# TITLE PAGE

**Title:** ABRACE
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**Main supervisor:** Bente Dahl Thomsen
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**Product report:** 24 pages
**Appendix (USB):** 23 pieces

Endurance & Comfort



Kristine Kronborg Sørensen
Maya Maria Gulbæk
Simon Freundlich Jensen

# PROJECT DESCRIPTION

Within Industrial Design at Aalborg University, three co-students works together to develop and complete this master thesis project. This project adress the problems with interior, atmosphere and furniture within the psychiatry. More specific the closed departments. This assignment are formed in collaboration with NAU (New Aalborg University Hospital) and done with help from diverse staff in both Randers and Aalborg psychiatry.
The frame for this project, concerns developing a furniture fitting in the common rooms, helping the patient to be independent by controlling the amount and need of stimuli within the passive hours of the treatment.

# ABSTRACT

Dette projekt omhandler udviklingen af et møbel til psykiatrien, af tre studerende fra Industrielt Design på Aalborg Universitet. Produktet er rettet mod psykiatrien med fokus på sikkerhed, atmosfære og sansestimulering og er primært tiltænkt de indlagte patienter på lukkede afdelinger. Igennem projektet har der været adskillelige interview og møder med både personale og patienter i Aalborg og Randers psykiatriske afdelinger, som har dannet retningslinjer for produktet. Dette har været i sammenspil mellem teoretisk materiale og selvudførte tests.

Resultat er en lænestol, med fokus på at berolige patienten for at forhindre aggresiv adfærd, ved hjælp af stimuli til at afstresse sind og krop. Dette selvstændiggøre patienten ved ikke længere at skulle spørge om lov, til lån af sansestimulerende redskaber.

# PROLOGUE

In our project lot of different professions and companies have been helping and we would thank them.
NAU (New Aalborg University Hospital) for believing in us and to agree to formulate and cooperat.
Likewise thanking Malene Terp and Camilla Krogh from the management of the Northern Psychiatry.
It has been an important factor, that we where able to visit the psychiatries in Randers and Aalborg - so thanks to Jeanette Hansen and Charlotte Madsen for being engaged contact persons.
Thanks to BPI and Gabriel for giving valuable information and sponsoring materials for the final model.
Also a great thank you for all the staff we have meet doing our visits and different companies for answering questions.

# READING GUIDE

This report is divded into five sections:

1. Investigation 1
2. Investigation 2
3. Idegeneration
4. Concept development and deatiling
5. Business and production

- Sections are introduced with a short text and tests within are describes with a purpose and how it's done
- When a decision has been made or confirmed, findings are found or things needs to be elaborated, the icons below, will be present through the report
- Please be aware of the process have been iterative, but is put together linear.
- Yellow markings is something important
- The patient is referred as the user.

## AGRESSIVE BEHAVIOR DEFINITION

Attempting to inflict physical harm to self is a self destructive behaviour, while deliberately trying to inflict physical injury to others is called interpersonal violent behaviour. Aggressive externalizing behaviour is directing violently or aggressively impulses towards the surrounding environments or persons.

## FINDING

New findings and insights that affect further decisions, choices and requirements.

## ELABORATIONS

New insights or findings that needs further elaborations.

## CONFIRMING

Findings or elaborations that confirms previous decisions, requirements or choices.

## DECISIONS

New descision based upon finding have been made.

# TABLE OF CONTENT

# INTRODUCING ASSIGNMENT

The first initial meeting, were with the ward manager/ nurse Charlotte Madsen, Project Manager Helle Andersen and Head of the Office Heine Overby, which is a part of the construction of New Aalborg University Hospital (NAU). The meeting consisted of a presentation of the new hospital, with pictures and a 2020 plan for the psychiatry. The current furniture solutions within the wards were presented along with some examples of what is accessible on the market (presentation in app. 1). The meeting included matching of expectations in the further collaboration and an open dialogue of the problematics were presented, when working with furniture for the psychiatry.

*Figure 1. Common area at NAU.*

*Figure 2. Example on patient room.*

## 2020 PLAN FOR THE PSYCHIATRICY

Considerations about how the new psychiatric wards, both in a large scale and the individual rooms was presented. Within the new psychiatric building, two closed wards (S5 and S6) is placed right next to each other, only separated by the personnel's offices and common rooms (fig. 4), so the staff can move quickly between the wards. Each ward has several common rooms and areas for the patients, including exercise room, dining area, television rooms and more. At the end of each department are special quarters, intended for screening patients. In the middle of the wards is an inner courtyard, allowing the patients to move outdoors.

The presented renders (fig. 2-3) of the bedroom and the common area illustrates the needed wish for allowing the staff to form an overview, with see-through walls, reflective lamps and limited hiding spots. The renderings also gives an impression of what style, materials and colors are expected in the new facilities.

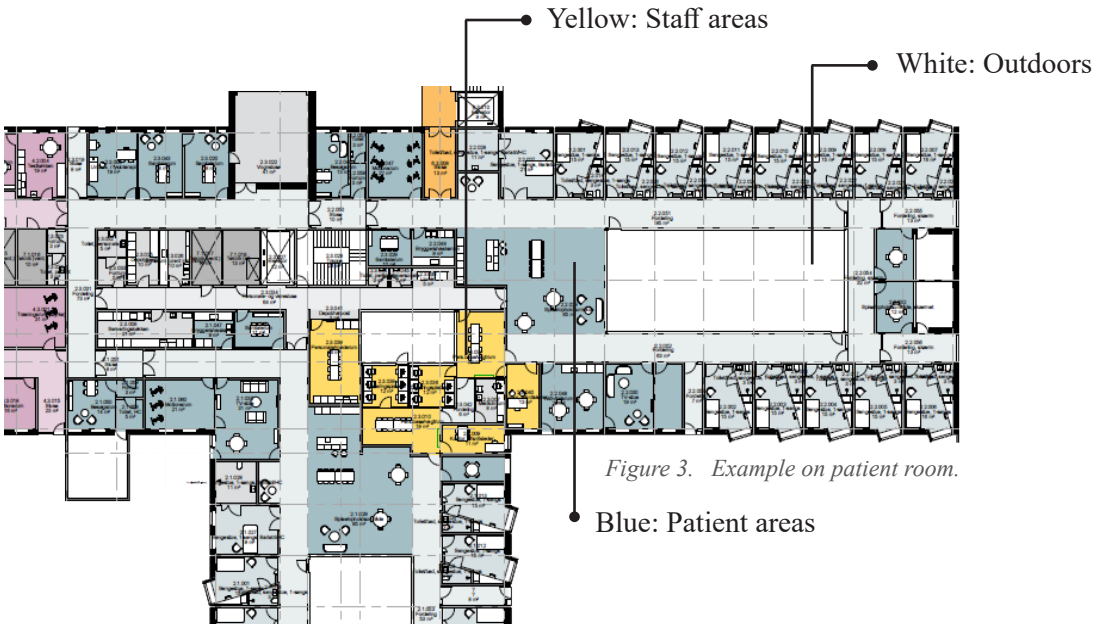


*Figure 3. Example on patient room.*

# THE ASSIGNMENT

The assignment concerns developing a furniture for the new psychiatry. NAU has different requirements for the future furniture, which comes from the problematics they currently facing in relation to aggressive externalising behavior from patients. The presentation and the following discussion afterwards lead to some initial needs, based on what the three involved representatives stated. Existing products in this area are not desired due to the aesthetics and functions. The psychiatric department are therefore forced to buy regular office furniture to some extend fulfil their requirements. They state that they need more customized and helpful furniture to avoid making their work even harder than it is. Within the psychiatry, furniture are also often changed, replaced or fixed because the patient's destroy them or wear them down fast.

## INITIAL FINDINGS

### FURNITURE IN RELATION TO PATIENT:

- It must not be possible to break of parts to create objects for self-harm
- Therapeutic functions like a rocking or other calming movements
- No possibility of hiding drugs or other in furniture
- Furniture have a calming/homely look
- Creating a private space in social setting
- The patient must be able to touch the ground

### FURNITURE IN RELATION TO STAFF:

- Furniture should be heavy so it is hard to throw
- Furniture must be so light that it can not be able to hurt others if thrown
- Furniture must be able to be wiped off

### OTHER NEEDS:

- Furniture must resist hard treatment
- Needs to fit the aesthetics of the departments

### VISION STATEMENT 1

We want to create a product design within behavioural healthcare at the psychiatric department that will create a better working environment and give the patients a better experience of well-being.

# INVESTIGATION 1

## INDENTIFYING, SENSEMAKING

Based upon the initial meeting with NAU it was important to understand everything in depth, to find focus area, by exploring the field. Due to this, the investigation include several cases

- What are the existing furniture?
- Visiting the psychiatry
- Departments, wards and patients
- Problems with furniture
- Use of furniture and rooms
- Zones
- Atmosphere
- User needs
- Next investigation


*Figure 4. Randers psychiatry.*

# EXISTING FURNITURE

**PURPOSE:** Locating functions and values for new insight can help to clarify functions and idioms for further development. This analysis is also to determine questions to ask, at our first interviews.

**HOW:** The existing furniture are to be presented to personnal, at the first visits at the psychiatry. Preventive furniture within Denmark and the United States of America, was found by a desktop research. Based upon the information given from NAU, each furniture was then given pros and cons and a "?" for elements we could not answer and dots for what we considered neutral (see app 2).

**OUTPUT:** The analysis showed that rotational molded furniture is the most common within preventive furniture and there is more focus on safety rather than aesthetics. Many of the different seating products do not accommodate homely aesthetics, but upholstery could make a big difference in the expression.
Takeouts from Aalborg and Randers:

- Patient can get anxiety sitting close next to others
- Fixed furniture makes patients feels trapped
- Staff dislikes institutional appearance but see the benefit in plastic surfaces (cleaning)
- Patients tampers with screws, hinges, buttons ect., just to keep themselves occupied

Often the focus in the existing products is tainted by the attempt to create value, by performing well with a single function, and by this deviating from other similar products. Some products are made as one single piece, making it near impossible to disassemble (no. 4, 5), others are made with an extra strong construction to ensure they cannot be taken apart no. 1. A couple of the furniture has functions who deviate more from the others, like no. 3 being a sound absorbent furniture, no. 5 being a rocking chair and no. 2 addressing the issue of users sharing objects with each other and hiding it from others (see comments in app. 3).

## FINDING

1. Values: **Comfort** in feeling comfortable in the environment and the furniture expression is comfortable. **Safety** for both staff and patients and by the construction of the furniture.
2. Idiom and appearence in this analysis shows that the furniture is focussed on durability and safety rather than aesthetics.
3. Single standing legs can be broken off/disassembly to use as weapon.
4. Fixed furniure causes patients to feeling deprived of liberty and can lead to agreessive behavior.
5. One person-seating is good due to struggels with close human contact (privacy/social).

## ELABORATIONS

It will be beneficial to look into the atmospheare within the psychiatry and different kind of spectrums to identidy the disred atmosphere (see p. 16-17).


*Figure 5. Outtake from furniture analyse.*

Figure 7. Randers psychiatry, 2017

> When entering a room, and the furniture has stains and alike, it just doesn't look nice to the ones who just got emitted and already feel horrible
>
> - *Charlotte, Nurse Aalborg Psyciatry (translated from danish)*

Figure 8. Randers psychiatry, 2017

Figure 6. Randers psychiatry, 2017

# FIRST INTERVIEWS

**PUPOSE:** Finding insights to understand the patient's behavior and which wards they are admitted in. Furthermore finding relations between the psychiatric environment and furniture and to identify problem related to furniture.

**HOW:** Through questions (app. 4) and pictures of existing furniture and a tour of the wards in Aalbog and Randers, different furniture was seen to explore the purpose.

## AALBORG ACUTE WARD S5

The visit at Aalborg Psychiatry found place at the intensive acute and closed ward S5. The patients within this ward are the worse cases. The contact person, Charlotte Pingel Madsen, head of the department, gave a tour after the interview. During the interview, Charlotte Madsen mentioned that they do not take care of patient differences as they would like too. This concerns the level and needs of different stimuli the patients can get and also levels of how social each patient wants to be. Right now they treat patients with music, iPads and outside walks, which is also some of the preventive methods they use on patient behavior (transcription in app. 4.1).

## RANDERS INTENSIVE CARE WARD E1 AND E2:

In Randers the closed wards E1 and E2 was visited. Leader Jeanette Brinch Hansen and nurse Maiken Hagelberg gave a tour at E1, along with the interview. The security and trade union representative of the facility Eskild joined the tour around E2. In Randers they have seen patients using rubberband from underwear or credit cards as tools for inflicting self harm. If they were capable at finding such things, it would be nearly impossible to remove all objects they could use. Jeanette Hansen presented catalogues they use whenever they were to buy new furniture, which often makes mixed furniture, because previous bought gets outdated (transcription app. 4.2).

## OUTPUTS

The interview leads to seven outputs:

1. Wards and patient illnesses
2. Problems with furniture
3. Use of rooms and furniture
4. Zones
5. Target group
6. Atmospheare
7. User needs

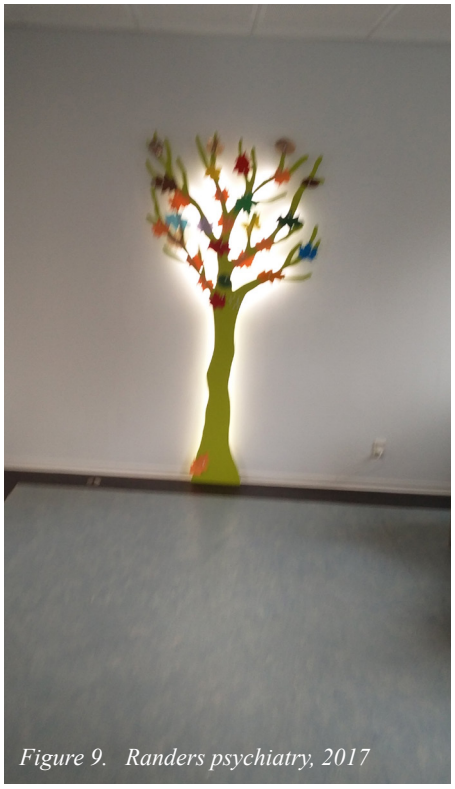

*Figure 9. Randers psychiatry, 2017*

*Figure 12. Aalborg psychiatry, 2017*

*Figure 10. Randers psychiatry, 2017*

*Figure 11. Aalborg psychiatry, 2017*

# 1 WARDS AND ILLNESSES

To form an overview of the various psychiatric wards and their purpose:

- Children and Young people
- Acute psychiatric
- Anxiety
- Personality disorders
- Manic-depressive
- Psychoses
- Forensic psychiatry

Besides these wards the region also has several of outpatient departments for: Anxiety, Manic and Depression, Drug and alcohol, Suicide prevention, Psychoses, Autism and Schizophrenia and more.

The acute closed department S5, specialises in intensive care for patients who are putting them self and or others at risk. S6 are very similar but primarily for long-term admissions. Department S9 and S10 is forensic departments for criminals with mentail disorders who are waiting for verdict or a psychiatric assessment.
The hospital also has a psychiatric emergency ward, which is the first place the patient goes before getting transferred to one of the wards [1] (read about S1-S4 wards and illnesses, app. 5).

## FINDING

1. In case of replacing broken furniture, it can be difficult to get parts or same furniture again, which creates mix of different furniture and chaotic atmospheare.
2. Safewards is an english method, used in the psychiatry. Safewards is about coercion and how to reduce it. It also gives information about patient behavior and what causes it. Safewards also has 10 steps of creating a better indoor environment for patients and staff [2]. See app. 6.

## ELABORATIONS

Investigate the cause of aggressive behavior, with help from Safewards and interviews.

## DECISION

The focus are the closed wards. Patients with aggressively behaviours are primarily found within these sections according to the head of the S5 department nurse Charlotte Madsen. Especially S5 is in focus since this is the emergency department, where they receive all kinds of patients, hereamong some of the most aggressive patients, because they haven't come to terms with their admission.

# FURNITURE PROBLEMS

**PURPOSE:** Identifing problems and subproblems with furniture and the consequences (fig. 13).

**HOW:** From the first interview, different problems with furniture in Aalborg and Randers was discovered (see app. 7).

## FINDING

1. The furniture should not appear worn down, because it can reflect on behavior and could start conflicts and vandalism that is unnessesary.
2. The furniture shall be able to be used normally by others people (visitors, nurses).

## ELABORATIONS

Looking into the environment and expressions of furniture, could give new insights in what requirements there is to materials, construction and the atmospheare the furniture should express.

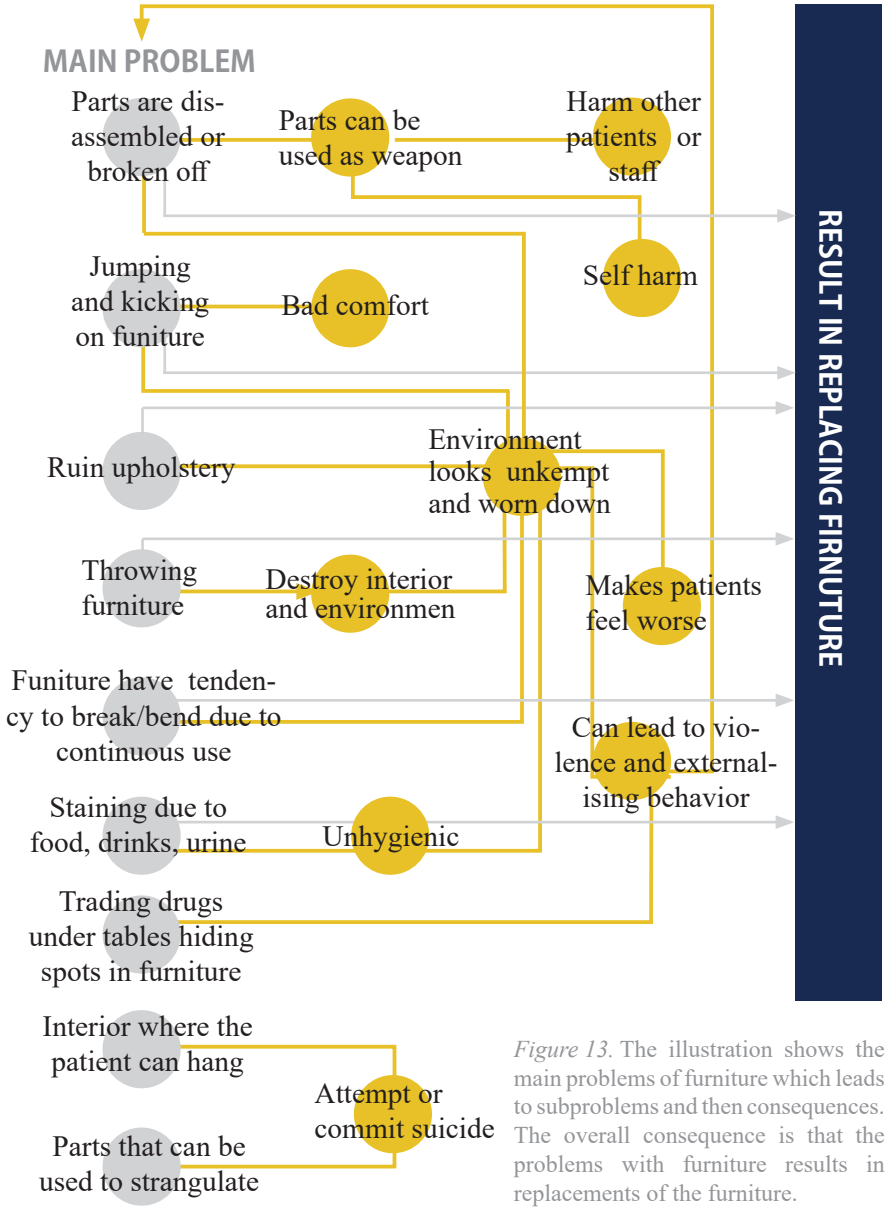


*Figure 13.* The illustration shows the main problems of furniture which leads to subproblems and then consequences. The overall consequence is that the problems with furniture results in replacements of the furniture.

# SECOND INTERVIEW:
# FURNITURE & ROOMS

**PURPOSE:** The purpose is to identify the use of rooms and different usage of furniture.

**HOW:** A mock-up of a room and small models of furniture was brought to get the staff to interact and show what they thought the most optimal room solution were (fig. 17).
Another tour was given and two new nurses Kathrine Bjørn and Gitte Andersen was attending (transcription and audio app. 8).

### DINING AREA:

Some dining areas, are half common room and half dining area. The area of dining consist of a long table with dining chairs. These light chairs are those mostly throuwn. The chairs often break and needs to be replaced once a month. Lamps within these areas, are hanging along the ceiling wtih knots, to prevent patient taking out light bulbs or strangulation in electrical cords. In dining areas, conversations are held, during breakfast, lunch and dinner.

### COMMONROOM:

The common rooms are the most used rooms. They contain different activities, like playing piano or watching TV. Within these rooms, armchairs and ball chairs are used to relax in, but also to have conversations. These chairs are therefore not only placed in common rooms, but also in therapy rooms. In common areas, rocking chairs and armchairs with a high back are the most popular one, because it is here the patient is able to be social but still feel that you are private. The patients also put armchairs together, to make a sofa and are often sleeping within this area too.

### PATIENTROOM:

Within the patient bedroom, it is required that the only furniture here, is a bed, a chair and a small table. In some room closets are already build in and others have smaller dressers. It also differentiate if the patient has a TV, and a computer in their room. Due to strangulation, no curtains are allowed. Within the room, there is no lights on the walls either, because the patients have a tendency to rip them out of the wall.

According to nurse Kathrine Bjørn the patient are allowed to go the their quarters if they need to, but are not encourage to stay there for too long. The patients can have a tendency to isolate themselves from other people, which is not optimal for their treatment. This is also, why the patients quarters are so cleaned from objects, so the patients are not encourage stay there, but if they do it is because they do, they are getting overstimulated.

Others: Other rooms like fitness room, conversation room, contains different furniture and equipment.
Pillows and blankets has been bought to create some cosiness, but due to stealing this is not a sound solution and therefore the personnal that buys this themselves, have in some sense given up on creating better atmosphere.

## FINDING

1. Being social is a part of the treatment, to prepare them to get out in public.
2. Patient move around the furniture to get more cosy or to take a nap. The staff sees this as a problem due to they have to move it again.
3. It's important for the patients that the staff are visible and available. Likewise important for the personnal always to see the patient to prevent possible aggresive behavior.

## CONFIRMING

Due to the personal space, an armchair would be preferred, as the patients can have a better control over their personal space, confirming fnding 4 on p. 7.

## DECISION

1. The areas chosen to work with are the common areas.
2. The furniture should be for one person, due to the patients get a better control over their personal space.

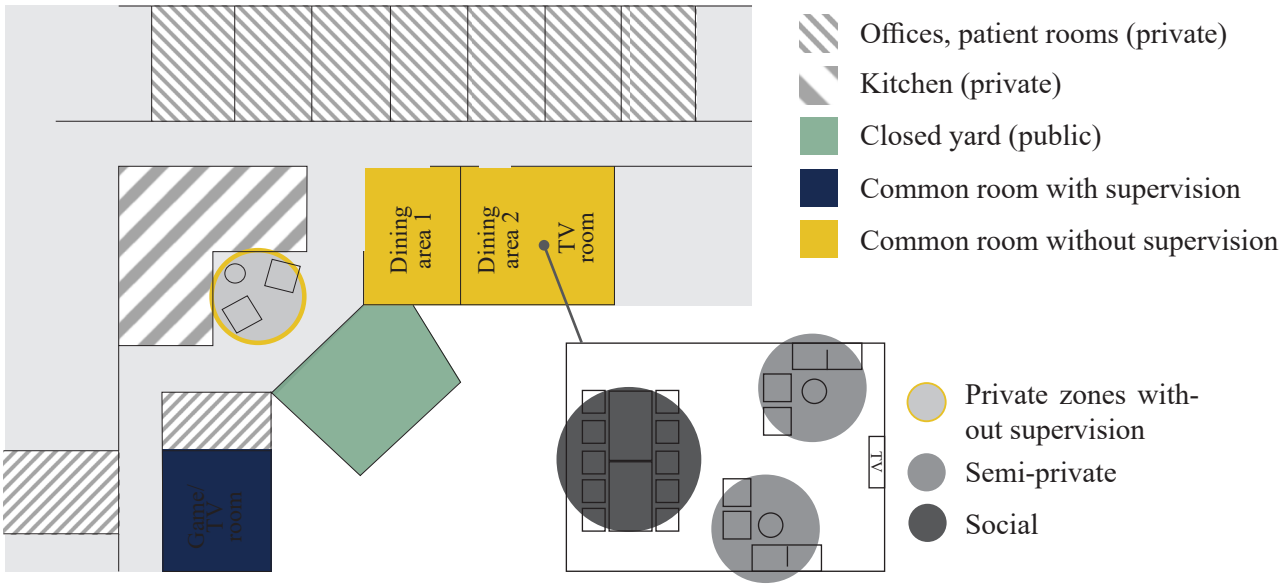


*Figure 15. Overview of a part of the psychiatry in Aalborg.*

*Figure 14. Illustration of the best room solution according to staff with marked zones.*

## ZONES

The psychiatric wards consists of different zones. Some are private, social and semi-private like the common areas.
During the second interview, nurses were asked if they were able to set up the most optimal interior solution (in the common room), with help from small models. The result of this were what they already had, due to this solution is acutally working very well.
Around the psychiatry is different zones that could be relevent places, for the solution to be used too.

To illustrate this, a figure (fig. 15.) has been made to give an overview of the different zones in the psychiatry in Aalborg. A decision have been made to work with common areas and the zones within.

As fig. 15 shows, there are different zones within the common room. The zones are both social but some are more private due to the placement of the furniture. It does not force one to be social in the semi-private setting. This room are without supervision.
There is also small zones in corners at the psychiatry. These corners allows the patient to be private and alone with possibility of listening to sounds, due to the speaker incorporated in the corner. This corner is also a place without supervision.
In the other end of the psychiatry, is a game/TV room, which is locked. This can only be used with supervision most of the time.

*Figure 16. Left side of the commonroom, that the nurses were decorating with models.*

*Figure 17. Nurses interacting with models.*

## DECISION

It was chosen to focus on the common areas, that patients are able to use without supervision, which makes the patients more independent.

# TARGET GROUP

On page 9 it is chosen to work with the following wards: S5, S6, S9 and S10 which consist of:

S5: Closed ward

S6: Open ward

S9, S10: Forensic ward

## WARDS AND PATIENTS

As the closed acute ward is in focus throughout the project, the open and forensic wards are still relevant due to the aggressive behaviour that patients has (see the definitions of the wards on page 9). The differences between them are not big, as the open wards can function as a closed ward, if there is any need for it. On the open wards there is more people running around, also family members. Depending on how ill the patient is, it also determine which ward is best for the patient. Except from the forensic ward.

Though there is some behaviours/illnesses that are strictly for the closed wards. This could be patient with suicidal risks or patients with a high level of psychoses and hallucinations, like those that can't tell the difference reality and imaginations. Often those people with an aggressive behaviour, are within the closed wards to both take care of themselves and others. But within the acute closed wards, as S5, it's important to always have a few free beds in case of new patients arriving. Therefore do the open wards in some cases, receive patients that are not ready for the open wards. This is why the open wards also experience aggressive behaviour and are a part of the target group. Within the forensic wards, patients are hospitalized for an indefinite period and therefore there can be frustrations that lead to aggressive behaviour.

## MEETING A PATIENT

Up to this point, it has not been possible to get in touch with an admitted or former patient, due to ethical reasons but through a new contact (see page 17), this is no longer an issue. A former 28-year old patient, has agreed to participate in an interview to contribute the project. Since he was 13 he have been dealing with depressions and manic periods and have been admitted several times.

## USERS

Below here are stated the users of the product:

Admitted patients

Caretaker (Nurses, health-service assistants)

**The Patient** are the focus as the main user of the product. They should use the product for watching TV, taking a nap, reading a book or just wants to be private within a social area. It's different for each patient how much time they spend for themselves in their private room or in the common rooms, even though the staff encourages to be social with others. They spend most of their time reading, taking naps, listen to music, walking up and down the corridoors or watching TV. The ward provide activities such as ping-pong, fitness facilities, board games or playing videogames (app. 8).
These are people that suffers from depression, manic, bipolar, anxiety, personality disorder, schizophrenia or psychosis, that in some cases also are in relation to a substance abuse or crime. The admitted patients are 18+ years and could be male or female. Needs that are essential for the patient, are listed on p. 18-19 and marked with a "(P)".

**Caretaker**

The caretakers (nurses and social and health-service assistants) are those who still interact with the product when it comes to maintenance. This group of staff are those who interact with the patient on daily basis. Staff creates relations to the patients and help them forward in their treatment. They always have to ensure that they are alert in case of conflicts or if other staff needs help. Beyond this, the staff also have a lot of paperwork, delegation of medicine, conversations and observations and therefore the product shouldn't give staff additional work.

## COURSE OF TREATMENT AT S5

Based upon the two meetings there have been, a phone meeting with an psychologist and the meeting with the former patient. An example of a course of treatment within closed wards is explained below.

The patient always goes through the acute psychiatric emergency room for clearing

From here the patient goes through different personnels.
The doctor helps with determinates how bad the patient health is, what needs there is, which medication and too which ward the patient is admitted. A social worker helps with the practical things that needs to be taken care of, if they are not able to do it themself.

Within 24 hours of this first meeting, a plan for the treatment will be set.

24hr

During treatment there are conversations with a psychologist a few times a week and conversations with the contact person. Occupational therapy happens 20 min. pr. day or less (depending on the patient) to see what the patient are able to do physically and mentally. Defining the patient's health and change of medicine if necessary or to be stimulated to control the behaviour.

The patient each has a contact person which will observe daily, likewise the other available staff. Two times a day in shift hours, informations are shared to always update the staff about patient behaviour.

When the treatment is finished the patient will go back home. If relapse happen it starts from the top again.

RELAPS

# AGGRESIVE BEHAVIORAL REASONS

There are different factors to why a patient will have an aggressive reaction. The factors can be both internal or external (app. 6 for more information).

### PERSONNEL TO PATIENT:

- If the personnel sets limitation for the patient's behaviour
- If the personnal does not take care of the patient's needs and wishes
- If the personnel deliver bad news.

### PHYSICAL ENVIRONMENT:

- Frustrations of furniture and equipment that does not work or looks worn down
- If the patient is screened for long periods of time

### OUTSIDE THE HOSPITAL:

- Patient struggles or has loss of family and friends
- Crisis, bad news about people or incidents outside the hospital

### PATIENT TO PATIENT:

- Patients can have difficulties having to cope with others patient's behavior

### THE PATIENT:

- The patient hallucinates and reacts upon it
- Imaginary or actual loss of liberty.

[3]

# THE ATMOSPHERE

**PURPOSE:** Determining which atmosphere(s) the furniture should fit within.

**HOW:** A broad spectrum of atmospheres. 11 different interiors was defined by three rooms: Livingroom, bedroom and dining area (app. 9). This was brought to accommodate the observed types of rooms during our interview. Each atmosphere where commented in Aalborg. In order to still get inputs from the department in Randers, the style-board were sent by E-mail with a description of how to answer the survey. As final the staff was asked to choose which were best.
To verify the opinions, literature was read and the former patient did also comment of the atmospheres, to see if staff and patient aligned.

## LITERATURE

How well and fast patients are discharged in hospitals recover, besides the direct influence of their treatment, influence from the quality, accessibility and sustainability of the physical environment is also an important factor to keep in mind [4]. In psychological healthcare, this may have an even larger impact of the patients recovery time than in the somatic departments. In order to recover as a patient with a mental disorder, the first step for the patient is to feel comfortable within the healthcare facility. Several areas attributes making this possible, some of which is the elimination of environmental stressors. Such as poor design, crowding, noise, poor indoor air quality and light. Avoiding visual disturbance by creating a calm environment with lighting, furniture and colours also has a positive effect. There has been conducted several studies in how to arrange furniture in semi-public settings, in order to strengthen socialising between the users. Charles Holahan found that allowing and encouraging patients to freely arrange the furniture in such areas had a very negative effect on the amount of socialising between patients. Instead, the largest amount of social interacting occurred with the furniture prearranged in small groups [5].
In 1964 Richard Olesen documented the positive effect of having warm, living room-like atmospheres with upholstered furniture, window curtains, rugs, wall papers and more, in contrast to traditional institutional-looking furniture on hospital [6], and The facility guidelines institute (FGI) has since 2009 published several updated papers regarding therapeutic environment and design for healthcare facilities psychiatric departments. FGI emphasis that patients with different backgrounds, have very different views on a home-like environment. They state that a better focus would be to focus on making the furniture non-threatening, and making sure the patients can feel relaxed and comfortable. Paying attention to the use of colours, texture and natural materials such as transparent wood finishes [7].
To many of the patients, the purpose of each room should be clear, for them to understand how to use it. For patients admitted for a longer period of time, has influence on how their quarters are decorated means a lot, but it is important that this freedom, do not lead to chaotic impressions in their rooms [8] (app. 10).

> I think that it matters how the furniture looks afterwards. It is what makes a difference, because it does not look very pretty. And if you have nice things around you I also think that it has a calming effect. It invites not to destroy things, if it's nice to be in.
>
> *- Charlotte P. Madsen, Nurse and Head of the Department of S5 (translated from danish).*

**GUIDELINES**
- Natural materials
- Woods
- Study looks

**GUIDELINES**
- Natural materials
- Plants
- Varm colours
- Wood nuances
- Grey tones


*Figure 18. Chosen atmospheres*

## CHOISES FROM STAFF

At the moment, S5 has squared black furniture and have nature wall-paper on their walls, to give a cosy feeling, which is a step on the way what Richard Olesen also documents. They have and are still trying to implement coloured pillows and blanket, to make it feeling more warm and cosy, but due to patients often steal it, take it with them back home or just down to their own bedrooms, the rooms of S5 quickly looses their cosy feeling. The more simplicity of the furniture but still express the cosy atmosphere, would be the most optimal. At the same time, simple furniture also what the psychiatry has the longest time.

The staff chose three different atmosphere as the spectrum they wanted most (no. 1,2 and 3 below). Each of them accommodstes a cosy feeling and the feeling of home, that they thought was important as they think it improves patient behaviour. Already they experience that ruined furniture do not have a good effect on patients. The worn and damaged look furniture has, due to the treatment the furniture gets, patients seems to doesn't care about ruin the furniture even more (app. 8).

## CHOISES FROM PATIENT

Even though that patient are admitted in different timespans, it's still important that it does not look like a sterile white minimalistic hospital, due to it effects your mental, according to the former patient.

The feeling of the atmosphere becomes too cold, whereas it should be cosy and warm.

The patients needs to get "ready" to come home, so creating a home feeling should be a balance, because it should not be a place to want to be rather than in own home. The more warm colours and wood there is used, it creates the cosy feeling because of the combination of materials. Warm colours is preferred and plants due to it gives balance and calmness. The patient did thereby chose atmosphere 2 and 3.

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### FINDING

1. It's a good thing that the furniture is simple and easy to read. It shall not be to quirky, because patients with psycohses can get anxious and panic.
2. Loose obejct like blankets, iPads and pillows are often stolen. So for further adue it's important to keep this in mind, so the furniture will not lose functions.

### DECISION

It was chosed to work with atmospere 2 and 3 (fig. 18). Atmosphere 1 was a part of the decision, but after talking to a former paitent, Marco, it was confirmed that it was to minimalistic. The other two atmospheres has a lot more to offer, in case of cosyness and feeling home. It got more personality, which is important within the psychiatric wards because it can have a calming effect.

### CONFIRMING

Confirming choises, the literature both confirm statements and the staff and the patient.

### ELABORATIONS

There is a need for styleboards of which kind of furniture, idioms, and colours fits within the chosen atmosphears (see p. 52).

*Figure 19. Discussing atmospheres with nurses.*

# USER NEEDS 1

**PURPOSE:** Purpose is to identity user needs. Following user needs are prioritised in order.

**HOW:** Information from previous interviews, have been interpretation into user needs through statements from transcriptions. "Product Design and Development"'s "Customer Statement" was used. The statements are written in relation to a context, to understand statements and needs. The needs are put into categories and are prioritised with definition of stars (*) where three are the most important [9] (app. 11).

**OUTPUT:** Below every need are listed in a prioritised order within different categories. Through analyse, some of the needs are not used, as they are arguement-related or specific statements from interview that are important to keep in mind and used later, see app. x for which). The listing contains following indications: P = Patient both from staff perspective and patients own, S = Staff and SP = Staff and Patient.

## ELABORATIONS

These needs are used later to create and define requirements for the furniture on page 32.

### SAFETY

*** The furniture must not break into sharps (SP)
*** The furniture make patients unable to share objects and drugs (P)
*** The furniture do not provide remedies to commit suicide (P)
** The furniture must not have detachable parts (SP)
** The furniture must have rounded edges
* The furniture is heavy and difficult to throw due to safety (S)

### CONSTRUCTION

*** The furniture can not be disassembled (S)
*** The construction is durable (resit throw) (SP)
*** The furniture material is durable (S)
*** The furniture can resist physical violence (P)
*** The furniture can resist dynamic force (P)
** The furniture upholstery is stab-proof (P)
* The furniture canno have breakable legs (SP)

### APPEARANCE

*** The furniture should be balanced and subtle in expression and idiom (P)
*** The furniture expresses durability (SP)
*** The furniture should be in natural colours and materials (SP)
*** The furniture is modern (SP)
*** The furniture shows no harsh treatment (P)
*** The furniture looks comfortable (P)
*** The furniture can not have bright colours (P)
** The furniture can't show screws/connections (SP)
** The furniture is something that could stand home (S)
* The furniture contributes a cosy feeling (SP)
* The furnitures colour should make it appear clean
* The furniture should be available in different colour variations

**RELATIONS**
*** The furniture gives the possibility of privacy (P)
** The furniture encourages to socialise (P)
** The patient shall not be able to hide (SP)

**FUNCTIONS**
*** Patient belongings can be locked away (P)
** The furniture should be noice reductive (SP)
* Movable furniture is impracticable to staff (S)

**MAINTENANCE**
*** The furniture material is “stain-free” (S)
*** The furniture is easy to clean (S)
*** The furniture has a long life span (S)
*** The furniture material can resist excessive use (friction) (P)
*** The furniture has a long life span (P)
* The furniture is repairable (SP)
* The furniture can be used to take a nap (P)

**FEEL OF USE**
*** The furniture is comfortable (P)
*** The furniture can be moved (P)
*** The furniture make the patient feel free (P)
** The furniture should not make noise (S)

**MISC.**
*** The furniture is practical (S)
** The furniture shall be easy to move (S)
** The furniture shall not be too big (S)
* The furniture do not contain small objects (P)

# INVESTIGATION 2

## INDENTIFYING, SENSEMAKING

Based upon a new focus of direction, it is important to understand the whole preventive perspective. This second investigation consist of:

- Conflict management
- Visiting the psychiatry at S9 and an occopational therapist and their sensory rooms
- Human apperatus and stimuli
- User needsz

# A NEW FOCUS

## A NEW CONTACT

In our investigations with the staff, we have collected a lot of information regarding their considerations. The personnel does however often seem to be very focused on practical aspects of the environment. Seeing important aspects of the furniture as durability, easy maintenance and safety. This has given us a valuable knowledge of the base our product needs to cover, but many other aspects may be equally essential to consider. During the first month of the project, it became clear that the project was leaning towards safety, due to the single perspective we have had - staff's perspective. Other aspects to consider was the opiniones from patient's point of view, which can be read on page 12-15 that we were lucky to get. Through an article which where about a former admitted schizophrenic patient, we chose to contact the person, to see if she could provide any help for us. Camilla Krog was interested and wanted to contribute with more than just her point of view. Camilla has knowledge to NAU and have also been cooperating with them. She is educated within Industrial Design at AAU and knows our process. She works with involving the user (patient) in different projects, related to the Northern Region of the Psychiatry, where she also works. She understood that we had an issue of creating contact to patients and because she is a member/leader of a peerboard consisting of 18 different patients, helped us use this as a possibility of involving the users. Through this contact, new insight and perspectives came from a former 28- year old bipolar patient, that wanted to share his opinions.

## AN UNEXPECTED TURN

Cooperating with Camilla Krogh and her partner, Malene Terp, we tried to turn our project into a stronger direction. Currently the psychiatric departments throughout the country is working hard on reducing coercion and the methods used for this, is focusing on preventing the need for coercion before it becomes a necessity. Therefore together with Camilla and Malene, it was determined that rather than use safety and the atmosphere/aesthetics as the main focus of the project. To give the furniture more value, our furniture should be preventive. Having in mind that all three elements (safety, aesthetics/atmosphere and preventive element) needs to be processed and mixed together. To aim strongest in our target group, it was also chosen that it should be the passive hours we should aim for. This is the time where patients really needs something more than what they have.

From here the second investigation starts by exploring the possibility of creating a furniture which can contribute to the prevention of aggressive behaviour, rather than entirely focusing on the safety when such situations occur. Occupational therapist working within the psychiatric department are now to be involved in the process, to better understand the patient perspective too. Likewise are the patient involved even further in the project.

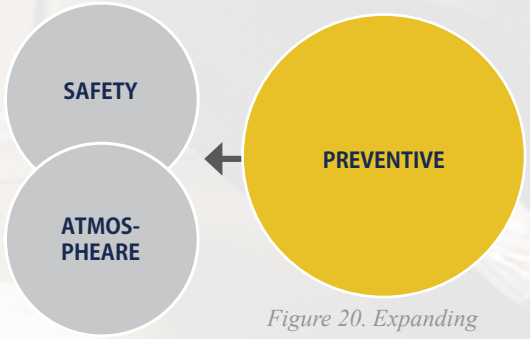



*Figure 20. Expanding to preventive.*

*Figure 21. Visiting sensory room.*

# COERSION

The psychiatric departments in Denmark has set a goal to half the use of coercion before the year 2020, and some regions has already reached this goal. Departments located in Ballerup, Slagelse and Esbjerg minimised the use of coercion with minimum 50 percent already achieved years before their deadline. The department in Ballerup has reduced the use of restraints with drastically 96 percent, and other departments have not used it for years. Anne Witthøft writes the success in Esbjerg is achieved through the new physical environments, and changes in the personnel's culture. They allow the patient to throw with objects, if the action is not directed towards a person, and have increased the focus of ongoing dialogue with the patients. Extensive renovations and the possibility of various stimulating activities is also a big part of the success in Esbjerg. Extensive renovations has also been made in Ballerup, in order to make the staff more visible for the patients, to make it easy to find and contact the personnel if needed. The entire staff in Ballerup have also been educated in de-escalation and conflict resolving methods [10, 11, 12, 13]. The psychiatric departments' current focus of reducing the coercion, is using the physical environment and resolving conflicts before they develop into something dangerous. Implementation of patients, both currently and previously in treatment, alongside with occupational therapist should provide valuable information for the user needs in this project, to archive a solutions that fits within the preventive focus.

## CONFLICT MANAGEMENT

Within the psychiatric departments, conflicts can never be completely avoided. Nurses working within the department possesses multiple communicative skills, from their education as well as their experience, to help avoiding situations leading to conflicts. can use their knowledge about the patient to derive what reactions and signals indicates an escalating behaviour. Many conversations between the nurses and patients constantly improves the understanding of expectations and reactions, through scheduled meetings but also through spontaneous dialogs. The model next page (fig. 23) illustrates some of the methods used both by nurses, patients and the administration, to resolve conflicts with in the psychiatric wards in Denmark. It is inspired by Anna Björkdahls model, and is divided into primary, secondary and tertiary prevention in the vertical direction. The horizontal directions consist of positive recognition, self-adjusting, and effective structures. The bottom of the model represent, when the patients is peaceful and calm. Here most of the focus in on preparation, helping the patient understand the rules within the wards, the mind-set of the staff, and how various behaviours are perceived. It is also here the staff and the patients collaborate, to find what aggravates the patient and what calms them. all to help the nurses analyse the patients and help resolving conflicts when they occur. The middle of the model represent, when a conflict is starting to arise. Here the suitable action plans of the organisation can be taken in use [15].

Even though they also posses techniques to handle conflicts and aggressive externalising behaviour, avoiding the conflicts with deescalating techniques are always preferred. The nurses must of cause be capable at spotting when a patients behaviour starts escalating towards something that could become a conflict. To understand how conflicts develop, "the conflict stairs" (fig. 22) can be used, as a representation of a typical escalation. It shows an escalation up until the behaviour reaches a point where physical interference is required to avoid a dangerous outcome. If the conflict can be resolved prior to this, the need for coercion is far less likely to occur [15].

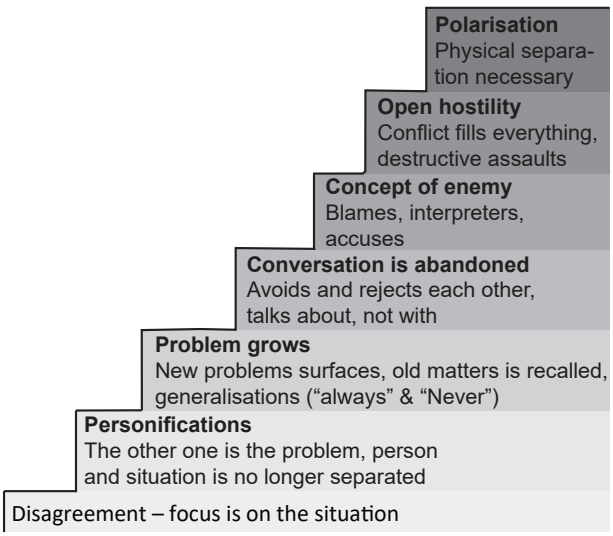



*Figure 22. Escalation of conflits [15].*

When the nurses interacts with the patients, they make sure to provide recognition for the patient, to show the patients they understand their fears, anger, owerlessness or what makes them sad. When the nurses spends time and effort to engage with the patients, in order to understand them better, they can use their knowledge about the patient to derive what reactions and signals indicates an escalating behavior. Many conversations between the nurses and patients constantly improves the understanding of expectations and reactions, through scheduled meetings but also through spontaneous dialogs. The model below (fig. 23) illustrates some of the methods used both by nurses, patients and the administration, to resolve conflicts with in the psychiatric wards in Denmark. It is inspired by Anna Björkdahls model, and is divided into primary, secondary and tertiary prevention in the vertical direction. The horizontal directions consist of positive recognition, self-adjusting, and effective structures. The bottom of the model represent, when the patients is peaceful and calm. Here most of the focus in on preparation, helping the patient understand the rules within the wards, the mind-set of the staff, and how various behaviours are perceived. It is also here the staff and the patients collaborate, to find what aggravates the patient and what calms them. All to help the nurses analyse the patients and help resolving conflicts when they occur. The middle of the model represent, when a conflict is starting to arise. Here the suitable action plans of the organisation can be taken in use.

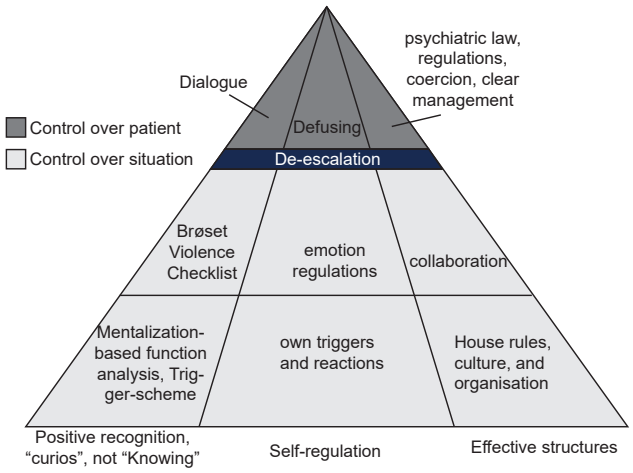



*Figure 23. Anna Björkdahl, illustration of coersion and conflicts [14].*

The rules of the house supports the staff and patients, in clear indications of what is prohibited and what is allowed according to the law. The patient can be assured that the purpose of the control is to defuse the now aggressive reactions to the conflict. And the staff are aware that follow up meetings to the event, will be used to insure their experience and feelings are considered, as well as the patient's.

## MEANINGFUL DESIGN

It is obvious that the psychiatry uses and test different methods, when it comes to handling aggressive patients. But talking about how to handle conflict, the team wanted to make a design that gives more than just a chair. As previous said, the purpose is to create a preventive designed furniture that is meaningful.
Looking into Anne Björkdahl's triangle, it becomes clear that the objective is to create something that could have a grounding effect giving the patients the possibility of being deescelating and in control of their own treatment. The chair is a part of the house and an equipment for the staff to use when a patient are in need of getting relaxed. But the patient shall also be independent by chosing by him or herself that they are in need of stimulation and therefore choosing to use the chair and thereby be regulated before an escelation are happening and the staff needs to interfere.

## CONFIRMING

The focus should be on the experience the patients would value, when interacting with the furniture. While also investigating the possibilities of including some kind of stimulation or activation to prevent the aggressive externalising behaviour within the product. This gives the possibility of handling conflicts outside the active treatment. Meaning within the walls of a psychiatric ward, the patients get the needed energy for the daily life, and the relaxing opportunities, through the active treatment but also in the passive hours.

## ELABORATIONS

To start the second investigation a meeting with an occopational therapist is arraged to understand which preventive elements to stimuli there is. Making sense to understand what was stated during the first interview also, about how to aim as most patients as possible though they have differencies.

*Figure 24. Maya trying sensory equipment.*

> ”Sensory integration is emerging, no doubt about that. Sensory impressions, sensory integration, furniture’s impact and patients’ surroundings they have huge significance.”
>
> *- Occupational therapist Thomas Nielsen, Aalborg Forensic department (translated).*

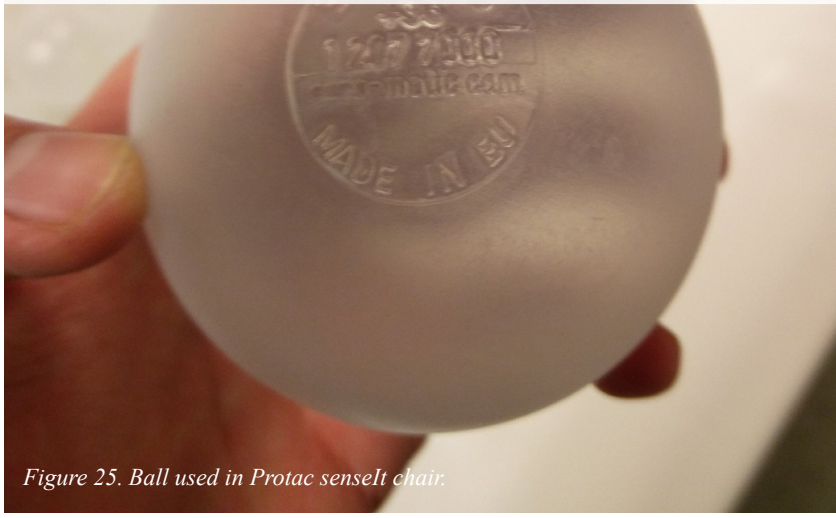


*Figure 25. Ball used in Protac senseIt chair.*

# MEETING AN OCCOPATIONAL THERAPIST AT S9

**PURPOSE:** Identify which “tools” what could be preventive in the design to reduce aggressive behaviour.

**HOW:** Questions will be asked to gain the wanted knowledge and to do that a meeting have been set up with an occupational therapist.

## AALBORG PSYCHITRIES SENSORY ROOM AND THE FORENSIC WARD

According to the association for occupational therapists, sensory rooms makes patients relax. Andreas, which is a patient within psychiatric center in Frederiksberg, says that these types of comfortable rooms with activities makes him feel free, because he have no other options besides being in his own bedroom [16]. The activities is made with both small and big equipment, which helps the mental and motor-skills agitation that patients may have everyday. The center in Frederiksberg, do also have sensory objects, that the nurses brings around, if needed.

This could be different objects that gives a messaging feeling, or pillows with build in music and more. It gives the patients possibilities that some of them might not usually have, due to their condition [16]. During our interview with Thomas Nielsen, an occupational therapist working at S9, different stimulation activities was tried (see pictures). Thomas specified that this kind of treatment could for some patients happen once a day in 20 minutes. For those patient who are not allowed outside access, same possibilities goes as for patients at the center in Frederiksberg. Because activities with an preventive effect has a positive influence in patients active treatment in their everyday life, this should be considered as an important factor to incorporate in the furniture [17]. Mental disorders often have consequences for patient education, working conditions, social relationships and basic chores. Therefore, as chairman Gunner Gamborg also says that occupational therapy can prevent and replace coercion in psychiatry.
Occupational therapists and methods related thereto, thereby helps people with mental disorders to create an everyday life, when they are discharge. with is both beneficial for those psychiatric patients and their relatives [18].

From the interview (transcription app. 12) Thomas was able to give a tour at S9. Likewise helping to define patients and the difference between the intensive wards and the forensic ward. If we look at the similarities at the different wards we had visit, two things are clear regarding the patient target group: There are two types of patients - those who have the permission to go out and those who have not.. During the interview is became clear that the patients that are not able to go out, is often lacking stimuli and activation and thereby wondering around to self-stimulate themselves. The reason why some patients are not allowed to get access anywhere, since some patient are not

*Figure 26. The group trying out a ball tub.*

well-functioned or "healthy" enough in their progress of treatment. So to get a more specific direction, the furniture needs to be aimed for those patient with limit actions and denied access. Thereby helping the patient getting better by providing stimuli in their daily life during their treatment, which can contribute to granted access and improvements in their passive treatment. These stimulating opportunities could then prevent escalations and therefore aggressive externalizing behavior and coercion - thought it should be considered that every patient are different to each other, and some might not be relaxed and effecting by the same elements. To determinate which stimulation is most optimal and understand the arousal in it, the physiological aspects of the senses are investigated as seen on the following page. Thomas Nielsen works at the forensic wards and therefore a tour was given. Unfortunately pictures and phones were not allowed.

From this interview one outputs are defined and explained on the following pages whereas this interview together with literature will be used.

**OUTPUTS:**
1. Stimuli and arousal
2. Needs

## FINDING

1. Patients that are not allowed access to go outside, do not get the same stimuli as those patients who does..
2. Information about stimuli and how body and mind reacts to it (this is explained on the next pages).

## DECISION

Within this interview, it became clear that patients that are not allowed outside access to get stimuli, gives us an challenge to make a furniture with stimuli that are for those patient that are not alowed to go outside, which can effect and contribute for the passive ours and improve their mental state.

## ELABORATIONS

Find preventive, objects and stimuli for inspiration (app. 13).

# SENSORY APPARATUS

People with a mental health disorder can have difficulties with their sensory apparatus. It can either mean that they lack some sensory abilities or can be overstimulated in specific senses which can lead to aggressive behavior and anxiety (app. 12).

## THE SEVEN HUMAN SENSES

The human body consist of seven senses, which can be divided into two groups: the proximity senses and the distance senses. The proximity senses is the the ones that makes the human body move and able to function in everyday life, where the distance senses are not in direct relation to the body.

### PROXIMITY SENSES

**TACTILE:** The tactile sense is activated through receptors in the skin. The skin perceive all kind of contact; pressure, vibration, scratching, humidity and softness.

**VESTIBULAR:** The vestibular sense makes the perception of our body in relation to the gravity's influence on the body. It tells how the direction (up/down, back/forth) and change of speed of the body.

**PROPRIOCEPTION:** The body's ability to perceive itself. The proprioceptive sense tells where every body part is relative to the neighborhood part, which is detected with receptors in the joints. It allow us to plan our movements, which strength is acquired, know what pressure to conduct on object etc.

### DISTANCE SENSES

**VISION:** The sense giving the ability to see colours and light = see the world.

**AUDITORY:** The ability to hear sound.

**OLFACTION:** The ability to smell and detect scents.

**GUSTATION:** The ability to taste flavours.

[19].

People who have cognitive complications, mental health illness or some kind of deficit disorder where there is damage in thinking or processing of thoughts, can have problems with their proximity senses. For an example, when you get an input which could be some kind of pressure, then the brain process it to understand what's happening through the proprioceptive sense. But people who have cognitive difficulties might not get the same impression because their proprioceptive sense does not work optimal, which make it hard for them to have a sense of where their own body relative to space - like a baby, that has not developed the sense and therefore fling with all limbs. For people with mental health illness it can lead to anxiety and aggressive behavior. In this case, the patient need proprioceptive stimulation in form of pressure to the body that gives a comforting feeling and awareness of the body's existence. Like understimulated senses needs to increase, overstimulated senses needs to på decreased. People with a mental health illness often get tactile overstimulated by people touching them, leading to discomfort and aggressive behavior. To decrease the overstimulation tactile sense, a tool could be the a ball-stick, which is a massage ball that distance the directly human contact but address the problem in graduated manner (app. 12).

### AROUSAL

When a person gets stimulated, it can be in an appropriate level of arousal, under- or over arousal level. The arousal can be defined by the brain's ability to receive sensory perception. It includes both psychological aggression, anger, confidence, fear etc.) and physiological (breathing, heart rate etc.) components.

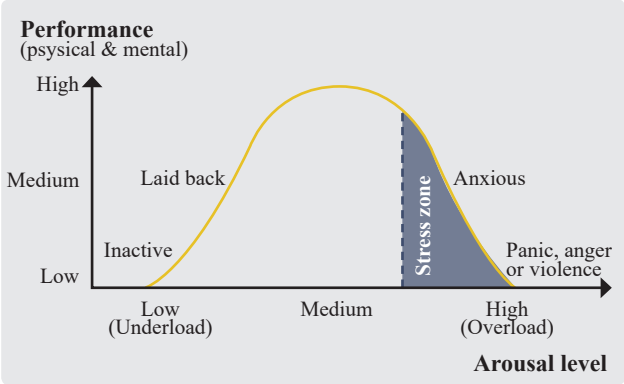



*Figure 27.* Model showing performance and arousal level[17].

The model (fig. 27) shows how low stimulation results in under arousal, which leads to laziness, inactivity and in worst case decrease of sensory functions. Too much stimulation results in overarousal, which leads to stress, anxiety and worst case in violence behavior [20]. The arousal and the ability to self-regulate has a significant impact on the brain function and therefore how we act and perform as human. A good

self-regulation makes it possible to be stable in transition of ifferent psychophysiological conditions, that affect emotion, cognitive and behavior.

A normal functional brain can regulate the level of arousal by controlling the extent of neurons that works together. this way the brain is possible to find the optimal level of arousal in a given situation, because the central nerve system are able to process incoming sensory stimulus to appropriate behavior - this means, that the brain is able to shift to low arousal, relax and go to sleep without racing thoughts. Contemporary with it is can also shift to higher arousal giving good and healthy performance. If a brain is dysfunctional, it can not regulate between the level of arousal and has difficulties being stable. The self-regulating system can be disturbed in multiple brain levels, because the self-regulating system works on different levels of the brain.

The limbic system is where emotions, mood and social adaptability and memory is modulated. A part of the limbic system is hippocampus, through hippocampus is where a sensory effect happens on the cerebral cortex, so that the sensory input is given a emotional value that will be stored in the memory. Along with the limbic system, the cerebral cortex also modulate the mood, by affecting the limbic system with different neurotransmitters like dopamine, serotonin, adrenaline etc, which are hormones that influences the mood and mental state. If the limbic system is damage it can cause depression, psychosis and personality disorder [19].

People with a mental health illness can either have decreased or increased sensitivity towards different kind of sensory input, which leads to unstable arousal level. Depending on the situation, it is different what kind of stimulation there is needed to get the patient to a more stabilised level. As mentioned earlier, increased senses needs to be decreased and opposite. The canadian occupational therapist Amy MacDonald divide sensory stimulation into categories; sensory entertainment, sensory stimulation and sensory integration.

- Sensory entertainment is a sensory bombardment, which can be compared to a trip to the amusement park. It is a concentrated level of sensory input, that can be experienced as uplifting and life-giving. Sensory bombardment can harmful for people with a mental disorder, because they can have trouble sorting the impressions or are sensitive to certain sensory input.
- Sensory stimulation are stimulation that increases sensory function that does not work optimal. Sensory stimulation focuses dividing the senses and stimulate one sense at a time. Sensory integration is where the senses are stimulated to perform - meaning providing stimulus that will give the person the proper arousal. The “hungry” senses must be stimulated, either in form of decreasing the over responded senses or increase the under responded senses to achieve a healthy level of arousal [19].

## BALANCING SENSES AND AROUSAL

| SENSE | INCREASE AROUSAL | DECREASE AROUSAL |
|---|---|---|
| **Tactile** | Massage, ballpool | Touching, stickball, footbath |
| **Vestibular** | Rotianen on chair or around self and swinging. | |
| **Proprioception** | Activities ball games, active wii, balance board, and large movements f. ex swing exercises, stretching, pressure (ballsack-chair and ballpool) and massage. | Deep presure, fx from ballstick, ballsack-chair, masage, vibration |
| **Vision** | disco ball, lights, colours etc. | Calming pictures and lights |
| **Auditory** | Music with faster rhythmic beat. | Soft music (beat on 60). |
| **Olfaction** | Different smells: coffee, cake, oranges. | |
| **Gustation** | Tastes of sweet, sour, salt - fx. candy | |

*Figure 28.* Tabel giving an overview of arousal.

**! FINDING**

Stimuli can be incorporated in the furniture, as a function to prevent aggressive behavior.

# SUM UP

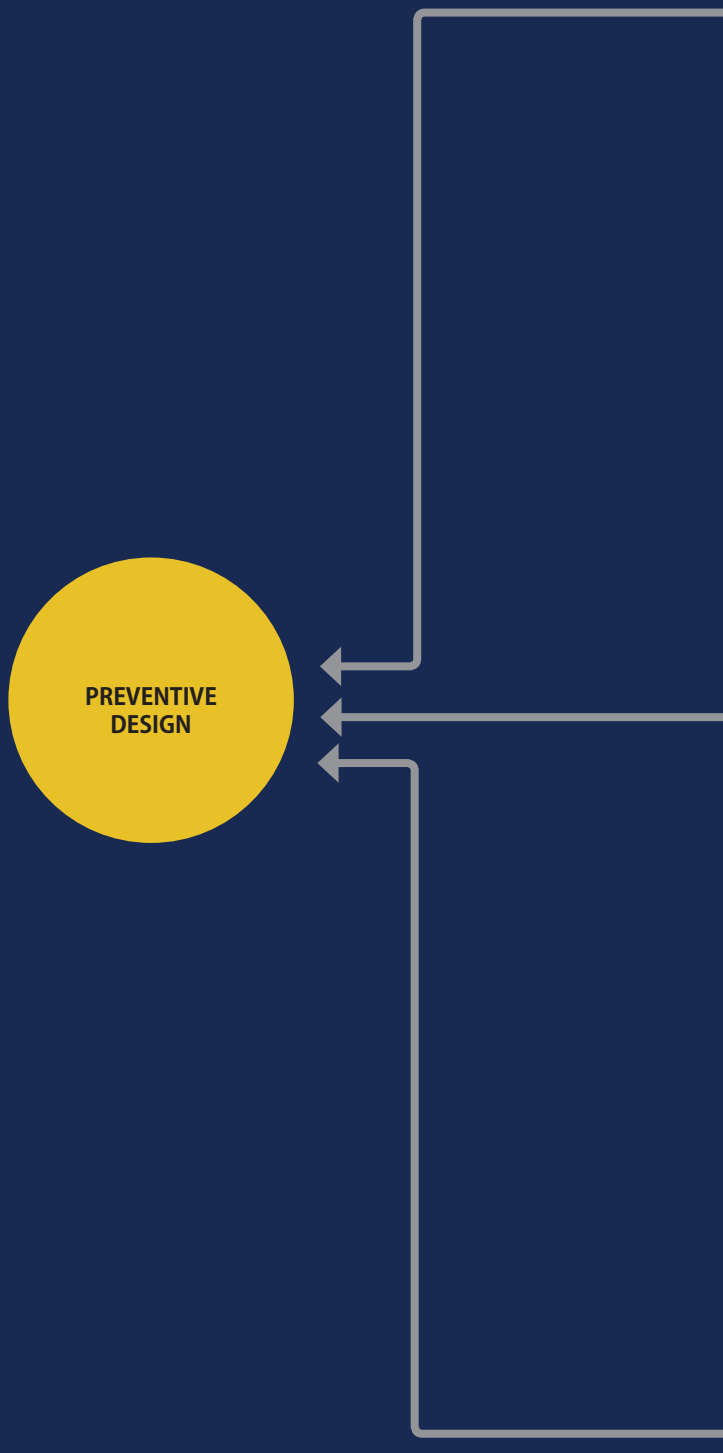
As mentioned on p. 21, an element preventive element/function was incorporated to give more value for the product, beside the two elements: safety and atmosphere. Investigation gave new knowledge that resulted in the decision of doing a preventive design in relation to aggressive behaviour.

Safety and atmosphere will be combined, because literature validated by the nurses and patients (p. x), shows that the atmosphere affects one mentally. When being in an environment or having a product that expresses something you like, as cosiness, home, warmth or comfort, that patients and nurses both would like, you have less reasons to ruin it. This can be interpreted as the product's atmosphere and expression are a preventive element, due to what affect is has mentally.

Safety and atmosphere are to elements within creating a preventive furniture, but through the visit with the occupational therapist new insight were revealed. One additional element to improve the capability to prevent aggressive behaviour, could be imbedded in the furniture. Through investigations in the human body senses it was discovered that a preventive function could be stimulus, to calms the patient by stimulating the body. So to create a complete preventive design, these three elements needed to be combined.

The market today, with furniture consisting of these three elements are non-existing, which means there is a new market. There might be a furniture with a combination of stimuli and safety, e.g. the rotational moulded plastic rocking chair (fig. 31, furniture 1). An example on the combination of atmosphere and safety could be "Nobody Chair from HAY (fig. 30, midt below).

To develop mixed furniture, inspiration of the different elements  wanted in a preventive design, is needed. To do this, products within each element existing on the market are found. These products should provide an overview what safety, the atmosphere and stimuli is in existing products.




## ELABORATIONS

Knowing we want to combine atmosphare, safety and stimuli, the expression we want to have, based upon the chosen atmosphare and these inspirational product, a styleboard has to be made (see p. 52).

ATMOSPHEARE

*Figure 29.* Examples of home looking furniture.

SAFETY

*Figure 30.* Examples of furniture focussing on safety.

STIMULUS

*Figure 31.* Examples of stimuli products.

# USER NEEDS 2

Based upon the interview with the occopational therapist Thomas and informations from the former patient, regarding stimuli, new needs have been defined the same way as described on p. 18-19.

**OUTPUT:** Below every need are listed in a prioritised order within different categories (app. 14).

### APPEARANCE

*** The furniture should invite to casual and non-formal use (P)
*** The furniture should be easy feasible and have a clear purpose (P)
**** The furniture should provide a stimulation that is easy feasible and clearly shown. (P)**

### FEEL OF USE

** The furniture provides psychical stimuli (P)
*** The furniture should be calming to the patient (P)
** The furniture should provide an impression of being surrounded/protected (P)
** The furniture should be calming in a distractive way (P)

### FUNCTIONS

***The furniture should provide sensory experience (P)
*** The furniture should be a part of the treatment and help improve the patients state (P)
**The furniture should provide the possibility of being active, without during sports (P)
** The furniture should provide an adjustable, swaying movement with the possibility of disabling it. (P)

### RELATIONS

** The furniture should only provide space for one user at the time

### STIMULATION

*** The stimulation should not be distracting for people not using the furniture (SP)
*** The furniture should activate the patient and relieve their restlessness. (P)
*** the amount of stimulation should be adjustable. (P)
***The furniture should provide stimuli for the passive hours (P)
***The furniture should provide stimulation, without the need of supervision (SP)
**there should always be the possibility of reaching the ground (P)
** stimulation should be applied on separate parts of the body (P)
**The furniture should provide the possibility of proprioceptive stimulation (P)
**The furniture should provide the possibility of vascular stimulation (P)
** patient who are not supposed to be calmed, should be stimulated by self-inflicted movement. (P)

### ELABORATIONS

These needs should be used to create and define specifications for the furniture on next page.

# FRAME

## CONTEXT

The field of focus in this project, is making a preventive design for the common rooms of the psychiatric departments closed wards. The product shoud be an option for the patient, in the passive hours.

## PROBLEM DESCRIPTION

Aggressive externalizing behavior is a common problem in the psychiatry, especially in the closed wards where the patients are deprived of their freedom. The aggressive externalizing behavior can occur by multiple reasons and have many consequences. The chosen problem area concerns problems within safety, stimuli and atmosphere.

**SAFETY:** When patient conduct aggressive externalizing behavior towards the furniture it can result in broken furniture and interior. The furniture and environment can be worn down and in worst case thrown furniture. occasionally parts can be broken and used to harm staff, other patients or self-harm. Extreme violent behavior can result in patient being under forced restrains.

**ATMOSPHERE**: The environment has an influence on the patients' mood and behavior. An environment that feels unfamiliar, unwelcoming and worn down can worsen the patient mood. it can make it harder to accept being admitted and slow progress of treatment. If the interior looks worn down or vandalized it can lead to more vandalism.

**STIMULUS** : There is a lot of time during the admission with passive hours. Due to limited access to facilities that provide different forms of stimulation, the patient has many hours where they need to pass. This can lead to aggressive externalizing behavior due to lack of stimulation. If the patient need a form of stimulation they have to contact staff for them to provide it.

### VISION STATEMENT 2

We want to create a preventive product design within behavioural healthcare for the psychiatric department that helps improve the patient's treatment, by giving them the opportunity of being stimulated or activated during the passive hours of the daily life in the wards. Giving patients a better experience of being at ease and also to create an optimistic, comfortable and safe working environment for the staff.

## MISSION

To create a preventive furniture three elements needs to be incorporated: safety, atmosphere and stimuli (fig. 32).

**STIMULUS:** The furniture must provide stimuli for different needs with the purpose of calming the patient – the stimuli should be able to decrease restlessness, provide grounding and comfort. The furniture and it's functions must be available for the patients at all time without having to ask staff for it or be observed while using it.

**ATMOSPHERE:** The furniture should be within to the desired atmosphere and have an inviting, welcoming and cozy expression. The furniture should look familiar, giving the feeling of something known and safe.

**SAFETY:** The furniture must not have parts that can be broken or elements to do self-harm or strangulate.

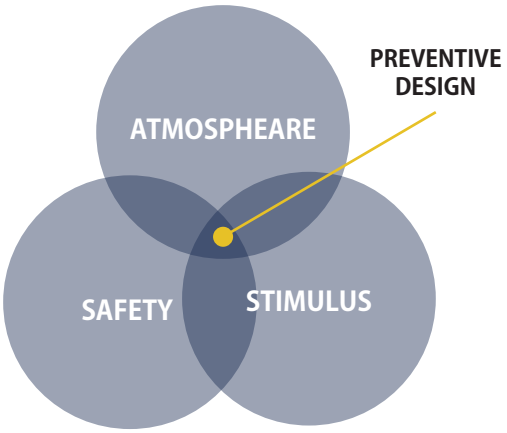



*Figure 32.* Preventive design.

# SPECIFICATIONS

These specifications are based upon previous interpreted user needs and findings during interview, analsis and research/literature. They are seperated in three categories: Functions/feel of use, appearence and safety/contruction. Within these, there are “need to have” and “nice to have” whereas nice to have, are prioritated in order, within each category.
Take into considerations, that right now, there is not many quantitative specifications, but during test and experiments some of the qualitative specification turns into quantitative. These are marked with “(L)”.

## QUANTITATIVE - DEMANDS

- The furniture material is min. 80.000 martindale
- The furniture ways approxiamtly 40 kg
- The foam for the furniture must be at least 35 kg/m³

## QUALITATIVE - DEMANDS

### STIMULUS AND COMFORT

- The furniture is for one person
- The patient must not be able to hide from staff
- The furniture has good comfort (L)
- The furniture must not be fixated to the floor/wall
- The furniture makes patients unable to share/hide objects/drugs in the furniture
- The furniture provides a psychical stimuli
- The amount of stimulation must be adjustable (L)
- The furniture must provide stimulation, without the need of supervision from staff
- The patient should be stimulated by a self-inflicted movement when using the furniture
- The stimulus can’t destract other when it is in use
- There must be a possibility of reaching the ground with feet, when using the furniture

### ATMOSPHERE

- Harsh treatment must not be visible on furniture
- The furniture do not show screws and connections
- The furniture must be in natural colours/materials

### SAFETY

- The furniture must not be able to break into sharp pieces when tumbled or ruined
- The patient must not be able to strangulate with help with/or in furniture
- The furniture can resist physical violence like kicks, punches and tumberling
- The furniture can resist a dynamic force (L)
- The furniture material is stain-free
- The furniture is easy to clean
- The furniture shall not be too big (L)
- The furniture and material must be fireproof
- The furniture must not have breakable parts
- The furniture cannot be disassembled without tools

## QUALITATIVE - WISHES

### STIMULUS AND COMFORT

1. The furniture should provide an impression/ metaphor of being surrounded/protected/safe
2. The furniture has multipule seating positions
3. The stimuli of the furniture must be easy feasible and intuiative for the user
4. The furniture accomodates being social
5. The furniture should calm a distracting way
6. The furniture can be used to take a nap
7. The furniture makes no noise (materials/use)
8. Stimulation should be applied on separate parts of the body

### ATMOSPHERE

1. The colour should make it easy to appear clean
2. There should be different colour variations

### SAFETY

1. The furniture have rounded edges
2. The Furniture should be sound absorbing
3. The furniture has repairable parts
4. The furniture material is stab-proof

# VALUES

These are the overall values that the furniture should makes the user feel, when using the product. The values are also clarified below, by being divided into additional values for both patient and staff.

COMFORTABLE

AT EASE

SECURITY

*Figure 33.* Values.

## STAFF

### INDEPENDENCE

- Being capable to satisfy their needs without depending on staff.
- Being in control of your mind, and capable at stopping racing thoughts.

### PEACE OG MIND

- Stress relief through stimulus
- Relaxation by feeling secure and without responsibilities

### COMFORT

- Feeling embraced and shielded.
- Feeling comfortable and safe in an inviting environment.
- Comfortable in being in a social setting, with the possibility of privacy.

### FREEDOM

- Having various opportunities of activities to choose between.

### SECURITY

- Removing possibilities for self harm

### BALANCED

- Being able to change focus away from thoughts.

## STAFF

### SECURITY

- Don't fear of violent behavior from patients.

### SAVE TIME

- Less concerns about maintenance (changing upholstery, furniture) and cleaning.
- Less time spend on accomaditing patients needs for stimulation.

### OPTIMISTIC

- The ward/rooms gives a welcoming feeling towards new patients, without broken or worn down surroundings.

### EQUAL

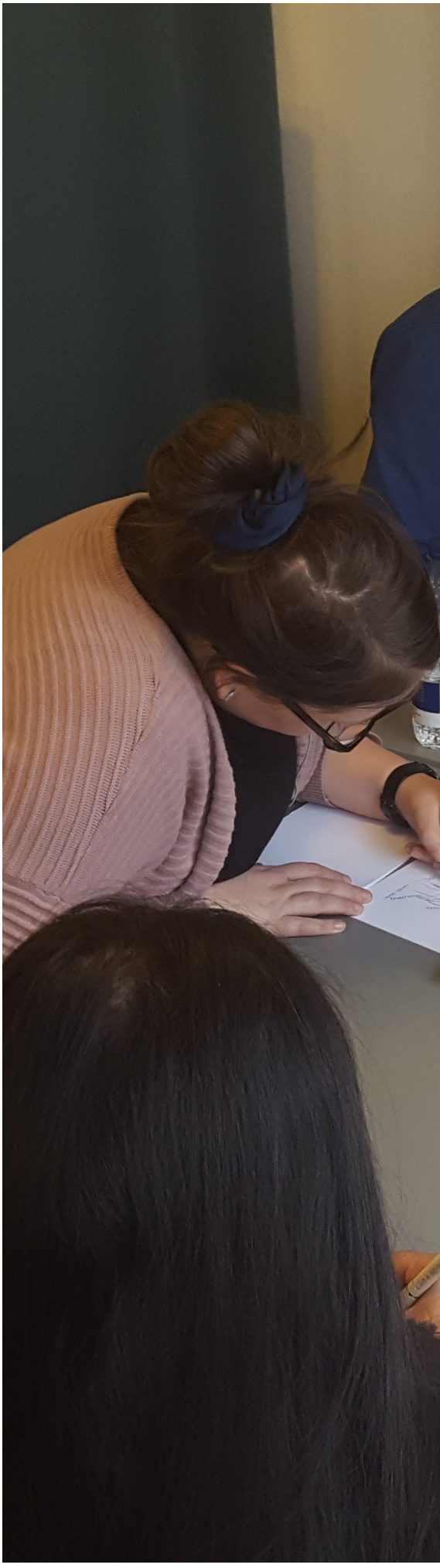
- Not feeling the need to use their authority to implement forced restraints.

### SURPLUS

- A better work environment, with neat surroundings gives gumption.

# IDEAGENERATION

This section present the first initial ideas through three different approaches. After grouping and combining ideas, different conceps were found and selected. The final concepts were then brought to two focus groups to align the concepts with the needs from staff and patients. To the right is illustrated (fig. 34) the steps of this ideageneration phase.



# PROCESS
## ILLUSTRATION

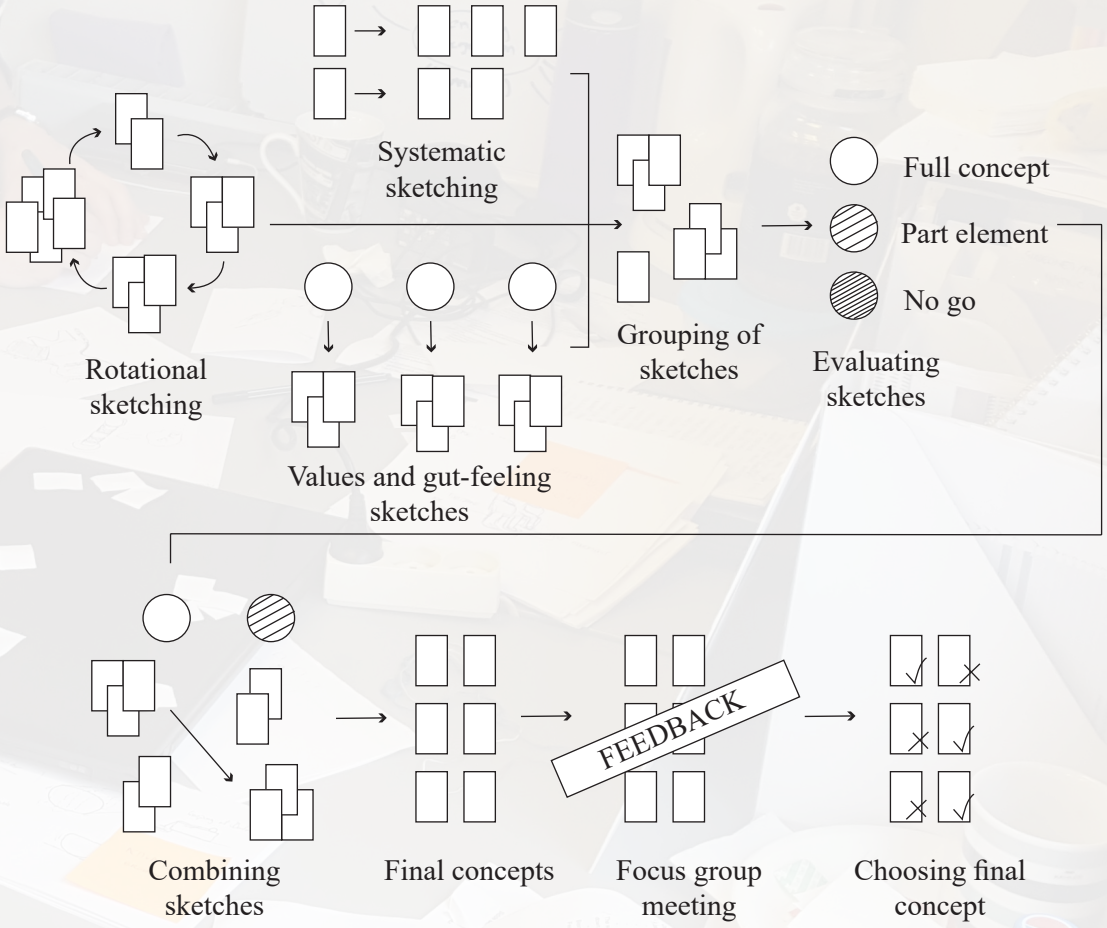



*Figure 34.* Process illustration.

*Figure 35.* Ideating.

# FIRST IDEATIONS

The first ideations consist of three stages through three apporaches to investigate as many different areas as possible. These ideas are then divided into groups, whereas each group and sketch are evaluated and chosen to combine with others. Below here, are the three sketchrounds explained with additional process pictures (fig. 35-37).

## SKETCH ROUND 1

First ideation round lasted for 20 min. and was based upon gut feeling and the three values on p. 33.
This ideation is free and should give the team the possibility of drawing everything wanted or unwanted, to empty their heads. By looking through the sketches it was clear, that even though this ideation was based upon values, the vision statement and the requirements, the ideation are missing some core elements. The team were aware the problematics of combing everything into everything in this early stage and due to this it was need to ideate more structured.

## SKETCH ROUND 2

The second ideation was based upon the sketches made in round 1. To get more structure rotational sketching, was used. One round lasted 5 minuts which where continued four times, meaning that this ideation lasted for 1 hour. In every round, sketches where rotated to use as inspiration for the new round and thereby the team gets “fresh” inspiration in every round. The development of ideas within this round, where more funny and out-of-the-box thinking were much easier. This ideastion did miss some of the core element of what the team wanted the product to contain. Either some kind of activation or relaxation regarding making a preventive furniture with stimulation.

## SKETCH ROUND 3

This last and third ideation was a forced systematic sketching based upon priniples the team wanted to investigate and elements that were already determined (app. 15). This should accommodate the missing link from sketchround 2. In this ideation numbers were drawn within each row of principles and sketches were made in 5x5 min (fig. 37). The main thing intented to do is to calm the user, and there is two ways of doing this: relaxation and activation. Other elements within setting (social, private or both), parts to stimulate (feet, arm, full body, head, legs, front and back and hands) and chosen requirements/needs was used to combine with each of the two principles.

*Figure 36. Sketch round 1*

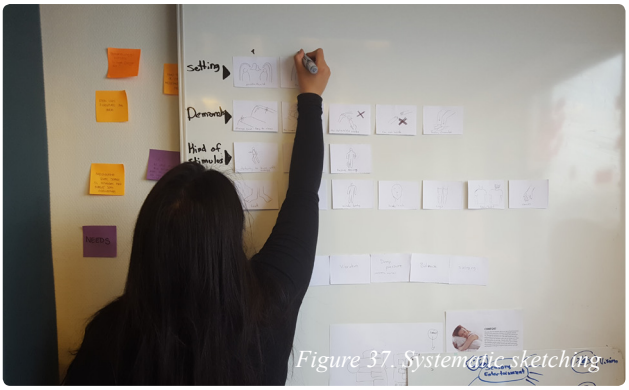



*Figure 37. Systematic sketching*

*Figure 38. Sketch round 3*

*Figure 39. Grouping sketches.*

# GROUPING IDEAS

After ending the three ideations stages, the ideas needs to be collected to put into groups, to sort out in those sketches that are the same.
The ideas was divided into 10 different groups (see fig. 39-41). Below the groups are described:

- **HELPING RESTLESSNESS:** Ideas within being active through different levels of physical activities.
- **MASSAGE:** Being able to relaxe my getting massage by automaticly or by own movement when using furniture/equipment.
- **UNTHROWABLE:** Examples or good ideas for how the furniture or equipment could be unthrowable regarding weight or fixture.
- **ABLE TO SEE PATIENT:** Examples/inspiration for how the staff could be able to see the patient.
- **PRIVACY:** Ideas where the patient are able to be private and surrounded.
- **HANGING:** Ideas of furniture hanging. This could be in ceiling or hanging from something fixed to the floor.
- **STRESS BALLS (FIDDLE):** This are ideas for those patients that has a need for fiddling due to restlessness or other.
- **EMBRACED:** Ideas that makes the patient feel their own body.
- **BALANCE/ROCKING:** Ideas that give activation or relaxation throughout balance or rocking.
- **MISCELLANEOUS:** Miscellaneous are those ideas that did not fit within a group.

*Figure 40. Grouping sketches.*

*Figure 41. Evaluating ideas.*

# EVALUATING

All group and the ideas within, were put up on the wall to create an overview over the groups and sketches (fig. 41).
To narrow down, the team needed to evalutate the ideas, which were done through dotsorting with three different colours, to point out the different potientials in the idea:

- Intire idea have potential
- Part(s) of the idea that have potential
- Idea do not have potential enough.

During this evaluation the team where met by a problematic that choses the entire purpose for the furniture. It was a necessarity to make it clear what the goal is for this project, thinking about the needs from both patients and staff. Basiclly there is to main directions: Activation and Relaxation. Chosen one of them over the other, influences the rest of the evaluation.

## DECISION

During this the evaluation, it was determined to work futher with relaxation as a pat of an armchair. If patients are in the need of being activated to calm down, they would choose other indooor possibilities like the gym, rather than using a furniture. Making a relaxing furniture also makes less disturbance for others in the common rooms. Due to this descision, there is a bigger possibility of people using the furniture as a preventive element, in situations where the aggressive behavior increases.

# RELAXATION

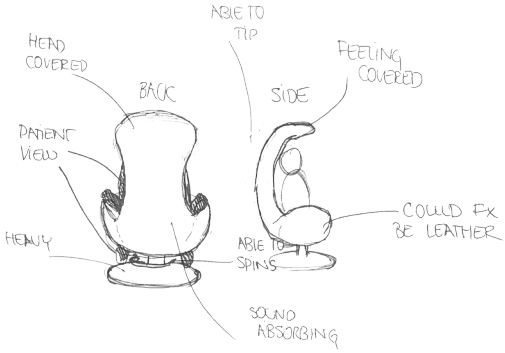
After decsiding relaxation were in focus, ideas were evalutated. Some are showed below (see app. 16).


- Idea where blankets flip over legs

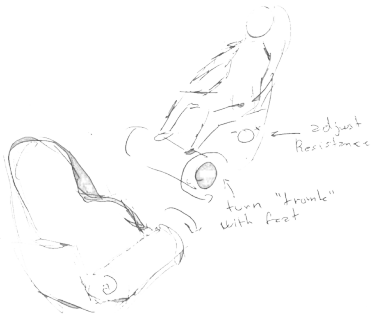

- Idea for having a swing for each foot.


- Support for head and pressure for shoulders.

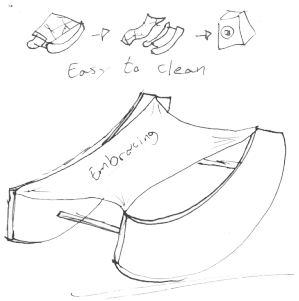

- Idea where a full blanket is covering the patient.



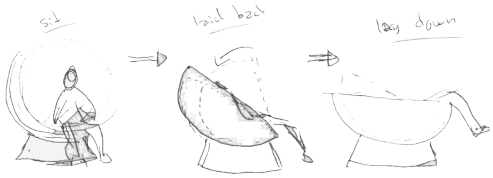

- Private chair where staff can still see one.




- Idea of a chair with a "roll" for feet.

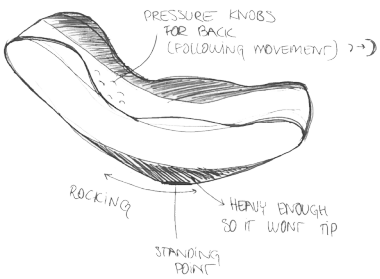



- Idea of a rocking chair with cloth that can be taken off.

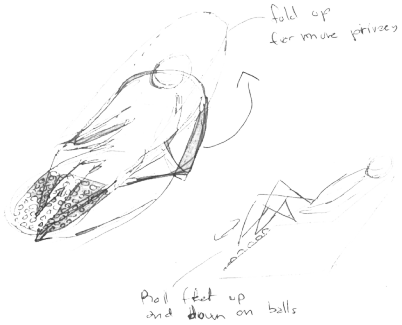



- Idea the chair is moving around as a balljoint.

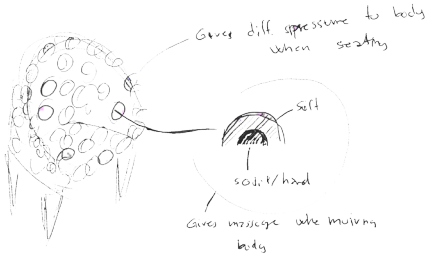

- Chair with flexible sides that one can use to hug.




- Rocking chair with massage balls in back.




- Chair with ball massaging feet.




- Idea of a full covered ball chair, that can massage.

*Figure 42. Chosen ideas.*

# COMBINE IDEAS

Those sketches within relaxation, that were marked green and yellow were collected. These ideas should be further inspiration to creates initial concepts, by combing the different ideas and potentials.
Doing this, the team got a lot of different ideas that are presented below. See app. for more.

The ideas were discussed, to find out which potientials where inbetween. These potentials where later made into six final concepts, presented on the following spread.




*Figure 43. Combined ideas.*

# FINAL SIX CONCEPTS

From combing different initial concepts that had potential as explained on previous page, six concepts were defined: Beach chair, hug chair, blanket chair, “cave” chair, swing chair and massagechair.

1

## BEACH CHAIR

This chair takes inspiration a beach chair, where a loose cloth is used as seat, which is possibile to rock back and woth. This should ease the restlessness.

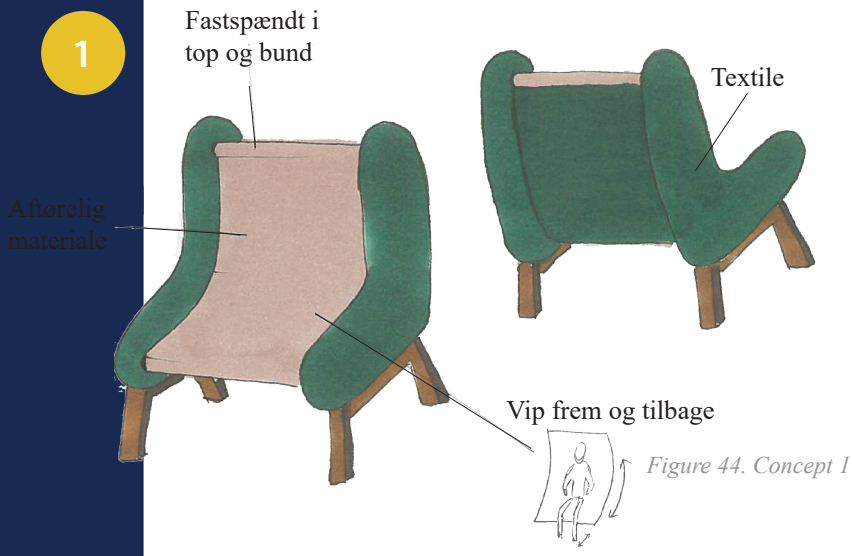



*Figure 44. Concept 1*

2

## HUG CHAIR

The chair has two flaps which hugs the patients when using it, due the weight in it. This gives security and embracement. It can have two different legs.

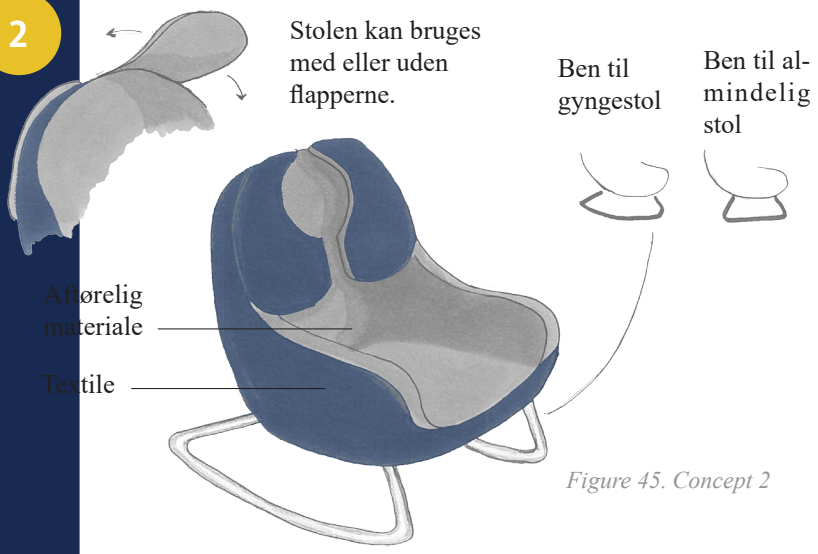



*Figure 45. Concept 2*

3

## BLANKET CHAIR

The chair has a blanket on each side to give varm and security when using it. Due to foreclosure, the patient can also be private. It can have two different legs.

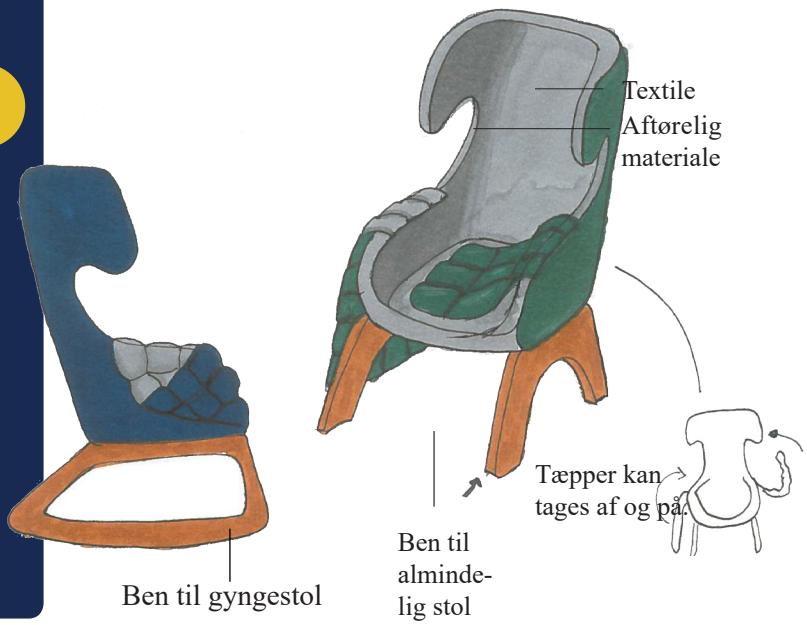



*Figure 46. Concept 3*

4

## "CAVE" CHAIR

This chair can be both privat and social ("ears"). The "ears" have a opening between them, so the staff are able to see the patients. The chair have balls as a stimuli for the feet or legs to massage on.

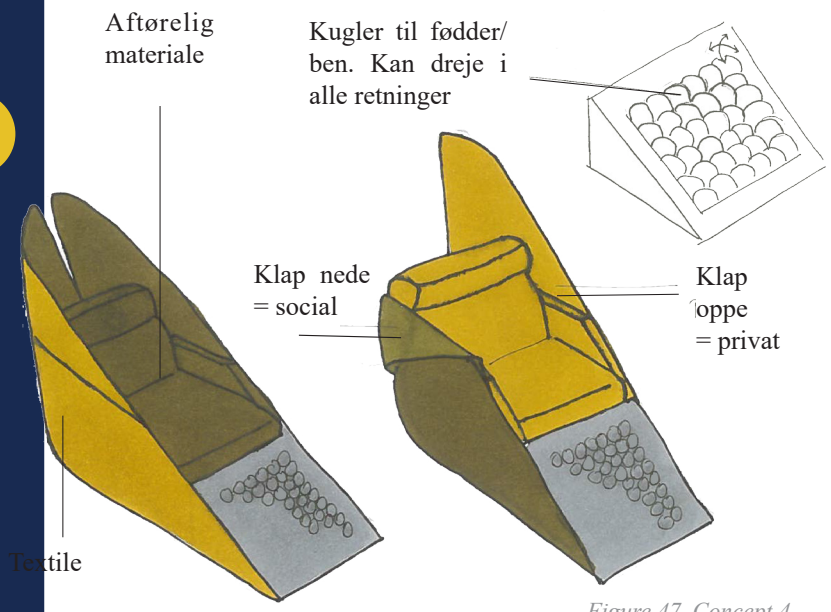



*Figure 47. Concept 4*

5

## SWING CHAIR

This chair has a swing for the feet, making the patient relax. It will also compensate for the hole chair isn't moving, but only a part of it, making less disturbing.

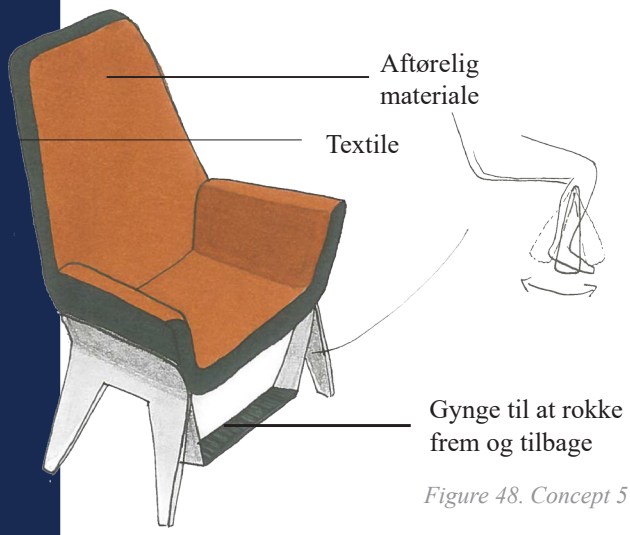



*Figure 48. Concept 5*

6

## MESSAGE CHAIR

Below the surface of the chair, there is felxible foamballs with a hard core. The patient gets message by moving.

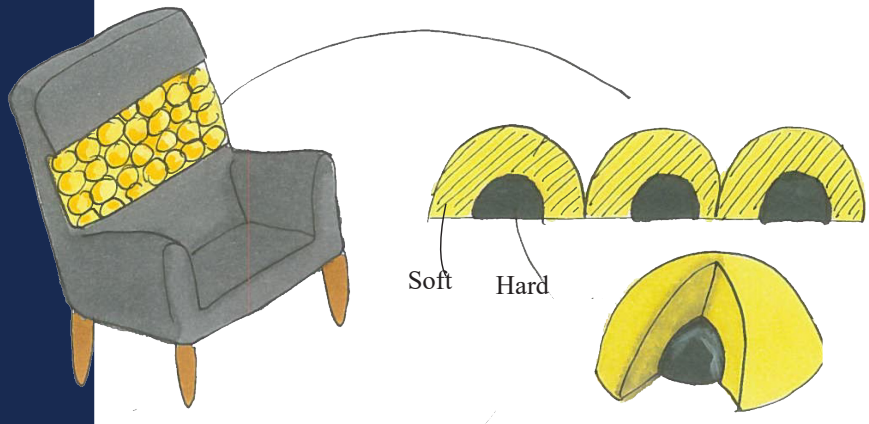



*Figure 49. Concept 6*

# FEEDBACK ON CONCEPTS

The six concepts, have been made into small prinicple models to enhance the understanding of the conceps. These concept models are brought to two group focus meeting, in Aalborg and Randers. These meetings should give the team knowledge and direction in what needs there is, for a specific furniture for the psychiatry in relation to functions and shapes.
Attending the meetings was both former patients and admitted patients, together with contactpersons (nurses) from different wards and in Randers the head nurse and an occopational therapist.

## NEW INVOLVERS

In Aalborg our patient contact brought another former patient. He gained us with a different perspective due to his knowledge within stimuli working with ADHD kids and the psychiatry both personally and professionally as a psychologist. In Randers, two admittet patients were attending with their contactpersons, which gave some indsight in what is needed while they are in their treatment. Both perspectives resulted in usefull information like which sideeffects medication could have on patient, e.g. gaining weight and getting restlesslegs-syndorm in legs.
During the meetings, every aspects of the concepts and their functions, idioms and materials where discussed. The team worked as a convesation starter and explained every concept and the thoughts behind it. The staff and patients did then discuss while refering to eachother to ask questions and simply giving eachother space to answer what it relevant for the specific person/profession (app. 17 for concept comments).

*Figure 50. Focus group meeting in Aalborg*

*Figure 51. Focus group meeting in Aalborg*

*Figure 52. Focus group meeting in Randers.*

## FINDING

1. Feedback on concepts showed important elements like light sensitivity, weightgaining, hotflushes and that proprioceptive stimuli are hard to overstimulation.
2. During the focus group meeting, it was discovered concepts (like no. 5) helps more than first thought. The relaxation part was not all. It showed up helping for some medical side effects like restlesslegs.

## ELABORATIONS

Fromout the feedback and comments on concepts, the team needs to determine which concept(s) to work further with.

# COMMENTS ON CONCEPTS

The combined commets from Aalborg, Randers and online from Peerboard.

### GOOD

- Blankets are good for grounding, feeling comfort and security.
- Blankets are optional.
- Sheltering for auditory and visual disturbance.
- Private with staff able to see patient
- Familiar idiom
- Changeable legs
- Best type of stimulation (of concepts)
- Changing type of leg

### CONCERNS

- Not necessary with sheltering in common room → if privacy are the need, the patient will be in their room.

### IDEAS

- Multiple blankets for adjustable weight

### GOOD

- Wings gives grounding, feeling of comfort and security
- Optional wings
- Changeable legs
- Idiom

### CONCERNS

- Uncomfortable with weight on shoulders and lean back on a rocking chair → difficult to get up and afraid to fall back.
- Too much with only rocking chairs in the common room.

### IDEAS

- Wings with adjustable weight.

### GOOD

- Footswing → ease distress in the body (especially restless legs)
- Keep patient seated for longer than 5 min
- Better than a traditional rocking chair

### BAD

- Do not like the big contrast in colours

### IDEAS

- Add on a surface that gives tactile stimulus
- Transfer the function to other concepts.
- Optional swing by making keeping it underneat.

### GOOD

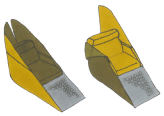
- Nice form of stimulation

### CONCERNS

- Limited stimulated → body might get to used to it.
- Material might lose effect over time

### IDEAS

- Optional, the massage nups can be taken off.
- Easy to clean if separated.



### GOOD

- Optional foreclosure
- Patient can't hide from staff
- Stimulation for feet and legs
- Idea of the seperate stimulation board

### BAD

- Exhausting to rub feet against (upward motion)
- Would only buy one for common rooms.

### CONCERNS

- Take up much space.
- Difficult to get in and out of.
- Unable to see what is going on, can be nerve racking.
- Shocked by a person walking by because they can't seen until they are right upfront.

### IDEAS

- Detachable board could be hidden under the seat.

### GOOD

- Whole chair doesn't move when it is in use so it doesn't distract other.
- Movement can calm restless legs.

### BAD

- Stimulus is not optional.
- Might not appear durable, so overweight patient fear using it.

### CONCERNS

- Not so feasible - patients might be surprised by the movement.
- Uncomfortable.
- Might not work in practice.
- Much effort to set in movement in comparison to a normal rocking chair.
- Difficult to get out of.

### IDEAS

- The fabric could provide tactile stimulation.

## GENERAL COMMENTS

### GOOD

- Optional stimulus
- Elements of woods gives warmth
- Familiar/recognizable idiom
- Heavy furniture is not easy to throw
- The furniture and stimulus can be used without supervision
- Materials that are easy to wipe off.

### CONCERNS

- The wipeable material, should not be sticky when sitting on it.
- Stimulation should not produce noise that annoys other
- The material may not be too warm or cold (due to weight gain)

### IDEAS

- Provide stimulus to hands
- Multiple positions

# CONCEPT DEVELOPMENT & DETAIL

This section present the chosen concept(s) there is combined. Within this phase, models for testing and experimenting are made together with a variarity of testpersons.
For this to make as much sense as possible, the detailing phase are integrated within this phase. The details of the products will be understanding the ergonomics and measures of the products, likewise testing and evaluating the measures for best result and feel of use.
During this section small mock ups model and a 1:1 model will be presented throughout the process.


*Figure 53. Concept pictures.*

# CHOOSING CONCEPT(S)

Fromout the feedback and comments on the six concepts, the team needed to deselect some of them. Every single function of each concept, were seen as a principle. How one single principles work versus how all pinciples of each concpet works together.

Choosing between the concepts, four principles from four concepts was chosen (fig 54-57). The four principles are chosen due to their proprioceptive stimuli and due to the functions was those that were most prioritated. Some of the principles like the swing for the feet and the rubbing balls was suggested to combine.

The patients and staff agreed in that concept 3 (fig. 46) and concept 5 (fig. 48) were popular due to their idiom and functions are interesting. There were both functions and idioms combined to ideate on what concept this could be, based upon whishes like adjustability in weight (blankets) and back. See three “extreme” combined concepts below (fig. 58).

## ELABORATIONS

Discussing what furniture this could be and taking about what is preferable or not wanted, didn’t give much progress, so to move further from here, it was important that the functions were made and combined in a model, to see if the functions worked as wanted.

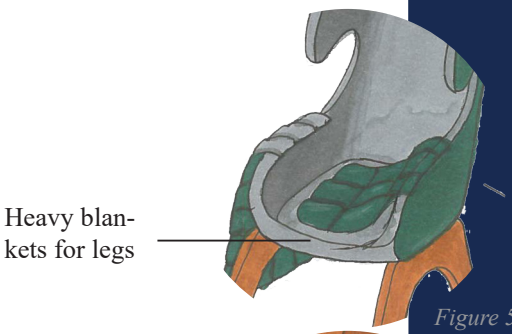



Figure 54. Blankets.


Figure 55. Swing for feet.

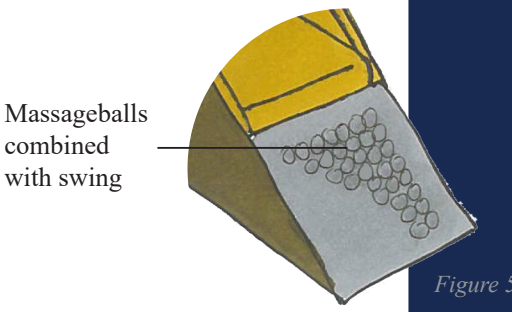



Figure 56. Rubber balls.

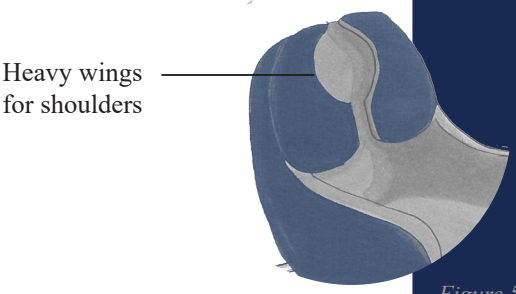



Figure 57. Wings.


Figure 58. Three extremes, all concepts combined.

# TESTING FUNCTIONS WITH PATIENTS

**PURPOSE:** It was determined to make a full size model with all principles (functions). Purpose of this is to determine how each function feels/works alone and together. It was important to investigate if it works the way intended, due to the concepts were only based on sketching and assumptions, like the swing for the feet and to find the limits of weight in blankets. The model is presented for two former patients, where the team and patients tries out the functions together.

**HOW:** The model was made from an old school chair as a base, whereas extra stability was put on. Likewise was the swing put on with different exstension possibilities, because we know the testpersons and team had different heights. Weight blankets was sewed with rice and pillowcases. Beyound this, different screening possibilities was tried (lengths and heights) to find the limits.

## FINDING

1. The team found out that devoping a chair at finding the needs for it, are very individual, which creates the need for finding out how much is wanted to be induvidualized.
2. By testing the functions with patients, whishes as adjustability in back, seat and swing were located, additional details needs to be investigated.
3. Trying out the swing on the chair, a problem with the chair tilting was an big issue, that later needs to be handled, for people not to fall when forgetting the swing trying to walk/get up.
4. The heavy blankets was made in squares randomly but actually the shape and size were very optimal for the best division of weight.

## ELABORATIONS

It's important to keep in mind the finding when futher developing. Next step from here to move further with the findings, should therefore be locating different scenarious.

*Figure 59. Testing foreclosure and blankets.*

*Figure 61. Testing swing.*


*Figure 60. making blankets.*

*Figure 62. Sewing blankets.*

# SCENARIOUS

**PURPOSE:** Based on the previous test with patients and the feedback from the focus group meetings, it came clear that adjustability in many cases was wanted. To explore different scenarious was acted was made. It is important to look beyound the legs at this point.

**HOW:** To test out different scenarious, the team used principle cards (app. 18) to "act it out", which provides insight in having non or full adjustability. Thereby making it possible to locate the limit in adjusting functions. To do this to extreme scenarious were set: one where everything is adjustable (fig. 63) and one where everything is fixed/ "standard" (fig. 64). Every principle are acted throughscenarious and evaluated, to therby find what is most fitting for a funiture for the psychiatry.

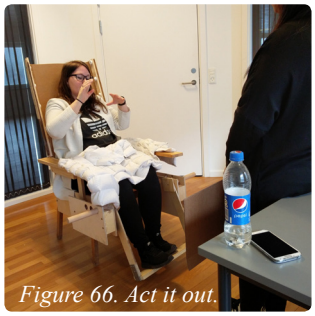


*Figure 66. Act it out.*

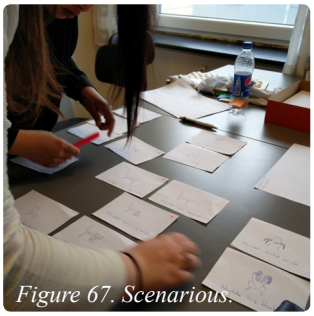


*Figure 67. Scenarious.*

## FINDING

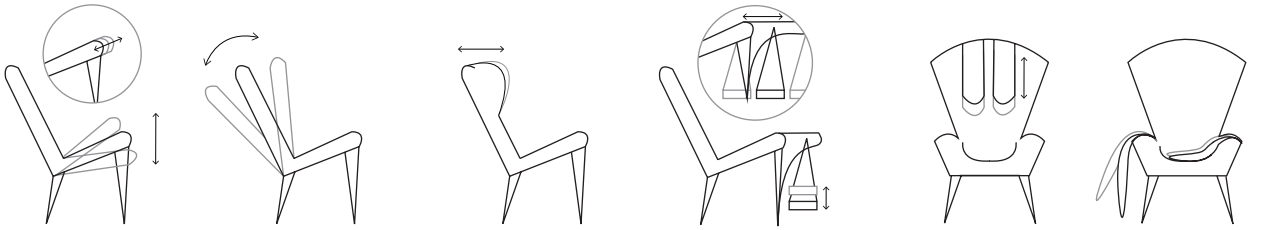
1. Adjustability can make the furniture to complicated, which do not accomates the patients needs of the furniture being simple and easy feasible.
2. Adjustability complicates construction and damages according to aggressive behavior.

## DECISION

To accommodate the wishes met through feedback and tests about adjustability, the team tried to narrow adjustability to what is most important, for creating a relaxing furniture there is easy feasible. The chosen scenario (fig. x) consist of few adjustable function like back-adjustment, adjustment of the swing and adjusting wings. These are chosen to create functions fitting as many as possible to give the right feeling in use. The ability to draw back and be somehow private in the common room was a requirement that was highly prioritized. To accommodate that need a foreclosure had to be implemented in the chair.

## ALL ADJUSTABLE

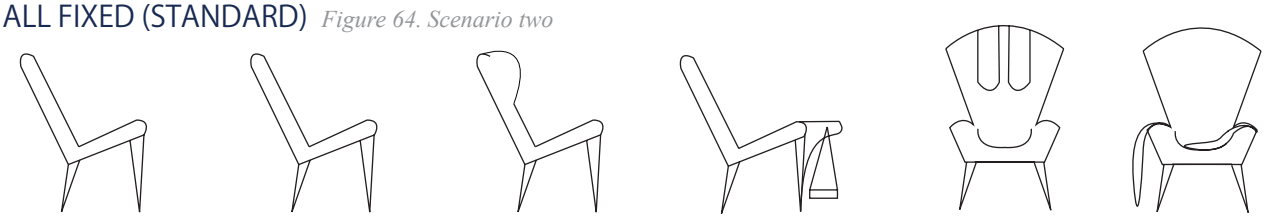
*Figure 63. Scenario one.*



Seat goes back and forth, up and down | Back adjustment | Forclosure length | Swing height and length | "wings" length | Several blankets

## ALL FIXED (STANDARD)

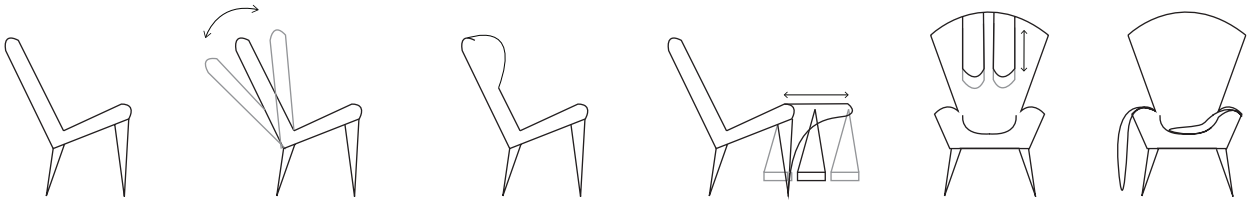
*Figure 64. Scenario two*



Seat is not adjustable | No back adjustment | Forclosure are fixed or non exsistng | Swing height and length are fixed | "wings" length are fixed | One blanket on each side

## CHOSEN SCENARIO

*Figure 65. Final scenario.*



# TRYING OUT SCENARIO

**PURPOSE:** Visiting Gades Møbelcenter, gives the team the possibility of not only acting out different scenarious, but trying some of the chosen function in the scenario of different designs. This should provide insight in validating if all the scenario are realistic.

**HOW:** For the visit, the swing was brought as a mobile part to try it out sitting in different types of furniture, with and without adjustabiliy in back.

**OUTPUT:** The test of different scenarios of adjustability showed that a adjustable solution was not only a bad solution in terms of the harsh treatment the furniture must be able to resist, but also a bad result in relations to a user-friendly and easy feasible design. The biggest consequence of that conclusion is that the requirement of a both social and private solution was compromised in the chosen scenario.

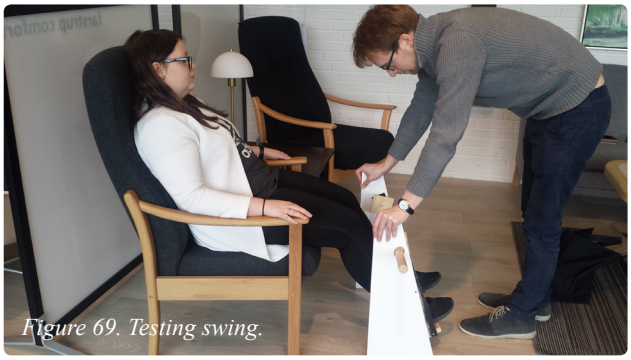


*Figure 69. Testing swing.*

*Figure 70. Chair with adjusting back.*

*Figure 71. Chair with adjusting back.*

## TWO CHAIRS

When investigating the wishes for the users in the various wards, the team have seen the importance of being capable at creating a calming and easy recognizable atmosphere, with the possibility of having both privat and social zones. A chair within the chosen scenario is a private relaxing chair. One of the larger challenges in this, is having various furniture with the same expression, without compromising on functionality and durability, making a whole interior solution. It makes it near impossible to have an easy overview of the environment with big furniture. The challenge in this can be for the staff to create an environment without it consisting of the same expressions. This could be a problem to meet the desire to have a cosy home-feeling interior solution without some variarity in the furniture.

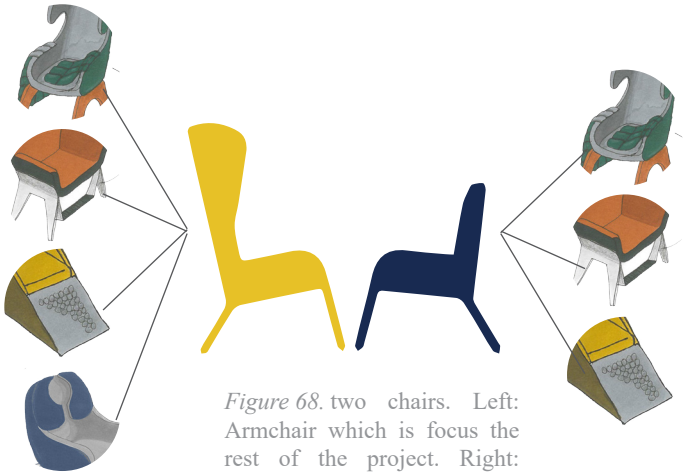


*Figure 68.* two chairs. Left: Armchair which is focus the rest of the project. Right: Lounge chair. Each shows which functions hould be available for the current chair.

To best accommodate these problematics, the solution will consist of two products (fig. 68). One product to help the patients relax and stay comfortable in common areas without the need to be actively involved in what is going on around them. The second product should be smaller and easy to furnish the rooms with, it should encourage to be social rather than relaxing. The two products should be made based on some of the same principles found in user needs, shapes, dimensions and functions. They are to follow the same production methods and as far as possibly be made with the same equipment and moulds.

## DECISION

1. Gunnar Erik Hansen, manager in Gades Møbelcenter Aalborg, cleared that they have a lot of furniture for institional use. But making a product for the psychiatry, complicates to many moving elements. It was therefore chosen, not to have an adjusting back because moving element weakens the strength of the back.
2. Chosing two chairs accomdates more needs and a stronger interior solution. The armchair will be focus to detail, due to the loungechair is an extension hereof. Making two chairs also meets the desire of different back positions.

## ELABORATIONS

This final scenarioshould be used to create new ideas within the concept.

# GADES MØBELCENTER

**PURPOSE:** Visiting Gades Møbelcenter should provide inspiration for sketching upon the concept, by seeing different kinds of chair designs.

**HOW:** The swing was brought as a mobile part to try it out sitting in different types of furniture, to feel the use of it in different seatings, idoms and angles.

**OUTPUT:**
Through the visit different problematics and possibilities to incorporate were discovered.


*Figure 73. Tipping plate.*


*Figure 74. Tipping plate.*


*Figure 75. Ears and support.*


*Figure 76. Ears and support.*


*Figure 77. Trying swing.*


*Figure 78. Trying swing.*

## FINDING

1. Head support are loacted to be more comfortable havning an almost 90 degree "ear" to lean head on (fig. 75). Whereas having a cuved back is not as comfortable (fig. 76).
2. Seat-thickness and -height is a problem for the swing to have the right movement.
3. For the ankels, tipping could be preferrable for the best movement (fig. 73-74).

## ELABORATIONS

From here it is important to investigate idiom and dimensions according to sketch on a full scenario with the functions aligning with the idiom and measures.

# ERGONOMICLY USE

**PURPOSE:** It was for the team time to set some specific measures related to what ergonimic seating position is in a armhair, to find what is comfortable. *NB! It is important not to focus on legs at this point.*

**HOW:** Finding the right angles for the armchair to feel relaxing, different testpersons has been trying a model build by the team, where angles on seat and back are incorporated. The testpersons tries one seat angle at the time (5 degree interval up to 20). When trying each seat angle, the back got adjusted so every angle was tried (5 degree interval up to 40). At last the most comfortable seatings where tried second time to select the best one. Before the test, measures of the seat and back has to be determined as a starting point (fig. 79).

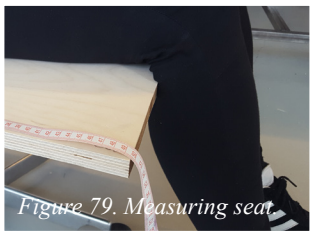


*Figure 79. Measuring seat.*

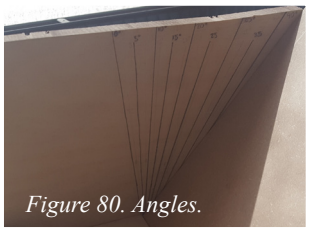


*Figure 80. Angles.*

## SEAT

Knowing that the swing should fit with the height and depth of the seat, for it to function well. The chair shall also be able to use without the swing and therefore it needs to accommodate different seating positions as described in Poul Østersgaards "Fornuften i højsædet" on p. 58 [22]. An armchair should not force one to sit in only one position. It's important to be able to change position, to different relaxing - not strained seatings to make one able to be as comfortable as possible [22]. It's therefore chosen that the seat is slightly bigger than other armchairs like the ikea chair (app. 19). The chosen measures are descided in terms of the user are able to get the important grounding and still having a comfortable seating experience without causing discomfort and problems with blood circulation due to seat there is to small or a seat too high [22]. The height of the seat will be 450 mm for uses to still be able to touch the ground. See. ill. 69 for chosen seat measures.

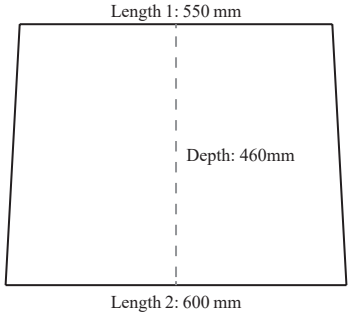



*Figure 72.* Final inner measures for the seat.

## ANGLES OF SEAT AND BACK

With help from 12 different testpersons including the team, angles of seat and back have been testet. Making the test some criterias were set: It should be possbile to imagine you are watching TV, read a book or take a small nap/be relaxed, which Poul Østergaards "fornuften i højsædet" agrees [22].

During the test, the seat and back got adjusted by 5 degrees until an uncomfortable point has been reached, describes under "how" (app. 20 for tabel of results) and fig. 81 for the measures.

*Figure 82. Angle testing.*

*Figure 83. Testing.*

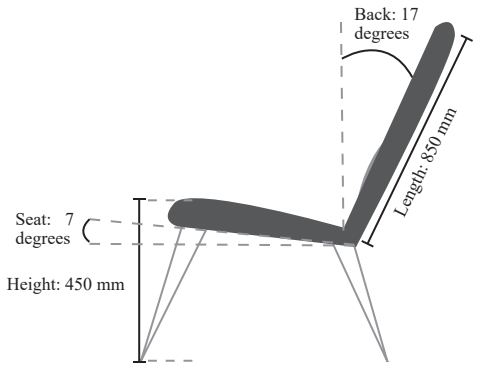



*Figure 81.* The testdata showed the best seat slopes were 5 and 10 degrees. With the seat liftet, the sitting height becomes shorter than the seat height, which helps the user from not sliding forwards when using the chair [22]. It also provides better comfort and less tensions in back [22]. The best back angles was 15 and 20 degrees and with these angles, the best comfort is to secure 2-4 cm support in lower back [22] to also decrese pressure on nerves and thereby provoke discomfort [22].

### ARMREST

Observing testpersons during the test, it showed that the need for an armrest where quite big, due to their movements like getting in the chair, up from it was hard because of the angles of the seat. An armrest is an important part of the chair and seating/sitting experience, due to the advantage of it to help one not using too much force of the movement one make [22], likewise it accomdates several seating positions and support for it (e.g. reading a book).

Ergonomically speaking according to Østergaard, an armrest shouldn't lift the users shoulders, as it creates tension and muscle activity in neck and shoulder, which isn't relaxing [22]. According to the book "Human Dimensions & Interior Space" an armrest should have a height between approximatly 170 and 250mm [23] and a width between 70 and 150mm incl. cousing/upholstery [23].

To give the best support, the armrest should at as long as the seat. In same connection, careful consideration should be given around soft armrests, which can provide poor support and that the tip of the armrest must be a material that handles wear, like wood.

### FORECLOSURE AND BACK

Usinf foreclosure as more than feeling private and shielded, supporting different seating position could be one of them. To accommodate this, it's important that the back of the chair curved, that it naturally gives muliple seating positions, rather than a straight back [22]. The visit showed on previous page also accomodates that there should be a specific foreclosure, that the team tried and found as the most comfortable and that it was the best for it's purpose to lean up against as support (finding 1 on p. 50).

### FINDING

1. The more straight the back was, the less need for head/neck support.
2. When adjusting the seat, people mentioned the feeling of not being grounded. During the test the height of the chair was almost 500mm, which made out the reason for people not being able to reach the ground. This and because 500mm was unnatural, the height changed to 450mm (fig. 45).
3. The test was performed without armrest. Observingg the testpersons when getting up, sitting down or leaning forward was diffucult for them, due to the angles of the seat, when there isn't any support for hands/arms to take some of the weight.
4. When observing the test persons, the lower seatangle and higher backangle, the person looked more comfortable.
5. Due to diffuculties and that is was uncomfortable, the seatangles 20-25, and back angles 35-40 wasn't tried.
6. Different testpersons where testet based upon their height. The average human height is 175cm so trying taller and lower people, should give spikes of where the limit goes, of not designing for every individual.
7. When seat slopes 5 degrees and back 10 degrees, it were associated to be social. This could be fitting for the lounge chair.

### ELABORATIONS

Determining the idiom and final measures on armrest and foreclosure, should be testet to find best solution.

# STYLEBOARD

For the team continuing the development of the concept, a styleboard has been made to set some inspiration of the aesthetics of the furniture. Details in different materials, combinations of colours and inspirering idioms have been in focus.

This styleboard are based upon the chosen atmospheares on p. 16, colours from atmosphears and two inspirational furniture boards (app. 21), to give the expressions fitting to the needs from the psychiatry and the modern look of something regonisable.

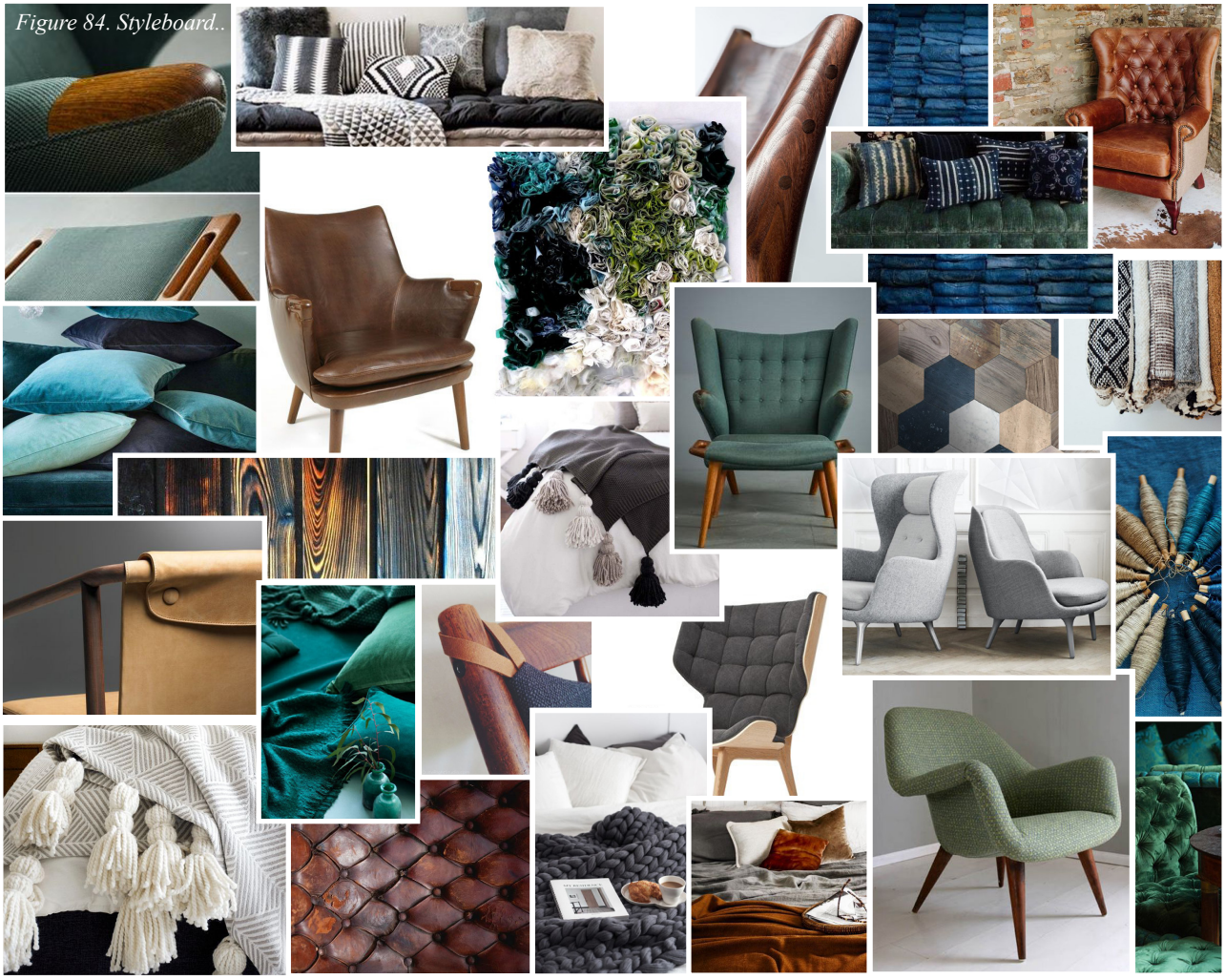


*Figure 84. Styleboard..*

# METAPHORS

To meet the requirements a furniture there has a cozy home-feeling look that looks comfortable and recognizable, metaphors have been visualised to align with the appearance of the furniture. This should give an expression of how furniture should feel to use and which assosiation one would make.



*Figure 85. Metaphor.*

# CONCEPT IDIOM

As an extension to the investigation of finding the right scenario of the armchair, specific measures and discovering elements that the team needs to incorporate, an ideation is made. With inspiration from styleboard and methaphor, idioms are investigated through sketching. See buttom right corner for the chosen initial idiom.

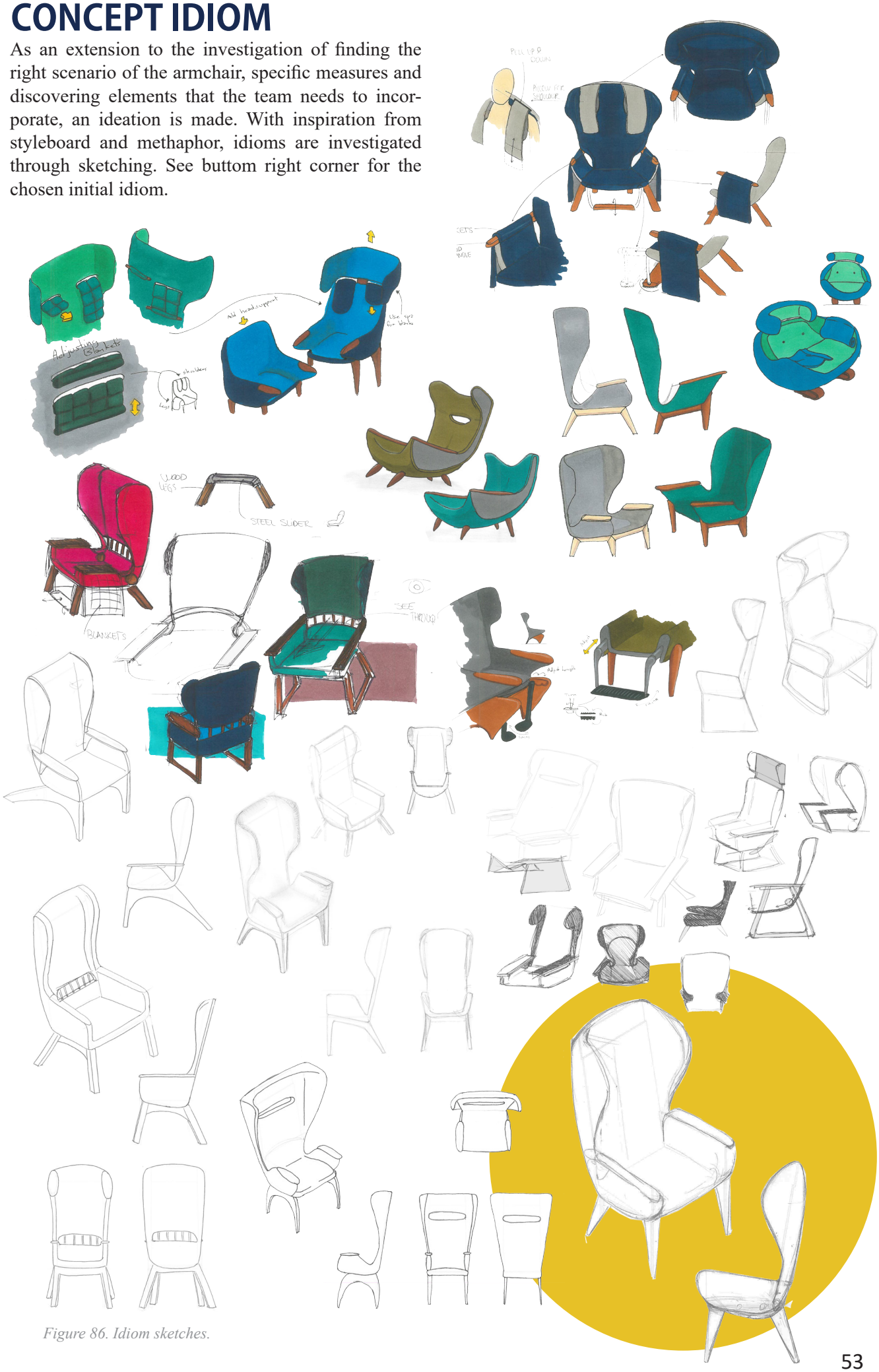



*Figure 86. Idiom sketches.*

# MINI MODELLING

## LEGS AND ARMRESTS

Most of the process has been iterative and this is not an exeption. Finding the initial idiom, different element also needs to be integrated. Drawing out examples on the initial idiom, of how legs and armrest could be, happened at the same time the idiom was made in different mini chair-variations in clay and foam (fig. 88). To the right, the different ideas to legs and armrests are shown.

*Figure 88. Clay and foam models..*

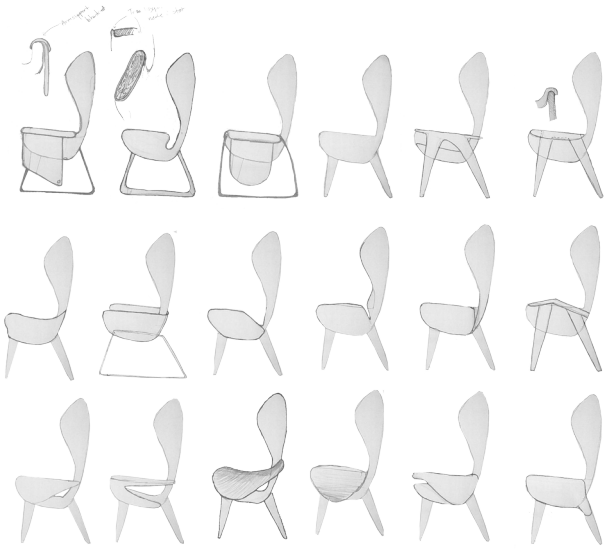


*Figure 87. Quick sketches for how armrest could look like and how legs could be an intergrated part of it.*

## METAPHOR BLANKETS

The metaphor has also been worked through, on some ofthe small models. It has been tried out in different ways (fig. 89-96). Doing this, it became clear that the metaphor of the chair hugging the user, could also come across by the chair hugging it self. The blankets was therefore chosen to “surround” the chair itself.
Fig. x shows the blankets are covering the whole seat, hugging both ears and armrest. Another way is to give the idiom more “air” and visibility on fig. 90, 94. This also hugs both ears and armrest.
The top blanket, should be able to hug the chair and hang inside the chair when it’s not used and put back in place. The blankets below are set to be a part of the seat too, to get the right feeling that you are sitting in a cosy blanket that you also can wrap yourself in. To make it even more cosy, getting the feeling that a blanket are put over the chair, like home at grandmas place, the pieces of blankets, has been chosen to go around and below the seat and around the back (fig. 95).

*Figure 89. Trying meaphor.*

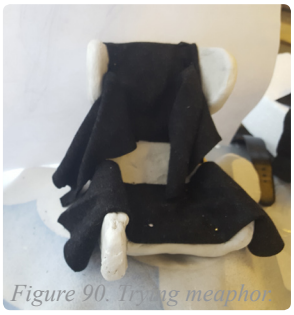


*Figure 90. Trying meaphor.*

*Figure 91. Trying meaphor.*

*Figure 92. Trying meaphor.*

*Figure 93. Trying meaphor.*

*Figure 94. Trying meaphor.*

*Figure 95. Trying meaphor.*

*Figure 96. Trying meaphor.*

### DECISION

The second metaphor (fig. 90), that are seperated in two blankets, became the metaphor the team wanted to work with. It accomodates both the visibilty of the chair. The two functions are divided, seeming more easy feasible, which is an important need. This is also chosen due to it’s appearence fits the shape and the purpose best way.

## SHAPES OF METAPHOR

Deciding the metaphor, different shapes of it needs to be investigated, of how the profile should look. The sketches to the right, have been drawn with the chosen idiom as a base. Due to the metphor was the focus at this point, the “ear” of the chair, also changed it shape, so the two elements would fit more together.
During this the team discovered that letting the front of armrest point out, gave possibilities of a nice detail and a clear indication of where to put your hands. It was also chosen to give the buttom blanket a slight slope and the top blanket following the ground, to give the best balance of the expression.

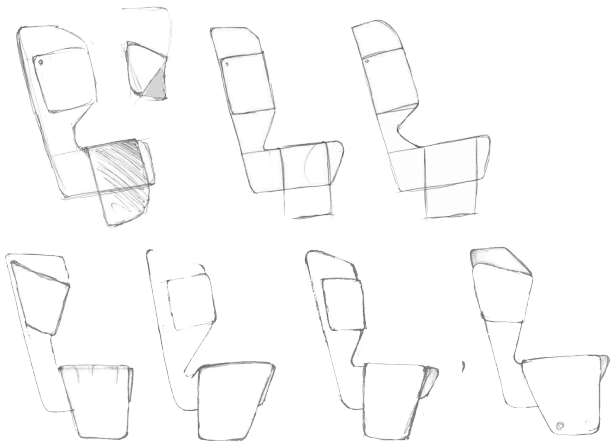


*Figure 97. Sketches of shapes of blankets and ear.*

## LEGS

Deciding upon the metaphor of how it should feel and how it would function, side view if the idiom was used to draw out the look of the metaphor. After deciding in both metaphor and idiom, the suggestions for legs where brought up to incorporate. With inspo-ration from the previous sketches of legs, new drawings have been made, with the right appearence of the metaphor and idiom (Fig. 98).

The drawings are illustrated in order of what lead to one another starting fro the left. The final sketch that the team chose is figure 99. It basically fits the metaphor of the chair hugging itself and still, it gives a simple look to the chair. These legs are then made in think bendable wire and are then tried on, on the mini model.

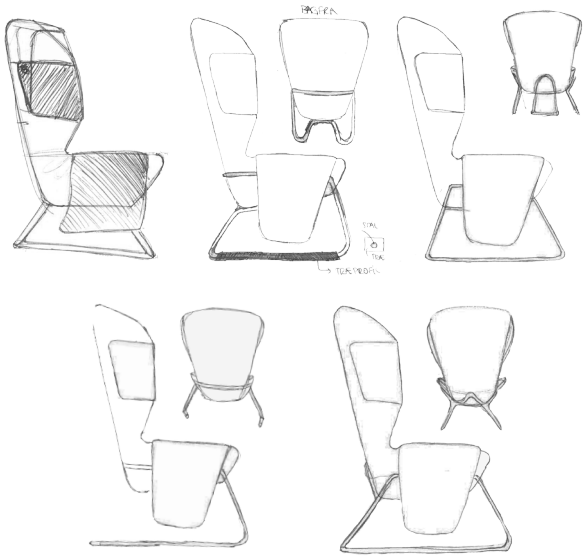


*Figure 98. Different skecthes of legs on final shape of chair and blankets.*

*Figure 100.Making legs.*

*Figure 101.Making legs.*

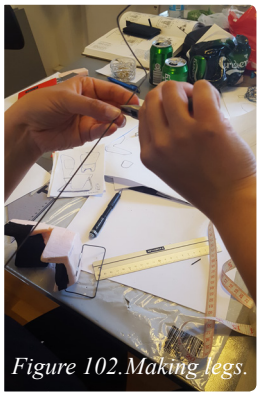


*Figure 102.Making legs.*

## HAND RENDERS

This look are what the team are trying to aim for and to accomodate that, following marker drawings have been made. Both in combinations of colours and materials but also textures and how the swing could be fitting into this look.
This is an example upon the blankets giving a cosy home-like look, that also should provide extra comfort.

*Figure 99. Final idiom and metaphor.*

# 1:1 MODEL EXPERIMENT

Knowing most of the meazsures, shapes and sizes the team chose to make a model in 1:1, to discover any left over issues, when putting all the shapes and features together. The model are made in styrofoam, whereas big part have been cut at first and to make the overall shape. The whole model got cut in smaller pieces, shaped and reassembeld. The idiom and details were revised discussed and adjusted.

## BUILDING MODEL

### SEAT AND BACK

The first step of making the big model, was making the seat and back in the measures chosen earlier in the process. Also cut in the angles they should have in relation to eachother (see process below).

### ARMREST

Next step was implementing the armrest, where shape, height and angle was in focus. On p. x is listed what is nessesary for an armrest to function, which have been in consideration when making the test. The team needs to ensure that the armrest are reachable and the shape fits to the overall expression.
It is decided that the armrest should be rounded at the tip and that the angle should be 5 degrees for us to able to still reach the armrest when having a wide seat. The height was determined to be 220mm.
The thinkness of the armrest variates from 80mm to 60mm because it's conic shape, helps slim the chair.

### "EAR"

Implementing the shielding as "ears" was a bigger process than expected. It turned out that this ear was blocking movement in the arm/alboue because it was to long and adjusting the angle on it didn't help. The shape of the ear then got a huge change of the size and shape, which helped the problem. The thikness of the ear also changed to a thinner version, to make it less bombastic.

### CREATING CURVES

After assemblying the whole chair, it was time to make the round edges that the team wanted, so it seemed more "nice" to look at and not as sqaure.
Doing this, the team draw the side profile, on a cardboard see where we needed to cut up the model.
The team ended up seperating the model in small parts, to be able to cut curves and transistions.
The model was glued and taped together afterwards.

## MOCK UP

*Figure 103. Process of making the 1:1 model.*

# TRYING THE METAPHORE

After finishing the model, the team tried to incorporate the metaphor and defining the blankets even more (see the process below).

## BLANKETS AND METAPHOR

The blankets was made with a cloth at first to defined the lengths and the determined looks of the metaphor was tried out. Doing this it was time to try them out and a problem occurred. Having the top blankets on, made the user looking like you were restrained to the chair, which is quite stigmatising. This would make the comforting look and feeling a bad experience.
To find another solution to it, the top blankets where tried hanging directly from the back. This made them more easy to read, that it's a function to use and that you need to use them for your shoulders. So by doing this, the experince of use became a lot easier and simple. The only thing deteminated from here was that the blankets needed to be longer and first assumed.
To make it easy for the nurses and cleaning service to take them off to was the blankets, dur to hygienic reasons,the top blankets should be fastned on the back and blankets for legs, along the seat below them. To not have a visible fastening this should beable to hide.

## LEGS

The metaphor is not only about the balnkets hugging the patient, but is also about the chair hugging it self. Working with the legs, we used a bicycle tube to imitate different thickness and the shape. This turned out well and the outcome of it was as assumed.

## BLANKETS SHAPE

To make the last touches of the blankets, different shapes and gaps where tried, whereas it was chosen to have a sort of similar gaps between them. As stated earlier, the blanket should also hug the chair. The way this is done, is by letting the fabric go round the back, so it looks like a blanket hanging, from behind. As an extra detail, we chose the gap to follow this, to give a detail of displaying the transistion of the two fabrics.

## BLANKETS PATTERN

The blankets do not accomdate the cosy and homelike feeling as wanted, when there is no pattern in the blankets. So different patterns were tried and a square pattern was chosen to give the best feeling. Likewise, as this point, it was chosen to make the end for the top blankets soft and round to simply the look.


*Figure 104. Process of developing the metaphor and trying it out.*

# SWING DEVELOPMENT

During the process of developing the product, the swing have been incorporated a bit of the way and inspirations is found. These pages is to show the whole development, even though it has been an iterative part of the process. Sketches, ideas, technical solutions and scenarious are presented on these pages.

## IDEAS FOR THE SWING

The swing have been imitated with two arms the whole process. But working on how the swing should look, different ideas than the two armed swing, have been investigated (fig. 105).
Upper right corner is the idea of a one-arm swing, which has been chosen to work further with, because it's interesting, different and best integrated to not be a solutions that do not look to much as an add-on.

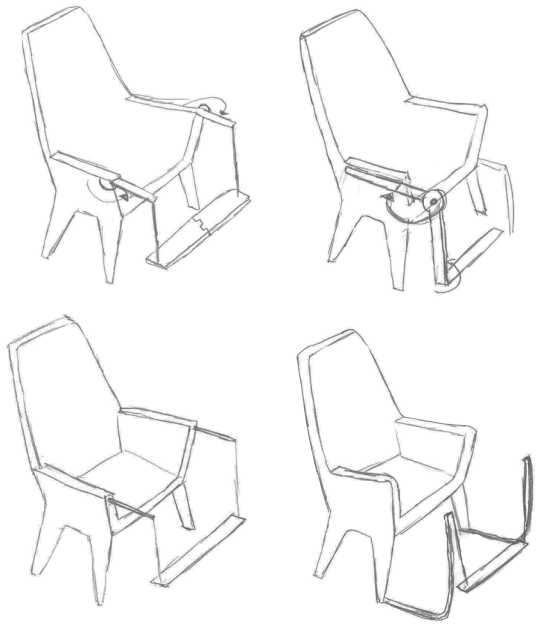


*Figure 105. Few skecthing showing different integrations and ideas of a swing.*

## ONE ARMED SWING

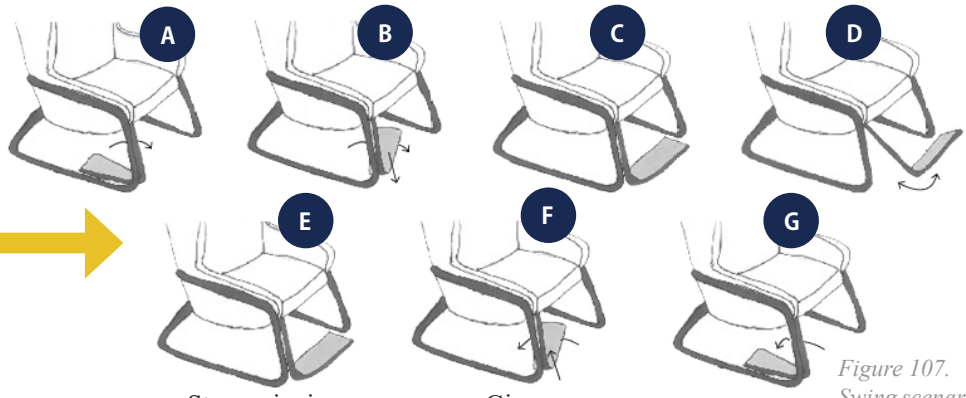
Working on the idea, the interaction and how intuative it could be was important, for the swing to not be in the way. We mocked up a a plate for the swing and tried to act the chosen scenario:

**1 FUNCTION**
Reducing restless legs

*Figure 106. Swing purpose.*

**2 SCENARIO**
How to use the swing

The swing is hidden under the chair. Take it out with feets.




Stop swinging

Give a small push

*Figure 107. Swing scenario.*

## 2 SCENARIO PROBLEMS

This scenario and the experiences of trying the two-armed swing earlier in the process, different problem are discovered:

- Forgets using the swing and standing up: User might fall - the swing disappears under you
- The swing can not be in the way

The problem leads to a solution to how the swing is prevented to "swing away" when putting a big amount of weight on it. The ideas is that is snaps (hits the ground) when 40 kg of weight is put on the swing.

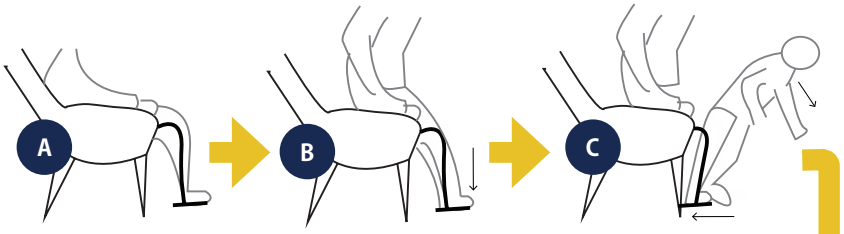
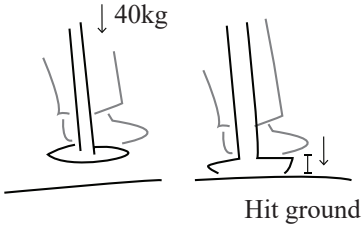



*Figure 108. Swing problem.*

### BALLAST

From the human bodyweight, 17% of that, are the weight of legs when sitting down. The 40 kg are then based upon the "snap function" needs to work if it's a woman of 45 kg or a man at 200 kg.

Solution to prehend the scenario "**snap function**"




Hit ground

## DETAILING SWING FUNCTIONS

To detail the functions of the swing, an overall view of the moving parts is shown in fig. 106. The friction lock are a determined feature, that is validated by using steel support, that resulted in putting weight on it, the lock was not moving because of friction, which is therefore to be used. The function of the swing going under the chair, will be small spring mechanism. The last function of the swing are the “snap feature”. It has several solutions: using magnets and using a spring. See both solutions below.

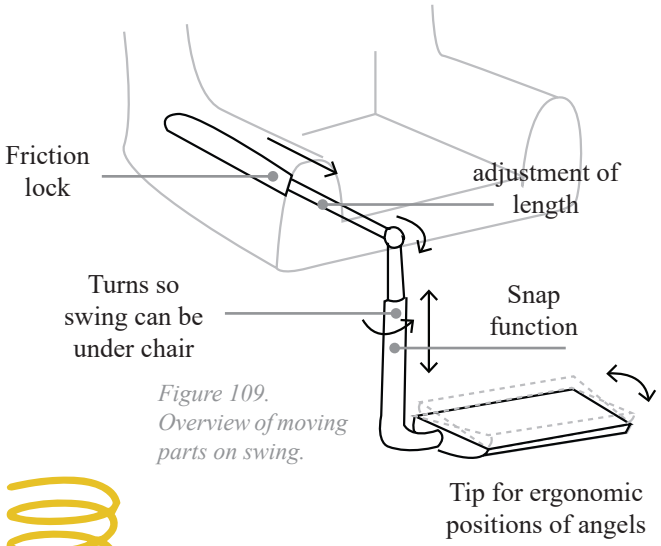
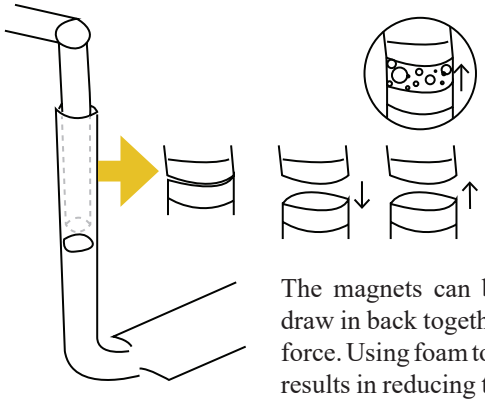



*Figure 109. Overview of moving parts on swing.*


### 1 MAGNET IDEAS

**A** This solution is using magnets to hold the function, until it snaps and then it will go back together.



The magnets can brake, when they draw in back together due to the high force. Using foam to aviod this (2mm) results in reducing the force by 30 %.

**B** Another solution with magnets, is having four magnets along sides, aviodingthe magenets to brake. But the power here, will not be strong enough, when only having 4x10 kg magnets.

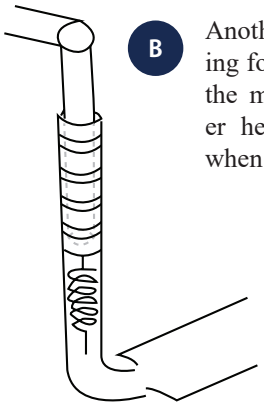
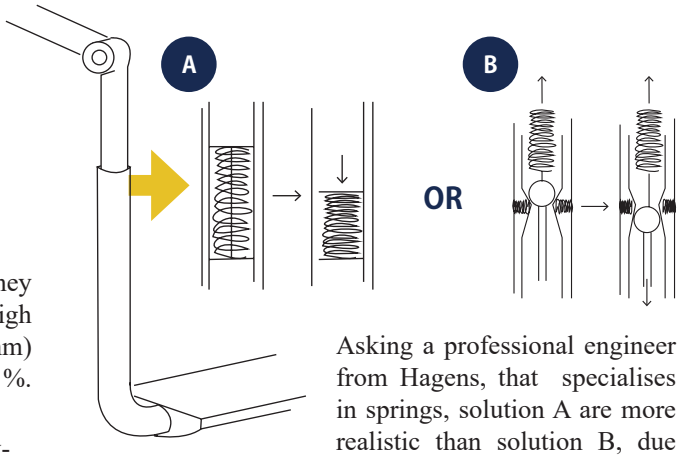


*Figure 110. Two swing solutions with magnets.*

### 2 SPRING IDEAS

This solution is using springs, both a compresses type (A) and a “slip through” type (B).




Asking a professional engineer from Hagens, that specialises in springs, solution A are more realistic than solution B, due to solution B will not be functionable enough in this size.

*Figure 111. Two swing solutions with springs.*

### + DECISION

The solutions of the snap function, was using either magnets or sprinsgs. The two ideas, had to different ways of solving the problem. To get some help to prove/disaprove what works best, Magnetz.dk and Hagens was called. Magnets were a bad solution due to the size, price and effect. The solution using a compressed spring was the final choise.

*Figure 112. Swing.*

# UPHOLSTERY

The upholstery consist of what textile the chair and blankets, the foam that is used around the fiberglass shell and what foam and granulate to put weight in the blankets consist of.

## TEXTILE

The textile for the chair have a lot of demands it has to accommodate being in such environment with big issues in relation to resisting harsh treatment and bad hygiene from patients, but also needed to have the aesthetic quality to give the desired atmosphere.
Gabriel, a leading supplier of textile, was contacted to find the best textile for the psychiatry. Gabriel recommended three textiles based on the needs and the desired aesthetic quality and another textile was discovered during another research at the interior store Gades. The textiles are listed in fig. 114, which shows the requirements and how the textile fulfil it.
The first two textiles, Go Check and Step Melange, are textiles that can be used for the outer side of the chair and the blankets. Both textiles are mottled, (fabric with different colored threads) which make stains less visible than monochrome fabric (all same color). The two other, Obiker Leather and Compound, are for the inner side which needs to be capable of being wiped off and clean easily.

### CHOICE

The users liked Go Check better because it has a smoother surface, but Step Melange was chosen because it had the best qualifications in terms of maintenance, but also had the best aesthetics quality to accommodate a cozy and relaxed feeling. The Go Check fabric can be confusing to look at, making it un-suitable for psychiatric patients, and the stains are more visible due to its organized structure. Obika leather was chosen because it had the best martindale (times of rubs in kan resist) and because it can handle the chemicals used for cleaning the furniture, which Compound are not capable of.

*Figure 113. Choosing color*


*Figure 114. Chosen colors*

## COLOR

In corporation with patients and staff colors from the two textiles where chosen. The colors must not have a bad effect on the patient and need to fit in to the desired environment. Bright colors where discharged because in can set of a bad reaction for psychotic patients. A lot of the clear blue tones, white and light gray tones were also discarded, because it is closed associated with hospital and institution, making the environment feel strange and give the feeling for being sick. More calm, natural and darker colors where chosen (fig.110). A lot of colors of the Obika Leather where discarded, because the inner textiles need to be close relate to give at merged expression.

● Yes ● No

| REQUIREMENTS | GO CHECK | STEP MELANGE | OBIKA LEATHER | COMPOUND |
|---|---|---|---|---|
| Friction/tampering (martiendale) | ... | 100.000 mart. | 250.000 mart. | 100.000 mart. |
| Can be wiped off (due to spills, urine and feces) | ● | ● | ● | ● |
| Handle chemicals (cleaning) | ● | ● | ● | ● |
| Not absorb liquid | ● | ● | ● | ● |
| Stapp-proof | ● | ● | ● | ● |
| Flammability testet | ● | ● | ● | ● |

*Figure 115. Textiles and how they fulfil demands.*

## FASTENING OF BLANKETS

There are multiple ways to fasten the blankets to the chair. At first there was a consideration about locking the blankets to the chair, so only staff could take them off – to avoid that the blankets will end up I the patients rooms. But talking with staff they don't see it as such big problem, so they rather have it without a lock. The experience of how to connect it is essential for how the experience for the user is as well as the importance of how the connection can withstand pulling and what happens if something breaks. The following shows what the proposals are evaluated upon.

**Actions:** The less actions the staff needs to do the better. **Ease:** Easy to get to and see when fastening. **Fiddle:** What happens is the patient fiddles fit the connection. **No break function:** Does the connection release instead of breaking when it is being pulled **Wear down over time:** Will the function break or not work optimal over time. **Damage/repair:** What happens if something breaks and how does can it be repaired.

### CHOICE

The zipper was the chosen solution. It was chosen based on the best interaction for the staff, and because it fastens to a bigger area of the surface keeping it properly in place. Push buttons and Velcro are also easy to handle, but might be too easy for the patients to open so they can take the blankets discreetly. The duffer lock has good quality in terms of breakage, but takes too long to put on and take off, which also can be in awkward positions underneath the chair.

## PLASTIC GRANULATE

To give the shoulder and leg blankets weight, plastic granulate will be used as stuffing. The plastic granulate consist of polyethylene, each granulate measures 5x5mm. The spastic granulate are CE-marked, which means that it fulfill the European requirements for safety and environmental health. The granulate can be washed in machine at 60 degrease and can tolerate detergent. This is chosen due to the use of rice, that are normally used in ricebags, are attracting mites.

*Figure 116. Plastic granulate.*

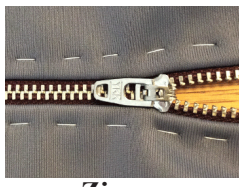
| |  **Velcro** One for shoulder blanket and two for leg blanket (on surface) |  **Zipper** One for shoulder blanket and two for leg blanket (on surface) |  **Push button** At least 4 for shoulder blanket and 4x4 for leg blanket (on surface) |  **Duffer lock** At least 4 for shoulder blanket and 4x4 for leg blanket (through chair) |
|---|---|---|---|---|
| **Connections** | | | | |
| **Actions** | 1 per connection. | 1 per connection. | At least 4 per connection. | At least 4 per connection. |
| **Easy** | Easy to handle. | Easy to handle. | Easy but take a bit more time. | Take some time to put in in place. |
| **Fiddle** | Damaged by fiddle and noisy. | Should be okay. | Wear down by fiddle. | Not much to fiddle |
| **No break function** | Don't break | Break | No break | Break |
| **Wear down over time** | Yes | Not much | Maybe | Not much |
| **Damage/repair** | If the velro on the chair needs change, it needs to be send to upholstery. | If the zipper on the chair needs change, it needs to be send to upholstery. | If the buttob on the chair needs change, it needs to be send to upholstery. | Only the blanket needs to pe fixed, because the loc isn't locked to the upholtatry. |

*Figure 117. Fastners for the blankets are evaluated.*

# PRODUCTION & BUSNIESS

This section describes the overall production for the big components and inportant materials of the product. It introduces business elements and production flow.
The section concludes with the final price of the product and breakeven.

*Figure 118. Meeting at S5 to present final concept.*

# PRODUCTIONFLOW

Fig. 114 illustrates the production flow, from ordering to a finished product. Different arrows explained to the right, shows the flow parts, actions, information and the product. some parts as the shell and legs are made prior the order and kept in storage until needed. when ready the shell is send to get foam applied before continuing too the uphosltery. Finally the product is assemblied and send to the costumer.

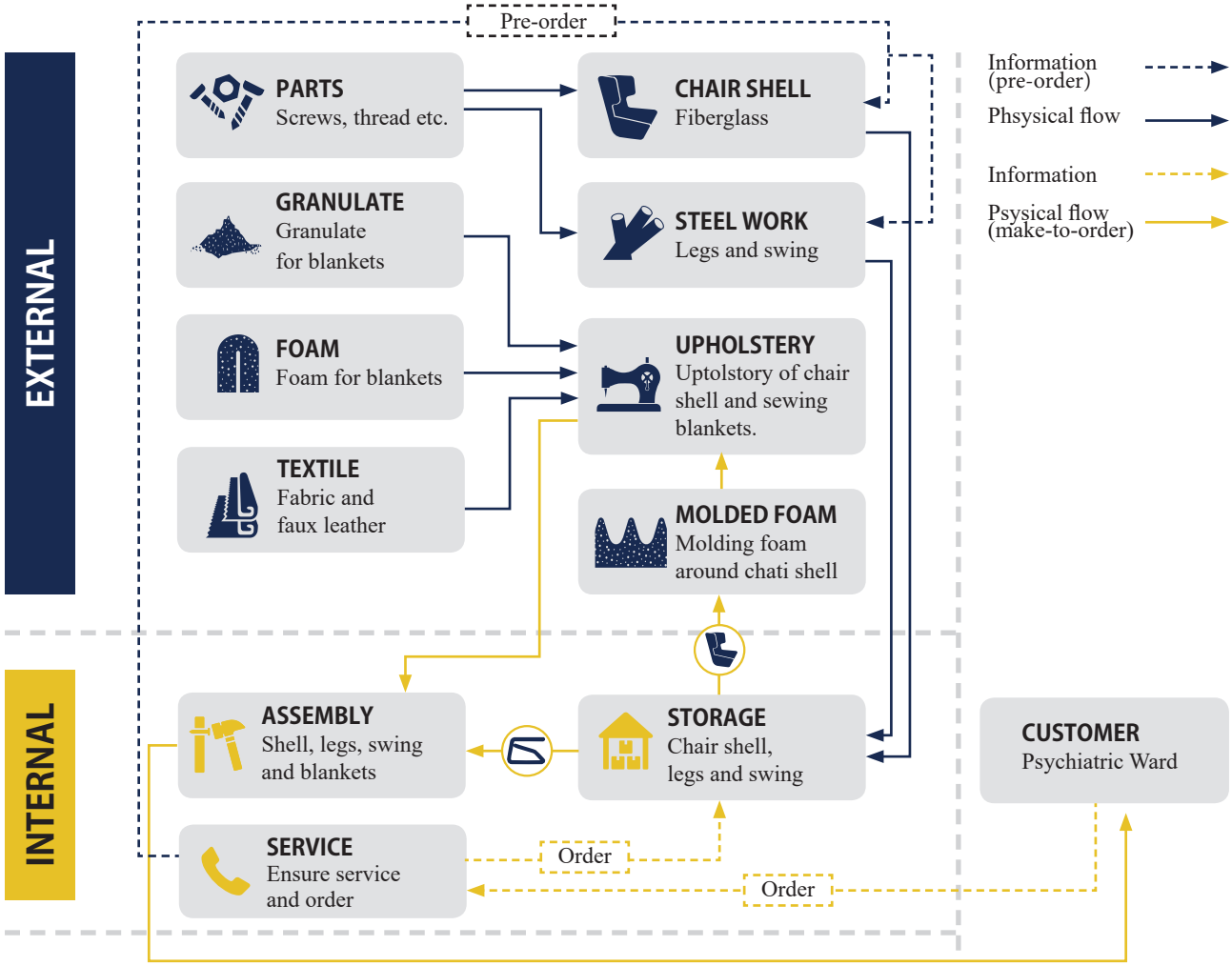



*Figure 119. Processflow.*

# PRODUCT PRODUCTION

## SHELL

The inner shell is made of a fibreglass composition. The fibres are placed over a mould in layers while a hardener is continuously applied. The foam composite is the added on the fibre, and lines is cut alongside its surface, to allow pathways for the hardener. A second set of fibreglass layers is then applied, alongside with additional hardener. A plastic cover is then placed over the entire element, and held against the surface with a vacuum. This helps the layers, stick to the mould, while they dries and hardens over several hours. The vacuum also helps suck the hardener down through the lines cut in the surface of the foam; connecting the two fibreglass walls. The composition of fibreglass and foam adds stiffness, and strength, compared to a shell made solely out of fibreglass. The thickness added with the composition, gives additional space for any inserts such as metal threads and hinges, imbedded in the shell during the application of fibreglass.

### STEEL LEG

The steel frame, acting as legs for the chair made of one steel tube approximately three meters long. The tube is bend 10 times with the same radius, and one time forming the large curve around the backrest of the chair. The frame and shell is held together with bolts, inserted through the leg frame, in predrilled holes. The bolts are then screwed into a threaded inserts in the shell, placed under the fibreglass when the layers where applied.

### FOAM PADDING

The soft foam padding, will be made with reaction injection moulding, using polyurethane (PUR) foam. The fibreglass shell will be placed in a closed mould on a few support elements, allowing the foam to surround the entire shell. The PUR foam is made by mixing two reactive liquids, just prior to injecting them into the mould. The two liquids are typically a polyol and a isocyanate, kept in two separate containers. The reaction between the two, is a chemical exothermic reaction, causing the mixture to expand as a PUR foam which then sets [24]. The PUR foam can be made fire retardant with additives, to accommodate the requirements for public facilities, such as the hospital.

### UPHOLSTERY

The fabric surrounding the chair is made by craftsmanship. The textile is cut in pieces, and sewed into shape with machine stitching on a sewing machine. Parts of the upholstery can be pulled over the shape of the foamed chair, whereas other parts has to be stitch together by hand. Some places it can be necessary to apply glue between the foam and fabric, to insure it stick to the shape. However, usually the fabric can be made to follow the form, by tightening, the upholstery together when stitching it together by hand. The upholstery of a chair, cutting and sewing the textile takes an upholsterer and sewing machinist approximately six hours of work.

# OVERVIEW

Using business model canvas and value propersision canvas, gives an overview of the whole product situation, both production, service and selling points (fig. 115).

## PRODUCTS AND SERVICES

**Finansial**
- Replacements of parts
- Delivery

**Digital**
- Homepage with info presentation of products and contact info
- Personal service

**Imaterielle**
- Repairs
- Buying separate parts

**Psychical products**
- Legs, blankets swing (replacements)
- Armchair, lounge chair (complete furniture)

## PAIN RELIEVERS

**Reliving**
- Reducing aggressive behavior
- Stronger materials that withstand use
- Unthrowable
- Easy to clean
- Not asking for and providing blankets
- Easier to observe the patient's desire for stimuli
- Defusing aggressive behavior
- Minimizing the possibilities of creating weapons

- Self managed stimulation
- Modern warm interior with simple expression (home feel)
- Fever tasks for nurses (patient's don't asks for stimuli)
- Independence (patient)
- Nurses do not get disturbed as much
- Able to be private

## GAIN CREATORS

## TASKS

**Social task**
- Not a treatment
- Looks comfortable and cosy

**Functional task**
- Finding and putting back
- Finding nurses to ask
- Observing and documenting
- Tool for defusing

**Emotional task**
- Feeling at ease
- Security and comfort
- Trusting the surroundings
- Not feeling stigmatised
- Feeling independent

## PAINS

**Unwanted results**
- Parts gets broksen of and used as weapon
- Diffucult to clean
- Overview
- Being borred
- Aggressive behavior
- Feeling stigmatised
- Ruined upholstery
- Appears worn down
- Used for throwing
- Hiding drugs, money
- Nurses to satisfy patients
- Patients needs to ask

**Wishes**
- Modern
- Social and private
- "Unthrowable"

**Expectations**
- Comfort
- Simplicity

**Unexpected**
- Arousaal stimulation (swing)
- Proprioreceptive stimuli (blankets)

**Demands**
- Hygiene
- Safety regulation (fire)
- Durable

## GAINS

## KEY PARTNERS

**Suppliers**

- Wood (handles and cover for legs), legs, swing, fabric, foam, shell, upholstery
- Small parts: Screws, brackets, zippers, plastic granulate

- Accountant
- Legal consultant
- Delivery firms

## KEY RESOURCES

- Shell/skeleton parts
- Foam
- Fabrics
- Steel (legs/swing)
- Plastic granualte

## KEY ACTIVITIES

- Assembly (in house)
- Maintenance/repairs
- Sales
- Shipping
- Storage

- Production of shell and foaming
- Cutting fabrit, sewing and upholster.

## VALUE PROPOSITIONS

- Safe and durable furniture
- Comfort
- At ease
- Secure
- Reliable delivery
- Personal contact
- Customisation
- Value for money

## CUSTOMER RELATIONS

- External delivery firm
- Security in checking broken chairs
- Contact with customers and ongoing observations of the chairs in use (redesign)

## CHANNELS

- Regional offices
- Repair service
- Catalogue/newsletter
- Sales consultant
- Showroom
- Webpage (only info and contact)

## CUSTOMER SEGMENTS

Niche: Psychiatry furniture

- Patients
- Nurses and social and healthcare assistants
- Environment and purchase responsible for each department

## COST STRUCTURE

- Using same channels when making new products

## REVENUE STREAMS

- Payment
- Made to order
- New parts
- Customisation

*Figure 120.Business model canvas and value propersition canvas.*

# BUSINESS

The business informs about the calculated price of the product, based upon the quantity and market. Before doing this, prodcuts we have seen in the psychiatry in Aalborg and Randers are shown to come up with a range of the reatilprice of the different products. This is a short analysis of what the cost is of products they have and are buying at the moment, to validate is our own price are realistic.

## FURNITURE IN THE PSYCHIATRY

Fig. 118-121 shows some of the furniture that is met during visits at the psycihatry.
The products do not have functions or features that is similar to the product that are developed. Expect the ball chair from Protac, which has been an inspiration. The furniture was original for kids needed care and embracement, which is then expanded to elderly and adults people.
Other products are ergonomic, modern chairs that is not ment for the psychiatry, but are found as choises, when the nurses and staff didn't have a specific furniture to choose between.

The prices of the prodcuts variate a tiny bit and a are very normal prices for public sector products for institutions.

*Figure 121.*

**11.249 DKK**

**ABOUT A LOUNGE CHAIR**

Modern neat chair from HAY, in different materials.

*Figure 122.*

**12.810 DKK**

**STRESSLESS CHAIR**

The stressless chair have a very smooth movement and is a comfortable chair i leather.

*Figure 123.*

**15.743 DKK**

**LAMINO**

Comfortable and ergonomic chair

*Figure 124.*

**10.750 DKK**

**SENSEIT**

Protac's sensory ballchair, stimulating points on our body.

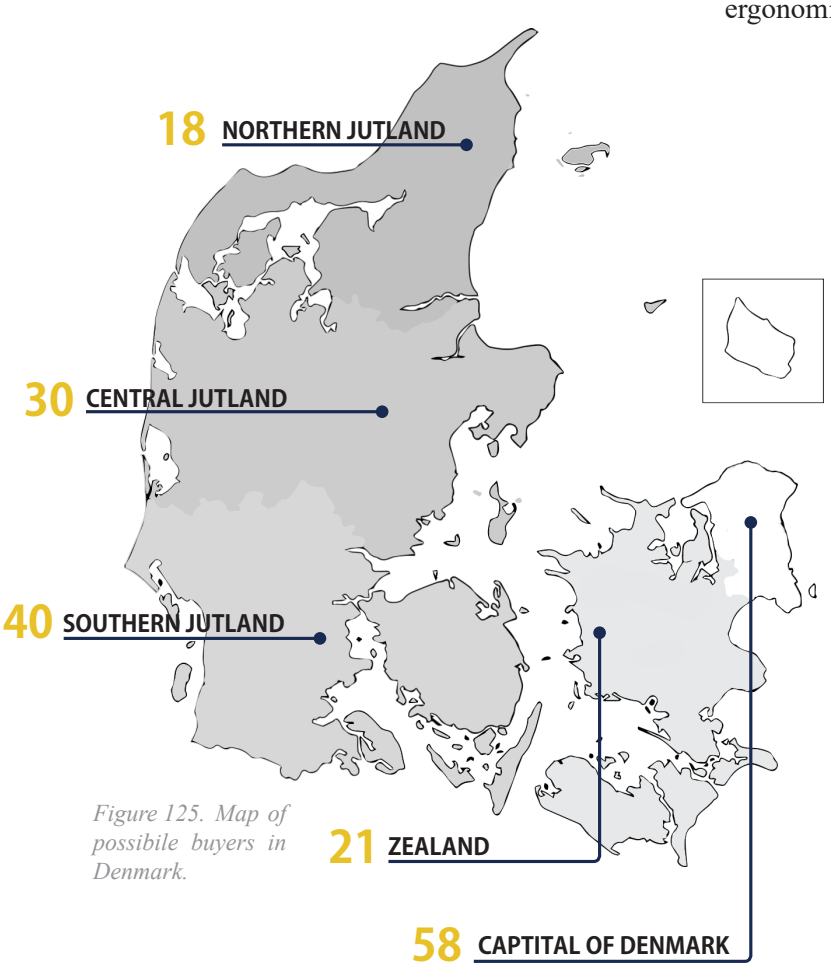



*Figure 125. Map of possibile buyers in Denmark.*

## MARKET POTIENTIAL

To investegate how big the market is, all relevant departments of the psychiatries in Denmark, have been listed (app. 22). Looking beyound the wards worked with in this project, wards for treating anorecsia and elderly psychiatries are also possibilities. Likewise wards for young people (under 18).

After getting final feedback on the concept, meeting at S5, nurses and persons from the management estimated that each ward would be able to use 2-3 chiars each., which means that adding up the numbers on fig. 120, it becomes 437 buys (chairs) if everyone is going to buy the rough estimated amount of chairs.

*Figure 126. Final product.*

## PRICE ESTIMATION

Below is the calucated price for the products, showing retail price and breakeven of a periode on three years. For full calculation and numbers see app. 23.

| RETAIL PRICE (WITHOUT RETAILER) | DKK |
|---|---|
| *Production cost (60%)* | *13000,18* |
| *Constribution (40%)* | *5200,07* |
| *Sales price (retail excl. VAT)* | *18200,25* |
| *VAT (25%)* | 4550,06 |
| Retail price (incl. VAT) | **22750,31** |

| BREAKEVEN SALE (DKK) | YEAR 1 | YEAR 2 | YEAR 3 |
|---|---|---|---|
| *Potential buys (DK): 437* | *15%* | *20%* | *25%* |
| *Sold units (chairs)* | *65,55* | *87,4* | *109,25* |
| *Prototype* | *150.000* | | |
| *Production* | *852.161,47* | *1.136.215,29* | *1.420.269,12* |
| *Expenses* | *116.000* | *116.000* | *116.000* |
| *Total expenses* | *1.118.161,47* | *1.252.215,30* | *1.536.269,12* |
| *Turnover* | *1.491.282,57* | *1.988.376,76* | *2.485.470,95* |
| Margin | **373.121,10** | **736.161,47** | **949.201,84** |

### ENCO

The identity of ENCO is that three designers have their own business. The ideas is that the assembly is done by the company itself, meaning there is a need for stage, an office and place for doing the assembly.

Parts are then made by suppliers, where some are by order, like the upholstery, the rest is thought to be in stock in a certain amount. Calculating the breakeven for the company, shows that the brekeven are reached within the first year.

## REFLECTION

We are aware of the estimation can be overated. Even though the departments in Aalborg might be interested in 2-3 pieces, i don't justify that everyone else wants the same amount (meaningthe full solution). Since selling seperate parts of the procduct and it's possbile to have a very simple product too, this could also be good for business and desired. Another thing to expand the market, is the loungechair which is more social oritentated.

The price of the product are quite expensive. This could be optimised by mowing the production outside Denmark, like Lithauania and optimizing production possibilities, like using a steel frame instad of a glass-fiber contruction shell. The prices are also estimated by suppliers in Denmark, which is not the cheapest options to have. So if the production should countinuing being in Denmark, different suppliers should be tried to find the cheapest with the best quality.

# REFLECSION

## PROCESS

### GETTING INTO THE RIGHT DIRECTION

As shown in this report, the initial direction of the changed quite suddenly. This was a result of the constant improving understanding of the problems scope. Initially we may have been a bit to fast in assuming, our full comprehension of the problematics. A result of this is that our initial market research were inadequate, and additional research were necessary far later in the process. Something that might could have been avoided if a more diverse representation of the hospitals staff, had been interviewed in the beginning of the process.

### CAN WE TALK TO A PATIENT?

Getting into contact with the user, were a big challenges, both practical and ethical. The privacy and taboo, of being either emitted or previously emitted in a psychiatric department, made it difficult to find a way of contacting the users of the product. Even when contact were established, finding a suitable time and place for a meeting, showed to be a reoccurring challenge. Never the less we managed to get several meetings when needed, and got important user insights through this. However we were forced settle with few, reoccurring representatives for our tests, which may be problematic.

Additionally, during inteviews and test, with persons affected by these types of illnesses, also requires additionally observant eyes. Otherwise one might not notice whether or not they currently are experiencing effects of their illness. For instance a depressed and anxious person, might be very negative in the feedback, where a manic patient may be fare to optimistic.

Not enough contact to NAU

Throughout the project, we have attempted to collaborate with NAU. Unfortunately their busy schedule have made this very challenging, and regretfully NAU incorporation in this project has been very limited.

### DEVELOPING THE SHAPES AND AESTHETICS

In developing the form of the chairs, we have spent far to much time, investigating the idiom on paper. This resulted in a very slow process, of developing the form. The actual process of developing the form, did not amount to much before the goal became an full size model. Which ended up improving our understanding of the shape tremendously. Making an additional full size model, could possibly have provided a lot of benefits in improving the shape.

### PLANNING

Our process has not been controlled buy a specific management model. Whether or not his could have help us through the part of the our process, that have slowed us down, is difficult to say. Even without a management model to intentionally follow, we have had a process very similar to how we previously have conducted projects controlled by such models. This is undouble because of this is an well-known and trusted way of solving a problem, and because it comes natural to us.

### 3D CAD

Modelling the chair in 3d has been a big challenges. Our most frequently used sketching program is solid work. Which has great advantages in many various aspects, when sketching technical and precise elements. But using it for soft furniture, and pillows is not an optimal chose. The requirements of sketching within solidworks have made the process of making a 3D model far slower than it could have been. In retrospect we should have used a more suitable software for this, such as Rhine serous for instant.

## PRODUCT

### MANY FUNCTIONS

Our Product has ended up with multiple attachments, all that we have been unwilling to discharge. As a result, our chair may have too many visually disturbing effects for it to be easy feasible for the user. Our focus on keeping as many features as possible may have been a bad decision. We might have benefited more from including fewer features, and focusing solely on the embracing feeling we wants the chair to express and provide.

### STIGMATISING

We have a concern that our product, being a stimulation tool used for patients who needs to calm down, may lead to a stigmatization. Our concern is that using the chair might be associated, with being placed in corner to calm down. If our chair looks too much as a helping aid, it will be associated more with a treatment for aggression, than a comfy furniture.

# FURHTER WORK

## SWING

Several aspects of the swing is of a concern. Both the experience of using it with its current construction. The effects of how it can be exposed to harsh treatments, and whether this causes it to break. The visual impression of the strength of the swing may also be an issue, regardless of its durability. All this is problematics and concerns we need to consider under a further development of the swing.

## PROTOTYPING

Several concerns of the products capability still needs to be tested and possibly altered. The initial next step is to start forming prototypes, suitable for testing, especially for durability. How the product would be affected by harsh treatment, is near impossible to determinate, whiteout proper experimentation on a full size prototype. The experience of using the product and its functions is also something which has to be evaluated, based on a final prototype.

## OPTIMIZING

It may be possible to optimize several aspects within our company setup. Beside practical adjustments found under prototyping and testing. The construction of the product may possible become fare cheaper while still sufficiently strong, if it were to be made as a steel frame. The production price of the chair can possibly be reduced significantly, if the larger part of the production where our own, rather than outsourcing all the elements for the product. Furthermore, the elements needed from suppliers may be cheaper, If acquired through companies outside of Denmark, where the salary of employees often are cheaper.

# LIST OF LITERATURE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