raised as a sail or a roof during daytime it could be used as weather protection. But if the cover is made in one piece the wind can catch it and this could cause high strain on the construction holding it, with the risk of it breaking. Instead strips of fabric could be used this would reduce the force from the wind but still act as protection (pic 7, double protection). When covering the sandbox it would act similar to a cattle-grid to deter cats from entering the sandbox, still making it possible for rain to dampen the sand. This idea were also interesting but was put aside for the next idea presented.

This concept was to have accessories that could be attached to the frame of the sandbox (Pic13, Using the frame). By having exchangeable parts different needs and demands could be met (pic 14, Modules). This could also give the sandbox a new profile compared to ordinary sandboxes.

Pic 13 Using the frame
I got a suggestion of having the parts that could be attached to existing sandboxes today. Renovating a sandbox is very expensive and it could be a good idea to make it possible to upgrade parts instead of the whole sandbox. After discussing this concept the decision was made to continue with this as my project.
4.5.5 Ideation sketching connecting the frame

To develop the concept ideation sketching on how to connect modules with each other was made. (Pic 15, Frame-connections).

Pic 15, Frame-connections
4.5.6 Sketch-modeling connections

I used soft foam to build sketch-models to test different solutions for assembling sections with each other. (pic16, Sketch modeling connections)

I realized that there could be a problem with the connection between the first and last section of the frame when an angle is used to change direction of the frame. To try and solve this I used paper that was cut in different shapes and sizes. By placing them in different patterns I tried to find a solution (pic17, paper puzzle).

The conclusions I made was, when a 45 degree angle is used the length of that side of the frame changes. This creates a problem for connecting the first and last part of the frame. This makes it necessary to have many different length of the sections (Pic 18, angled box).
I researched miniature car and train tracks to see how these solved the problem. The solution was to use many different lengths of the track-parts but also to use some flexibility in the material, this wasn’t possible for my parts. A solution could be to let the sandbox have an entrance so the frame don’t need a closed assembly see picture 18. If the sandbox is built symmetrically and with 2 opposing angles on the same side a closed assembly can be achieved, this restrains many possibilities for different layouts and becomes too complicated. Because of production cost and trying to keep the number of parts to a minimum (DFM/DFA) the solution with many different parts wasn’t suitable. Parallel to testing the sketch-models I evaluated the sketches from the frame-connections.
4.5.7 Sketch evaluation

To evaluate the sketches (Pic 19, frame-concepts). I used a Pugh decision matrix to do a comparison to an ordinary wooden sandbox-frame that I used as reference. The criteria's and importance was based on the earlier function analysis. Picture 19 can be seen as a larger picture in attachment 10.

<table>
<thead>
<tr>
<th>Design nr</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tr>
<td>Criteria</td>
<td>importance (importance)</td>
<td></td>
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<tr>
<td>Minimize assembling (labor cost)</td>
<td>2</td>
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<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Offer simplicity (for customer)</td>
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<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Enable manufacturing (few operations)</td>
<td>4</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Enable storing (at Hags &amp; retailer)</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Enable handling (weight &amp; size)</td>
<td>2</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Show innovation</td>
<td>4</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Offer ideas (for future products)</td>
<td>4</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Enable accessories (storage/benches/toys)</td>
<td>4</td>
<td>0</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>0</td>
</tr>
<tr>
<td>Be adaptable (for different needs)</td>
<td>4</td>
<td>-</td>
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<td>6</td>
<td>-4</td>
<td>14</td>
<td>-6</td>
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</table>

The results from the evaluation shows that design nr 5 that got the highest score with its function of snapping a part on to another.
4.5.8 Sketches based on the result from the Pugh matrix

While evaluating the different solutions I found a few problems that needed to be solved.

- For safety, parts should be easy to attach and replace by adults but not by children. This is to be certain that the part is attached in the correct way.

- An issue that could cause problems is if the frame is built on height. The force put on the frame from the increased leverage could break the frame that the part is attached to. This could happen while children are climbing and pushing/pulling on the part.

- Sketch 5 in the evaluation (pic, 19 frame-concepts) requires that the lower part of the frame has a special slot where the upper part can be attached to. If the part is to be used on an existing sandbox the centered wedge would be in the way.

Different solutions for making it possible to attach and at the same time strengthen the frame can be seen in Picture 20 (Pic, 20 stability). By using a solution that could be used for accessories that either build on height or don't would make it easier for laymen to install and/or change the part by themselves. It would also be possible to change between high and low accessories without having to add extra parts.
Pic 20, Stability
By using a supporting pole that have two adjustable endings that secures the accessory it could serve two purposes (pic 21, stability and attachment). It supports the frame by taking care of the extra force caused by the increased leverage, it also secures the part to the frame. By burying one end of the pole into the ground acting as a ground anchor the height and tension of the accessory can be adjusted (middle sketch in picture 21). The other end needs to be adjustable because of the thickness on the overlaying board that can differ on different frames. The adjustment can be done by using left hand threads in one end and a right hand threaded bolt in the other. For the first time the supporting pole probably needs to be installed by a specialist, but once installed laymen should be able to remove and install accessories by themselves.

The top sketch describes a solution for attaching the accessory if no supporting pole is wanted or possible, this isn't recommended for parts that build on height but could be used for lower accessories. The bottom sketches shows two different solutions for covering the holes where the bolts securing the accessory to the frame is. The left bottom sketch uses a transparent cover that can be used together with lights for illuminating the sandbox. The right one uses a thicker plate that also acts as a support for the frame. These solutions for attaching the accessory to the frame can be seen in the result chapter as cad rendered pictures.
Pic21, Stability and attachment
4.5.9 Concepts of accessories

An observation I made during my research studying children playing was that children easily gets distracted when they see something new or different. By making accessories that build on height and create a new profile for the sandbox I hope to achieve this. By making accessories that can catch the attention and trigger children's imagination the sandbox will be more interesting and exciting attracting them to play in the sandbox (pic22, Accessories). I made ideation sketches on accessories that could be used together with the attachment-system I developed. More of the sketches can be seen in attachment 11.
Some of the accessories are multipurpose to make the sandbox dynamic and some sketches are made exploring different types of play. A pattern of dents can be used for collecting and arranging stones in. For the youngest children the dents could just be something different that they could touch and feel. I made a concept where the part is foldable, when the part is unfolded it reveals a track for cars, when it is closed it acts as an ordinary bench with an edge that can be used to balance on. To test the functions and find problems in the design of the folding function I made a sketch model.

4.5.10 Sketch modeling accessory

The sketch model was made using soft foam, a hinge was used to simulate the folding mechanism. Since the track was immersed into the surface a problem occurred where the tracks meet on the two parts. The tracks created a hole between the top and bottom part of the model when the lid was closed (pic23, track 1). This created a risk of getting fingers jammed. The problem with the hole was solved by making the track level to the surface just before the edge. (pic24, track 2)
To make it possible for kids to reach the tracks without having to climb on top of the lids I cut out parts in the center of the track (pic25, track 3).

To make the surface interesting when the track is closed I immersed the surface slightly. This also keeps the sand inside the sandbox (pic26, track 4).

By making a cutout in the endings where the parts meet I tried to reduce the chance of getting fingers squeezed when opening the track. To determine if I had covered the risk I read the safety standards for playgrounds and unfortunately I had missed an important issue.

According to the safety standard from SIS [13, s.25] openings that can change during play must have a distance of at least 12mm. This creates a problem when unfolding the track. Since the parts need to rest against each other for support and for the track to be smooth the parts won’t have the necessary distance between them. Since safety is a priority the idea of having a foldable track was discarded. Because of the conclusions from the foldable car-track I tried to construct accessories without moving parts.
4.5.11 Accessories for the frame

To keep the idea of having a car-track as an accessory I made a track that built on height instead of the folded version. By using gravity children can put the car on the track and let it move by itself. The track continues into the sandbox where the child can build its own track in the sand. By giving the surfaces on the side of the track some relief it makes the part look more elaborate giving it shadows and structure. It also gives the youngest children something to touch and feel (pic 27, bridge). More ideas of accessories for play can be seen in attachment 11.

To illuminate the sandbox giving it a new appearance during the darker time of day I suggest using LED lights. These are mounted behind a sheet of transparent plastic that helps to disperse the light. This was tested using a piece of Plexiglas and bicycle light and the result was a nice contour of light. By dressing the sandbox with panels (pic 28, plated) a different look compared to other sandboxes can be achieved. I made a pattern that resembles waves of water but other patterns can be made to suit different customer wishes. The panels are attached to the edge of an accessory. To make it possible to have a sandbox with just lights and panels I made a thin bench that can be used for updating old sandboxes with new "clothes". The bench can also be used for replacing accessories when they become boring or for other reasons are removed, still keeping the possibility for lights and panels.
4.5.12 3d modeling

To visualize the concept in rendered 3D pictures I used Solid Works to make the different parts and assembled them into the final concept. Before I started constructing in Solid Works I made sketches that was used for reference (pic 29, PreCad and pic 30, PreCad2). Picture 30 shows the basic construction that will be used on all parts for attaching the part to a frame (Pic 30, PreCad2).
Approach and implementation

Pic 29, PreCad

Pic 30, PreCad2
When building the parts I have taken consideration for release angles for the molds to make it possible for molding. By using Solid Works drawings can be made directly from the parts instead of using a surface program such as Alias where the files needs to be rebuilt in a cad program before creating drawings (pic 31, Solid parts)
5 Result
This chapter shows the result from the project and is followed by a conclusion and discussion.

5.1 The final concept
The concept is to use the frame in existing sandboxes to add accessories. This is to make the sandbox more versatile and attractive for children in different ages and with different needs (Pic32, Sandbox in playground).

By using led lights in the accessory a nice shining line that surround the sandbox gives it a new interesting appearance (Pic 33, Led lights lit).
5.2 Description of functions

This chapter explains the different features and solutions off the final concept.

5.2.1 LED equipped bench

The main purpose of this bench-attachment is to make it possible to refurbish an old sandbox, making it more similar to the rest of the playground and to make it more modern (pic34, LED equipped bench). But also for showing how a modern sandbox with lights and different materials compared to wood could be. The bench is made to be attached to a t-shaped frame that uses a wooden board with the thickness of 45mm for the overhead plank. The thickness of 45mm is a common standard for wood studs and I have seen during the research that these are often used on sandboxes. It can be used on frames with other measurements as well but this is the optimal thickness.

The bench consists of 4 separate parts that are assembled in production. To use a modern material that are recyclable and giving new possibilities on shape and form the main part is made from rotational molded polyethylene. By moving the balance edge towards the center of the bench a new look and a different technique of learning to balance is achieved. The orange ledge has a different texture from the sitting/playing area. This is to create grip when balancing and prevent slipping and to give the surface a different texture to touch. The sitting/playing surface also has a different color and texture giving the bench an elaborated look. This is also to give young children more variations of textures that they can to explore by touch. The LED:s are mounted on a Plexiglas-sheet that are inserted into the bench. The LED:s makes the Plexiglas board shine in the color transmitted by the diodes making it possible for different colors and light effects. By using
12 volt for the LEDs problems with safety and weather-protections are avoided. The angled space between two bench sections creates a surface that can be used for playing.

5.2.2 Supporting poles

The supporting poles (pic35, supporting poles) have three major functions.

- To secure the accessories to the frame of the sandbox. Preventing it from moving. Together with a front-panel (explained next) it also makes it harder to steal.
- It supports the frame from breaking the frame caused by the force from the leverage that the accessory can create in upward and downward direction when a child is playing/climbing with on the attachment.
- It also guides the accessory into place when attaching or removing it.

Pic35, Supporting poles
5.2.3 The front panel

The front panel (pic36, front panel) is used to cover the sides of the sandbox, creating a new different look making the sandbox more interesting and exciting. It can also stimulate children's imagination. The shape of the plate can be made in other versions to give the customer the possibility to "dress" the sandbox to their liking. It makes the sandbox blend in with the rest of today's colorful playgrounds. By making the ends of the pattern aligned with each other no noticeable gap between the covers need to be seen. When put into place it covers the supporting legs and prevents access for loosening the poles holding parts in place.
5.2.4 Car track

The Car-track (pic37, car-track) is attached to the frame with the same system as the LED-bench. The car track can because of the straight endings not be attached in corners without occupying space from the part next to it. Because of this the track needs to have some extra space beside it. The curved part that extends the track into the sand is optional, with this attached children can use the entire sandbox as a construction site for a road. The supporting part that extends into the sand has a shelf that is buried under the sand providing support and keeping it in place. The narrow tracks in the middle of the track is made for playing with small glass balls. By not making the hole/culvert go through the car-track the possibility for kids to get stuck there is eliminated. Colors and textures on the track are different to what you could expect from a real bridge or road, this is done to give room for children's own imagination.

Pic 37, car-track
5.2.5 Castle

The castle (pic38, Castle) has no special functions and is used for stimulating children’s imagination, but also to catch their attention when playing in the rest of the playground. Since the parts are made by rotational molding they are hollow, this gives the opportunity to use lights mounted inside the part to color the part using the versatility of LEDs.
5.3 Exploded view

This view describes the different parts of the bench. (pic 39, Exploded view)
5.4 Presentational model

The presentation model was built using 3d printing for some parts and hand tools for some. LED:s were mounted inside the bench to show the effects of lights. (pic 41, Presentation model) More photos of the physical model can be seen in attachment 12.
6 Conclusion and discussion

So what is the meaning of a sandbox? It has as many meanings as there are stakeholders, this is because everyone has his or her own meaning of the product at hand, and only you can answer what the meaning is for you.

Children have different needs when they grow up and their meaning for the sandbox will change. But since the modules can be replaced with versions that better match their learning curve and interests the sandbox can stay fascinating and fun for a longer period.

Kindergarten teachers can replace modules by themselves without having to wait for experts to do the installation. And since the cost for one module will be moderate kindergartens can have different versions depending on the need.

One thing that I have learnt during the research is that children shouldn't be guided exactly what to do. They need to use their imagination and learn new things to develop their skills by themselves.

Since this is a product that I haven't found anywhere else it will give Hags a chance of being the only supplier of the modules, giving them a head start to their competitors. And hopefully making money from it.

By using lights in the frame the sandbox can serve as a decoration in a park or a backyard creating a new look and meaning for the sandbox.

By using different stakeholders I believe that I have come to a good result. But since this is design and not physics no one can say if it is good or bad. Only if the product is introduced on the market the response can give the answer to this question.

Things that can be made after this thesis could be to make more versions of modules that use the method developed for attaching it to a frame. Different patterns on the panels to make the sandbox match the environment the sandbox is placed in. A solution for the edges that occur between the panels when they meet a corner needs to be developed.

When I interviewed Marcus at Hags to find functions for the functional analysis I did it a bit late into the project. It would have been better to do this earlier when he wasn't aware of my ideas for the project.

I have realized that a project can grow immensely if the goal isn't set from the start and that I should have decided in an earlier stage what I was going to develop. It was easy to get into the wicked problem and not being able to continue forward.
7 References


### 8 Attachments

<table>
<thead>
<tr>
<th>Attachment</th>
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<tbody>
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<td>Accessories</td>
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<tr>
<td>Attachment 12</td>
<td>Photos of presentation model</td>
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8.1 Attachment 1 Notes from meetings with Marcus Söderberg at Hags

Meeting 1
This meeting was held at Hags in Aneby, this was the first meeting with Marcus. I talked about myself and what I wanted to do together with them. We looked thru my portfolio and Marcus talked generally about what Hags does. After this meeting Marcus was to come back to me with a answer if I could make my thesis with them.

Meeting 2
This time I showed the ideas on improvements on existing products but also suggestion on new products. We had discussions on how I could change things to better suit them. Marcus was interested in several of my ideas and copied them from my notebook. Then we had a discussion about what I should do for them, Marcus had 3 different suggestions. The one he liked the most was to make something that had to do with playing with sand. I got to borrow a cd with standards for safety on playgrounds. We decided that I should send him a project plan and suggestions for meetings.

Meeting 3
This meeting was held over telephone. I told Marcus what I had been doing since the last meeting. A competition benchmark analysis on competitors sandboxes. I explained the different solutions on the cat/litter problem. How you could use light to illuminate the sandbox and ad a water play at night to make the sandbox beautiful when kids isn't using it. I asked him what he thought about the idea and possibilities to manufacture sections with rotational molding with their sister company in United States. He liked the idea but said that they had a company in Denmark that does this for them. And that it would be a good solution to make it in US. He also had a suggestion that I should make some kind of container for toys and equipment in connection with the sandbox.

Meeting 4
This meeting was at Hags. I presented the ideas that I had come up with and showed sketches of them. We had discussions on a the suggestion on building a house over the sand box. The result was to remove the roof and to move one of the walls so the shape from above would be a z. This creates a weather protection but also makes a wall that can be used for different games. I showed the ideas of cat solutions that I told him over the phone at the last meeting. He was interested in the solutions where I had used nets or strips. He really liked the ideas of making big accessories in sections that could be replaced according to the customers’ needs and wishes. He thought this would be better than selling smaller equipment like shovels and buckets.
8.2 Attachment 2 Project specification

- Complete sandbox
- Protection from weather
- Protection from cats and litter
- Accessories for play
- Age group 1,5-5 years old
- Build quality > 10 years
- Size > 2*2 meter
- Manufactured per year 100-500
- Could be cheap or expensive
- Wheelchair access
## 8.3 Attachment 3 Gantt schedule

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<td>Activities at different Phases</td>
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### Project Plan

**January**
- Task A
- Task B

**February**
- Task C
- Task D

**March**
- Task E
- Task F

**April**
- Task G
- Task H

**May**
- Task I
- Task J

**June**
- Task K
- Task L

**July**
- Task M
- Task N

**August**
- Task O
- Task P

**September**
- Task Q
- Task R

**October**
- Task S
- Task T

**November**
- Task U
- Task V

**December**
- Task W
- Task X
8.4 Attachment 4 Competition benchmarking

http://www.playdale.co.uk/products/toddler-play-equipment/roleplay/sandbox/ (acc 2012-02-07)

http://www.playdale.co.uk/products/interactive-play/sand-and-water-play/sandbox-with-canvas-cover/ (acc 2012-02-07)

* Can sit without getting sand everywhere, can be closed
* Risk of crushing, Small size

* Simple, cheap
* Small, old fashioned
http://www.kompan.se/Lekredskap/Sand-och-vattenlek/-Sandlaada-M512P (acc 2012-02-07)

http://www.kompan.se/Lekredskap/Sand-och-vattenlek/-Sandlaada-NAT501 (acc 2012-02-07)

* The sit and play tables can be used by kids in wheelchairs
* Risk to get hurt were the metal connects the frame, not easy to get sand onto the tables
* Use connections in flexible material to get different shapes
* Cheap

* The corner tables blend into the frame
* Hard to get in and out of if you are small, wide wall edges invites to balancing act and wet wood is slippery when wet
* Choose the number of tables
* Natural colors and shape would fit the form language of Hags playgrounds
* Good looks nature inspired, can have any shape, easy to replace parts
* Takes a lot of work to assemble, A risk of getting splinters
* Could use the same idea with different material, Use the same size but of poles but in different shape, attach a bunch of poles for easier handling
* Anyone can make this
http://www.lappset.com/se/sv/Produkter/Sok продукции/Produkt_kort.iw3?prodID=16
0020-1 (acc 2012-02-07)

http://www.lappset.com/se/sv/Produkter/Sok продукции/Produkt_kort.iw3?prodID=12
2460M (acc 2012-02-07)

* Different and exciting shape, Differences in height, adaptable shape.
* Many details
* Could make a special corner for wheelchair access
* A new form on sandboxes

* More than a sandbox, weather protection
* Hard sharp edges, Wheelchairs can't get access
* Can use the poles for accessories
* Targets kinder gardens
Many different choices in shapes
Risk of getting stuck with fingers between sections, has the looks of a metal beam
Could be built on height
Built with modules like the one I am doing
Lid combined with a backrest, smart solution
Tight, risk for crushing, needs strong person to open and close it wood is heavy.
If made with lightweight material it could be more safe.
If it is built with a bottom it could be a cheap solution for kinder gardens
http://www.playdale.co.uk/products/interactive-play/play-panels/ (acc 2012-02-07)

Reflections on play board
Different, you can play by yourself or with friends, can be used by kids in wheelchairs. The glass could easily be worn, is suitable for older kids, Disadvantage it makes the playground less active.
8.5 Attachment 5 Design brief

1 The sandbox is for play in a safe, fun and developing manner.
2 It should contain sand and keep it inside the box. It should have a wall or similar with gadgets that could be used together with the sand. It should give children with disabilities the possibility to play there.
3 A fun place were the imagination can run free, there is room for me to play with other children. This is a place that you can come and play without the need for accessories. A place to make friends.
4 Children between 1,5 and 5 years. Some like to play alone and some like to play together and some don’t have a choice. Younger children need less advanced gadgets and can be happy with just sitting in the sand, when they become a bit older and develop their imagination they can use more toys together with the sand. The sand box should give a feeling of safety and a exploration which develops the imagination and should be able to adapt to shapes and sizes for the owner. This is a place for all children.
5 Soft shapes with different textures on the frame depending on placement gives the sense of safety. It should be built with modules to make it adaptable. It should have a deterrent feature for cats and foreign objects.
6 Safety and high quality is essential to reflect Hags brand, details and well thought true solutions.
7 The sandbox should fit in with the rest of Hags playground products.
8 All parts should be sturdy to reflect that the product is meant to last for at least 10 years.
9 Anyone can
10 Use sustainable materials

The sandbox is for play in a safe, fun and developing manner. Cats and foreign objects are not welcome here. All kids should be able to play here either by them self or together with friends. Kids should be able to develop their skills and imagination without having to bring toys. Different aged children have different demands and this should be taken into account. The sandbox should be adaptable in size and shape. Surface-textures in the right place can give a sensation of safety and quality. It should be easy to maintain both in repairs as in expansion. To fit the rest of Hags high demands for safety and quality, parts and details need to be made with care and good materials. Usage of sustainable materials has tomorrows children in the plan for a better playground. And last but not least the box should keep the sand in the right place.
8.6 Attachment 6 Modified functional analysis

Importance of functions according to Marcus at Hags

Ranked 1-5 where 5 has the highest value and then choose 1 to be most important (marked with *).

1. Easy assembly                      1
2. Fast assembly                      1
3. Have few parts                     3
4. Be storable (at Hags)              3
5. Be recyclable                     4
6. Have similar appearance as current products 3
7. Adaptable price                   3
8. Adaptable size                    3
9. Expandable                        2
10. Disable friendly                  4
11. Have different appearance compared to today's sandbox 3
12. Have protections against cats     2
13. Have protection against sun       3
14. Have accessories (storage, benches) 3
15. Use the frame for accessories (car track) 4*
16. Have a new frame for the sandbox  4
8.7 Attachment 7: Brain-writing/brainstorming ideas for concept

This is the result from the brainstorming/writing session with Lotta, Jordi and Fowad.

Protection against foreign objects

(Cat protection)
- Push a button to stop waterspray for the time that the kid will be in the sandbox
- Waterspray starts after a set time in the evening
- A fabric fence that can be raised, this could be used to keep kids inside the sandbox and cats from entering
- Have a fabric roof/top that can be lowered at night to keep cats out, this could also be used as weather protection.

(Clean the sand from foreign objects)
- Have a metal grid that can be raised from under the sand (hard to get back under)
- A metal grid that is pushed sideways

Play-board

- Fill a belly of a doll and when the belly is full he says something and needs to be emptied
- Use classic solutions discovering things, like paraboler (talk in one end listen in another.
- Use sound and light change in color
- Connect the board to different places, do things at one place and something happens somewhere else
- Have a board with many pages that can be scrolled sideways to see the next page
- Have a board that describes different sandgames.

Inspiration

- Have already made models to inspire kids into artistic sand forming
- Have a house with models inside that can inspire, should look like sand but be solid
Shape of the sandbox

- Have rounder shapes to the sandbox
- Have different heights of the sandbox where kids can move the sand around and create "new worlds"
- Not only use one sandbox but have several different connected, make it a large educating area.
- Have different areas with themes in the sandbox

Accessories

- Use cabinets for hiding game (hide the toys)
- Something to store cubes, spoons and toys

Play

- Treasure hunt (found elephant)
- Compete, have plates with different patterns or pictures that are under the sand, you search for these and cross match them to a board with the same pictures. The one that finds all first wins
- Balance with sand
- Form press sand
- Spinning wheel with sand
- Sand clock for play and competition
- Divide the sandbox in different colors (compete against the other side)

Other

- Hole in the bottom of the sandbox to let water out
- Have frame in different material than wood
8.8 Attachment 8 Photos of playgrounds
8.9 Attachment 9 Inspirational photos from K-rauta
8.10 Attachment 10 Decision matrix
8.11 Attachment 11 Accessories
Practice while your child is playing

**Step Up!**

- Extra distance to enable assembly
- Access for easy removal of sand
- Opening to shuffle sand from table into sandbox
- Table for building sand castles
- Support for stability
- Wheelchair access
8.12 Attachment 12 Photos of presentation modell