CLOUDCUDDLE SENIOR

The design of a bed tent for wandering people with dementia

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CLOUD CUDDLE

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INDEX

SUMMARY

THE DESIGN OF A BED TENT FOR WANDERING PEOPLE WITH DEMENTIA

The primary purpose of this Integrated Product Design Master thesis has two purposes. The first is to gain a deeper understanding of the needs of the elderly with dementia that causes undesired behaviour or Behavioral and Psychological Symptoms of Dementia, such as wandering during the night. The second purpose is to design CloudCuddle Senior: a lightweight and inflatable bed tent that keeps patients up to 120 kg in bed and creates a feeling of safety in various use cases such as home, caring home or the hospital.

Data for this thesis were gathered by study literature on topics such as dementia and non-pharmaceutical interventions, making rapid prototypes and doing qualitative user tests.
These methods generated knowledge for two sub-sections of the CloudCuddle Senior Design. The challenge of the Structural Design part was to come up with a bed tent concept that will be stiff enough to keep patients up to 120kg in bed while being lightweight to ensure mobility and consider nursing activities in and around the bed. The Experience Design of CloudCuddle Senior is about creating a safe and comfortable experience in bed that take the needs of people with dementia into account.

The literature research results provide the support that patients with dementia need dynamic stimuli. However, research often focuses and compares mainly the type or the meaning of the stimuli such as Snoezelen, light therapy and music therapy while intensity through pace and amplitude often forgotten. More research into the intensity of therapeutic activities may conclude that designers of new interventions should focus on creating an intensity of dynamic stimuli that matches the patients need instead of focusing on the type of stimuli.

A concept design is proposed based on the results of the Structural and Experience Design research. One of CloudCuddle's bed tent's significant characteristics is its inflatable structure. Although it was tried to design a more stiff design through solely inflatable elements, hard materials are required to meet the requirement of keeping 120kg patients in bed. The results on research from an Experience Design perspective implies that a bed tent that impairs vision on all sides except on one side offers a sense of safety while still being connected to the room in which the patients sleeps and a sense of control. The results of both the Structural and Experience Design research are combined in a final concept design for CloudCuddle Senior that should be prototyped and tested on strength and experience.

INTRODUCTION

This thesis is about designing a bed tent (CloudCuddle Senior, figure 1) for wandering behaviour of people with dementia. It is relatively unknown why people with dementia show wandering behaviour, which makes it challenging to prevent patients from wandering at night. As a response to this problem, companies offer bed tents: cages around beds that prevent patients from leaving the bed. Instead of strapping patients to the bed (which still occur sometimes), patients are allowed to have freedom of movement in their bed. Usually, these bed tents are expensive, immobile due to weight and size, have a cage-like appearance and seem to be focused on effective economic solutions to keep patients in bed. A new bed tent design by CloudCuddle can improve on safety due to its expertise using inflatable structures, creating a better experience by taking the patients perception into account, making a more mobile bed tent by using lightweight materials than can be folded while making it more affordable because it will not include a complete hospital bed.

figure 1. CloudCuddle Senior, a bed tent for people with dementia is an inflatable structure that prevents patients from wandering out of their bed and support a sense of safety.

COMPANY ANALYSIS

CloudCuddle is a small start-up initiated at the Delft University of Technology. The project started as a minor project of a group of students of whom Lotte Leufkens is now the founder and CEO of the company. The company exists of a full-time CEO, a full-time Marketing & Communication specialist and a part-time Logistics Manager.

CloudCuddle's only product, named CloudCuddle Junior, is a bed tent mainly for a mentally or physically disabled lightweight children. CloudCuddle Junior is for families with children that have multiple disabilities that usually need a heavy bed construction to keep the child in bed safely during nighttime. Many families have a safe and secure bed at home, but these are heavy and not easy to travel with, prohibiting them from ever spending the night somewhere else. CloudCuddle Junior's inflatable construction makes the product light and mobile, which makes the product suitable for travel during holidays or weekend trips. CloudCuddle Junior offers families with a disabled child more freedom and enables them to participate more in society. Besides lightweight mobility, CloudCuddle Junior makes no sound while banging on it and has no loose components that can get lost or need complex setup

A newly identified market for an inflatable bed tent is elderly with dementia that wanders at night. Hence, the main objective of this thesis was to design a CloudCuddle Senior. There are already solutions on the market for this problem, yet they are – like the bed tents for children – massive constructions that require special transport and is not set up quickly. CloudCuddle would like to see CloudCuddle Senior as a stiffer version of Junior that can repel escaping patients of 120kg and is focused on people with dementia. A side effect of increased stiffness is that the design also helps families that have children who are too heavy for a CloudCuddle Junior.

CloudCuddle strongly prefers a CloudCuddle Junior that is fortified smartly so it can be used with heavier patients. This thesis shows that a stiff CloudCuddle Senior design as a solely inflatable bed tent is considered unrealistic.

CLOUD CUDDLE ©

FOR YOUR SAFEST DREAMS

figure 2. CloudCuddle's logo

figure 3. Patients with dementia are unaccountable and may harm themselves during wandering.

WANDERING BEHAVIOR OF PATIENTS WITH DEMENTIA

THE PROBLEM

Dementia is commonly accompanied by sleep disturbances, leading to a lower quality of life, a higher burden of care and is a significant factor of institutionalisation (Higami, Y., 2019). Research indicates that one-third of people with dementia have trouble sleeping due to a disturbance of the circadian rhythm system and other neurodegenerative processes unique to Alzheimer disease and other dementias (McCurry et al., 2008). See Appendix A for an extensive overview of dementia, the functionalities of the upper and lower brain and about senses and stimuli.

WANDERING BEHAVIOR

People with dementia are known to wander behaviour. Patients can frequently climb out of bed and start wandering in search of dynamic stimuli (van der Plaats, 2016), are confused and think they should do something or are searching for an unknown need.
Although wandering might seem innocent, it can be a burden that increases the care burden of both professional and family caretakers. Research illustrates that a patient can leave the bed as much as 31 times per night (Higami, Y., 2019). Sleep disturbances lower patient's quality of life and increase the burden of care.

With a chance of 32 per cent of elder people falling once a year, from which 24 per cent had severe injuries and even 6 per cent fractures, falling is a significant danger while walking (Tinetti et al., 1988). Patients with dementia are considered twice as vulnerable to falls compared to those without dementia, making falling an even higher probable danger for people with dementia (Healey et al., 2007).

DEMENTIA

So far, it is unknown what the cause is of dementia, and so no cure for dementia has been developed. Industry, researchers and therapists have designed pharmaceutical and non-pharmaceutical interventions in an attempt to alleviate agitation, undesired behaviour and restlessness, also known as Behavioral and Psychosocial Symptoms of Dementia (BPSD). Non-pharmaceutical interventions are desired over pharmaceutical interventions because the latter tends to disconnect the patient from its environment, making desired social and emotional communication harder which results in a decrease in Quality of Life (Silversty et al., 2004).

The world of demented people often includes confusion, isolation, misunderstanding and over- or under arousal of the senses, which leads to stress or sense deprivation. It is common knowledge that people with dementia have troubles memorising simple things and forgetting faces of family and close ones. Both these examples are due to a dysfunctional so-called upper brain in which the rational functionalities take place. The lower brain is unharmed, and thus the patient lives only with the part of the brain that is responsible for its emotional capabilities (van der Plaats, 2016).

It is common that during the night, people with dementia wake up in the middle of the night and are confused about their current situation. They might not recognise where they are and start wandering because:

- Patients are searching for something unknown to the nurses
- Patients believe it is time to wake up and have the need to start an early routine, e.g. the need to bring their kids (which are now grownups) to school
- Patients are searching for dynamic stimuli

Wandering behaviour involves an increased risk of injury. Patients with dementia that start wandering at night may cause trouble to themselves or their environment because of (Brightfocus, 2019):

- Confusion. The person with Alzheimer's disease does not realise that he is at home and sets out to "find" his home.
- Delusions. A patient may be reliving anxiety or responsibility from the long-ago past, such as going to work or caring for a child.
- Escape from a real or perceived threat. A person with Alzheimer's disease can be frightened by the noise, a stranger who visits, or even the belief that her caregiver is trying to hurt her.
- Agitation. This is a common symptom of Alzheimer's disease, and it can be made worse by some medications.
- Boredom and restlessness that may be brought on by a lack of exercise and other stimulation.
- The patient is searching for a person, a place, or an item that was lost.
- Some patients find their way outside and can become lost, confused, injured or even die from exposure to harsh weather or other safety risks

figure 4. People with dementia have difficulties relating and understanding their environment causing anxiety and stress.

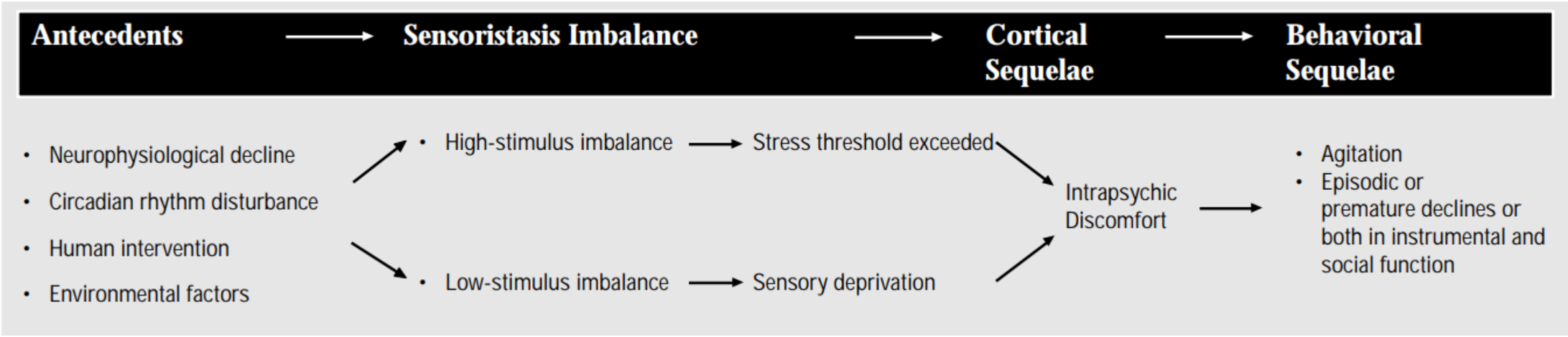


figure 5. Stimuli (or Antecedents) can create an intrapsychic discomfort by either exceeding stress threshold or sensory deprivation (Kovach, 2000). This varies per person (Lombard, 2007).

THE ROLE OF INDIVIDUAL PERCEPTION

UNDERSTANDING THE EFFECT OF STIMULI ON PERCEPTION

Everybody is unique, and so are their perceptions and how strong stimuli are perceived. Based on sensory integration theory in the 1960s Lombard A. (2007) describes the sensory intelligence. She explains that we are different regarding our threshold and how each responds uniquely to our environment.

The threshold, as described by Lombard, is crucial as it is key to how much a patient can cope with before intrapsychic discomfort that leads to BPSD is constituted (Kovach, 2000). Antecedents (environmental factors, human intervention, circadian rhythm disturbance and neurophysiological decline) can lead to intrapsychic discomfort through either a high-stimulus imbalance, which leads to an exceeded stress threshold or a low-stimulus imbalance, which results in sensory deprivation. BPSD is a consequence out of this intrapsychic discomfort.

When talking about stimuli, Lombard explains seven senses: sight, hearing, touch, smell, taste, Movement divided in vestibular (the gravity sensors in your ear) and proprioceptive senses (when you use a joint or muscle).

THE HIGHLY INDIVIDUAL PERCEPTION OF STIMULI PER PERSON.

Lombard makes a distinction between people with a low threshold and a high threshold. Each of the threshold profiles includes two different characters that perceive stimuli differently. A description of the four archetypes of how the sensation is perceived can be found below. For a full explanation of these traits, see Appendix A. The four profiles are:

1. Low Threshold – Sensory Sensitive
2. Low Threshold – Sensory Avoiders
3. High Threshold – Low Registrator
4. High Threshold – Sensation Seeker

What is very important to consider is that What is very important to consider is that individual perception is highly dependable per person. On top of the profiles described above, every person registers each sense differently. This means that for one Low Threshold – Sensory Sensitive person a particular sound may cause over-arousal thus stress due to the sensitivity of the ear while the same sound does not create over-arousal in another Low Threshold – Sensory Sensitive person. This complexity of how humans perceive their environment is not solely applicable to this project. However it is essential to note that under or over-arousal is more likely to trigger extreme behaviour in patients with dementia, also known as Behavioral and Psychological Symptoms of Dementia (BPSD).

figure 6. Percepttion of healthy people.

figure 7. An impression of deteriorated vision of people with dementia.

SENSES: DEMENTIA AND AGEING:

People with dementia are usually elder. Ageing is known to affect and deteriorate the senses. Besides ageing, dementia also is known to affect the senses. Besides dementia affecting the senses, ageing also is known to deteriorate the senses. The degree of deterioration and the current state of each sense varies person from person, but overall destination should be taken into account when designing for elderly with dementia. This means that while stimuli are perceived with an average intensity by healthy people; it may not be noticed by patients with dementia. Dementia is also known to affect the visual processing part of the brain (van der Plaats, 2006). This means vision becomes blurred and a vignette grows into the field of vision. The colour white is, therefore, a source of trouble because people with dementia cannot estimate distances. This means that contrast helps people with dementia to create an overview of the room in which they are.

A full analysis of dementia can be found in Appendix A: Literature study on Dementia.

figure 8. One of the major players in bed tent: the Posey bed.

figure 9. Mobifit is a 'mobile' bed tent for children.

SOLUTIONS ON THE MARKET

Preventing wandering people with dementia is not a new problem and solutions are therefore already available (see Appendix B for other solutions available).

There are already solutions on the market available in order to prevent people with dementia from harming themselves through wandering behaviour. Relative simple solutions like high-low beds, bed rails, and raising the long sides of the mattress all prevent patients from crawling out of bed or hurting themselves while doing so. These solutions, however, do not guarantee that patients will not start wandering around and get injured during their wandering or creating problems elsewhere, such as waking up other residents of the caring home. In other words, they decrease the likeliness that patients hurt themselves when trying to get out of bed. This does not solve the problem when patients should not leave the bed at all when, for example, a patient had knee surgery and forgets he can not walk. These solutions also still allow patients with dementia to roam around and create problems while doing so.

More effective solutions are bed tents such as the Posey Bed (figure 8). These are complete beds with a cage around it that gives the patients enough space to lay and move around in bed but does not allow the patients to get out of bed. These products are all-in solutions complete with electrically adjustable backrest and will replace the initial bed of the patient. These bed tents are sold for around five to eight thousand euro, making them costly beds. The choice to use a posey bed is thus a choice that may have a significant financial impact on the Healthcare Providers. It is not a solution that can be quickly experimented with to see whether it calms or has a positive impact on the patient. On to of that, the practical design of a bed tent such as the Posey Bed does not show any apparent features that empathise with the patient's needs. Its goal is to offer a bed which keeps patients inside, and that is it.

The Mobifit (figure 9) is a portable bed tent that is more compact than a complete bed tent installation such as Posey Bed. The Mobifit weights around 22 kg. The Mobifits metal construction unfolds on the floor into the desired shape, and a mattress is laid inside the tent, so the patients sleep on the floor. Unfolding and installing the bed tent cost some time and less easy compared to CloudCuddle Junior. The solution is not safe for people who behave aggressively, as these patients can hurt themselves, hitting the hard materials, although foam is offered to wrap around the metal bars. Mobifit marketing targets children, so it is not clear whether the solution will suffice for heavier patients such as the elderly.

The features of the above-described products leave an open area for CloudCuddle Senior to create a unique offering as a bed tent that:

1. guarantees no bed escapes by patients
2. is an addition to any sorts of beds, making the solution more versatile and makes the product cost less,
3. is designed to make patients calm for those who are sensitive to environmental stimuli,
4. is safer to use because the structural components are mainly inflatable
5. is compact, and lightweight which is easy to store in case of non-use and easy to travel with

PROJECT GOAL

VISION

CLOUDCUDDLE SENIOR IS A BED TENT THAT PREVENTS PEOPLE WITH DEMENTIA FROM WANDERING AND LET THEM EXPERIENCE A SENSE OF SAFETY .

Design brief

The goal of the project is to research how CloudCuddle Senior can be optimally designed for people with dementia regarding product experience and to design and prototype CloudCuddle Senior.

Vision

To ensure CloudCuddle Senior aligns with CloudCuddle's vision, a separate product vision has been determined (see Appendix C: VIP Process for details). This also guides the design process in making decisions that are aligned with the product's goal.

CloudCuddle vision statement is to provide a safe sleeping environment for everyone who needs it, so caregivers and healthcare professionals have more rest and freedom of movement.

Based on observations and the previous literature study, the vision statement of the CloudCuddle Senior is described above.

figure 10. Goal of CloudCuddle Senior is to provide a safe sleeping environment for elderly with dementia that also support a sense of safety.

STAKEHOLDERS AND REQUIREMENTS

REQUIREMENTS BASED ON STAKEHOLDERS

STAKEHOLDERS

CloudCuddle wants to help consumers having a save sleeping environment everywhere, so carers are more flexible and can participate better in society. In order to accomplish this they need to take various stakeholder needs which are formulated into product requirements. Stakeholders and their needs are described below, and a list of requirements that follow up is described after that.

The Government protects and care for patients on a governmental level through law and regulation.

On the 1st of January 2020, the government of the Netherlands will introduce a new law regarding care and coercion (Wet Zorg en Dwang 2020). Fundamental to this law is the idea of "No, unless.." which means that freedom restriction methods or compulsory care may not be used unless there is a severe disadvantage for patient or his or her environment (Volksgezondheid, 2017). According to the Law of care and coercion the functionality of a CloudCuddle bed is 'limiting freedom of movement', and 'enclosure' which are both defined as compulsory care.

Applying freedom restricting mediums needs to be done according to a roadmap explicitly made for the Law care and coercion (see appendix D). Depending on the situation, various experts will be advised on embedding freedom restricting products. This roadmap describes that care representatives need to come up with a plan to phase out freedom restricting products before integrating such method. CloudCuddle takes this into account by making a product that is usable as a non-freedom restricting product. Also, fewer experts are needed to advise when the patient already agrees with applying a freedom restricting product. Therefore patients need to perceive CloudCuddle Senior as non-invasive, which makes using CloudCuddle Senior according to law easier.

Insurance Institutions supports the financial needs of patients.

For insurances, it is interesting to offer financial support for cheaper solutions that are coming available because it increases their profit. For innovators, this means that making a more cost-effective solution helps to get their product offered by insurances, which makes their product widely available and thus selling more products. Current solutions like the Posey bed are available for approximately €8000,-. A CloudCuddle Junior costs €900,- euro. This means that CloudCuddle can generate a substantial strategic advantage based on price and that CloudCuddle products become more financially accessible for customers.

Today, insurance does not cover CloudCuddle Junior. To find financial support, consumers can apply for a Personal Tied Budget ('Persoons Gebonden Budget', PGB) at the city Hall of residence.

Healthcare Providers need a product that helps them to eliminate problems while taking care of patients.

Healthcare institutions or individuals that are close to the patients require a bed tent that can keep patients into bed safely. While CloudCuddle Junior does this for lightweight children (<60kg), CloudCuddle does not offer solutions for adults (<120 kg) yet. Healthcare Providers are beside the patients one of the two stakeholders that interact with the product. This stakeholder needs to set up and dismantle the CloudCuddle Senior. They also want the best for the patients, so the patient's needs are essential for this group too.

Patients want to have a product experience that fits their context of use.

A designer challenge is always to design a product that fits the user needs. For this particular product, it is an extra challenge to find this solution because the user are patients with dementia, which do not have common sense and are not acccountable for evaluations. The major goal of CloudCuddle Senior for the patients is to offer a sense of safety.

REQUIREMENTS

Product Requirements based on stakeholder needs:

Viability for consumers and CloudCuddle

1. CloudCuddle Senior cost should be affordable for home consumers because financial support is not always guaranteed. This price is yet to be set and the costs depends on the embodiment design.
2. CloudCuddle Senior should be within reach of CloudCuddle's competency and area of expertise.

Employability of CloudCuddle Senior:

3. CloudCuddle Senior is also employable while not being used as a freedom restricting method to give patients a safe and comforting experience without healthcare providers needing to ask authorisation from third parties.
4. CloudCuddle Senior does not occupy space above the bed that is needed for a mobile hoist so nurses can hoist immobile patients in bed
5. CloudCuddle Senior is compatible with various bed designs such as beds with or without handrails. This ensures CloudCuddle Senior is employable in-home, caring home and hospital scenarios.
6. CloudCuddle Senior allows the use of a hospital trapeze
7. Bedlinen should be able to be changed at night in case of wetting the bed.

Usability of CloudCuddle Senior by Healthcare Providers

8. CloudCuddle Senior must be easy to set up and break down
9. CloudCuddle should be portable: fitting in a bag and light enough to carry around
10. CloudCuddle Senior must allow nurses to take out patients in immediate action in case of an emergency
11. CloudCuddle Senior should allow nurses to see how the patient is doing in the bed tent.
12. CloudCuddle Senior should not make any noise when the patients bang against the tubes.
13. CloudCuddle Senior should be washable

Safety

14. CloudCuddle Senior should in no circumstances, create dangerous situations like suffocation, pinching off or getting stuck in any other way.
15. CloudCuddle Senior must be stiff enough to keep people of 120kg in bed
16. CloudCuddle Senior must be stiff enough to prevent patients from creating a 'hammock.'
17. CloudCuddle Senior gives patients a safe and comforting experience
18. CloudCuddle Senior must be light enough to carry around
19. CloudCuddle Senior structural tubes do not harm the patients when he/ she uses aggressive behaviour
20. CloudCuddle Senior must be made of non-toxic materials

22 *figure 11.When pushed against, CloudCuddle Junior tips over due to a lack of fixtures.*

STRUCTURAL DESIGN

DESIGN FOR STIFFNESS

The structural design of CloudCuddle Senior should be optimised on its two main features: freedom and stiffness. On the one hand, CC Senior should offer users the freedom of mobility while on the other hand, it should be firm and stiff enough to keep patients in bed safely. Because a mobile bed tent evokes thoughts of smallness and lightness, it evokes a contradiction with a stiff and robust design.

The features of freedom and mobility should be regarded from a broader perspective. For instance, CC Senior should provide the freedom to use any ordinary bed or hospital bed available, so CC Senior should be compatible with all sorts of beds. It should also allow nurses to use a mobile hoist to hoist patients into bed. Thus CC Senior shape should not restrict the use of hoists. One of the more involved users of CloudCuddle Senior are the nurses because they take care of the patients and any usability problems with the new bed tent are an extra burden on top of their daily labour-intensive work. Emma Knijn, a previous graduate from the University of Twente, researched how to design a CloudCuddle Senior from a nurse perspective to optimise Senior's use case. For this research, she interviewed nurses and ergotherapists to propose a design that answered their needs. New research on how to design CloudCuddle Senior combines the needs of patients with dementia a feasibility design. See Appendix E for the insights gained from tests on how to stiffen the inflatable structure of CloudCuddle Senior.

STRUCTURAL DESIGN: DESIRABILITY

A map was drawn to create an overview of the space that would be occupied by nursing activities around the bed. These insights were generated by Knijn (2018) through interviews. One of the significant insights is that previous CloudCuddle Junior design occupies space that is needed to hoist people into bed with a mobile hoist.

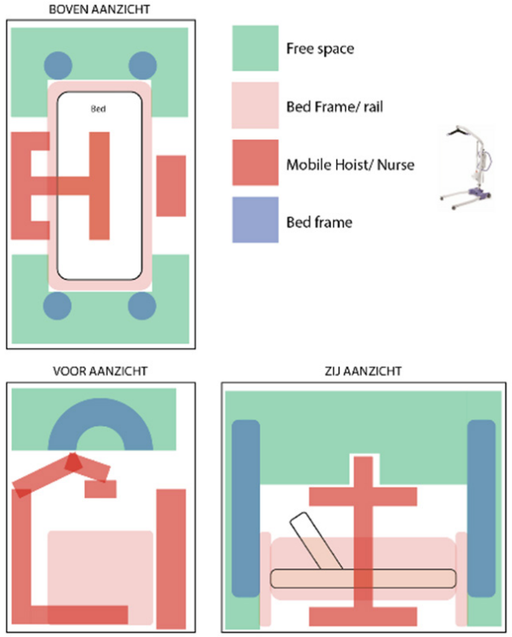
The design of Knijn considers this as it uses two arcs at heads and feet end instead of Junior's original intersection above the bed. The mobile hoist has enough space to hover above the bed when the nurse has removed the fabric between the arcs. Having no fabric or intersection above the bed allows the arc design to be lower than the hoist but still compatible with the mobile hoist. The design freedom that allows the designer to define the arc's height also gives design freedom for the roof to be designed in a way that it creates an experience of shelter and safety within the bed tent (will be elaborated on in the Experience Design chapter). An ideation session to consider other shapes that might be advantageous but unknown before was held to diverge solutions (appendix F).

STRUCTURAL DESIGN: A HYPERBOLIC PARABOLOID SHAPE AS FUNDAMENT FOR CLOUDCUDDLE SENIOR

Different shapes were sketched in ideation sessions to explore shapes that would be stiffer than the arc design (appendix G). It was assumed that the arcs would not be stiff enough to keep patients in bed because it was only held together by straps on the feet and heads end. Another problem that would have occurred is compatibility with different kinds of beds. The design described by Knijn was a typical hospital bed with high ends on both head and feet side while Senior will not only be used in hospital scenarios but also at home.

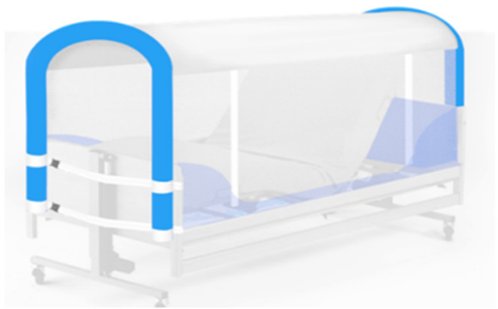
A confidential partner of CloudCuddle who is expert in designing shapes with inflatable tubes and advisor for both Knijn's design and CloudCuddle Junior, supported the idea to make a single-piece design. He reasons that an inflatable tube that does not have an intersection (unlike CloudCuddle Junior) in its design is easier to manufacture and therefore lower its production cost. The expert also suggested that a Hyperbolic Paraboloid shape (a shape that looks like Pringle chips) he had made before was the stiffest shape that he could make. The combination of 1) a connected design 2) a nonintersecting design, 2) a stiffer design and 3) the idea of keeping space above the bed unoccupied by having only two arcs at feet and heads end let to a natural decision that the Hyperbolic Paraboloid 'Pringle' shape is a solid fundamental choice for CloudCuddle Senior.

One concern to make the Hyperbolic Paraboloid shape usable as a bed tent was that the tube's diameter would need to fit between mattress and bed on the long side when it rests on the slatted base. The reason for this is that it otherwise creates an obstacle to climb into bed for people with dementia. This requirement requires the diameter of the tubes to be thinner compared to current CloudCuddle Junior design. Consultation with the expert in inflatables points out that the smallest diameter the inflatable tubes could have was 8 cm. Being able to rest the lower tubes between matress and bed also creates fixture which proved to be a significant improvement in stiffness compared to the current CloudCuddle Junior as is explained in the next chapter.



SPACE FOR HOIST AND NURSE

figure 12. A map of the top, front and sideview of the space around the bed that is occupied by the nurse and a mobile hoist indicating where there is room the inflatable structure of a bed tent.



BED TENT CONCEPT TAKING INTO ACCOUNT NURSES NEED

figure 13. A concept design of CloudCuddle Senior by E. Knijn mainly focused on the needs of the nurses. It focused on leaving room for the nurses around the bed to do nursing activities such as washing

HYPERBOLIC PARABOLOID

figure 14. Hyperbolic Paraboloid 'Pringle' shape made from inflatable tubes as proposed by the confidential expert in inflatable tubes. Photo: Emma Knijn.

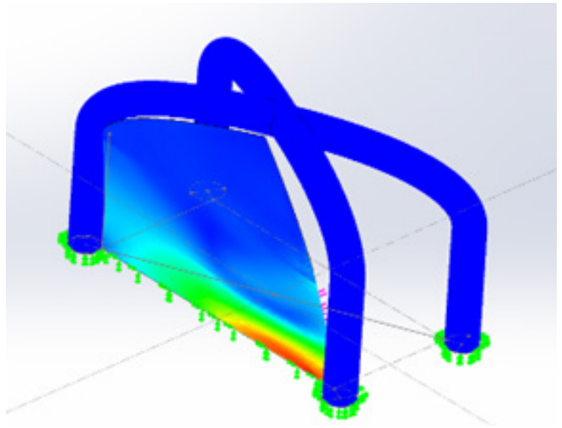


figure 15. A FEM analysis of the bed tent would be to complex and unrealistic to validate the model.

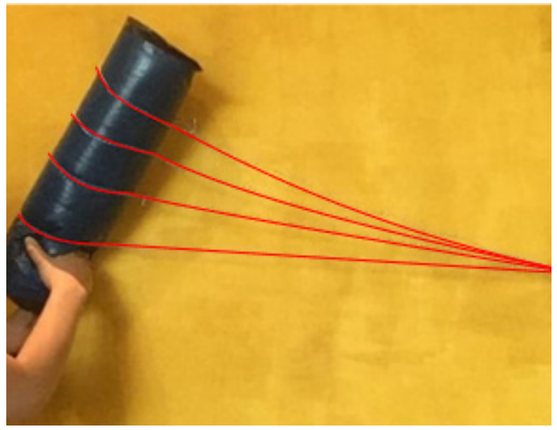


figure 16. A rapid 'prototype' was created to mimic the physics of applying force on an inflatable structure to gain understandance what is happening.

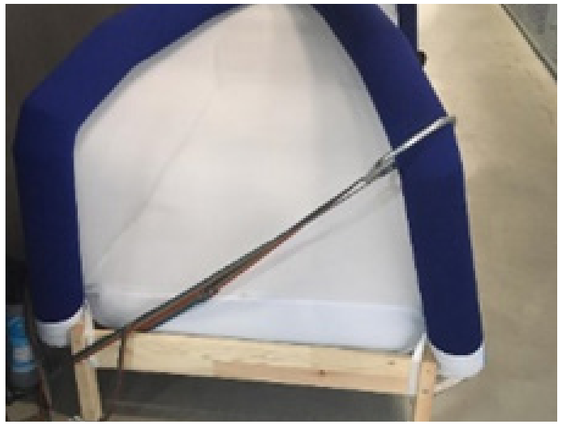


figure 17. A quick solution was prototyped to validate the idea that creating a pulling force would stiffen the inflatable structure. This was idea was busted.

figure 18. Holding CkoudCuddle Junior by hand stiffened the structure. This was due to applying force in the opposite direction of which the bedtent was pulled when someone in the tent pushes against the wall.

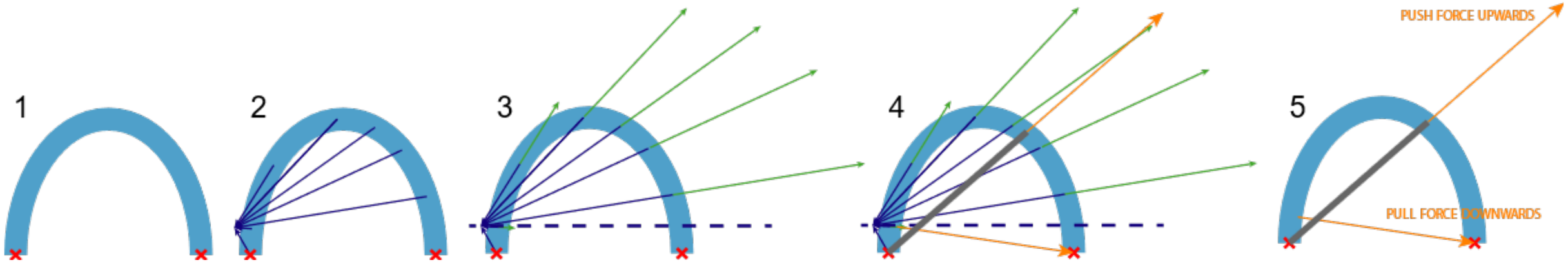


Figure 19. Side views of a CloudCuddle Senior and force vectors that apply in 5 steps.

Legend
Blue arc: CloudCuddle Senior from a side view
Red cross: points of fixtures
Blue vectors: the force that is applied when an individual push against the side
Green vectors: required force to counter the blue vectors in order to keep someone inside
Orange vectors: force directions from the points of a fixture to stiffen CloudCuddle Senior.

STRUCTURAL DESIGN: RESEARCHING STIFFNESS

Multiple approaches led to a design of CloudCuddle Senior that is strong enough to withstand a person of 120 kg. Among these approaches were FEM analysis (figure 15), rapid prototyping (figure 16 and 17) and mimicking forces by hand (figure 18) in an attempt to generate results efficiently and effectively to understand what is happening to inflatable structures that endure force. For an in-depth review of these methods, see Appendix G.

The complexity of physics in the bed tent excluded a realistic approach through FEM analysis (figure 15). Sander Minnoye, teacher at Delft, University of Technology and Embodiment Design expert, suggested isolating the features that needed testing and to prototype these features. Material characteristical studies created an understanding of what is happening with the inflatable tubes when force is applied. Quick solutions were then prototyped to test and validate the assumptions that were supposed to make inflatable arcs stiffer.

Result

The result of the previously described process was an understanding of the forces that are needed to apply to the CloudCuddle Senior to create the most reliable product possible. These forces are shown in figure 19 that represents a side view of an inflatable arc structure. The arc has fixtures on the bottom (1) on which someone applies force by pushing against the mesh (2). The green vectors show countering forces in order to maintain the structure's shape (3). In the 4th model shows a pull and a push force (the orange vectors in model (4). Model 5 shows the result in which fabric can be used to generate a pulling force downward, and a stiff material such as a metal is used to create pushing force upwards. The importance to make the force direction as similar as possible as the countering force, indicated by green vectors, in model 3.

STRUCTURAL DESIGN CONCLUSION

The following conclusion can be made based on previously described research.

1. Two arc-shaped tubes on the heads- and feet end eliminates the intersecting structure like CloudCuddle Junior and offers optimal use space above the bed tent. Open space above bed is beneficial for nurses when they require a mobile hoist to hoist patients into bed.
2. A hyperbolic paraboloid 'Pringle' shape creates two arc-shaped tubes on the heads- and feet end. This complies with the requirement that CloudCuddle Senior does not occupy space above the bed that is needed for a mobile hoist so nurses can hoist immobile patients in bed.
3. A hyperbolic paraboloid shape is much easier to produce such shape for a CloudCuddle bed tent because it has no intersection; this results in lower production costs. It also increases fixtures between the mattress and bed, so the lower tubes of the hyperbolic paraboloid are fixated.
4. A hyperbolic paraboloid shape creates fixtures on the bottom that makes CloudCuddle Senior stiffer. These fixtures are also fundamental for applying material that makes the bed tent more stiff (see next point) which prevent patients from creating a hammock in which they get trapped.
5. A bed tent design that is made of inflatable tubes exclusively and is stiff enough to keep people up to 120kg (see requirements Safety) in bed seems, based on research from this thesis, unrealistic. The inflatable tubes available for a CloudCuddle design are not capable of withstanding any high loads due to its flexible nature. Therefore, load resistant material should be added to create a force in the opposite vector of the applied force that needs to be neutralized. For this reason, the CloudCuddle Senior design requires
6. To increase the stiffness of CloudCuddle Senior structure, a hard material that is capable of applying a pushing force in a diagonal direction. A diagonally placed pole creates this force between the point of a fixture at the side from which the patient applies force on the bed tent to the other side of the arc in an angle which is close to the angle of the applied force by the patient.
7. To increase the stiffness of CloudCuddle Senior structure, a material that is capable of applying a pulling force from the point the patients applies force on to the bed tent to opposite laying fixture point.

The shape of the tent does not only ensure it is strong enough, it also should give the patient a safe experience. Therefore, research has been done to ensure a safe experience and a comfortable place to sleep in. Read on about Experience Design. After this section, a complete prototype and its tests are documented.

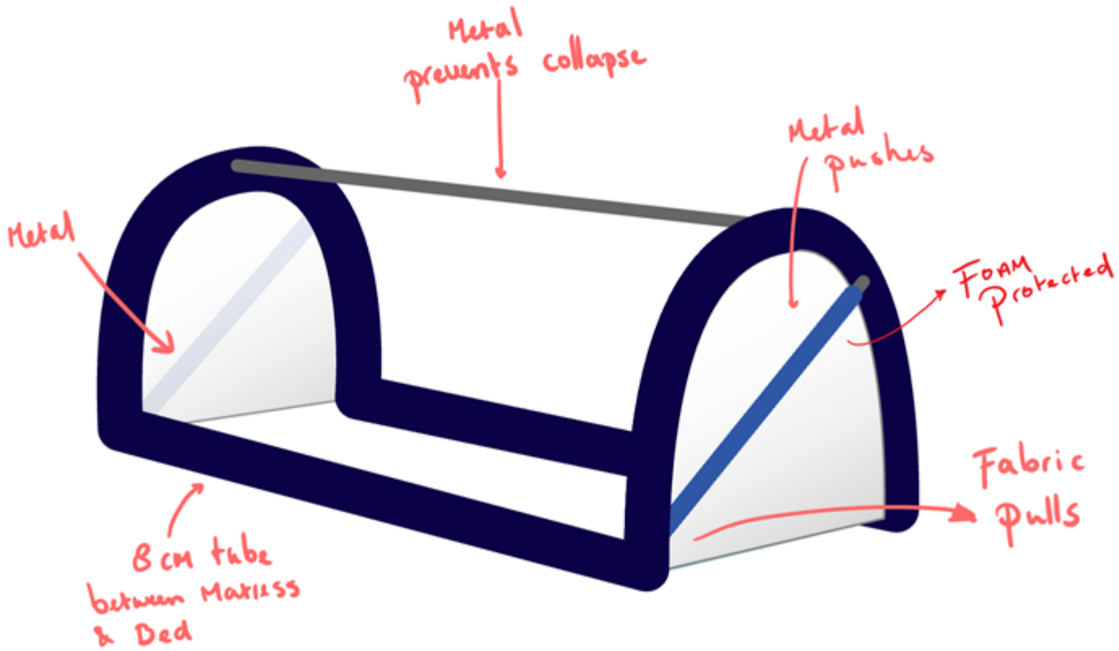


figure 20. Major improvements are expected when applying three metal poles to the inflatable structure: two diagonal poles that create a upwards force and one top pole that prevent the arcs from collapsing inward.

EXPERIENCE DESIGN

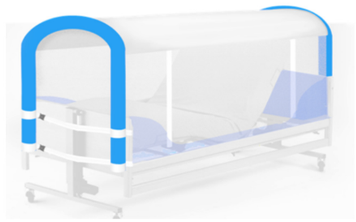
DESIGNING SA SAFE AND COMFORTABLE BED TENT

EXPERIENCE DESIGN: VARIABLES WITHIN CLOUDCUDDLE

Various design variables create the experience of CloudCuddle Junior, consisting of shape, height of the roof, color of the scuba material, mesh density and the mesh color (see figure 21).

Because it was unclear what the effect of each was, an experiment was designed to understand the different variables (see Appendix L: Experience Test Transcripts).

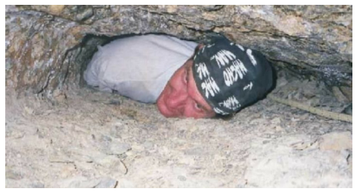
The shape of CloudCuddle predominantly defines the strength of the structure. The research on Structural Design provided a shape that is optimally designed for strength and therefore not, taken into consideration for the Experience Design research. The aim of this research was to generate an understanding of how people experience different setups and find a way to give a safe experience.



Shape

Design by Emma Knijn

Height:
Roof to body proximity



Scuba Color

Mesh Density

Mesh Color

figure 21. Variables for designing the experience in the design of a CloudCuddle are shape, mesh density scuba color, height of the roof and the mesh color.

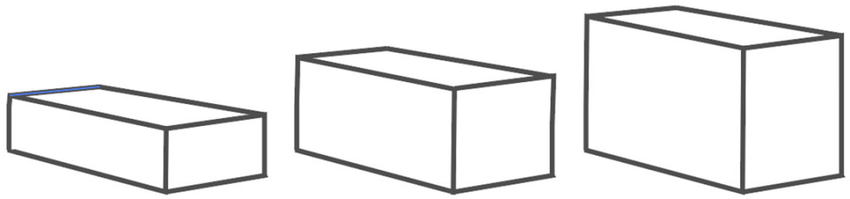


figure 22. A prototype for research purposes (appendix K) was made to create at a low, medium and high height to test what the best height was to offer a safe but not claustrophobic experience

EXPERIENCE DESIGN: QUALITATIVE RESEARCH METHOD

Quantitative research was done to generate an understanding of how CloudCuddle Senior could provide a sense of safety. Various ways of setups of a bed tent would lead to different experiences, and the goal was to create an understanding of what people want while asleep and how this is achieved. The interview consisted of a semi-structured interview that was aimed to find setups that people preferred as a bed tent. It is important to note that the seven participants are not patients with dementia but were healthy individuals. The goal of the interview was more to understand the perception of a human rather than finding the best universal solution for these participants. Therefore, open questions that asked 'Why' their perception created their experience was vital in order to gain insights that can be used to design for people with dementia and their unique perception of their environment. After the evaluation of the results, environmental perception of people with dementia should be taken into account to make a recommendation on how to create a safe and comfortable bed tent environment for the demented.

EXPERIENCE DESIGN PROTOTYPE

The variables in the test were 3 different heights (figure), and different setups at the side of the bed an on top (the roof). These setups could be light or dark colored mesh and light or dark fabric. The head and feet end of a bed was not taken into account for a 'mesh-or-fabric' research because these sides need a fabric that has the least stretch as possible due to strength qualities (see Structural Design Conclusion). A fabric is superior compared to mesh regarding stretch due to its weave density. On to of that it was assumed that the head and feet end had less effect on the experience of the bed tent because it is not in direct line of sight when laying into bed.

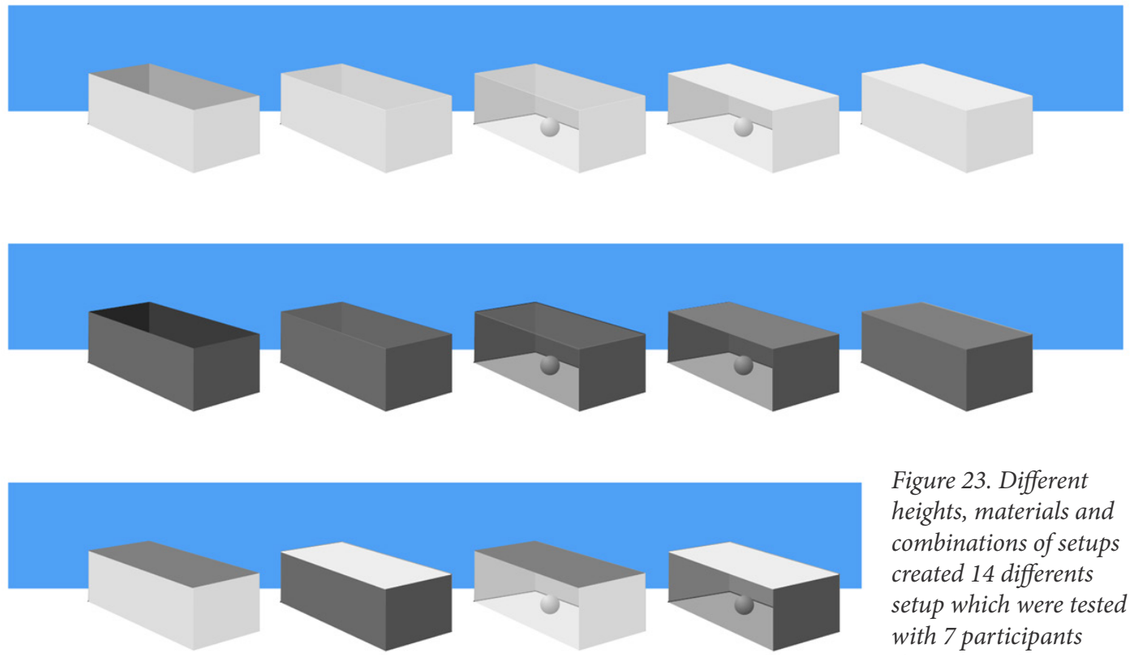


Figure 23. Different heights, materials and combinations of setups created 14 differents setup which were tested with 7 participants through qualitative research. A prototype was made to quickly iterate setups and test them with participants. See Appendix K for details.

EXPERIENCE DESIGN: EVALUATION

Transcripts of the interviews were made in order to evaluate the results of the interview (Appendix L). Perceptions per variable were filled into a table, leading to an overview of insights. These variables are the height of the bed tent, the choice between mesh or fabric and the choice between light or dark material.
These insights were written down based on transcripts:

- People can be profiled as 'side sleepers', 'back sleepers' or 'belly sleepers'. This means that a wall or roof has a more prominent effect on the experience of the bed tent based on the position of how people sleep.
- People like to see what is going on in the room. Therefore, no visual obstacle should be placed at the side which the person is facing.
- People link darkness to 'going to sleep' (research has shown us that this has to do with our biological circadian rhythm)
- People lose a sense of context, time, space around them and get confused when it is completely dark. When taking into consideration the deteriorated vision of demented this means that every environment should be a little lighter than a healthy person would estimate.
- Light material is associated with a feeling of safety
- Dark material as walls of the bed tent offers more rest due to the reducing of (visual) stimuli
- A combination of shelter and open space to see what is around creating a safe feeling while having 'space to breath'. A shelter that is closed on too many sides gives an experience of being locked up. For dark material, this locked up gives a negative experience; multiple participants mentioned they had the feeling they were inside a cardboard box. Light material gave multiple participants the experience of being in their own cocoon.
- The structure of the fabric or mesh walls and roof have to 'make sense' as robust design. E.g. mesh walls around, and a fabric roof is considered as a floating roof, which did not make sense to participants.
- The smell of material can have a positive effect (or negative) on the experience of the bed tent. The deteriorated smell of ageing people should take into account when explicitly aiming for the creation of a pleasant experience through smell
- Fabric structures can be associated with activities such as camping for light fabric structure and making a test out of bedlinen as a kid with dark fabric structure. This association should not rely upon while designing CloudCuddle Senior because some people may have never camped. On top of that people with dementia may not remember.

As was clear from the research section, Human Senses, every individual perceives the environment differently due to a variation of senses. Some adaptability should be taken into account for designing the right experience of CloudCuddle Senior

EXPERIENCE DESIGN CONCLUSION

The insights from the evaluation lead to the following conclusion.

Conclusion 1: Top of the tent should be at arm's length to maximise comfort
The height of the roof was considered best at perceived arm's length for a sense of shelter. Below this length caused a feeling of claustrophobia above resulted in a loss of 'cocoon' effect, meaning that the participant felt like he or she was in any other room. Dined presents that maximum arm length (thus not reach) is 83 cm for 99% men and women between 31 and 60 years old.

Conclusion 2: Combine Fabric and Mesh to create a safe 'closed' environment that breaths
Overall the combination that offers the most safety to the participants is a combination of light fabric on three sides (heads end, feet end and one along the body) in combination with mesh on one side along the body and the roof.
The closed sides offer a feeling of protection, but the roof and side leave air to breathe. The closed sides fortify the feeling of a barrier that is created by a mesh resulting in a feeling of being in a cocoon instead of lying in the corner of fabric.

Conclusion 3: Adapt the space to user need by allowing modification of one side and roof
Literature has shown that everyone experiences stimuli in a different way. Therefore, it is recommended that a way to control the openness of the sides is designed in order to address the personal needs of closedness vs breathability. Because people sleep in different positions, it is recommended that one side and the roof can be fabric or mesh.

Conclusion 4: Light colour creates a safe experience, darkness reduces stimuli and creates rest
Light colours create a safe experience because participants could see what is happening around them and could see where the walls of the bed tent are. The tests were done during evenings in summertime, which means it can be quite light in the Netherlands. It should be mentioned that some participants preferred dark colours because it made the space around them darker but not wholly dark, emphasising nighttime. People with dementia will perceive their environment darker than it is so light colours might compensate for that.

Dark materials result in a decrease of contrast and light in the bed tent which reduced the visual stimuli around participants and gave a relaxing experience. On the other hand, it made space seem smaller than its actual boundaries which sometimes resulted in a claustrophobic experience (sometimes referred to as a cardboard box). This means that in combination with dark materials there is a need for a bigger bed tent to reduce the claustrophobic experience. It may be assumed that there is a real risk of creating a claustrophobic experience for people with dementia due to the deterioration of their vision and the reduction of cognitive capabilities. The decline of cognitive capabilities and darkness will result in more confusion and anxiety which is of course undesirable.

The conclusion is that it would be wise to use light materials to provide a safe feeling for people with dementia. During the winter, this also makes their surrounding appear lighter and thus not near complete darkness. Dark curtains should be used during summertime

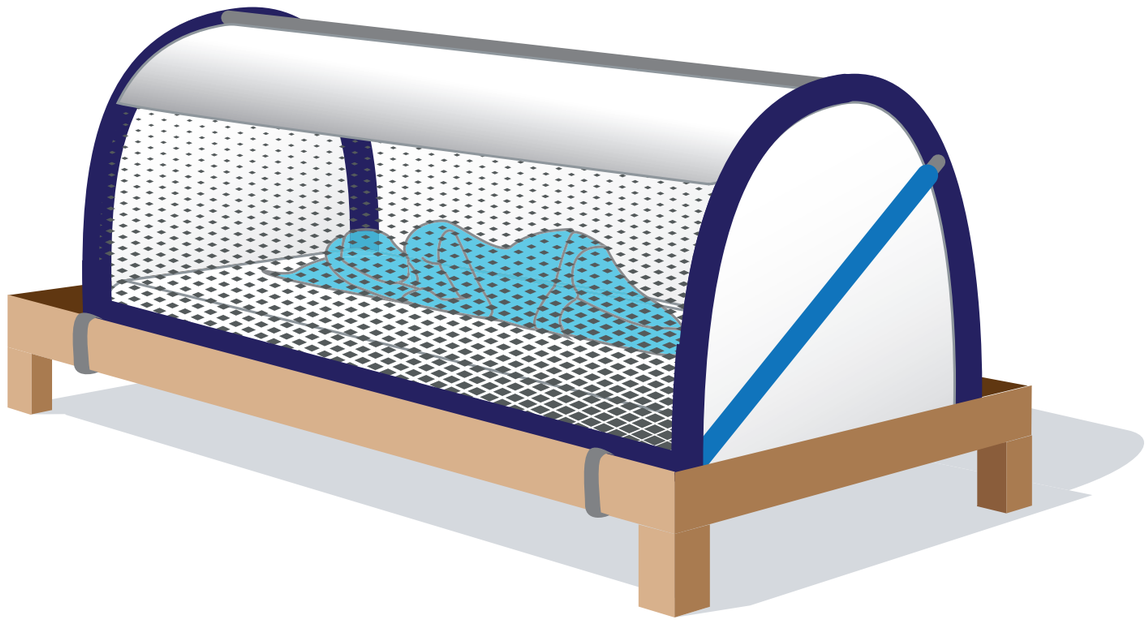


Figure 24. Concluding design of CloudCuddle Senior regarding experience design for supporting a feeling of safety. To support a sense of safety, all sides should be covered except for one length side.

CLOUDCUDDLE SENIOR CONCLUSIVE DESIGN

Figure 25. An impression of the CloudCuddle Senior concept in a hospital context.

The conclusion of the Structural Design and Experience Design phase results in a unified design which takes both stiffness and patients experience into account (figure 25).

The CloudCuddle Senior provides a safe bed tent environment that keeps people up to 120kg inside their bed. For the patient's experience, the side and roof can be adapted to specific needs. There are two different settings for the CloudCuddle Senior (figure 28.

1. Setup 'Open': The bed tent can be used to offer safety but not restrict the patient's freedom by opening both the fabric and the mesh. In this way the bed tent is used less compulsorily. In this setup, it is not required to consult a doctor and family because it does not restrict the patient's freedom.
2. Setup 'Semi-Open': Setup 'Closed': Offer more privacy and personal cocoon. If the patient is over-aroused, it will reduce stimuli in an attempt to calm the senses.

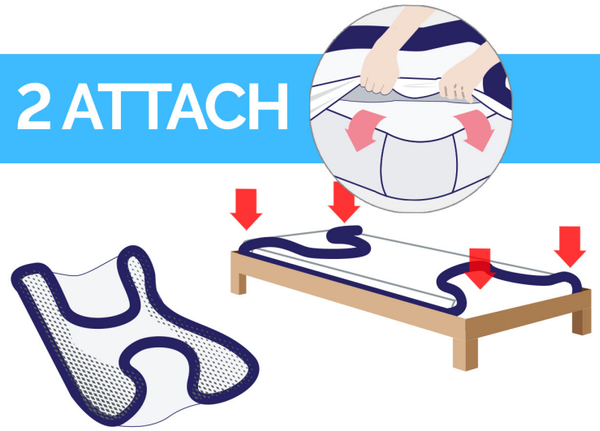
The top bar that keeps both ends apart is required to generate stiffness. This requirement complicates the use of a mobile hoist, which needs free open space above the bed. An ideation session on how to move the top bar is performed to explore different solutions. An elaborate time should be spent on how to design this mechanism during the embodiment design of CloudCuddle Senior.

Figure 26. Due to the small diameter of the inflatable tubes (8cm), CloudCuddle Senior is not an obstacle for patients to climb in bed.

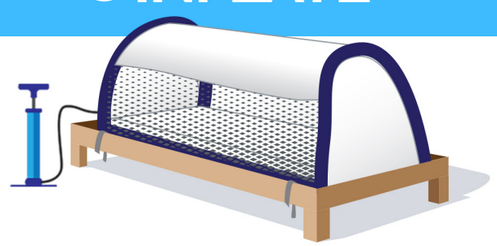
Figure 27. The mesh on the side can be zipped open. The top pole is also moved aside to make room for a mobile hoists.

1 UNPACK

2 ATTACH

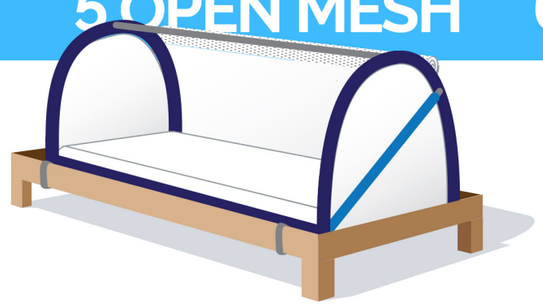


3 INFLATE



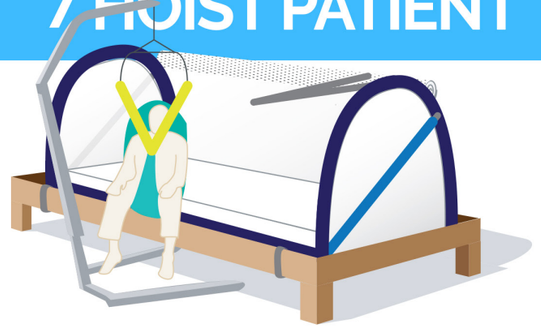
4 FORTIFY

5 OPEN MESH

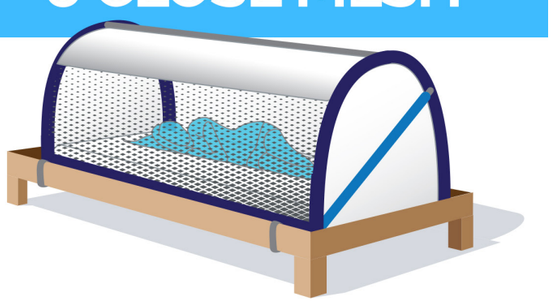


6 OPEN TOP BAR

7 HOIST PATIENT

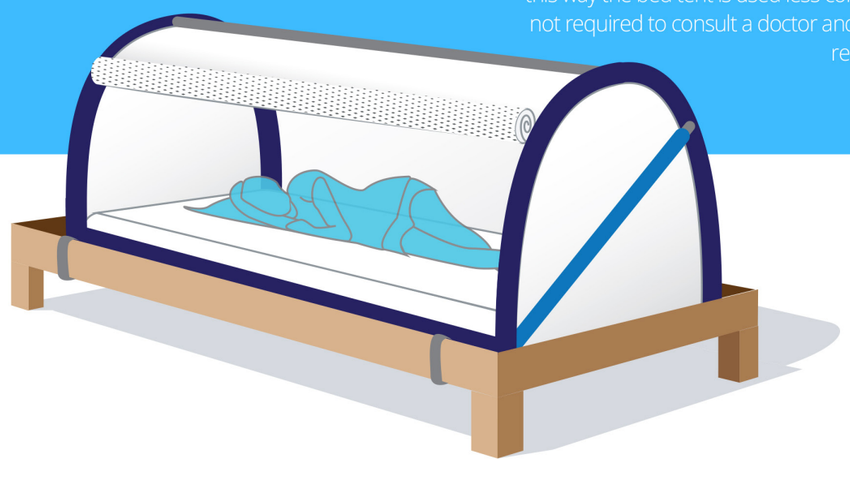


8 CLOSE MESH



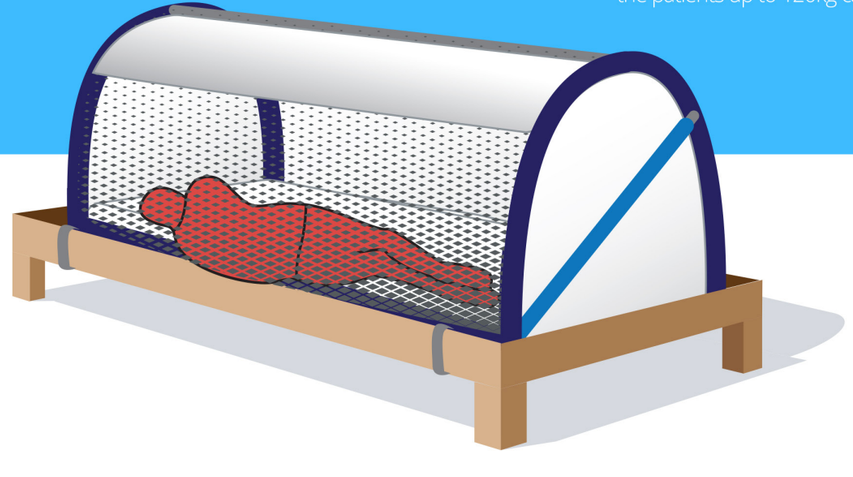
OPEN: A SENSE OF SAFETY

The bed tent can be used to offer safety but not restrict the patient's freedom by opening both the fabric and the mesh. In this way the bed tent is used less compulsorily. In this setup, it is not required to consult a doctor and family because it does not restrict the patient's freedom.



SEMI-OPEN: A SAFE ENVIROMENT

Offer an open but sheltered experience that allows both safety and openness. The mesh on the side will make sure the patients up to 120kg can not leave their bed.



CLOUD CUDDLE

Figure 28. Setting up CloudCuddle Senior is similar to Junior except for the three poles that need to be installed. CloudCuddle Seior can be used as an open bed tent or closed with its mesh. A third option (not presenterd) could offer extra security. This however needs testing with real patients because it might cause claustrophobia and anxiety.

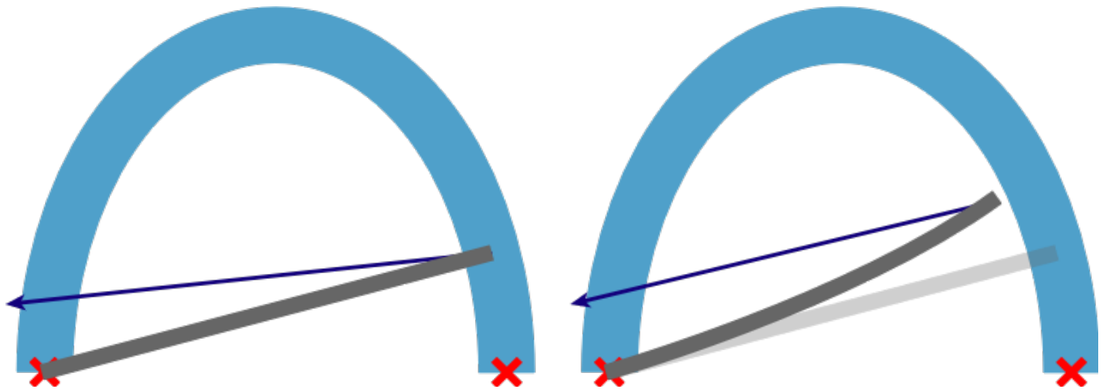


Figure 29. left: normal situation hwere the pole is stiff enough to resist force. Right: the pole deforms when too much force is applied. This depends on various variables such as shape/profile, sort of material, length, thickness and the direction of force that is applied

CLOUDCUDDLE SENIOR STIFFNESS DEPENDS ON THE STRENGTH OF THE SIDE POLES

The main factor that provides CloudCuddle Senior with stiffness are the poles that are diagonally placed and create an upward force

The stiffness of these poles depend on:

- Aluminium sort which are commonly used for tent poles: 7075-T5/ T6/ T9 (aluminium-tube-pipe.com, 2019)
- The pole's length
- Pole thickness
- The rod's profile (different profiles can easily be found online)
- The amount of force that is applied (120 kg, but separated by CloudCuddle Senior. This is very complex how this will be divided.)
- The Direction of force, which depends on the angle of pole placement which depends on the rod's length, which depends on the shape of the bed tent

The shape of CloudCuddle Seniors should be known to determine the length of the pole and the direction of the force. Therefore it is required to test different pole setups with a complete full-scale prototype. This allows for quick iterate solutions to make CloudCuddle Senior stiff during the weight of this solution can be taken into account to maintain mobility.

HOSPITAL TRAPEZE

Patients require a hospital trapeze to lift themselves in bed. The hospital trapeze could be integrated into two ways but should be tested with a full-scale prototype. The first option is to use a standard hospital trapeze pole and a hole in CloudCuddle Senior to allow patients to lift themselves. The other, more elegant, solution is to use the top pole as the Hospital Trapeze. Whether CloudCuddle Senior's structure will hold should be tested with a full-scale prototype. Another option to include a smaller pole that could be deployed in the bed tent was not included because pa-

NORMAL HOSPITAL TRAPEZE

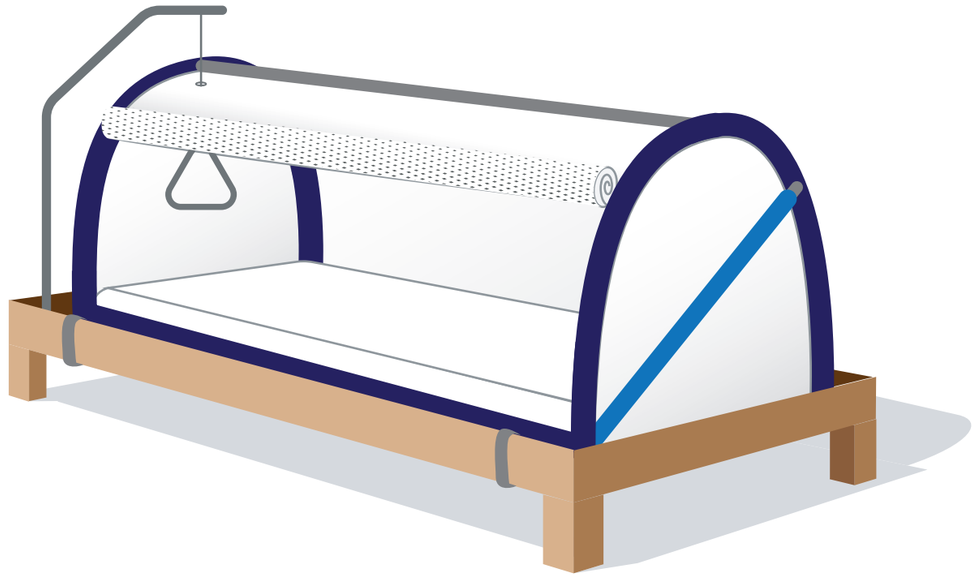


Figure 30. A normal hospital trapeze would not hole to allow the trapeze in the bed tent. A smaller one would not fit, or it should be installed in the bed tent, which is undesirable considering the hard material that could harm the patient inside.

HOSPITAL TRAPEZE FIXED TO THE TOP POLE

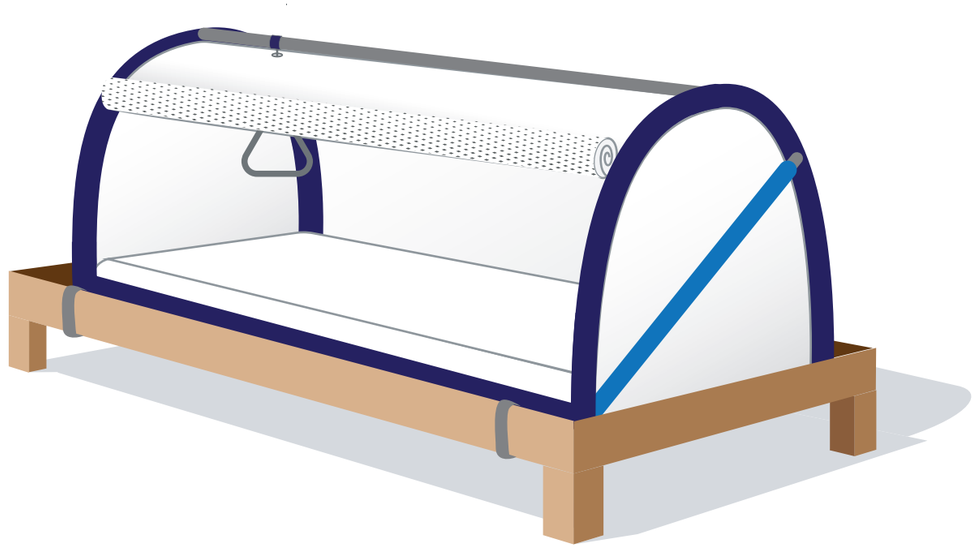


Figure 31. An elegant solution might be to use the top pole to install the hospital trapeze. Whether the inflatable structure can hold this downward force remain to be seen by a prototype.

ASSESSMENT OF REQUIREMENTS

Viability for consumers and CloudCuddle

1. CloudCuddle Senior cost should be affordable for home consumers because financial support is not always guaranteed. This price is yet to be set and the costs depends on the embodiment design.
   a. Not Validated Price should be determined when the embodiment of the product is clear.

2. CloudCuddle Senior should be within reach of CloudCuddle's competency and area of expertise.
   a. Match CloudCuddle Senior does not require any specialized technology. It is expected that CloudCuddle and their partners will not find major difficulties producing CloudCuddle Senior.

Employability of CloudCuddle Senior:

3. CloudCuddle Senior is also employable while not being used as a freedom restricting method to give patients a safe and comforting experience without healthcare providers needing to ask authorization from third parties.
   a. Match In its 'open' setup, CloudCuddle Senior offers patients their own private space while not restricting freedom.

4. CloudCuddle Senior does not occupy space above the bed that is needed for a mobile hoist so nurses can hoist immobile patients in bed
   a. Match When set up, CloudCuddle Senior uses space above the bed to keep patients in bed and provide stiffness to the frame. The space can be liberated from any obstacles. This can be done by removing the bar. For a more sophisticated design, a mechanism can be engineered that allows the top bar to be moved aside with a hinge of some sort.

5. CloudCuddle Senior is compatible with various bed designs such as beds with or without handrails. This ensures CloudCuddle Senior is employable in-home, caring home and hospital scenarios.
   a. Match CloudCuddle Senior is compatible with various bed designs.

6. CloudCuddle Senior allows the use of a hospital trapeze
   a. Not Validated Two solutions are identified: 1) a normal trapeze on which the pole is outside the bed tent but the trapeze itself in the bed tent and 2) a trapeze hanging on the top pole. This means there is definitely a way to make CloudCuddle Senior compatible with a hospital trapeze, but it depends on the embodiment of the design how the frame and trapeze will fit best.

7. Bedlinen should be able to be changed at night in case of wetting the bed.
   a. No Match So far, CloudCuddle Senior does not take into account bed wetting and changing bed linen. A solution like diapers is available. CloudCuddle can choose to focus on making bed linen interchangeable in a later design stage.

Usability of CloudCuddle Senior by Healthcare Providers

8. CloudCuddle Senior must be easy to set up and break down
   a. Match Setting up CloudCuddle Senior is based on the same principles as CloudCuddle Junior which is considered easy to set up and break down.

9. CloudCuddle should be portable: fitting in a bag and light enough to carry around
   a. Match Although not tested, it is assumed that CloudCuddle Senior will be around the same package as a Junior but with aluminium poles. CloudCuddle Senior is considered to match the requirements since there are many tent examples that also use tent poles and are mobile when packed.

10. CloudCuddle Senior must allow nurses to take out patients in immediate action in case of an emergency
    a. No Match It is unclear whether this is necessary since alternatives also do not offer this feature and depending on how difficult it is to get a patient out of the bed tent through in a regular way. More research should be done to investigate the design of an emergency exit and whether it is needed.

11. CloudCuddle Senior should allow nurses to see how the patient is doing in the bed tent.
    a. Match The mesh allows nurses to see through.

12. CloudCuddle Senior should not make any noise when the patients bang against the tubes.
    a. Not Validated The frame of CloudCuddle Senior is made of inflatable tubes. However, the additional poles that are required to stiffen the frame may cause noise. This should be tested in different circumstances

13. CloudCuddle Senior should be washable

a. Match CloudCuddle Senior will be made of the same material as CloudCuddle Junior.

Safety

14. CloudCuddle Senior should, in no circumstances, create dangerous situations like suffocation, pinching off or getting stuck in any other way.
a. Not Validated This needs testing with a full-scale prototype.

15. CloudCuddle Senior must be stiff enough to keep people of 120kg in bed.
a. Not Validated This needs testing with a full-scale prototype

16. 1CloudCuddle Senior must be stiff enough to prevent patients from creating a 'hammock.'
a. Not Validated This needs testing with a full-scale prototype

17. CloudCuddle Senior gives patients a safe and comforting experience
a. Not Validated The user tests done with healthy participants showed that the current design of CloudCuddle Senior support a feeling of security. User tests with real patients should be done with a full-scale prototype.

18. CloudCuddle Senior must be light enough to carry around;
a. Match CloudCuddle Senior is very similar to CloudCuddle Junior and made of light-weight materials. Aluminium poles are added, but just like tent packages these are light-weight and support mobility.

19. CloudCuddle Senior structural tubes do not harm the patients when he/ she uses aggressive behaviour
a. Match The inflatable tubes will not harm the patients; foam around the poles will prevent the hard poles from harming the patients.

20. CloudCuddle Senior must be made of non-toxic materials
a. Match The same materials of CloudCuddle Junior will be used by CloudCuddle Senior. CloudCuddle Junior's materials are non-toxic.

RECOMMENDATION

There are three recommendations, one on research for the scientific community, a second on new product development and a third for the development of CloudCuddle Senior on which the latter two are recommended to CloudCuddle.

RESEARCH RECOMMENDATION

Based on the literature study done for this thesis, it was striking that comparative studies on effective interventions mainly involved the type of activity performed by the patients instead of its intensity. This problem generates inconsistent conclusions on effective interventions in an attempt to calm patients and decrease BPSD. For example, Smith and D'amico (2019) state that "In the Nair et al. (2011) study of the effect of listening to Baroque music, significantly more behavioural disturbances were observed during the weeks when the Baroque music was played...", meaning that music therapy is evaluated negatively in this particular case while other research (Svansdottir & Snaedal 2006, Raglio et al. 2008,2010a,b) indicates a significant positive effect of music therapy. Strøm, Ytrehus and Grov (2016) therefore emphasise "the importance of targeting interventions to individual needs and preferences since such has been found to be more effective (Cabrera et al., 2015)". This makes sense as musical preferences are highly individual. However, some music is liked by many people while others are attractive to only some. From a research perspective it may be interesting to question 'What is it that certain music appeals to many, and what not?'.

Research on interventions, such as music therapy, has been categorised too broad and is an opportunity for researchers and designers to discover characteristic of specific therapies that help to decrease BPSD. For example, in the particular Baroque example of the previous paragraph one might wonder whether variables like the rhythm, the pitch, the amplitude or the volume that caused an increase of behavioural disturbances. Patients with dementia may significantly benefit when these parameters can be described and common guidelines are formulated in order to let designers and therapists design interventions that appeal to the many. In an ideal situation these interventions would help caretakers getting a grip on reducing behavioral disturbances which may, in regard to this thesis, make bed tent solutions unnecessary due to the prevention of BPSD in an early stage.

NEW DESIGN FOR STIMULI RECOMMENDATION

The objective of this thesis was to design a CloudCuddle Senior based on the experience of the elderly with dementia and keep them in bed. This does not have to be a bed tent necessarily. As research has shown it is very likely that demented that wander have under aroused senses and require dynamic stimuli because they cannot process static stimuli. This is an underexposed phenomenon that, although has a scientific fundament, has not to find their way to the market (except for Tranquil Turtle which is targeted at children, see Appendix C).
It should be taken into account that a bed tent only prevents the symptoms of wandering. If the source of BPSD seems to be under or over-arousal and there is a way that stimuli based products solve this probem, CloudCuddle's bed tents could become less valuable as a freedom restricting medium. In it open setting though it still could be used to calm over-aroused patients. From a strategic and long-term perspective, it is worthwhile to invest in designing a product that meets the patient's needs regarding satisfying under- or overaroused senses. This new product might make symptom-fighting products like freedom restrictors unnecessary and allow patients to have a more 'normal' life.

CLOUDCUDDLE SENIOR DEVELOPMENT RECOMMENDATION

CloudCuddle should manufacture CloudCuddle Senior as proposed to perform strength experiments with people up to 120 kg. Due to the complexity of physics and the materials, it is unrealistic that a simulation validates the strength of the current design. Tests then should point out whether the prototype is stiff and safe enough to test with patients safely. After these tests are considered successful, experiments focused on experience will validate whether CLoudCuddle Senior indeed gives patients a sense of safety and makes them less agitated.

As multiple times requested by CloudCuddle, CloudCuddle Junior can be upgraded to a stronger version. To do so, the same principles from the section Structural Design can be applied to a CloudCuddle Junior. The reason this thesis did not broaden its scope to improving CloudCuddle Junior is that CloudCuddle Junior design lacks functionalities that were specifically requirested by ergotherapists and nurses (E. Knijn, 2018) such as the use of a hoist. Using the principles of two diagonally placed pole that resist downward force, an upgraded CloudCuddle Junior can offer a solution for patients who are too heavy and strong for a regular CloudCuddle Junior. This opens up a new market with a relatively low investment for CloudCuddle as a company.

If both the strength and experience experiments with real patients are successful, the potential unique combination of features that CloudCuddle Senior offers over competitors are:

Safety: Patients are kept in bed safely while structural components of CloudCuddle are mainly inflatable and can do no harm;

Comforting Experience: Patients who are sensitive to over-aroused stimuli have a calming sleeping place;

Freedom: CloudCuddle Seniors is lightweight, mobile, compatible with all sorts of beds and 'hoist friendly';

Affordability: CloudCuddle Senior is not a bed tent fixated on a hospital bed making the solution much more affordable.

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APPENDICES

Appendix A: Literature Study Dementia

Dementia is a progressive disabling neurological condition that may be seen in a wide variety of diseases. Dementia is commonly known under elderly but not every elder person gets dementia. Aging is the most significant risk factor though (Marti et al, 2006,). Commonly known consequences of dementia are loss of memory and patients increase of agitation, aggression, repetitive speech and confusion. Alzheimer disease is with 70% the most common disease of dementia followed by vascular dementia (16%) (Alzheimer Nederland, n.d.). Dementia affects the brain and decreases the patient's cognitive capabilities such as automated processes, understanding social contexts, reasoning, abstract thinking and memory. What has been learned during the life time of the patient is slowly unlearned due to the loss of memory. This means that the further dementia progresses within patients, the more dependent patients become on their caretaker. As dependence on their caretakers increases, the heavier the care burden becomes which often results in heavy duty work for family or care professionals. This means dementia has not only a major impact on the patient life but also on their family's and close relatives. Progression of the disease results in a growing need for care and an increase of severe behavioral difficulties that leads to the need of institutionalization (Marti et al., 2006, Silverstry et al., 2004).

So far, it is relatively unknown what the cause is of dementia and so no cure for dementia has been developed. Interventions, both pharmaceutical and non-pharmaceutical are designed in an attempt to alleviate agitation, undesired behavior and restlessness, also known as Behavioral and Psychosocial Symptoms of Dementia (BPSD). Non-pharmaceutical interventions are desired over pharmaceutical interventions because the latter tends to disconnect the patient from its environment, making desired social and emotional communication harder which results in a decrease in Quality of Life (Silversty et al., 2004).

Overall statistics

In 2016, 270.000 people are diagnosed with Dementia. With our aging society, this will grow to a half million people with dementia in 2040 and 620.000 in 2050 (Alzheimer Nederland, n.d.). Dementia is not considered hereditary. People whom parents have dementia only have a slight increased chance to develop dementia.

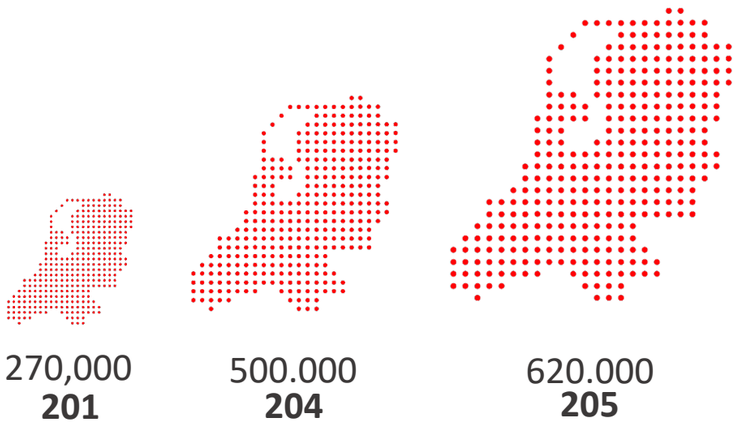


Figure 1 Amount of people with dementia (Alzheimer Nederland, n.d.).

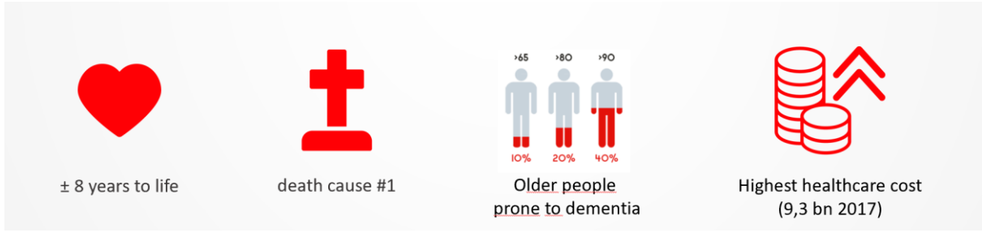


Figure 2 People with dementia have an average lifespan of 8 years. Dementia is death cause #1, the older you become to more prone you are to get dementia and it is the highest healthcare cost in the Netherlands.

The overall chance to develop dementia is 20%. Due to an older life expectancy, woman have 33% chance on dementia, which is higher compared to men (14%).

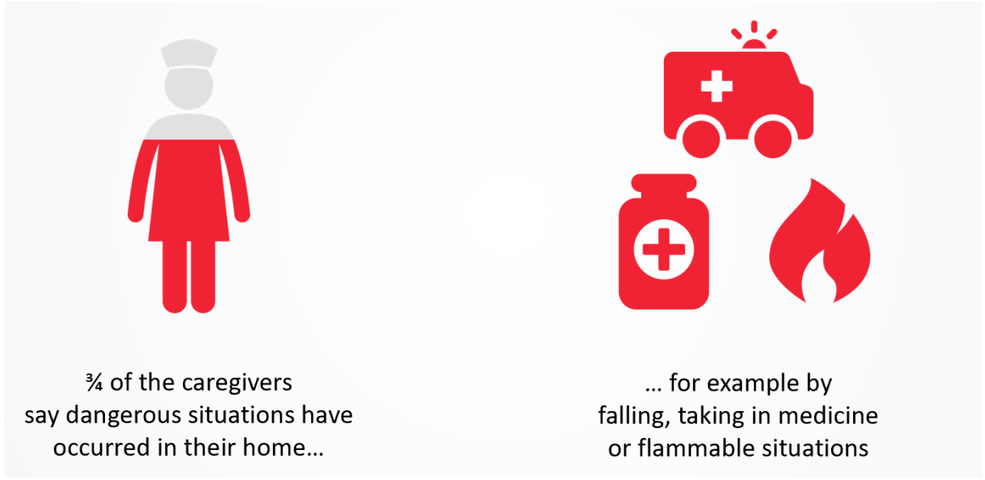


Figure 3 Three on four caregivers reported dangerous situations occurred in and around the house. This is due to falling, wrongly consumed medicine and flammable situations.

Main risk factors for developing dementia are:

- Low mental activity during lifetime
- Smoking
- Inactivity of the body
- Depression
- High blood pressure (from middle age)
- Diabetes
- Obese (from middle age)

Dementia in the brain

The world of dementia often includes confusion, isolation, misunderstanding and an over- or under arousal of the senses, leading to stress or sense deprivation. It is commonly known that people with dementia have troubles memorizing simple things and forgetting faces of family and close ones. Both these examples are due to a dysfunctional upper brain. Dementia affects the upper brain in which we rationalize. This leaves the patient to live only with his or her lower emotional brain capabilities.

Rational and Emotional Qualities in the Brain: Upper and Lower Brain

The brain can roughly be separated into two parts: the rational upper brain and the emotional lower brain (van der Plaats, 2016).

Lower Brain

The Lower Brain is responsible for the emotional part of our brain. It's where we feel things like joy, enthusiasm, happiness, sorrow and anger. It is also the part that is connected to the senses and is where the environmental stimuli enter the brain. When it has entered the brain it gets sorted and ordered. From there, stimuli reach the upper brain, where a decision is being made on what to do with the stimuli.

When stimuli enter the lower brain, it will:

1. Sort stimuli: sight by sight, hearing by hearing, and feeling by feeling;
2. Order stimuli: it will order every sorted stimulus by proximity, movement and contrast;
3. Pass to the upper brain.

Dynamic stimuli is being processed in the lower brain. These include things and phenomena that is in movement: motion, sound and smell.

Upper Brain

Rationality is the core functionality of the upper brain. It's where decisions are being made, strategic thinking is being done and memory is stored. We use the upper brain for speaking, calculating, learning, remembering and performing automated tasks like driving our car. The loss of rational capabilities impairs the patient depending on the rate of decline and at what stage the patient is.

After the brain sorts and ordered the stimuli the brain will:

4. Think about the stimuli, add meaning or context from previous experience;
5. Make a decision about appropriate behavior;

Static stimuli are processed in the upper brain: no motion and silence are being processed by the upper brain.

Memory loss

One of the more commonly known results of dementia is loss of memory. Losing memory means patients can't save new experiences and slowly forget things from the past, starting with memories from the near past events until early life experiences. This means they forget the date, forget modern context, how to use modern products, start remember people only when they looked young and more. Due to an increase of loss of memory, patients become confused and anxious which may result in agitation and annoyance. As soon as patients realize they have dementia, they may turn to isolation due to increase of social difficulties, which can result in less social interactions and eventually worsens the disease even more.

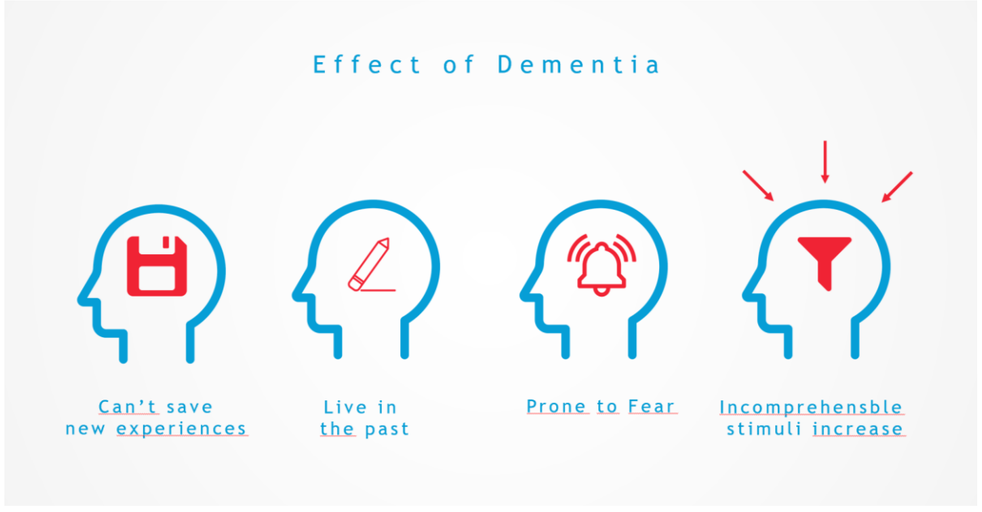


Figure 4 People with dementia can not save new experiences, they slowly erase their memory, are prone to fear and because they don't understand all stimuli anymore their experience an increase of incomprehensible stimuli

Environment as input for behavior

Our brain gets input from our environment through our senses. In order to understand how to behave in certain situations we receive input from our environment through our senses, where it passes through our lower, emotional brain. Here, stimuli are sorted and ordered and made into an image. Together with memory, we add meaning to the image of the situation in order to define a recognizable context. Because we recognize its context we understand how to behave. When sorted and given order, the inputs go to the upper brain, in which we think about the input and make a decision on how to act. This choice is reflected in our behavior. We are being perceived as behaving inappropriately when stimuli from the environment gets into our brain but we understand it differently than others. In the context of dementia this means that people with dementia may look behave inappropriately, while in their perception it makes sense to them. Situations that may not be dangers can be perceived as life threatening by the patient with dementia, meaning they behave accordingly while healthy people have no clue what has happened.

Dynamic and Static stimuli

Stimuli can be roughly divided into two types: dynamic and static. A dynamic stimulus is everything that moves, smells or makes sound. Static stimuli are non-dynamic and is still. Dynamic stimuli are being processed in our lower emotional brain, and static stimuli is processed in our upper rational brain. Because dementia affects the rational upper brain, it becomes harder to process static stimuli. This explains why people with dementia often can be found moving their head back and forth in order to make the world move around them so they can process their surroundings in a dynamic way.

Trouble with processing static stimuli may cause trouble at night when darkness and silence reduces the level of dynamic stimuli. This creates a demand for dynamic stimuli for the patient. Nightly wandering might be a result of under-arousal of dynamic stimuli. Wandering is known to be a dangerous activity for patients due to falling (Healey et al., 2007).

Amygdala

We have an important evolutionary tool within the lower brain that has helped us survive throughout history: the amygdala. It's the part that warns us of danger and drive us to take action even before we can think about the danger. It's the system that drives you to pull back your arm in an instant when touching something hot. In a life-threatening situation, we get in survival mode that is recognized by three different behaviors in accordance with the situation: Flight, Fright, or Fight (Lombard, 2007).

1. Flight is characterized by behavior that makes us flee, removing us away from danger to a safe distance.
2. Fright is the mechanism that has helped us hide from predators and make them go away.
3. Fight is the response in order to deal with the problem and eliminate the source of threat.

While this mechanism clearly has significant advantages, it has some major disadvantages too. Mostly this disadvantage can be observed when the amygdala signals a threatening situation, while in real life there is none. In a functional brain, the rational brain will be able to rationalize the danger and program the amygdala to prevent it from alarming the nerve system when a similar false-dangerous situation will occur in the future. When the cognitive abilities of people with dementia decrease, the control mechanism of the amygdala also declines. When memory fades away, more and more situations are not recognized and the amygdala will continuously alarm the patient, which leads to constant flight, fright or fight behavior or Behavioral Psychosocial Symptoms of Dementia.

Sensory Ordering System

The Sensory Ordering System (SOS) is a system that helps to filter environmental stimuli and decrease the number of stimuli that needs to be processed by the upper brain. If this system is not working properly, a lot of stimuli gets into the brain, making the person agitated and restless. For example, people with ADHD have a dysfunctional SOS (van der Plaats, 2016).

A dysfunctional environmental filter means that more stimuli are being perceived by patients with dementia. Combined with lowered stress threshold, environmental stimuli can be a big source of over stimulation leading to Behavioral and Psychological Symptoms of Dementia (BPSD).

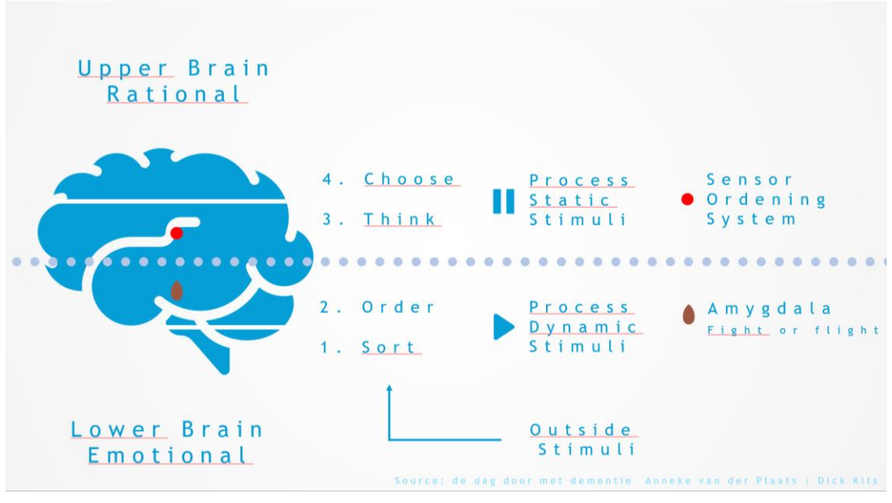


Figure 5 The upper brain deteriotes due to dementia. The lower brain stays intact.

Behavioral and Psychological Symptoms of Dementia

Patients with dementia have a reduced stress threshold and at the same time, their sensory ordering system deteriorates. This means that they have more difficulties coping with stimuli but also more stimuli enter their brain, resulting in an over arousing of the patient's neurological system (van der Plaats, 2016). This could be a cause of undesired behavior from the patient, or Behavioral and Psychological Symptoms of Dementia (BPSD).

Due to the loss of communication and a troubled social connection, it can be challenging to understand why and what BPSD triggered. Misbehavior is then difficult to trace and can lead to friction between the caregiver and the caretaker. Inappropriate behavior of patients can be divided by four categories (Cohen-Mansfield, 1995):

Subtypes of Inappropriate behavior

1. Physically aggressive behaviors, such as hitting, kicking or biting;
2. Physically nonaggressive behaviors, such as pacing or inappropriately handling objects;
3. Verbally nonaggressive agitation, such as constant repetition of sentences or requests; and
4. Verbal aggression, such as cursing or screaming.

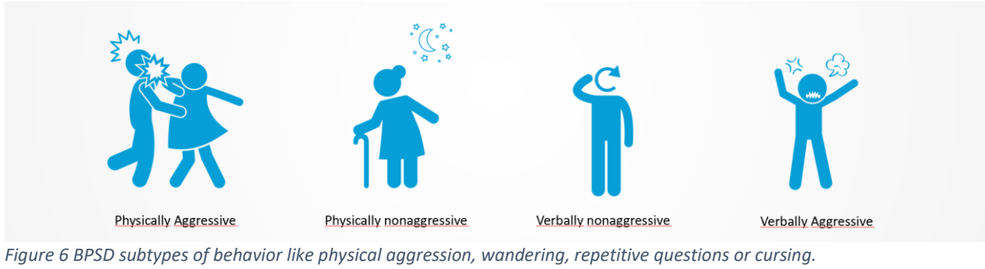


Figure 6 BPSD subtypes of behavior like physical aggression, wandering, repetitive questions or cursing.

Explaining BPSD: Three Psychosocial theoretical models

Behavioral problems can be explained by three models according to Cohen-Mansfield:

1. The unmet needs model
2. A behavioral/learning model
3. An environmental vulnerability/ reduced stress-threshold model

Unmet needs model

Unmet needs are needs of patients that are not immediately clear or observable and thus cannot immediately be addressed by the caretaker. A lot of patients with dementia suffer from sensory deprivation, boredom and loneliness. Therefore, activities that stimulate the senses or involve social contact are commonly used as non-pharmaceutical interventions.

Another type of need relates to the quality of care: reduced level of restraints, sufficient levels of light, good toileting procedures etc.

Behavioral/learning model

This model assumes that there is a connection between antecedents, behavior and reinforcement that stimulates this behavior. Changing the Consequence of the Behavior in the ABC model = Antecedents → Behavior → Consequences can possibly change the inappropriate behavior as a response on the antecedent.

The environmental vulnerability/ reduced stress-threshold model

This model describes the effect that patients with dementia have a greater vulnerability to the environmental stimuli and have a lower stress threshold. Persons with dementia lose their capabilities to cope with environmental stimuli leading to more and more stressful situations. In the meanwhile, the stress threshold that indicates the limit of stress a person can handle decreases, leading to more confusion and anxiety which results in inappropriate behavior.

As can be seen from the descriptions above the three explanatory models for behavioral problems are interconnected and as a set of complementary models reinforce stressful situations that lead to an increase in restlessness, anxiety and confusion. It is important to note that the models vary per person, as every person requires different needs due to a difference in sensitivity to their environment. More information on this can be found in chapter 'Human Senses'.

Non-Pharmaceutical Interventions

While there is no cure for dementia, multiple interventions are designed and used to alleviate BPSD, agitation and restlessness and is aimed to increase alertness. In the past, pharmaceutical interventions, physical constraints or patients were being ignored were used in order to deal with inappropriate behavior (Cohen-Mansfield, 2004). Today, non-pharmaceutical interventions are preferred above pharmaceutical interventions due to unintended side effects that prevents patients from interact with their environment at all. Eight categories of non-pharmaceutical interventions are recognized and their effect on quality of life have been recorded. Although there are some success stories of interventions, it is still unclear what the effect of interventions are and what the characteristics of the interventions are that made it a success (Strom, 2016).

Types of non-pharmaceutical interventions

There are various non-pharmaceutical interventions that are aimed at improving the Quality of Life of patients and decrease BPSD.

Music and Music based intervention

Music can used for relaxation and to provide sensory stimulation. Interventions can be Music Therapy, Use of Instruments, Singing, Movements and Listening music. Some studies were found to reduce aggressive behaviors and a decrease in other problem behaviors (Clark et al. 1998, Thomas et al., 1997). Music based intervention studies were mostly reported to reduce agitation (Brotons et al., 1996).

Light therapy

Light is an important element in our circadian rhythm. It helps our system to understand when it's time to be awake and when to sleep. Light Therapy is used to improve sleep, reduce agitation that results from circadian rhythm disturbances. This is based on the assumption that a good night sleep reduces BPSD. Results of Light Therapy studies however have no convincing evidence of having effect: some report no effect, some report a significant decrease and some studies report a trend (Cohen-Mansfield, 2004, Strom et al., 2016). Examples of light therapy is providing enough light in the common area and the use of a light box.

Acupressure/reflexology

Acupressure and reflexology is based on the theoretical foundation to stimulate the blood flow and nerve impulses. Based on one study, acupressure significantly reduces agitated, aggressive and physically non-aggressive behavior. However, Montessori activities proved to be more successful in the same study (Lin et al. 2009)

Massage/ Aromatherapy

Massage, Aroma therapy and a combination of the two such as massaging the forearms with lavender oil are found to be effective methods to decrease agitation and BPSD. Massage like hand massage showed a reduction in the patient's agitation and aggression (Suzuki et al. 2010). The use of aroma, such as lavender patch as a necklace, reported a reduction in agitation, irritability and other inappropriate behavior (Lin et al., 2007, Sakamoto et al., 2012).

Doll therapy/ Animal assisted therapy/ toy therapy

An emotional/ social connection-based theory is the foundation of doll, animal and toy (robotic) therapy. Both seemed promising in reducing in overall Quality of Life, agitation and showed an increase in interest according to a review study of Stroh, Ytrehus and Groc. One significant successful story is one of Paro, a seal robot. These Social Assistive Robots (SAR) emphasize the social relation by mediating between the therapist and the patient. Moreover, Paro has proven to receive persistent attention of the patient, characterized by a deep engagement and a rich and meaningful emotional experience (Marti et al., 2006). However, others studies have not demonstrated this quality of interaction in other SAR due to the evident unlikeness from real cats ands dogs (Shibata et al., 1999)

Snoezelen

Snoezelen is an intervention aimed to alleviate sensory deprivation which can lead to BPSD. Several studies reported a positive effect on behavior, agitation, well-being and mood but not more effective than other activities (Baker et al., 2003, van Weert, 2005).

The Sonas Program

In extension to stimulating the senses like Snoezelen, the Sonas Program focuses on stimulating all the five senses (Hutson et al. 2014). Two studies that were reviewed (Strom et al., 2016) were aimed at alleviating depression, aggression and agitation. However, no significant changes had been found in behavior in both studies (Hutson et al. 2014, Jackson et al, 2003).

Simulated presence

Simulated presence has been used by using pre-taped recordings of random or relative people and given to people with dementia. Garland et al. (2007) compared listening to music with simulated family presence and found that listening to music reduced verbal agitation while simulated presence reduced physical agitation as well. However, in the same study a significant improvement on agitation was also found in simulated non-family presence. Here, the simulated presence seemed the key factor in contribution to an improvement of BPSD.

A consistent improvement on BPSD has only be reported for some non-pharmaceutical interventions. These interventions include massage, aromatherapy and simulated presence (Smith et al., 2019, Garland et al., 2007). I suspect this is due to the foundation of the problem: the same solution is tried to be found for different people. Just like ordinary people, needs of people with dementia vary from time to time and person from person. Finding a solution for BPSD that takes unique personal perceptions into account based on cognitive capabilities such as stress-threshold and the personal perception of stimuli due to a preference in, and personal deterioration of, the senses might be a more appropriate starting point when addressing the challenge of taking care of people with dementia.

Human Senses

Everybody is unique and so are their perceptions and how the strong stimuli are perceived. Lombard A., 2007, describes the sensory intelligence which is based on sensory integration theory in the 1960s. She explains that we are different regarding our threshold and how each respond uniquely to our environment.

The threshold as described by Lombard is important as it is key to how much a patient can cope with before intrapsychic discomfort that leads to BPSD is constituted (Kovach, 2000). Antecedents (environmental factors, human intervention, circadian rhythm disturbance and neurophysiological decline) can lead to intrapsychic discomfort through either a high-stimulus imbalance, which leads to an exceeded stress threshold, or a low-stimulus imbalance, which results in sensory deprivation. BPSD is a consequence out of this intrapsychic discomfort.

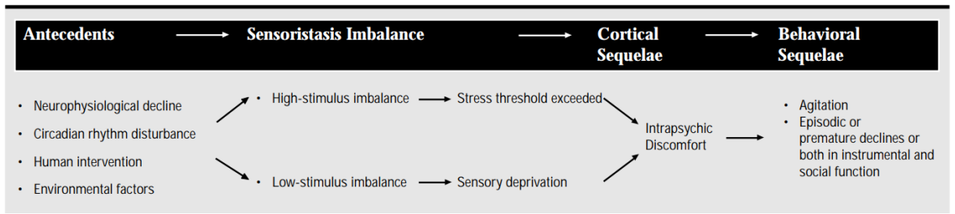


Figure 7 Stimuli (or Antecedents) can create an intrapsychic discomfort by either exceeding stress threshold or sensory deprivation (Kovach, 2000)

When talking about stimuli, Lombard explains seven senses: sight, hearing, touch, smell, taste, Movement divided in vestibular (the gravity sense in your ear) and proprioceptive senses (when you use a joint or muscle).

Threshold Profiles

Lombard makes a distinction between people with a low threshold and high threshold. Each of the threshold profiles include two different characters that perceive stimuli differently. The four archetypes of how sensation is perceived are described below. For a full overview of traits see Appendix A.

1. Low Threshold – Sensory Sensitive

People with a Low Threshold have more difficulty coping with environmental compared to their High Threshold counterpart. Sensory Senstive people typically require a reduction of the intensity or quantity of stimuli and need less information that also is softer, slower and gentler. This group response passively to stimuli

2. Low Threshold – Sensory Avoiders

People with a Low Threshold have more difficulty coping with environmental compared to their High Threshold counterpart. Sensory Avoiders actively avoid environmental stimuli or engage to reduce stimuli.

3. High Threshold – Low Registrator

Typically, people with a high threshold can withstand more environmental stimuli. Low Registrators needs include intensified stimuli and more information. They want stimuli to be more intense: louder, brighter, faster etc. Low Registrator respond passively to stimuli

4. High Threshold – Sensation Seeker

Typically, people with a high threshold can withstand more environmental stimuli. Just like Low Registrators, Sensation Seekers needs include intensified stimuli and more information. The want more intense stimuli. In contrast to Low Registrators, Sensation Seekers actively respond to stimuli: they are in search of activity, novelty, variety and change.

Separate senses

Lombard also explains we have different needs regarding our separate senses. There are senses from which a person wants to shield himself and senses that he demands. The one person likes strong perfume, the other doesn't. This means that together with the Threshold Profile, a person has a complicate scheme of needs regarding senses. On top of that this need may vary from day to day due to mood.

Sense	**Calming/Inhibitory(used when in over-arousal)**	**Alerting/Excitory (used when in under-arousal)**
Tactile	Deep touch (firm, hard pressure)	Light touch (tickle, gentle stroking)
Auditory	Soft, whisper, classical baroque music	Loud, intense, rock music
Visual	Soft, gentle colours and light	Bright light, colours, clutter
Vestibular	Slow, rhythmic movement	Fast, irregular movements
Proprioception	Heavy muscle work against resistance	Heavy muscle work against resistance
Taste	Warm, smooth, sweet	Cold, sour, spicy, minty, crunchy
Smell	Lavender, chamomile	Mint, citrus

Figure 8 Every sense can be calmed when in an over-arousal state or excited when under-aroused (Lombard, 2009)

Senses: Dementia and aging

People with dementia are usually elder. Aging is known to affect and deteriorate the senses. Besides aging, dementia also is also known to affect the senses. Besides dementia having effect on the senses, aging also is known to deteriorate the senses. The degree of deterioration and the current state of each sense varies person from person, but overall destination should be taken into account when designing for elderly with dementia. This means that stimuli that is perceived with a normal intensity by healthy people, it may not be noticed by patients with dementia.

Dementia is also known to affect the visual processing part in the brain (van der Plaats, 2006,). This means vision becomes blurred and a vignette grows into the field of vision. The color white is therefore a source of trouble because people with dementia cannot estimate distances. This means that contrast helps people with dementia to create an overview of the room in which they are.

Figure 9 Repesentation of a room perceived by a 'healthy' person.

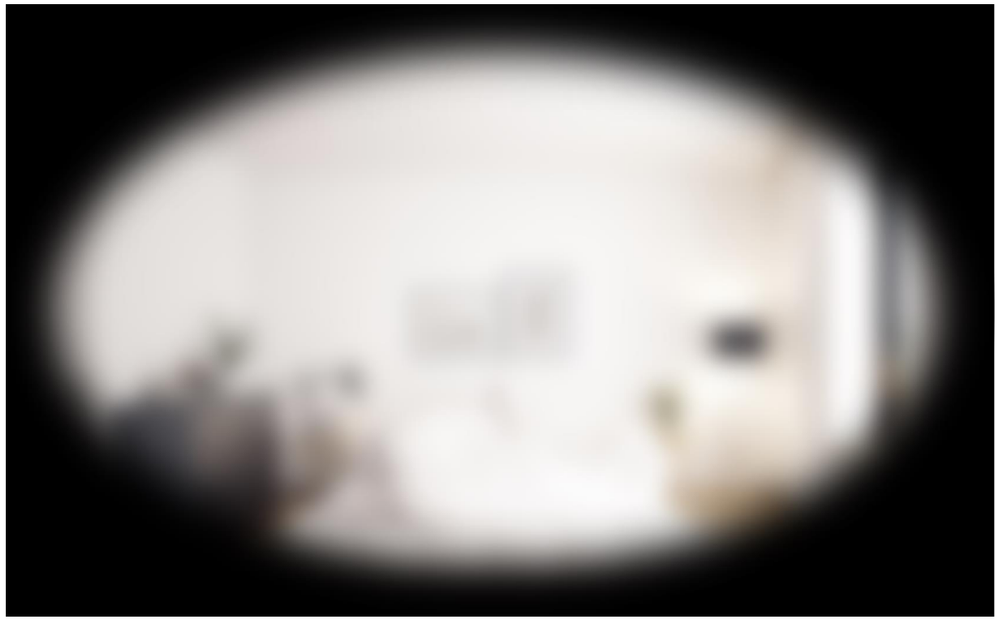


Figure 10 Representation of the same room shown in figure 9 but perceived as a person with ementia.

Appendix B: Solutions for wandering behavior

Preventing wandering people with dementia, not a new problem and solutions are therefore already available. Some solution offer solutions which are not bed tent, some are.

Non-bed tents

Some non-bedtent solutions are:

Figure 11 A high-Low bed

1. High-Low beds
   These are beds that can be lowered to the ground. This means that patients can not fall out of bed. An extra mattress can be placed beside bed to prevent falling on the hard floor.

2. Bed rails
   Some beds have a bedrail along the side to prevent patients from climbing out. However, if they do attempt to do so, the rail increases the risk of falling out because of the extra difficulty to climb over the rail.

3. Heightening the sides of the matrass
   By heightening both sides of the matrass patients are laying in a pit, making it difficult for patients to climb out. Patients with dementia are usually elder people who are not strong enough to climb out of a soft pit

4. Creating the right stimuli
   Sometime wandering behavior is created by a lack of the right environmental stimuli. This can be for example anxiety for darkness or a need for sound. This is highly dependent per patient and good nurses know how to sooth and calm the patients. This can for example be done by leaving the door ajar, playing some calming music, using a heavy blanket or any other method to sooth the senses.

Bedtents:

There are bedtents available for people with dementia.

Figure 12 Posey Bed

1. Poseybed (see figure) is a popular all in one product that includes bed and tent. It doesn't require setup and is cleaned by the distribution companies themselves. The patient can be approached from all sides for example washing. The bed can be rearranged electrically.

2. Barry Emons bedtents (see figure below). These are similar to the Poseybed. It includes bed and tent. Prices range from 5000 to 8000 euro's.

Figure 13 Various bed tents

3. Mobifit

   An alternative for CloudCuddle Junior is Barry Emon's Mobifit. This is a standalone bedtent that is not compatible with beds. It is installed on the floor and a mattress is added inside the tent. Compared to the CloudCuddle Junior it is fairly large, heavy, kids can hurt themselves when punch or headbutting the aluminum bars.

Figure 14 Mobifit

Appendix C: VIP Process

This thesis project follows the process of Vision in Product, or ViP, by Paul Hekkert and Matthijs van Dijk (Hekkert, van Dijk, 2009). A schematic overview of the process is described below.

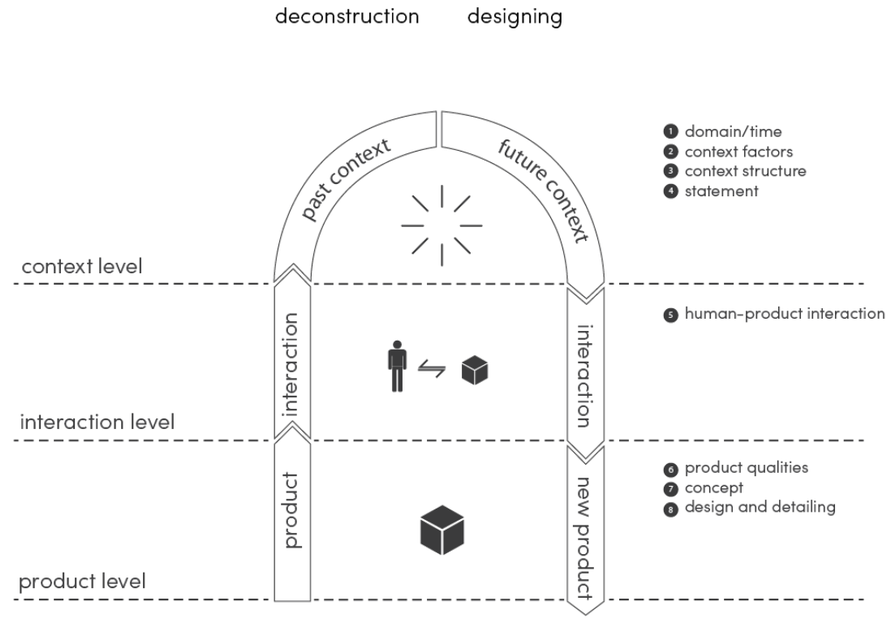


Figure 15 A schematic overview of the ViP process by Hekkert and van Dijk, 2009.

The reason for this process is to include *raison d'etre*, or a fundamental reason of existence of the product. First a deconstruction is being done as a form of practice, analyzing existing products on product, interaction and context level (the three stages on the right of the schematic). The goal of this exercise is to understand how current designers might look at the current context and how their values has shaped their design and how the to be designed product can differentiate itself.

The following step is to shape a future context. Activities include defining a domain/ time, finding context factors and structure, and formulate a statement. Factors are observations by the designer that make building blocks to shape the future context. The statement, or vision statement, that follows from these observations defines the goal of the product based on the factors and context vision.

From this vision, according human-product interaction is defined. This is a description of the relation between human an product. Analogies are useful tools to describe this relation. For example, *I want the product to be serving yet invisible to the user, like the smooth hostess at a good restaurant that serves and removes plates without bothering you or allowing you to notice her presence.*

From this human-production interaction a product character is described. These are similar to personal traits such as *friendly, thoughtful, adequate, discrete etc.* The product character can then be defined in *product qualities* and its function, or *action*. Product qualities are definitions like *smooth, strong lines, geometric, soft* and *fluffy*. It's action is what can be done with it such as pull,

push, stroke etc. Product qualities and its action can be aligned creating a coherent story. On the other hand qualities and action can be misaligned, creating confusion or a surprise. For example a door handle can have qualities that emphasize its pull action (*see figure beside)*.

A concept can be designed with the domain, the vision statement, the human-product interaction and product qualities. When the concept proves to be successful, the concept can be finished with detailing and made into a design.

Deconstruction

A deconstruction of products that are related to soothing and relaxing the user in a sleep context were analyzed to practice the ViP process and understand what kind of products are available in this field. (Appendix B)

Figure 16 An exercise for ViP was to deconstruct similar products. This is a deconstruction of the sleeping robot Somnox.

Figure 17 An exercise for ViP was to deconstruct similar products. This is a deconstruction of the Posey Bed

Figure 18 An exercise for ViP was to deconstruct similar products. This is a deconstruction of Tranquil Turtle.

Factors

FACTORS EXPLAINED

Developments:	Changes in the world around us
Trends:	Reflections of developments in peoples daily lives
States:	Phenomena that appear as fixed, but do not need to be so in the long run ("freedom of speech")
Principle	Kind of law or a general pattern in nature or human behaviour for example, it was in the past en wil remain in the future)

Psychological

- Wanting a positive experience is in itself a negative experience. Accepting a negative experience, is a positive experience (principle)
- It is big misconception that Elderly with dementia are like children (state)
- Taking care of people with a disability or elderly can be at cost of the health of the carer (state)
- Often, needs of people with dementia are unclear (State)
- Humans have a deep desire for freedom (principle)
- Human beings find comfort in genuine and undivided attention (principle)
- Humans want to spend their life meaningful (principle)
- It costs energy to adapt to change (principle)
- Teddy bears are not just capitalizing on the human urge to cuddle with something soft. They're designed to elicit nurturance and affection, (principle) source
- Affection makes people feeling loved, and sense of belonging together (principle)
- Positive emotional engagement makes people happy (principle)
- Snoezelen, u is used to sooth someone with dementia (trend)
- People are comfortable at home, with their stuff (principle)

Demographic

- Healthcare employee shortage will increase due to increase of our aging society (development)
- There are not enough caring homes to take elderly in (development)
- Dementia is increasing among population (development)
- There are above average divorces amongst parents with children that have disabilities (state)
- De Wet zorg en dwang gaat per 1 januari 2020 in: "nee, tenzij ernstig nadeel" (state) [2]
- Houses for people with dementia are designed 'home-like' (trend)

Sociological

- A healthy lifestyle has becomes more important and will continue to grow (trend)
- Sleep quality gets more attention lately and increases in popularity (trend)
- Parents and carers want the best for their beloved ones (principle)
- Being socially aware of being different makes people uncomfortable (principle)
- Minorities are treated differently (state)
- People find support in finding out they are not the only one with problem X (principle)
- People want to be treated with respect and dignity (principle)
- People with dementia fall in a negative spiral: lose communicative and social skills, lose relationsship, losing social skills … (state)
- People with Dementia want to go home, while care at home is inadequate (state)

Economic

Caring for a child with disabilities is more expensive (state)

- Prevention better than cure (principle)

Biological

- People with dementia may have sleep and circadian rhytm problems. (principle)
  - To sleep well, people need a sense of calmness, safety and security (principle)
  - Juniors and seniors with a disability benefit from structure and rhytm (principle)
  - Children like to cuddle, cute looking stuffed animals (principle)
  - A calm night of sleep is not only valuable for the care-taking person but also for its environment (principle)
  - Children with a disability are prone to overstimulation (principle)
  - Elderly are prone to worn out senses, this is why they need stronger stimulation of senses to stimulate them (principle)
  - Children with disabilties have less developed cognitive abilities (principle)
  - People with disabilities behave differently, even the ones with the same diagnosed disability (character + disability) (principle)
  - Demented seniors and people with disabilities have a high need of care and attention from their carers (state)
  - Feedback to human action, will provoke more action (principle)
  - **Sleep quality is extremely important for a human being's health** (principle)
  - All human beings fall asleep through repetitive and non-responsive stimulation of the senses (principle)
  - People with dementia have declining thinking skills (principle)
  - Non pharmaceulaitcal treatmetns are prefered above pharmaceutical (trend)

Evolutionary

- Juniors and seniors with a disability have limited cognitive ability, and heavily rely on their caretakers (principle)
- The older you become the more your body wears of, including your senses (principle)
- It's human nature to crave for a sense of peace, securty and comfort, evoked by cuddling (principle) source

Technological

- Technological distractions are growing in our lives (trend)
- People have become less anxious about technology in their home (microwave then vs. Google Home now) (development)
- Technology allows us to explore and monitor the world more thoroughly (development)
- The public gets easier access to more advanced technologies (development)
- Robotic development will continue to grow and they will become part of our daily life (development)
- One of the most readily observable emerging trends in contemporary environments for people with dementia is the move towards deinstitutionalization of care environments. (trend)
- Colour can have a powerful psychological effect. Van <https://thespaces.com/5-interior-design-hacks-to-reduce-your-anxiety/>
- People are afraid of the unknown
- People like to do as they please

Clusters

‘Go with the flow’ is a mindset to effectively and efficiently cope with problems

- Wanting a positive experience is in itself a negative experience. Accepting a negative experience, is a positive experience (principle)
- It costs energy to adapt to change (principle)
- The path of least resistance is the most energy efficient way (principle)
- Prevention better than cure (principle)
- Taking care of people with a disability or elderly can be at cost of the health of the carer (state)
- People like to do as they please

Sharing an emotional connection is a deep profound quality of life

- Affection makes people feeling loved, and sense of belonging together (principle)
- Human beings find comfort in genuine and undivided attention (principle)
- Humans want to spend their life meaningful (principle)
- Teddy bears are not just capitalizing on the human urge to cuddle with something soft. They’re designed to elicit nurturance and affection, (principle) source
- Positive emotional engagement makes people happy (principle)
- Demented seniors and people with disabilities have a high need of care and attention from their carers (state)
- Non pharmacological treatments are preferred above pharmaceutical (trend)
- It's human nature to crave for a sense of peace, security and comfort (principle) source
- People are afraid of the unknown
- People want to be treated with respect and dignity (principle)
- It is big misconception that Elderly with dementia are like children (state)
- Often, needs of people with dementia are unclear (State)
- People find support in finding out they are not the only one with problem X (principle)

Being a human means to have the right to free autonomy and to be in a safe environment

- Parents and carers want the best for their beloved ones (principle)
- People with Dementia want to go home, while care at home is inadequate (state)
- People with dementia fall in a negative spiral: lose communicative and social skills, lose relationship, losing social skills … (state)
- Minorities are treated differently (state)
- Humans have a deep desire for freedom (principle)
- Houses for people with dementia are designed 'home-like' (trend)
- De Wet zorg en dwang gaat per 1 januari 2020 in: "nee, tenzij ernstig nadeel" (state) [2]

Human beings have an urge to understand what is going on, it gives them a peace of mind

- People with dementia may have sleep and circadian rhythm problems. (principle)
- To sleep well, people need a sense of calmness, safety and security (principle)
- Juniors and seniors with a disability benefit from structure and rhythm (principle)
- A calm night of sleep is not only valuable for the care-taking person but also for its environment (principle)
- A healthy lifestyle has becomes more important and will continue to grow (trend)
- Sleep quality gets more attention lately and increases in popularity (trend)
- Sleep quality is extremely important for a human being's health (principle)
- All human beings fall asleep through repetitive and non-responsive stimulation of the senses (principle)
- Technology allows us to explore and monitor the world more thoroughly (development)
- Technological distractions are growing in our lives (trend)
- People have become less anxious about technology in their home (microwave then vs. Google Home now) (development)
- The public gets easier access to more advanced technologies (development)
- Robotic development will continue to grow and they will become part of our daily life (development)

The perception of environmental stimuli varies from person to person

- Elderly have worn out senses, this is why they need stronger stimulation of senses to stimulate them (principle)
- People with dementia have declining thinking skills, meaning they don’t recognize things they usually would (principle)
- People with disabilities behave differently, even the ones with the same diagnosed disability (character + disability) (principle)
- Snoezelen, is used to sooth someone with dementia (trend)
- People are comfortable at home, with their stuff (principle)
- Colour can have a powerful psychological effect. Van <https://thespaces.com/5-interior-design-hacks-to-reduce-your-anxiety/>
- One of the most readily observable emerging trends in contemporary environments for people with dementia is the move towards deinstitutionalization of care environments. (trend)

Helping hands in healthcare, also in dementia care, is highly demanded and will grow even higher in the future.

- Healthcare employee shortage will increase due to increase of our aging society (development)
- There are not enough caring homes to take elderly in (development)
- Dementia is increasing among population (development)

Dimensions

The clusters can be used to make dimension. This is useful to find the relation between the clusters. The relations can then be used to make a quadrant diagram in order to sketch four different use scenario's.

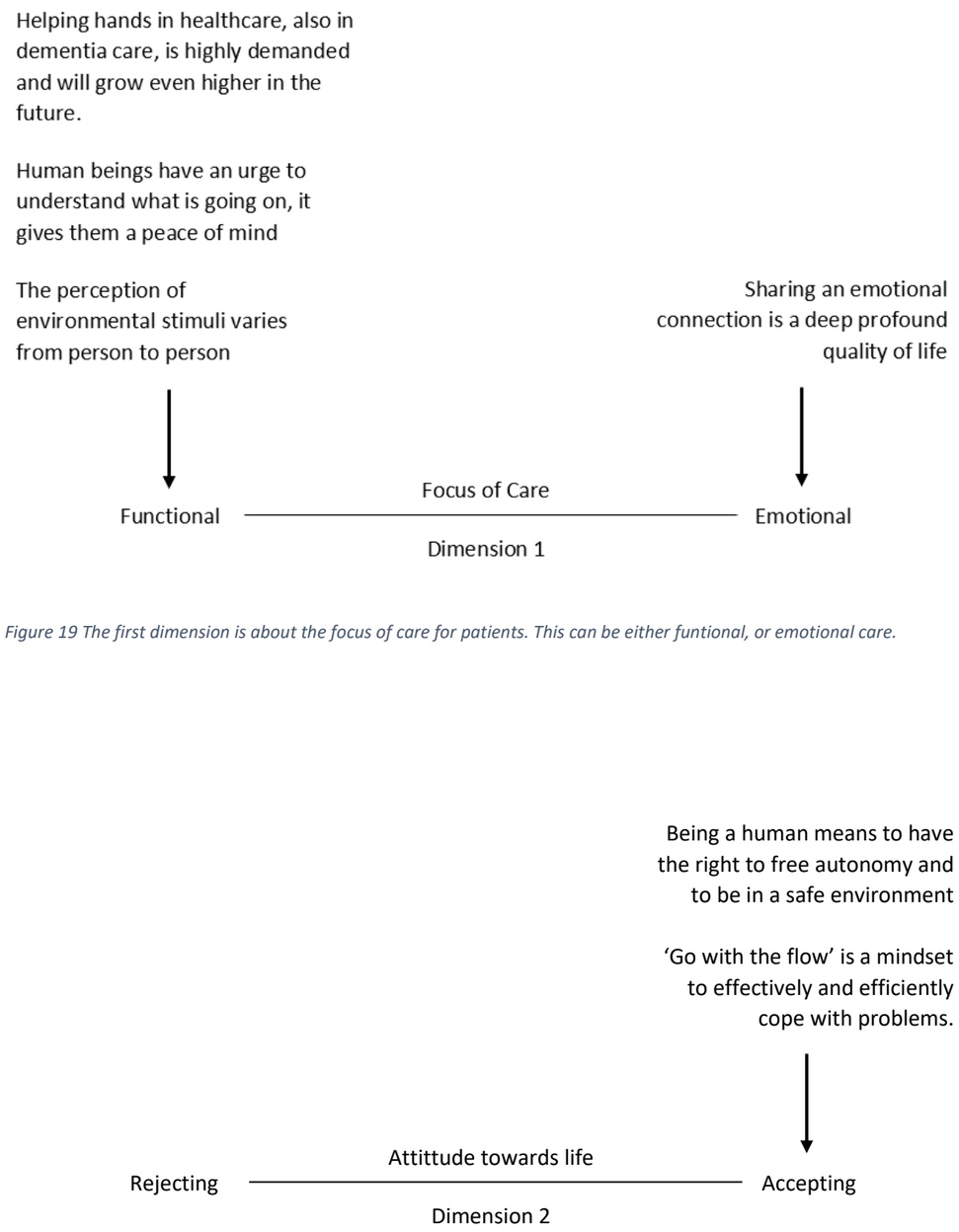


Figure 19 The first dimension is about the focus of care for patients. This can be either funtional, or emotional care.

Figure 20 the seceond dimension is called 'attitude towards life'. Some people resist to changes, to events, to what comes to their life. Some people accept.

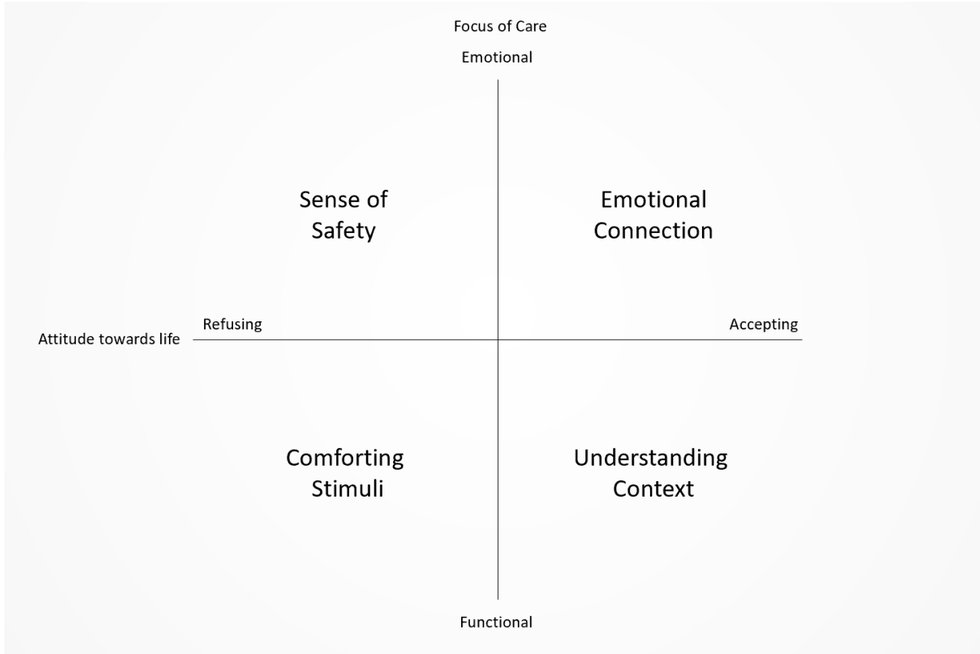


Figure 21 Dimension 1 and 2 create an quadrant that can be used to sketch four different use scenario's.

Vision Statement, product character and qualities

Cloudcuddle vision statement:

Providing a safe sleeping environment to everyone who needs it, so caregivers and healthcare professionals have more rest and freedom of movement.

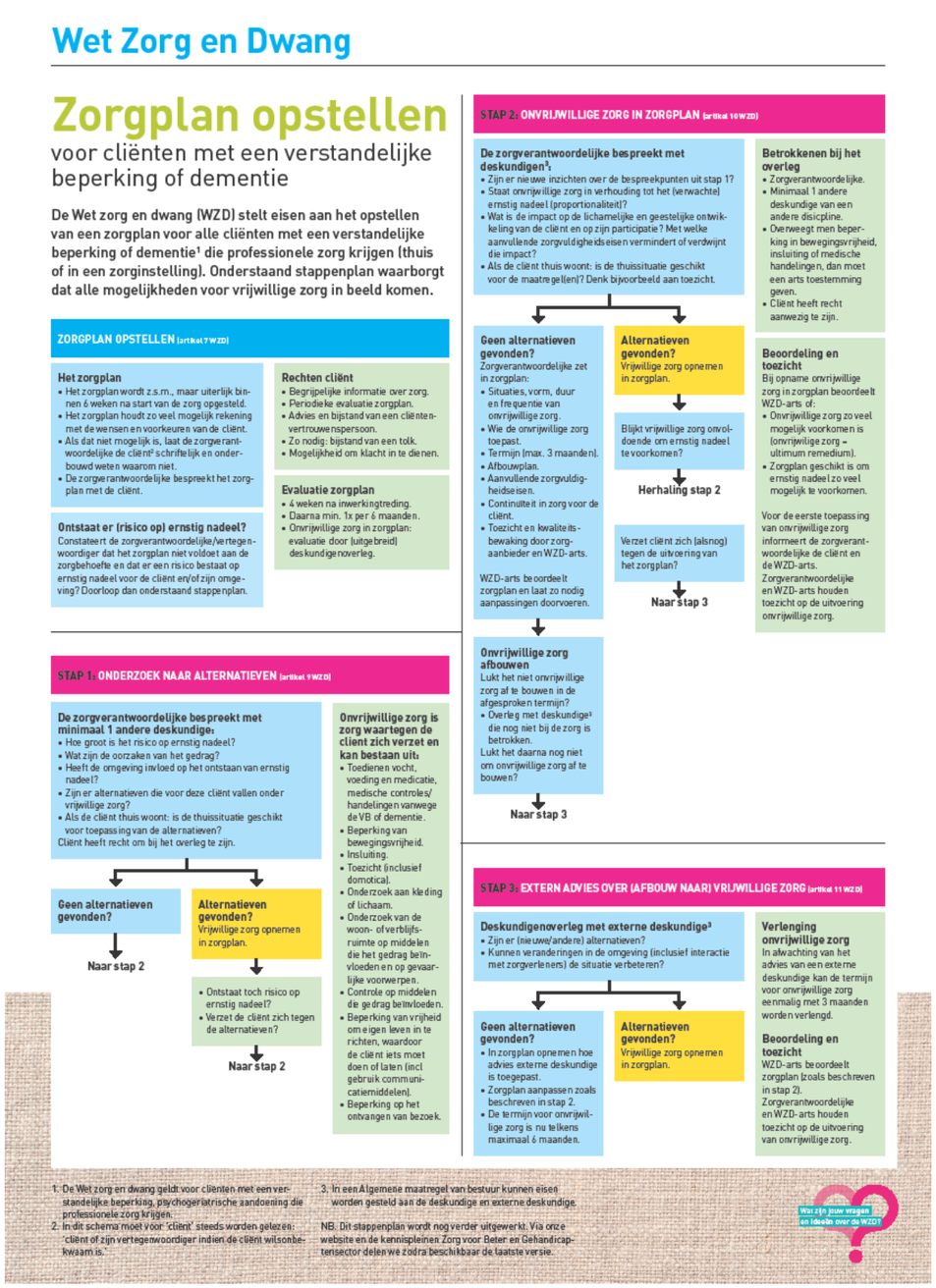
Product vision statement

CloudCuddle Senior is a bed tent that let people with dementia experience the right comforting stimuli in their bed, and gives them a sense of safety.

Character and Qualities

Figure 22 The product Character can be used to align design aspects in a way it creates a coherent design. This can be done in the embodiment of the design.

Appendix D: Roadmap Law Care and Coersion



Wet Zorg en Dwang

Zorgplan opstellen

voor cliënten met een verstandelijke beperking of dementie

De Wet zorg en dwang (WZD) stelt eisen aan het opstellen van een zorgplan voor alle cliënten met een verstandelijke beperking of dementie[1] die professionele zorg krijgen (thuis of in een zorginstelling). Onderstaand stappenplan waarborgt dat alle mogelijkheden voor vrijwillige zorg in beeld komen.

ZORGPLAN OPSTELLEN (artikel 7 WZD)

Het zorgplan
- Het zorgplan wordt z.s.m., maar uiterlijk binnen 6 weken na start van de zorg opgesteld.
- Het zorgplan houdt zo veel mogelijk rekening met de wensen en voorkeuren van de cliënt.
- Als dat niet mogelijk is, laat de zorgverantwoordelijke de cliënt[2] schriftelijk en onderbouwd weten waarom niet.
- De zorgverantwoordelijke bespreekt het zorgplan met de cliënt.

Rechten cliënt
- Begrijpelijke informatie over zorg.
- Periodieke evaluatie zorgplan.
- Advies en bijstand van een cliëntenvertrouwenspersoon.
- Zo nodig: bijstand van een tolk.
- Mogelijkheid om klacht in te dienen.

Evaluatie zorgplan
- 4 weken na inwerkingtreding.
- Daarna min. 1x per 6 maanden.
- Onvrijwillige zorg in zorgplan: evaluatie door (uitgebreid) deskundigenoverleg.

Ontstaat er (risico op) ernstig nadeel?
Constateert de zorgverantwoordelijke/vertegenwoordiger dat het zorgplan niet voldoet aan de zorgbehoefte en dat er een risico bestaat op ernstig nadeel voor de cliënt en/of zijn omgeving? Doorloop dan onderstaand stappenplan.

STAP 1: ONDERZOEK NAAR ALTERNATIEVEN (artikel 9 WZD)

De zorgverantwoordelijke bespreekt met minimaal 1 andere deskundige:
- Hoe groot is het risico op ernstig nadeel?
- Wat zijn de oorzaken van het gedrag?
- Heeft de omgeving invloed op het ontstaan van ernstig nadeel?
- Zijn er alternatieven die voor deze cliënt vallen onder vrijwillige zorg?
- Als de cliënt thuis woont: is de thuissituatie geschikt voor toepassing van de alternatieven?

Cliënt heeft recht om bij het overleg te zijn.

Onvrijwillige zorg is zorg waartegen de client zich verzet en kan bestaan uit:
- Toedienen vocht, voeding en medicatie, medische controles/handelingen vanwege de VB of dementie.
- Beperking van bewegingsvrijheid.
- Insluiting.
- Toezicht (inclusief domotica).
- Onderzoek aan kleding of lichaam.
- Onderzoek van de woon- of verblijfsruimte op middelen die het gedrag beïnvloeden en op gevaarlijke voorwerpen.
- Controle op middelen die gedrag beïnvloeden.
- Beperking van vrijheid om eigen leven in te richten, waardoor de cliënt iets moet doen of laten (incl gebruik communicatiemiddelen).
- Beperking op het ontvangen van bezoek.

Geen alternatieven gevonden?

Naar stap 2

Alternatieven gevonden?
Vrijwillige zorg opnemen in zorgplan.
- Ontstaat toch risico op ernstig nadeel?
- Verzet de cliënt zich tegen de alternatieven?

Naar stap 2

STAP 2: ONVRIJWILLIGE ZORG IN ZORGPLAN (artikel 10 WZD)

De zorgverantwoordelijke bespreekt met deskundigen[3]:
- Zijn er nieuwe inzichten over de bespreekpunten uit stap 1?
- Staat onvrijwillige zorg in verhouding tot het (verwachte) ernstig nadeel (proportionaliteit)?
- Wat is de impact op de lichamelijke en geestelijke ontwikkeling van de cliënt en op zijn participatie? Met welke aanvullende zorgvuldigheidseisen vermindert of verdwijnt die impact?
- Als de cliënt thuis woont: is de thuissituatie geschikt voor de maatregel(en)? Denk bijvoorbeeld aan toezicht.

Betrokkenen bij het overleg
- Zorgverantwoordelijke.
- Minimaal 1 andere deskundige van een andere discipline.
- Overweegt men beperking in bewegingsvrijheid, insluiting of medische handelingen, dan moet een arts toestemming geven.
- Cliënt heeft recht aanwezig te zijn.

Geen alternatieven gevonden?
Zorgverantwoordelijke zet in zorgplan:
- Situaties, vorm, duur en frequentie van onvrijwillige zorg.
- Wie de onvrijwillige zorg toepast.
- Termijn (max. 3 maanden).
- Afbouwplan.
- Aanvullende zorgvuldigheidseisen.
- Continuïteit in zorg voor de cliënt.
- Toezicht en kwaliteitsbewaking door zorgaanbieder en WZD-arts.

WZD-arts beoordeelt zorgplan en laat zo nodig aanpassingen doorvoeren.

Alternatieven gevonden?
Vrijwillige zorg opnemen in zorgplan.

Blijkt vrijwillige zorg onvoldoende om ernstig nadeel te voorkomen?

Herhaling stap 2

Verzet cliënt zich (alsnog) tegen de uitvoering van het zorgplan?

Naar stap 3

Beoordeling en toezicht
Bij opname onvrijwillige zorg in zorgplan beoordeelt WZD-arts of:
- Onvrijwillige zorg zo veel mogelijk voorkomen is (onvrijwillige zorg = ultimum remedium).
- Zorgplan geschikt is om ernstig nadeel zo veel mogelijk te voorkomen.

Voor de eerste toepassing van onvrijwillige zorg informeert de zorgverantwoordelijke de cliënt en de WZD-arts.
Zorgverantwoordelijke en WZD-arts houden toezicht op de uitvoering onvrijwillige zorg.

Onvrijwillige zorg afbouwen
Lukt het niet onvrijwillige zorg af te bouwen in de afgesproken termijn?
- Overleg met deskundige[3] die nog niet bij de zorg is betrokken.

Lukt het daarna nog niet om onvrijwillige zorg af te bouwen?

Naar stap 3

STAP 3: EXTERN ADVIES OVER (AFBOUW NAAR) VRIJWILLIGE ZORG (artikel 11 WZD)

Deskundigenoverleg met externe deskundige[3]
- Zijn er (nieuwe/andere) alternatieven?
- Kunnen veranderingen in de omgeving (inclusief interactie met zorgverleners) de situatie verbeteren?

Verlenging onvrijwillige zorg
In afwachting van het advies van een externe deskundige kan de termijn voor onvrijwillige zorg eenmalig met 3 maanden worden verlengd.

Geen alternatieven gevonden?
- In zorgplan opnemen hoe advies externe deskundige is toegepast.
- Zorgplan aanpassen zoals beschreven in stap 2.
- De termijn voor onvrijwillige zorg is nu telkens maximaal 6 maanden.

Alternatieven gevonden?
Vrijwillige zorg opnemen in zorgplan.

Beoordeling en toezicht
WZD-arts beoordeelt zorgplan (zoals beschreven in stap 2).
Zorgverantwoordelijke en WZD-arts houden toezicht op de uitvoering van onvrijwillige zorg.

1. De Wet zorg en dwang geldt voor cliënten met een verstandelijke beperking, psychogeriatrische aandoening die professionele zorg krijgen.
2. In dit schema moet voor 'cliënt' steeds worden gelezen: 'cliënt of zijn vertegenwoordiger indien de cliënt wilsonbekwaam is.'
3. In een Algemene maatregel van bestuur kunnen eisen worden gesteld aan de deskundige en externe deskundige.

NB: Dit stappenplan wordt nog verder uitgewerkt. Via onze website en de kennisplein Zorg voor Beter en Gehandicaptensector delen we zodra beschikbaar de laatste versie.

Wat zijn jouw vragen en ideeën over de WZD?

Figure 23 Law of Care and coersion is unfortunately in Dutch.

Appendix E: Static Design Tests

Strength is one of the more important functions of the CloudCuddle. The main challenge for strength is to create a product that can withstand 120 kg. There are three different variables that have effect on the strength of CloudCuddle. It was assumed that the shape, the size and diameter of the inflatable tubes and elasticity of the mesh and scuba material were the variables for strength.

5. Shape
6. Tube diameter
7. Use of material with different properties such as elasticity.

Validation

To validate that the variables had effect on the strength of the design, a FEM analysis was started in order to validate the strength of the CloudCuddle and iterate on variables such as diameter of the tubes, shape of the CloudCuddle and materials.

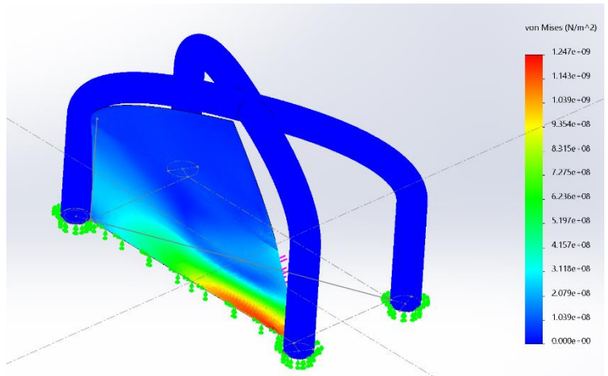


Figure 24 A attempted FEM analysis. The physics that are applied in a CloudCuddle Senior however is so complex it was considered unrealistic to make an accurate prediction model.

After consult with Sander Minnoye, lecturer of Integrated Technology, Design Engineering and Mechatronic Design it became clear that this FEM analysis is too complex to be accurate and that it would be best to test separate parts of the CloudCuddle to understand its behavior.

Understanding behavior of the CloudCuddle and its components

To understand the behavior of the CloudCuddle tubes, different shapes were made:

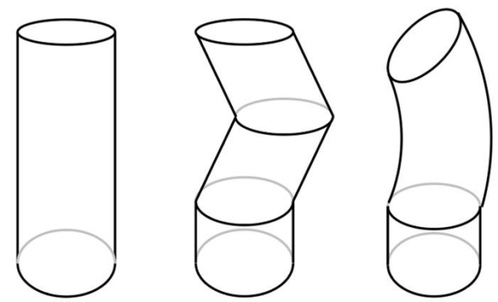


Figure 25 Three different shapes were made to test in order to understand how forces are distributed.

To imitate the mesh, 4 cords were attached to the cylinder. These cords were pulled to a direction to imitate a force that is applied by the person that pushed against the mesh. The cylinder was hold on the bottom, imitating a fixed point.

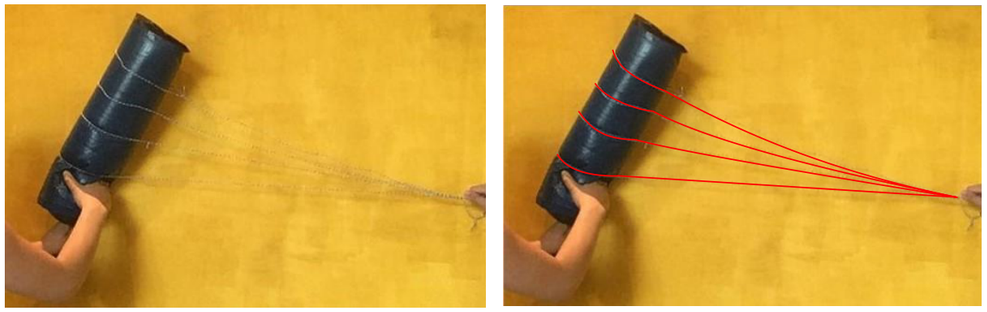


Figure 26 The cylinder tilts over, creating a tipping point at the fixated point.

The result can be found in the figure above. This can be illustrated in a schematic:

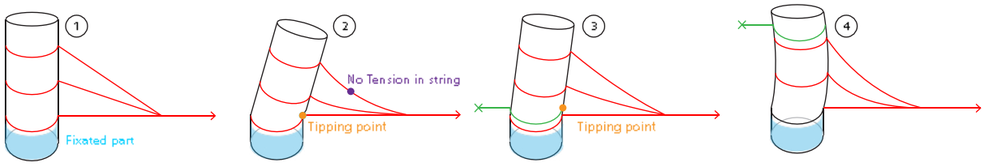


Figure 27 Schematic overview of cilinder behavior when pulled by four strings that imitate mesh.

A tipping point was created at the point where the fixated part stopped (cylinder 2). Making a string in the opposite direction, another tipping point was created (cylinder 3). When only fixated at the top, the cylinder bended in the pull direction (cylinder 4). No other behavior was observed with other shapes.

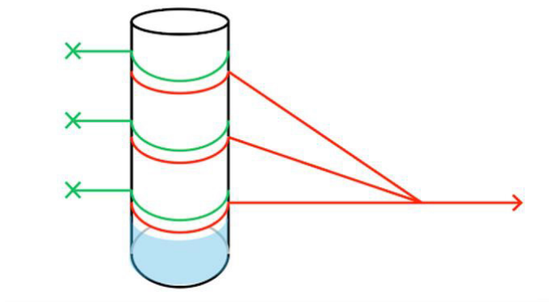


Figure 28 Schematic overview of cilinder behavior when pulled by four strings that imitate mesh while the inflatable tube is fixated. It was assumed this would help prevent the Inflatable model from bending or tipping over.

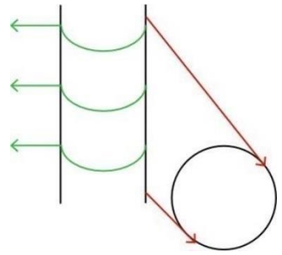


Figure 29 It was assumed that a solution was to create a force to the left (green arrows) to neutralize downward force created by a patient that would push against mesh and create a hammock.

A solution would be to create fixated points along the cylinder.

Behavior of the CloudCuddle was then observed.

Figure 30 Behavior of the CloudCuddle Junior shows there is fixation on the bottom of the tube and it leans over.

It can be clearly observed that the current Cloud Cuddle has no fixated points from which it gets strength. Solving this problem might already end up in an improvement of the strength of CloudCuddle Junior and make Junior available for bigger children and elderly with dementia.

Conclusions that can be withdrawn

8. Shape of the cylinder pillars does not have much effect in the test as first thought.
9. Stifness of the cilinders is received from the fixated points
10. The higher the fixated point, the higher the tipping point

It can be reasoned that the higher the pressure in the cylinders, the higher the stiffness. Material use of the cylinder affects how much pressure the cylinder can handle and how stiff the cilinders become. It is unknown whether the cylinders are stiff enough and don’t bend when a proper fixated system has been designed.

Appendix F: Ideation ‘tube frame’

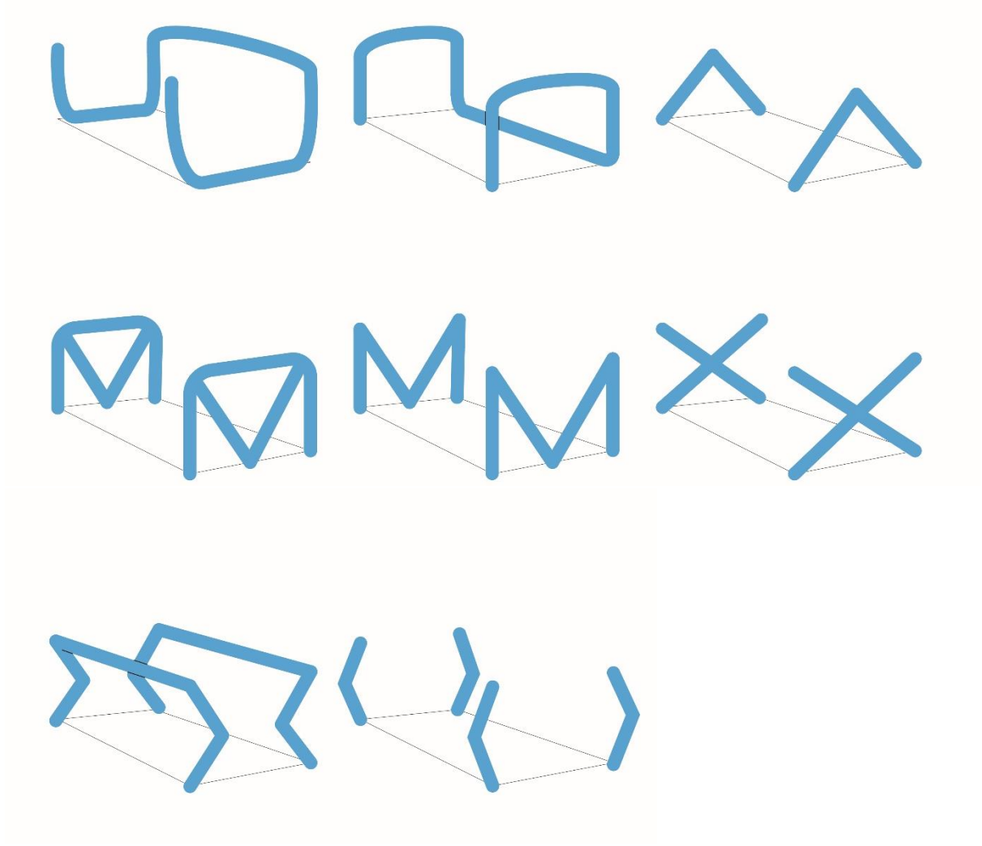


Figure 31 Various designs to leave the space above bed open in order to allow mobile hoists and nursing activities.

Appendix G: Inflatable Frame Ideation for Strength

The two major functionalities of the product is that it should keep patients safe, and it should give a sense of safety. An understanding of the behavior of the inflatables shape of the CloudCuddle was needed to determine how to design a product that is strong enough to the function of keeping patients safe. An experiment was set up to do so. (figure)The conclusion of this experiment was that the shape of CloudCuddle does not affect the strength as much as assumed (appendix C).

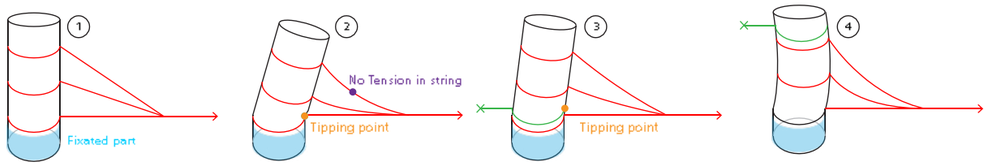


Figure 32 Schematic overview of cilinder behavior when pulled by four strings that imitate mesh.

Figure 33 A quick solution to test the hypothesis that a fixating the tube would prevent the inflatable tube from bending over.

What it made strong however were points of fixture the helped to keep the cylinder in place. This idea was validated with a quick mock-up that could be applied to a CloudCuddle Junior. This second experiment validated that a fixation of the cylinders of CloudCuddle indeed made CloudCuddle stiffer.

An ideation session on how to fixate the cylinders of the inflatable tubes was held instead of an ideation session on the shape of the CloudCuddle.

The desire from strength perspective is to create a design that is stiff enough to withstand forces of a 120kg weighting person out of material that is not stiff. Due to the complexity of physics in the design of CloudCuddle, a research through design approach was chosen to create an understanding of the behavior of tubes.

Although the inflatable tubes have some stiffness due to pressure inside the tube, it became clear that a lack of fixture was cause of weakness. In an attempt to solve the weaknesses in a quick way and to see how the shapes could be enforced, various ways of fixating the inflatable tubes initiated (figure 34, 35 and 36).

Figure 34 Fixating the inflatable tube with 2 ropes made the structure more stiff. It was assumed that this was enough.

Figure 35 Hold the inflatable tubes at both the front and the end was effective

Figure 36 Holding the middle of the structure of CloudCuddle Junior was effective

The results were 3 different types of products: an idea to fixate the cylinders with 1) straps, 2) a solid product and 3) a hybrid between the straps and solid product (see figure below and Appendix F).

Fixtures by ropes, hard material or a combination of both.

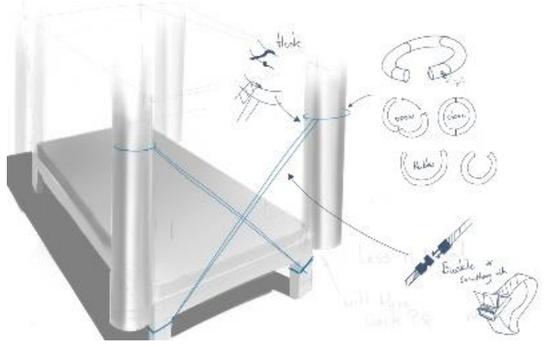


Figure 37 The quickes way to 'fix' the tubes at the top was with ropes. This is amobile solution but probably less stiff to a solution that would use hard materials.

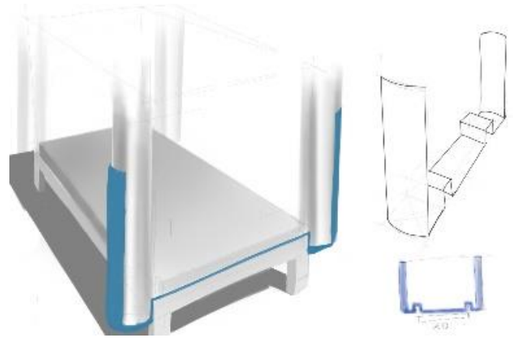


Figure 38 Another solution was to use hard materials to creates fixtures. This design is considered stiffer but less mobile due to weight and size.

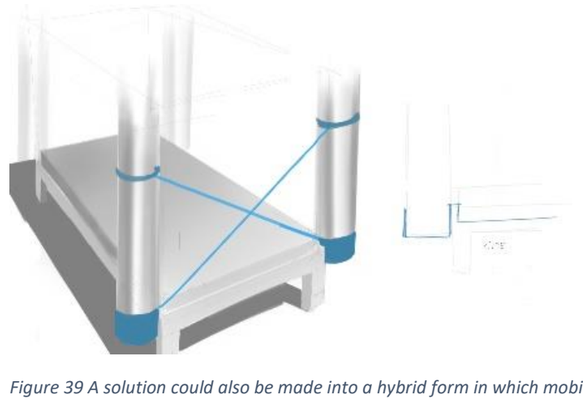


Figure 39 A solution could also be made into a hybrid form in which mobility and stiffness would be combined.

All the ideas can be designed as a separate add-on or can be integrated into a new design.

A separate add-on is a product can be offered to clients who already have bought a CloudCuddle Junior. From a

Advantages of a separate design is that users with an CloudCuddle Junior can upgrade to CloudCuddle Senior and that there is no need to produce a separate CloudCuddle Senior.

Advantages of an integrated design is things can be changed and optimized for use: shape can be designed to facilitate passive lifts for example.

Validation with a mock-up up test

Figure 40 A simple test with a scaled prototype shows that the inflatable tubes deform, although the side material is not mesh but a fabric with minimum elasticity.

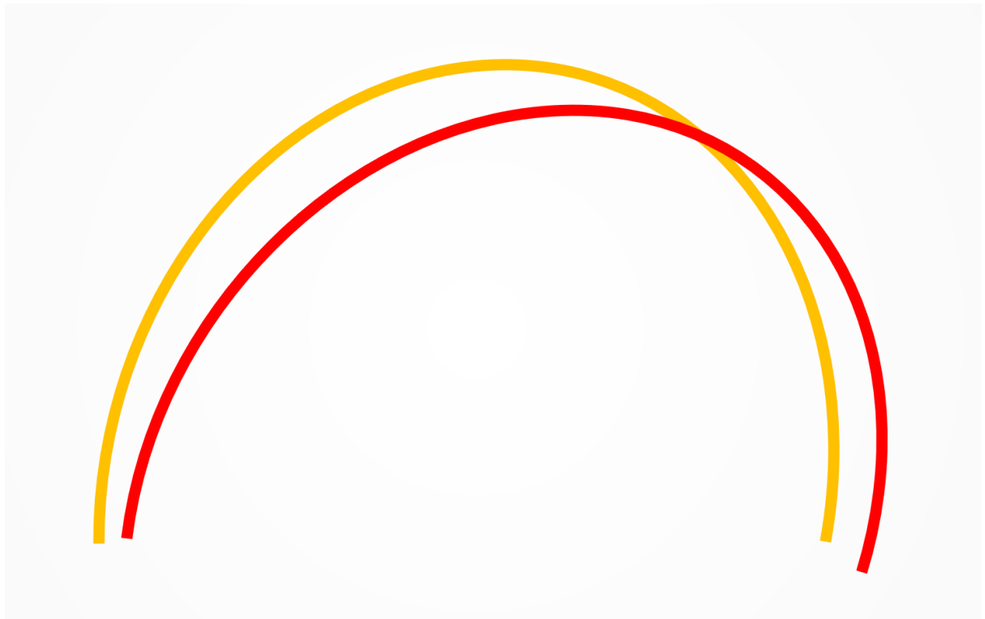


Figure 41 The yellow represents the arc of cloudcuddle senior from a sideview while no force is applied. The red line is a sideview of CloudCuddle Senior when force is applied. It is clear there is deformation.

To validate that mesh or fabric on the side would indeed prevent an inflatable frame to bend over, a scaled mock-up was made to see what happens when the model gets forces similar to a CloudCuddle Senior. It was assumed that fabric on the side would generate enough pull downward to prevent the frame from bending. However, this was unvalidated as can be seen above. The yellow arc is the arc in normal situation, the red arc is when force is applied. It is clear that the inflatable frame moves along the direction force that represents a patients pushing against the arc.

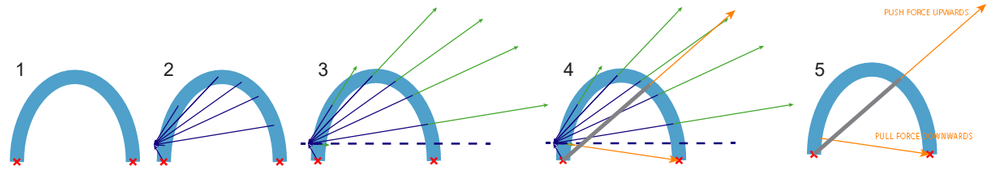


Figure 42 Back to the drawing table and sketching out the direction of forces, it become clear why the solution so far did not work.

A sketch was made with a simplified model of the bed tent as a sideview (figure 42). The 5 steps are explained below:

Step 1. The blue arc represent the sideview of the cloudcuddle model as a pringle shape. you see this model with fixtures on the bottom (red crosses) .

Step 2. The dark blue arrows show the direction of forces when a patient pushes against the wall on the side.

Step 3. The green arrows are the counter forces to the force applied as shown in step 2. Ideally these green force vectors are applied by the inflatable tube, but this is not stiff enough to repel the outwards forces.

Step 4. Stifness can be created from the points of fix'tures. These are the only points that significantly stiffen the inflatable structure because these points are fixed and will not move. From the points on which the patients pushes, it is mostly required to generate a diagonal force upwards.

Step 5. A material that is able to endure pressure is required to resist a downward force. The grey line represent a pole or rod that generates this force. Of course, more poles can be added when one pole doesn't seem significant.

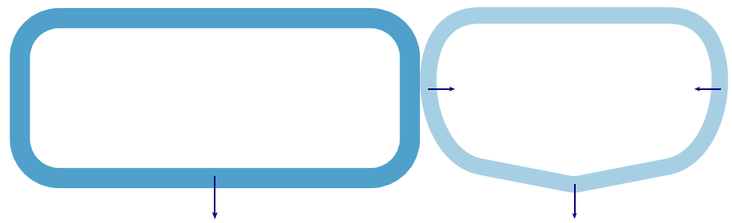


Figure 43 A top view of a inflatable structure. When force as represented in the left image, the sides collapse as represented in the right image.

Figure 43 represents a cloudcuddle senior on top view. When a force is applied to an outer direction (left image), the inflatable tubes move inward on the side which in results the frame gives way to the force applied.

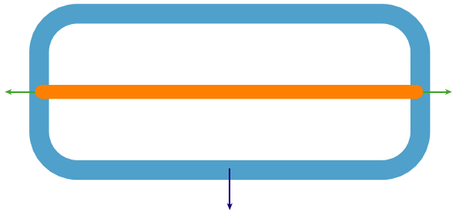


Figure 44 Applying a hard material that is able to prevent CloudCuddle from collapsing by resisting inwards pressure.

When a pressure resistant pole is added (orange stroke above), it resists inward forces leading to less deformation in the direction of the force that is applied to get out of the bed tent.

Figure 45 The mock-up scale with it's diagonal poles and top pole that made the inflatable tubes more stiff.

Usability Ideas

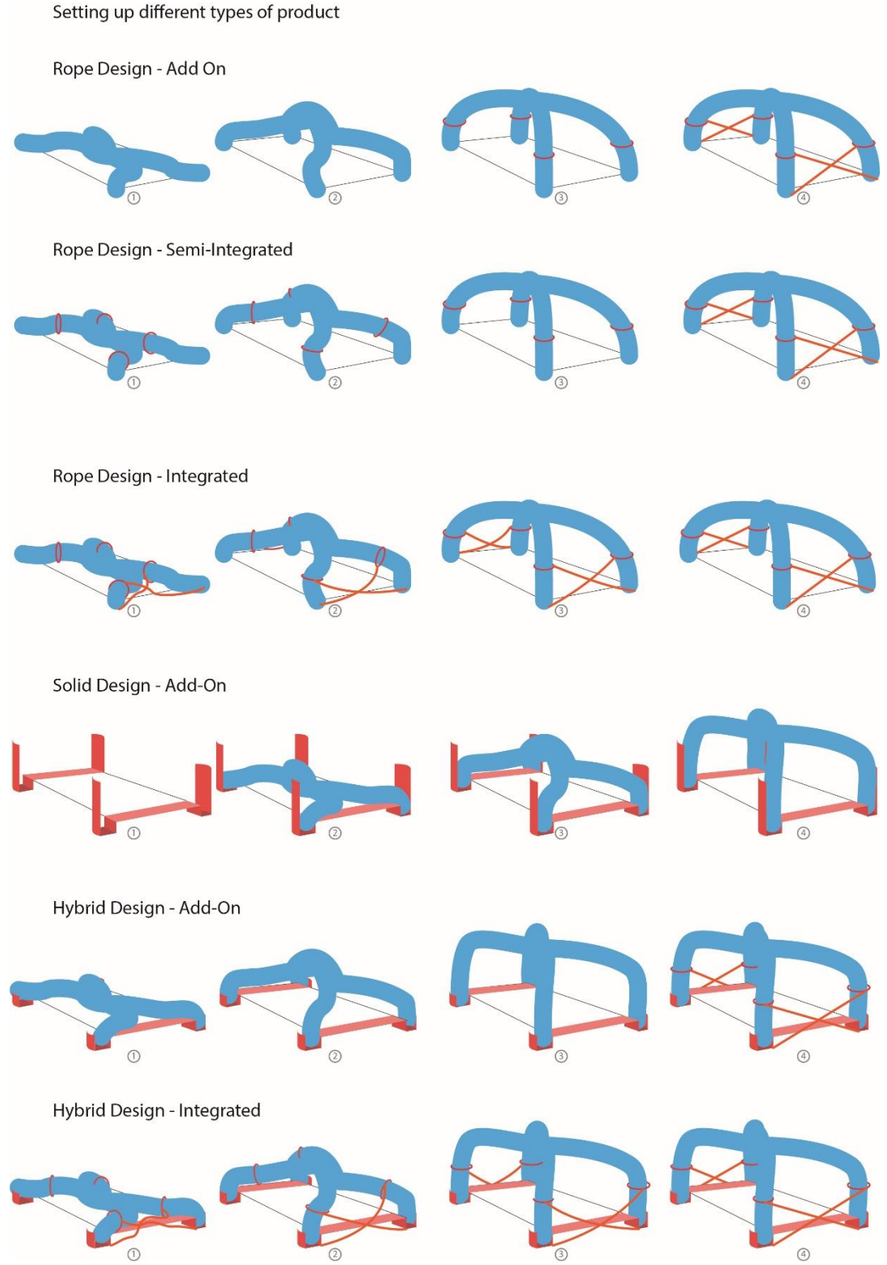


Figure 46 Various way of integrate solution that were considered effective. The solution could be designed as a stand alone add-on and thus sold as a seperate product. It also could be designed as semi-integreated into the product or as Integrated part of design.

Evaluation criteria

The differences, advantages and disadvantages between a separate and integrated design can be discussed according to feasibility, desirability and viability.

	Add-on design	Integrated design
Feasibility	Only add-on design required	Complete new design of CloudCuddle Senior required
Desirability	People with a CC J can upgrade for at low cost	People with a CC J can upgrade for at high cost
	No opportunity to change shape of a CC and meet new needs	No opportunity to change shape of a CC and meet new needs
Viability	Multiple products to sell	One product to sell

Appendix H: Ideation ‘strength’

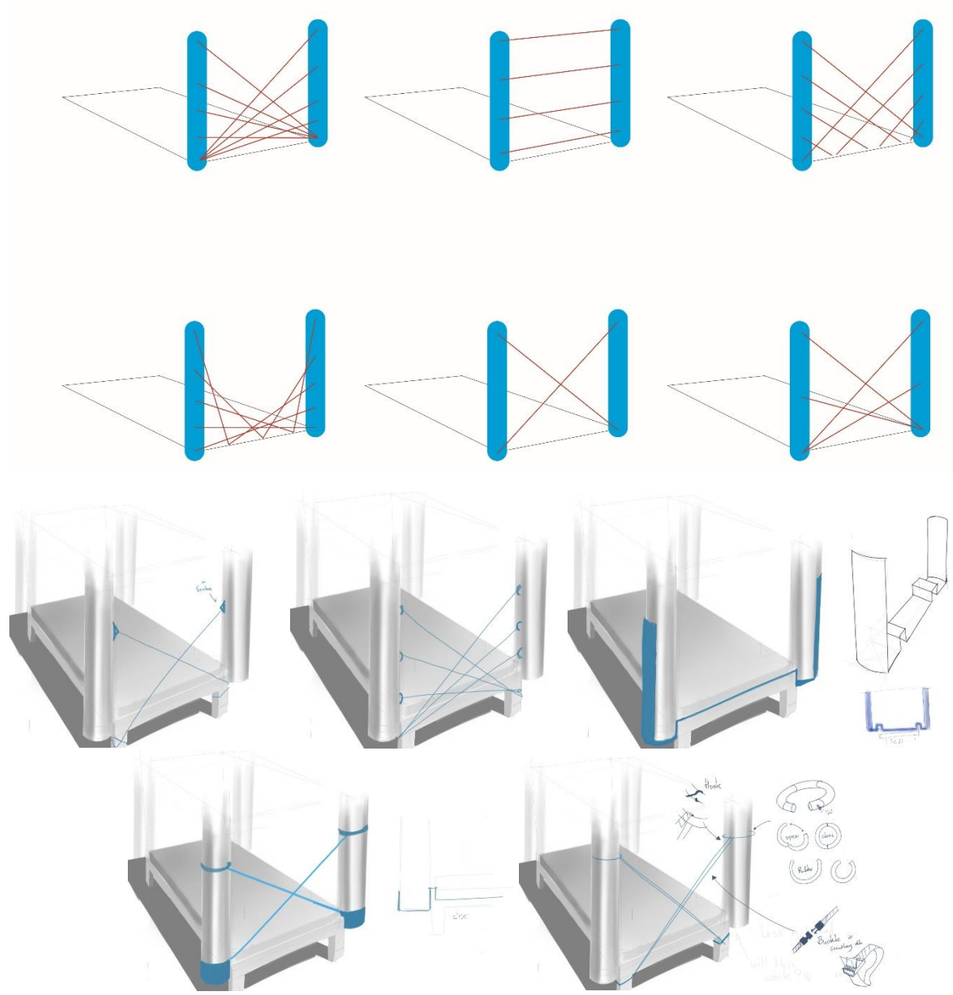


Figure 47 Different ways to fix the inflatable tubes

Appendix I: Fixating CloudCuddle Junior

Figure 48 Fixating the inflatable tube made the mesh more stiff.

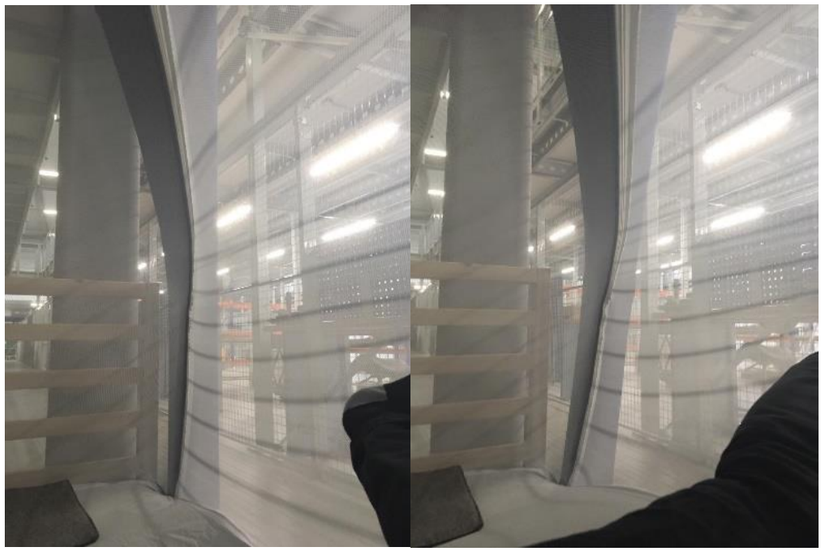
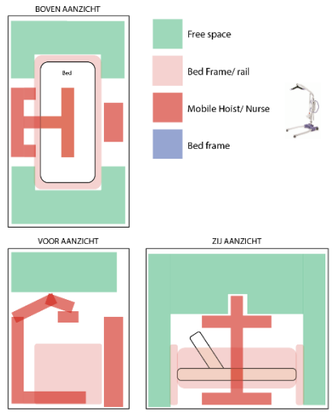


Figure 49 Small displacement was still visible.

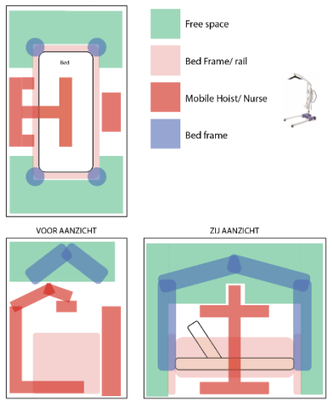
Figure 50 If no force was applied, the ropes would fell to the ground.

Appendix J: free zones for CloudCuddle around the bed



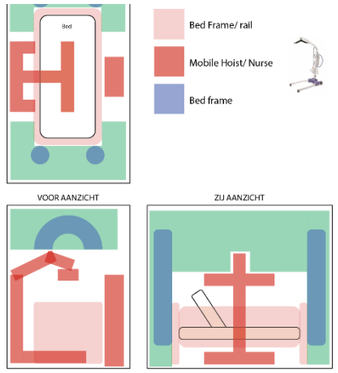
Free Zone

Figure 51 The schematic made clear what space is available for the structure of the new CloudCuddle



Space occupied by Junior Shape

Figure 52 An attempt to show where CloudCuddle Junior occupies space. This created conflict with 'no go' zones such as the possible bed frame of the hospital



Space occupied by Emma Knijn’s design

Figure 53 E. Knijn's design complied free zones for the bed tent

Appendix K: Prototype set up for Experience Test

Figure 54 A low, midhigh and high frame of PVC was made to test with particpants.

Figure 55 Dark and Light Fabric and Mesh could be fixated to the sides and on top.

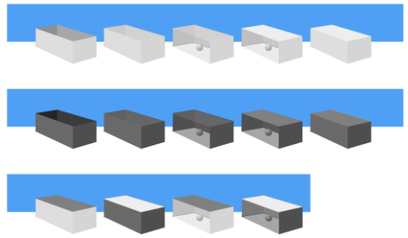


Figure 56 14 different fabric and mesh setups were tested for the best experience of safety.

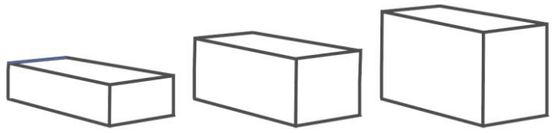


Figure 57 Different heights were tested to see what height would have created a comfortable space.

Appendix L: Experience Test Transcripts

Participant 1 G

OPBOUW: LAAG – GAAS

Hoe vind je dit?

Het doek ligt te dicht op mijn neus om me geborgen te voelen. Het voelt alsof je geen mogelijkheid hebt om op je zij te liggen.

Je hebt denk ik net iets meer bewegingsruimte nodig. Het idee van geborgen voelen is dat je je we bescherm voelt maar wel een soort van de ruimte hebt om je te kunnen bewegen. Net als vroeger een fort maakte.

Mag ik samenvatten dat je je opgesloten voelt?

Dat valt wel mee, ik heb meer het gevoel dat ik draai dat ik het kapot maak (mock-up product).

Ik voel me wel beperkt in vrijheid

Wit doek erover

Dit bied eigenlijk wel meer rust. Misschien omdat je minder zicht hebt, voel je je meer in je eigen cocoonetjes voelt. Wat ik wel nice vind.

En de afstand?

Die is nog steeds kut. *Dit (strekt arm uit)*zou fijner zijn

Zwarte doek

Nu ben ik een papagaai, ik moet slapen omdat er een donker doek over mn kooi wordt gelegd.

Nee dit is minder nice. Omdat het heel donker is. Dat geeft het gevoel dat je niet zo goed weet wat er buiten is, misschien. Bij die witte dacht ik daar minder bij overna terwijl ook net zo goed weinig zag.

Welke gaf meeste geborgenheid?

De witte

Ik kan me alleen voorstellen dat als je wilt slapen dat het gaas fijner is omdat je dan niet afgesloten bent van de buitenwereld.

Later wat small talk over prototype:

Ik ben wel verbaasd. Ik had verwacht dat het donkere chiller zou zijn om te slapen

Bed wordt verhoogd naar middelhoog met gaas

Hoe is dit?

Wel nicer denk ik. Meer ruimte. Dit is wel beter, maar niet nog hoger omdat het anders voelt alsof je in een normaal bed ligt, wat misschien ook wel nice is. Maar voor geborgenheid is het misschien wel fijn om semi dicht op je.

Wit laken op de persoon in

Uhhhh… ja. [Veel twijfel]. Erop en eraf. Nee het is toch wel meer geborgen. Het geeft toch meer een geborgen gevoel, denk ik.

Kan je een ander woord geven dan geborgenheid

Ja ik denk wel meer rust. Door het gaas heen is het lastig te focussen om de dingen die je heen. Misschien meer comfortabel dan geborgen.

In termen van veiligheid

Kan je uitleggen wat geborgenheid betekent

Voor mij is dat knussig denk ik. Als je het gevoel hebt dat het heel erg je eigen plekje is. Het is meer het gevoel dat het je eigen plekje als je niet de buitenwereld kan zien. Door het gaas heb ik het gevoel dat ik ergens niet bij kan. Met dit witte doek kan je makkelijker conformeren aan de ruimte waarin je zit.

Dan nu de donkere doek

Ja het is toch minder aangenaam, wel echt. Ik weet niet zo goed waaraan dat ligt.

Wat zie je voor verschil

Misschien dat je ruimte kleiner lijkt door de kleur, dat zou kunnen. En je had bij het andere doek dat je had dat je nog een beetje lampen erdoorheen zag. Als het licht wordt ‘s ochtends krijg je daar nog wat van mee. Ik vind het zelf niet fijn om in een compleet verduisterde kamer te liggen en toch wat meer te krijgen van de zon cyclus.

Waarom vind je het niet fijn om in een compleet verduisterde kamer te zijn?

Het neemt de perceptie van tijd weg. Als je weet dat je in een duistere ruimte zit kan je nergens op eiken waarop je weet hoe laat het is. Als het pikkedonker is kan je het verschil niet vertellen tussen middennacht en ochtend.

In termen van geborgenheid, welke opstelling zou je dan kiezen?

Geborgen wit

Nog hoger, tent vorm met gaas

Nu verander je te veel voor me gevoel. Nu heb je een soort tentje wat ook wel nice is, want je krijgt een tent gevoel en in een tent slapen is nice, maar dat is persoonlijk.

Net had je ergens een associatie bij?

Nee, en nu wel. Ja dit is een tentje dat is nice.

Wordt tent gemaakt met een lichte kleur

Ja dit is nice, dit is gewoon een tent. En dat is chill

Donkere kleur tent

Ja ook wel nice, maar minder dan wit. Omdat hetzelfde: gewoon zwart, te weinig invloeden van buiten die je hebt. Verduisterde ruimte, ik zou dat niet nice vinden.

Rond en lichte kleur

Heeft ook wel zijn charme. Ik denk wel dat het nicer is. Dat er iets van een vorm in zit. Een vierkante plaat boven je is gewoon minder aantrekkelijk denk ik.

Dit is toch wel minder dan een tent. De tent is toch fijner, maar dat is persoonlijk. Lijkt op een tent, en dat vind ik aangenaam

Zijkant open:

Doet niet veel met me, alsof je gewoon in bed ligt.

En als het dicht is?

Ja uhh. Ik denk dat ik het toch helemaal wit toch nicer zou vinden.

De hoogte is wel oké, maar ik zou het nice vinden om het aan te kunnen raken. Misschien is de hoogte ook wel goed.

Cirkel wit, hoog

Is we nice, maar is wel nice

Vergeleken

Het is te hoog. Qua gevoel zou ik hem lager willen. Om geborgenheid te geven moet je er misschien wel bij kunnen.

Participant 2 T

Laag - gaas

Hoe vind je dit qua geborgenheid?

Qua geborgenheid wel goed, ik ben een soort rups maar wel een beetje claustrofobisch.

Kan dat samen? Geborgenheid en claustrofobisch?

Geborgenheid is dat je bij je moeder ligt toch? In je baarmoeder is geborgen maar het is wel krap

Hoe goed kan je hierin slapen?

Ik slaap op mijn buik, dus dan boeit het me niet.

En de zijkant?

Dat is beter, het voelt beter, is iets verder weg

Kunnen we zeggen dat het je vrijheid beperkt

Het is niet dat ik fysiek beperkt word, maar het is meer een soort van mentale barrière voor mijn neus

Dat claustrofobische is dat comfrotabel of niet?

Nee

WIT LAKEN EROVERHEEN

Nu is het een doodskist, claustrofobie wordt alleen erger

ZWARTE LAKEN

Dit voelt alsof ik vroeger tenten bouwde in mijn kamer. Daar heb ik dit gevoel bij. Die herinnering brengt wel een zekere geborgenheid op

VERHOGEN VAN TENT

Middelhoog en gaas

Minder geborgen, maar wel fijner. Dat claustrofobische effect is er niet meer omdat er iets verder weg zit

Kan je beschrijven hoe dit aanvoelt?

Lastig. Hoe voelt dit aan? Het voelt alsof ik op vakantie ben in een malaria land.

Wat gebeurt er met de ruimte om je heen?

De hele ruimte. Het creëert een kamertje in de grote kamer.

Hoe is dit qua geborgenheid? (Licht laken wordt gebruikt)

Uh, de ruimte wordt wel iets geborgener. Je kan er toch een soort van doorheen kijken. Eerst was het een soort van kamertje maar wel een doorzichtig kamertje en nu is het een afgesloten ruimte. Het voelt nu of dit de ruimte is.

Denk je dat je het op een manier nog comfortabeler kan maken? Varieren in hoogte, kleur

Ik denk dat de eigenlijke hoogte, *dit*, doet tent iets omhoog. Voelt minder geborgen dan lager. Dat je het net kan aanraken maar niet dat het in je face komt

In termen van veiligheid, voel je je veilig?

Ja ik denk het.

Waarom?

Er kan niet zoveel gebeuren denk ik. Je ziet alels wat er gebeurd, alles is in handbereik.

Verander naar Zwart

Hoe is dit qua geborgenheid?

Eh ja.. het is denk ik wel iets geborgener. Ik denk wel dat in deze situatie lichter fijner vond omdat het lichter is. Het is fris en helder maar dat is omdat ik nu wil slapen. Als ik wil slapen zou ik donker willen. Werkt het beter.

Qua geborgenheid is het iets beter. Het verschil tussen gaas en witte is een stuk groter dan deze zwarte en witte.

Hoger is minder geborgen. Lager wordt vervelend.

Boogjes hoe is dit qua geborgenheid?

Minder. Ik denk als de zijkanten lager

Het verschil tussen dakje en platte?

Geeft me gevoel van kamperen met m'n ouders zeg maar. Dit geeft me wel een geborgen gevoel.

De zijkanten lijken meer in verhouding. Anders is het voor je, armlengte waar je bij kant en zijkant…

Witte is net iets minder geborgen dan de zwarte en qua hoogte zelfde verhaal.

En qua veiligheid verschil in zwart en wit?

Nee zit geen verschil in

Als ik zou preferen: zwart is logischer omdat ik donkerte wil als ik ga slapen.

Improvisatie: boven je hoofd en aan zijkant.

Alsof ik kampeer.

Het voelt een beetje als een hek ten opzichte van de ruimte.

Ik denk dat het ik chill vind om te kiezen om een zijkant open dicht te doen en bovenkant dicht (boven hoofd).

Bedstee achtig – boven het hoofd en dakje maar wel op zij kunnen kijken.

Participant 3 R

Laag – gaas

Ik voel me niet opgesloten maar wel een beetje dicht op me. Niet het idee dat ik bewegingsvrijheid heb

Zou je zo kunnen slapen?

Ja dat wel, maar zou schrikken als ik wakker word want is dichtbij.

Kan je iets vertellen over de ruimte waar je in ligt?

Ik lig nog wel in deze, de grote kamer omdat het lekker doorschijnend is. Dan heb je niet het idee dat je opgesloten bent, ik zie nog alles.

Qua veiligheid: voel je er veilig in?

Niet bijzonder

Geborgenheid?

Ja het is wel knus. Het is wel gezellig hihi

Laag – wit doek, wat vind je hiervan

Nog knusser.

Zou je zo lekker kunnen slapen??

JA, dit is nog knusser. Het moet niet tegen m'n hoofd zitten maar een fractie eraf

Hoe voelt dit?

Ja dit is lekker maar het is wel warm. Temperatuurstijging

Hoe voelt dit?

In een fijn coconnetje alsof je een rups bent

Kan je het verschil beschrijven?

Dit houdt ook licht tegen, waardoor je niet ziet waar in welke ruimte je bent. Dus je bent in dit kleine holletje in plaats dat je in de kamer ligt.

Kan je iets zeggen over geborgenheid?

Dit voelt heel veilig hierbinnen. Maar omdat je niet weet wat erbuiten gebeurt, voelt het ook een beetje… als je daarover na gaat denken is dat gek. Het is een beetje eng alsof je daarover na gaat denken. Want ik weet dat je daar bent, ik zie je een beetje maar niet goed genoeg om contact te leggen.

Hoe zou je liever willen slapen, zo, of met gaas?

Toch wel liever dit.

LAAG – DONKER, hoe is dit?

Minder fijn dan het lichte, omdat je nu echt, echt afgesloten bent van de kamer en je eigen holletje.

Leg je dat uit?

Je ziet hier niet zoveel, dus dan weet je ook niet of daarbuiten iemand is.

Ik zit nog wel in een tentje, maar minder geborgenheid gevoel dan een witte doek. Ik denk omdat ik minder van de omgeving zie.

Voorkeur voor slapen?

Praktisch dat gaas, voor zuurstof

Voor gevoel is de witte doek fijn, knus. De donkere totaal niet

Tussendoor:

Het doet me denken aan een box als kind: dat is een deel van gaas maar stevig en geen overkapping. Er kan altijd iemand in kijken, je kan er niet uit, maar je ziet wel alles en je hebt nog lucht dat is erg fijn. Je hebt geen dak, wel bewegingsvrijheid, maar je zilt wel in een veilige omgeving.

MIDDELHOOG – GAAS

Hoe is dit?

Lekker.

Wat is het verschil tussen laag gaas en hoog gaas

Uh. Meer bewegingsvrijheid en het gevoel ervan en... Nog wel een tentje

Als je gedwongen wordt tot 1 houding word je ook niet rustig. Als je het idee hebt dat je overal tegenaanstoot ligt niet zo lekker. Dus dat gevoel van vrijheid is wel lekker en ja... ik zie nog alles. Je weet nog dat je zintuigen werken,

Voor geborgenheid. Prefereer je dit of die andere?

Die lage. Dit is zo luchtig en doorschijnen dan wil je het ook wat dichterbij hebben, dan wil je het als een coconnetje dichtbij je hebben.

Dus je coconnetje is weg?

Nee, het is meer een open lucht maar met een dak boven je hoofd

MIDDELHOOG – LICHT DOEK

Haha, dit is echt een tent. Veilig omdat je een dak boven je hoofd hebt. Een beetje je eigen huisje bouwen. Nou dat je het gevoel hebt dat je kamer te groot was en dat dit beter bij je lichaam past. Dat dit alleen je eigen aura vangt en niet meer. Dus je hebt alleen met je jezelf, maar je hebt wel de vrijheid om je hele zelf in te stoppen. Dat voelt lekker. Ja.. genoeg ruimte, dat lage was veel minder bewegingsvrijheid hier heb je ook meer.. geestelijke ruimte om een beetje te keren.

Net had het over knusheid met dat lage gaas. Kan je dit verschil uitleggen met middelhoog licht doek

Dit is knusser. Omdat je meer afgesloten bent. En dat gaas wordt je ruimte niet per se kleiner, maar was het meer een fijne deken die over je heen ligt. Meer mentaal dan fysiek.

En dit is echt een… je maakt je ruimte een stuk kleiner. Je sluit je af van de buitenwereld maar je hebt nog wel ruimte voor jezelf.

Voelt dit gevaarlijk aan? Opgesloten?

Nee absoluut niet. Minder dan het lage met deze stof. Ik zie je nog steeds dat is fijn. Ik hoor je niet alleen, maar ik zie je ook dus dan. Als je ene zintuig het dan niet doet, heb je nog bevestiging van de ander.

Qua geborgenheid?

Ja dit is fijn. Dit voelt wel geborgen

MIDDELHOOG – DONKER

Is dit eigenlijk alsof je donker in de kamer ligt, maar dan met een witte doek? Het is nooit echt pikkendonker.

Hoe voelt dit?

Het lage was het een beetje benauwend maar dit niet. Nu je fysieke ademruimte hebt is dit niet meer vervelend

Verschil tussen dit en witte?

Dit is iets meer gedwongen rust omdat het donker is. Wit is neutral, daar kan je nog doorzien of het donker of licht is buiten. Het maakt je ook wel rustig. En het voelt eigenlijk net zo fijn/ veilig als de witte doek. Maar ik heb minder een tent gevoel, maar dat is

Dat tent gevoel telt bijna niet, dat is gewoon een jeugdsentiment. Maar desalniettemin als iemand dat heeft, dan voel je dat

Maar qua geborgen en veiligheid. Kan je dit uitleggen in deze termen?

Bij dat lage had ik minder veilig gevoel omdat je er niet doorheen kan kijken. Ik zie jou nog steeds. Dat geeft heel veel meer veiligheid denk ik. Maar het is nog steeds een knus tentje

Kan je verschil uitleggen tussen dit en witte?

Ja dit is veel meer donker. Minder nuance tussen lucht en donker waardoor je minder besef hebt wat er om je heen gebeurt.

Waar lig je in, wat voor ruimte lig je nu?

Een beetje een kartonnen doos. Alsof je verscheept gaat worden ergens naartoe. Dat andere witte had je nog een soort ‘en hierbuiten is de buitenwereld en daar kan ik nog wat mee, daar doe ik nog aan mee’

Die kartonnen doos, kan je daar een waardeoordeel aan vast plakken. Is dat een veilige doos?

Nee, dat is wel echt afgesloten van de buitenwereld. Van: ik moet hierin slapen want nu is het donker. Nu gaan we slapen. Iets meer gedwongen dan het witte doek.

Wat vind je van de afstand?

Ja fijn.

Verschil tussen laag en hoog.

Ik kan met mn arm strekken en been bewegen. Als je dan rusteloos bent kan je nog een beetje je energie kwijt en je eigen bewegiubg.

DAKJE – TENT en zwart

Nee dat vorige was fijner. Je kan dan nog je eigen wanden aanraken. Je kan je wel strekken maar je kan er wel overal bij. Nu wordt het een soort ongrijpbaar ‘waarom is dit hier’.

Maar je hebt wel meer vrijheid

Ja. Maar ook minder geborgenheid. Dat neemt wel af naarmate de grote van de ruimte waar je in ligt. Ik kan mijn armen strekken. Dat is precies goed

DAKJE – Tent en licht

Hier kan ik in slaap vallen. Dat is toch lekker? Nee dan is mijn tent weg.. mn huisje is weg.

Dit is wel meer een tent vorm

Maar het is te groot voor mijn eigen aura. Mijn tent was plat. Qua geborgenheid is dit minder omdat het nét te groot is. Kan er net niet bij

En je vrijheid?

Groter, maar boven een bepaald punt van vrijheid maakt het niet meer uit. Heb wel beenstrek vrijheid maar dat boeit niet zoveel maar dat maakt niet uit, gaat meer om mijn arm denk ik.

Hoe vind je dit verschillen met de hele lage versie

Ja nee.. Hier heb je het idee dat je kan ademen. Maar qua sfeer dat liever dat hele lage dan het hele hoge. Met ademruimte bedoel ik: dat je een beetje claustrofobisch wordt.

Qua sfeer zou je dus het lage willen doen ok al weet dat is het wat claustrofobisch is

Als je jezelf gerust kan stellen dat je wel gewoon normaal kan ademen, want dat kan, dan zou ik dat lage willen hebben. Want dit hoge is niet knus

En de middelhoge?

Ja dit is goed. Deze middenweg het is knus, je kan ademen, je kan bewegen.. je kan.. de knusheid van het lage en de adem en bewegingsruimte van het middelhoge

Dat hoeft dus niet hoger?

Nee

DAK – ZWART, hoe is dit?

Dit fijner dan middelhoog zwarte. Dan is dat donkere minder verstikkend. Dit donkere is gewoon niet zo fijn. Het besef van de buitenwereld is weg. Je ziet niks, je hebt geen tijd oriëntatie. Sommige mensen vinden het fijn in het pikdonker te slapen

Qua veiligheid?

Die kleur bepaald de veiligheid. Vergeleken met witte is het nog steeds minder veiliger dan het witte.

Van alle opties die hebt meegekregen. Wat zou j het meest comfortabel/ veilig. Wat zou je voorkeur hebben om in te slapen

Middelhoog wit.

Waarom?

Omdat je je armen kan strekken zodat je kan voelen waar de randen van je tentje zitten zodat je weet hoeveel ruimte je hebt, maar je kan wel ademen en bewegen. En je zit niet opgesloten maar wel naarmate afgeslote dat je meekrijgt wat daarbuiten gebeurt dat je het ziet en horen. Vooral het zien. En je ziet dus nog over het licht of donker is, of dat iemand de lampen aan doet. Dus dat zintuig is niet volledig afgesloten maar wel heel veel minder prikkels dus het is wel rustig. En lekker je eigen coconnetje.

Participant 4 A

DONKER GAAS omheen Donker Dak
Wat is je eerste indruk/ gevoel?
A: Ik ben blij dat ik in bed lig en ik vind het nu vooral gek dat ik door een raster met je moet praten

Waarom
Ondanks dat het open is, is het toch best wel dicht

Is dat fijn?
Joah, eigenlijk..

We kunnen het ook even weghalen
Ik vind het eigenlijk wel een soort van, meer voelen alsof je.. gewoon.. meer echt in bed ligt in plaats van op een plek waar je dan hoort te slapen

Hoe kant dat?
omdat je hier een soort van aflsuiting hebt

En wat voor verschil qua gevoel geeft je dat? In bed/ op.
Omdat ik het idee dat iker nu minder snel uitkan denk ik dat ik minder snel zomaar denk: oké ik ga er weer even uit maar ik heb vannacht ook slecht geslapen dus lig hier nu prettiger dan vannacht

Voel je je veilig in dit tentje?
Ja

Waarom?
Het voelt ook echt als een tent. Het is een kleiner coconnetje om je heen, alsof je meer geborgenheid hebt. Normaal als je zo op bed ligt zonder deken, als het nacht is

Zou het veranderen als je onder deken ligt? → proberen.
Verandert dat iets?
Nee veranderd niet veel. Veranderd meer als het er niet was

Donker Dak erop laten, de zijkant eraf
Nu is het een soort raar dak
Ik ervaar minder invloed van het dak, dan van de zijkant.
Je staart toch altijd naar een plafond, en nu is het plafond dichterbij.

EN als we de muren erop halen en het dak eraf?
Muren worden opgezet (donker) en dak eraf
Eigenlijk een kinderbox. Die je kan opvouwen en onder het bed schuiven. Met van die zachte randen die kan je dan als een soort harmonica in elkaar duwen.

Hoe is dit?
Ik denk dat ik de combinatie het nicest vind, maar alleen het dak vind ik minder fijn dan dit alleen.
Een dakje erbij was wel prettig

Hoe voelt dit dan zonder dak?
Ik heb niet echt een drukke kamer, maar er staat veel en dat filtert nu een beetje. Niet overal verschillende kleuren maar er staan veel dingen. Het is wel prettig dat ik kan zien wat er gebeurd.
Wel een rustgevend bakje.

maar de combinatie was het fijnst?

Dak wordt erop gezet

Gaan nu naar de lichte variant.
LICHTE MUREN EROP

Ik voel me echt zo'n kindje die in een box ligt en er niet uitmag. Bij die andere ook maar.. ik weet niet

Enkel de muurtje en lichte stof, hoe is dat?
Het is inderdaad wel wat lichter dus wel wat prettiger, maar ik vind het wel vervelender dat er geen gaatjes in zit en ik niet zie wat er gebeurt. Het is fijn als je kan zien wat er gebeurt.

Waarom vind je dat fijn?
Gewoon, een beetje controle vinden. Ik denk dat ik dat nachts ook wel kan hebben.
Ik zou bijvoorbeeld niet met mijn rug naar de deur liggen. Dat vind ik minder. Als ik in slaap val draai ik altijd wel naar de andere kant (van de deur af), maar als ik begin met slapen lig ik vind ik het wel fijn om met mijn gezicht naar de deur. Weet niet waarom, ik denk toch dat er een inbreker komt. Ik vind het wel fijn om te weten wat er aan de hand is. Die gaatjes erin geven wel wat rust in je beeld, filter je zicht, maar je kan wel zien als er wat geen beetje je ziet wat er nog gebeurt. Als je beweegt kan ik wel zien dat er iets gebeurt, maar zie bijvoorbeeld nu niet waar je staat.

Als je beweegt door dit lichte stof zie ik je wel alleen als je er beweegt maar weet niet wat er gebeurd.

De gaatjes vind je dus fijn om te zien wat er in de kamer gebeurt?
Ja

Zou je dat misschien kunnen vergelijken met als de kamer helemaal donker is
Mijn gordijnen zijn altijd super licht. Dus zodat ik kan zien wat er in de kamer gebeurt.
Als ik snachts wakker wordt en het is donker dan raak ik in paniek
Geur in katoen is ook fijner dan net (donker). Het is wat liever. Ik denk dat als je dit wast met iets lekkers

Voel je je hier veilig in?
Ja.

Kan je de veiligheid vergelijken met die van net? Met die gaatjes
Dit qua materiaal vind ik denk ik wel een veiliger gevoel geven dan het andere materiaal. Maar het niet hebben van overzicht vind ik minder.
Dus als je misschien katoen met gaatjes heb heb je misschien de best of both worlds

En dat komt door het spul zelf? Of de kleur?
Ik denk beide

Als we dit vervangen door licht gaas?
Dit vind ik wel het nicest. En het is prima dat het maar aan één kant is. JA dit vind ik het lekkerst (3 wanden licht stof, 1 kant gaas) Misschien nog een dakje erop?

Dak erop wordt erop gezet > **3 lichte wanden en licht dak + 1 kant gaas**
Hoe is dit?
OH DIT IS TOP!

Waarom?
Omdat het je coconetje is. Het is toch overzicht, dus nu orienteer ik me niet daarheen (boven) maar daarheen (zijkant). En ik ben ook een zijslaper

Dat dakje zou je niet voelen maar nu toch wel?
Ja dat voelde omdat je dan eerst een zwevend dakje hebt. Dat is gek.

Kan je omschrijven wat voor gevoel dit geeft.
Ik denk rust. Maar dit heeft ook te maken met de stof, de kleur ervan en de geur. En uuhmm.. ja ik denk vooral rust

Voel je je opgesloten in dit ding?
Nee

Heb je het idee dat je nog in je kamer ligt?
Ja, maar in een hoekje van de kamer. Alsof ik echt IN bed ligt ipv OP bed.

*En als we dit dakje erop hebben? (***Donker dak erop)**
Minder. Je verliest overzicht. Als ik je maar…

Lichte gaas nu verscheeld met dat donkere gaas? Want dat donkere gaas kon je ook doorheen kijken
Donker gaas ipv licht gaas aan de zijkant)
Dat lichte gaas ziet er wat liever uit dan zwart. Weet niet of dat heel veel verschil gaat uitmaken in donkere kamers.

Kunnen dan ook even bekijken: kamer wordt nog donkerder gemaakt
Wit gaas wordt ervoor gehouden, en donker gaas

Het wordt ook gelijk donkerder binnen met donker gaas. Ik vind dat is niet chill.
Als je dit (licht gaas) hebt maar iets minder doorzichtig. Als je een iets dunnere lichte stof hebt zodat je er een beetje doorheen kan kijken. Nu is het als er licht op schijnt dat je er doorheen kan kijken maar als dat niet zo is dan kan dat niet. Ik denk toch dat ik het lichte vind.

*Je zei dus: ik wil graag erdoorheen kunnen kijken. We gaan even kijken wat dit brengt. Helemaal dicht (***zwarte stof helemaal omheen, licht dak***).*
Kan je hier iets overzeggen?
Hmm.. ik voel me wel iets meer opgesloten. Ja het lijkt nu ook veel minder breed. Ik denk dat het meevalt omdat het dak nog licht is.

Ik kan hier nog wel een beetje doorheen kijken. Dus nu is het bijna helemaal zwart. Het laat nog best wel wat licht toe.

Als je dit vergelijkt met de vorige, hoe is dit dan?
Ik denk wel dat ik hier beter in kan slapen. Ik weet niet of ik hier het prettigst ga vinden maar slapen wel het prettigst werkt. 0 afleiding, het is een donkere omgeving. Het lichte dak laat nog wel… het is geen donkere doos zeg maar. En ik zie wel dat daar de lamp hangt, ik zie de kast, de poster maar wel met een donkere roes overheen

En qua veiligheid?
Ja ik voel me best wel veilig...

Ik denk dat dit het minst voor afleiding zorgt.

Je zei wel dat de muren wel dunner, heb je dan niet het idee dat je vrijheidbeperkt wordt
Het is dat ik door de stof heen kan kijken, dat ik het niet als heel benauwend ervaar

Hoe vind je dit vergeleken vergelijk je met het zwarte gaas?
Dat gaas is heel letterlijk dat je nog stukjes ziet maar daardoor krijg je ook een heel onrustig beeld en door die spikkeltje krijg je ook een gek beeld. Terwijl dit een donkere versie is van je kamer.

En als we de bovenkant ook donker maken? (dus **alles wordt zwart gemaakt)**
Nee dit is wel echt minder nice.. het komt nu wel een beetje op je af.

Waar heb je de hoogte eigenlijk op gebaseerd?
Op andere testen. Armlengte. Als dichtbij is dan wordt het v

Ik lag op portugal gingen we roadtrippen met camper vans
En ik had letterlijk tot hier ruimte (net boven je hoofd) het was echt facking naar. Ik moest daar ook heel erg aan wennen, het was niet fijn.

Je kon op je zij liggen, maar als ik dan wilde verliggen kwam je tegen het plafond aan.

Voorbij deze lengte heeft het ook geen zin, dan verlies je geborgen gevoel
Ja dat snap ik

*Hoe is dit (****alles zwart****)?*
Nee ik vind dit wel minder. Nu voelt het alsof ik.. in een doos lig gewoon. Terwijl dat lichte. Ik weet niet of het komt doordat het lichter is of ander materiaal. Dat je een gevoel hebt waar de bovenkant ligt. Nu kan je je minder goed oriënteren. Ik denk wel dat het goed is dat de bovenkant duidelijk de bovenkant is.

*En hoe is dit? (****alles omheen zwart****)*
Ik voel me een klein kind, alsof ik in een box.

Hoe voelt het om een kind te zijn
Nu er alleen muren zijn zonder dakje voel ik me misschien wel meer ingesloten dan dat ik wel een dakje heb.

Hoe kan dat?
Omdat het aanvoelt als een soort hekken.

Als je van al deze opstellingen een fijne plek zou willen om waar je rustig wordt, kalmeer en slaapt welke zou je dan kiezen?
Ik denk met dat lichte dak en zwart omheen. Omdat je door deze stof wel ziet wat er gebeurt maar minder afgeleid bent. Je wilt niet die perforatie maar een licht stof. Die perforatie is onrustig. Moet

Moet het dan donker zijn of licht.
Ik denk donker want dat brengt meer rust

Hoe verschilt dat met lichte?
Ik denk dat ik met katoen te maken heeft. Dat associeer ik ook met strand maar zwart zorgt voor minder afleiding. Ik denk ook dat het meer de textuur en de geur is dan de kleur.

Participant 5 T

Uitleg

Donker Gaas, geen dak

Hoe vind je?

Ik vind het wel chil, ik heb altijd in een hoogslapen geslapen dus ik had altijd minder ruimte. Plafond redelijke dichtbij. Beetje gewenning denk ik

Je slaapt nu in een laag bed, wat is het verschil?

Dat voelt wat volwassener maar ook meer ruimte om te ademen.

Heb je dat nu ook

Ja. Maar per seizoen zou dat ook verschillen. In de winter zou ik meer in een cocon willen zitten.

Waarom? Wat geeft dit cocon gevoel?

Dit voelt meer als een hutje dus wel gezellig. Tenminste vind ik. Ik snap dat mensen claustrofobisch worden maar ik heb dat niet. Ik heb nog wel het idee dat ik genoeg ruimte heb

Hoe veranderd de kamer?

Het bed staat nu een soort van afgezonderd. Normaal heb je nog wel een connectie met de rest van de ruimte maar nu valt dat weg, dus daar ben ik nu niet mee bezig. Mijn aandacht verkleind naar de ruimte waarin ik ben.

Wat speelt zich in die ruimte af?
Alleen ik

Test wordt opgezet met dak (Donker gaas omheen, licht gaas dak)
Hoe vernderd dit de zaak?
Ik lig nu op mijn rug dus kijk nu tegen het dak aan.

Je mag ook liggen zoals je
Er is minder licht inval dus nu donkerder. Ik snap wel dat mensen met claustrofobie problemen hebben maar ik niet. Ik vind het gezellig, doet me denken aan een tent

Hoe verschilt dit met de vorige opstelling?
Het voelt nu als een soort van afgemaakt. Net had ik het idee dat ik in een wieg lag.. zo'n baby box. Maar nu voelt dat meer als een holletje.

Kan je uitleggen wat dit geeft qua gevoel.
Ik zit in mijn hut, en jij zit daarbuiten.

Mag ik daarvan zeggen dat je daar veilig voelt of een ander woord?
Ja ik voel me best veilig maar ik denk ook: hoe kom ik hieruit?

Donker dak erop + donker gaas
Hoe is dit vergeleken met het witte dak?
Het is nu veel donkerder, dus de nachtmodus gaat aan. Ik merk dat ik begin te gapen

En qua veiligheid?

Hmm. Ik vind het lastig. Ik vind dat witte gaas ook wel fijn, dat voelde wat ruimtelijker en dit is nu een stuk kleiner, maar uhm. Persoonlijk slaap ik beter als het donker is.

De ruimte wordt kleiner, wordt het te klein of is dit wel goed zo?

Ik vind het wel prima zo

Kan je qua veiligheid dit vergelijken met de ander

Ik denk dat wit veiliger voelt. Maar ook zwart is dat wel na wat wennen.

Met die witte had ik het idee dat het ruimtelijk is maar alsnog een beetje dat wieg gevoel.

En het dak eraf?

Nee dat doet het niet voor mij. En als ik een dak mocht kiezen dan zou ik voor zwart gaan.

Witte zijkanten
Hoe vind je dit?
Irritant dat ik je niet kan zien.

En als je alleen bent?
Dan ben ik misschien wel zon neuroot die om zich heen wilt kijken

En de geborgenplek?
Ja uhm.. het voelt wel wat ruimtelijk maar niet perse veel fijner dan het gaas.

Waarom is dat?
Ja ik weet niet, dat zwarte gaf schaduw dus ik had toch wel meer het idee dat ik afgezonderd was. Terwijl dit meer een klinisch effect heeft net alsof ik in een afzonder ruimte ligt in het ziekenhuis en ziekenhuizen vind ik niet zo chill. Ik vind het niet zo chill, de vorige

Je zegt wel met dat zwarte dat je wat afgezonderd voelt

Het is misschien.. Doordat het minder licht in laat dat ik het idee heb: oke ik zit in een plekje en jij bent erbuiten maar ik kan je wel in de gaten houden waardoor ik jou beter kan zijn dan jij mij.

Wil je een persoon in de gaten houden of de omgeving?

Ja alles.. ik vind het wel fijn dat ik kan krijgen

Witte zijkant + Wit Dak

Nu heb ik het idee dat ik dood ben

Hoe kan dat?
Dat weet ik niet.. uhm.. het is heel veel wit om me heen. Het laat meer licht door dat is wel ergens toch wel fijn maar ik zou hier moeilijk in kunnen slapen denk ik. Die andere is donkerder daardoor begon ik al met gapen. En ik kon toch als ik op mijn zij ging liggen naar de kamer kijken en nu kan ik dat niet en dat vind ik niet niet per se chill.

Hoe geborgen voelt dit?
Minder geborgen

Witte zijkant + zwart dak

Dit is iets beschutter, maar er komt aan één kant nog wel licht

Ik blijf standvastig bij zwart gaas en zwart dak.

Dat donkere doet wel wat met geborgenheid

Ja ik denk dat dat claustrofobisch kan zijn,

Witte zijkant + Zwart Gaas dak

Dit beeld wordt heel onrustig, doordat het zo erg beweegt.

Witte zijkant + Wit gaas dak

Hoe is dit?

Minder intens maar ik voel me minder beschut. Beetje ledikantjes idee.

En veiligheid?

Veiliger dan een doek maar minder veilig dan zwart gaas

*En als we er een **alleen zwart dak** overheen leggen, hoe veranderd dat de zaak?*

Dit is wel chill, maar ik heb het idee dat dit minder stevig is. Het witte gaas lijkt minder aanwezig.

Zwart is best wel aanwezig. Het lijkt minder een hokje. Minder een plekje. Maar meer een… (weet het niet zo goed)

Kan je een gevoel omschrijven?

Er is iets boven je maar je hebt minder het idee dat er minder om je heen wat datgene omhooghoudt.

Zijkanten gaas, de rest wit

Het verschilt niet van die complete witte. Ik kan nu naar buiten kijken maar dit gaas is minder aanwezig dus dit haalt dat hokjes gevoel weg. Het is ruimtelijker dus de zwarte is wel chiller.

Ik zou het lastig vinden om hierin te slapen want er is zoveel licht. Als het donker is kan ik beter slapen.

Participant 6 M

Licht gaas aan een kant, hoofd, voeten, boven en rug is dicht

Ja op zich ligt dit fijn. Wat ik fijn is dat hierachter me dicht is en boven en dat beschermd. Ik weet dat daar niks is.

Aan de voorkant?

Ja dat vind ik iets minder. Dan heb ik het gevoel dat ik niet weg kan.

En de andere kant dan? Daar kan je ook niet weg

Ik zal me even omdraaien… dit voelt fijner. Dat kan ik niet uitleggen. Maar dat komt omdat het. Voor mijn gevoel is het duidelijk. ik heb voor me wat ruimte maar het is duidelijk dat het dicht is. En als ik me omdraai in vergelijking met deze dichte want dan weet ik, dan zie ik dat ik erdoorheen kan kijken. Het is een onduidelijke situatie voor mij. Is het nog dicht of is het nou open?

En boven je hoofd?

Dat vind ik wel fijn dat het open is, omdat het wel ruimte geeft. Het geeft niet het gevoel dat het opgesloten is.

Dichte, lichte stof wordt er opgelegd

Even kijken… als ik nu door de voorkant kijk, krijg het wel een duidelijker geheel. Het is afgesloten maar kan er wel doorheen kijken. Ik snap nu meer.. ik kan het nu plaatsen. Maar het geeft me wel een gevoel van opgesloten zijn. En meer een ‘ik hoor er niet meer bij’ ofzo.. even denken hoor. ‘ik hoor er niet meer bij’ is niet het goede woord maar meer ‘ik lig afgezonderd’. Als ik het zou moeten kwalificeren als ik naar de vorkant kijk waar ik doorheen kan kijken dan voelt dat fijne. Ik kijk nu door het gaas heen. Dat voelt wel fijn want ik denk ‘ik ben wel helemaal beschermd in de rug en boven me’. Dat komt omdat ik op mijn zij lig. Als ik me zou omdraaien, op mijn rug, dan voelt dat afgesloten. Want dan denk ik ‘oh, ik lig echt in een apart compartiment’. Alsof ik een doosje zou liggen

Gaas bovenop. Open zijkant. Hoofd, rug en voeten dicht met lichte stof.

Dit is wel fijner. Als je je zou kunnen voorstellen dat dit dicht is, dat is fijn. Boven is open, maar door dat gaas is het toch dicht. En als dit gaas ook aan de zijkant zou zitten dan is het voor mij een perfect geheel zijn. Want ik weet dat het afgesloten is maar ik voel me niet afgesloten omdat ik genoeg om me heen kan kijken.

En als ik me om zou draaien (gezicht naar dicht) omdat ik ruimte van 30 cm voelt het niet als afgesloten. Voor mij zou perfect zijn om hoofd en voeten en één kant dicht zijn en boven en één zijkant open

Alle kanten dicht en dak van gaas

Oh dat zou ook fijn zijn. ik voel me veilig maar bij de vorige voel ik me minder opgesloten. Dat vind ik nog steeds het fijnste.

Waarom?

Omdat ik als iko p zij lig kan ik naar buiten kijken zijkant en boven en nu omdat aleen de bovenkant open is, voel ik me op mijn zij ingesloten, op mijn rug vrijheid. Vorige opstelling vind ik fijner want dan kan ik kiezen tussen op mijn zij en rug waardoor ik het gevoel heb van veiligheid maar we weg kan kijken en als ik me omdraai en 30 cm ruimte heb voel ik me niet opgesloten

Dit is minder omdat als ik op mijn rug lig alleen vrijheid voel, maar op mijn zijkant voel ik meer beperking maar ik heb een makkelijke switch naar de bovenkant met mijn hoofd waardoor ik het gevoel van vrijheid ervaar

Dak haalt eraf

Je haalt het dak eraf en ik voel me meteen bedreigd, meteen onveilig. De neiging om een laken over me heen te trekken. Dat is heel grappig om te ervaren.

Donker dak erop

Doordat het donker is voel ik me meteen opgesloten. Ook door donker gaas. Donker maakt de ruimte klein, licht maakt de ruimte groter.

Met dit donkere dak vind ik het niet prettig. Ik heb niet meer het gevoel dat ik deel uitmaak van de kamer. Als je het hebt over in afzondering liggen.. dan heb ik dat nu weer: ik lig in afzondering. Maar tot mijn grote verbazing eigenlijk maakt het me niet zoveel uit als ik nou eh.. nee ik vind het toch iets afgesloten

Wat wilde je zeggen me

Het gevoel blijft wel een beetje hetzelfde. Nu heb ik meer het gevoel dat ik in een tent ligt. En misschien is dat ook nog wel prettig. Maar dat heeft te maken maar dat heeft te maken, ik heb niet meer zoveel last van prikkels van buiten.

En met dat lichte stof als dak?

Eeh, nee dan had ik niet het gevoel dat ik in een tent lag. Dat heb ik nu wel. En eigenlijk merk ik dat ik minder prikkels krijg. En dat is wel rustgevend. Een donker dakje met lichte muren. Dat vind ik wel lekker. Geen prikkels

Met dak eraf krijg je die prikkels wel?

Ja. Dan heeft de zijkant geen zin meer.

Met het gaas boven en aan de zijkant heb ik het gevoel dat ik meer in de slaapkamer lig. Eigenlijk zou je dit in de woonkamer kunnen zitten om even tot rust te komen.

Dat is het verschil met nu. Nu voel ik nu krijg ik minder prikkels. En ervoor: ik voel me veilig.

En die minder pirkkels zijn fijn?

Als hoogegevoelig persoon is dat we fijn. Even geen prikkels

Wat was tot nu toe de meeste favoriete opstelling

1. Als het gaat om veiligheid gaas aan de zijkant en bovenkant
2. Als het gaat om minder prikkels, de lichte wanden en het donkere dak

Donkere wandjes

Nee ik vind dit niet fijner. Dit is niet fijn. Het neemt alles weg

Donkere 3 wanden, open dak en gaas aan de voorkant

Ja.. nee dit vind ik niet fijn omdat ik het niet kan plaatsen. Onder boven achter is helemaal donker en voor is het gaas wat lijkt alsof het niks is.. maar er zit wel wat. Ik snap het niet. Deze constructie snap ik niet, het geeft geen veiligheid, het dak is open, dat wel. Het weerhoudt geen prikkels en doet eigelijk helemaal niks en omdat het contrast tussen donker en gaas groot is snapt mijn lichaam niet zo goed wat ik hiermee moet. Het is net alsof.. het past niet bij elkaar. Ik probeer altijd een vergelijking te maken, het is alsof je een dikke winterbroek aantrekt met een bikinitopje.

Donkere wandjes aan alle zijdes, open dak

Haha dit voelt als een commode als kind.

Hoe voelt dat

Als je therapie zou moeten geven waarbij je gebroote of baby tijd zou moeten ervaring dan is dit het effect wat je zou moeten zijn. de neiging om je benen in te trekken. Dit geeft een heel baby effect.

Kan je daar een waardeoordeel aan geven

Als er een probleem is waarvan de oorsporong is de baby tijd is dit perfect als rollenspel. Maar als volwassene die gezond is tussen de oren is dit wat komisch.

En qua gevoel?

Ik zou dit een beetje zinloos vinden qua gevoel.. ja.. hoe moet ik dat zeggen. Doelloos. Wat is hier het doel van? Zo van: naja dit grappig en komisch. Maar het voelt alsof het iets is voor trauma verwerken. Kijk! Zie je wat mijn voeten doen? Ze krullen zich automatisch als baby'tje.

Wat grappig om te ervaren dat omgeving, de bed opbouw zoveel doen.

Donkere wandjes aan alle zijdes, gaas dak

Hoe is dit met gaas erover?

Dan wordt het weer wat functioneler. Het hele baby gevoel verwdijnt en het geeft wel weer een veilig effect. Dit is wel weer oké. Maar ik blijf een claustrofobisch gevoel hebben.

Wanneer had je voor het eerst dat claustrofobische gevoel? Want dit is voor het eerst dat je zegt dat je een claustrofobisch effect blijft hebben.

Nou als ik mij, kijk, wat ik net heb gedaan is naar boven kijken en de wanden op me af laten komen waardoor ik het baby gevoel had en toen net ging ik op mijn zij liggen. En dacht oh ja, nu kijk ik echt naar de wanden en dan dacht ik 'oh ja nu komen de wanden op me af;' het is donker het is klein en dan voel ik me opgesloten. En als ik dan op mijn rug ga liggen en ik zie vanuit mijn ooghoeken die wanden en wel het gaas boven mij als plafonnetje dan krijg ik wel het gevoel van ohja ik ben wel beschermd mar het is niet in alle positifes dat ik dat voel. Dus als ik echt op mijn zij ga liggen denk ik ohnee ik lig echt in een doos als ik op mijn rug ga liggen dan kan ik wegkijken en dan worden die wanden, voelt wel een beetje beschermd.'

Eigenlijk heeft dus ook wel erg te maken of je een zij of rug slaper bent.

Wit stof dak met donkere wandjes

Nou dit is ook niet fijn. Dit is echt een tent en ehh. Het geeft geen veilig gevoel en geen prikkeloosheid maar gewoon 'ik lig in een tent'. Gewoon een feit, een gegeven.

Je kampeerde vroeger, geef dit dan nostalgische gevoel?

Nee. Zelfs nog minder dan in een tent liggen. Omdat je buiten geluid mist, wind wapperen enzo. Nee, dit heeft totaal geen.. nee. Zelfs een naar idee. Nou, gewoon op één of andere manier wekt dit mijn irritant. Beetje gevoel van weg, weg met dat spul. Het doet helemaal niks. Ik hoor niet bij mijn kamer, ik hoor niet in een tent want ik mis buitengeluiden en het klappen van de tent. Het levert geen veilig gevoel. Het levert geen rust van vanwege de prikkels die niet.. dus het doet helemaal niks en het irriteert me ook. wat grappig is dat ik het in mijn rug voel. ik krijg hier rusteloze benen van. Ik wil weg.

Dit was het einde. wat vond je het fijnste qua slapen.

Voor slapen wil ik het veilige gevoel en de opstelling die daarbij hoor (zie opstelling voorkeuze). Wat grappig dat dit zo veel doet.

Participant 7 P

Uitleg.

Lichte wandjes omheen, met gaas aan één kant

Hoe voelt dit?

Alsof ik in een ledikantje lig. Een baby bedje.

Hoe voelt dat?

Dat is wel beschermend. In die zin.. veilig. Kan ik lekker rustig slapen

Is dat anders dan je normaal ligt, helemaal open

Ja als het open is… ja ik weet niet. Als het open zou zijn dan.. ja.. alsof er iets binnen kan komen

en als het dicht is

dan niet.

*Wat is het verschil tussen dit (gaas) en dit (***licht doek als dak***)*

Dan wordt het nog veiliger. Dan zit je in een tentje.

Dus dit is beschermender?

Ja hier kan je niet doorheen kijken dus dan denk ik van nou, lekker in mijn tentje. Net als kamperen als je dan weer of wind hebt dan ben je beschermd dan je niet nat wordt of koud dat je geen last hebt van de wind

En hoe vind je het dan boven je, want nu is daar niks

Dan zou ik dat nog meer hebben. Alhoewel je in een tent ben je buiten weet je en als je dat hier doet zou ik dat misschien wel benauwend vinden omdat er al een dak boven mijn hoofd zit.

Gaas over het dak

Ja dan krijg ik het benauwende een beetje. Van doe maar open, dan krijg ik meer lucht. Dit is minder

Zijkant open doen

Ohja, dat is wel prettig. Dan heb ik het idee dat ik onder een muggennetje lig

En als er gaas aan de zijkant was

Ja dan was het nog wel fijn

Wat vind je het fijnst

Zonder het gaas erboven en dan de rest dicht. Ik ga me geheid een keer omdraaien, dan zit ik nog wel in een tentje maar heb voldoende lucht. Zodat ik figuurlijk lucht krijg.

En dat je boven gaas hebt en één kant open is minder fijn dan alle kanten dicht en het dak open?

Ja. Zo voelt dat wel.

Alles dicht met lichte stof

Hoe is dit dan?

Nee. Nee dit is helemaal dicht van boven. Alsof ik in een kartonnen doos onder de brug leef.

Oh maar net zei je (over gaas erop) dat je nog wel het idee hebt in een tent te liggen terwijl dit meer een tent is

Ik denk dat als ik echt zo in een tent lig, met wind en water ben je beschermd maar ik zit hier in een huis en dan is het meer benauwend dan.. nee. Geef me maar een beetje lucht

Overal lichte stof heb je dus het idee dat je in een kartonnen doos ligt onder de brug?

Ja

Helemaal donkere stof

Och jee.. nee dit is niet prettig. Nu krijg ik het helemaal benauwd. Nee dit is niks. Het komt helemaal op je af. Het mag best buiten donker zijn maar als het donker wordt gemaakt dan zit je net in een cel.

Alsof je in een kistje ligt.. nou, zover is het nog niet he.

Alle kanten donker, één kant gaas en dak open

Ja dit is ook wel lekker. Dan heb je iets mar naar buiten te kijken, en tja.. als het maar boven open is.

Wat is prima? Is dat fijn?

Ja dan kan ik lekker slapen.

Voelt dat veilig, of geeft dat beschutting?

Ja net als wat ik in de eerste woorden had, van die veiligheid en die bescherming. Dat is met die bescherming al helemaal maar je moet niet helemaal zwart maken dan heb ik het gevoel dat in een hokje gestopt wordt. Die kant open is toch prima. Dus als je zoiets tegen de muur aan zet krijg je hetzelfde effect zo'n beeetje

Maar nu is het niet erg dat het zwart is

Gaas boven, andere kant open rest zwart

Eehmm.. dit is wel iets lekkerder. Nu heb je nog een beetje bescherming van boven en heb je aan de zijkant nog van: ik kan eruit.

Het moet niet dicht boven. Het moet of open of gaas. Gaas geeft bescherming maar het moet zeker niet dicht.

Ook als er licht stof is

Nee dan heb ik dat idee minder.

Dichte stof boven, 1 kant open rest donkere stof

Nee dat is meteen niks.

Alle kanten dicht met zwart en boven open

Nee. Ooh nee. Nee. Alsof ik in mijn kistje lig. Beetje weggestopt.

Zijkant open, 3 kanten zwart dicht

Nee. Dan voel ik me alsnog een beetje weggestopt. Heel dwingend is dit: nu moet je slapen! Ik heb het idee dat ik er niet uit kan.

Alles dicht doen

Ga je alles dicht doen? Nou dat weet ik al, dat zou ik helemaal niks vinden. Dit is helemaal niks, man man. Nu lig ik helemaal in mijn kist. Benauwd. Dit is zo benauwend. Figuurlijk en letterlijk geen lucht krijg. Helemaal buitengesloten wordt van alles en iedereen. Opgesloten.

En als we een kant open doen?

Dan vind ik het met get gaas prettiger. Gaas boven en zijkant open

3 kanten zwart boven kant dicht, 1 gaas zijkant

Ja dat gaat nog wel. Je kan dingen zien. Je ziet als er iemand langs komnt. Je hoort er nog wel bij, bij de buitenwacht

Wat was je favoriet

Witte doek helemaal rondom, en gaas boven.. en ook aan één kant gaas. Één ding is heel zeker: bovenkant open of gaas.

Appendix M: Evaluation of Experience Design Tests

LOW DESIGN

	MESH	LIGHT FABRIC	DARK FABRIC
Participant 1	Tent is too close to feel safe, no freedom in movement	This offers more peace. Maybe because you don't see that much.	This is too dark; you don't know what's outside. Same goes for the light fabric (seeing outside) but that didn't bother me
	No feeling of imprisonment but does feel restricted in freedom	Feels like being in your own cocoon, nice.	
		Distance is still uncomfortable	
Participant 2	Feels safe, but a little bit claustrophobic. There is a mental obstruction	Feels like a coffin.	The memory of making tent of bedsheets give me a certain experience of safety
Participant 3	Don't feel imprisoned but don't feel like I have freedom of movement	Even more cozy, but no breathing room	Is less comfortable because you don't connect with the room outside or this room
	I would be scared when waking up because it's so close.	Like you are in a cocoon of a caterpillar	
	Its's kind of cozy		

HIGH DESIGN

	MESH	LIGHT FABRIC	DARK FABRIC
Participant 1	Distance is nice. Don't need to be higher.	At first, participant is not sure whether this offers more security compared to the MESH	Truly less comfortable.
	Makes me feel like I can't reach places.	The light fabric makes it easier to conform to the room you're in	Maybe because of color, but you see less from the environment, for example morning sunlight
		Offers more peace	
Participant 2	Less safe, but more comfortable	Feels safer.	Darkness is safer at this distance

		Can look semi-through fabric, which makes it a smaller space	Darkness makes more sense: I want darkness when going to sleep.
		Arm length is good. Makes me feel safe to be able to touch it	
Participant 3	This is nice. More freedom of movement	This fits with your body. It feels nice. Enough space to move around	Feels like you're in a dark room
	Because you can see, you know your senses still work.	Closed off from the environment (but still can see something) but room for your self	Not unpleasant but feels somewhat forced.
		Feels secure. Feels like there is an outside world and I am still part of it.	There is less difference between light and dark which reduces everything around you
			Space is a cardboard box. I feel closed off from the outside world

TENT ROOF DESIGN

	MESH	LIGHT FABRIC	DARK FABRIC
Participant 1	Feels like to much space	Really likes the tent fabric	Seems ok, but less than Light Fabric (see HIGH – DARK FABRIC)
Participant 2		Reminds me of a tent!	
Participant 3	Doesn't feel comfortable, I can't touch the walls.	It's just a little too big. I got more freedom but I don't need it.	Tiss is more comfortable compared to dark fabric en high ceilig. But the darkness isn't comfortable

CONCLUSION

There are two parameters

Height of ceiling

1. under arm length, → feels secure but also gives the people claustrophobic feeling, and the idea they can't move
2. at arm's length and → gives freedom without losing sense of security
3. above arm's length → past arm's length the space is too big and a sense of security has gone away

Transparency

1. See through → makes people they are aware in a smaller space in a big space. But also makes it clear there is a barrier between them and the outside world.
2. Semi see through → makes them feel they have their own space, but still are part of the world outside of it.
3. Not see through→ makes it dark, and creates an undefined space. They don't experience a personal space anymore.

Shape of the roof:

Shape of the roof can elicit nostalgic feelings like camping. Regarding dementia and visibility this also also creates a difference in color, which make perception easier and depth.

Noteworthy Quotes of Patricipants combination of position of Mesh/ Fabric/ Light/ Dark

P4 (zijslaper) Quotes

"Het is inderdaad wel wat lichter dus wel wat prettiger, maar ik vind het wel vervelender dat er geen gaatjes in zit en ik niet zie wat er gebeurt. **Het is fijn als je kan zien wat er gebeurt**."

"Als ik snachts wakker wordt en het is donker dan raak ik in paniek"

"Dus als je misschien katoen (materiaal en licht kleur) met gaatjes (overzicht) heb heb je misschien de best of both worlds"

Over 3 kanten licht stof en 1 kant licht gaas: "DIT IS TOP"

P4 wil kunnen zien wat er in de kamer gebeurt terwijl ze in een coconnetje ligt. In een donkere kamer is licht gaas hiervoor de beste optie in combinatie met lichte wanden. P4 had ook voorkeur voor textiel geur en materiaal keuze.

Donker omheining: "dit is een donkere doos. Prikkels worden minder"

Donker = meer rust, minder prikkels

Licht = meer veiligheid

P5

Witte zijkanten
Hoe vind je dit?
Irritant dat ik je niet kan zien.
"Ik blijf standvastig bij zwart gaas en zwart dak"

P5 wilt kunnen zien wat er gebeurd en heeft donkere plek nodig om te slapen. Donker kan wel wat claustrofobisch worden.

P6 zijslaper

“Doordat het donker (dak) is voel ik me meteen opgesloten. Ook door donker gaas. Donker maakt de ruimte klein, licht maakt de ruimte groter.”

1. Als het gaat om veiligheid gaas aan de zijkant en bovenkant
2. Als het gaat om minder prikkels, de lichte wanden en het donkere dak

Donker neemt alles weg. Contrast. Prikkels verminderd.

P7 buikslaper

“Witte doek helemaal rondom, en gaas boven.. en ook aan één kant gaas. Één ding is heel zeker: bovenkant open of gaas.”

Dicht Donker– opgesloten gevoel ‘in een doos”

Dicht Licht – Eigen coconnetje, veilig gevoel

Men wil nog wel kunnen zien wat er gebeurt en ruimte om te ademen krijgen.