Chalmers School of Architecture Department of Architecture & Civil Engineering
Year of graduation: 2026

Figure 1 Author made
Author holding a selfmade waiting ticket

Sustainable healthcare waiting room transformation
- How to design a therapeutic waiting room at healthcare facilities?

Master's Thesis 2026
Supervisor: Marie Larsson
Examiner: Cristiana Caira
Author: Keming Zhao

CHALMERS
UNIVERSITY OF TECHNOLOGY

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Figure 2 Author made
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Education

Chalmers University of Technology — Gothenberg, Sweden [08. 2023-06. 2026]
Master of Science in Architecture (MSc in Architecture)

Dalian University of Technology — Dalian, China [09. 2018-06. 2023]
Bachelor of Architecture
Architecture (five-year program)
GPA: 85.6/100, 3.56/4.00 Advanced GPA: 3.73/4.0

AA Summer School 2022: About A New Togetherness — London, UK [07. 2022]

Internship

Intern, Kraaijvanger Architects — Rotterdam, the Netherland [09. 2024-08. 2025]

"Keming approaches her work with precision, a strong eagerness to learn, and consistently met our expectations."
-- Chantal Vos, associate partner & interior architect

Intern, Tianjin Architecture Design Institute Co., Ltd. — Tianjin, China[08. 2022-10. 2022]

Responsible for background research, site analysis, analysis drawings, construction drawings, and renderings.

Abstract

keywords: Healthcare facility,
waiting room, therapeutic, intervention.

With high hygiene, safety, and functional requirements, public spaces in healthcare facilities often look impersonal and lack warmth. Calm, cold colors, and airport-like benches can be seen at almost any waiting room in healthcare facilities. Do those function-prioritized choices help people going through their journey there, which are often accompanied by some painful or other negative feelings? In addition, people visit hospitals with an uncertain state of mind. They might not be familiar with the process of the visit. Many questions appear, such as where is the check-in, what is the drop-in procedure?... There are many challenges in healthcare facility design, such as high hygienic standards, safety, and accessibility requirements. Though many demands come from the healthcare system, architects could still make an effort to improve the space quality in certain aspects, such as create easy way-finding. In this way, create a better visit experience.

In waiting rooms, the state of uncertainty is quite high for visitors. This study investigates the potential of waiting room design in healthcare facilities, proposing that these spaces serve not merely as transitional zones but as integral ingredients of the therapeutic environment. Through a literature review of the EBD 2020 report (Chalmers Centre for Healthcare Architecture [CVA], 2024), I summarized sensory and spatial intervention suggestions towards a therapeutic waiting room. In the study of several high-quality waiting rooms, some design strategies are found to be similar to my intervention suggestions. I applied the suggestion to transform the sampling waiting room at Sahlgrenska Hospital. To show the diverse uses of intervention suggestions, I used sensory and spatial intervention design strategies to create one minimal and one holistic intervention.

There are certainly many non-architectural opinions about the cost of such a gesture in public spaces in healthcare facilities, such as using the budget to provide more support for staff. But a little extra funding could make a great change and benefit patients, their companions, and the staff. This discussion will be nonstop. I sincerely hope my work could remind people that everyone in healthcare facilities, even the patients' companions, deserves care.

Contents

Purpose

The topic of the thesis starts from my original reason to study architecture and be an architect: to use design to make a better world. My experience participating in the healthcare design studios, along with a personal unforgettable memory in the waiting room, led to my intention to improve the public space in healthcare facilities.

The study aims to improve the waiting room environment in healthcare facilities via different extent of design interventions.

Research Questions

• What is the current situation in the waiting room at healthcare facilities?

• What does therapeutic mean in the healthcare facilities' public area context?

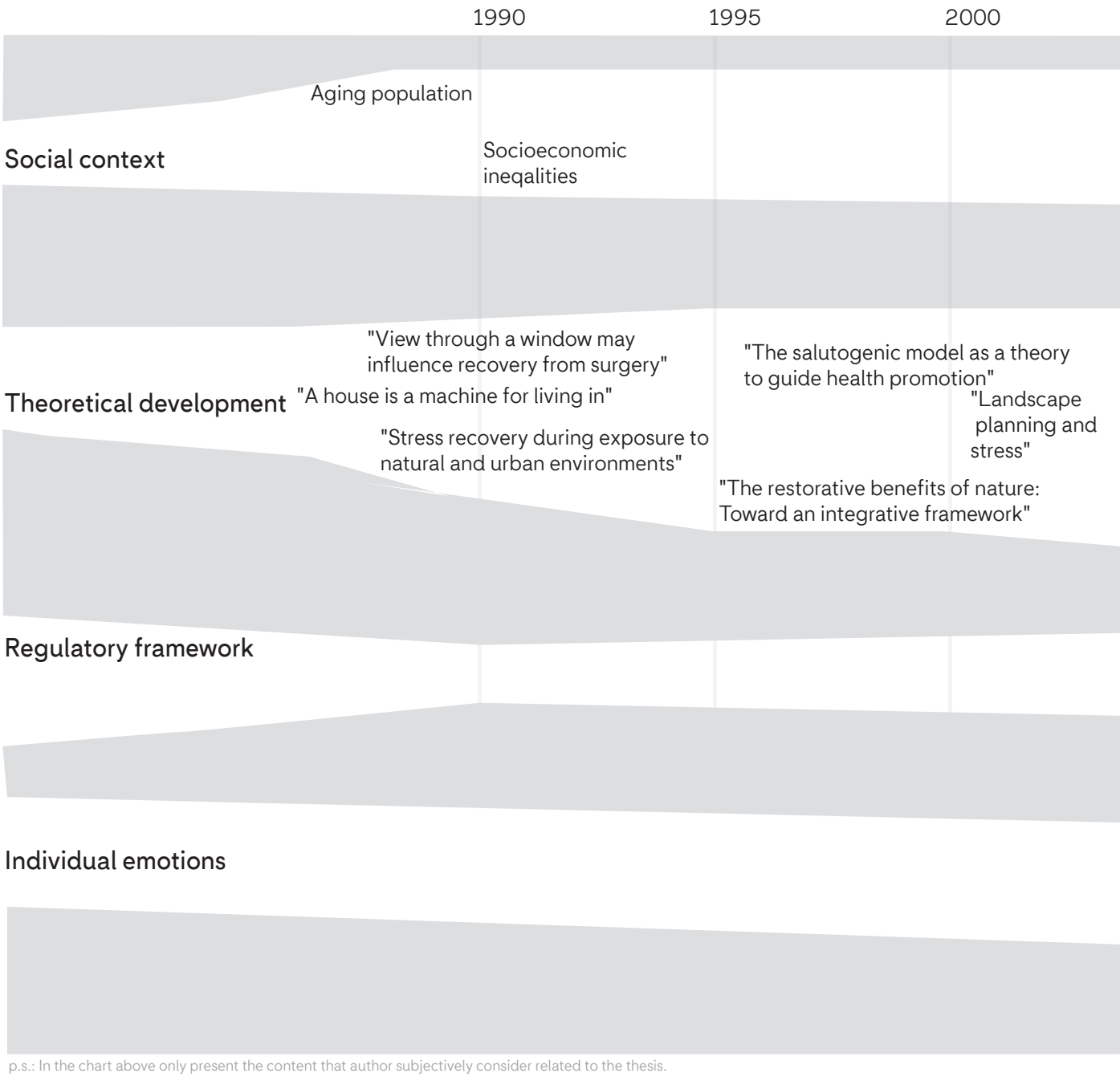
• What design strategies could architects apply to make an improvement?

• What is the benefit of having a therapeutic waiting room at healthcare facilities?

Theory

THEORY

Background



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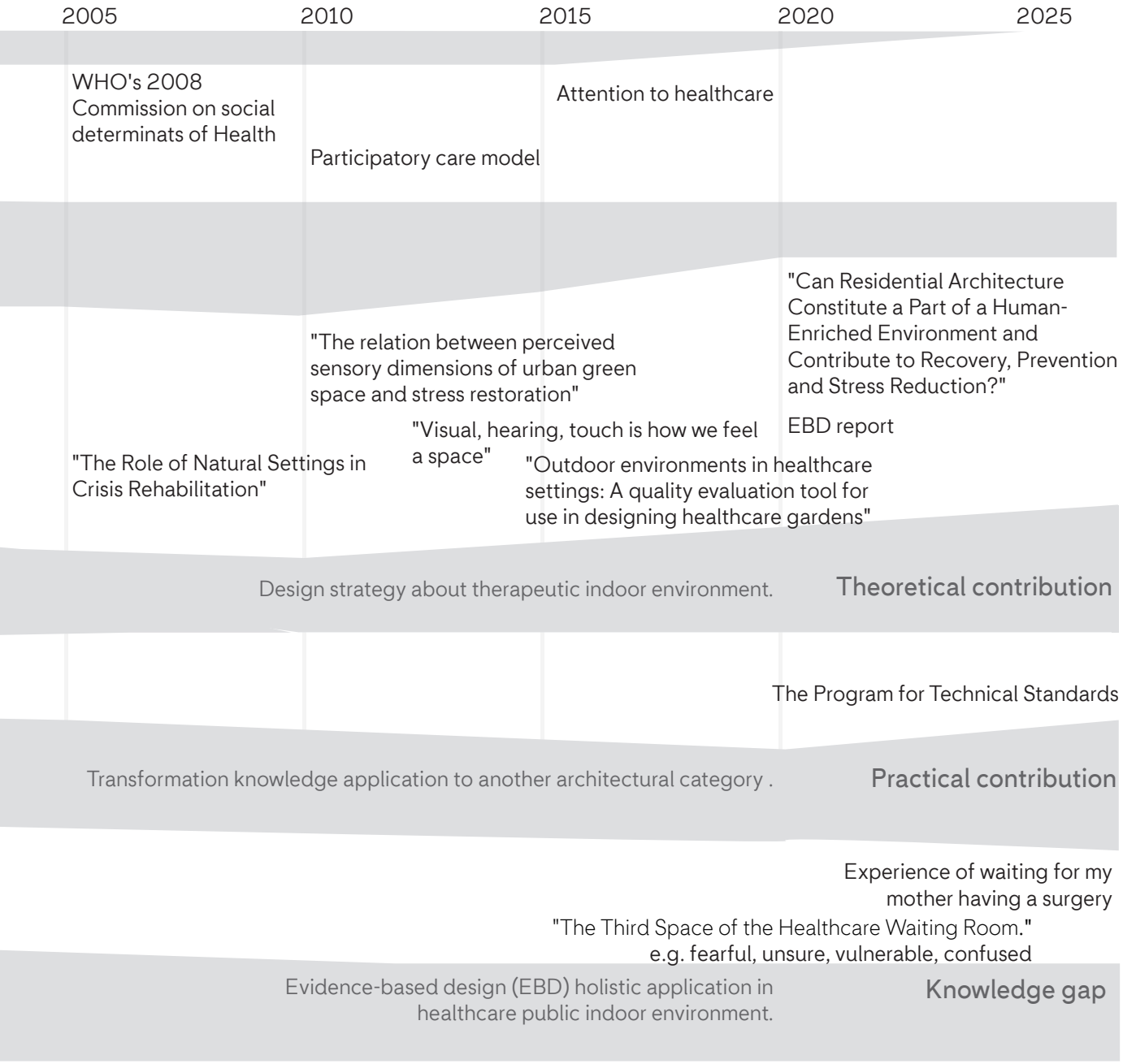

Figure 3 Author made
Background information

Background

Architectural Theory

Through the development of architectural theories, the idea of A house is a machine for living in (Le Corbusier, 1927) somehow gives the 'permission' to put the functional purpose of a building at a higher priority than the feelings space brings to its users. Looking at the theories about health-promoting environment, nature and outdoor environments are always included. I am wondering, since nowadays people spend so much time indoors, isn't it necessary to think about the indoor environment?

Architectural theories regarding the influence on human well-being started from the recovery from surgery, due to its relatively simpler quantity evaluation. It seems that nature is an inevitable element in this area. Then recovery from stress became the next hot topic about the effects nature brings. I wonder why we don't prevent the problem from existing rather than solve the problem. In other words, let people feel healthier when they enter the hospital in the first place, and start the journey in the hospital with a better beginning.

Visual, hearing, and touch are how we feel a space (Pallasmaa, 2012), and also how the interaction between human beings and architecture begins.
When diving into the massive amount of theories about health-promoting theories, it is proven that those three senses are also how we are cared for by the connection towards nature through architectural methods, bringing us.

It seems like it is unavoidable to visit hospitals, from giving birth to having a fever, breaking an arm, or even passing away. Whether you like it or not, there are thousands of reasons to go to a healthcare facility. Part of the journey, the waiting room is a classic transitional place that connects everything. And based on my personal experience and many stories being told, the waiting room is also the place where a lot of emotions are exploded and buried. Therefore, I think the waiting room at healthcare facilities is a perfect medium to explore the connection between indoor space design decision-making and the outcome it brings.

Regulatory Framework

The Program for Technical Standards (PTS) is both an IT system and a network for exchanging experiences regarding healthcare construction in Sweden (Program for Technical Standards, n.d.). PTS is an important tool to help achieve the goal that all healthcare buildings in Sweden must be built with the right function and quality (Program for Technical Standards, n.d.). When going through the concept program for different healthcare facilities, I summarized the following suggestions regarding the waiting room or waiting area (Program for Technical Standards, n.d.).

Functions:
Area for patients waiting for treatment and examination, for companions waiting for patients, for delays, for traffic, etc. All the components are there because of waiting.

Design Principles & Strategies:
The core of waiting room design decision-making is the balance of comfort and efficiency.
• Using digital systems or improving appointment management to reduce the waiting demand, which solves the problem from the start.
• The reception should be designed for staff to easily monitor the patients' status.

• Patients should be separated because of different waiting purposes. High-volume visits should be considered. A separate area and seating should be provided for children.
But all those are actually about efficiency, about perspective from the hospital, staff, and managers. I see there is a gap regarding the other users' perspective, which concerns the comfort needs of patients and their companions.

Pros & Cons about different sizes:
• Small waiting room
Pros: Customized, reduces mixed groups
Cons: Poor visibility, increased ventilation requirements.
• Large waiting room
Pros: Flexible, open views, easier for future reconstruction.
Cons: Fixed ventilation openings limit furniture placement, and transparent partitions have an impact on ventilation and views.

Special Requirements:
Children and adolescents' perspectives should be considered. Special categories of healthcare facilities, such as psychiatry(psykiatri), primary care (vårdcentral), and surgery and intensive care, have their own separate focus and priorities.

Hygiene Requirements:
Social distancing, support facilities, ventilation, and more detailed requirements about disease prevention.

Post-COVID Reaction:
Innovative typologies such as outdoor waiting rooms emerge after COVID-19.

(Program for Technical Standards, n.d.)

Those suggestions stressed the balance between comfort, safety, and efficiency, which are based on the staff and healthcare facilities management perspective. Even when viewed from a child's perspective, it is about how to help them understand the organizational principles of healthcare facilities. I wonder whether this misses the original purpose of healthcare facilities, which is to cure and to heal. Furthermore, Sweden is a society based on individual independence. It is common for Swedish visitors to healthcare facilities by themselves, under a fragile status. Would the environment be like a cold, efficient machine, good for their recovery? To avoid the second-time harm from the healthcare environment, it is necessary to also design the healthcare environment with care for humanity, to find a balance between different starting points.

Individual Emotions

When entering a new, unfamiliar space, how can you make yourself comfortable? Especially when you come to a hospital, you are in an uncertain state of mind. People usually don't know the exact time they will spend in the waiting room. Many negative feelings tend to grow in the waiting room for many reasons.

From the PHD thesis (Green, 2024), which contains loads of interviews regarding visitors' feelings about waiting rooms, I concluded the typical feelings that appeared when visiting a not thoughtfully designed hospital waiting room: indifferent, confused, agitated, fearful, vulnerable, and depressed. From the thesis, the

negative emotions were triggered by several design features that need improvement. In the interviews, many elements regarding staff or system management have an influence on the patients' feelings. Those elements could not be improved by architects, but should be brought up in healthcare area discussions. In order to design a waiting room that avoids irritating those negative emotions, I first consider what the opposite of those feelings is.

My purpose of letting the waiting room have a healing effect is to tend to make a person feel seen and cared for. The positive emotions in the diagram are also put in order, from less positive to more positive. All the emotions will be a guide for the health-promoting indoor environment design.

People spend a certain time in the waiting room due to the limit of healthcare capacity; the negative emotions appear more and more when the waiting time increases. Besides, I found out that many bad experiences with the waiting room do not come from the design, but from the events that happen. That makes me think maybe the solution is to make the waiting time shorter, objectively or subjectively.

Delimination

The reference projects and thesis site are all located in Gothenburg, aiming to lower the influence of policy and the healthcare system, and ensure depth of investigation and comparability.

The target user group of the thesis is patients and their companions, who are also the main users of the waiting room.

The diagram below shows the flow this thesis will investigate. Although the healthcare system is complex, this thesis focuses on a more general situation: self-check-in and staff picking up. The activities that happened in the waiting room will be stressed in the thesis compared to arriving and leaving the waiting room.

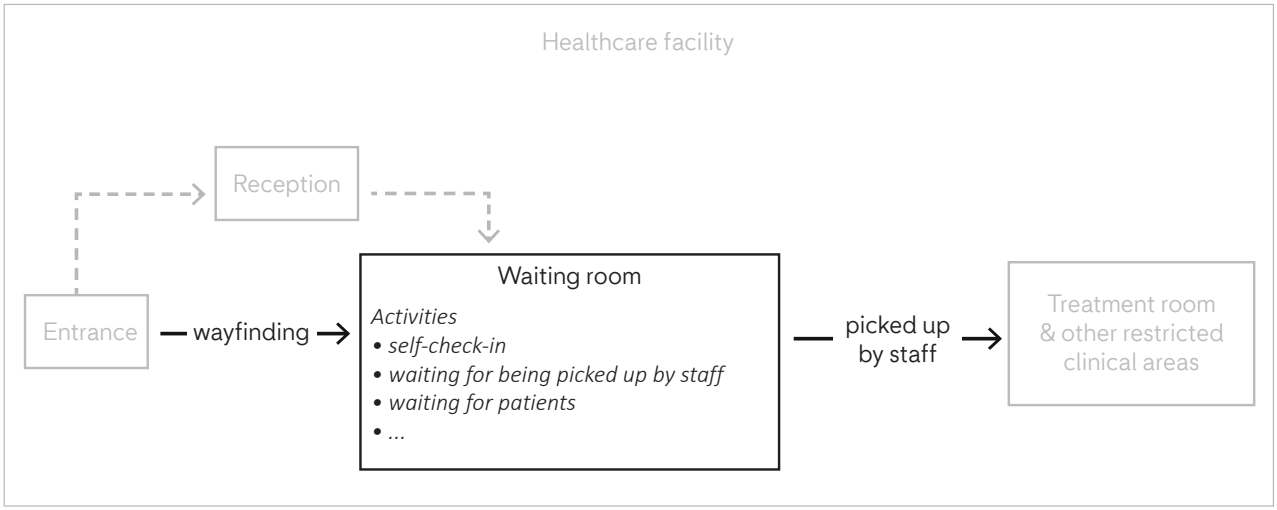

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Figure 4 Author made
Thesis research scope

Method

The methods of this thesis are chosen according to the study stage. In the preparation stage of the thesis. I used a literature study to explore the background of the project. The background contains several dimensions: the previous research in the healthcare area, the definition of a therapeutic waiting room, the policy that plays a guidance effect on design, the research about the common existing problems and demands, and the design elements that influence space users' mood.

After the research about the background is done, the next step is to look for the solution. In the field of healthcare theory, there are many conclusions about design decisions and their benefits. Thus, I still need to do a literature study to find the design decisions that are applicable to waiting room design. The case study based in Gothenburg will be helpful to find practical solutions about therapeutic waiting rooms and maybe the verification of the conclusions from the literature study.
The background information regarding the reason behind the design decision will also be collected.

In the design part, I will do two transformations of the same site in parallel. In realistic circumstances, there are usually many budget limits regarding a transformation project. However, as a thesis project, I also wish to explore the boundary of the limits. Thus, two separate designs in different intervention levels will be presented in the thesis.

In the conclusion and discussion part of the thesis, I will reflect on the design outcome and the theory application result. And hope this thesis could bring attention to similar public spaces.

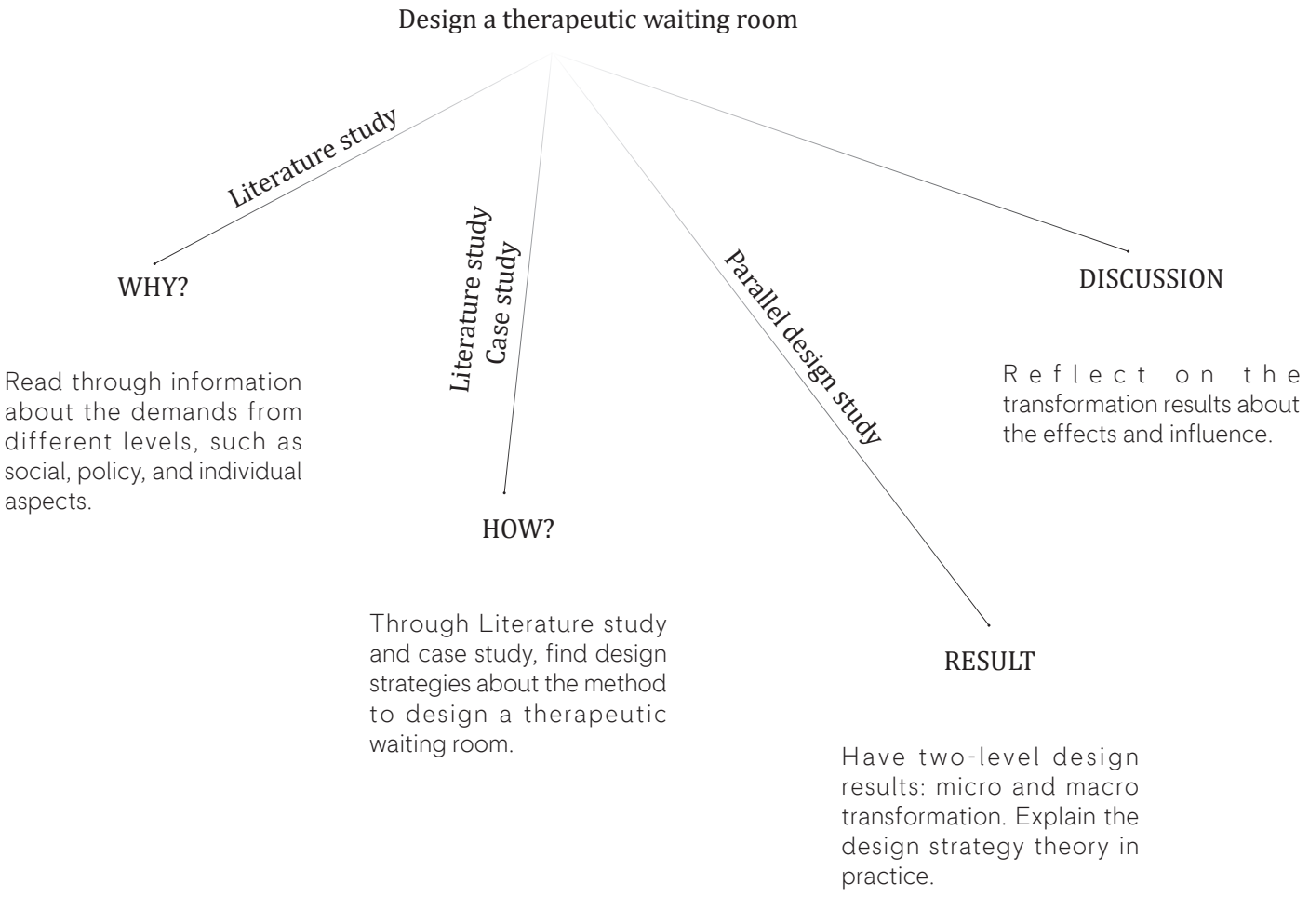


Figure 5 Author made
Thesis structure and method

Theroy

Therapeutic

From the Cambridge dictionary, one of the interpretations of the term "therapeutic" is "causing someone to feel happier and more relaxed, or to feel healthier" (Cambridge Dictionary, n.d.). This meaning explains the exact effect I pursue about the waiting room design outcome. Space could have a positive effect on people in it.

In the healthcare context, the primary purpose of architecture is to provide a place for curing or healing patients. Most of the treatment process happens in specific rooms. That process possibly goes along with pain, sadness, or other negative feelings. But public space, where patients wait for their examination results, or family members waiting for the patients, sometimes also evokes some people's bad memories. The waiting room is one example of the worries accumulated. Compared to other types of places where visitors have emotional swings, the waiting room at healthcare facilities is regulated with many safety and hygienic requirements when designing the space. This brings challenges to improve the waiting room design more therapeutically, compared to family rooms at hospitals, which have more options like soft fabric to create warm feelings.

However, in order to use the therapeutic waiting room as the main concept, there is a need to interpret it in several design aspects. The design of healthcare facilities usually prioritizes efficiency to 'save more lives', so one layer of meaning of therapeutic means a more efficient space arrangement. Because of the placebo effect, having many small improvements on multiple design levels in waiting rooms could have a holistic positive effect. So, in the latter part of the theories study, I looked into some topics regarding waiting room design in the healthcare field. The topics follow the order of experience in the space: entering, staying, and leaving. First comes orientation and wayfinding. Then, during the stay, the lighting and daylight conditions and the distractions. Finally, the holistic attractiveness of the space. In addition, the users need.

Orientation & Wayfinding

In the EBD 2020 report (CVA, 2024), orientation and wayfinding is an independent chapter. It is very important for patients, relatives, and other visitors to be able to orient themselves at healthcare facilities via various features (Kim et al., 2014). That is not hard to relate to, since in many public buildings, it is important to stress orientation.

There are five orientation factors for architects to consider, according to Huelat et al. (2007): 1) knowledge of where you are, 2) knowledge of the destination, 3) knowledge of the route that will take you where you want to go, 4) knowledge that you have reached your destination, and 5) knowledge of how to return. In the thesis specifically, they are finding the waiting room, finding the information center, finding the treatment rooms, and finding the entrance or the exit of the department or building.

In the research about the layout impact on wayfinding by Devlin et al. (2014), factors like repetition can be a barrier to wayfinding. Therefore, it is important to have clear landmarks. Literature review by Jiang & Verderber (2017) also writes that views towards the outside also benefit wayfinding. Marquardt and others (2014) concluded that many studies indicated cues such as special color codes, signage, and so on help orientation, especially for older people.

At the end of the EBD 2020 report (CVA, 2024), there are seven design features implied to enhance wayfinding: colour coding, signage, symbols and pictograms, landmarks, unobstructed views, information desks, and lighting and materials. Within those features, many can be improved in a transformation project like this thesis. Different colors can be used; a simple floor plan of the space could be designed as signage.

Daylight & Lighting

Daylight is considered to be one of the aspects that are related to well-being in a study at a cancer centre (Tinner et al., 2018). Besides, access to daylight, views of nature, and comfortable temperature were ranked highest. In another study in the patient room, views of nature and access to daylight could bring positive feelings in ill patients (Timmermann et al., 2015). However, in the emergency department, access to nature, daylight, and cleanliness are the least important factors regarding the level of satisfaction, while cleanliness and communication with staff and family are the most important (Walsh & Knott, 2010). This research result is within the special occasion, the emergency department, which the author presumes is not very related to the general waiting room design. Thus, daylight is considered an important factor in this thesis.

Lighting was studied as more related to employee job satisfaction. The possibility of glare and other ergonomics aspects should be considered in lighting design in workspaces and public spaces in a healthcare environment. In conclusion, a healthcare environment with a high-quality lighting level usually brings satisfaction to the overall space.

Positive distraction

According to Ulrich et al. (1991), positive distraction indicates several physical environment features and specific types of sound or light impressions, which research has shown have many positive effects, such as reducing stress, improving well-being, and relieving pain. In the later research also by Ulrich (2012), an important way of promoting positive distraction was by outdoor environments with natural features or just the views of those. In the more recent research, places where family members of intensive care units prefer to go for a break are studied (Ulrich et al., 2019). The result is that they prefer to choose the garden over waiting rooms (Ulrich et al., 2019). While some healthcare environments have unchangeable factors that have no access to those features, the same research indicated that natural impressions could be achieved via technology such as virtual reality. Similar benefits still happen, such as the patients' perceived pain decrease since their attention to pain is distracted (Ulrich, 2012).

There are also many other studies that show that patient access to positive distractions is an important design intervention for well-being and stress reduction (Andrade & Devlin, 2015; Devlin et al., 2016; Andrade et al., 2017). Specifically in studies in waiting rooms, natural features, for example, plants, pictures of plants, sounds of a waterfall or birds, could reduce psychological, physiological, and behavioral indicators of stress and anxiety (Beukeboom et al., 2012; Pati & Nanda, 2011; Saffarinia et al., 2012). Nature distraction is also found to be effective in reducing anger and aggressive behavior. The nature photograph is found to be more effective in reducing medication than abstract art in the study by Nanda and colleagues (2011). All the research results show that distractions should be selected with caution. The wrong choice of art could bring a negative effect to patients.

"Seeing, experiencing, and spending time in environments with natural features is positive for health and well-being." (CVA, 2024). Nature has a significant influence on the patient's well-being. Healthcare facilities should introduce nature in various ways. Having a garden that patients could visit is great for their health, but it is difficult to maintain in some specific weather conditions. Introducing nature-depicting art is an alternative option.

Attractiveness

An attractive healthcare environment can mean an appealing, beautiful care setting (Dijkstra et al., 2008). The space attractiveness can be connected to the quality of the healthcare facilities. An environment that gives a pleasant feeling can improve both patients' and staff mood (Sadler et al., 2011). Attractiveness is associated with positive attractiveness in many studies (CVA, 2024). However, it is difficult to set a clear standard for attractiveness since there are subjective views influenced by personal, societal, and cultural backgrounds. Timeless aesthetics seems a neutral concept, but due to the divisive architectural theory and styles, it is still difficult to find a definition to get a common agreement. But timeless aesthetics in a healthcare setting can be divided into several parts, such as the use of neutral colors and natural materials. Mood lighting and designer-inspired furniture are found with patients' preference in the study by Suess & Mody

(2017). A proper amount of wood finishes on the floor or a wall is also found to be chosen more by patients in the study by Nyrud and colleagues (2014). Rooms with vinyl flooring are perceived as cleaner in the study by Harris (2017).

In a study by Siddiqui and others (2015), results about patient satisfaction seem to be related to the placebo effect. Patients were positive about the newly renovated building. Similarly, in the study by Tieche and others (2016), changed lighting, new finishes, and a new color scheme are also found with a higher satisfaction. The authors also indicated that the environment has an impact on the evaluation of care.

In conclusion, some aspects are often considered influential: well-maintained premises, visual and physical access to nature, non-institutional aesthetic, cleanliness, good privacy, professional character, spaciousness, good sound environment (not noisy), good lighting, wood finishes, and textiles (CVA, 2024).

User needs

Waiting room users include a wide range of age groups, from children, working adults, to elderly people. In the study by Green (2024), she interviewed patients in the waiting room and summarized the results into a diagram that showed the barriers to positive patient experience. The results are categorized according to the feelings. I reorganized the diagram by adding the design elements in the healthcare environment. The influential elements in the waiting room are: acoustic, space arrangement, art, sightline, lighting, furniture, ambience, color, and smell. The evaluation criteria in some elements can be supported by the evidence mentioned before, while others vary according to subjective opinions. There is another way to interpret the user needs, which is to investigate the user journey in the waiting room. The waiting time varies in different circumstances. I also looked into the basic human needs. I compared several needs triangles, and realized the basic needs are to be seen and the sense of belonging.
In conclusion, the user needs of the waiting room are more effort in the design result, more options, and a well-maintained environment.

Reference Analysis

Figure 6. White arkitekter. (n.d.) Waiting room

Case study:
Carlanderska Hospital:

Description: Extension as for the original building has blended the new with the old.
Architects: White arkitekter
Motivation: Renovation building, special usage of existing conditions.

Figure 7 Wingårdh Arkitektkontor AB. (n.d.) Waiting room

Case study:
Nötkärnan Primary care center

Description: A healthcare centre with the concept from specific cultural background.
Architects: Wingårdh Arkitektkontor AB
Motivation: Nice example of design based on specific context.

Figure 8. Sweco. (n.d.). Waiting room

Case study:
Högsbo local hospital
Description: Sweden's smartest hospital
Architects: Sweco
Motivation: Newly built hospital which applied many new technologies, acting as state of art.

Figure 9. Author made
Photo of entrance waiting area

Case study:
Drottning Silvias children's hospital

Description: Playful color choices and appliance on walls, floors and ceiling to show space division. Children's library and lower windows show the designers' consideration from children's perspective.
Architects: White arkitekter
Motivation: Inspiration for children's perspective

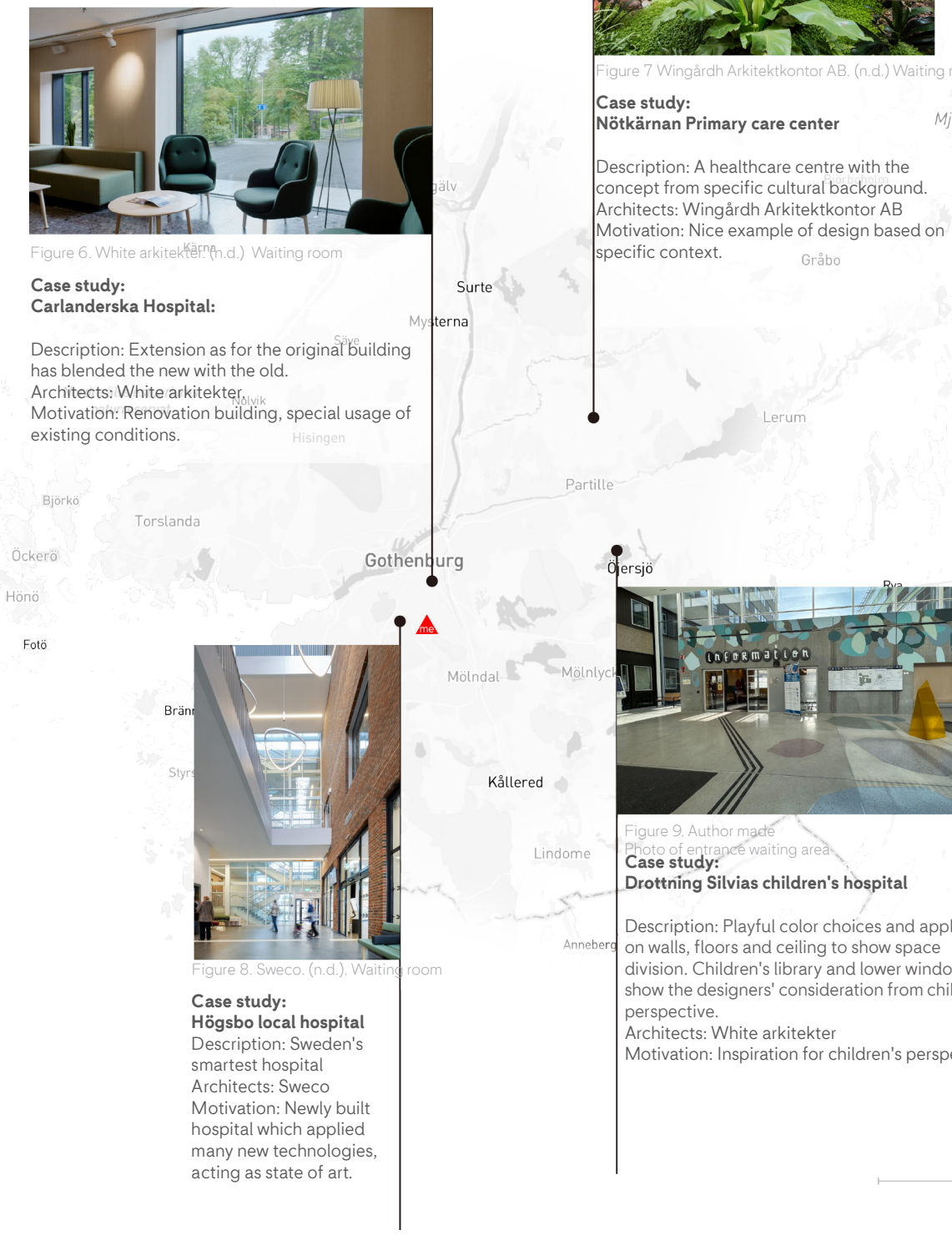


Figure 10 Author made
Case studies locations

The case studies are all situated in Gothenburg, a west coast city in Sweden. The reason for choosing the reference projects from the same region is to minimize the influence of policy, weather, culture and other location impacts. Thus, the research about the locally contextual analysis will be minimized, and more content will focus on the transferable knowledge. The case study contains a site visit, an analysis layout, and observation. The waiting rooms that I investigated are the entrance waiting room and the waiting area outside the treatment rooms, usually in the corridor.

After visiting all the reference project waiting rooms, my first impressions differ obviously according to the size of the healthcare facilities. And the size is also influenced by the user, such as the children's hospital, which has a small waiting space inside the entrance space, but that hospital has the largest overall size in my reference cases. For the outpatient hospitals, visitors arrive with or without an appointment, and the time they spend varies from less than one hour to multiple hours. The subjective concept of time can be influenced by design strategies.

While the new self-check-in system is widely promoted and used in Sweden, the entrance will be the only place where specific staff will help with checking in. Other waiting rooms will be equipped with a self-check-in machine.

Carlanderska Hospital

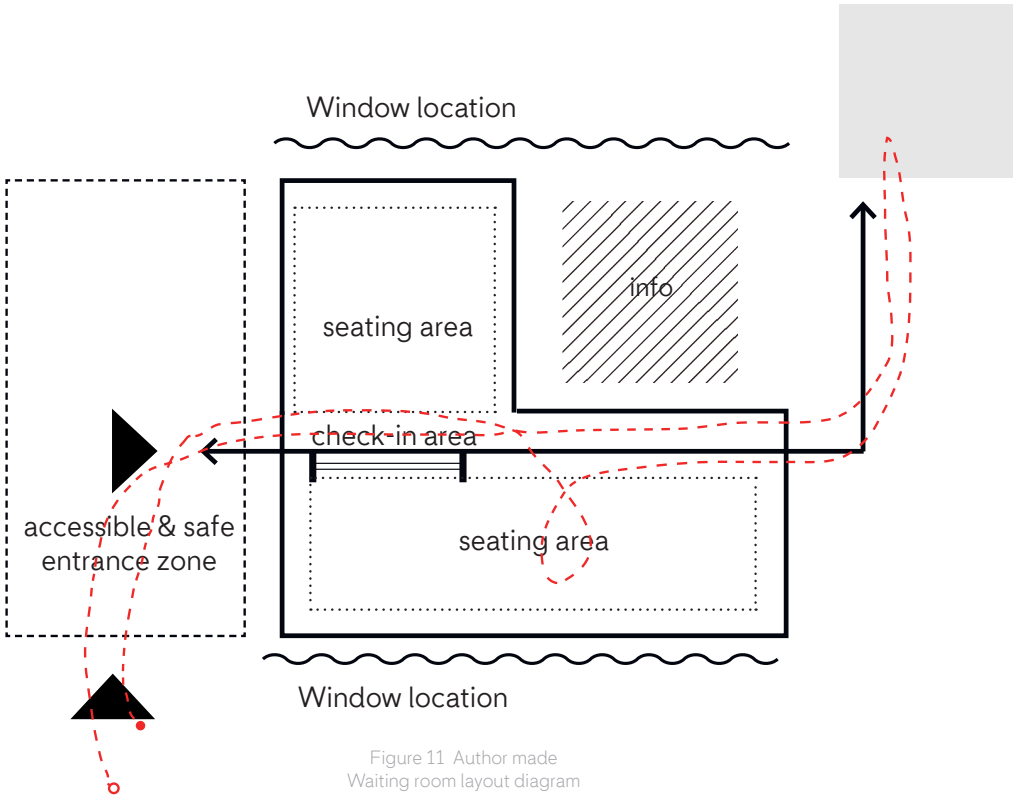
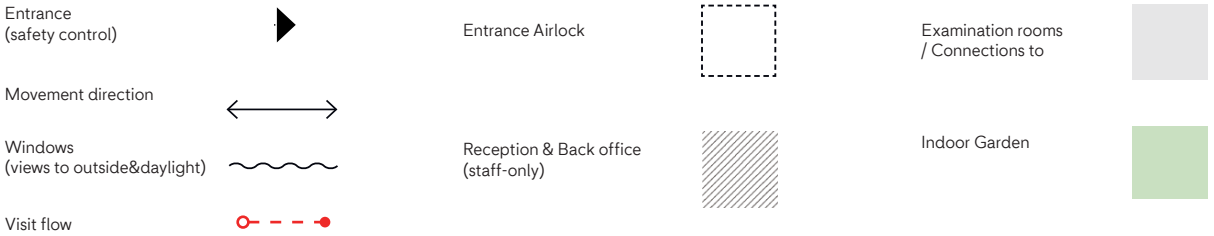


Figure 11 Author made
Waiting room layout diagram

After walking past the facade with windows, turn right twice, and the entrance is the waiting room at Carlandska hospital. The first impression is that it looks like a living room and has a nice food smell. The self-check-in machine is located to the right of the entrance and acts as a space divider. On the one hand, the check-in is in the middle of a traffic area, which might make people feel like blocking other people passing by while they are just checking in. The seating area is like an L shape, surrounding the information centre. The staff at the information centre has a holistic overview of the whole seating area. There are also various seating types, such as single sofa, bench, and so on. But the back of the bench is relatively low. The food smell comes from the restaurant located next to the waiting room, which is a design strategy to let people feel relaxed.



Nötkärnan Primary Care center

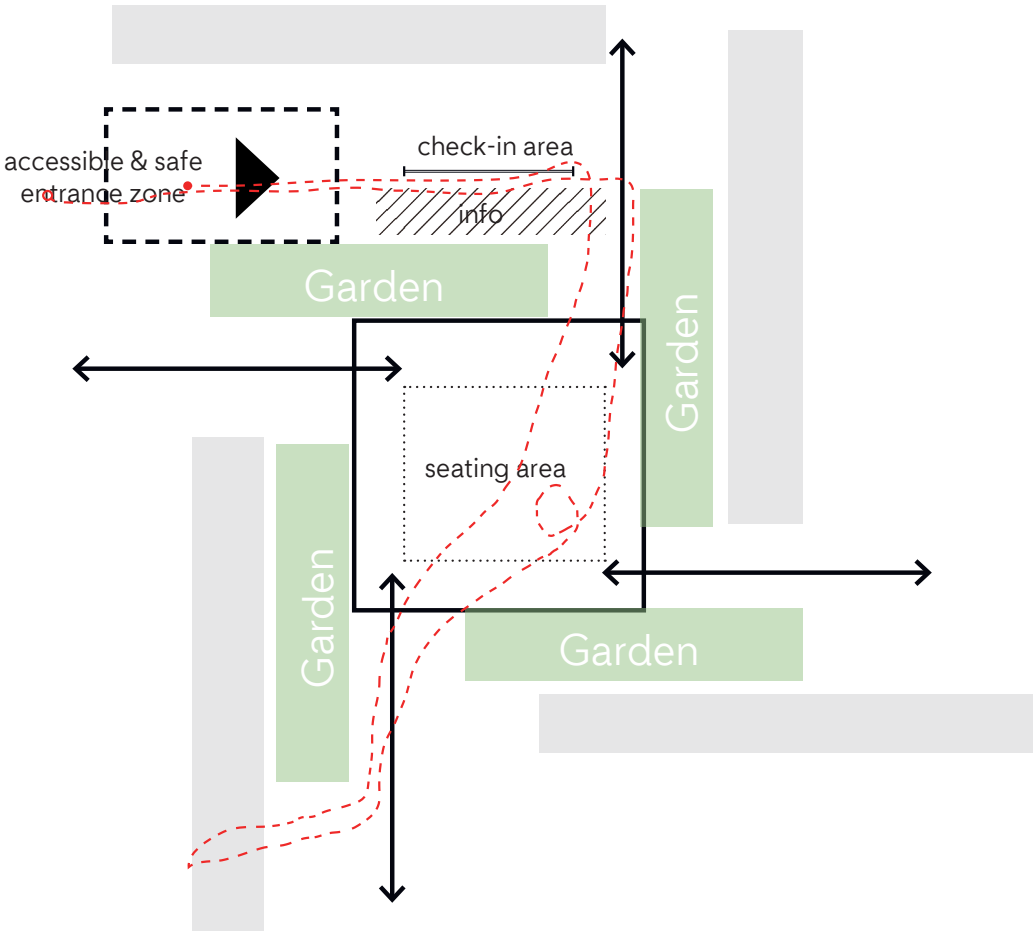


Figure 12 Author made
Waiting room layout diagram

Nötkärnan Primary Care center is a special case. The site is located on top of a parking plot. This not only affects the way to enter the architecture, but also gives this building a four-dimensional sense of direction because of the floating feeling. The overall layout looks like a windmill, rotating in the next second. The waiting room is surrounded by four garden boxes, with tropical plants inside. Plants could bring positive effects to patients. In addition, the care centre is in the region with many immigrants, and the tropical plants have special cultural meanings behind. However, the overall layout received some negative feedback from the staff working there, since the open arrangement has potential safety and management challenges.

P.S.: The digrams on those pages are not scaled. They aim to show the connections between different spaces

Drottning Silvias children's hospital

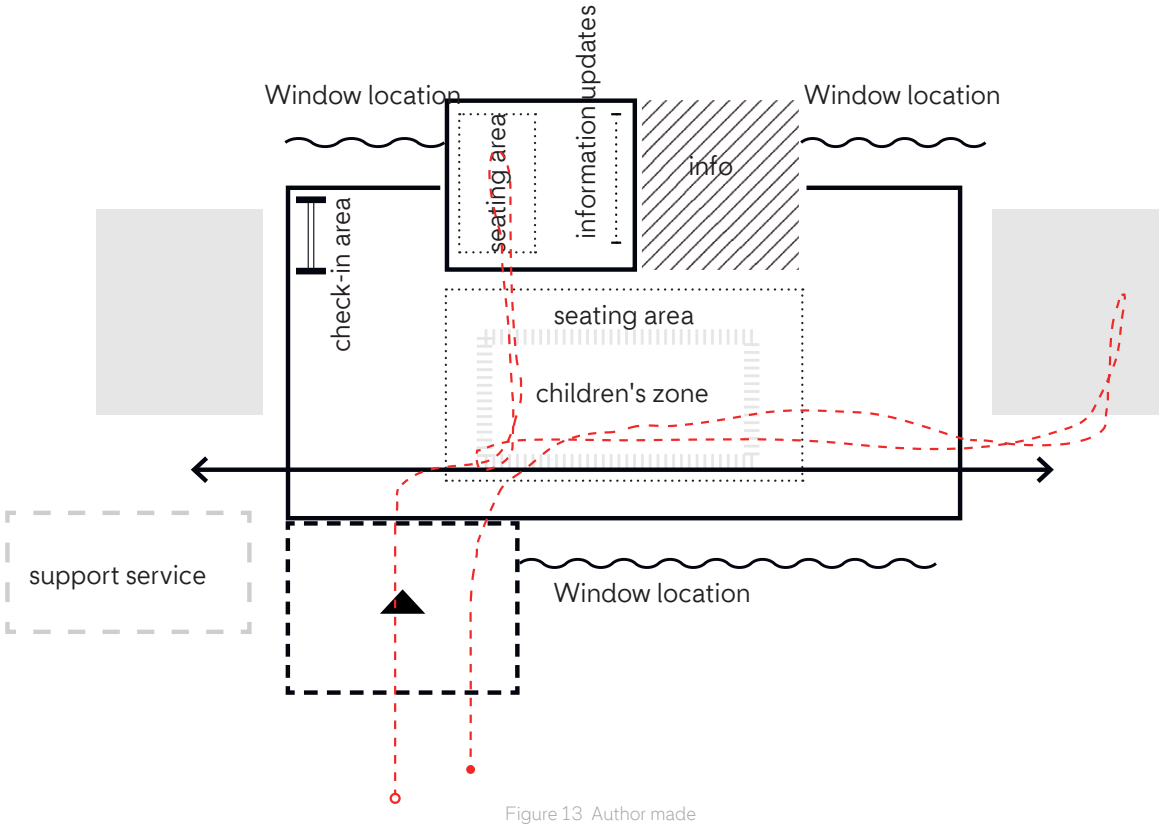
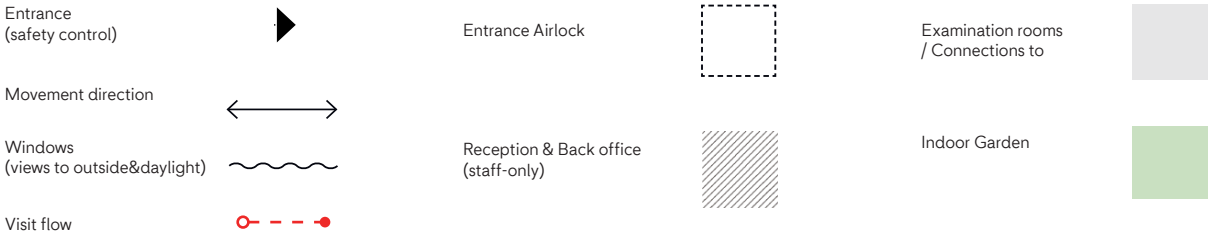


Figure 13 Author made
Waiting room layout diagram

In the Drottning Silvias Children's Hospital, the entrance waiting room has a small volume inside the double-height space. In the open waiting area, there are some children's scales, colorful furniture, and a linear seating area on one side of the area. However, this area is in the middle of the traffic zone, and when people enter, they will unavoidably pass by this open waiting area. In the smaller volume, half of it is an information center, and the other part is also a waiting area with a screen showing information updates. The smaller volume gives a smaller scale considering children's perspective, balancing the double floor height space. In addition, this adds another layer of safety insurance. Overall, the window facade provides sufficient daylight and views towards nature and the outside.



Högsbo local hospital

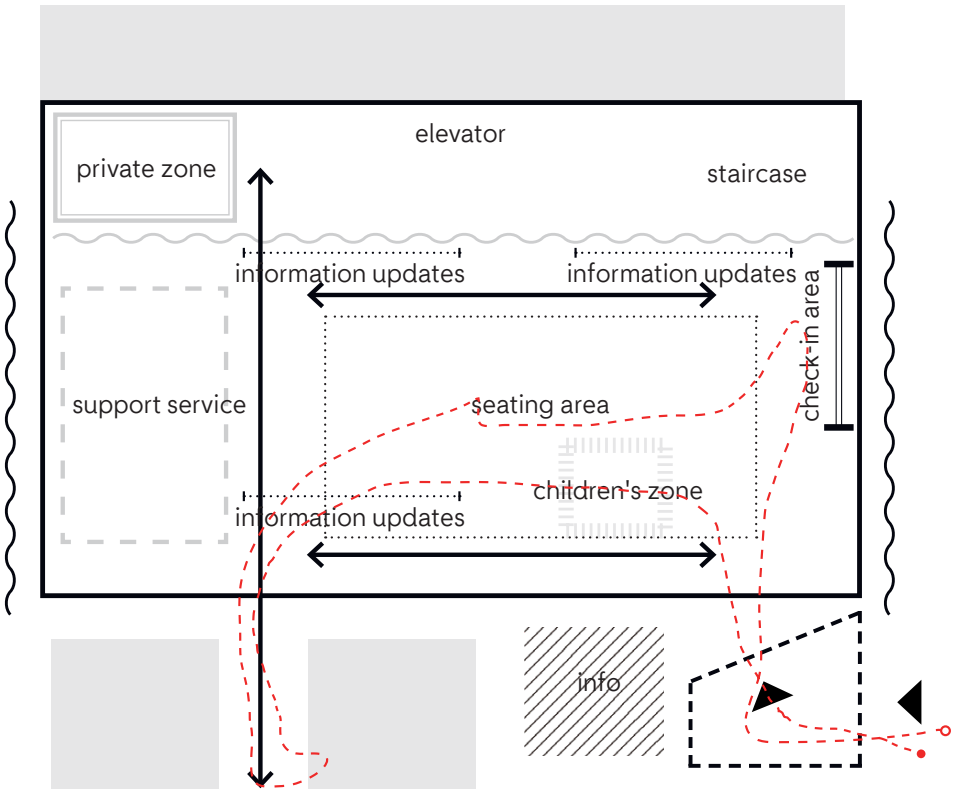


Figure 14 Author made
Waiting room layout diagram

Högsbo local hospital aims to be the smartest hospital. After entering the double door, a simple floor plan as a hand map is at first sight. This has a really positive impact on showing the layout of the hospital and the locations of different rooms. In the seating area, there is a corner specially designed for children with toys and lower seat settings. The arrangement of the seating is well organized to minimize eye contact. The seating is also surrounded by several art pieces. And there is a charging port on some of the seats. Information updates are available in many directions. There is also a local cafe just next to the waiting area. Behind a glass wall, there is a more separate and private area with art pieces. The overall view is quite open, with a slightly lower ceiling on the seating area to create a separate space.

P.S.: The digrams on those pages are not scaled. They aim to show the connections between different spaces

Högsbo local hospital

outside the examination room
/corridor waiting

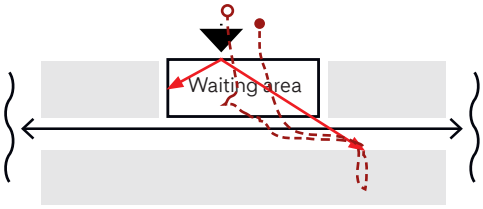


Figure 15 Author made
Waiting room layout diagram

-
Corridor interupts the waiting area
+
Always has a view towards outside

The waiting rooms outside the examination rooms are smaller and arranged with fewer seats. But there is still a corner for children, though the toys are the same type as those in the entrance. The waiting area is divided by the entrance to this area in the middle. No access to the outside in this layout, but it is efficient. Information updates are available on the screen.

outside the examination room
/corridor waiting

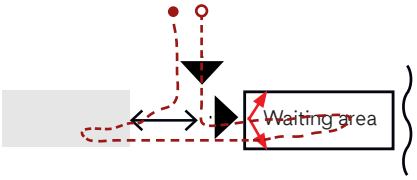
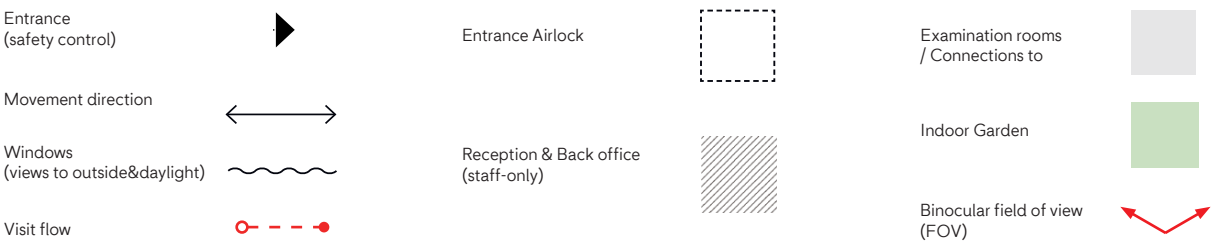


Figure 16 Author made
Waiting room layout diagram

-
Corridor interupts the waiting area
+
Easy orientation

The waiting rooms outside the examination rooms are smaller and arranged with fewer seats. But there is still a corner for children, though the toys are the same type as those in the entrance. The waiting area is divided by the entrance to this area in the middle. No access to the outside in this layout, but it is efficient. Information updates are available on the screen.



Drottning Silvias
children's hospital

outside the examination room
/corridor waiting

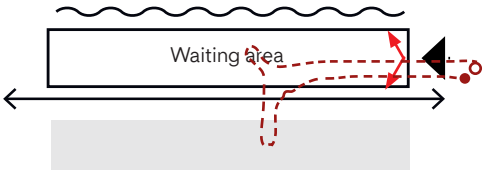


Figure 17 Author made
Waiting room layout diagram

-
Corridor interupts the waiting area
+
Always has a view towards outside

The waiting rooms outside the examination rooms are smaller and arranged with fewer seats. But there is still a corner for children, though the toys are the same type as those in the entrance. The waiting area is divided by the entrance to this area in the middle. No access to the outside in this layout, but it is efficient. Information updates are available on the screen.

Common situation

outside the examination room
/corridor waiting

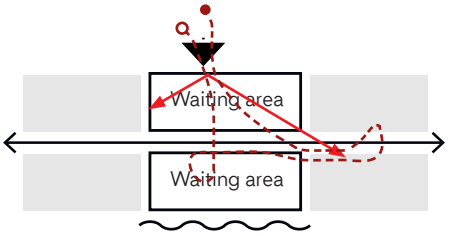


Figure 18 Author made
Waiting room layout diagram

-
Bigger area
+
Waiting area break long corridor system

There is also a typical layout of the waiting area outside the examination rooms. This looks similar to the one at Högsbo local hospital, but connects the waiting area to the facade with a window. Thus, waiting rooms could have access to nature and views of the outside. But this layout might bring a challenge in the cost of a bigger area and be shared by multiple departments, which might be confusing to find the examination rooms

P.S.: The digrams on those pages are not scaled. They aim to show the connections between different spaces

Design Strategy

Towards a therapeutic waiting room

• Sensory Intervention

When there is time, budget, or inconvenience of rebuilding limitations, designers are recommended to use sensory intervention. Sensory intervention refers to design contexts at a relatively micro level, which are usually more related to the interior design process, but are not limited to this. The following strategies could be used individually or together. The benefits increase in the case of more application of the strategies. The usage of strategies is recommended in the following order.

Ⅰ. *Incorporate nature depicting artworks in various formats.*

Studies in waiting rooms found that natural features reduce psychological, physiological, and behavioural indicators of stress and anxiety (Beukeboom et al., 2012; Pati & Nanda, 2011; Saffarinia et al., 2012). The EBD 2020 report (CVA, 2024) also suggests that nature-depicting artworks can be used to calm stressed patients. Various formats of artworks could be used, such as paintings, photographs, projected images or videos, displays, light art, etc.

Ⅱ. *Select a range of wooden upholstered furniture.*

Studies showed that attractive waiting rooms increase patient satisfaction with doctors, nurses, and other staff (CVA, 2024). While the attractiveness was exemplified in the studies by the use of wooden furniture, art, and ceiling decoration, waiting rooms that offered a variety of comfortable seating, good light from windows and lamps, or views of nature (CVA, 2024). The design and attributes of the physical environment can contribute to attractiveness and influence patients' evaluation of care (Berry et al., 2004). An attractive environment could improve the mood of patients and staff (Sadler et al., 2011) and shape a positive care experience (Carr et al., 2011).

Ⅲ. *Integrate appropriate lighting and attractive ceiling decoration.*

In healthcare facilities, a high-quality lighting environment is often associated with a higher level of satisfaction (CVA, 2024). Lighting can be designed intentionally to define spatial boundaries and enhance the character of a room. Lighting elements, especially in the ceiling, could be connected to artwork in wayfinding, defining space, or just as a distraction to add space attractiveness.

• Spatial Intervention

With more freedom in time and budget plans, designers are recommended to use spatial intervention strategies rather than sensory intervention strategies. Spatial intervention refers to a transformation that modifies the existing layout. Compared to sensory intervention, these strategies belong more to the field of architecture. The following strategies are recommended to be used in the following order.

Ⅳ . *Incorporate natural daylight into the waiting room.*

Several studies concluded in the EBD 2020 report (CVA, 2024) have investigated the experience of light, both artificial and natural. The result is patients, staff, and relatives all more satisfied with a high-quality lighting environment. The layout has a great impact on the access to natural daylight. The distribution of daylight between patient and staff should be considered in relation to their stay time in the space to achieve an equal result.

Ⅴ . *Facilitate orientation with few route choices.*

The orientation and wayfinding in healthcare facilities are important for patients, relatives, and other visitors (Kim et al., 2014). Many components are proven to facilitate a wayfinding system in the report (CVA, 2024), while at the spatial level, the suggestion is a simple layout with few route choices. The circulation from the waiting room to the treatment rooms preferably also has minimum route options by organizing the rooms efficiently.

Ⅵ . *Divide distinguishing zones according to users' needs.*

The time visitors spend in the waiting room varies. Different activities take place during the time, and various needs appear. Thus, different zones are divided according to the type of waiting room based on the needs of the users. According to the placebo effect and research investigated by Suess & Mody (2017), new finishes and new color schemes, etc., will contribute to users' better feedback of the space. Each zone is recommended to have its unique character, created through materials, color, furniture, and so on. All zones should have a neutral and timeless aesthetic.

Practice

PRACTICE

Site Analysis

Site
Sampling waiting room at Sahlgrenska Hospital

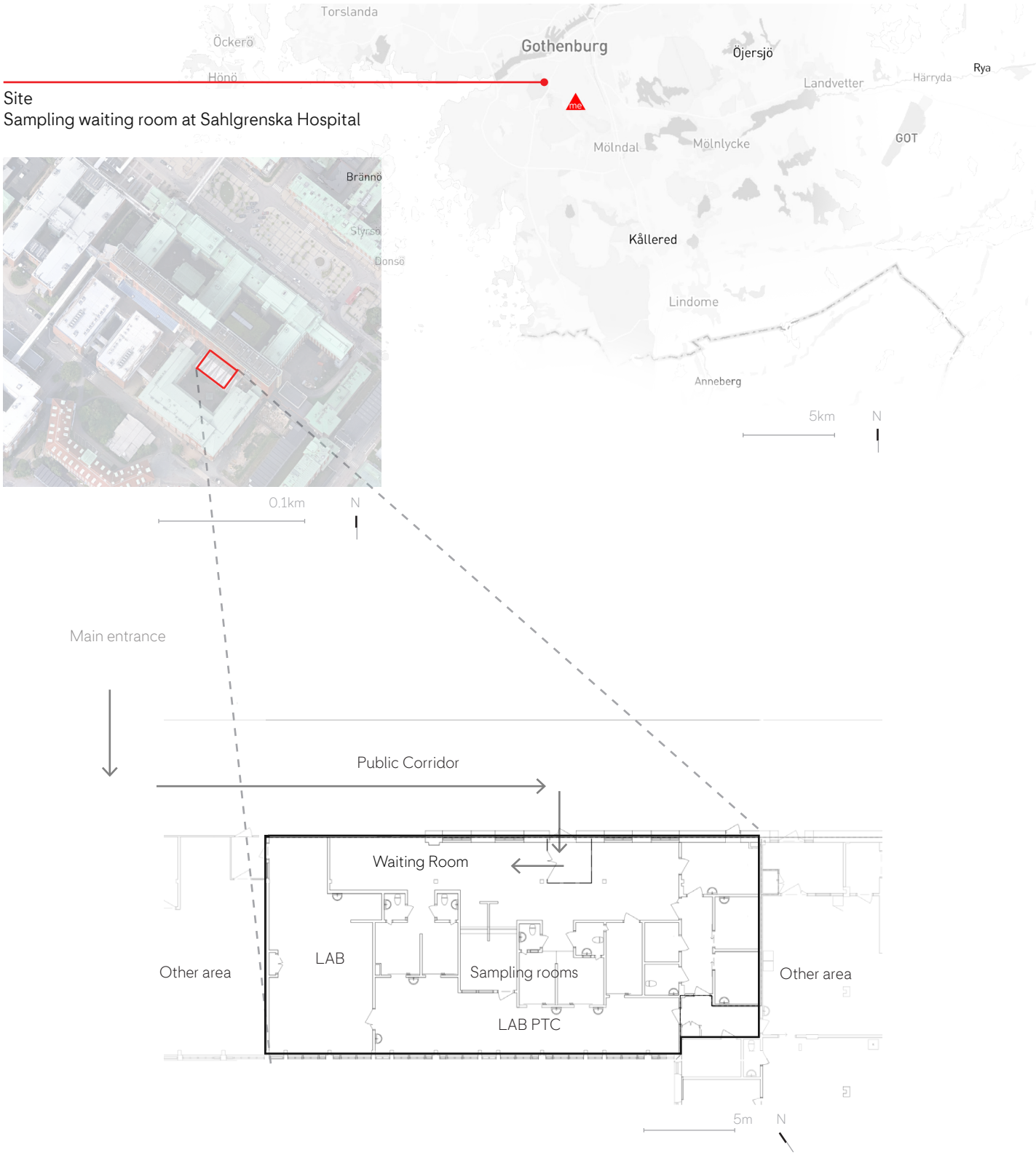


Figure 19 Adapted from Google Maps [Map],(https://maps.google.com/
Site loacation and related floorplan

Site Analysis
_Sampling waiting room at Sahlgrenska Hospital

Relative Layout

(Outwards View & Daylight)

The sampling waiting room is located in the central part of Sahlgrenska Hospital. From the main entrance at Sahlgrenska Hospital, walk straight ahead for about 25 meters, then turn left and walk 15 meters. The provtagningen is at your right. Due to the limited capacity, the hospital added benches in the corridor, which is 5 meters wide, and many people, including patients in bed, passed by.

From the Google map satellite photo and the opening direction of the waiting room, it can be deduced that the sampling department was located in an additional building around 2005-2008. The whole Sampling department is divided into 3 parts: Staff Area, Examination Room, and Waiting Room. Considering staff spend more time than patients here, they have access to outdoor views, which helps to relieve stress. The layering layout thus led to a waiting room without any connection to the outside. There are 3 side-opening skylights that help to bring daylight to the waiting room to a certain degree.

Space

About the wall, floor, and ceiling

- Relatively low ceiling height (around 2.35m)
- Too wide to see the whole room without looking around
- Shallow depth

The low ceiling height, along with many technical pipes in the ceiling, gives a depressing ambience.

With a total 22.5m width, the waiting room depth is the narrowest 2.39m, max 5m, the ratio of the waiting room is far from the space ratio that people feel comfortable and homely. ()

On the other hand, patients have to sit as close to their examination room as possible to be ready for their turn.

It is the same for the staff and hospital to arrange seating in this way to keep the efficiency of the whole flow.

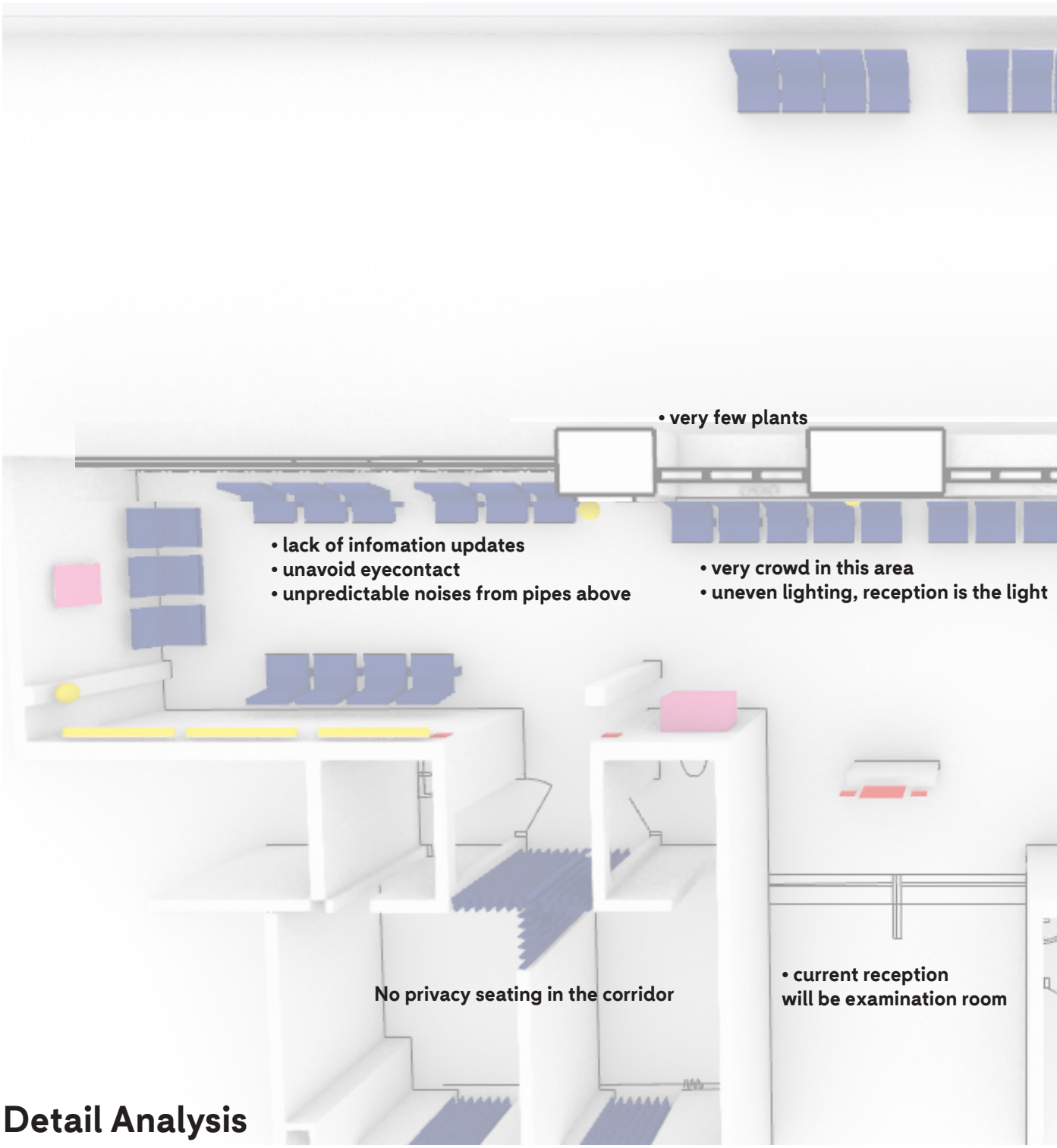
Signage & Wayfinding

Wayfinding depends on the signage and digital number display in front of the sampling waiting room entrance.

Although there are glass facades and windows in the waiting room, the safety manifestation stickers and frosted window film block the visual connection between the inside and outside of the waiting room to a certain degree.

Information updates mainly depend on staff communicating with patients. So, patients mostly sit next to the examination room door, crowded.

Dull, plain, cold bench selection. Very tight arrangement, which provides privacy and personal boundaries.
Lighting is based on strip lights aligning the examination rooms and spherical lights. Besides, the reception is the light source of the middle part right now. On Fridays when the reception is closed, the room is quite dark.



Detail Analysis

Art pieces include drawings on the wall, which are located just next to signage and a digital number display. And a boat model next to the number dispenser. Personally, I think the art is irrelevant and distracting from the useful information.

Only some pot plants on the window sills are there right now, and actually, the pots are waiting for plants.

Currently, there is no smell problem.

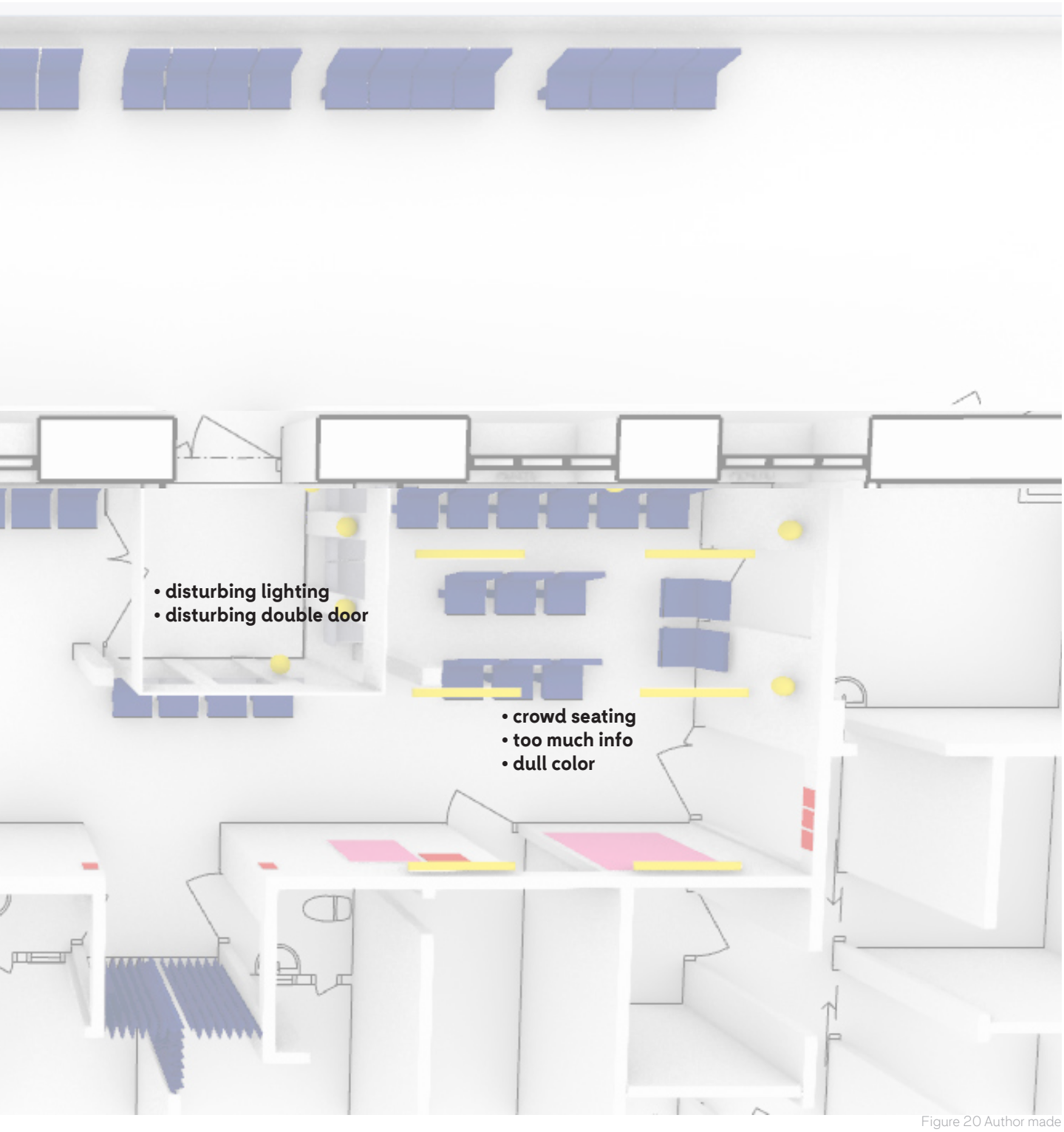


Figure 20 Author made
Perspective 3D floorplan with all analysed design elements

SENSORY INTERVENTION

Sensory Intervention

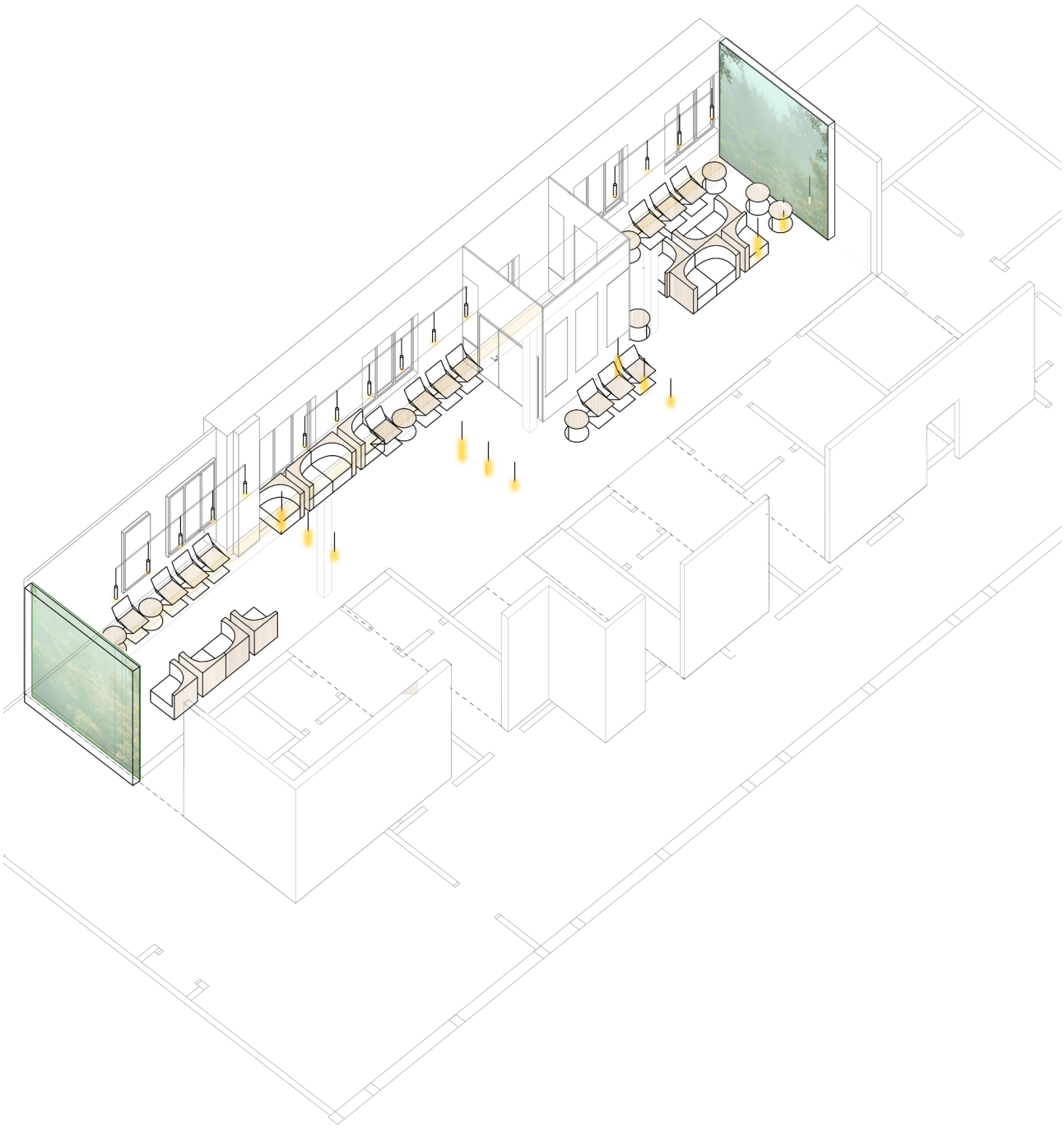
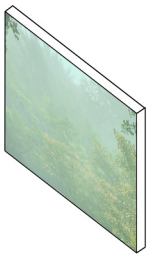


Figure 21 Author made
Axonometric diagram of the intervention result

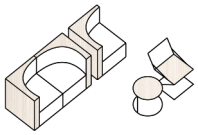
Ambient display



Ⅰ . *Incorporate nature depicting artworks in various formats.*

Due to high hygienic standards and potential allergy or other influences on visitors, a few types of plants could be chosen to be in the waiting room. However, to attain a similar therapeutic effect that plants could bring, nature-depicting art is a suitable medium. The ambient display with a seasonal forest image helps create a relaxing environment.

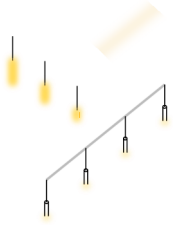
Various seating



Ⅱ . *Select a range of wooden upholstered furniture.*

Different types of seating offer visitors the opportunity to choose according to their stay time. From seats with no back to a modular upholstered sofa, the variety creates the possibility of creating a customized seating group. The wooden texture of the seats introduces a greater sense of nature.

Lighting



Ⅲ . *Integrate appropriate lighting and attractive ceiling decoration.*

Delicate lighting plan creates a comfortable lightness level. Moreover, lighting could have more functions, such as helping with orientation. Similar cylinder lighting components are repeatedly used in the waiting room. Spotlights are arranged properly for a balance of lightness and shadow, while the linear light points to the sampling rooms. The square lights on the beam are towards the ceiling to avoid flare and keep the light sufficient at the same time.

Figure 22 Author made
Axonometric design elements

Before & After Render

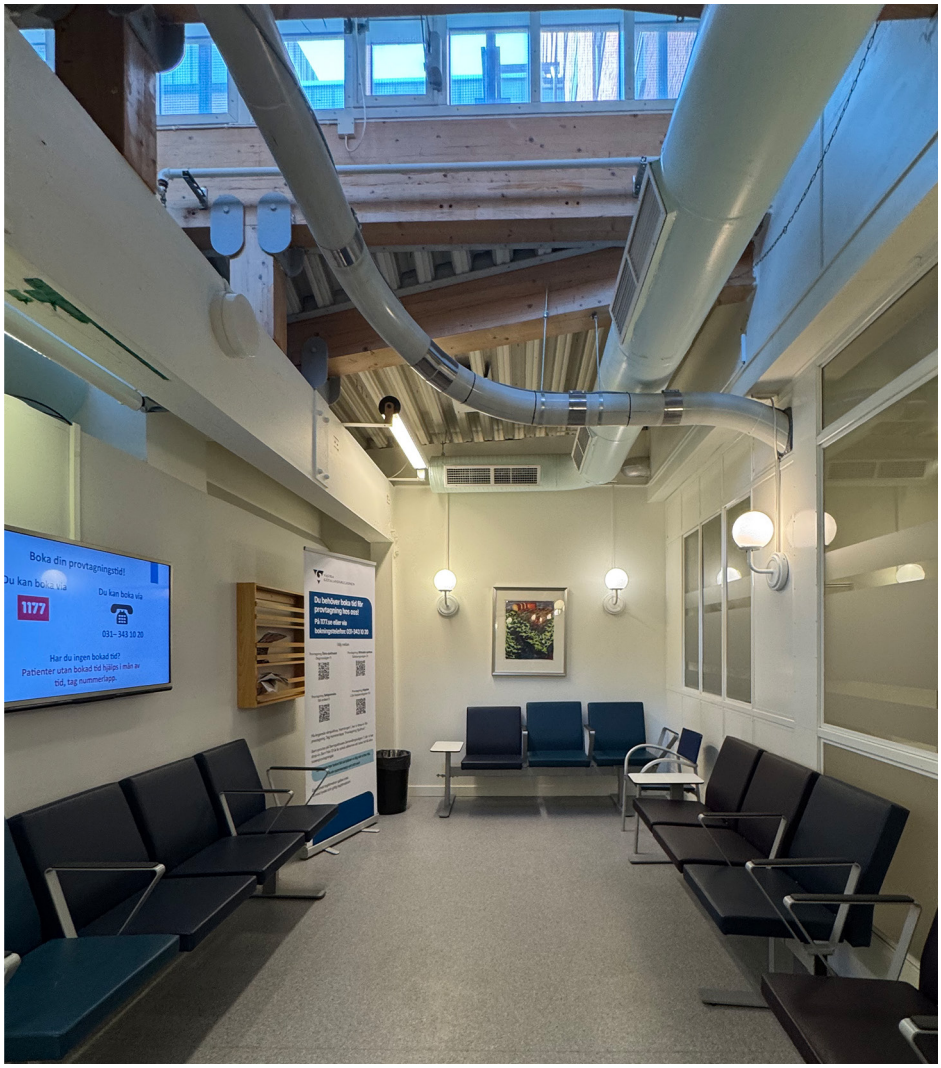


Figure 23 Author made
Photo of existing waiting room

Before

Figure 24 Author made
Same location of the photo, intervention result render.

After

Ambient display

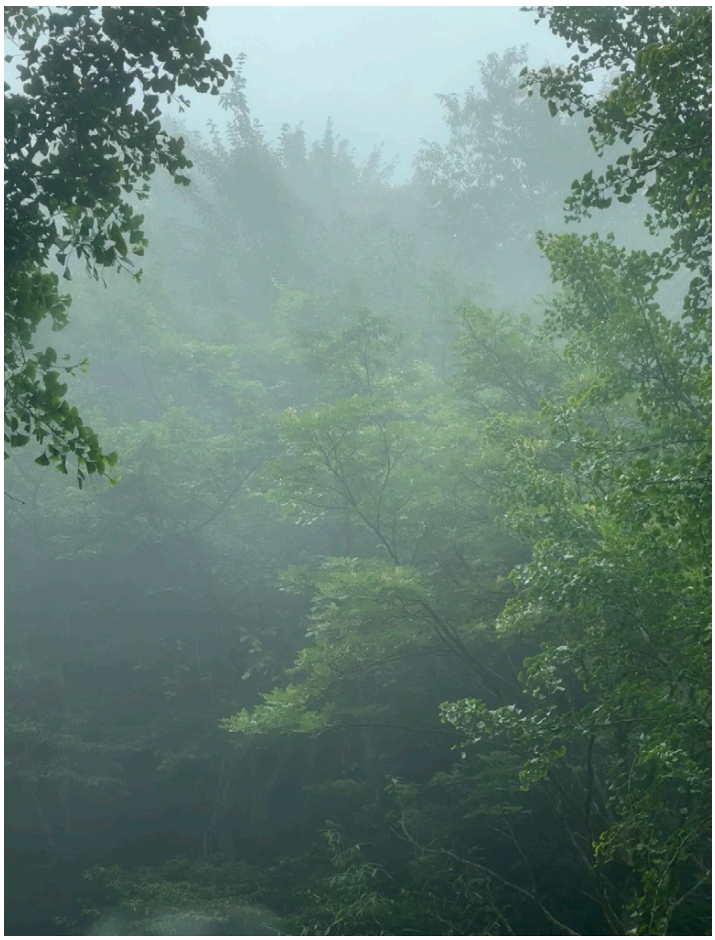


Figure 25 Author made
Image in the ambience display

Digital screens and projectors could help to create a nature-like ambience in an indoor environment. The content displayed is supposed to change according to the real season, towards a more realistic effect. Nature sounds are also encouraged in certain conditions.

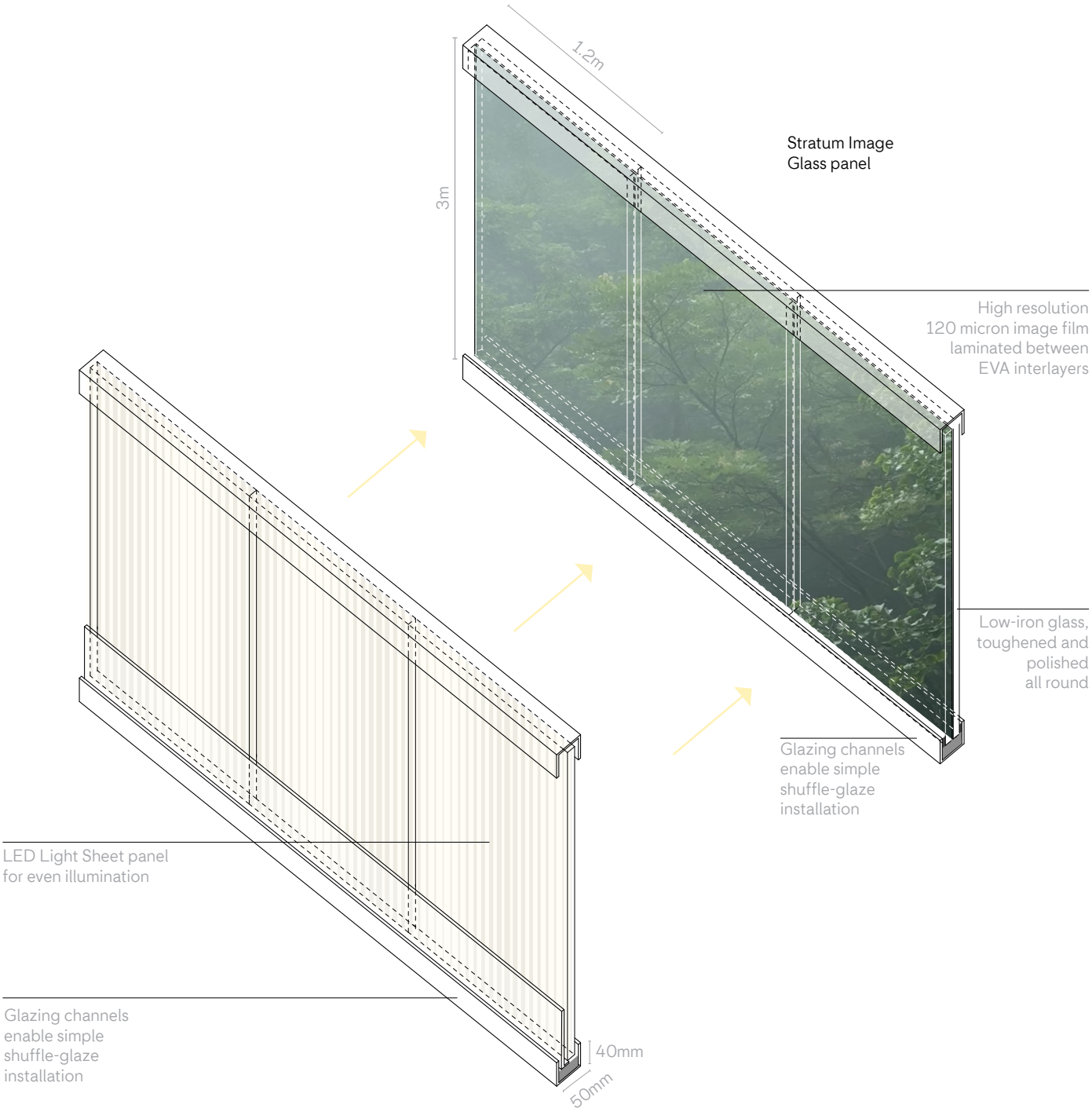


Figure 26 Author made
Ambience display axonometric drawing

Various seating 1:20

Upholstered individual seating unit
material axonometric

Figure 27 Author made
Axonometric seating unit

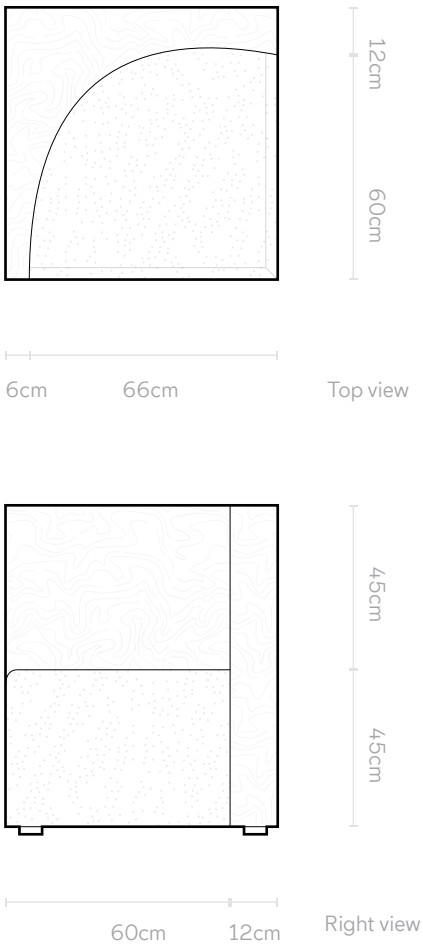


Figure 28 Author made
Detail drawing of seating unit

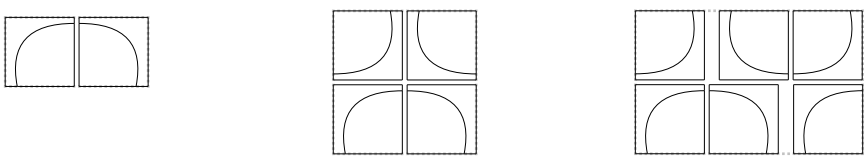


Figure 29 Author made
Seating units group lauout

A modular upholstered sofa could create both solitude and group seating. The diagram above shows an organized example of 2, 4, and 6-person groups. The flexibility of the design encourages users to customize their seating needs. The materials selected will meet hygiene requirements.

Type a chair axonometric

Figure 30 Author made

Type b chair axonometric

Figure 33 Author made

Figure 31
Laakso Dining Chair.
Note. Adapted from
THAT COOL Living
(n.d.).

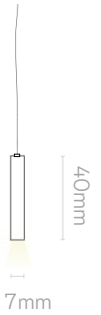
Figure 34
Spin Stool
Note. From Royal Design
(n.d.).

Figure 32
Ready Chair
Note. Adapted from
RoyalDesign.se (n.d.).

Figure 35
MALDEN pall
Note. From Jotex (n.d.).

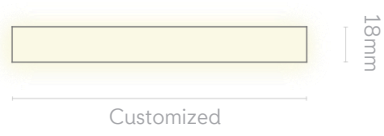
Lighting

Figure 36 Author made
Waiting room lighting plan 1:200



Spot light

Linear light



Panel light

Figure 37 Author made
Light detail drawing

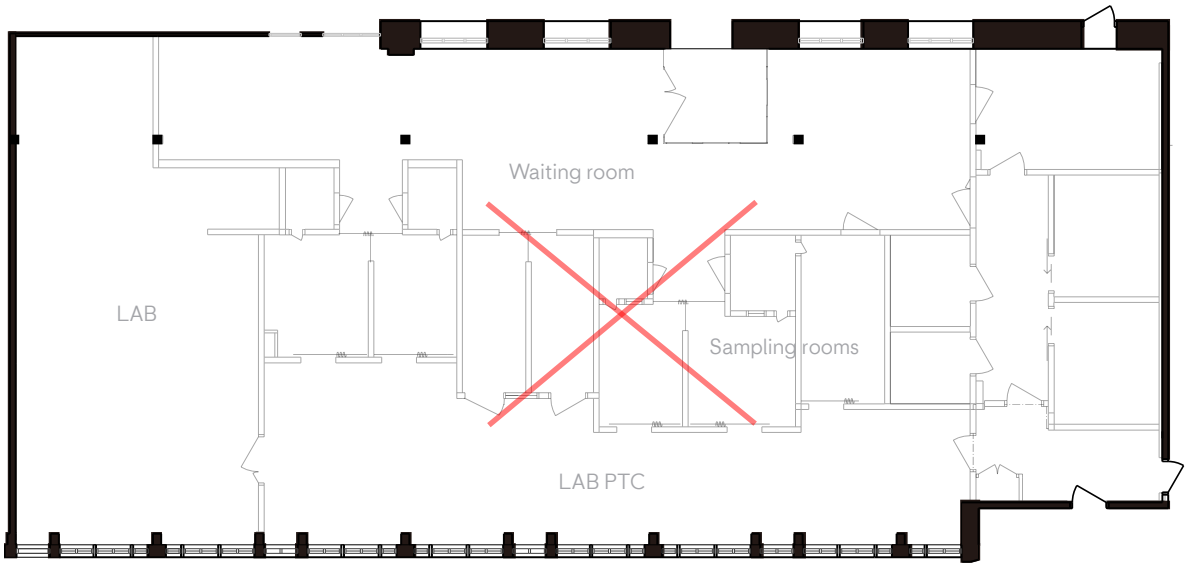
Figure 38
Pendant lamp
Note. From nordlux.(n.d.)

Figure 39
Modern minimalist LED pendant light.
Note. From QATARLIGHTING.(n.d.)

Figure 40
Panel light
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

SPATIAL INTERVENTION

Spatial Intervention



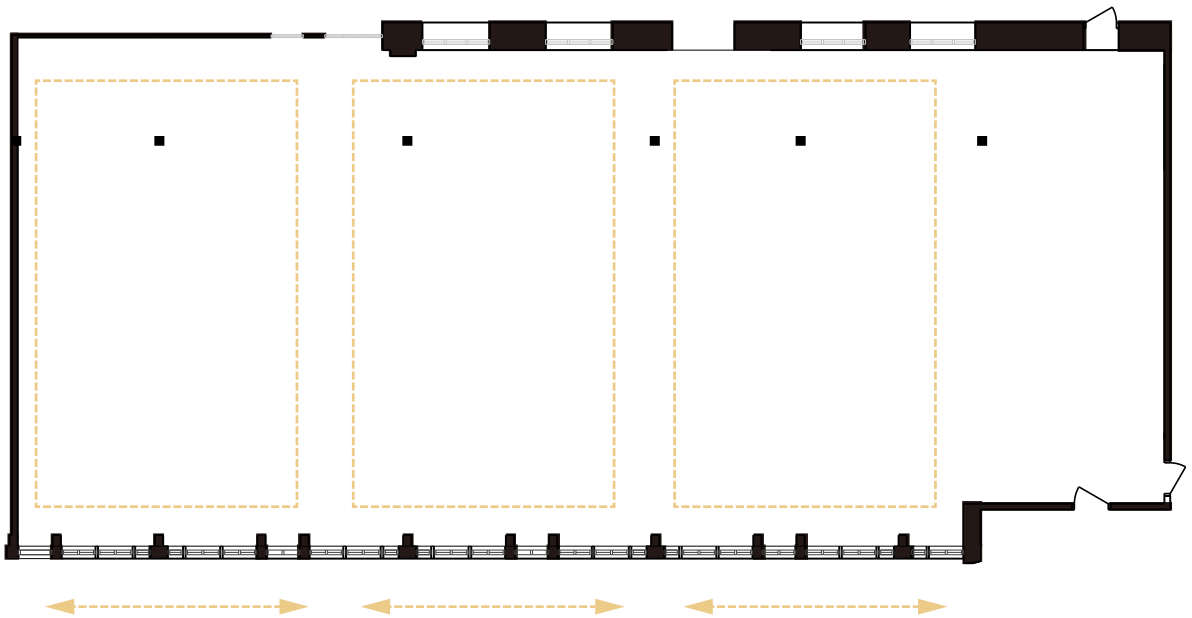


Figure 41 Author made
Intervention steps 1:200

step 0

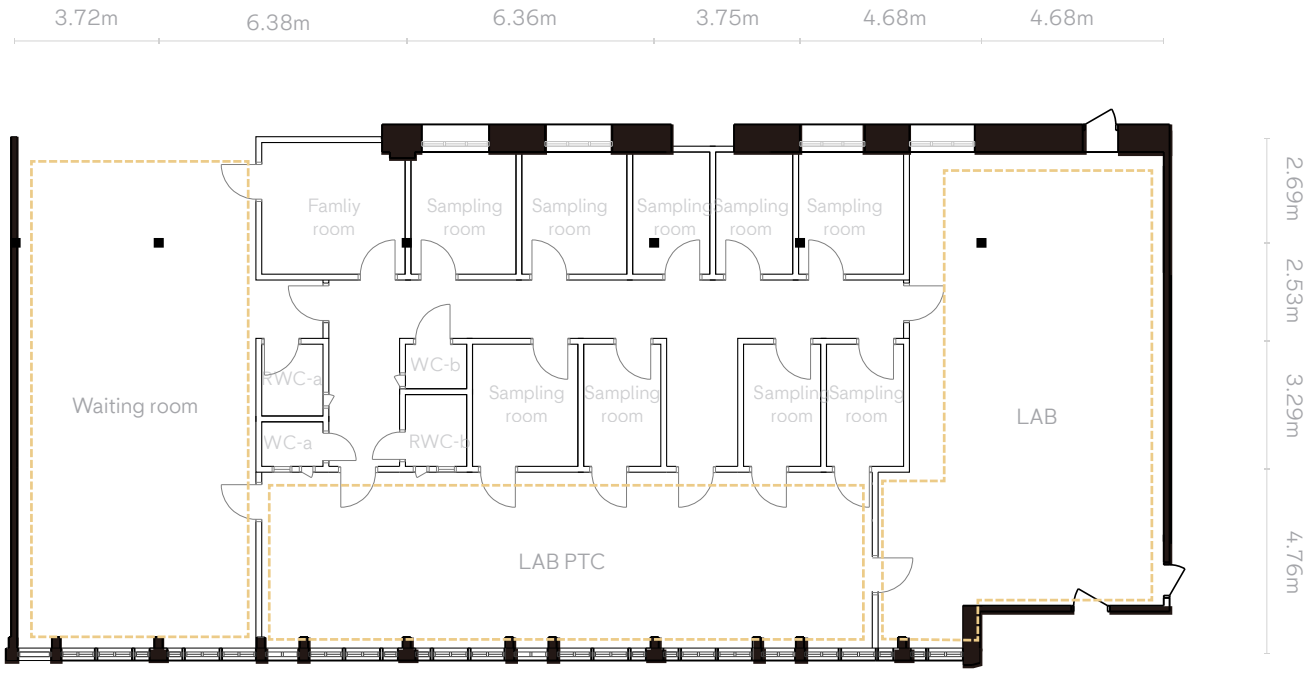
In spatial intervention, the existing floor plan is entirely removed. The type and number of sampling rooms, as well as the size of labs, will be kept the same in the following transformation result.

step 1

Ⅳ . *Incorporate natural daylight into the waiting room.*

Applying the design strategy to the design steps begins with access to daylight. In the sampling department, there is only one side of the space with a window towards the exterior environment. Thus, I tried to divide the facade into three equal parts for the waiting room, sampling rooms, and labs. Some adjustments will be made to meet the area requirements.

Spatial Intervention



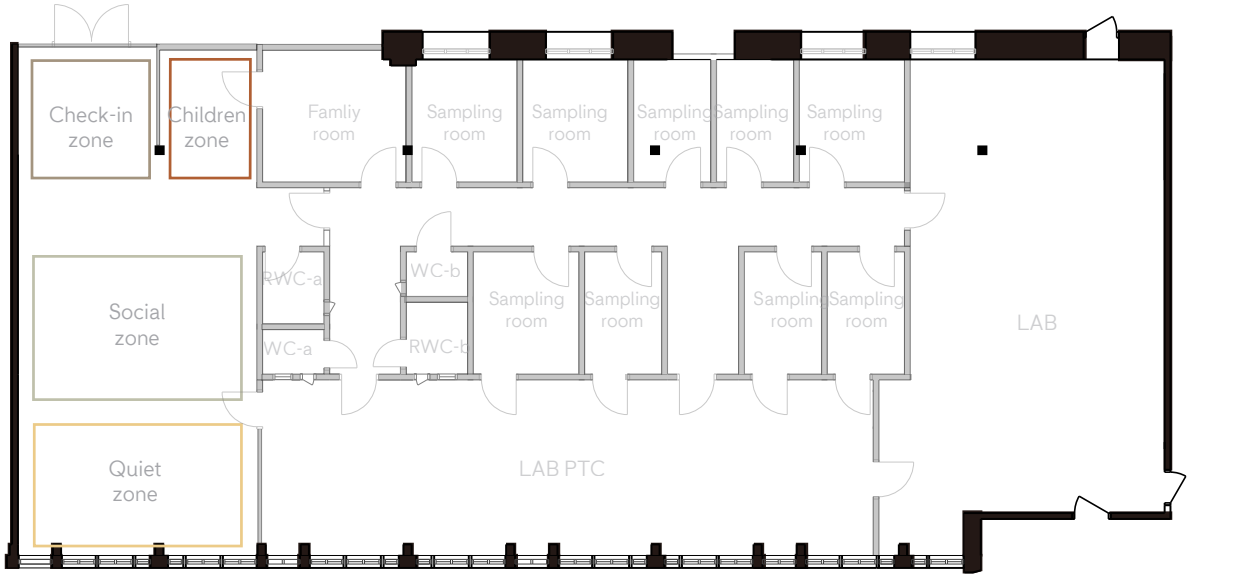


Figure 42 Author made
Intervention steps 1:200

step 2

Ⅴ. *Facilitate orientation with few route choices.*

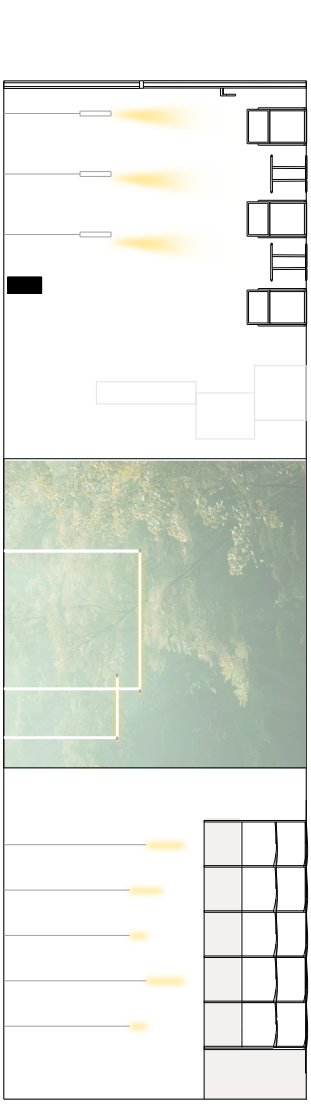
The entrance to the sampling department for visitors is designed with a sightline to the outside. This helps the visitors have a quick and holistic overview of the space, which could lower their confusion and anxiety of arriving in an unfamiliar space.
While visitors are in the waiting room, there are two entrances to the sampling rooms, with one special for family or children's use. Organizing the majority of sampling rooms with a corridor creates the chance of having only one access to this medical area. At the same time, wayfinding is optimized since the route choice to sampling rooms is limited.

step 3

Ⅵ. *Divide distinguishing zones according to users' needs.*

In the sampling department waiting room, visitors experience checking in themselves, waiting for their turn, taking the sample, and calming down afterward. In the waiting period, some visitors prefer a quiet ambience, while some consider this waiting as a type of social opportunity. And there are special needs for children. In conclusion, the waiting room is divided into several zones to meet all those needs. Each zone is designed with a different character, aiming to create an appropriate ambience.

Floorplan with interior facade 1:100



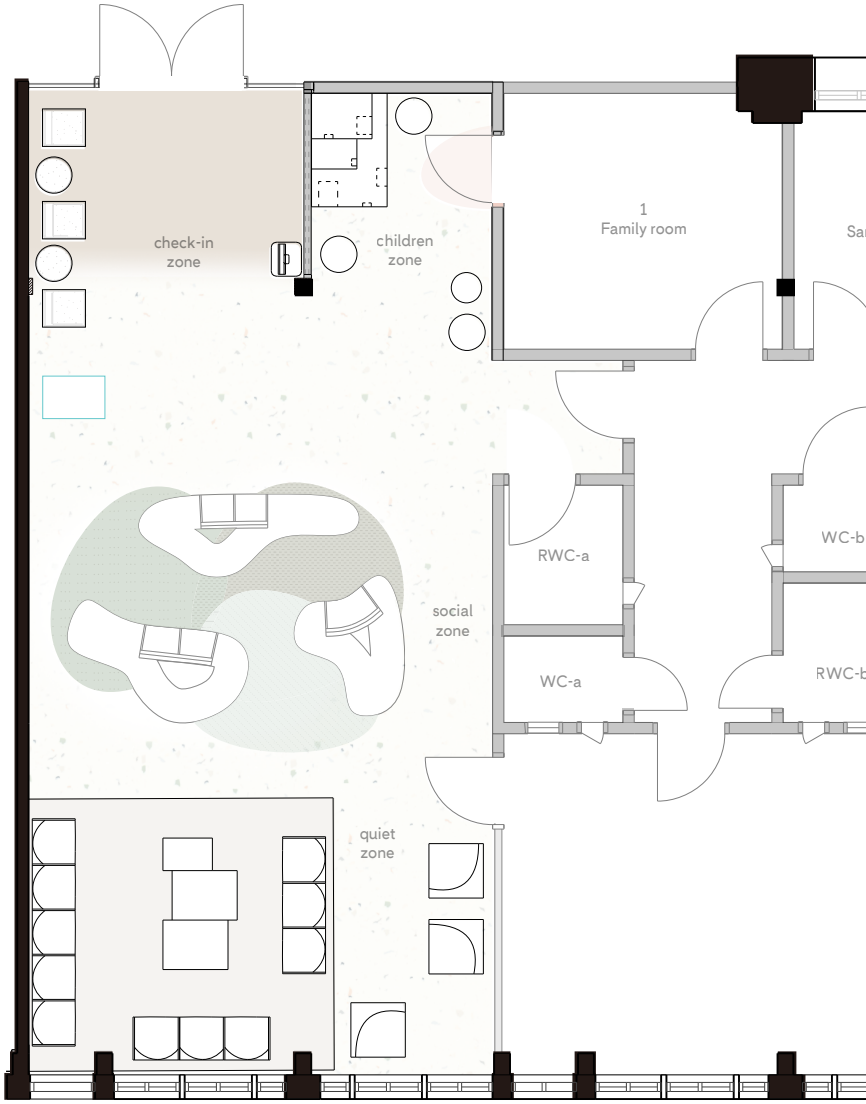


Figure 43 Author made
Floorplan and one interior wall facade 1:100


mpling room
2
3
Sampling room
4
Sampling room
5
Sampling room
6
Sampling room
10
Sampling room
9
Sampling room
8
Sampling room
7
Sampling room
LAB
LAB PTC

0
1
5m
N

Lighting plan

Figure 44 Author made
Lighting design

Spot light

Figure 45
Pendant lamp
Note. From nordlux.(n.d.)

Linear light

Figure 46
Modern minimalist LED pendant light.
Note. From QATARLIGHTING.(n.d.)

Panel light

Figure 47
Panel light
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

Wall washer

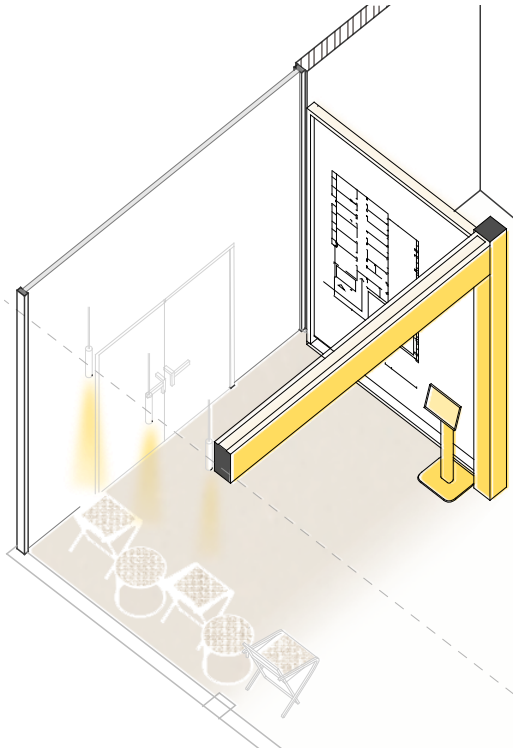
Figure 48
Modern Minimalist Aluminium Cylinder LED Flush Mount Ceiling Light For Hallway
Note. From at OME Lighting. (n.d.)

Special light

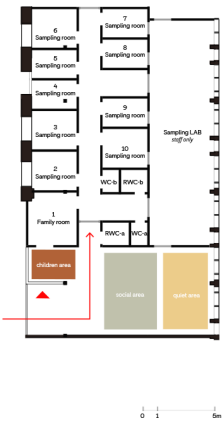
Figure 49
Modern arc line LED chandelier
Note. From ENB Lighting (n.d.),

Zone 1 - Check in

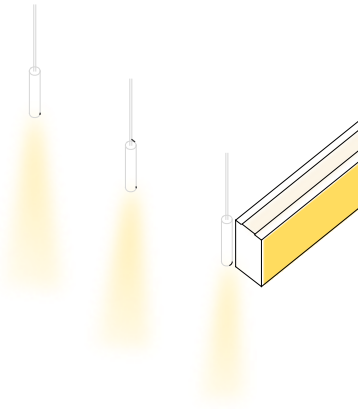
Axonometric



Design elements



Map



Spot light

Seating

Figure 50 Author made
Axonometric zoom in of zone 1 and design elements

Detail plan 1:50

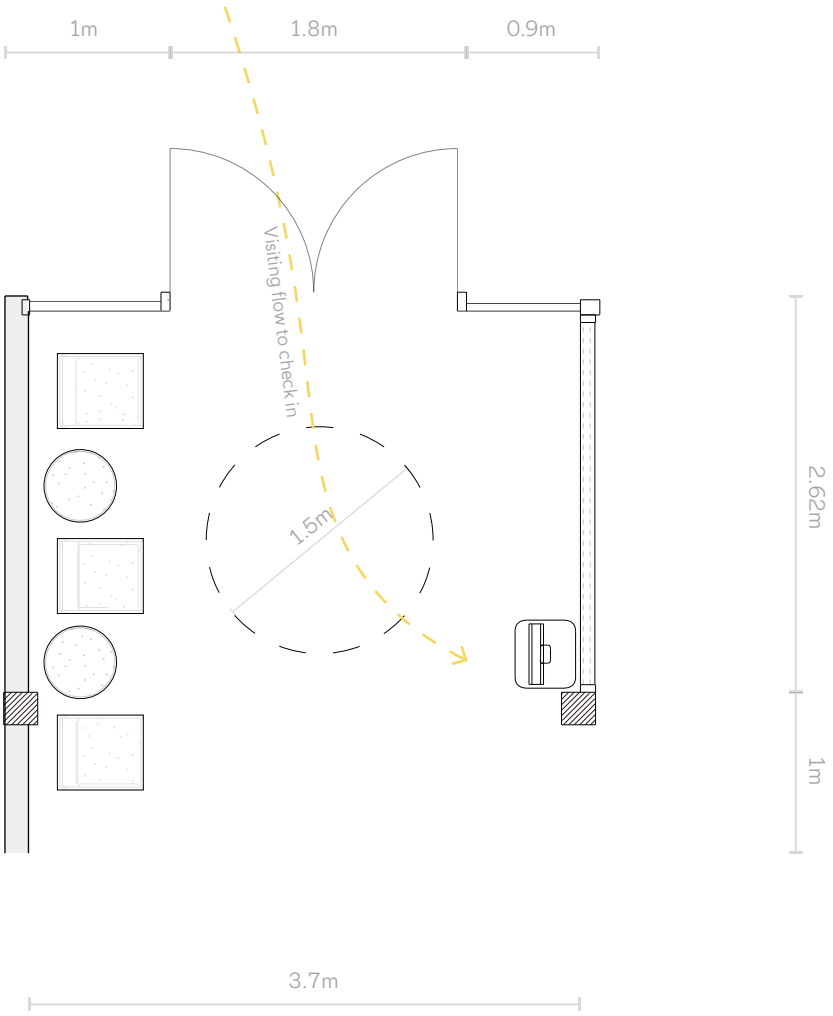


Figure 51 Author made
Zone 1 zoom in floorplan 1:50

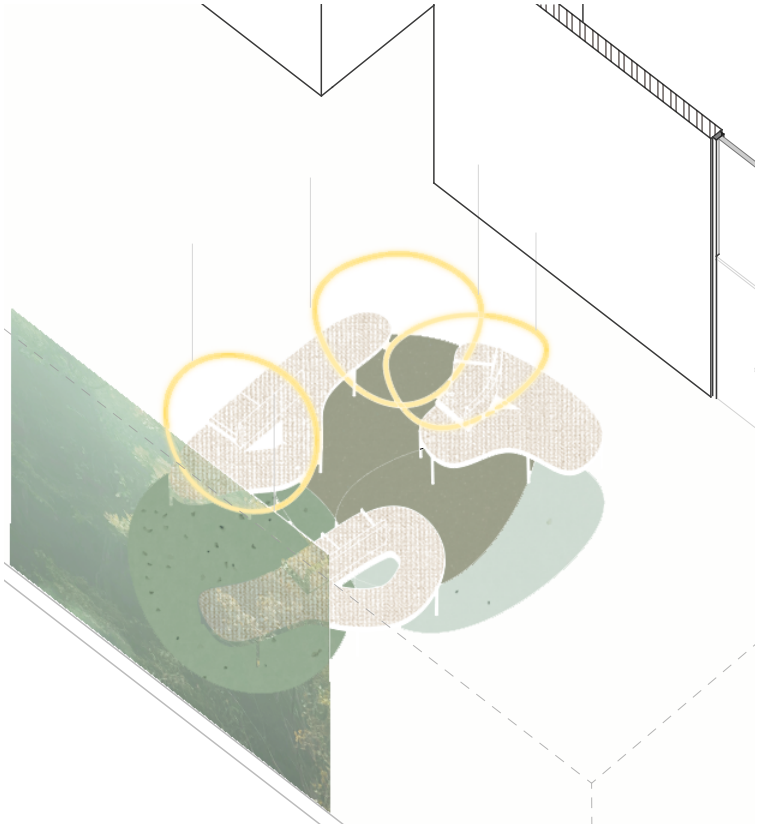
Columns and beam with bright color painted on act as an eye-catcher guiding the visitors to look at the self-check-in machine. The bright color column could also be a 'landmark' in the case of orientation. After checking in, visitors also have the opportunity to check the simple map of the sampling department, which will decrease the fear of unknown space and enhance the feeling of control. The simple and light loose furniture here suits visitors with an appointment, which means they will not spend a long time in the waiting room, so they can sit here to have quick access to the sampling room and then leave. Additionally, if visitors enjoy watching people walking by, there could be an interesting place to be. The spotlight over the seating let the lightness and shadow live together in a balance, which is more relaxing compared to evenly distributed light.

Figure 52 Author made
Zone 1 render location and view direction

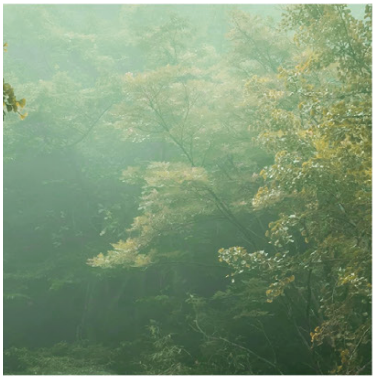
Figure 53
Architectural render of zone 1
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

Zone 2 - Social

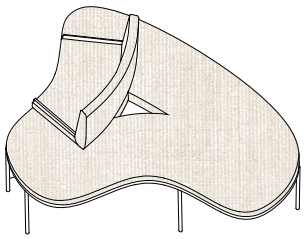
Axonometric



Design elements



Ambient display



Organic-form bench

Pendant light

Figure 54 Author made
Axonometric zoom in of zone 2 and design elements

Detail plan 1:50

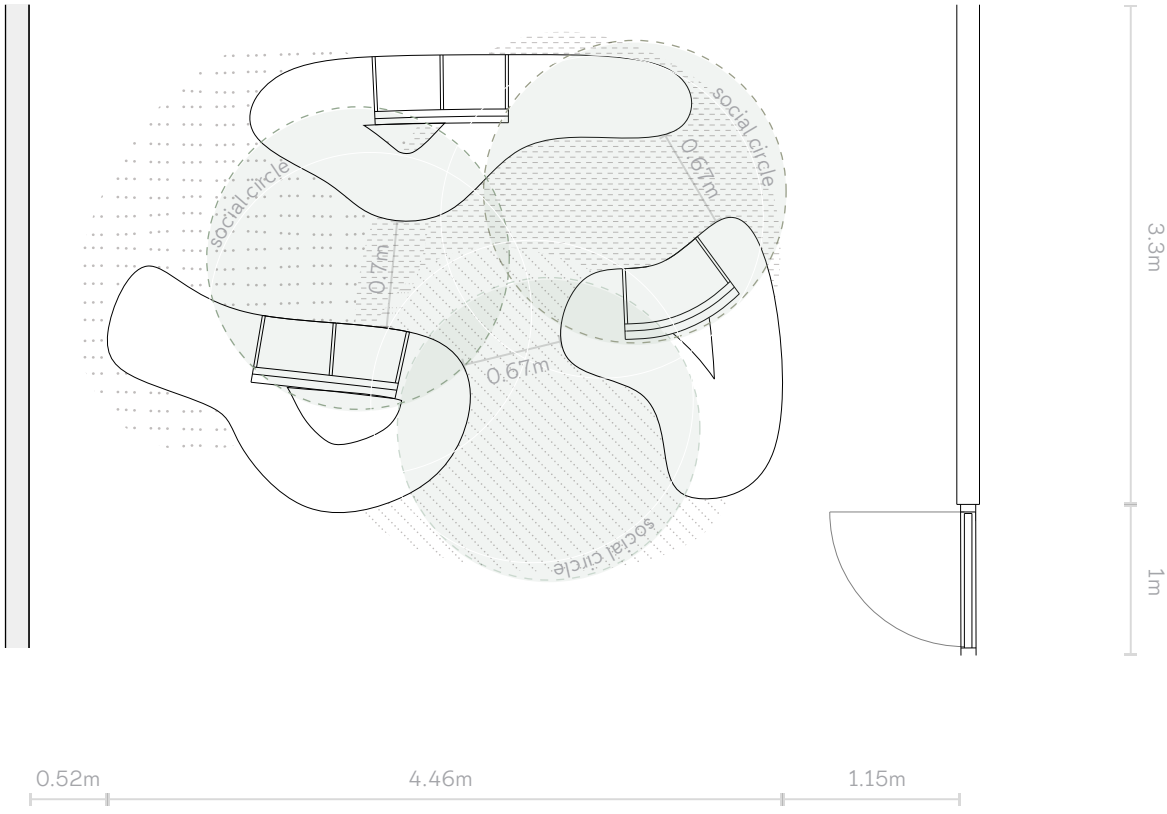


Figure 55 Author made
Zone 2 zoom in floorplan 1:50

For some elderly visitors, the journey in the healthcare facilities might be a social opportunity. Besides, asking someone just sitting next to you about your worries might be a relief from anxiety. Many similar reasons facilitate the social zone. Although this waiting room has windows towards the outdoors, the ambient display with nature could still benefit the visitors with an immersive forest image. The pendant lights, along with different floor colors, define the space. Three organic-form benches have inner sides and outer sides. Inner sides build three 'social' circles. While visitors sit in the same circle area, the distance between them and their eyesight direction all encourage conversation naturally. Even sitting on the outer sides, it is not that far from where the conversation could take place. The backrest and armrests make the bench accessible.

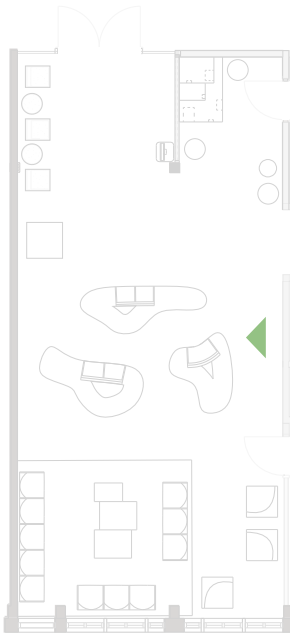
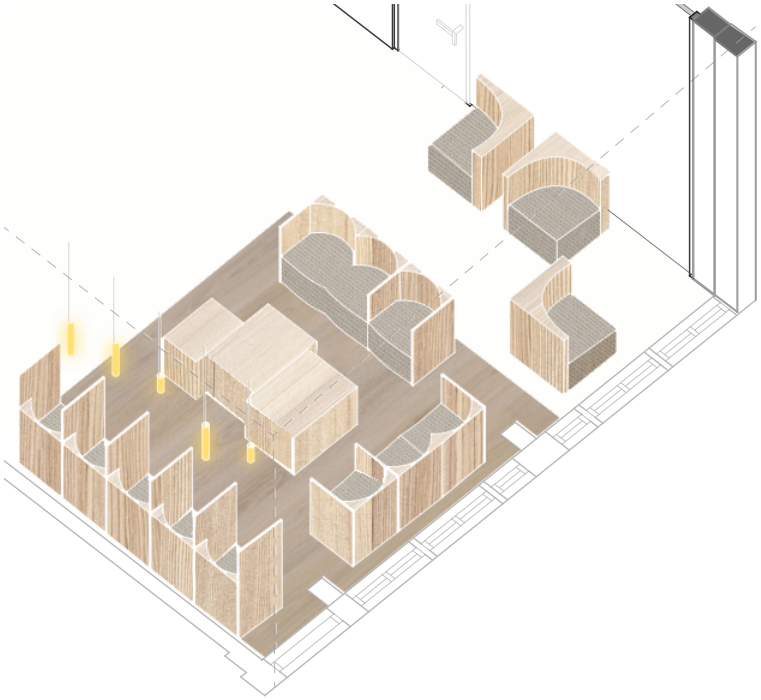


Figure 56 Author made
Zone 2 render location and view direction

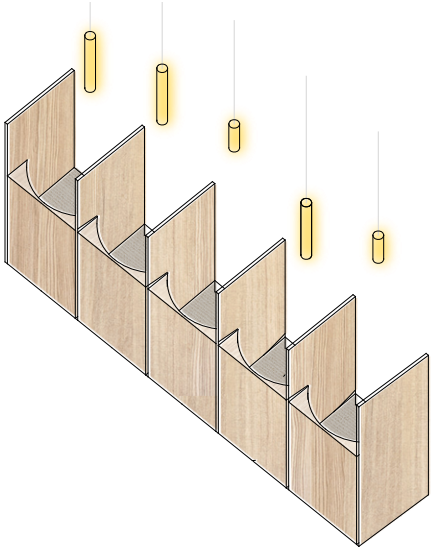
Figure 57
Architectural render of zone 2
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

Zone 3 - Quiet

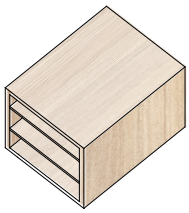
Axonometric



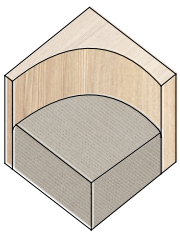
Design elements



Individual focus units



Book shelf



Individual seating unit

Figure 58 Author made
Axonometric zoom in of zone 3 and design elements

Detail plan 1:50

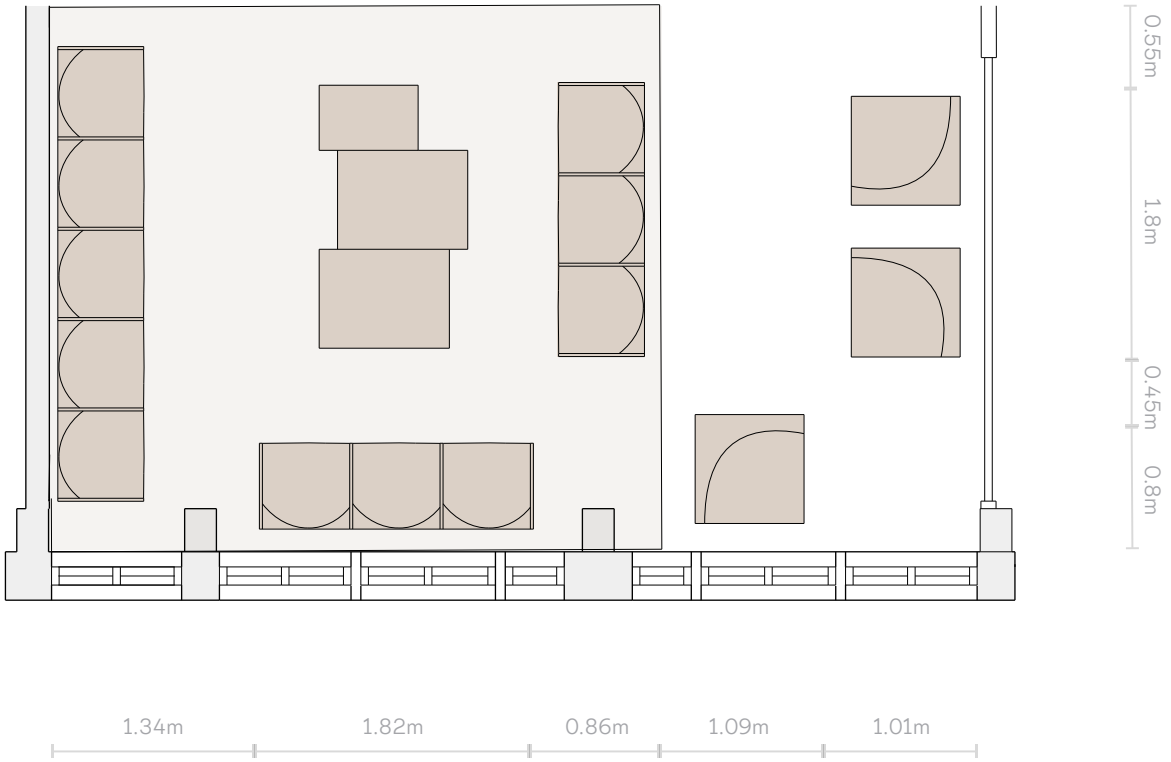


Figure 59 Author made
Zone 3 zoom in floorplan 1:50

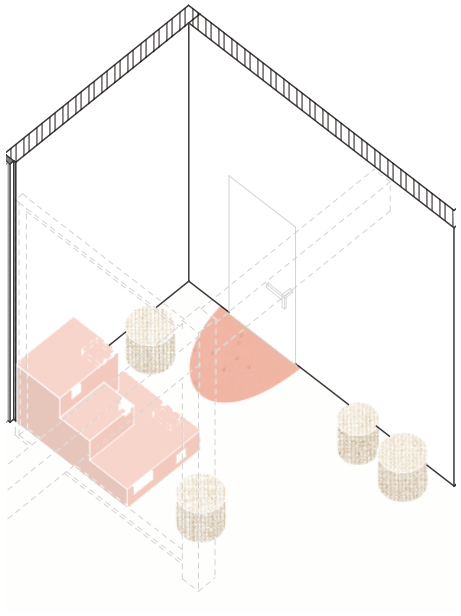
The quiet zone provides a space for the visitors to stay alone. The individual focus units allow visitors to work or pick a book from the bookshelf during the wait with the least disturbance, while not being too disconnected to miss their turn. The partition height between the seats considers the balance of privacy and unobstructed sightlines for staff management. The vinyl floor with a wooden pattern not only creates the space, but also creates a non-institutional feeling, helping the visitors in the long-term waiting.

Figure 60 Author made
Zone 3 render location and view direction

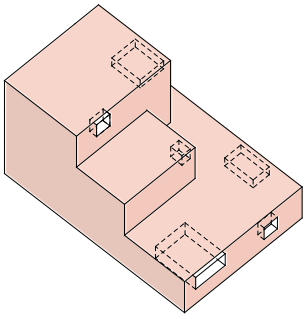
Figure 61
Architectural render of zone 3
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

Zone 4 - Children

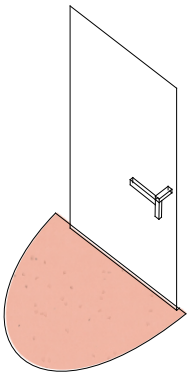
Axonometric



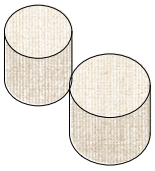
Design elements



Children's playground



Floor



Seating

Figure 62 Author made
Axonometric zoom in of zone 4 and design elements

Detail plan 1:50

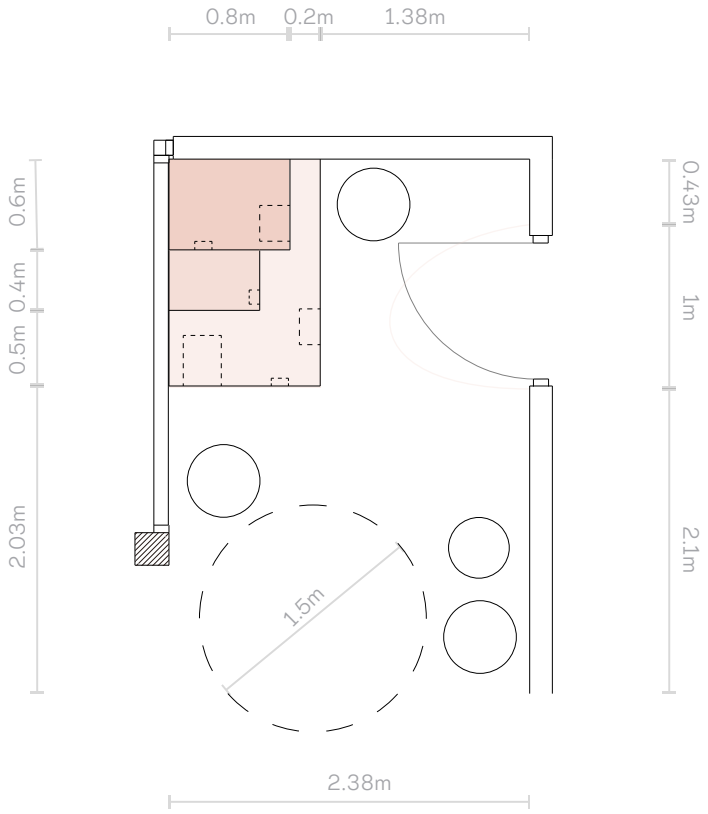
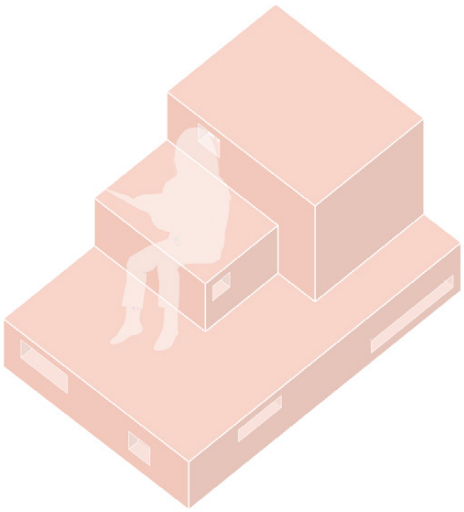
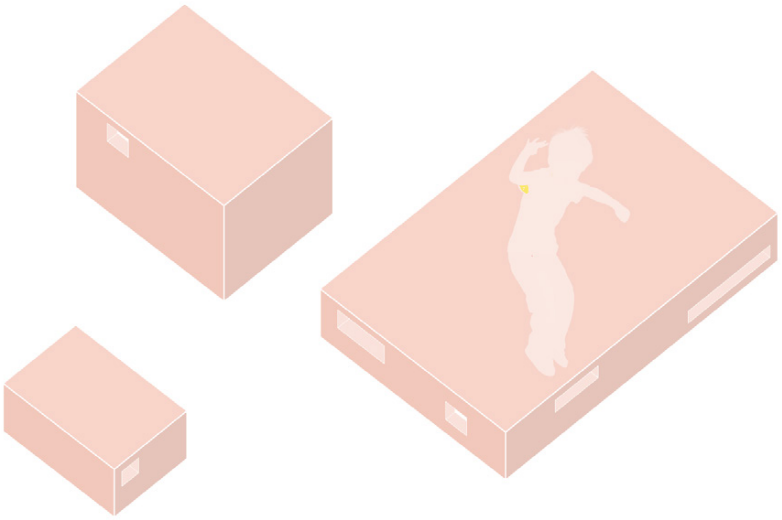


Figure 63 Author made
Zone 4 zoom in floorplan 1:50

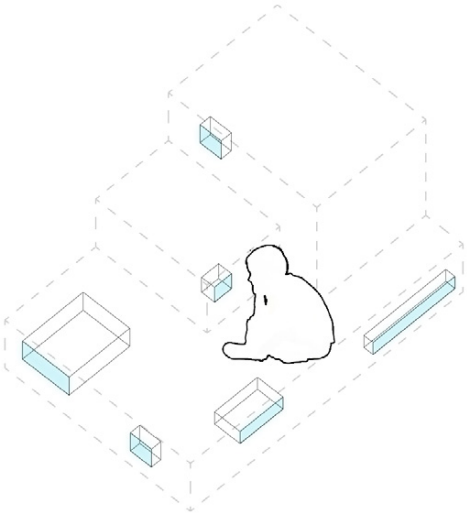
In front of the family sampling room, a small area is separated for the family zone. The cubic with some small windows in different directions, which I called 'children's perspective,' is an intermedium. It could be used for climbing and different seating arrangements. Artists could create art behind the small windows for children. Since those windows are quite low, it is noticeable to children. And the art could be a distraction for them. The light-colored floor in front of the door defines the entrance space. The soft cylinder seats also create a playful atmosphere.



Children's seating placement type A



Children's seating placement type B



The blue parts on the left diagram area are the spaces saved for art. On the next page, there are some references to art special for children's perspective.

Figure 64 Author made
Axometric drawing of children seating units.

Figure 65 Author made
Photo of children's perspective art piece

Figure 66
The view of a lower view exhibition.
Munch museum. (n.d.)

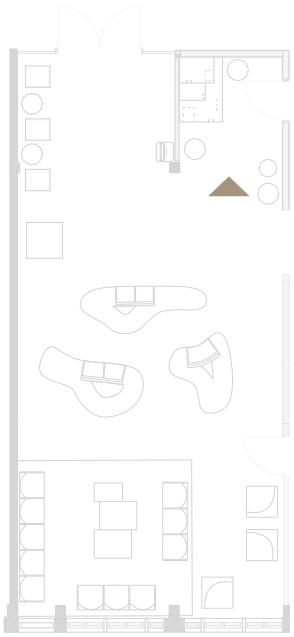


Figure 67 Author made
Zone 4 render location and view direction

Figure 68
Architectural render of zone 4
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

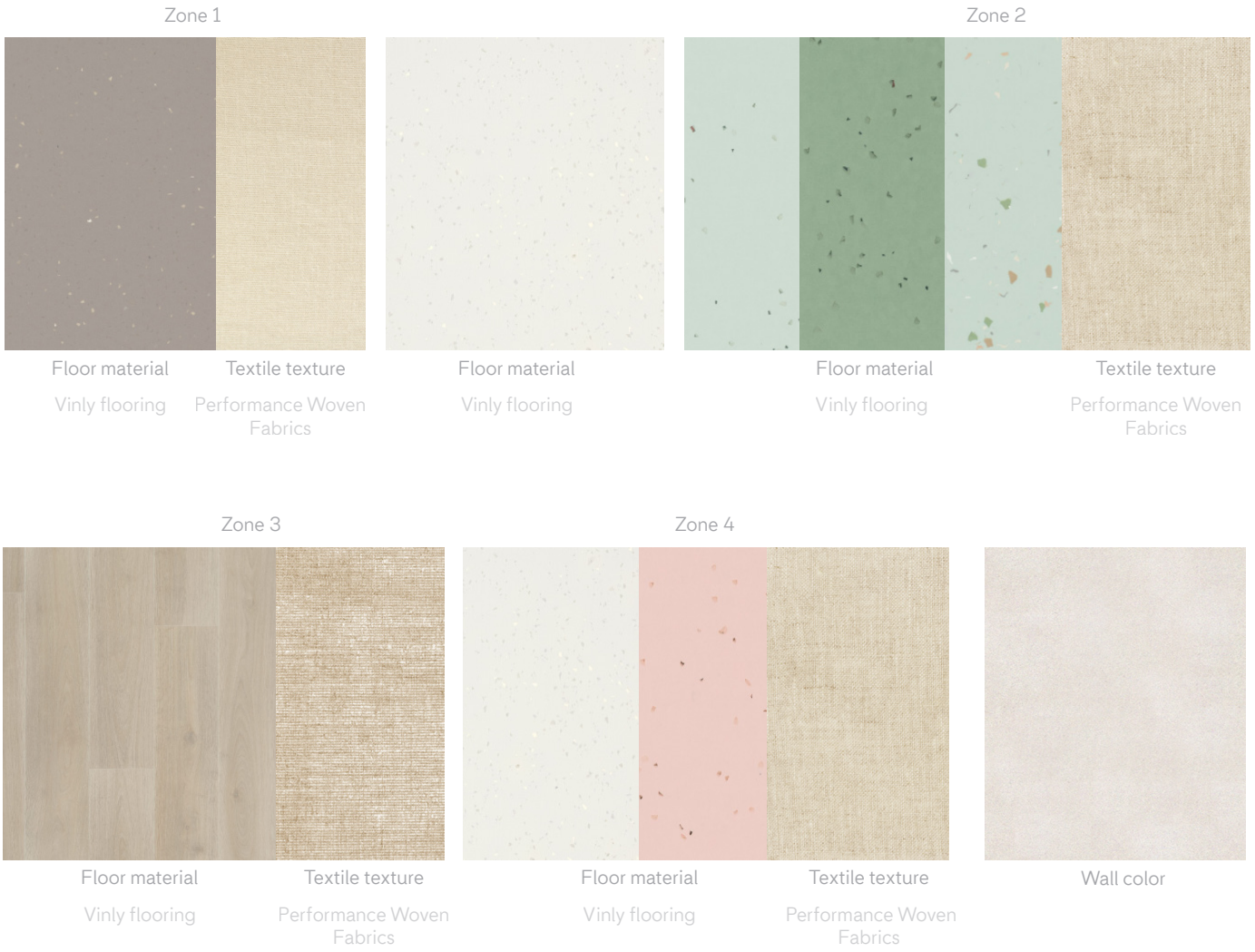


Figure 69 Author made
Material collage

The rendered image is the view after taking the samples. In the middle of the render, the art piece should be selected or designed with a therapeutic concept behind it. The light installation in the image is a test from the author, not a specific example.

The flooring of the project is all vinyl flooring, with different colors and patterns at different part. The textiles in the project all meet the hygiene and other related special healthcare context requirements.

Figure 70
Architectural render
Note. Image generated with assistance from OpenAI's ChatGPT (2026), edited by the author.

Discussion

This project explored transformation both at minimal and thorough levels. The minimal intervention, also written as sensory intervention, keeps the original layout. In this intervention, the ambiance of the waiting room is improved via changing the furniture and lighting, and adding an ambient display. The thorough transformation, also written as spatial intervention, contains a new layout of the sampling department and waiting room interior design.

In the sensory intervention, the ambience of the room is improved compared to the original situation because of the new lighting design. Wayfinding to the sampling rooms is clearer with the linear light placement. However, the waiting room still has no access to natural daylight since the layout did not change. And the waiting room is divided into drop-in and booked areas; instead of the needs of the visitors, the actual usage of the two areas might be uneven.

In the spatial intervention, access to natural daylight is distributed between each department. The orientation is clear, with the entrance of the waiting room having a direct sightline to the outdoors. It is also easier for patients to find the sampling room since all the sampling rooms are organized in a corridor and have one access point for patients. The staff has two accesses to the waiting room, one to pick up patients and the other to have an overall view. Four zones are divided in the waiting room according to the space users' needs. Visitors have more options to stay during their waiting time. But there are still some potential problems unsolved, such as the noises from the social zone might be an interference to the quiet zone, and it might be a hygienic challenge to place too much sound-absorbent material.

And loose furniture brings both flexibility and a safety threat. The cost of changing the whole plan (walls, sinks, bathroom) is high, but it will give a better experience for sampling as well as the waiting room.
The two interventions use some of the same design elements, such as ambient display and furniture. They give examples of how to design a therapeutic waiting room in different design phases.

In the exploration of design strategies, many elements intertwine with each other. Thus, the order of using design strategies is important. While there are still problems, such as information updates that are out of architectural criteria, they have an impact on users' feelings. Hopefully, the project has achieved the therapeutic effect.

Regarding methodology, the project follows the order: first theory exploration, then practice design. This process seems to be linear, but it is actually a loop.

Waiting rooms are a common public space in many types of occasions, such as airports, except for healthcare facilities. Broader implications of this project could be tested.

All in all, there are many features that architects could make a change, and also many details are not within our ability. When I visited the site, I was distracted by much information, which all came to me without any layering or instruction. My design process was influenced by that first impression since I was focused on details. In the end, I realized what my responsibility is, which is to improve the environment as much as architects can.

Relevance for Sustainable Development

Sustainability is shown mainly in the general solution, which is flexible and movable.

The transformation project explicitly aims to reduce the ecological footprint of interior environments by prioritizing: sustainable design strategies, including natural daylight, and spatial efficiency; sustainable material selection, such as the use of recycled, non-toxic, and locally sourced materials with low embodied energy; circular design principles, where possible, including reuse of existing structures, modular components, and recycled furnishings.
At the core of this thesis is a commitment to human-centered design, which directly supports social sustainability by: improving psychological well-being through restorative spatial qualities, creating environments that foster dignity, comfort, and emotional safety, particularly in moments of vulnerability, such as waiting for medical care.

By foregrounding the emotional and experiential needs of users, the thesis contributes to the high-quality spaces that are not only functional but also socially responsive and ethically grounded.

Figure 71 Author made
sustainable=wood?

Student background

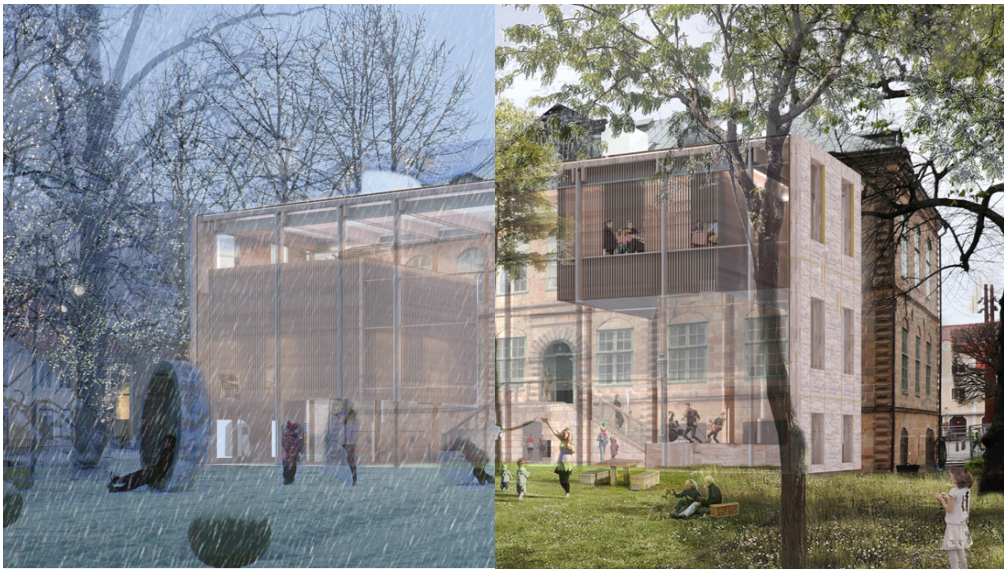


Figure 72 Author made
Perspective render of the transformarion result in different seasons

Sustainable building transformation

Working with irreplaceable places is an exhilarating struggle. It's a negotiation between place, history, culture, and the architect brought in to create new meaning: To highlight the existing and create new relevance by adding additional volume and restructuring the interior circulation.
By organizing the transparency of different volumes, we create a sense of grading hierarchy of openness and activities. Hoping to maintain the ambience of 400-year-old history.

Figure 73 Author made
Perspective render of BVC design

Healthcare architecture 1

Alma Primary Care Center's decision-making tries to fully achieve the clinic's commitment to well-being in every aspect possible, inner and outer.

Healthcare architecture 2

Breast cancer centre design in the big hospital area. Many challenges from the program and site.

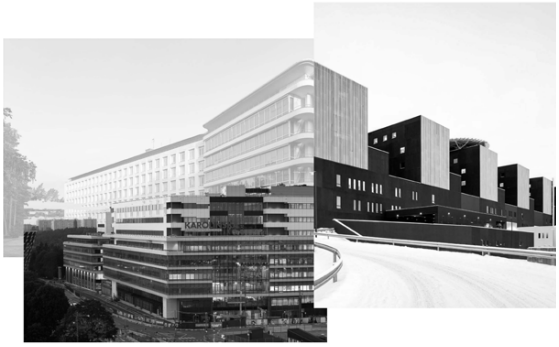


Figure 74 Federico Covre, Tuomas Uusheimo, White Arkitekter:
Collage of the research architectures

Color and light in spatial contexts

Practical implementation and guidelines of color and lighting in healthcare architecture in Scandinavia

Design and performance optimization in architecture

We apply building performance simulation software in the early phases of the design process to answer specific design questions with a sustainability perspective, structure and evaluate design choices, and our outcomes in terms of quantitative and qualitative criteria through several design iterations, using results from the simulation tools and simple architectural visualizations to present the proposal.

Figure 75 Author made
Lighting simulation of one of the design and final evaluation

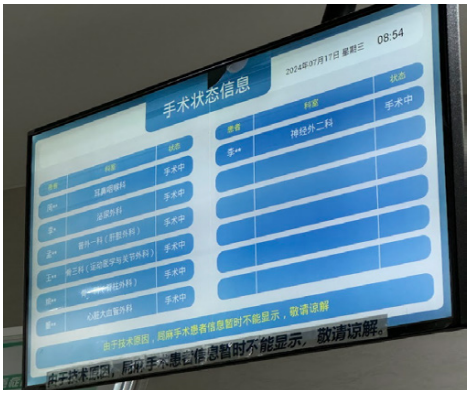


Figure 76 Author made
Photo of author mother's surgery information

Personal Experience

This is a photo of the information about the ongoing surgery. I took this photo while I was waiting for my mom's surgery.
The cold ambience of the waiting room didn't really help me pass through the longest two hours of my life. As an architect, I couldn't help but wonder, what can I do to improve visitors' experience?

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ChatGPT have been used as a text correction tool for grammar and spelling mistakes in already written text.
ChatGPT have also been used to generate images of objects and details to be used in visualizations such as improvements in material and lighting status.

Thank ML,CC,MS,...for all the help along the way.
Lastly, thank myself of always being critical,
via doing the thesis, i found the meaning of life

Sustainable healthcare waiting room transformation
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Author: Keming Zhao

Figure 77 Author made
Shadow of the cover photo