

Laura Barajas Martínez

# Design of an ephemeral exhibition to experience the light in Norway

Master's thesis in Department of Design

Supervisor: Martin Høgh Olsen

Co-supervisor: Irene De La Torre Fornés

June 2023



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Norwegian University of Science and Technology  
Faculty of Architecture and Design  
Department of Design



Norwegian University of  
Science and Technology







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**Master thesis for student Laura Barajas Martínez**

**Title: Design of an ephemeral exhibition to experience the transition of light in Norway.**

**What is the thesis about?**

The goal of this master's thesis is to design a temporary exhibition based on the concept of the transition of the light in Norway. People who walk through the exhibition will be able to experience firsthand how light feels like in such a nordic country.

**Background and motivation:**

Ephemeral architecture is concerned with the design and construction of buildings and structures that are only design and exhibited on a temporary basis. Thus, starting from a concept or idea and by means of the design process, the exhibition would be shaped and materialized for being functional.

As a new exchange student here in Trondheim and coming from a southern Europe country I am very fascinated by how the light behaves here in a northern one. How are the colors displayed in the outdoors during the daytime and at nighttime and also the number of daylight hours that exist. Thus, the proposed exhibition will be created by the concept of light and people who walk through it will be able to experience in firsthand how would be the life in such a nordic country as Norway and how light behaves on it. Moreover, I find it very interesting to be able to experience for myself the transition of the light in Norway from January to June which are the months I will be here while writing the thesis.

During my master's degree I have been able to participate in several subjects related to spatial design experience and I create different projects related to this. Moreover, I have used graphic and communication design skills to approach all these designs into the real world.

Finally, in the last course of my Master's Degree I had a subject of Design of Temporary Facilities and Exhibitions that I really liked and where I learned a lot about ephemeral architecture and how design could influence on it so I thought that this proposal could be very suitable to deepen my knowledge on the field of Spatial Design.

**Methods and process that will be used (describe as a list)**

- Interviews and workshops
- Literature / Research
- Autoethnography design
- Observation
- Ideation
- Conceptualization
- Selection of materials
- Prototyping
- Design process

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**Expected results and format**

Besides the thesis report, the expected results are a detailed research of referents and research work and the development of the shape of the exhibition to be represented in 3D modeling or small scale models. Moreover, the infographic part of the exhibition will be shown with graphical solutions and additional representation will be made on specific critical design solutions.

The assignment is carried out according to the "Guidelines for master's theses in Industrial Design".

Main supervisor: Martin Høgh Olsen

Co-supervisor (if applicable): Irene de la Torre Fornés (in Spain)

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Sara Brinch  
Head of department

# Acknowledgements

I have no words to thank all those people who have placed their trust in me to be able to do my work. Nor do I have the words to thank all what I have learned during these last five months I've been here in Norway.

This project has not been easy to develop as I was completely unfamiliar with everything related to the exhibition and interior design field. That is why this proposal could not have reached this magnitude without the great help of my two supervisors, Martin and Irene, whom I admire completely. I will be eternally grateful to them for being my support during all these months and for helping me to develop in the best way each of my ideas to reach the result shown in this work. Thank you Martin. Thank you Irene. Thank you for trusting me to supervise me and to carry out this project with me.

Apart from the complexities offered by the large scope of this project, it has been a project that I have enjoyed from the very beginning, from its ideation processes to the development phase to see how I was carrying out with my own hands everything I had proposed. The development of the prototype was very gratifying, as it was the first time I worked with wood and made a small-scale model.

Thanks to all my family for their daily support and for giving me the opportunity to be able to complete my Master's degree here at this university, to my father, my mother, my aunt and my sister without whom I don't know what I would have done without their help to develop many of the ideas here presented and for their unconditional support as a family.

To my friends for having listened to me and supported me during these months that I have been doing the Master's Thesis. To Fer, Juanpa, María, Raquel, Mónica, Bea, Lucía, Arianne, Ananaí, Patri, Miguel Ángel and many other people who have helped me in the hardest moments to keep going and to make the distance seem less distance.

Definitely, by carrying out this project, I feel that not only have I grown a lot as a person but also in a field of design that I was completely unfamiliar with and that has ended up becoming a passion.



# Sammendrag

Formålet med utstillingslokaler er å stille ut elementer eller gjenstander av kulturell verdi. Det er imidlertid en forskjell når målet er å skape en intim forbindelse mellom det utstilte og den besøkende.

Ethvert utstillingsrom består av arkitektonisk, kunstnerisk og teknologisk kunnskap, og har også som hovedmål å skape en eller annen form for kontakt med brukerne som går gjennom det, ved å overføre nye fornemmelser, følelser og oppfatninger for å gi dem den beste opplevelsen mens de går gjennom det. Følelsene som objektene i interiøret vekker hos brukerne, avhenger av hvordan det aktuelle rommet er utformet og hvordan elementene er fordelt i det. For å skape den beste brukeropplevelsen er det derfor viktig å gjennomføre en grundig studie av alle designelementene som skal plasseres i rommet, og å ta vare på hvert enkelt element i rommet, enten det gjelder valg av materialer, fordeling, føringsveier, belysning, farger og mye annet. Men før man tar stilling til alle disse elementene, er det viktig å utvikle et konsept som utstillingens tema kan baseres på.

Dette designforslaget er basert på konseptet lys i Norge, og for å oppnå dette er det laget et utstillingsrom der brukerne kan føle og oppleve de ulike lysene som finnes i ulike scenarier som naturen selv produserer i dette skandinaviske landet, enten det

er i vintermånedene, som skiller seg ut ved å være lange, harde og mørke, eller i sommermånedene, med mange timer med lys, kortere og mer livlige.

Dette prosjektet har som mål å gjenspeile skandinavisk kultur på en elegant måte gjennom kunst, design og teknologi. Utformingen av dette utstillingsrommet vil derfor ikke lenger bare være visuell og estetisk, men vil bli et sett med oppslukende opplevelser der brukerne vil kunne oppleve sanseintrykk som de aldri har opplevd før.

På denne måten er målet å bringe norsk kultur nærmere de som ikke kjenner til den, ved å vise det storslåtte ved disse naturfenomenene og scenariene som bare kan betraktes her i Norge, og redusere dem til deres mest essensielle og rene form, slik at deres sanne essens kan verdsettes med total klarhet og enkelhet i hvert av rommene.

## NØKKEWORD

Utstillingsrom, Norge, sjøcontainere, brukeropplevelse, lys, opplevelser.

# Abstract

The aim of exhibition spaces is to exhibit elements or objects of cultural value. However, a differential element is provided when the aim is to create an intimate connection between what is exhibited and the visitor.

Any exhibition space is made up of architectural, artistic and technological knowledge and also has the main objective of connecting in some way with the users who pass through it, transmitting new sensations, emotions and perceptions in order to provide them with the best experience while they walk through the space. The emotions that the objects exhibited in the interior space awaken in the users depend on how the spaces in question are designed and how their elements are distributed inside them. Therefore, in order to create the best user experience, it is essential to carry out a rigorous study of all the design elements that are desired to be placed inside the space as well as to take care of each element inside it, whether through the choice of materials, its distribution, its walkthroughs, its lighting, its colors and many others. However, before considering all these elements, it is important to develop a concept on which to base the thematic of the exhibition.

This design proposal is based on the concept of light in Norway, and to this end, an exhibition

space has been created in which users can feel and experience the different lights that can be found in different scenarios that the nature itself produces in this Scandinavian country, whether during the winter months, which stand out for being long, hard and dark, or during the summer months, with so many hours of light, much shorter and more lively.

In conclusion, this project aims to reflect Scandinavian culture in a very elegant way through art, design and technology. Therefore, the design of this exhibition space will cease to be exclusively visual and aesthetic to become a set of immersive experiences where users will be able to experience sensations they have never experienced before.

In this way, the aim is to bring Norwegian culture closer to those people who do not know it, showing the magnificence of these natural phenomena and scenarios that can only be seen here in Norway and reducing them to their most essential and pure form, allowing their true essence to be appreciated with total clarity and simplicity within each one of the spaces.

## KEYWORDS

Exhibition space, Norway, shipping containers, user experience, light, experiences.

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# 01

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introduction

motivation  
objectives  
methodology

## Introduction

One area of work within the field of architecture and design is the design of exhibition spaces, and that is precisely what this work is based on: designing an exhibition.

Most exhibition spaces are specially conceived and designed to last for a certain period of time. When this time is over, they are either taken to other places so that other people can see them or the materials and elements used in their assembly are reused to give life to other exhibitions or constructions. However, there are certain exhibitions that are permanent, which are usually collections of works of art or objects that are exhibited

continuously in specific places.

The present project is intended to be a temporary exhibition space based on the concept of light in Norway. This space will be eye catching and will present very intuitive walkthroughs. It will use sustainable and recycled materials for its construction, promoting the circular economy and contributing to the environment to the greatest extent possible. In addition, it is specially designed to be easily assembled, disassembled and moved to any desired destination, so it is imperative that it is easily transportable.

## Motivation

Living in another country has many benefits. Among them exists exponential growth both in a personal and professional way, and the fact of knowing a different culture, different people, another language, another way of doing things, allows you to develop certain skills and abilities that you didn't know about yourself before.

In my case, I chose Norway because in addition to wanting to get to know the Nordic education system first hand, which stands out for its excellence, I was looking for experiences that were totally different from those that can be had in a country located further south in Europe, as is my own.

Among them, I would like to highlight the fact of being able to witness and experience the long, cold and harsh winter that exists in this country on my own, as I considered it a real challenge. However, what shocked me the most when I arrived in this country was its lighting. I kept contrasting the warmth of the colours in my home country with much more vivid and saturated tones compared to the cold and saturated colours and hues I found here in the north of Norway. In addition, I was also very shocked by the change of light, the transition of light during winter and summer, with very little light and so much light, respectively.

This was my main source of inspiration to be able to find the theme that would lead me to develop this whole project. By creating this project, my intention was to compare two

very different cultures and to bring part of the Scandinavian culture to those people who perhaps have not had the opportunity to visit these countries. So that they could witness the same sensations that I was experiencing during my stay here in Norway, both in the city itself and those that I had the opportunity to witness in some wonderful places where I have been able to see the extraordinary natural phenomena such as eternal sunsets and the northern lights, both elements of inspiration to conceptualize part of this project.

So my concept was to base my project on the light in Norway, and I thought I could make it in an exhibition space that would be temporary and could go from one place to another so that anyone from anywhere in the world could visit it and experience all the lights that can be seen here in Norway through the journey of this immersive exhibition. Therefore, I have managed to capture some of my own experiences lived here into the project itself.

# Objectives

The main objective of this work is to create an exhibition space based on the concept of light in Norway, in which users can experience the different lights that can be found in this country at different times of the year through a series of sensory experiences along the way.

Thus, the aim is to show and reflect part of the Scandinavian culture in a very elegant way through design, art and technology to those users who are in other parts of the world and are not familiar with this culture.

during the **conceptualization phase** a brainstorming of ideas was carried out and the most suitable design solutions were proposed through a phase of ideation and sketching, creating different proposals. However, in order to obtain more inspiration when making these sketches and to have a more approximate idea of what was intended to be designed, it was necessary to make another research for much more specific and specialized referents such as lighting referents in the field of lighting spaces. Another design method that should be highlighted during this phase was the creation of different Mood Boards to use them as a visual guide for inspiration and to help to create the different spaces.

physical proposal, in order to observe its shape, its materiality and its functionality. In addition, light tests were carried out to check that all the proposed ideas would work and, if not, to propose the appropriate changes to make them work.

Once this phase was completed, a **brief communication phase** was carried out in which an advertising campaign was created to announce the exhibition. For this purpose, corporate graphic material was created with the theme of the exhibition.

Finally, a series of final **conclusions** were presented that could be useful as a guide for future constructions of spaces of the same approach.

Then, during the **development phase**, which has been the most extensive, a research in materiality has been carried out to see which was the most suitable for its final construction. At the same time, the final plans for both the exterior and interior of the exhibition were defined in AutoCAD and a 3d Model was built in Rhino. Furthermore, a study was made to see which different possibilities should have the containers when their assembly and the limitations they have on the space. Another study about the different walkthroughs that could exist in the space has also been done. Finally, a small model of a E 1:20 scale model was made in order to demonstrate the viability of the exhibition with the help of materials provided by the university. In this way, it was possible to obtain a visual and

experience of visiting certain exhibition spaces will be shown. In this phase, it has also been essential to carry out a research for referents in architecture, art and design who have had extensive experience in the sector of ephemeral constructions and exhibition spaces or pavilions in order to find out about some of the projects they have carried out and which have also served as inspiration source for developing the final proposal. In addition, each of the elements used in their works have been analyzed: their materiality, their lighting, their distribution, their colors, as well as the concept from which they start to create them.

Once all the references had been analyzed and all the users' needs had been detected,

# Methodology

In order to carry out this project, a methodology of work has been followed in four different phases: research, conceptualization, development and communication. All the steps followed in each phase are detailed below. However, it should be noted that it was essential to carry out a prior study of the design process required for interior spaces by taking a Retail Design course, as it is important to know which elements are the most important to consider when designing this type of spaces.

During the **research phase**, the briefing, the target audience and two questionnaires were defined in order to identify the concerns and needs of both the space and the users to find out which aspects were the most relevant when designing the space. In addition, the

# 02

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research

briefing

target audience

design requirements

user experience

own experience

art, design & architectural references

elements that define the space

## Briefing

In this design proposal, an ephemeral exhibition space has been created based on the concept of light in Norway, whose main objective is to show the different lights that can be observed in this country when some of its natural phenomena such as the Blue Hour, the Northern Lights, the Midnight Sun and others occur in each of its spaces.

This space will have a total of five rooms where users will be able to experience different experiences as they go through the exhibition route, which will also be very intuitive.

In addition, for its construction, use has been made of maritime containers that have come to the end of their useful life in order to give them a second life and create the structure of this exhibition. In this way, by making use of these materials, the aim is to collaborate

with the environment by reducing the environmental impact that a new construction could have in comparison.

Finally, it should be noted that this exhibition will have a type of joints that facilitate its assembly, disassembly and also its transportation, as its intention is to be moved from one place to another.



Fig.1 Design Thinking

## Target audience

The exhibition is aimed at a wide range of audiences of all ages. However, children under the age of 13 must be accompanied by adults.

It should be noted that the main target audience will be people who are in another country outside Norway or who have not lived or been in Norway for a long period of time. In this way, the intention is that visitors who have not been able to visit Norway, or

are not familiar with the country, can get an insight into its culture through a visit to this exhibition.

However, this does not mean that the exhibition excludes people with Norwegian nationality, but it is important to note that they will not experience the exhibition in the same way as others with a different nationality, as the intention is to bring them closer to this part of Norwegian culture.

## Design requirements

Any exhibition space has specific needs, as its content will depend on what is going to be exhibited in it. The lighting, routes, circulation, signage, mounting systems, materials chosen, other installations, etc. are just some of the elements to be considered when designing an exhibition space. The combination of all of them and the way they are placed in the space will make the difference between the experience of visiting one exhibition and another.

However, before defining the exact form and content of the proposed exhibition, needs sheets have been created to find out what the space may require and to take this into account when designing it, as well as the needs of users when visiting exhibition spaces.

To this end, two different surveys were carried out. On the one hand, the first was aimed at a more specific group and contacted professionals from the design, art and architecture sectors. Specifically, a total of 5 NTNU lecturers from the Department of Architecture and Design were contacted.

On the other hand, the second questionnaire has been created for a more general audience, especially for people who have been living in Norway for a longer or shorter period of time [but at least 6 months]. Native people are also included. For this purpose, different students from NTNU Trondheim and other Norwegian universities, as well as other people working in Norway, have been contacted.

### SPECIFIC SURVEY

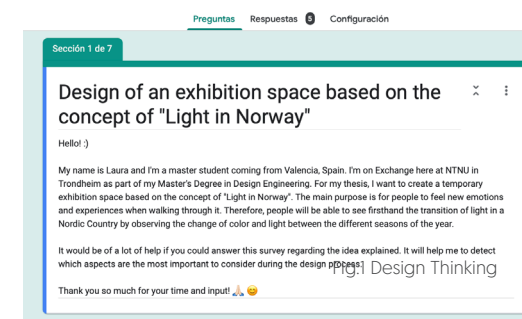


Fig.2 Surveys for Research phase

The aim of carrying out these surveys is that by analysing the responses we can detect the concerns and tastes of the users in order to

### GENERAL SURVEY



get a better idea of what they would like to find in the space or what is most relevant to them when visiting an exhibition space.

# Design requirements



Fig.3 Design Results

Due to the lack of knowledge about this culture, it has been useful to know the opinion of these professionals in order to draw the following conclusions:

## RESULTS OF SPECIFIC SURVEY

All the interviewed have been living in Norway for more than 10 years and all of them were between 35 and over 60 years old. The majority were architects.

The first things that came to their mind when thinking of Norway were landscapes, culture, lands and nature, so this was very useful to perhaps focus the exhibition on Norwegian nature.

The following questions were focused on the relevant aspects they considered while designing an exhibition space. The most

After having carried out both surveys, the following results have been obtained:

The first survey which was focused on professionals in the design and architecture sector living in Norway, has been answered by a total of 5 people. However, the information obtained was sufficient to get to know and get to know the Norwegian culture a little better.

meaningful was the location where it can be exposed and then the materials, the lighting and the colour choice in the space.

The element most relevant when designing an exhibition space was what will be exhibited, the lighting and the user experience. So it is important to make the content inside the exhibition attractive to the users so they show interest in visiting it.

Furthermore, to know what makes the difference in setting the right lighting when designing an exhibition space, for most people was the choice of having some emotions that can be experienced in different environments. So this answer was quite helpful to taking in mind that it is important to emphasize which emotions the exhibition wants to create in the visitors and how the light can be an influence on this.

Three people consider that the exhibition should be placed outside Norway, in a big city. This was very relevant to eliminate the possibility to make the exhibition in Norway and consider the possibility of bringing it to other cities, and even to different ones and not just only one.

Other things that people consider relevant when designing an exhibition space are the budget, the sequence of spaces, building up spatial experience and the path that the visitors follow.

## RESULTS OF GENERAL SURVEY

On the other hand, a total of 70 responses were obtained for the general survey. The results were the following:

Target public: 44 women and 26 men in which 69 were between 20 and 50 years old. 47 were students, 14 were working and studying and 10 were working. 52 of them were exchange students. And the majority were from Germany and Spain.

The most shocking thing while being in Norway for them was how short the winter days were, as well as the type of light and the food. The majority of the people didn't know that in summer the daylight duration is more than 20 hours, but they knew that the length of the daylight in winter is between 5-8 hours.

Half of the interviewed have experienced a Seasonal Affective Disorder and the following symptoms were the most lived:

- Feeling tired in winter [52]
- Oversleeping [40]
- Low mood [30]
- Feeling more sociable in summer [30]
- Insomnia [30]



# Design requirements

To cope with the negative effects of the seasonal disorder, the following activities were accomplished:

- Do exercise [40]
- Try to keep their mind busy[44]
- Taking D vitamin [40]
- Going out and do winter activities [42]

For relating Norwegian landscape with nature:

- Nature represented by sunsets, fiords and snow [62]
- Northern Lights [38]
- The difficulty to walk on ice [38]
- First time of seeing the snow [23]

About the Blue Hour, only 30 people could have experienced this phenomenon and their feelings were feeling calm, relaxed, nostalgia and coziness.

For the interviewed people the summer transmitted them cold colours, with lots of green and blue, and in winter a neutral scale of blues and greys.

- The materials that best represent Norway for the people interviewed were:
  - Wood [70]
  - Stone [33]
  - Glass [14]
  - Recycled materials [12]

Moreover, the most recommended materials for the exhibition space were:

- Glass [43]
- Wood [37]
- Recycled materials [20]
- Stone [17]

With this survey we knew a bit more about Norwegian culture and especially how exchange people perceive Norway.

On one hand, we can see that there were more women than men answering the questionnaire about exhibition spaces, so maybe this genre is more interested in these kinds of spaces than men.

Another relevant fact is that exchange students found winter days really short in comparison with their home countries as well as finding strange the light and food. So that was crucial in being able to research about daylight hours in Norway and how light affected people's lives, specially in winter. To consider adding this somehow into the exhibition space.

Moreover, the majority of the people didn't know that in summer the daylight duration is more than 20 hours so maybe we could consider showing this in the exhibition too. However, they knew that the length of the daylight in winter was between 5-8 hours, so they already knew that the winter didn't have much daylight.

Relating to the Seasonal Affective Disorder and how people cope with that, was not very helpful for developing the exhibition content.

However, knowing how best Norwegian landscape is represented helped us to develop some ideas about the content of the exhibition. Norway is best represented for its sunsets, fiords, snow and northern lights. So it was of great importance to consider these phenomena to see if they could be added to the exhibition somehow.

About the Blue Hour, only 30 people out of 70 had experienced this phenomena so it was helpful to consider that this maybe was great to add into a space inside the exhibition to explain in what consists, where it could be seen and what can you feel while experiencing this experience.

There was a clear recognition between the summer and winter colors so it was helpful to contemplate the importance of adding colours into the spaces to maybe represent summer and winter months. So it was helpful to know that the color was an essential fact to consider in the exhibition space.

Finally, people knew that the materials that best represented Norway were Wood, stone, glass and recycled materials and that they would like to see the same materials for the construction of the exhibition space. So it was good to know that those materials would be

considered while designing the exhibition space, because it would be easily recognised for anyone as a Norwegian construction.

In short, this questionnaire was helpful for trying to visualize the exhibition as a space for showing the dark part of Norway and the light part, and maybe to make a contrast between what can be seen on one side and on the other. Also, to see which kind of materials people think best represents Norway and taking them into account at the time of making the design proposal.

## Design requirements

The experience that a visitor can have when visiting an exhibition space depends to a large extent on the design elements that are arranged inside it and how the visitor interacts with them.

The aim of choosing these elements is to be able to connect with the user in such a way that they have an unforgettable and unique experience. To achieve this, it has been important to carry out a meticulous study of what is to be transmitted in each of the rooms in order to choose the most suitable materials and elements.

It could therefore be said that in order to create the content of the interior of any exhibition space, it is necessary to start from a single concept. Once you know what this concept is, you will try to transmit it through the design elements chosen for each of the corresponding spaces in the exhibition.

In this project, the concept on which the exhibition is based is light in Norway and therefore all the elements chosen to create the content of the rooms will be based on light.

It should be noted that it is the senses that help to create unique experiences while walking through certain exhibition spaces, as each visitor perceives the elements inside in a different way thanks to the perception of their senses.



Fig.4 User Experience

As this exhibition aims to create unique experiences, the senses will be a very important element to consider when designing this space.

Research about how the senses influence the user while being in a space has been done. Among all the articles searched, the most outstanding or the most interesting ones are mentioned below.

**Charles Spence** highlights that "most people are not aware that our experience of space is

more multisensory than we thought" [1] [p.3] so it is important to work on this topic while designing a space to make people notice this.

Moreover, **Charles Spence** says that "By designing experiences that congruently engage more of the senses we may be better able to enhance the quality of life while at the same time also creating more immersive, engaging, and memorable multisensory experiences" [1] [p.20]. So it is clear that the experiences designers and architects create in a space will make a difference to the experience that a visitor can have while visiting a place, so it can be said that this experience will depend on how the space is designed.

**Charles Spence** also says that "The architect must act as a composer that orchestrates space into a synchronization for function and beauty through the senses – and how the human body engages space is of prime importance. As the human body moves, sees, smells, touches, hears and even tastes within a space – the architecture comes to life"[1] [p. 14] So it is very important to emphasize this matter.

In another research paper based on the Measurement of User Emotion and Experience in Interaction with Space, **Myung Eun Cho & Mi Jeong Kim** investigate about the user experience and emotional aspects of a space's design. However, "the the strength of

this research is the focus on the integration of the space with technologies and user experiences from a new perspective in emotion research, rather than concentrating only on the architectural components of the buildings themselves" [2] [p. 105].

"The result shows that morphological, sensory and perceptual factors were the significant factors that influence emotion." [2] [p. 105]. So again, it is meaningful that the senses influence on the user experience while being in a specified space.

All of these researches have helped to understand the importance of impacting on the senses while designing the exhibition space in order to provide the best user experience and also how technology could be used in order to create new emotions and perceptions. That is why, in this proposal, the senses will take a leading role.

In order to create the best experience, and for the visitor to feel a difference from the moment they enter and when they leave the exhibition, we have analyzed each of the senses and how the elements arranged in the exhibition influence each of them to create different emotions and sensations in the visitors.

# User experience

## THE IMPORTANCE OF THE SENSES WHILE DESIGNING AN EXHIBITION SPACE



Fig.5 Senses

Each of the senses could influence the user experience inside the exhibition:

Firstly, **sight** will be the most relevant sense within the exhibition space as it will be based on light, and sight will be the sense that will allow light and colour to be perceived.

On the other hand, **touch** is another of the most important senses within an exhibition space because many users find it interesting to be able to interact with the different elements that are located inside it in order to obtain different sensations. In the proposed exhibition, the aim is to awaken this sense through the temperature inside each room. There will be different temperatures in each room to create a certain contrast between them and show the difference between the warmest and coldest months, as well as the phenomena that can be perceived in each of them. This will be perceived by touch.

**Hearing** is another very important sense to consider. Music transmits many emotions such as calm, sadness, melancholy, joy, anger and many more. By incorporating music into the exhibition space, the aim is to enliven

certain emotions in the different users. For this reason, hearing will also be an essential sense in the course of this exhibition.

Finally, **smell** is not the most relevant sense, as it is often the most difficult to add, especially in exhibition spaces. However, we should not let it go unnoticed, as by making use of it we can transport the user to any desired environment.

Unfortunately, taste is the least common sense used in exhibition spaces, due to its difficulty to implement. Nevertheless, it is one of the most important when designing in Retail Design.

**"Ikea** is an example of a retail brand that has achieved a strong taste association for its brand via its in-store restaurants with **30% of Ikea customers now visiting the store just to eat"**. [3]

Thus, it could be said that all the senses are decisive elements when designing any interior space as they will make a difference in the experience that a user may have when he/she find himself/herself in such a space.

# Own experience

During the development of this project, it was essential to carry out experimental work by visiting different exhibition spaces and noting down all the sensations, concerns and elements that were observed in each one. In addition, many of them have served as inspiration when creating the content of each of the spaces that have been designed in the project.

Likewise, some natural phenomena such as the Aurora Borealis or the Blue Hour, which we have been able to witness first-hand, have also been essential in order to develop more ideas. The following is a description of all the experiences that have taken place during these months and everything that each one of them has contributed to conceptualise all the ideas that have been put forward to create the content of the exhibition.

## NORTHERN LIGHTS

Arguably one of the best experiences you can have in your life is to witness the Northern Lights first hand. It is an unforgettable experience. Maybe you have a rough idea of what you might find when thinking about northern lights: which light are they going to have, which shape would they have, which colors and so on. But the truth is that when you see them, nothing is as expected. The colors are not the ones that appear on the pictures shown on the internet. On the contrary, if the intensity of the colors is not very vivid, they cannot be perceived in the same

way. However, a subtly coloured silhouette suspended in the sky can be distinguished moving itself in the shape of a cloud. The aurora creates undulating shapes in the sky.

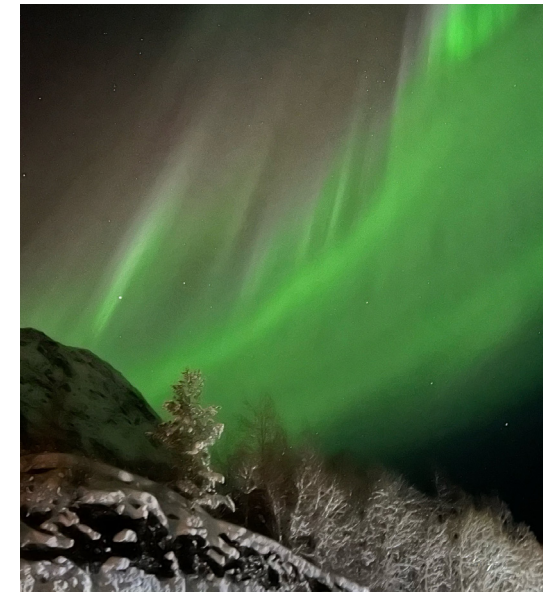


Fig.6 Northern Lights seen in Geirangerfjord in March 2023



Fig. 7 Northern Lights seen in Geirangerfjord in March 2023

# Own experience

## NORTHERN LIGHTS

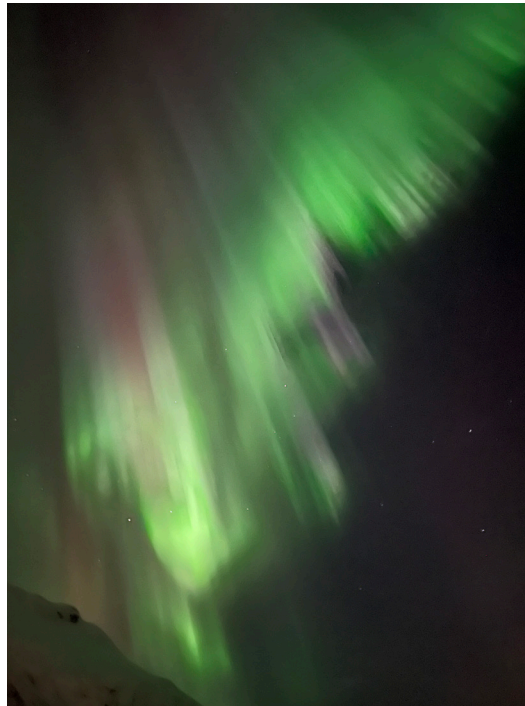


Fig. 8 Northern Lights seen in Geirangerfjord in March 2023



Fig. 9 Northern Lights seen in Geirangerfjord in March 2023

I had different feelings while observing the sky while the northern lights were moving. First, very calm and amazed but at the same time it seemed unbelievable to have them just above you in the sky and that they had green, purple and pink colors projected. Everything in the middle of the darkness.

However, with the camera's phone the shapes were better appreciated than in real life. Since light pollution in the area was very low, it was possible to have better perception of the Northern Lights.

The greatest part for me was when they were moving into the sky. They moved so fast that you weren't able to follow them. One second they were up in the sky and the next one they were 400 meters away. It was really stunning watching these shapes into the sky, it is a feeling that you can only feel while watching them and you can only live it if you are lucky and the weather conditions allows you to see them. So it is not a common phenomena you can always see by coming here to Norway.

## THE BLUE HOUR



Fig. 10 "The Polar Night is the blue time in Northern Norway" [4]

In large areas of Northern Norway, there exists the famous **"Polar Night"** also known as **"Blue Hour"**. The atmosphere in its whole turn blue creating a magical light that only happens in this area of the globe.

This phenomenon happens due to the inclination of the planet. When the hemisphere is farthest from the sun, the Winter comes around and specially the Polar regions in the north are the ones that are angled farthest away. So as a consequence, in Polar regions there exists nights in winter that last 20 hours or even some weeks without seeing the sun

such as in Svalbard.

Moreover, depending on your location, the Polar Night can last days to months, so the closer you get to the North Pole, the darker it will be, and as you go down from the North Pole, the lighter it will be. For example, in the North Cape, the sun remains under the horizon for more than two months. In contrast, in Tromsø it lasts for six weeks. From Bodø and farther south, the sun appears at least some hours briefly during midday. In other regions close to the North Pole, such as Svalbard, the sun disappears for almost four months.

# Own experience

## THE BLUE HOUR

Although the sun doesn't rise up the horizon, Northern Norway is never blacked out entirely. The sky in the north areas is a deep midnight blue and it can be distinguished by the dark black night.

“Around 1–2 o'clock in the afternoon, the residual light is reflected off the blue sea and the white snow, and the landscape is bathed in a glassy deep blue colour” [4], this phenomenon is called the **“Blue Hour”** and it is the most iconic period of the day. The blue lasts as long as the snow covers the ground and also when it's twilight time. That's why it cannot be perceived in summer months when it is too bright.



Fig. 11 Trip to Lapland

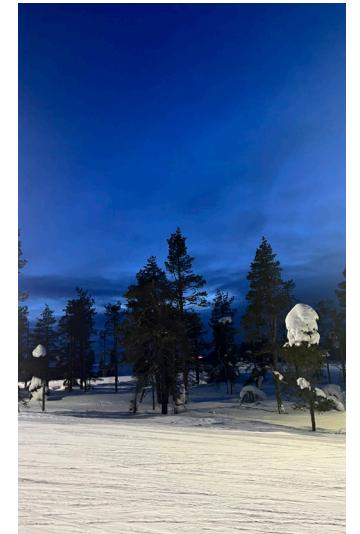
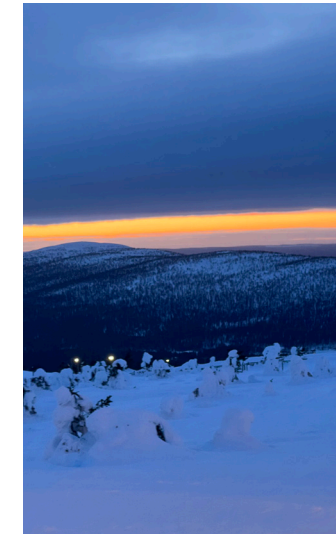
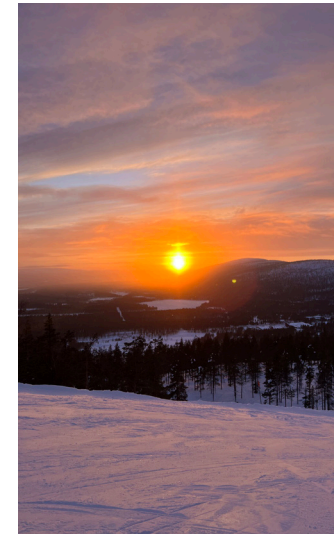


Fig.13,14,15 Northern Lights seen in Geirangerfjord in March 2023



Fig. 12 Trip to Lapland

In northern Norway there is usually some light at the winter solstice. On Svalbard, however, there is no light at all. Darkness surrounds these lands for months, but among this darkness, the Blue Hour can be found sometimes.

In my case, I watched the Blue Hour on a trip to Lapland in March as well as in a short cabin trip in April, during which the light leaves the skies around sunset time and the sky turns a completely blue; a deep blue colour that bathes the landscape creating a magical panorama that will give anyone watching it an inevitable sense of peace. I felt very calm and at ease.



Fig. 16 Short Cabin Trip - Holmsakoia April 2023

# Own experience

## KUK MUSEUM IN TRONDHEIM



Fig. 17 KUK Trondheim Museum

"KUK is Trondheim's most attractive meeting place for art and culture. Today it has become an art house that hits wide and narrow, with room for both established and less established artists." [5]

Through the visit to this museum located in Trondheim, some of the works presented by various artists were discovered, including the visit to the work of the artist Per Stian Monsås. However, this visit also served to observe the lighting of the space, as well as the distribution of the elements and the possible

routes that could be taken in order to observe what possibilities could be considered when developing the proposal.

Per Stian Monsås' work is based on everyday things or his own experiences and observations. His art is based on focusing on the properties of the materials he chooses and above all through abstraction. In this way he manages to create very characteristic works of art. One of his exhibitions at the KUK art center in Trondheim is described below.

## [TO BE CONTINUED] - Per Stian Monsås



Fig. 18 Exhibition [To be Continued] - Per Stian Monsås | KUK Museum Trondheim [6]

Ropes, stainless steel, wood, tape and strips have been used as the materiality of this exhibition. During Monsås' work [to be Continued], it is the spectator himself who must take an active role in order to interact with it. His work invites us to situations where the perception of the body plays on what surrounds us in the room. In other words, the presence of the body becomes an active part of what takes place in the exhibition space.

To be Continued is inspired by folk tales and is an abstract representation of an obstacle where the purpose is making the user interact

with it. However, the art work will also be available to those who simply wish to view it as a sculpture.

This art work is presented as an image of the heroes' journey where they must overcome certain obstacles and challenges. The wooden structure itself is inspired by old railway bridges and ropes fall from this structure creating an obstacle. At first glance, it seems that this obstacle imposed by the ropes may be insurmountable, but it is specially designed so that the person who wants to take on the challenge could cross it, providing him/her a different experience.

# Own experience

[TO BE CONTINUED] - Per Stian Monsås

This is why, by visiting this exhibition, the user will be able to create their own personal narratives with the experiences they have had. Some images of the visit to this exhibition space are shown.

The visit to this exhibition was very positive as it allowed me to understand that there are exhibitions where the user participates in the exhibition by interacting with the elements that are arranged in the space. The visit was therefore a source of inspiration to be able to develop new ideas in the project proposal.

Certain elements where users could interact with to create unique experience were considered in order to add them to the proposal.



[TO BE CONTINUED] - Per Stian Monsås

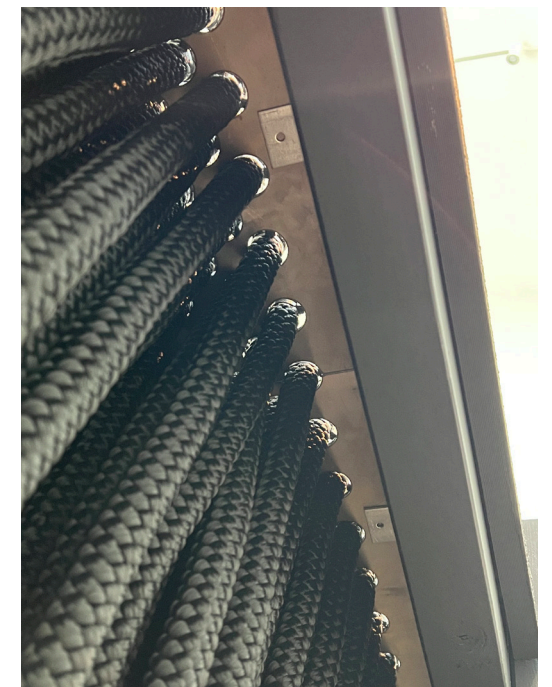


Fig. 19-24 Exhibition [To be Continued] - Per Stian Monsås | KUK Museum Trondheim [6]

# Own experience

## SPAREBANK TRONDHEIM



Fig. 25 Sparebank 1 Trondheim

### **Salamandernatten** (The Salamander Night).

This piece of art could be seen in the basement in the Sparebank Midt-Norge in Trondheim. The entrance is free but it could be only seen during the bank's opening hours.

The Salamander Night is an art installation made by the artist Kjell Erik Killi Olsen for Sao Paulo's biennial anniversary in Brazil in 1989.

The installation is composed of 72 sculptures, all of which are more than 3 metres high. Moreover, the Salamander Night was presented as a gift to Trondheim municipality by the artist in 2007.

## [SALAMANDERNATTEN] - Kjell Erik Killi Olsen



Fig. 26 [Salamandernatten] - Kjell Erik Killi Olsen [7]

"Firstly, 'Salamandernatten' was created for the São Paulo Art Biennial in Brazil, 1989. The building in which the 72 sculptures are exhibited is a dark and high room. The sculptures are more than 3m high. In the middle of the group a woman is found in the act of breastfeeding a salamander. The point of departure when Killi Olsen created this group of sculptures was his commitment to the rainforest, and indeed, the work of art led to increased attention towards the brutal

deforestation of tropical areas." [8]

Furthermore, " 'Salamandernatten' was in storage for 16 years before it was transported to Norway and displayed at an art exhibition in Oslo. The artist remained the owner of the sculptures for a long time until 2007, when they were brought to Trondheim, the artist's birthplace. Finally, Killi Olsen generously offered the sculptures to the Municipality of Trondheim" [8].



## Own experience

[SALAMANDERNATTEN] - Kjell Erik Killi Olsen

When I was in front of the exhibition I could appreciate that its exterior was made of a wooden structure about 6 m long by 4 m high and it had a black curtain for entering into the space.

I had different feelings before entering into the exhibition. First I felt a bit of fear because there wasn't any sound, it was cold and also it seemed really dark inside. I tried to open the curtain but the fear appeared again since I could not distinguish anything in the space.

I love the sensations that the artist makes you feel simply by placing you outside the exhibition itself, as you don't expect what is going to be inside, even by seeing that is already very dark.

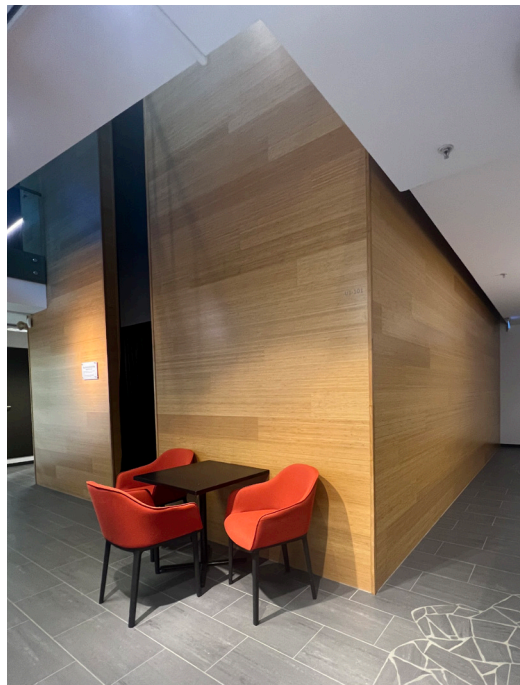
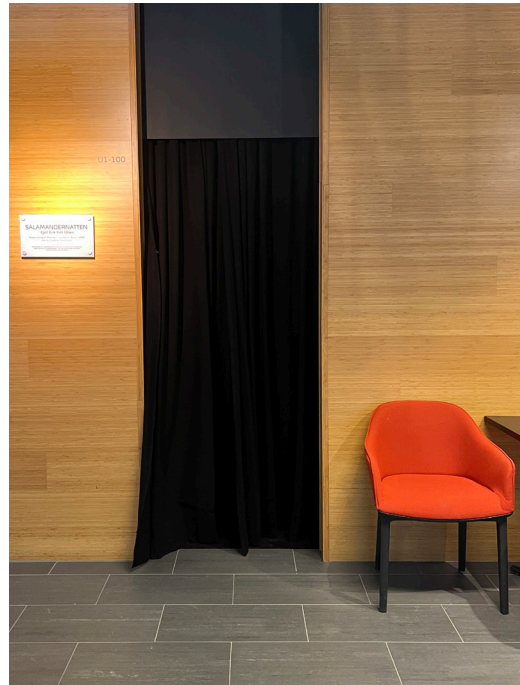
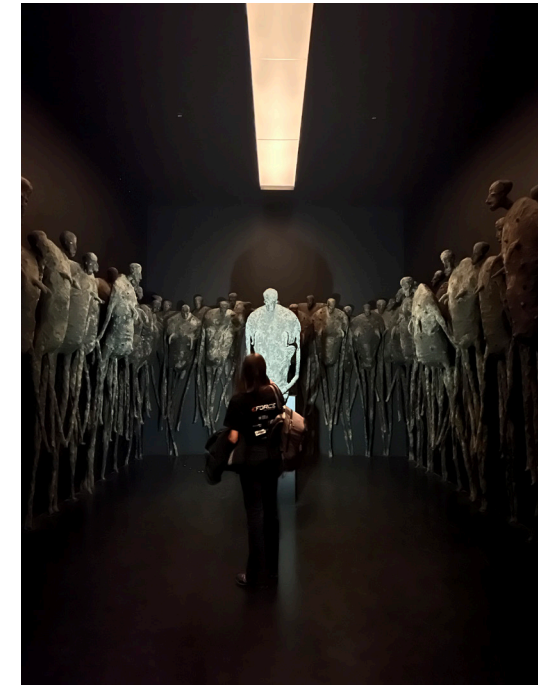
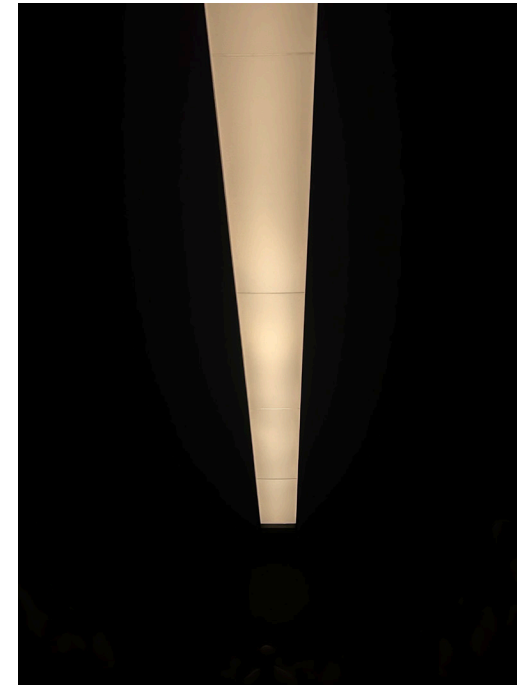


Fig. 27-31 [Salamandernatten] - Kjell Erik Killi Olsen

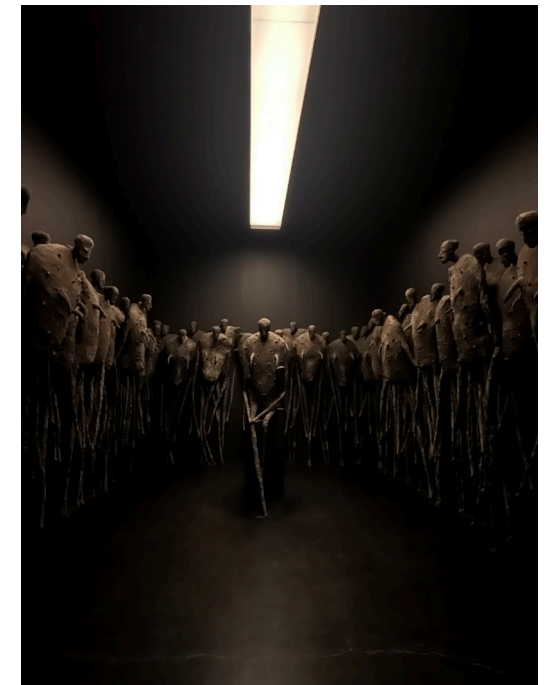
[SALAMANDERNATTEN] - Kjell Erik Killi Olsen



Finally, I saw two people coming into the exhibition and I decided to get inside with them. At the beginning it was impossible to see anything because the room was completely dark. I felt a bit of fear because I didn't know what was going to happen inside. It was supposed to wait around 2 minutes to be able to see some shadows and other elements inside but the result was that we didn't see anything but darkness.

Therefore, a second visit was necessary in order to appreciate what was inside. On this visit, when I entered the space I could not see anything but a little slight light in what seemed to be the roof of the space.

In around 3 minutes I started to distinguish some kinds of figures exposed inside the room. They were arranged on the walls and another one could be seen placed in the middle of the room sitting on a surface. They were about 3m tall and it was very impressive to have all of them inside the room. They seemed to be made of wood materials taken directly from the forest, like simulating some trees. When I entered the space I didn't expect to find all those figures in such a small space like this one. When you start to witness the figures, the space appears to be smaller compared to what it really is.



# Art, Design & Architectural References

A deep research in architecture, art and design of referents which had extensive experience in the sector of ephemeral constructions, exhibition spaces or pavilions has been done in order to find out about some of their best

projects carried out.

This research was essential to get some inspiration for developing ideas for the design proposal.

Furthermore, each of the elements used in their works have been analyzed: their materiality, their lighting, their distribution, their colors, as well as the concept from which they start to create them.

## ART & DESIGN REFERENTS



**SNARKITECTURE**

The beach

They create exhibitions that focus on the experiences that users can experience in them. In all their works, they seek that the user can interact on it and be part of it in some way or another.



**SOU FUJIMOTO**

Bus Stop

One of the inspiring characteristics of this architect is the power of conceptualisation in all his works and the use of white colours in them.



**NENDO**

Climbing Wall

This architect also stands out for the power of conceptualisation that he has in his works and his facility to decontextualise certain elements that are placed in them.



**CLAP STUDIO**

Her

Making creative and innovative solutions that combine functionality and aesthetics. The studio stands out for its experimental approach, using vibrant colours, geometric shapes and interesting materials in its projects.



**PLASTIQUE FANTASTIQUE**

Loud Shadows

Innovative and unconventional approach to architecture, exploring the intersection of art, design, and urbanism. Stand out for their inflatable structures and installations that challenge traditional architectural boundaries.



**LIKEARCHITECTS**

WanderWALL

Transform existing spaces through installations exploring the boundaries between architecture, art, and design. Their projects often incorporate unconventional materials, bold colors, and unexpected forms.



**SNØHETTA ARCHITECTS**

Aesop Oslo

Snøhetta is a transdisciplinary, dialogue-drive practice including architecture, interior, art, product design and graphic often integrating a combination of interests across their projects.



**CHRISTO & J. CLAUDE**

Wrapped Arc de Triomphe

A marriage where their works stand out by three very different aspects: the operation of wrapping or repeating, the materiality used in their projects [fabric and colour] and their scale.



**DANIEL RYBAKKEN**

Shelter Pavilion

The work of Daniel Rybakken occupies the area between art and design. His main focus has been to work with daylight and how to artificially recreate its appearance and effect.



**ATELIER YOK YOK**

Les Voûtes Filantes

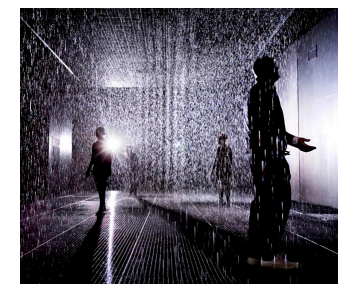
Atelier Yok Yok focuses on creating immersive environments and experiences through their designs exploring the intersection of architecture, art, and technology. Their work is characterized by a playful and poetic sensibility.



**NUMEN**

Void Seul

Their installations are characterized by their ethereal and otherworldly qualities. They try to invite viewers to interact with and experience the space in unconventional ways.



**RANDOM INTERNATIONAL**

Rain Room

They create immersive and experiential installations that invite audience participation and engagement by using robotics, artificial intelligence, and responsive systems.

Fig. 32 Design & Art Referents

# References Art, Design & Architecture

## NORDIC ARCHITECTURAL REFERENTS



HELEN & HARD  
The Financial Park



TYIN Tegnestue  
The Arctic Hideaway



BIG STUDIO  
The Plus



REIULF RAMSTAD  
The Whale



LUNDHAGEM  
Oslo Opera House



VARDEHAUGEN  
Utøya



SNØHETTA ARCHITECTS  
The 7th Room



ELDMØLLA SAUNA  
Elldmøla Sauna

-August Schmidt  
-NTNU Trondheim  
-Arnstein Gilberg  
-Ina Samdal



ESPENSURNEVIK  
PAN hytter



JENSEN & SKODVIN  
National tourist road



NORD 59°  
Trones Eye Glamping



ESPENSURNEVIK  
Våler Kirket

Fig. 33 Nordic Architectural Referents

# Elements that will define the space

Through the construction of this exhibition space, it was intended to create the the least possible environmental impact, and to this end, an extensive search of materials has been carried out in order to deduce which of them are the most suitable both for its construction and for its assembly.

The materials used in the interior of each of the rooms will be described in more detail in the following sections. However, for the external shape, recycled maritime containers that don't have a useful life anymore have been choosed in order to give them a second life.

In addition, they are the most suitable elements for this construction as the aspiration of this

exhibition is to be moved from one place to another. Therefore, the use of containers will facilitate the exhibition transport.

Choosing a shipping container for a construction element has a series of advantages and disadvantages concerning the transportation and construction.

## TRANSPORT ADVANTAGES

- Versatility and standardisation
- Efficiency and safety
- Cargo protection
- Reduced transport costs
- Intermodality: ease of transport by different means of transport

## CONSTRUCTION ADVANTAGES

- Very affordable prices [New 20' container from 2000 to 5000 USD; used 20' container from 1000 to 3000 USD]
- Durability and strength
- Efficient assembly and disassembly
- Fast on-site execution
- Versatile configuration due to modularity: stacked, linked together or modified
- Support of circular economy
- Mobility and relocation
- Reduced construction costs
- Contribute to sustainability by giving them a second useful life
- Optimisation during logistics processes
- Resilience and safety

However, it should also be noted that these elements also have a number of disadvantages:

## TRANSPORT DISADVANTAGES

- Slow transit time in maritime transport
- Limiting factor for companies requiring fast deliveries
- Require adequate infrastructure
- Land access limitations
- Difficulty in accessibility of certain geographical areas
- Some environmental impact on port cargo equipment

## CONSTRUCTION DISADVANTAGES

- Space constraints and design flexibility
- In some cases, their narrowness prevents them from meeting some specific standards
- The content has to be adapted to the container
- Need for structural reinforcement
- Thermal and acoustic insulation can cause problems.
- Additional conditioning is needed: insulation, ventilation and cladding
- Costly maintenance to prevent corrosion
- Complications with transport logistics
- Structural limitations

Despite the disadvantages that containers may have, these do not invalidate their use in construction. However, it is important to assess both the advantages and disadvantages in order to be able to approach the planning and execution of the project properly. In this way, it will be easier to analyse whether shipping containers are the most suitable option for the type of construction to be carried out.

The advantages above mentioned make shipping containers a very attractive option for projects that require speed, flexibility and portability like this one. However, their versatility, ease of transport, optimisation during logistical processes and their collaboration with the environment have been the determining factors that have influenced on the choice of these elements as a construction model for this design proposal.



Fig.34 Shipping Containers

# Elements that will define the space

## MATERIALITY OF CONTAINERS

Shipping containers are mainly made of corten steel, a corrosion-resistant form of steel.

Corten steel is a steel alloy that contains small amounts of elements such as phosphorus, nickel, copper and chromium. These help to make the steel much more resistant to corrosion and the effects of marine climates, a key factor in the durability of shipping containers.

In addition to steel, some containers may have treated plywood floors to protect the cargo and provide a non-slip surface.

In summary, most shipping containers are made of Corten steel with some additional components, but there are also aluminium and plywood, reinforced with fibreglass.

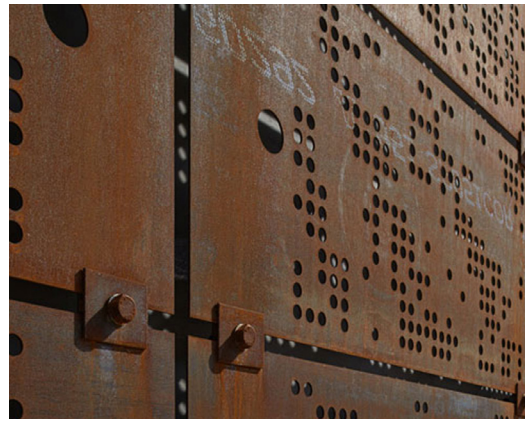


Fig.35 Corten Steel

### 20 ft. (DRY CARGO) CONTAINER:

- External length: 6.06 metres
- External width: 2.44 metres
- External height: 2.59 metres
- Cubic capacity: 37,28 m<sup>3</sup>
- Payload capacity: 28.160 kg



Fig.36 20 ft Shipping Container

## CONTAINER DIMENSIONS

Sea containers come in a variety of standard dimensions and are widely used in the freight forwarding industry. The table below details the typical sizes of the most common sea containers, 20ft, 40ft and 40ft HC. However, smaller 10-foot containers are also available.

### 40 ft. (DRY CARGO) CONTAINER:

- Outer length: 12.19 metres
- External width: 2.43 metres
- Exterior height: 2.89 metres
- Interior volume: 76.5 m<sup>3</sup>
- Payload capacity: 28.600 kg

### 40-ft. HIGH CUBE (HC) CONTAINER:

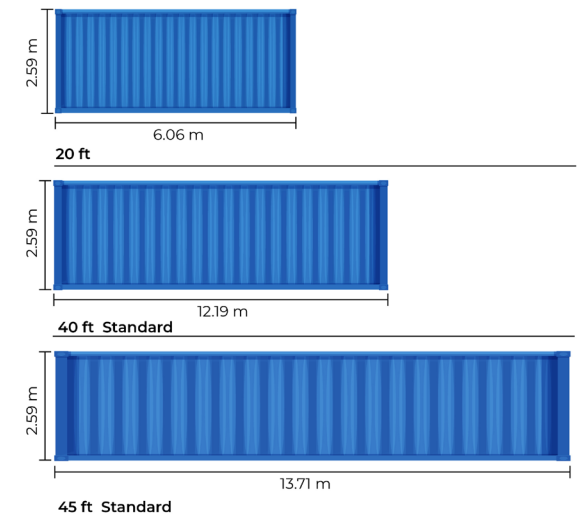
- Outer length: 12.19 metres
- External width: 2.44 metres
- Exterior height: 2.89 metres
- Interior volume: 88.15 m<sup>3</sup>
- Payload capacity: 28,000 kg



Fig.37 Shipping Container Dimensions

It should be noted that there are also other types of containers with other sizes such as refrigerated containers or bulk containers [open top and flat rack] and that the dimensions described above may vary slightly depending on the type of manufacturer and container.

However, they all follow the standardised ISO norms in order to facilitate all the means of the worldwide cargo transport sector as much as possible.



# Elements that will define the space



Fig.38 First visit to Trondheim Harbour

## REAL-SCALE MEASUREMENTS

A real scale in-person study was carried out by visiting the port of Trondheim in order to get a first-hand experience of the dimensions of the containers and to get a much better idea of the actual size of the containers. There they were able to compare the different types of containers found in the port.

This idea came about after seeing a project Vardehaugen AS studio did creating some measures in real-scale.

“The ability to visualize the unbuilt is an important part of the architectural process in the construction of a building. The bodily sensation of space or even the notion of walking through a room cannot be experienced through traditional 3D visualization or scaled

models. That’s why this part is so important, so to ensure a greater understanding of size and proportions of the project a real scale in-person study has been made”. [9]

In order to carry out this study, two different visits were necessary. On the first one, the space was study in order to think about how the elements could be distributed within the space. On the second one, was made to carry out a full-scale study of the different measurements of the containers.

For this second visit, it was necessary to bring the appropriate instruments such as tape, a measure, a notebook and chalk spray to be able to measure and draw them with the measures taken.

Drawing the container to real scale was essential in order to know which space to consider, whether the 20-ft or the 40-ft container. Walking around the prototype container. Finally, it was deduced that the 40-ft container was too long compared to the 20-ft container.

It was essential to be at the port in person and carry out this study to discard one and choose the other.

The following images show each of the visits that were necessary to obtain the correct measurements:

### FIRST VISIT TO STUDY CONTAINER SPACE

During this first visit, it was possible to get a spatial idea of the actual containers size and their proportions. In addition, a study of the resulting interior space was made. This was essential in order to know which size would be the most suitable for the proposal.

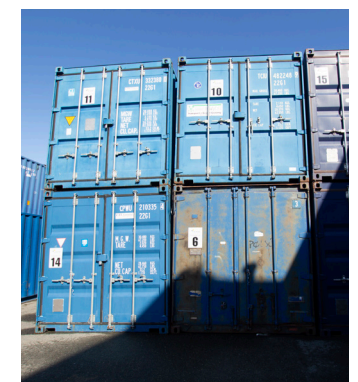


Fig.39-44 First visit to Trondheim Harbour

# Elements that will define the space

## SECOND VISIT TO STUDY CONTAINER SPACE

During this second visit, it was possible to measure the different containers in the port in person. However, the different types of containers available on the market had been studied beforehand. Knowing their measurements, the containers found in the port of Trondheim were measured to ensure that the measurements corresponded.

On the one hand, the blue containers correspond to the 20-foot ISO containers with the following measurements: Width: 2,43m; Height: 2,57m; Length: 6,05m



However, the red containers, which apparently looked like 40-foot containers, turned out to be another manufacturer's containers. These containers were DY12 containers with the following dimensions:

Width: 2,47m; Height: 2,85m; Length: 7,70m

Once the measurements had been taken, the aforementioned study was carried out on the other side of the port, using adhesive tape and chalk to draw the shapes of both containers on a real scale.

After this study, the idea of placing the 40ft container was discarded, as 12m would be too big to create the different rooms of the exhibition space. Furthermore, it would not be environmentally sustainable, as transporting the exhibition would require the use of many more and much larger lorries than the 6m containers.

The space offered by the 6m containers is more than sufficient for what is intended to be shown in the exhibition. Therefore, as a result of this visit and the study carried out in person, the 12m containers were discarded and the 6m containers were chosen.



Fig. 45-48 Second Visit to Trondheim Harbour

# Elements that will define the space

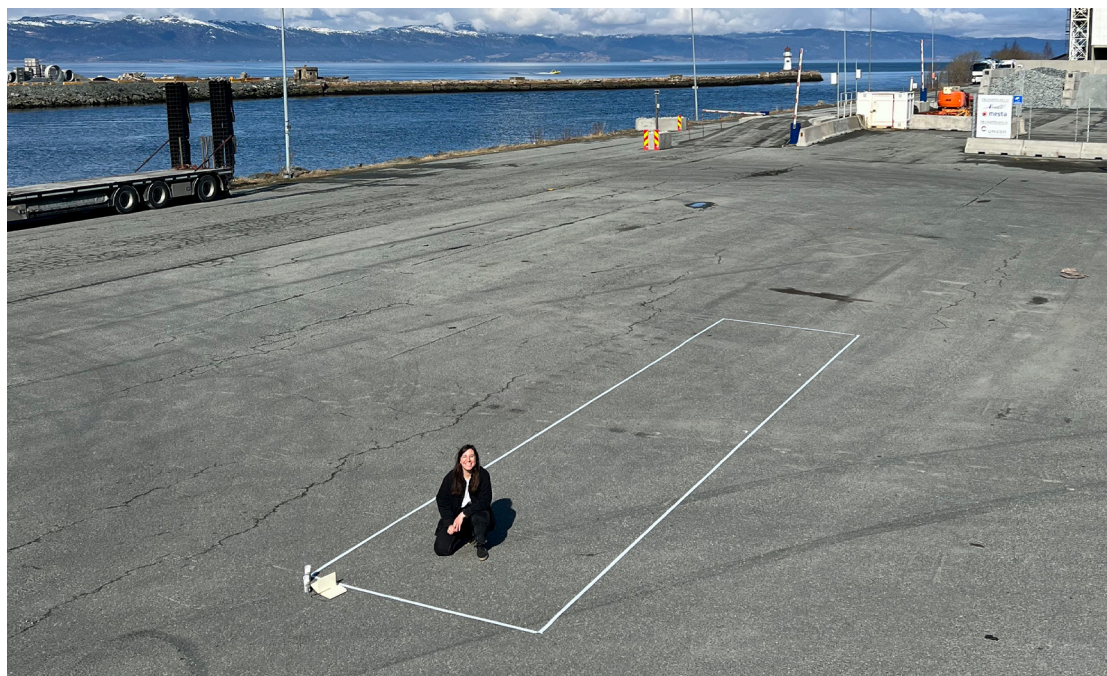
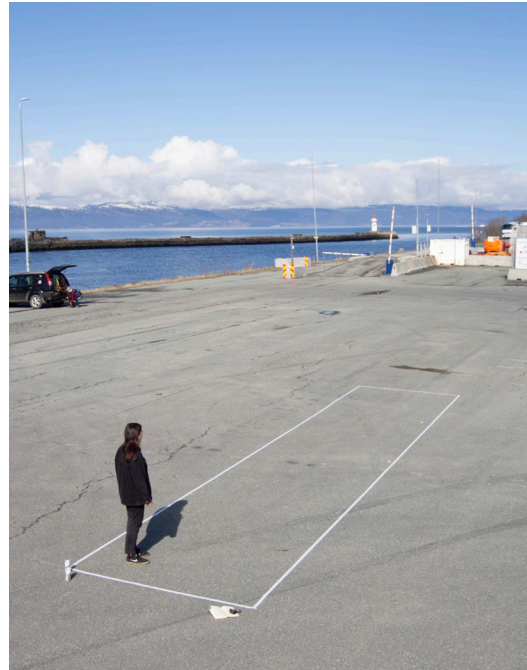


Fig. 49-54 Second Visit to Trondheim Harbour



# Elements that will define the space

## TRANSPORT



Fig.55 Transportation of shipping containers

As mentioned above, this exhibition is designed to move from one city to another across Europe and to bring Norwegian culture to all visitors who are in that city. Therefore, transport is essential for the development of this project.

In principle, it has been decided to move it through European cities in order to avoid the sea transport that can complicate its transfer. Specifically, it will be taken to the largest European capitals that are easily accessible by both national roads and motorways, thus avoiding remote geographical areas or those that are poorly connected between cities, as they are difficult to access by land transport services.

The possibility of transporting it by rail has

also been considered but has been ruled out because some locations do not have good connections and would then have to be transported by lorry from the station to the exhibition site.

For this reason, road transport by means of lorries with specialized trailers for transporting freight containers has been chosen in the end. By using these lorries, the aim is to optimize the logistical processes required to transport the exhibition itself, such as reducing the number of personnel needed to carry out the loading and unloading process.

If the exhibition was transported by other means of transport, much more staff would be needed. It also reduces the logistics of setting up the exhibition, as the containers will

be quite empty and this space can be used to carry the material necessary for its assembly.

The aim is to reduce the number of lorries required as much as possible.

Furthermore, a study has been conducted to explore alternative methods for transporting containers in the most environmentally friendly way possible and minimize as much as possible the number of trucks required.

The overland method of transporting the containers consists of trailers called "container trailer chassis" which can carry up to a total of two 20-ft containers or one 40-ft container.

In some cases, it is possible to stack two smaller, lighter containers on top of each other using a crane or specialized stacking equipment. However, it is important to note that stacking containers on a truck has

implications in terms of weight and stability. It is necessary to comply with loading regulations and ensure that the truck and securing systems are able to support the weight and ensure safety during transport.

In this project, this option has been discarded in order to avoid difficulties that could be generated by their transport when crossing certain bridges or tunnels on the motorways or roads between one city and another, impeding their own passage.

Therefore, this exhibition will require the use of 5 trucks to transport the 10 containers.

However, the possibility of transporting up to three 20-foot containers on the same trailer by adding a double container chassis to the main trailer exists. The following company [10] could serve as a reference to show the coupling of the three containers when transporting them:



Fig. 56 Double Container Chassis

# Elements that will define the space

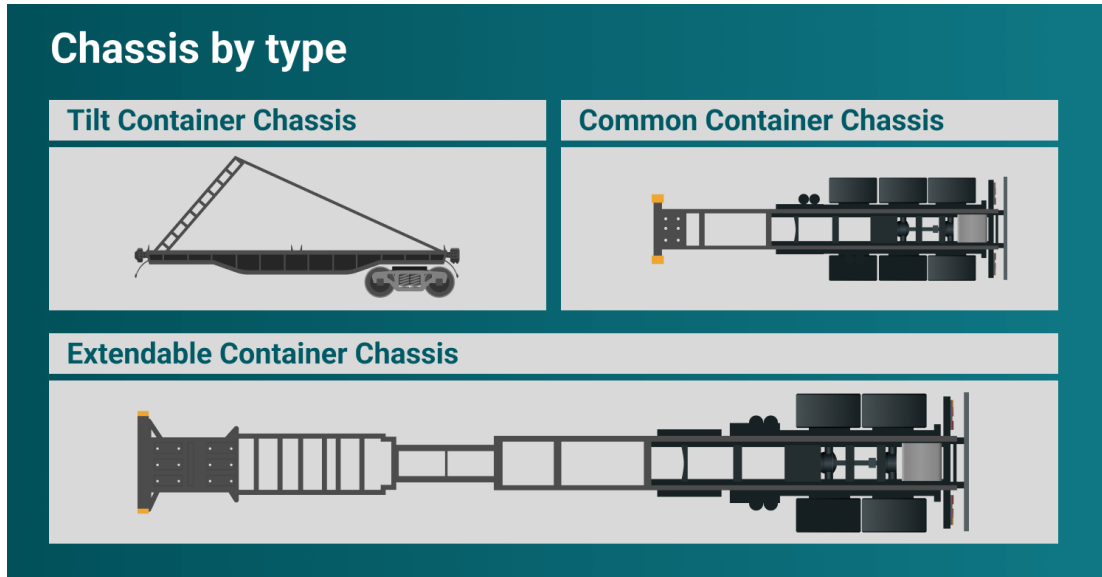


Fig.57 Types of Extendable Container Chassis

In this way, we would significantly reduce the use of lorries and as it has been specified that all cities will have good communication with motorways and roads, there will be no problem in using this system.

Therefore, it has finally been decided to make use of two lorries carrying three 20-foot containers and two more lorries carrying four more containers. This makes a total of 10 containers, which is what will be needed to set up the entire exhibition.

The decision to transport the 10 containers separately in this way was taken because they all contain electrical installations and elements that are very delicate and transporting them in stacks could lead to breakage. In addition, the containers will be wrapped in

a waterproof tarpaulin to protect them from external agents, whether meteorological or otherwise. This tarpaulin will be large enough to surround the containers in their entirety and to be able to anchor them to the lorries without causing any damage to them.

Finally, it should be noted that the trucks will be regulated to comply with the different transport regulations in each country.



Fig.58 Extendable Container Chassis

## ASSEMBLY

Once the lorry is delivered to its destination, the exhibition will be set up. To do this, each city will contact the local authorities as well as the different town councils in order to obtain a suitable space to place it and also to request the necessary permits.

Forklift cranes will be essential to unload the containers from the lorries and place them in the designated location. To do this, a local crane company will be located in order to avoid transporting the cranes from one city to another and to reduce the carbon footprint as much as possible.

The operators will be responsible for the proper assembly of the exhibition. Thanks to the fact that the containers have their own stacking system, generally those with double height will not require specific anchors to connect them to each other. Steel corners and locking structures at the top and bottom of the containers will therefore be used.

However, twistlocks are sometimes used, which are locking devices that are placed at the corners of the containers to ensure that they are held together by securing their connection to prevent lateral displacement. It is also important to note that double-height stacking must comply with safety standards and regulations.

In contrast, single-height containers may be

anchored to the ground in different ways depending on many factors such as local regulations, soil type, climatic conditions and so on. Qualified personnel should therefore be consulted to determine which method is most suitable for the type of installation desired. For this project, ground anchoring by means of ground stakes or ground screws has been chosen. These anchors are usually inserted into the ground and attached to the anchor points at the base of the containers by means of chains or cables.

Finally, it should be noted that in case that there is no electricity connection at the desired location, a high-voltage generator set will be required to carry out the necessary electrical installations inside the exhibition.

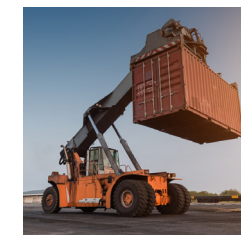


Fig. 59 Forklift  
Fig. 60 Operators

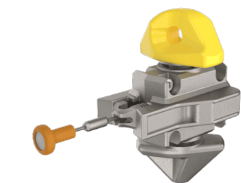
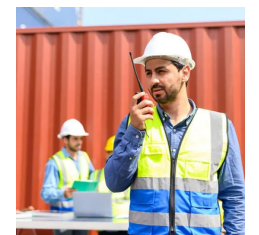


Fig. 61 Twistlock  
Fig. 62 High Voltage Generator



# 03

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conceptualization

environment  
project values  
exterior exhibition space  
interior exhibition space

## Environment

This exhibition does not have a specific location, as its aim is to move around different cities. However, it should be noted that it is intended to be located in cities that have a huge contrast to Scandinavian countries, so it will have much more impact in southern European countries than those at the same latitude as Norway or very close to it.

Each city that hosts this exhibition will have to comply perfectly with the regulations required for its assembly. In addition, the

responsibility will fall on the city council of each of the cities that want to host it. Hence, they must be sufficiently open spaces to be able to locate the exhibition without any problem concerning its access.

It should also be highlighted that having this exhibition in several cities will attract more tourists to come and visit the exhibition and therefore it will boost tourism in the city.

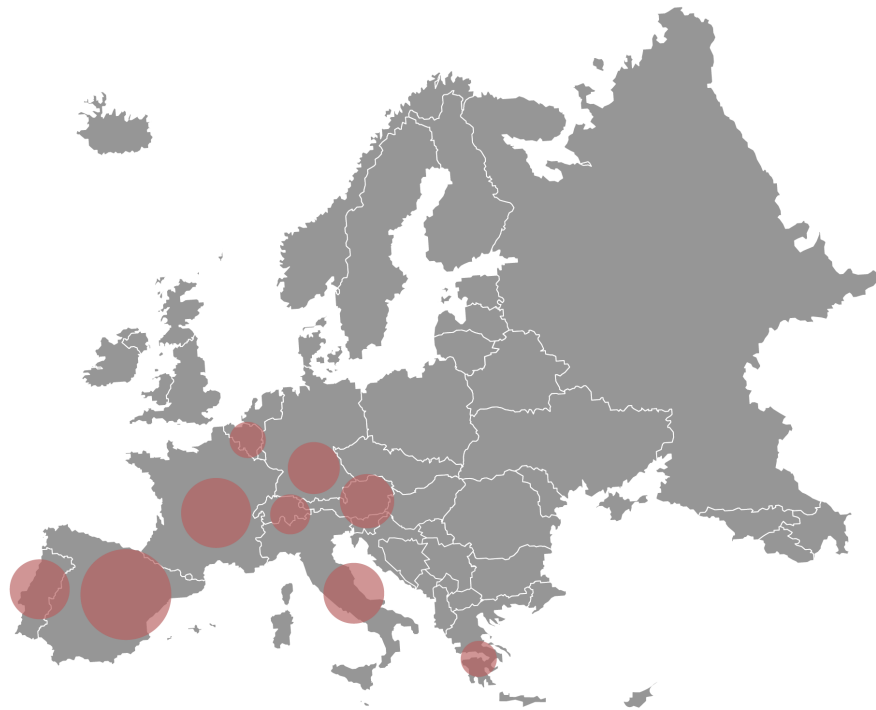


Fig.63 Locations where the exhibiton could be transported

## Project Values

In order to carry out a good conceptualisation phase, it is first necessary to be clear about which concepts the project is going to be based on, as well as the values that it wants to represent through the visit to this exhibition space.

On one hand, the light of Norway has been represented in different ways in each of the containers, so each of them is based on a different concept. On the other hand, the values are those qualities that will define the project. In this project we find the following ones:

SUSTAINABILITY	NATURE	LONELINESS	INQUIRY
PURITY	INNOVATION	ELEGANCE	SIMPLICITY
SENSITIVITY	CALM	COMPLEXITY	REFLEXIVE
DARKNESS	BEAUTY	UNKNOWN	IMPRESS

However, among all of those mentioned above, the ones that best represent the essence of the entire exhibition space are the following:

PURITY	NATURE	ELEGANCE	SIMPLICITY
--------	--------	----------	------------

## exterior exhibition space

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architectural referents  
exterior shape moodboard  
sketches of the first ideas



# Architectural Referents

A deep research in architectural references that work with shipping containers for construction was done in order to develop the exterior shape of the exhibition space. Those referents were not only used to get

inspiration about the way of distributing the elements but also for knowing which materials could be used for the exterior and interior of the containers.

Moreover, those referents were also used as a source for knowing which type of architectural constructions could be done with the shipping containers.



WHITAKER STUDIO  
The starburst house



ALVAR AALTO  
The Finnish Pavilion



UNPLUGGED  
Margot Cabin



NL ARCHITECTS  
Barneveld Noord Bus Station



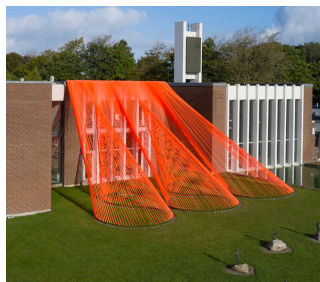
DISTILL STUDIO  
The Box Office



CATTANI ARCHITECTST  
Cite A Docks



MAPA  
Minimod



BEHIN HA  
Together Apart Installation



MB ARCHITECTS  
Container Studio



YASUTAKA YOSHIMURA  
Bayside Marina Hotel



RJDL  
Café Infinity



SEBASTIÁN IRARRÁZAVAL  
Casa Oruga

Fig.64 Architectural Referents

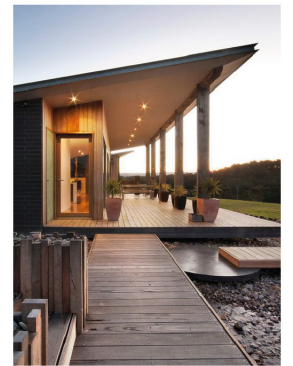
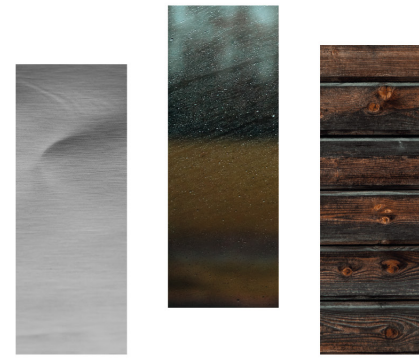
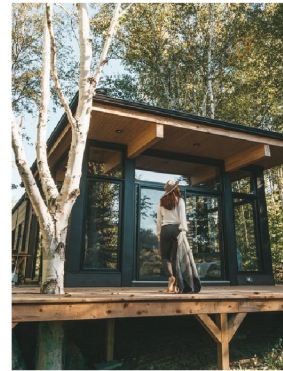
# Exterior Shape Moodboard

The visual stimulus helps to better understand what cannot be expressed in words and also allows us to understand all those ideas that we want to develop in any type of project in a better way. In order to show in which concept each of the spaces is based on, different mood boards have been made .

The Moodboard is a design tool that is used to get inspiration for what you want to design or create. It also includes a variety of images that represent the desired style and aesthetic for the design of a particular space. It is a widely used tool in interior design, as you can quickly visualize the results you want to achieve. For this reason, a moodboard was first created to visualize the exterior space and shape and then other mood boards were made for each of the interior spaces of the exhibition.

To create them, images of architecture, art, design, colors, textures, materials and natural elements will be selected. All of them have been taken from free image banks or own images. The final objective of all these moodboards is to obtain inspiration for the conceptualization phase and be able to sketch different ideas.

With this moodboard of the exterior part, the purpose is to show an idea of what is intended to be designed for the exterior space of the exhibition showing an approximate idea of what the exterior shape of the exhibition could be.



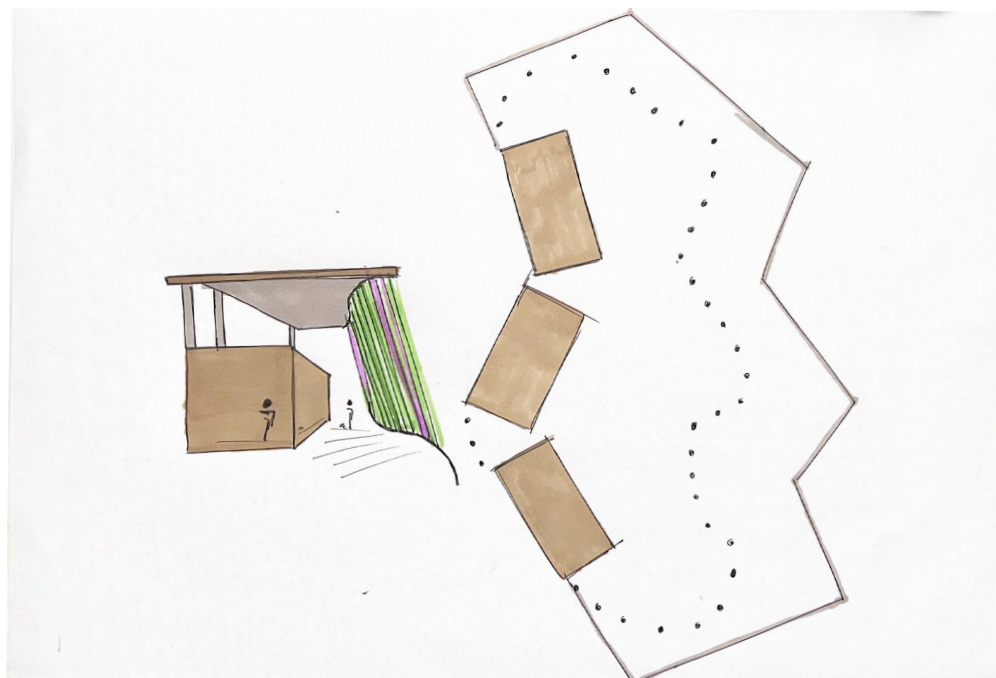
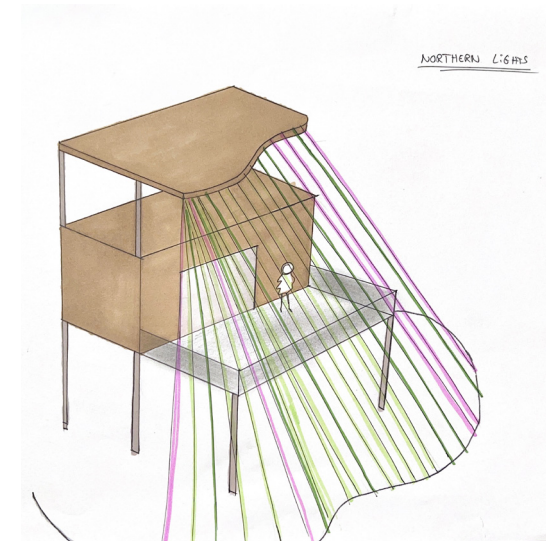
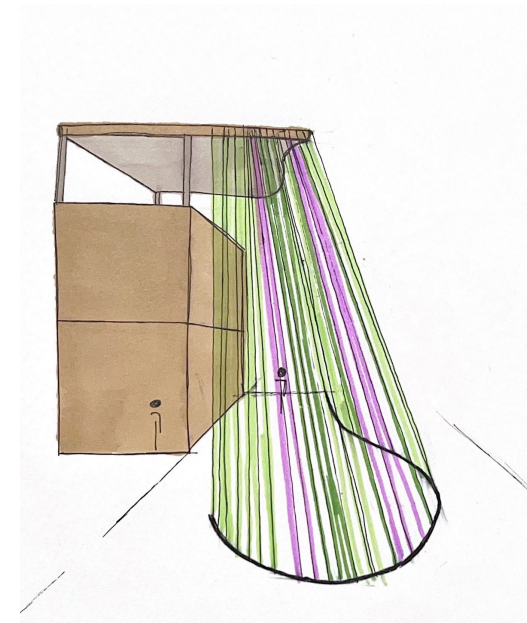
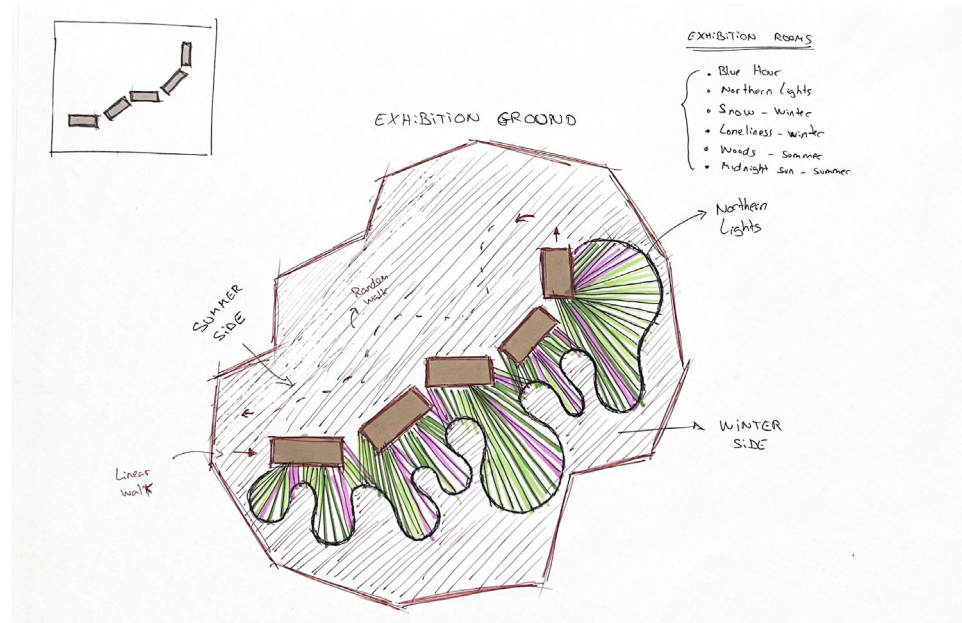
## Exterior shape



Fig.65 Moodboard

# Sketches of the first ideas

Here are shown the first ideas for creating the exterior of the exhibition space.



Inspired by the ephemeral Installation **"Together apart"** from **Behin HA Architects [12]**, the idea was to attach the containers at double height in order to place on the outside of their structures ropes anchored from the roof to the ground, generating organic shapes that reminds to the northern lights.

The aim was to create a space where the visitor could walk "through the aurora" by walking around and inside it in order to offer a unique experience.





## Sketches of the first ideas

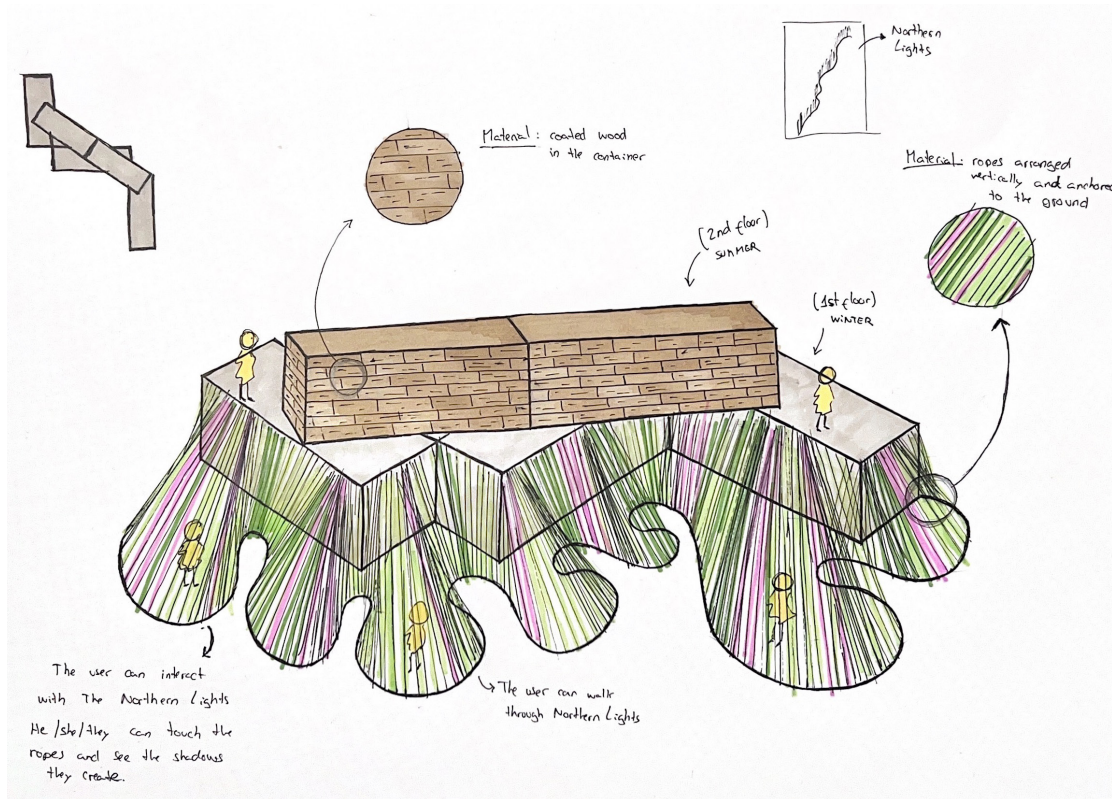


Fig.71 First Sketches

In this sketch, the idea about stacking the containers in two heights was considered.

In this phase, the exhibition was intended to relate each room to a season in Norway, so the idea was to put the hard, cold and long winter in the ground floor and the summer in the first floor.

Thus, the visitor will enter into the autumn and then he/she will pass through the winter. For going to the spring and being able to witness the Northern lights, the user would have to go to the first floor to discover them,

and then finishing the exhibition entering into the summer.

This was supposed to represent the rise of life through the passing of the seasons, from the harsh winter to summer.

However, this idea was discarded due to terms in accessibility for certain users and also because at the end the exhibition won't be related to the seasons of the year as it will be explained later.

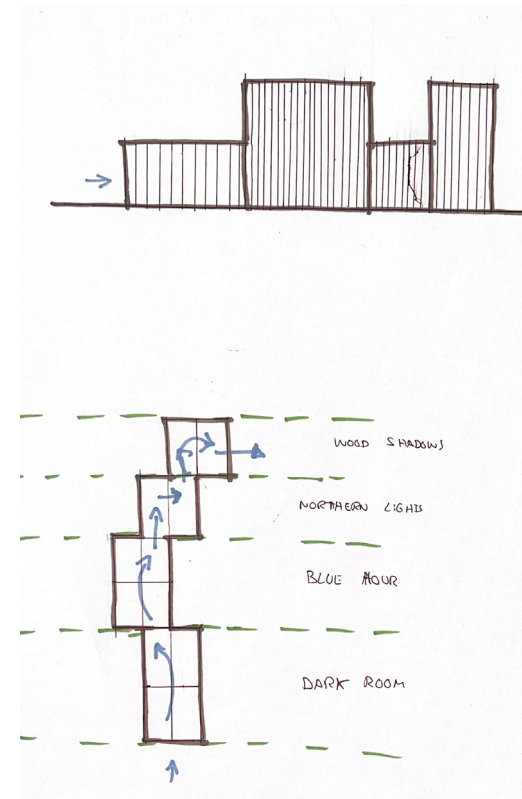
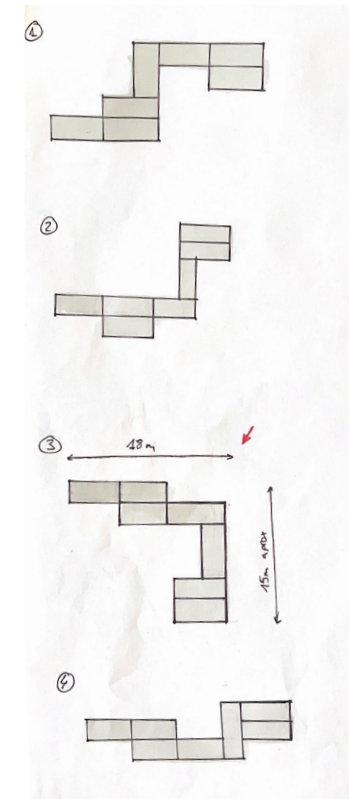


Fig.72 First Sketches

Another new idea was proposed in order to offer the best accessibility to the proposed space as well as to facilitate the assembly and disassembly of the exhibition space.

Discarding the ideas previously shown, the idea of taking advantage of the modularity offered by the containers themselves was developed by placing them in a continuous way and arranging some of them at double height to generate different spaces that create different sensations along the exhibition walkthrough.

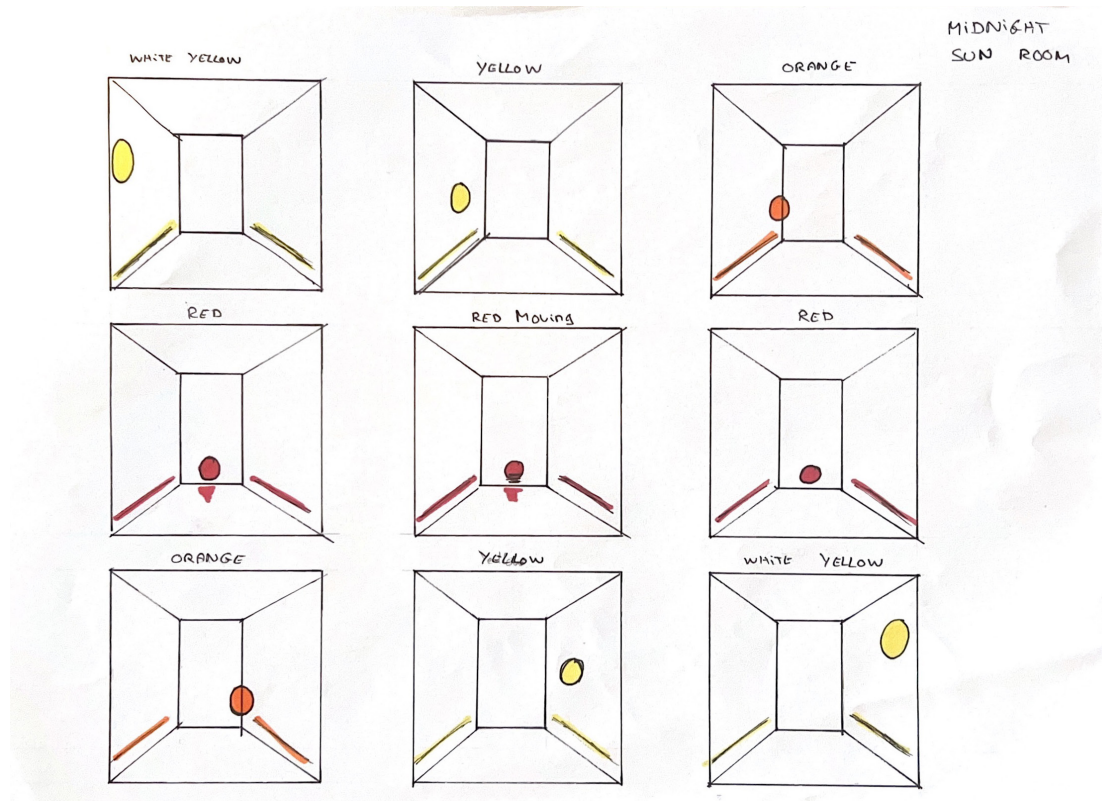


Thus, the first space could be at a double height, the second at a single horizontal height, the third again at a double height and so on.

In the following images, a better approach of this new idea is shown.

This new proposal will resolve the final distribution of the exhibition space.

## Sketches of the first ideas

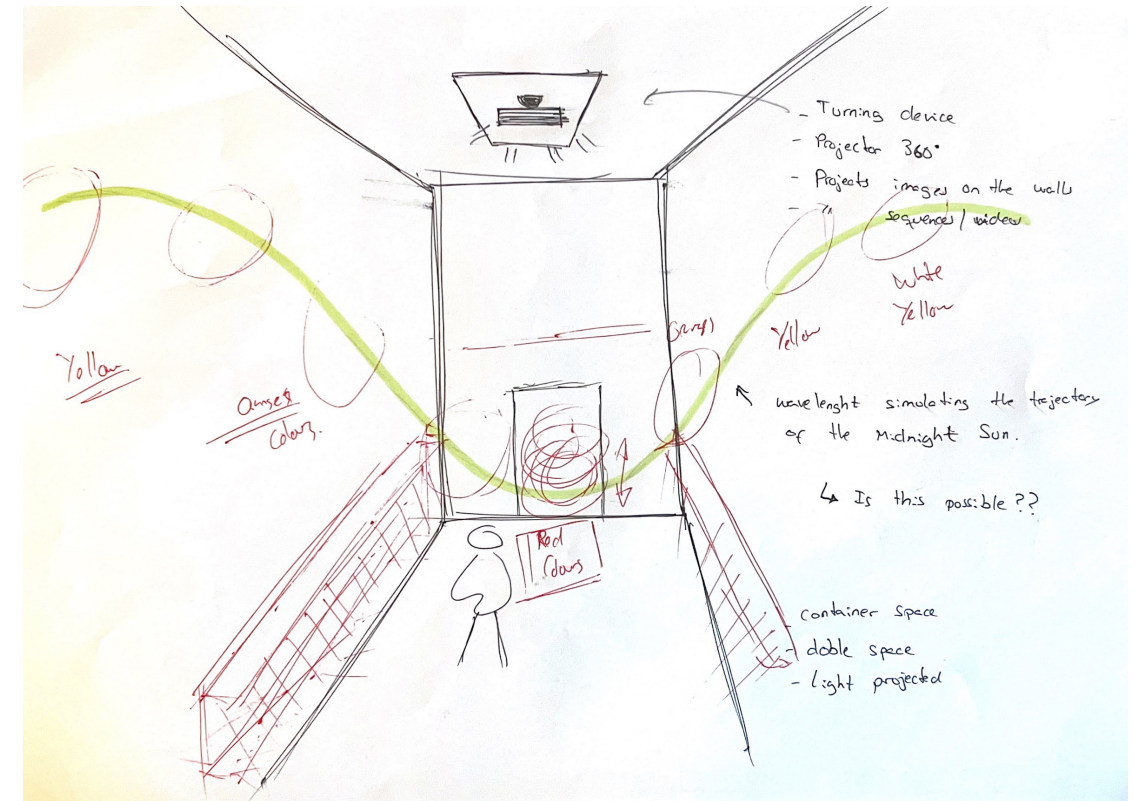


In this room, the idea is to recreate the trajectory of the midnight sun. For that, some projectors will be displayed from the roof to the walls showing the sun projection when the Midnight Sun occurs, in a sinusoidal way around all the walls.

Furthermore, there will be some OLED panels in the inferior part of the walls, bathing the atmosphere in warm colors such as yellow, red and orange, the colours that could be seen at sunset times.

In the following image, it could be seen in a

better approach.



interior exhibition space

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lighting referents

interior rooms moodboards

sketches of the first ideas



# Lighting Referents

In this section, another deep research in light referents has been done in order to know the best Light architects, artists and designers, as well as their works.

The aim of this research was to get inspiration for developing the interior of the rooms, since the light is the concept in which this proposal is based on.

Moreover, to know the works from other it was very useful to see which materials they used in their art works for showing the light.

lasers, light tubes, oled panels and others have been found.

This research was essential to keep coming up with new ideas that could be used in the design proposal.

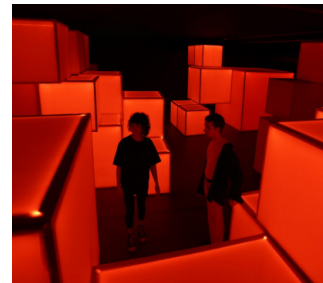
In fact some materials such as projectors,



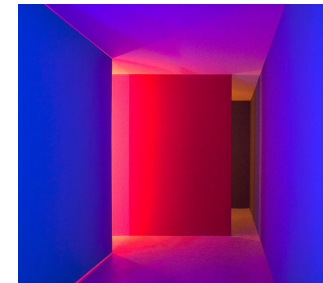
ARCHITECTS OF AIR  
Inflatable Luminary



BALLON MUSEUM  
Madrid



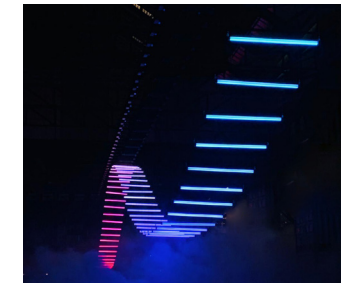
IKHONO  
Madrid, Barcelona



ESTUDI ANTONI AROLA  
40°N 3°W



OLAFUR ELIASSON  
The Weather



NICK VERSTAND  
Skyline II



VITAMIN  
Manhattan Valencia



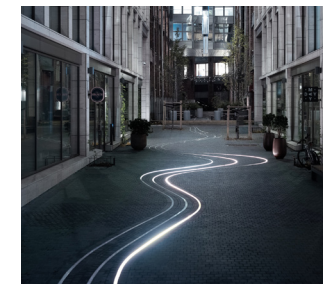
TEAMLAB  
Universe of Water  
Particles in the Tank



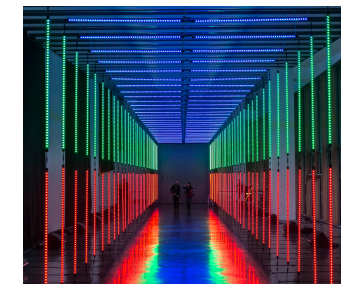
YAYOI KUSAMA  
Infinity Mirror Room



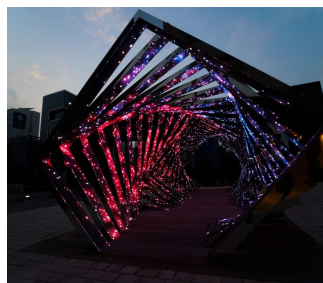
DANIEL RYBAKEN  
Colour Lamp



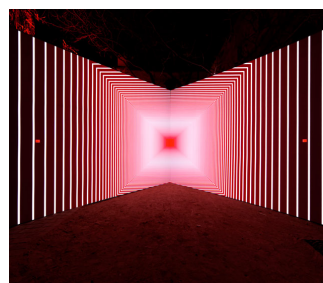
VOID.SA  
Delta



PLAYMODES  
Beyond



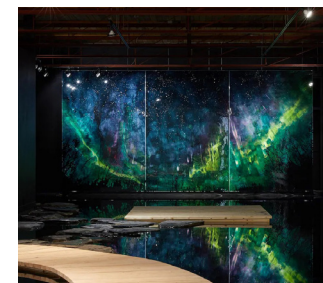
MINHA YANG  
Accumulation



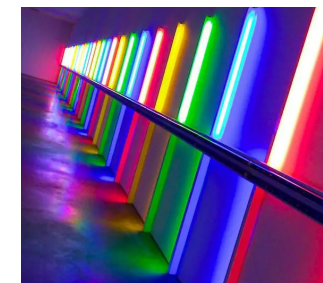
OLIVIER RATSI  
Onion Skin



ANTONIN FOURNEAU  
Water Light Graffiti



STEVE DRISCOLL  
Northern Lights



DAN FLAVIN  
Menil Installation



JAMES TURRELL  
Aftershock

# Interior Rooms Moodboards

The following moodboards show the first ideas made for developing the interior of the different rooms for the exhibition space.

## NORWEGIAN FOREST MOODBOARD



Fig.74 Moodboard

Inspired by Abu Dhabi Louvre [13] the idea was to recreate a Norwegian Forest with some light arranged on the ceiling of the containers for the first room.

## HYTTE MOODBOARD



Fig.75 Moodboard

Inspired by the harsh and dark winter in Norway, the idea of representing this darkness was considered for creating the concept of the second room

# Interior Rooms Moodboards

## NORTHERN LIGHTS MOODBOARD



Fig.76 Moodboard

After being able to witness Northern Lights in first hand, they were considered to make a room inside the light exhibition. The idea was to recreate the organic shapes the Aurora creates on the sky but in the room. Thus some kind of tube leds will be suspended from the ceiling.

## MIDNIGHT SUN MOODBOARD



Fig.77 Moodboard

This phenomenon, was not experienced in first hand, so it was notably the most difficult to conceptualise and develop. However, having been able to observe the beautiful Norwegian sunsets, the decision to recreate this incredible phenomenon in one of the rooms was made. Thus, the midnight sun will be exhibited somehow creating an immersive experience in this room with colour and sound.

# Interior Rooms Moodboards

## BLUE HOUR MOODBOARD



Fig.78 Moodboard

Since the first time I was able to witness this deep blue colour into the sky, it was clear that this phenomenon should be exhibited in the space somehow creating a blue atmosphere in the room.

The idea was not only to represent the Blue Hour that only occurs during winter due to the snow reflection with light but also to represent the length of the sunsets Norway has. Because in comparison to other

countries, sunsets here tend to be longer. This could be represented by how "infinity" they are in a poetic way.

Other ideas that did not go ahead were proposed trees. The respective moodboards are shown on the right page.

## OTHER MOODBOARDS

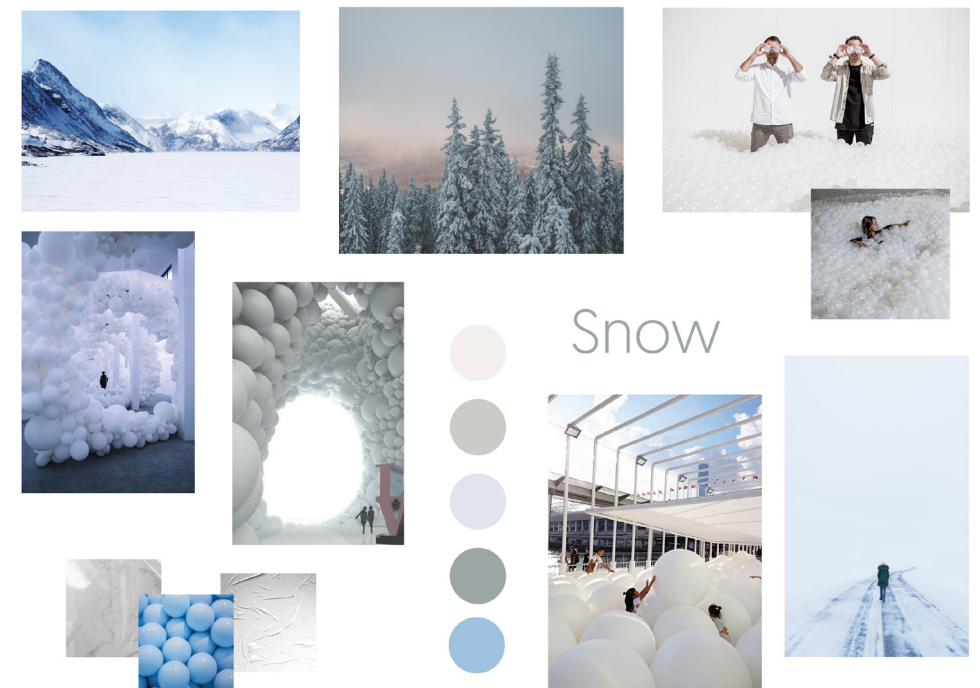
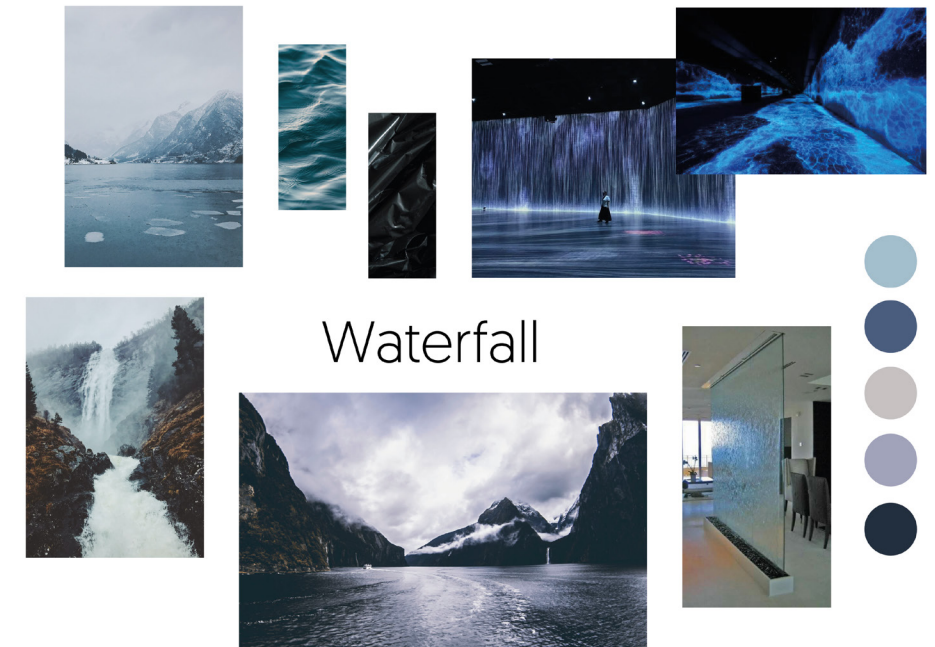


Fig.79 Moodboard

# Sketches of the first ideas

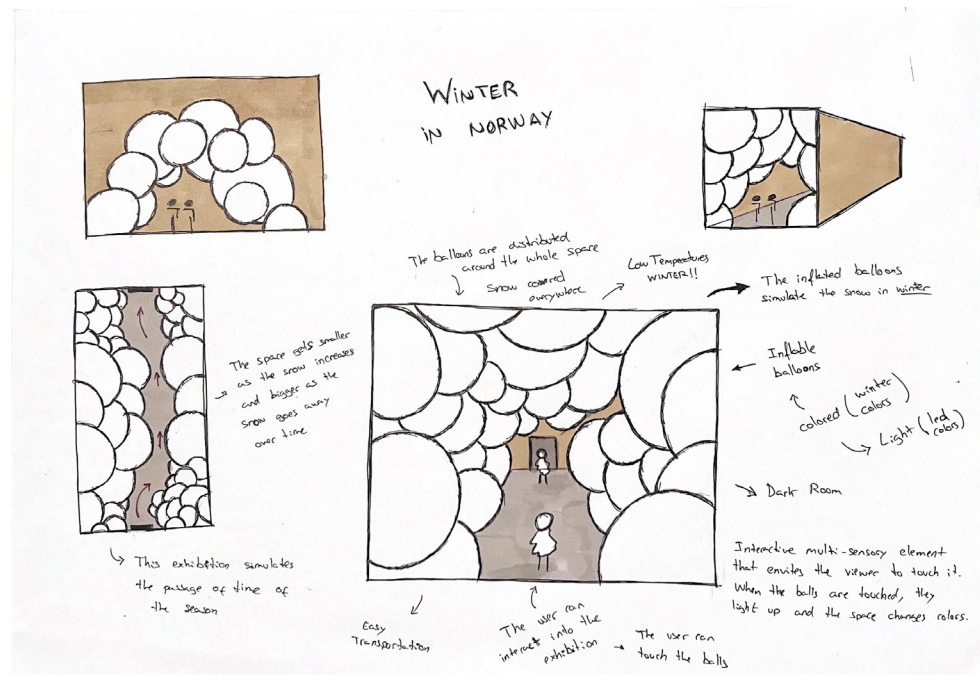
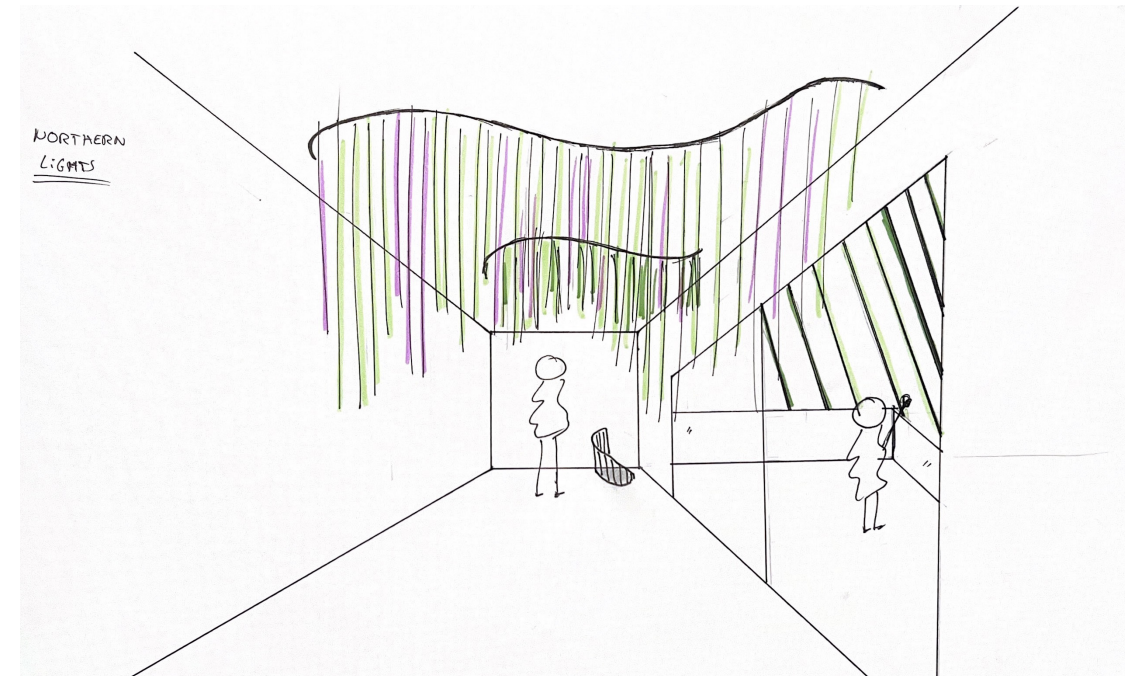


Fig.80 Sketches of first ideas

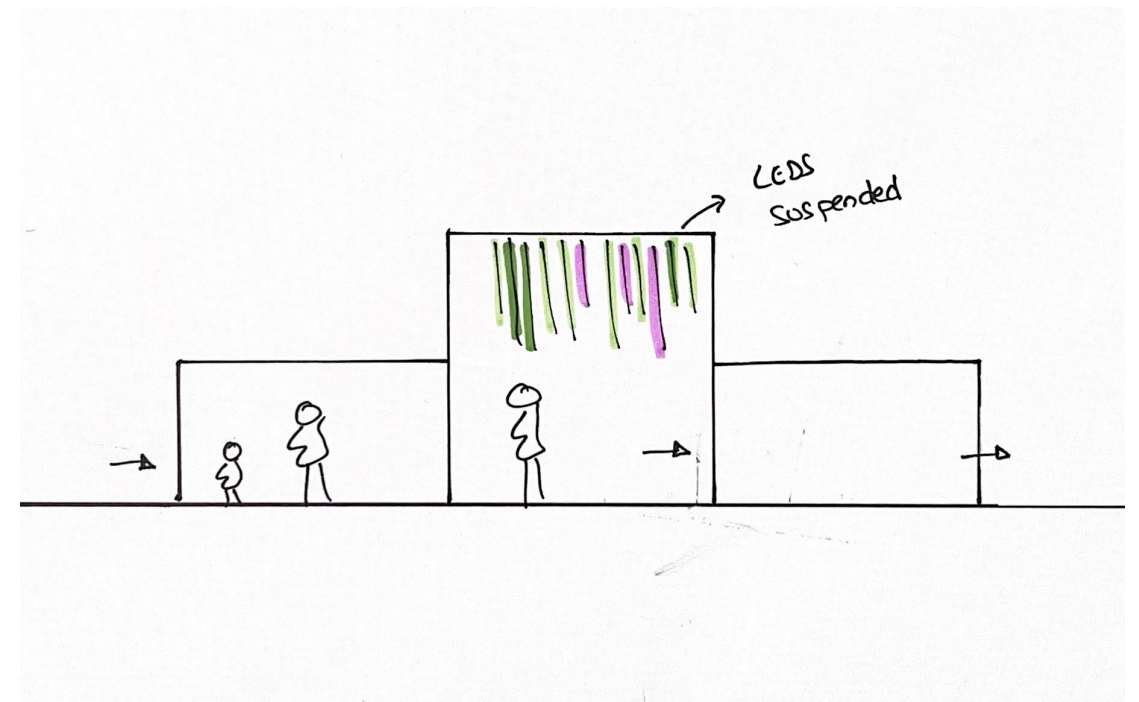


Fig.81 Sketches of first ideas



# Sketches of the first ideas

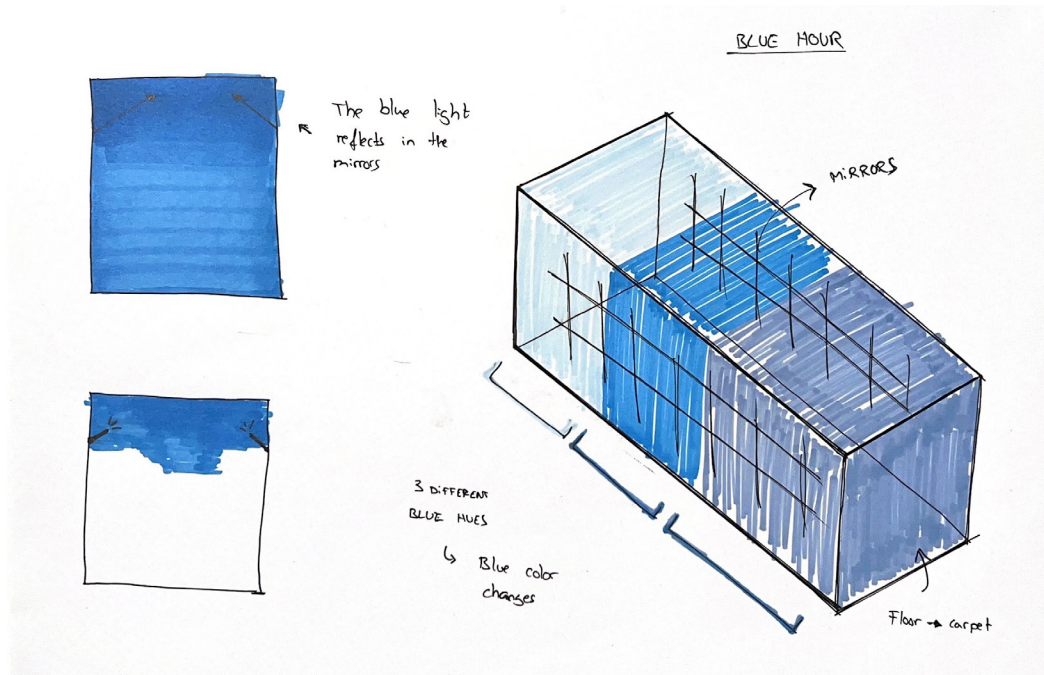
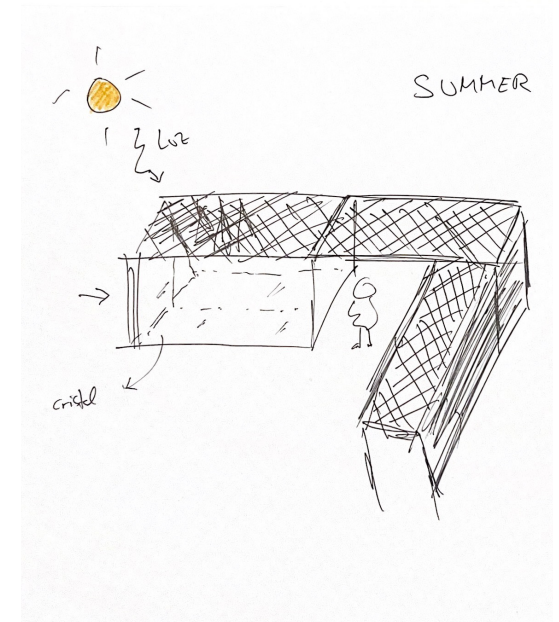
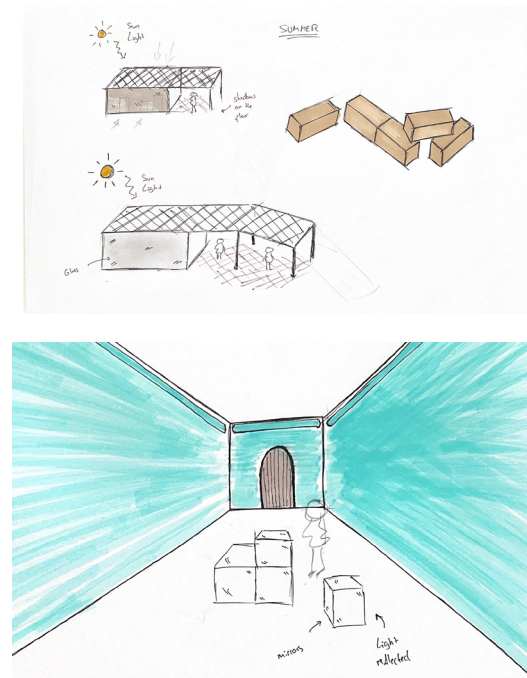
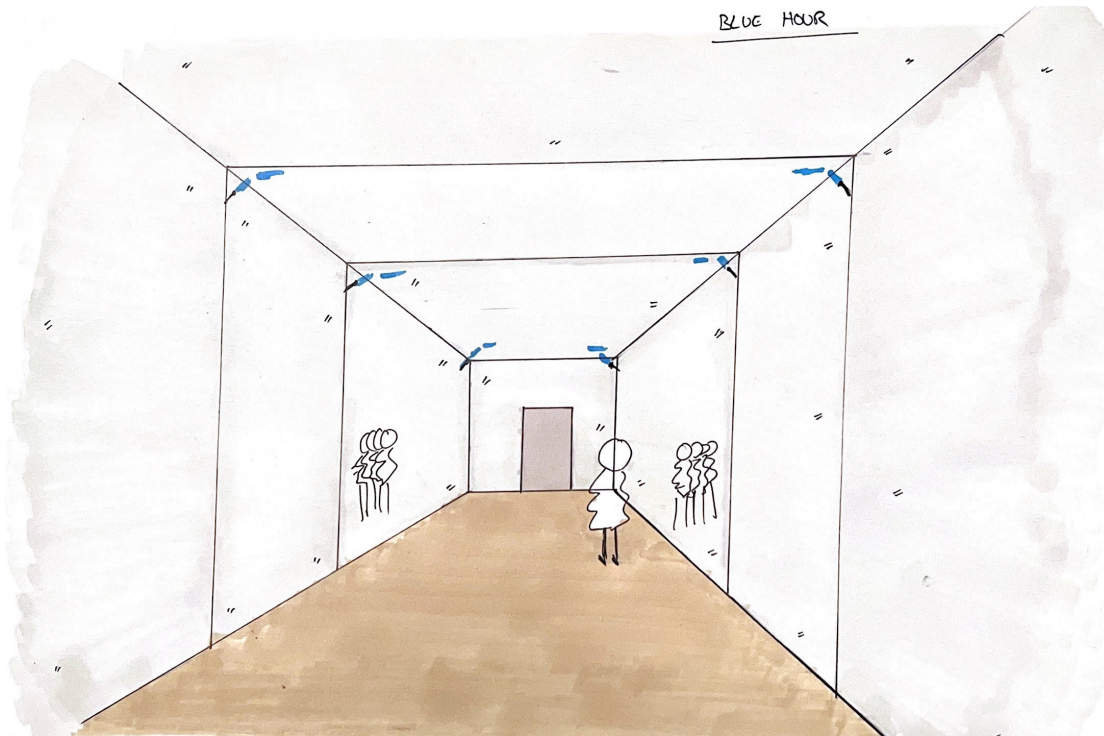


Fig.82 Sketches of first ideas

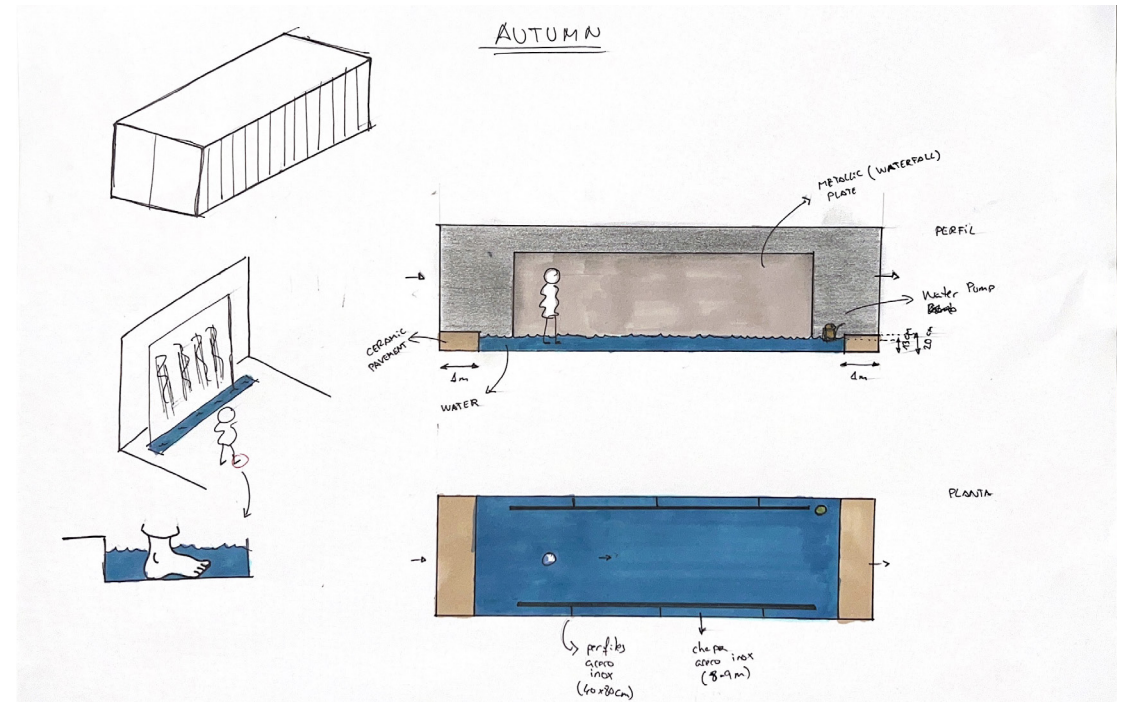


Fig.83 Sketches of first ideas

# 04

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design proposal

spatial configuration  
exhibition project  
prototyping

## spatial configuration

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distribution and modulation of containers

planimetry



# Distribution and modulation of containers

Shipping containers offer an infinite number of possibilities when it comes to their distribution in space. One of their main characteristics, as mentioned above, is the robustness of their structure, as they can be placed in different ways: joined in parallel or on top of each other to create double spaces. Another of its outstanding characteristics is its modularity, as

it is possible to attach as many containers as desired on the ground floor.

This is the concept that has been used in this project. Thus, the spaces of the different rooms have been created by joining some containers. The following image graphically explains the concept of modularity:

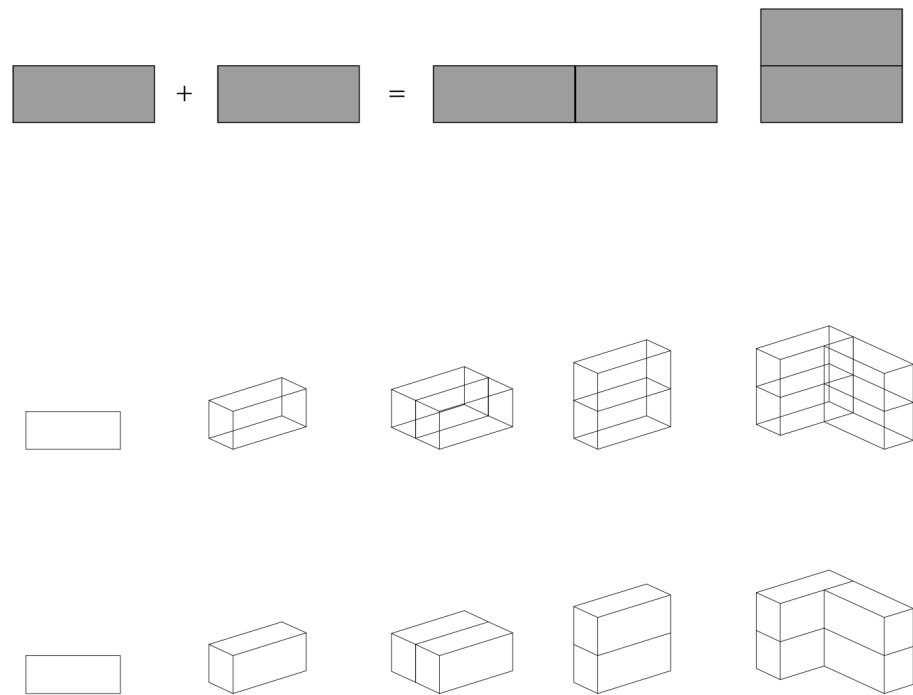


Fig.84 Modulation of containers

In addition, in order to be able to study the different possibilities that can be offered by the containers, a small-scale model on a scale of E 1:100 has been made. This has helped to

have a better spatial vision in order to be able to choose the final exterior layout.

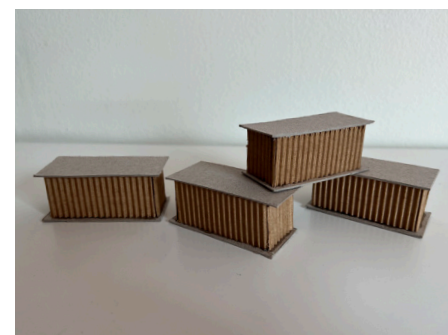
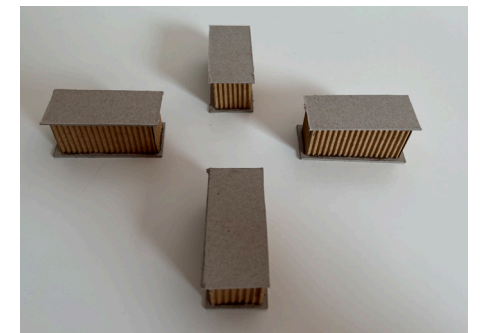
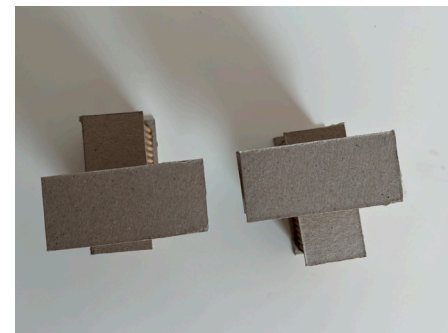


Fig.85 Small-scale model E 1:100

## Distribution and modulation of containers

Once we have a more approximate idea of the space generated by the containers, a study of the plans has been carried out in

order to see the different possibilities the containers have for making the distribution

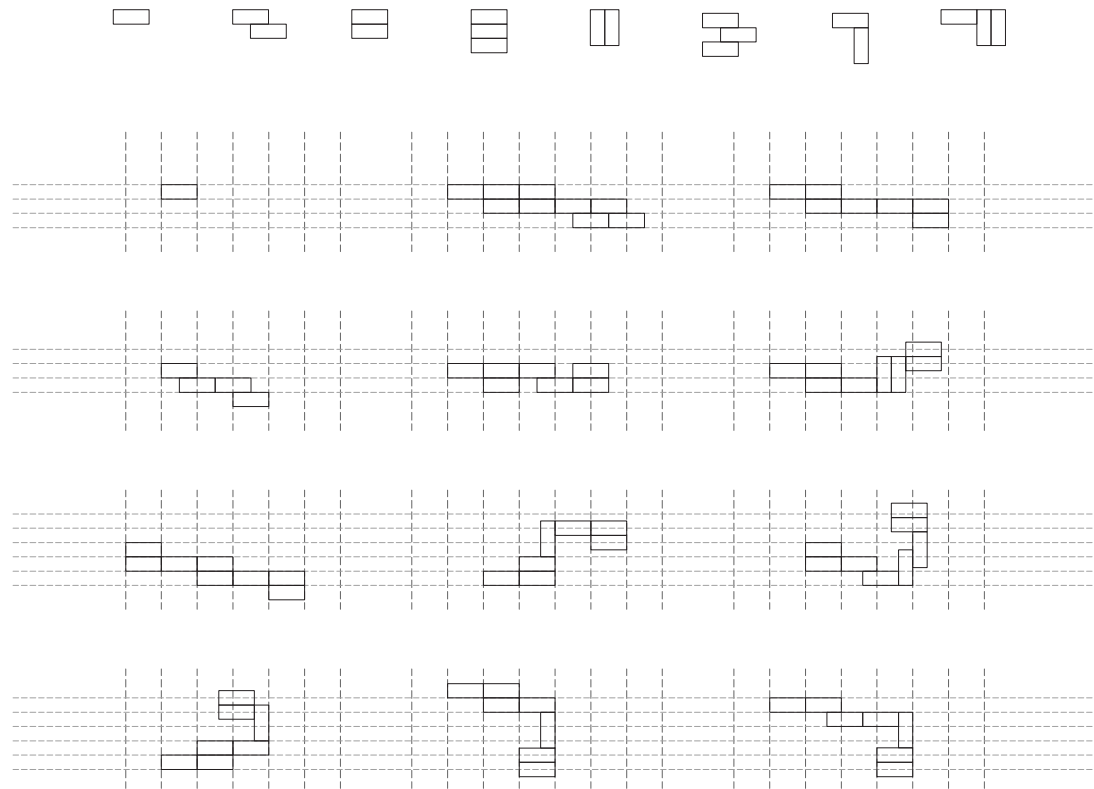


Fig.86 Containers Modulation Possibilities

Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia:	P0-01
Plan	TYPOLGY - POSITION MODELS	Escala:		Nº Plano	1

The image shown on the left page presents the different modularity the containers have.

Finally, the layout shown below has been chosen because it allows different containers to be coupled together very well to create

the desired exhibition space.

In addition, the walkthrough that it offers is very intuitive and will facilitate the transit of the exhibition as it presents a linear and orderly path that goes from one space to another.

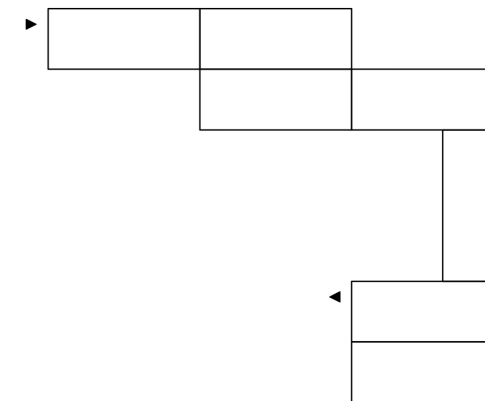
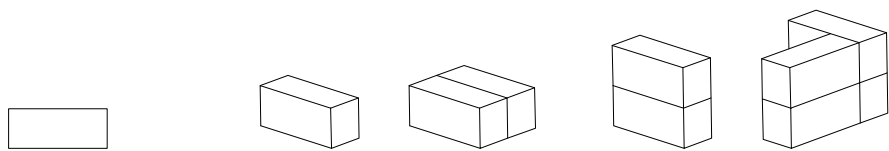
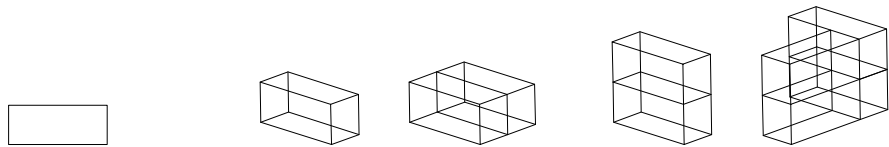
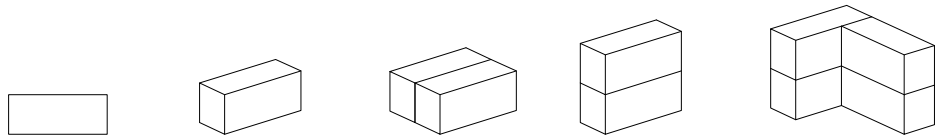
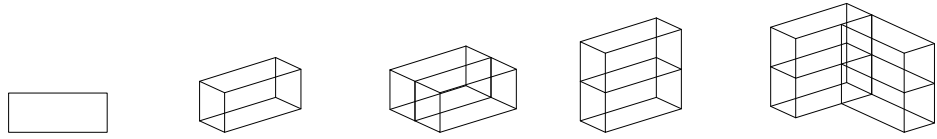
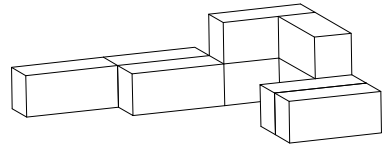
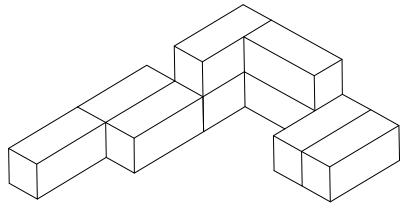


Fig.87 Exhibition Distribution

## Planimetry

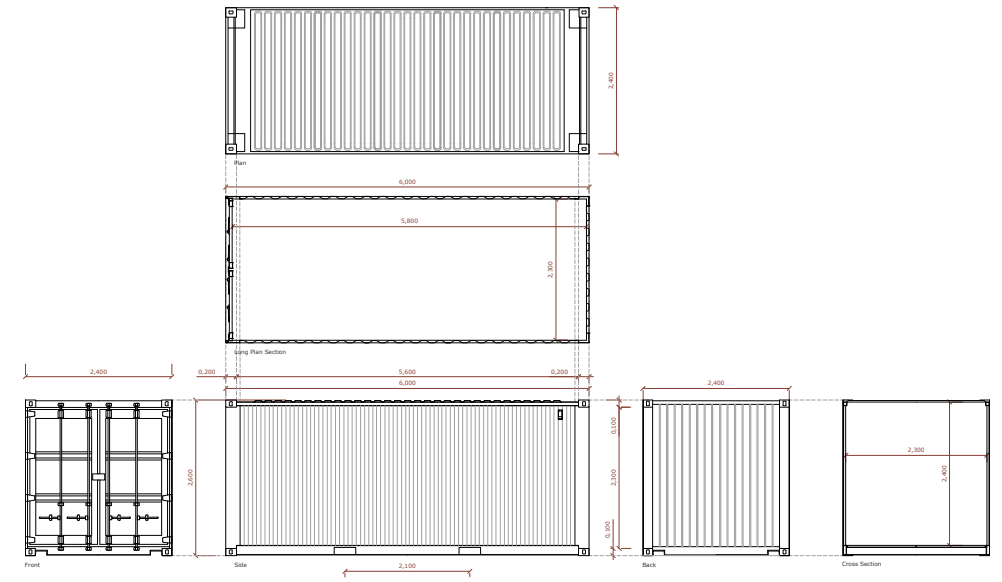
The AutoCAD programme was used to create the exhibition planimetry. The elevation plans, the plans and sections of the exhibition layout are shown below in order to have

a better comprehension of the proposed distribution. At the end, a plan for the light installations on the exhibition will be shown.

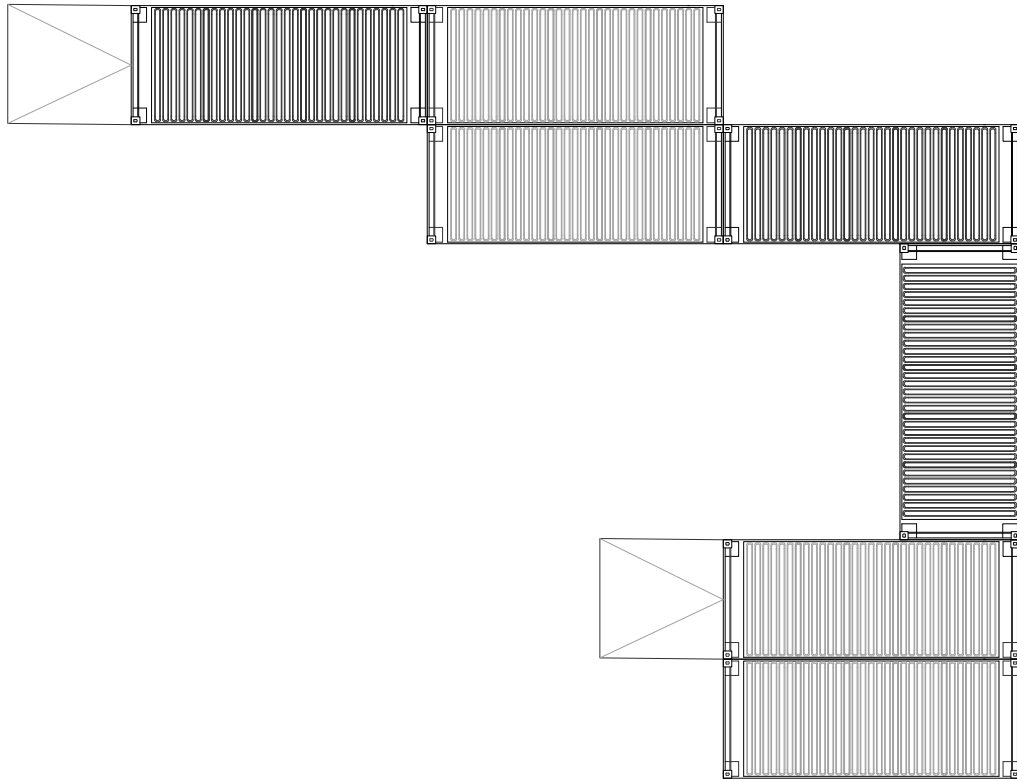


Project	DESIGN OF AN EPHIMERAL EXHIBITION	Date	June-2023	Referencia:	P0-02
Plan	TYPOLGY - POSITION OF VOLUMES	Escala:		Nº Plano	2

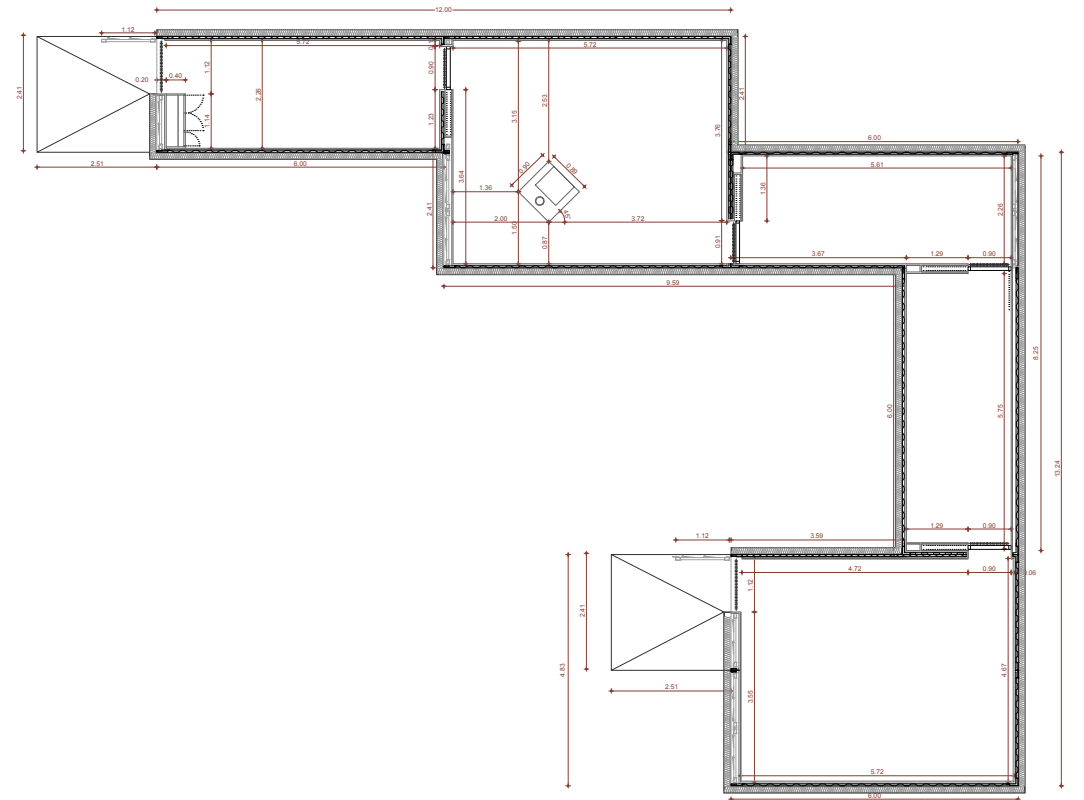
Standard ISO 20'



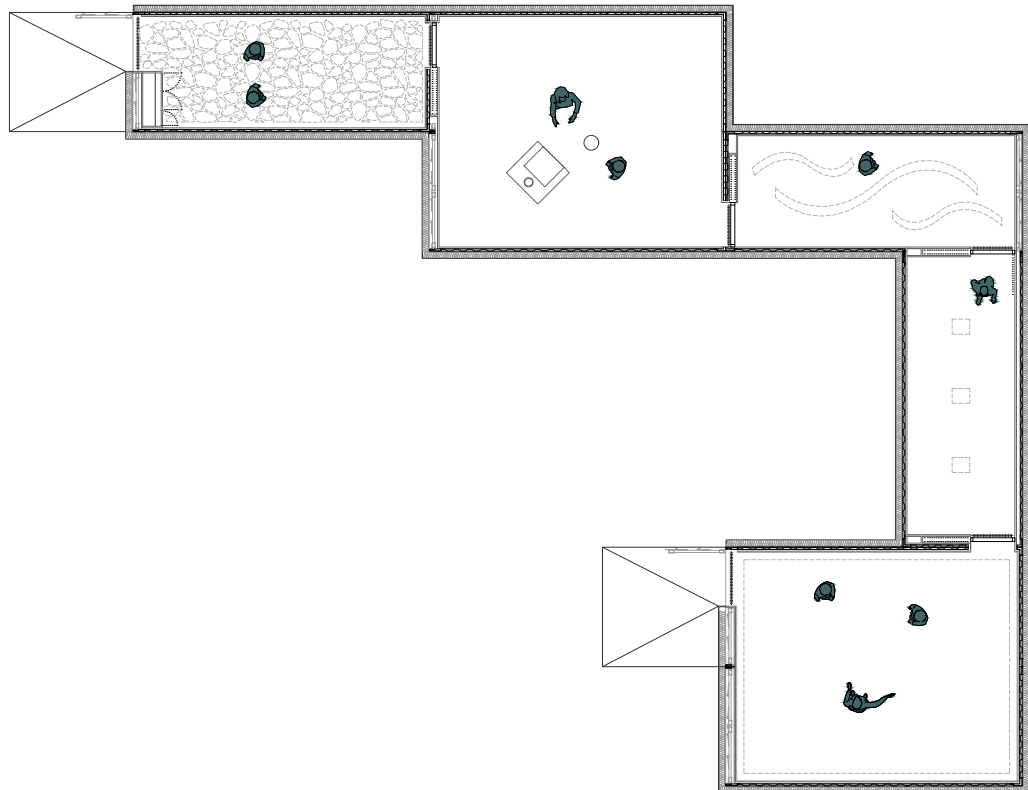
Project	DESIGN OF AN EPHIMERAL EXHIBITION	Date	June-2023	Referencia:	P1-01
Plan	CURRENT STATUS - PLAN, ELEVATIONS, SECTIONS	Escala:	1:100	Nº Plano	1



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia:	P1-01
Plan	EXHIBITION INTERVENTION - ROOFS FLOOR PLAN	Scale:	1:150	Nº Plano	2



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia:	P1-02
Plan	EXHIBITION - FITTED FLOOR PLAN	Scale:	1:150	Nº Plano	4

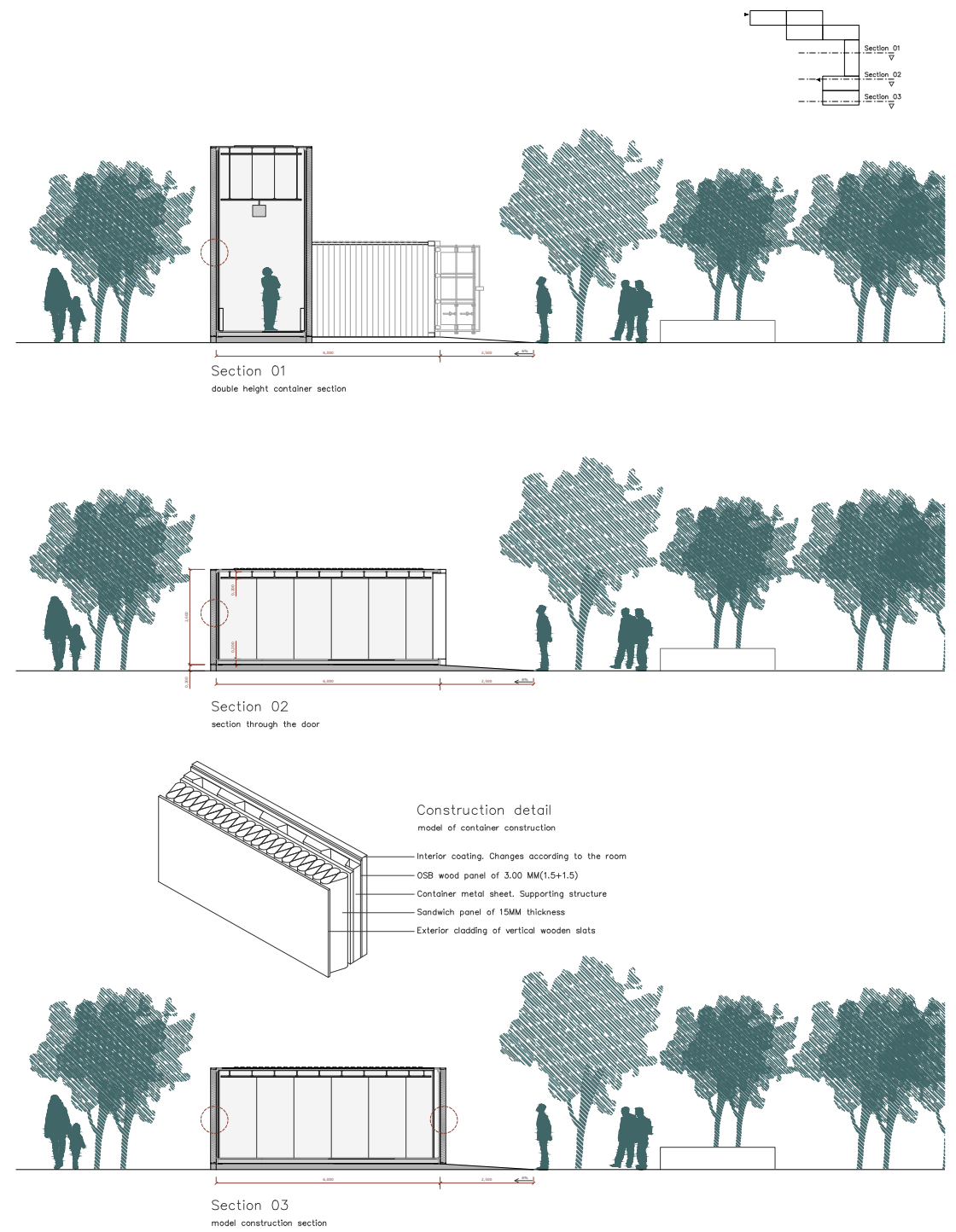
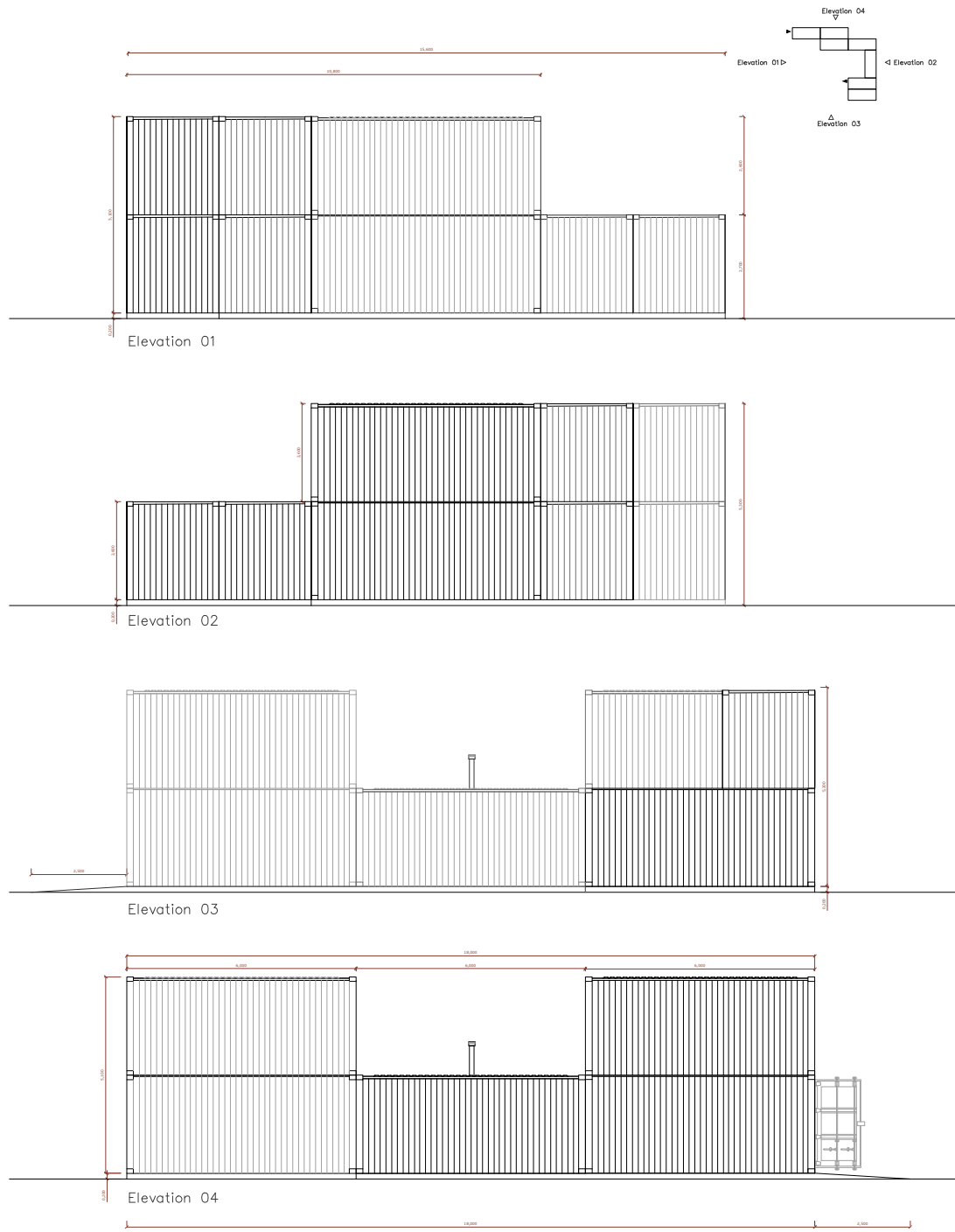


Project	DESIGN OF AN EPHIMERAL EXHIBITION	Date	June-2023	Referencia:	P1-01
Plan	EXHIBITION - FLOOR PLAN	Escala:	1:150	Nº Plano	3



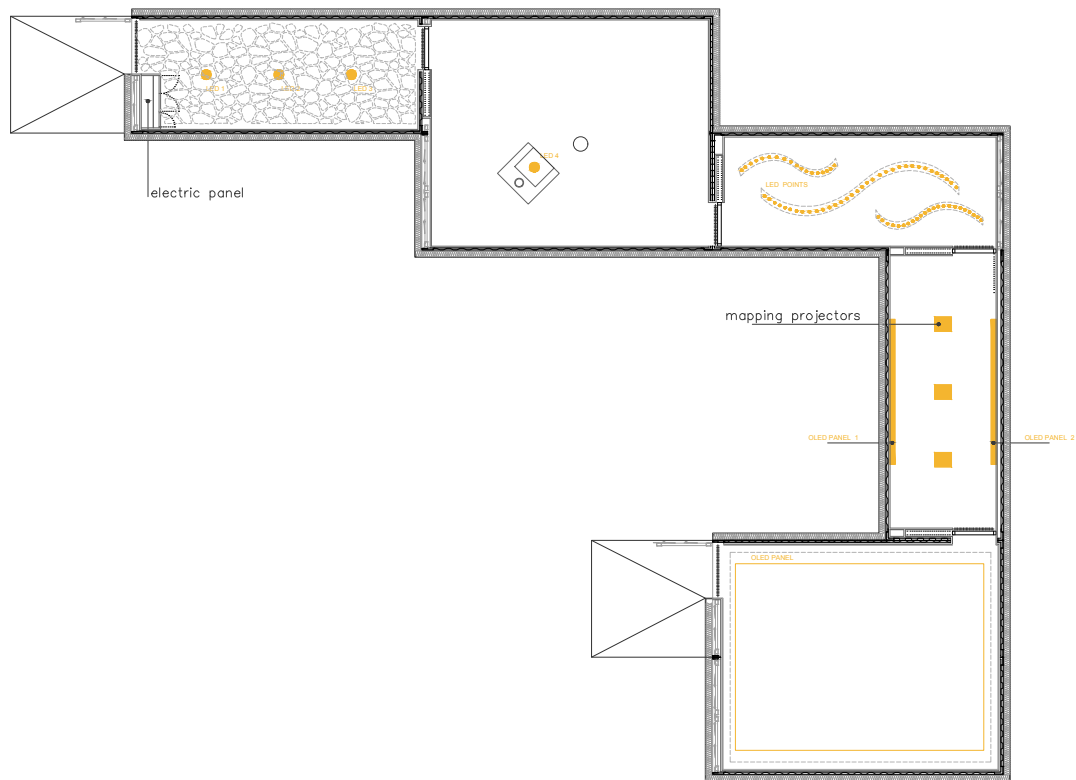
Project	DESIGN OF AN EPHIMERAL EXHIBITION	Date	June-2023	Referencia:	P1-02
Plan	EXHIBITION - ELEVATIONS (uncoated)	Escala:	1:150	Nº Plano	6





Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia	P1-02
Plan	EXHIBITION - ELEVENTIONS (with coating)	Escala:	1:150	Nº Plano	7

Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia	P1-02
Plan	EXHIBITION - SECTIONS	Escala:	1:100	Nº Plano	8



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia:	P1-02
Plan	EXHIBITION - LIGHTING PLAN	Escala:	1:150	Nº Plano	5

## exhibition project

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walkthroughs and distributions

exhibition experience



## Walkthrough and distributions

In the field of interior design, especially in retail and exhibition spaces, it is vitally important to make a good study of the possible routes that can be generated in the space. To do this, several factors must be taken into account; on the one hand, it is important to create a meaningful and orderly route, as this will make it easier to understand. On the other hand, it is essential to take into account the space available, as the shape of the route will depend on the floor plan of the interior area. In addition, the routes must be wide enough for the user to feel comfortable inside the space.

For the construction of this exhibition, 6m by 2.40m wide containers are used, so there is enough space for the user to move from one to another without any problems and also to be able to walk perfectly inside each space.

This exhibition is intended to be an enclosed space, where everything happens inside and nothing on the outside. The user will witness all the experiences by passing through each of the rooms but always walking through its interior space. Therefore, the entire user experience takes place from the moment they enter until they leave.

Within the field of interior design, it is also worth highlighting the importance of creating a good **distribution** of both the areas and the elements that are located inside them. To do this, it will be necessary to analyse and make a list of everything that you want to place in

the space as well as each of the areas of the space that you want to build.

In our case, we have divided the space into five different zones and the interior elements will be indicated in more detail in the following section.

In order to have a visual image about the exhibition plan and the walkthroughs and distributions, the illustration on the right page has been made.

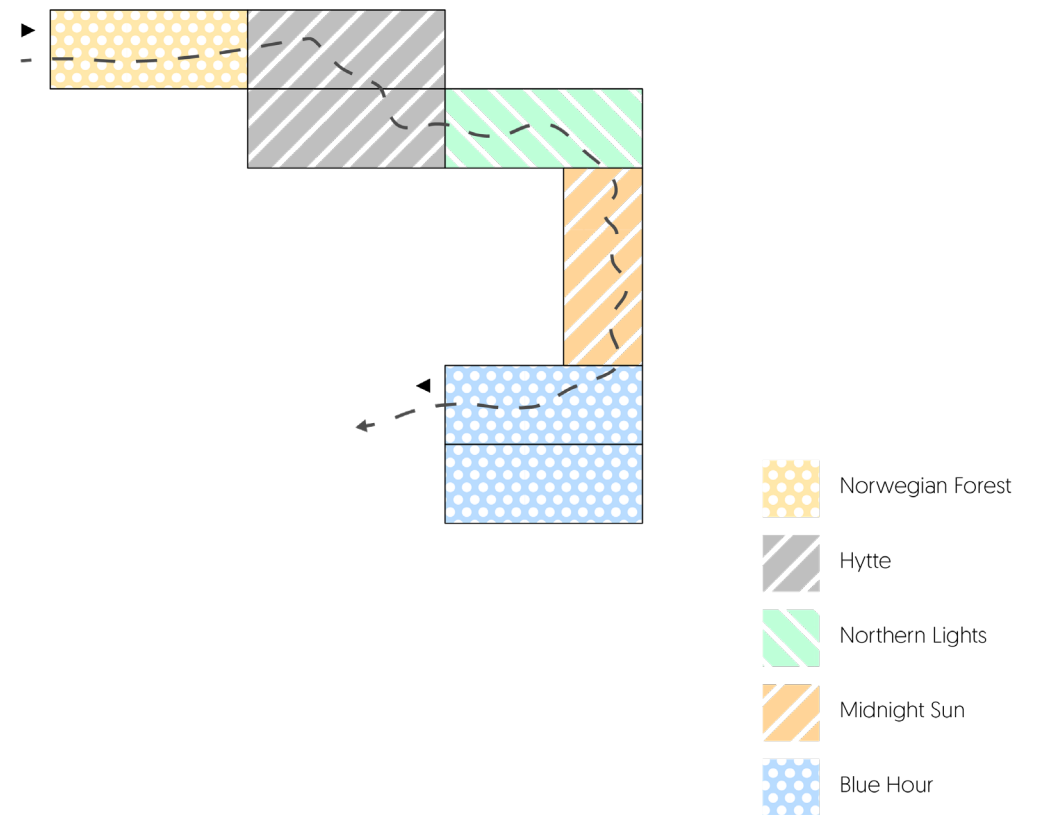


Fig.88 Exhibition Walkthrough and spaces

As it can be seen on the image, due to the final distribution of the containers chosen, it has been decided to create a linear walkthrough.

The choice of considering the exhibition to be on the same floor [ground floor] has been made in order to facilitate the accessibility to users with disabilities or special needs.

This walkthrough is designed to last 20-30 minutes in its entirety, so in each of the rooms it is intended to be between five and eight minutes. However, there will always be users who will be able to do the walk in more or less time.

# Exhibition experience

To create a good user experience in an interior space it is important to take care of every detail that you want to place inside. This involves both physical and sensorial or immaterial elements. On the one hand, the physical elements influence the aesthetics of the exhibition and the immaterial elements influence the emotions of the users.

Thus, for the design of this exhibition, both physical and immaterial elements have been taken into account. For the tangible elements, certain furniture and interior elements were used to design the interior of all the rooms. For the intangible elements, we have chosen to use lights [sight], sounds [hearing] and elements that create smells [smell] to enliven the senses of visitors as they walk through the exhibition space.

All of these, acting together, will help to make

the visitor's experience unique, allowing them to experience something they have never experienced before. It could be said, therefore, that the experience that everyone has in the exhibition will depend on how the elements are organized in the space itself.

In this project, the storyline and the concept on which this exhibition is based is light in Norway. Therefore, what is shown in each of the rooms will be closely related in some way to light.

In order to find the concept of each room with which to represent light, a table has been created to relate it to different elements. In this way we relate the elements that we can find in nature with the colours, seasons, feelings and elements of the interior that the room may contain. In the following table we can have a visual image of this:

ROOM	CONCEPT/ NATURAL ELEMENT	INTERIOR DESIGN ELEMENTS	FEELING	COLOR	SEASON
1	DARKNESS	BLACK ROOM/ SOUND / COLD	LONELINESS	BLACK	AUTUMN / WINTER
2	BLUE HOUR	MIRRORS / COLD/ BLUE LEDS	CALM	BLUE	WINTER
3	NORTHERN LIGHTS	SUSPENDED LIGHTS	AMAZED	GREEN PURPLE	WINTER
4	SNOW	POOL BALLS	BEAUTY	WHITE	WINTER
5	WATERFALL / FJORDS	WATER FALLING/ INTERACTIVE FLOOR	BEAUTY / RELAXED	BLUE WHITE	SPRING
6	WOOD SHADOWS	ROOF PATTERN/ WOOD SHADOWS	BEAUTY	DEGRADED GREEN / BROWN	SUMMER
7	MIDNIGHT SUN	VIDEO PROJECTORS	BEAUTY/ CALM	DEGRADED SUNSET COLORS (YELLOW, ORANGE, RED)	SUMMER

Fig.89 Rooms Conceptualization

Initially, the idea of relating the natural element to the seasons of the year was considered, so that each room would be a season and the most characteristic light of that season would be represented. However, certain difficulties were encountered during the development phase, which prevented the relationship of the natural element with the seasons of the year, especially because there were more elements during the winter season than in other seasons such as spring. For this reason, it was finally decided to relate the elements of nature to the feelings that these phenomena can cause us.

It was therefore decided to represent the following rooms in the exhibition:

**Norwegian forest** —> Which relates to the beauty that can be found in norwegian forests and nature itself.

**Darkness (Hytte)** —> Which relates to the loneliness that can be witnessed in the Nordic countries and is felt by many people.

**Northern Lights** —> Which relates to the beauty and wonder. A phenomenon that can only be witnessed near the Arctic Circle, and in which Norway stands out for it.

**Midnight sun** —> Which is related to the state of peace and calm that comes from observing this natural phenomenon at sunset.

**Blue Hour** —> Which is related to the maximum state of calm, because when we

witness this phenomenon we feel a lot of peace inside us.

As can be seen, each of these elements is closely related to a feeling, and this has been the key element in developing each of the ideas as well as the elements that are placed in each interior space that will represent each of the rooms.

It should also be noted that the choice of materials in each of the rooms has been a decisive factor in creating different sensations for users as they walk through the exhibition space.

In the following section, a detailed description of the walkthrough is explained. The use of materials, the lighting elements, which elements are placed in the interior as well as the concept on which each of the rooms is based on for having developed all those ideas.

The purpose of this small chapter is therefore to understand each of the spaces that the visitor passes through while visiting the exhibition.



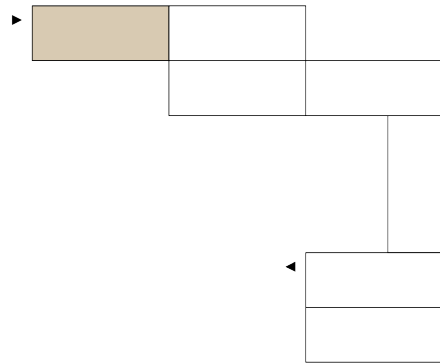
## CHASING THE NORWEGIAN LGHTS

Just before the entrance to the exhibition space, there will be a stand with exhibition staff in charge of handing out a Tote Bag to each visitor. This Tote Bag, as well as containing merchandising items, will carry a triptych with information about everything the exhibition contains: its name, an informative map to locate the different spaces and a brief explanation of each of the rooms without making a very specific advance, to leave

the user with the necessary intrigue to make them want to visit the exhibition immediately.

To enter the exhibition, the subject will have to pass through curtains at the entrance door, which will allow him/her to enter the first room in an interactive way.

## ROOM 1

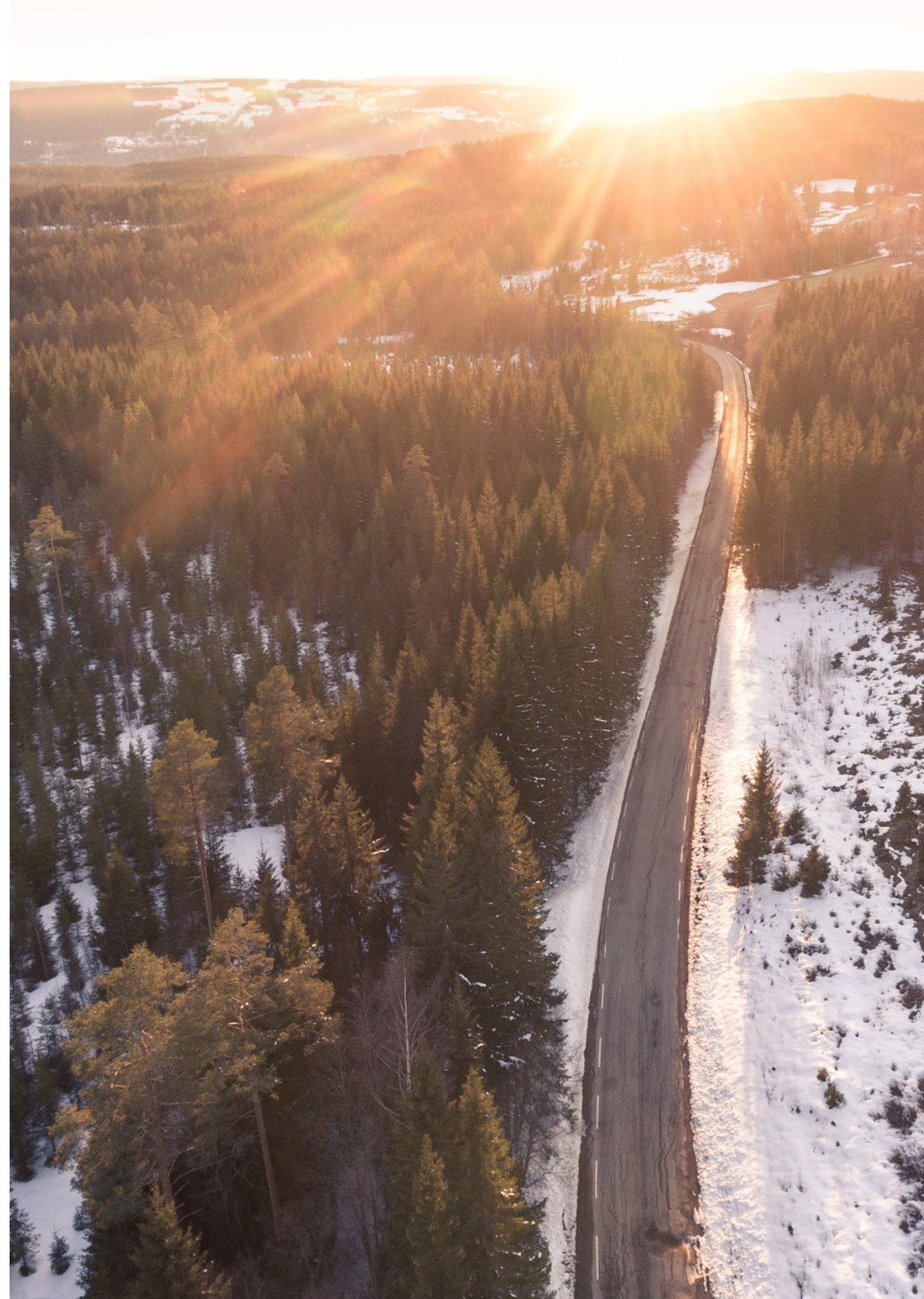


# NORWEGIAN FOREST

Norway stands out for its iconic nature and there is no doubt that it is wonderful in its entirety. From its majestic mountains to its imposing fjords, its icy roads, its crystal clear lakes, green forests and valleys and so many other places that remain to be discovered. Its landscapes undoubtedly capture the hearts of those lucky enough to explore them.

Being in any of these natural places means contemplating the magnificence of nature in its purest form.

In this room, visitors can find themselves transported to a Norwegian forest, watching how the light falls through the intertwined branches moving by the wind



Once the visitor gets inside the exhibition, he/she finds in the first space a representation of a forest. This allegory of the forest was created with the idea of transporting the user to the emblematic nature of Norway, with its incredible and extraordinary landscapes with mountains, lakes, fjords and especially its forests. When you are in the middle of a forest and you look up, you see the light hitting the treetops, but if you look at the ground you are walking on, you can distinguish the shadows that are projected on the ground depending on the angle at which the light hits the treetops.

Through this room, the intention is to represent a forest but giving meaning to the fact of “going outside”, to be outdoors and enjoy when there is a lot of light in Norway, especially during the spring and summer months, where the sun is present for almost 20 hours during the months of June and July, and this allows people to enjoy their time outside much more. Therefore, people leave a little bit aside the fact of being locked up at home and go outside to enjoy nature and the outdoor activities that can be done when the good weather and the light comes. Thus, the aim of this space is to create the feeling of walking through a Norwegian forest.

To generate the shadows in this space, three very characteristic patterns have been created with irregular and organic shapes so that when a spotlight is placed above it, on the ceiling, it simulates the light that in reality would fall on the foliage of the trees and generate these shadows on the ground [Fig.90].

In order to bring this idea to its possible construction, the patterns were design and printed in the laser cutter.

A double-height container will be necessary due to it has to be certain distance between the LED lights and the pattern to be able to generate the shadows properly.

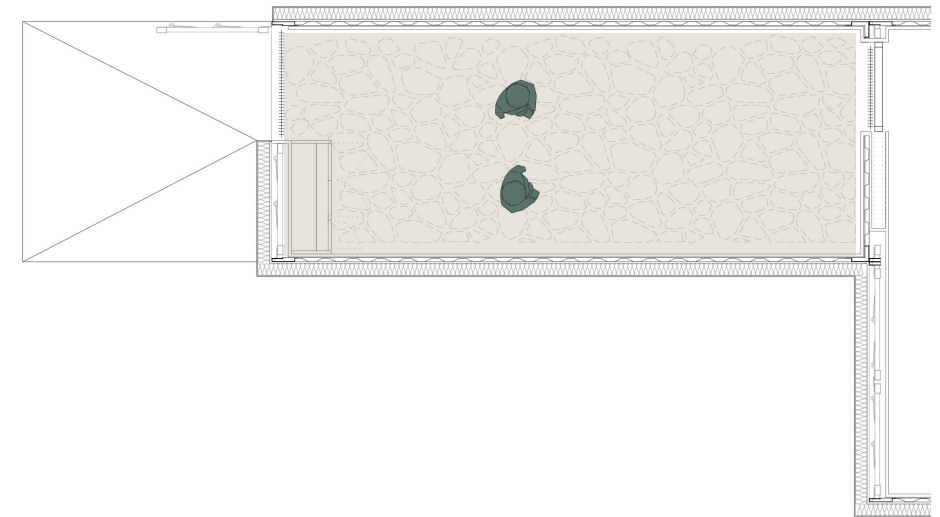
These patterns will be arranged in the double-height container, at different heights forming overlapping layers between them. In addition, there will be a mechanism for moving all the layers at the same time, so it creates movement in the floor and the sensation would be as if the visitor was visualising the movement of the branches when the wind blows on them.

Moreover, spotlights will be installed on the ceiling of the space, which will project light downwards, shining through the holes in the patterns and thus generating the characteristic shadows on the floor.

Finally, it should be noted that this space will have the walls painted in green colour to create a very elegant visual effect at the same time it simulates being in a forest.

The user will be able to observe these green colored walls and the different brown patterns simulating the branches placed in the second container from below. Once he/shee looks up, he/she will visualize them and also the light coming from the top interspersed through them.

## NORWEGIAN FOREST ROOM PLAN



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Reference	P2-01
Plan	EXHIBITION - NORWEGIAN FOREST PLAN	Scale	1:50	W/Plane	1

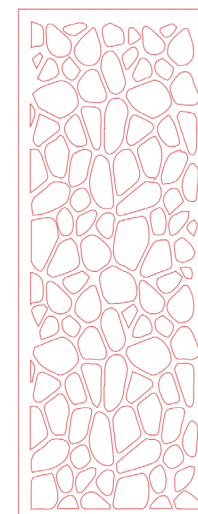


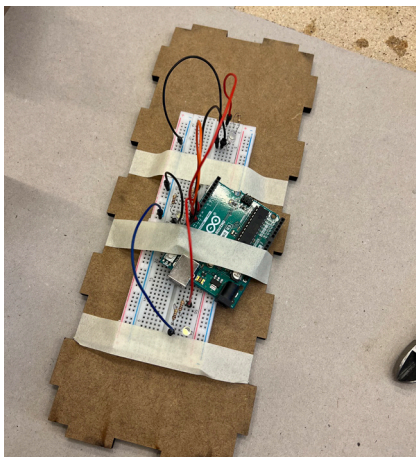
Fig.90 Patterns for generate shadows





Inspired by the museum Louvre Abu Dabi created by Jean Nouvel [13] on the way the light hits the interior space, I wanted to represent the Norwegian forest in a similar way.

The use of Arduino useful to be able to create a sequence with the light. The idea was to display each of the three LED lights located on the ceiling separately, so first one lights, then the other and then the last one. The intention was to create the sensation of movement as the branches in a forest do when moved by the wind.



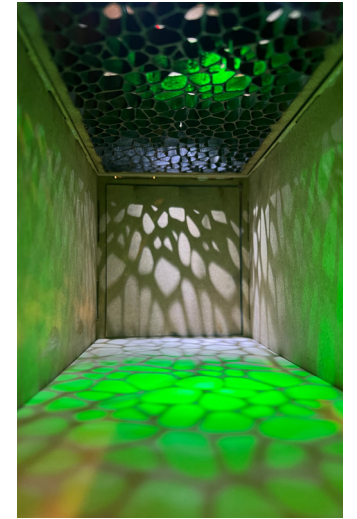
## FIRST LIGHT TESTS



The first test proved that a second height was required

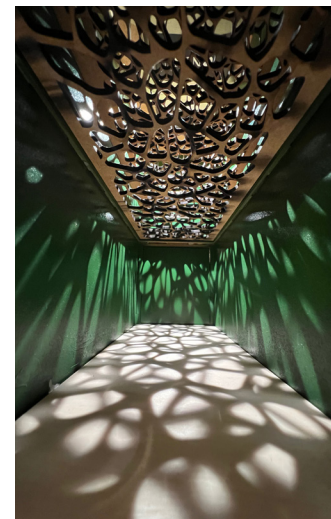


different patterns were printed in order to show different shadows



Light and color test were carried out to see the different effects

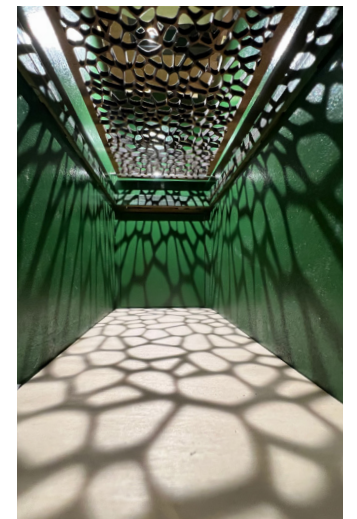
## SECOND LIGHT TESTS



The interior was painted in green to give a sensation of being in a forest



This is the view a person on the inside would see when looking upwards



Shadows are generated on the walls providing a magical feeling.

Fig.91-100 Development process

## OTHER ELEMENTS IN THE INTERIOR

Finally, it should be noted that the temperature in this room will be between 15 and 20 degrees, as the aim is to simulate the spring and summer season, which is when the most time is spent outside and therefore, when the weather is the best and when there is the most light in Norway.

A very important element that we want to add in this room is the fog effect, which reminds us of how cloudy the early mornings are in the forests here in Norway. Therefore, the fog effect will be added with a fog generator.

As mentioned before, the elements in the rooms have been related to emotions, and this room is related to the emotion of beauty as a whole. Therefore, what is intended to be conveyed through the course of this room is the feeling of connection with nature, i.e. the beauty that the forests and nature of Norway itself convey to us when we witness it firsthand. That is why the chosen pattern generates beautiful shapes on the floor creating a very intimate yet beautiful interior space.



Fig.101-102 Development process

## MATERIALITY

### PAVEMENT

For the flooring, a natural elm wood floor has been chosen. This type of wood has been chosen because it is one of the most commonly used in Norway. On the other hand, compacted soil, up to 2 cm thick, is available. The decision to use this material was made to create the sensation of walking through a forest.

Any person with reduced mobility will be able to access and enjoy the room in its full use. The pavement has been placed on top of the OSB (1.5+1.5) that have been placed in all the containers, covering them.

### ENCLOSURE

Natural elm wood has also been chosen for the enclosure. It is a continuity of the paving. It has been placed vertically, by means of rectangular and smooth slats. These are varnished to give them the darkest possible tone. The slats are anchored to the OSB panels (1.5+1.5) which, as mentioned above, are used in all the containers to provide insulation from one room to another, in addition to the exterior insulation.

For the enclosure of the ceiling, it was decided to install panels which, as specified above, form characteristic patterns with holes in organic shapes. These panels have been arranged at different heights and in the

double-height area of the room, i.e. in the container at the top.

### LIGHTING

For the lighting, there are fixed LED lights placed along the entire ceiling of the room behind a translucent screen about 3 cm thick, which means that the light, when it falls on it, spreads a little across the room, allowing it to fall on the patterns with sufficient intensity to be placed over the holes and generate the characteristic shadows on the floor.

The colour temperature of the light emitted by the installed LED luminaire must be taken into account. In this case, for this room it will be 2200 K [Kelvin], to provide a warm light to create a dim and pleasant space.

### SOUND

To generate the sound in this room, loudspeakers have been placed in the corners of the room, just behind the translucent screen.

These will play ambient music at an optimum volume for all users. This auditory support will transport the user to the forest, making them feel as if they were in the middle of nature, walking through the fog in the early morning in a forest, just when the sun begins to rise and illuminate the whole space and there are slight rays of light hitting the treetops.

Previsualization of the Norwegian Forest Room

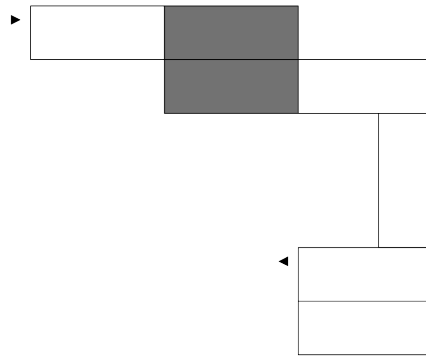


Fig.103 Norwegian Forest Render



Fig.104 Norwegian Forest Picture

## ROOM 2



# NORWEGIAN HYTTE

"It is said that norwegians could drive for hours to walk across forests, rivers and mountains to be able to reach a place where they can be isolated, in the middle of nature, alone and peaceful. They will hide themselves in this place without running water nor electricity. They call it "Hytte"

Norwegians will buy a hytte rather than spending their money traveling or staying at nice hotels, eating in nice restaurants. But owning a "Hytte" may cost millions of kroner."

[14]

This text as well as the image on the right page was extracted from a book found in a Coffe Shop in the center of Trondheim.

The purpose of this room is to create a real cabin feeling to feel the famous loneliness that could be found in nordic countries, that mean to understand well the fact of finding yourself alone in the middle of nature and discovering the inner peace sense.



Once the user leaves the first room and enters the second, he or she will witness an almost completely dark space. Furthermore, it is designed to be walked through individually, so that the user is alone in the space.

The first sense that is activated in the user when arriving in this room is the sense of smell, as the smell of wood and smoke is quite noticeable. You can't see anything, but you can see a beam of light coming from some element in the middle of the room, which is not very easy to distinguish with the naked eye.

Some sound emitted by this element can be heard, but it cannot be distinguished very well. To do this, the user must approach it. As he/she gets closer, he/she starts to recognise the element. Now, it is possible to distinguish that what emits the light is a gas cooker, very common in cabins and saunas in Nordic countries. As the wood burns, it emits the characteristic crackling sound that can be witnessed in the room. There is also a chair placed directly in front of the cooker that invites the visitor to sit right on top of it while looking at the fire. As the visitor sits in the chair, he or she can see that the room consists of a hut, which is very common in Norwegian culture.

The idea of recreating this cabin in this space was born on the one hand from a visit to the exhibition **Salamandernatten** [7] by the artist Kjell Erik Killi Olsen in Trondheim, where it has been mentioned before. This exhibition is located in a dark space where you can't

see anything at all, but with the passage of time, when your eyes get used to it after two minutes, your eyes start to distinguish the elements located in the space. On the other hand, the idea was also born from a visit to one of NTNU's cabins (Holmsakoia) where one could appreciate much more the Norwegian culture of disconnecting from everyday life and going to the forest to unwind for a long weekend.

However, as mentioned before, the most crucial idea to recreate this space was the discovery of the following book in a coffee shop: *The Social GuideBook*, where one of its chapters talked about the Norwegians' dream: to have their own cabin to be able to disconnect and spend time alone.

As above-mentioned, the elements of the rooms have been related to emotions, and this room is related to the emotion of loneliness. Therefore, what is intended to be transmitted through the course of this room is the sensation of being alone, of feeling alone and appreciating the time spent with oneself.

To this end, the idea was to recreate a dark space by linking it to the concept of solitude and the cabin.

The idea is for this dark space to transmit the sensation of solitude, and therefore for it to be a space in which the visitor could do introspective work, inviting him to sit in the chair and think about himself, as if he were meditating.



Fig.105 Norwegian Cabin

The intention of this room is for the user to be completely immersed in Norwegian culture, to be in contact with nature in the middle of the forest, to live slowly, to be aware of the here and now (*hic et nunc*), to meditate; in short, to have a break to disconnect from everything and spend more time alone.

Thanks to this Youtube video [15] the true essence of having a cabin experience in Norway and understanding the differences between solitude and being or feeling lonely could be understood.

In the video, Lisalotte says "How nice it is to sit and enjoy the warmth of the fire and a cup of coffee/tea and think about how good life is wherever you are". This has given us the idea to place the chair next to the cooker in the space.

We also understand the difference between being alone and feeling alone as they are very different concepts.

Being alone: Staying in the middle of nowhere and not being surrounded by many people but feeling connected to those people.

Feeling lonely: Not connecting with people, having different interests and values from the people around you.

In order to represent all this, use has been made of the key element of this space, which conceptualises the essence of the room: the cooker. For this, it will be installed in the middle of the room and just in front of it, there will be a chair, which, as mentioned above, invites the visitor to sit and watch the fire.

It is worth noting that this room will have a rather cold ambient temperature, to remind us of the cold, long, harsh Norwegian winter. It is during this period that everyone is much more introspective, and therefore spends more time at home enjoying time with themselves.

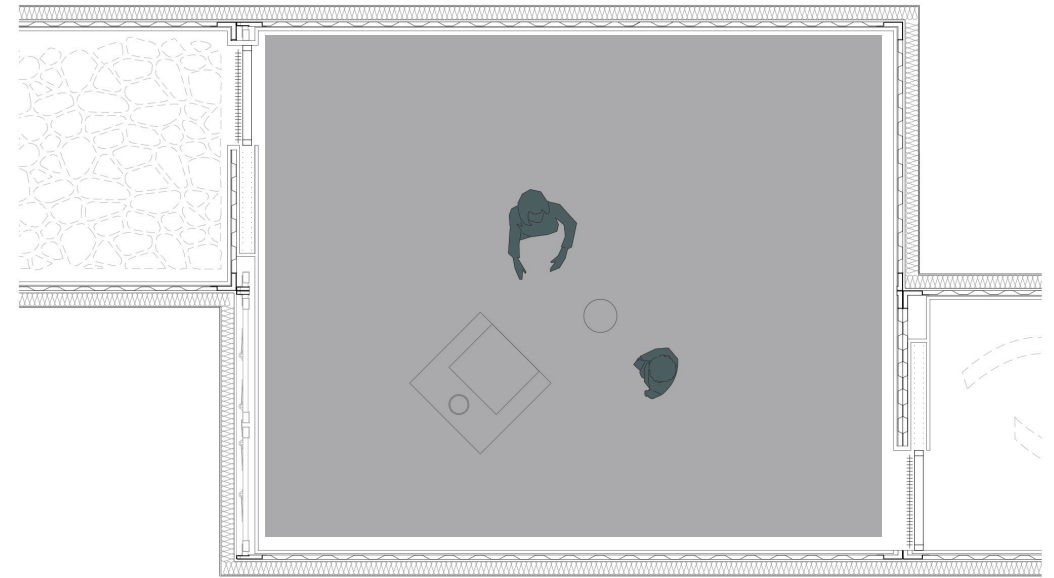


An engraving was done in order to recreate the wood cladding of a cabin into the woods.

For conceptualize the sense of being in a cabin, a stove and a chair have been done. Thus, its intention is to be placed in the middle of the room so the visitor can sit and have a moment of mindfulness to be able to enjoy the time being alone.



## HYTTE ROOM PLAN



Project	DESIGN OF AN EPHIMERAL EXHIBITION	Date	June-2023	Referencia	P2-01
Plan	EXHIBITION - HYTTE PLAN	Escala:	1:50	Nº Plano	2

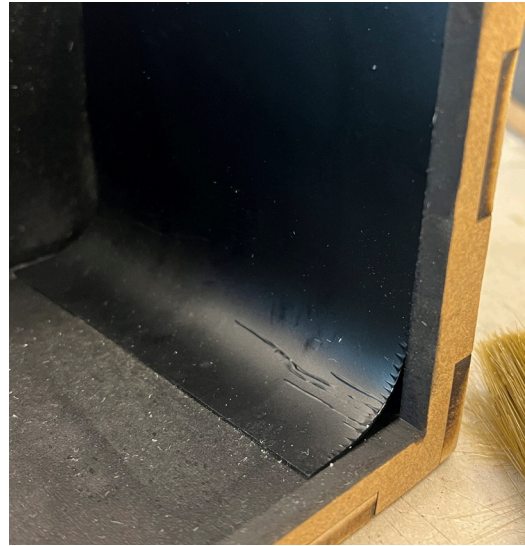


Fig.XX Patterns for generate shadows

## NEW MODIFICATION



It was decided to change the first layout of the cabin in order to improve it by making a complete black and dark space.

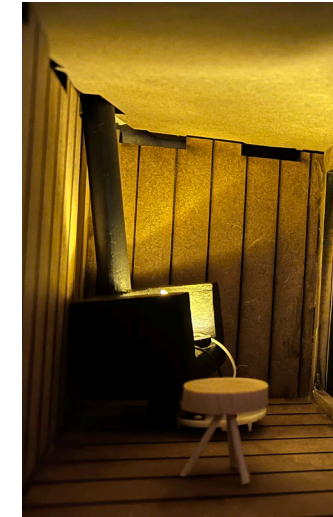


This details about losing the corners, were made in order to lose the sense about time and space while being in this room

## FIRST LIGHT TESTS



At the beginning the stove was intended to be in a corner.

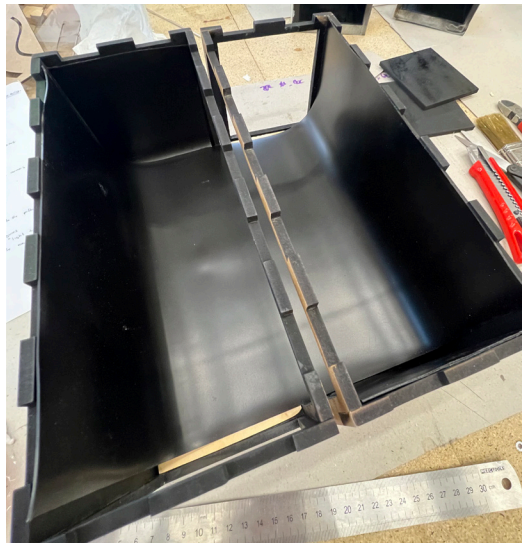


Some light was reflected on the walls.



A LED candle was used in order to simulate this type of lights.

## SECOND LIGHT TESTS



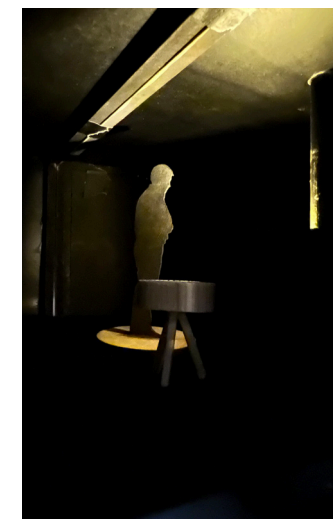
The sensation would be as if there were no walls, so the user can "lose himself" in the space.



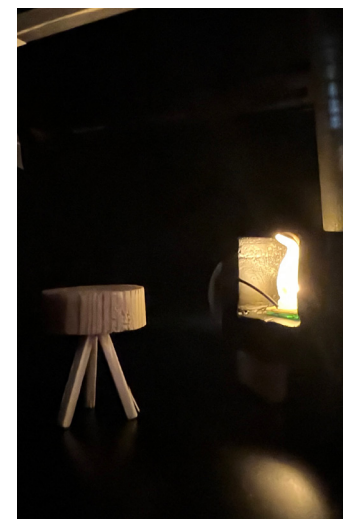
A plastic PVC was used in order to create this effect on the prototype.



The new proposal showed the ideas that were to be implemented to perfection.



The space was now completely dark having used a matt black paint and the light reflected minimally around it.



The intention was to create this cozy atmosphere inside the room and that the user loses the perception of time and space

## MATERIALITY

### PAVEMENT

In this case, for the flooring in this room, a natural pine wood floor has been chosen. This will be the same as the enclosure, to give the appearance of a Norwegian hut. The sensation of having a continuous floor with respect to the enclosure is to generate continuity and create the feeling of warmth and comfort that you get when you enter a Norwegian hut. The flooring has been placed on top of the OSB [1,5+1,5 ] that are arranged in all the containers.

### ENCLOSURE

Natural, untreated pinewood has been used for the enclosure. This is placed horizontally and cut in the shape of a semicircle to give the appearance of a hut and will be anchored to the OSB panels [1.5+1.5] to provide insulation from one room to another as well as insulation from the outside.

### FURNITURE

An antique iron cooker is placed in the centre of the room, like those found in Norwegian huts. It is a wood-burning cooker that will be lit throughout the exhibition. Thus, through the light given off by the cooker and the smell it generates, the sensation of being in a Norwegian hut in the middle of nature will be recreated.

### LIGHTING

The light point of this space is the stove. It is made of real wood so its a real fireplace and the light will be emitted by the firewood itself in its natural state.

Moreover, the smell of smoke could be felt to have the feeling of being in a cabin.

For emergency evacuation, there are small LED lights that indicate the exit, and there is also LED lighting attached indirectly to the false ceiling. This will only be used to maintain and clean the room.

### SOUND

As in the other room, loudspeakers have been placed in the corners of the room behind the false ceiling.

These play background music, representing the sound of crackling firewood, making the visitor feel as if they were in this hut, contemplating the fire. The music will be continuous and at an optimum volume for all users. This auditory support helps the user to connect much more with the space, inviting them to have a moment of introspection and reflection while they sit for a few minutes watching the fire in the stove.



# Previsualization of the Hytte Room

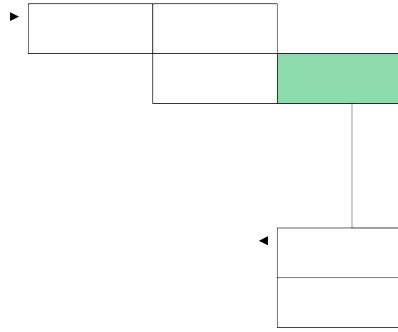


Fig.122 Norwegian Cabin Render



Fig.123 Norwegian Cabin Picture

## ROOM 3



# NORTHERN LIGHTS

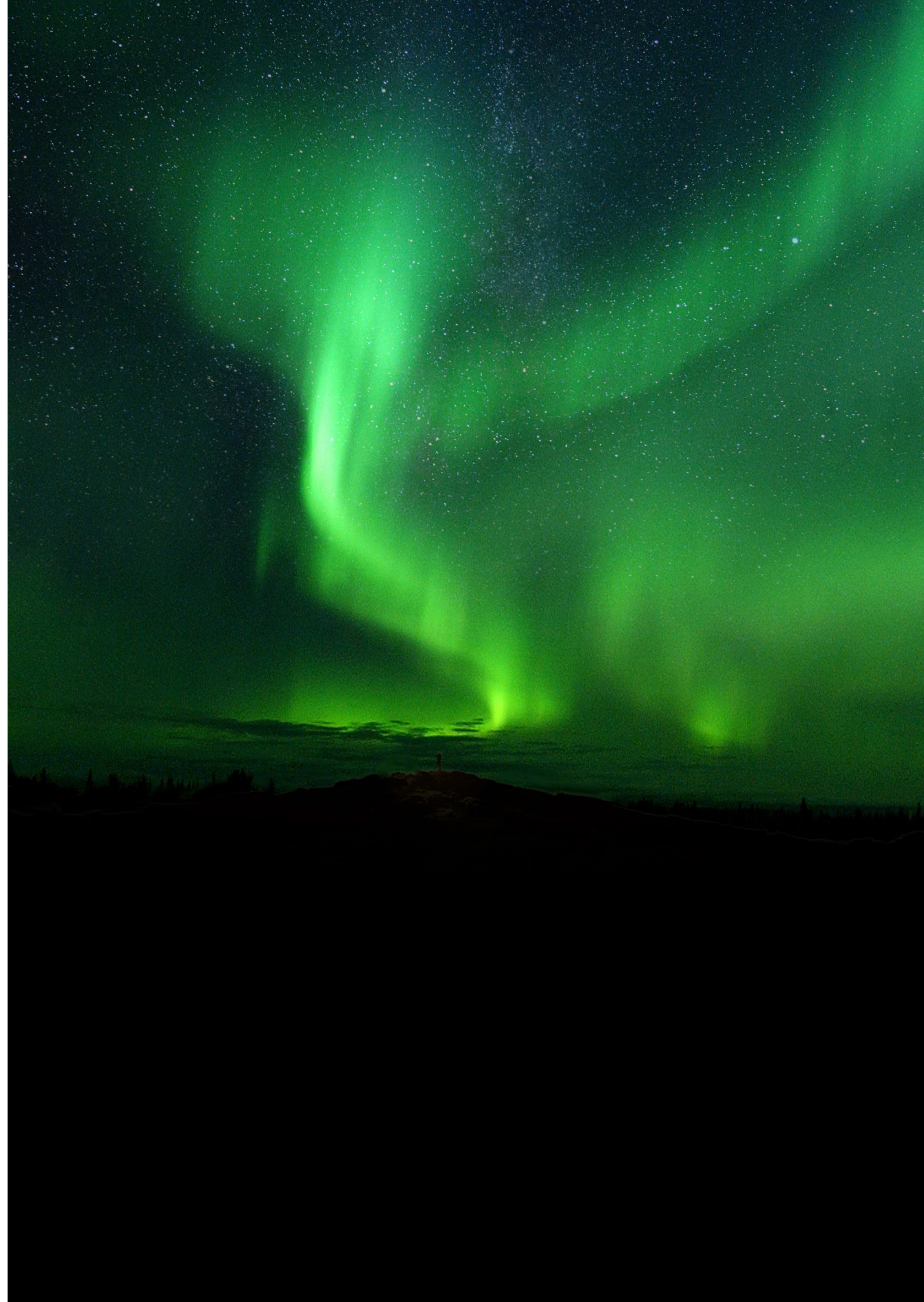
The Northern Lights, or "Aurora Borealis," are colorful lights that occur in the polar regions of the northern hemisphere. They are formed when charged particles from the sun interact with Earth's atmosphere. These particles are guided by Earth's magnetic field and collide with atoms and molecules in the upper atmosphere.

The collision excites the particles, causing them to emit light of different colors. This

resulting light displayed is known as the Northern Lights, and it can be perceived as bands, curtains, or swirls in the night sky.

Factors such as solar activity, the weather and atmospheric conditions influence the visibility of this phenomenon. [16]

Norway stands out for being one of the best countries to see this magic phenomenon.



In the third space, the visitor finds a room with double height, the containers will be coupled in order to obtain this double space. For making this, the ceiling from one container and the floor from another one have been removed.

This room should be a dark space since the Northern Lights could only be witness when there is no clouds but also when is dark. That's why in summer months they cannot be seen. Furthermore, this room will be illuminated by some LEDs suspended from the ceiling that project a green light with different intensities. For making this effect a dimmer will be needed in order to increase or decrease the intensity desired.

The purpose of this space, is to represent the Aurora Borealis, as they are a very distinctive icon of the Nordic countries, especially Norway. Moreover, as they are intimately related to light and colour, the intention is to make a nod to this amazing natural phenomenon.

To represent them, suspended LEDs have been used, creating a very characteristic curvature very similar to the organic shapes that make up the Aurora Borealis when we see them in the sky, simulating their movements in the sky.

These LEDs are distributed throughout the space, accompanying the user to the end of the room and inviting him or her to keep looking upwards to catch a glimpse of them.

Normally, this phenomenon occurs during

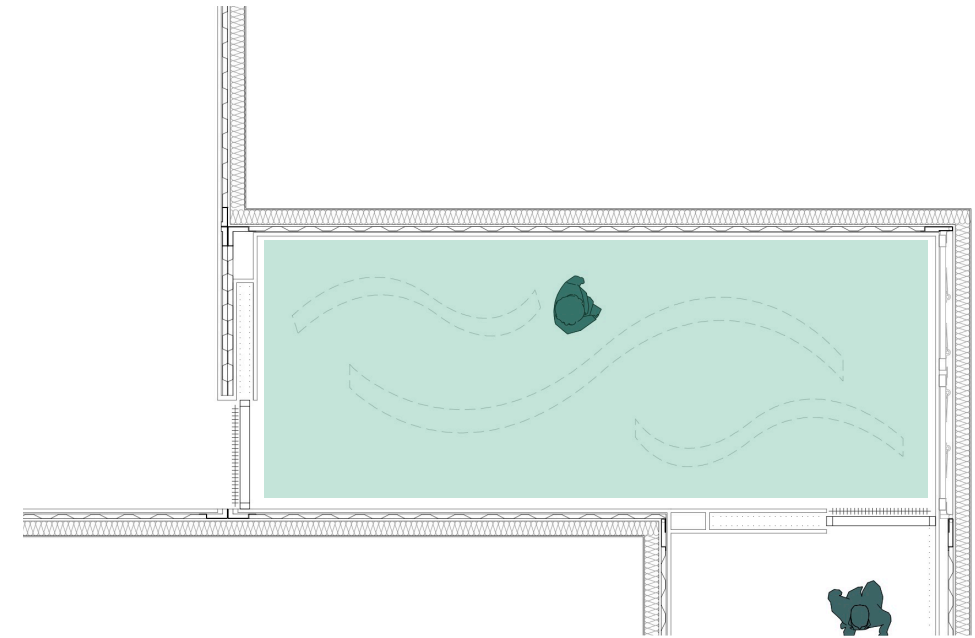
the winter months, between December and March, as this is when there is less light in the sky, and therefore when they can be better distinguished during the night, allowing them to be fully visible. For this reason, this room will have a somewhat cold temperature, so that the user can detect by touch that it is an element typical of the winter months, which, as mentioned above, stand out for being dark, long and cold.

As mentioned above, the elements of the rooms have been related to emotions, and this room is related to the emotion of beauty and amazement. Therefore, what is intended to be transmitted through the course of this room is the sensation of contemplating something astonishing as well as unique.

The idea for the concept of this room was my own experience, where on one of my trips here during my stay in Norway I was able to observe this wonderful phenomenon in the Geiranger fjord. I wanted to somehow represent this light show in some way, and after researching different references such as Nick Verstand [17], Playmodes [18] and others, the idea was born to use LED tubes suspended from the ceiling, so as to recreate the effect of the movement of the aurorae, as mentioned above.

Finally, it should be noted that the use of colour has been a key factor in the design of this space in order to capture this great spectacle of lights and colours and that these shapes can be recognised as the northern lights.

## NORTHERN LIGHTS ROOM PLAN



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Referencia:	P2-01
Plan	EXHIBITION - NORTHERN LIGHTS PLAN	Escala:	1:50	Nº Plano	3

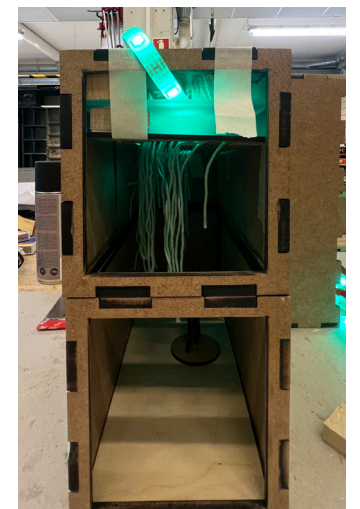
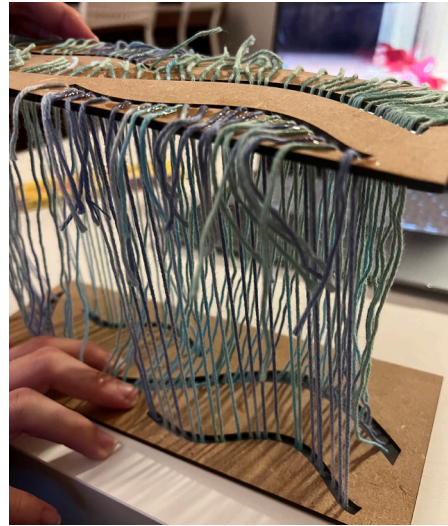
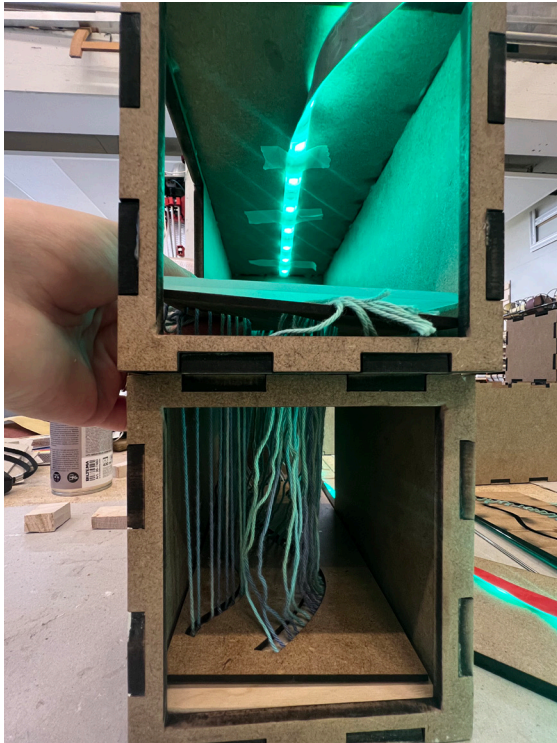
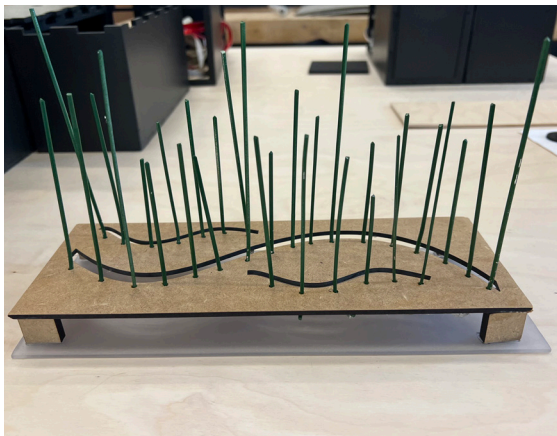
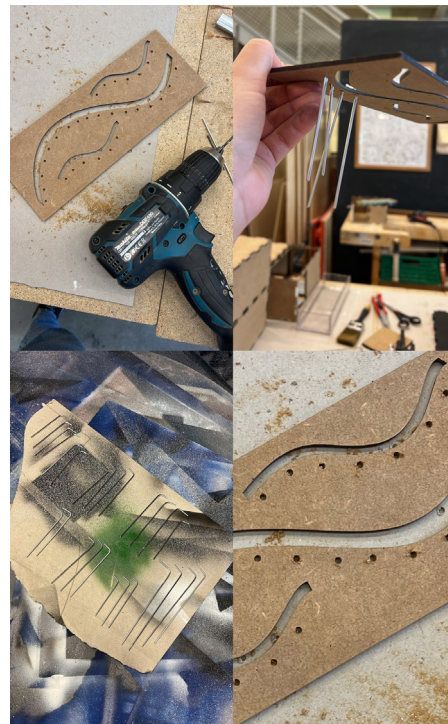
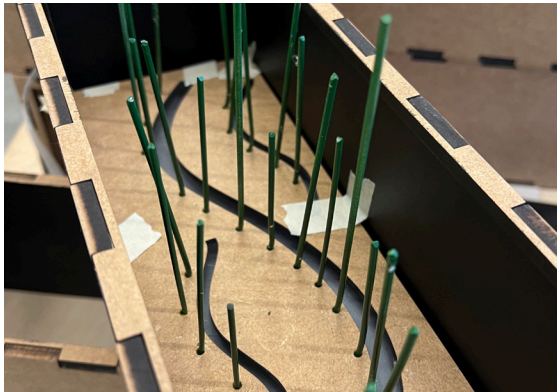


Fig.124 Patterns for generate shadows



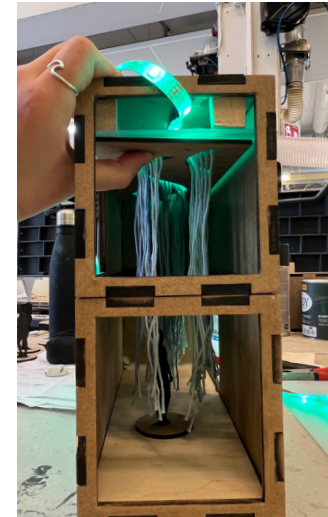
First it was considered the use of threads as a material to represent the auroras, but the result was not the expected one, so another system was created. It consisted of some rigid metal thin tubes which were somehow reflected when the light fell on them, as it can be seen on the following images.



## FIRST LIGHT TESTS



The threads were glued in this pattern for locating it in the roof down the LED Strip.

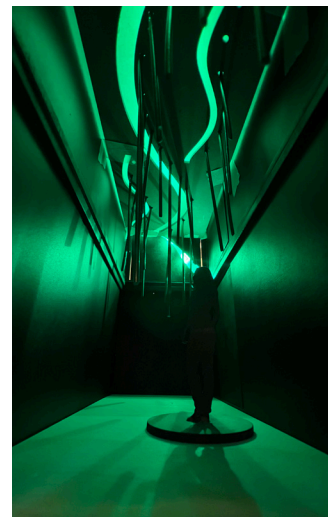


A acrylic translucent material was used in order to expand the light around all the room.

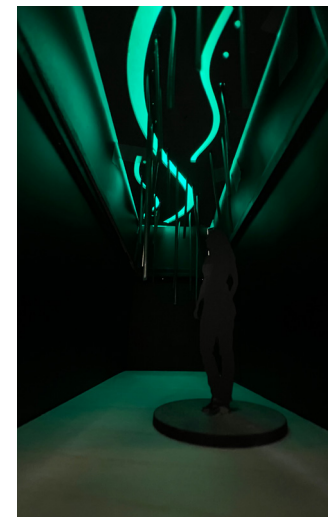


The threads simulated the led tubes suspended from the ceiling.

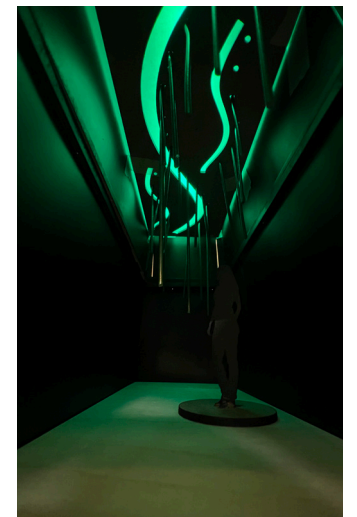
## SECOND LIGHT TESTS



With the new proposal, the room has improved remarkably.



The light incides perfectly from the top to the metal tubes simulating the real light tubes suspended from the roof.



The visitor can find himself/herself in this dark space contemplating this magical phenomenon suspended upon his head.

## MATERIALITY

### PAVEMENT

For the flooring of this space, it was decided to leave the floor with the OSB panels (1.5+1.5) that are used in all the containers. A laminate floor was laid on top of this.

### ENCLOSURE

For the enclosure, the OSB panels (1.5+1.5), which are used in all the containers to provide insulation from one room to another in addition to the exterior insulation, have been left exposed. These have been painted black to create a continuous, dark tone in the room in order to be able to provide lighting for the room.

### LIGHTING

For the lighting, fixed LED lights are vertically suspended, placed one behind the other in a sinusoidal pattern, at a distance of 0.5 m. These LED lights are programmed to change intensity of green for creating the sense of movement in the room.

The light emitted by a green LED generally has a color temperature that falls within the range of 5200 to 5700 Kelvin [K]. However, it is important to note that the exact range may vary slightly depending on the manufacturer and LED model. Green LEDs have a wavelength in the visible spectrum that is typically around 495 to 570 nanometers [nm], which gives them their characteristic green color.

Gallium Nitride [GaN] LED: Gallium Nitride LEDs, also known as GaN LEDs, utilize a semiconductor structure that combines gallium nitride [GaN] and other elements. GaN LEDs can generate green light through various techniques, such as direct light emission or using a phosphor coating that converts blue light emitted into green light.

### SOUND

In this space, there are also loudspeakers placed in the corners of the space behind the false ceiling playing music at a volume that is optimal for all users.

This auditory support helps the user by providing a different experience when observing the aurora, transporting them to the place where they can witness them, in the middle of nature without any light pollution.

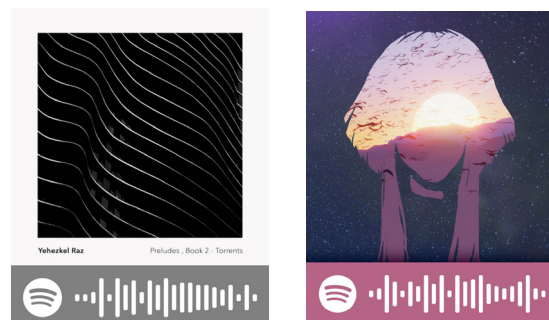


Fig.136 Songs for the space

Previsualization of the Northern Lights Room

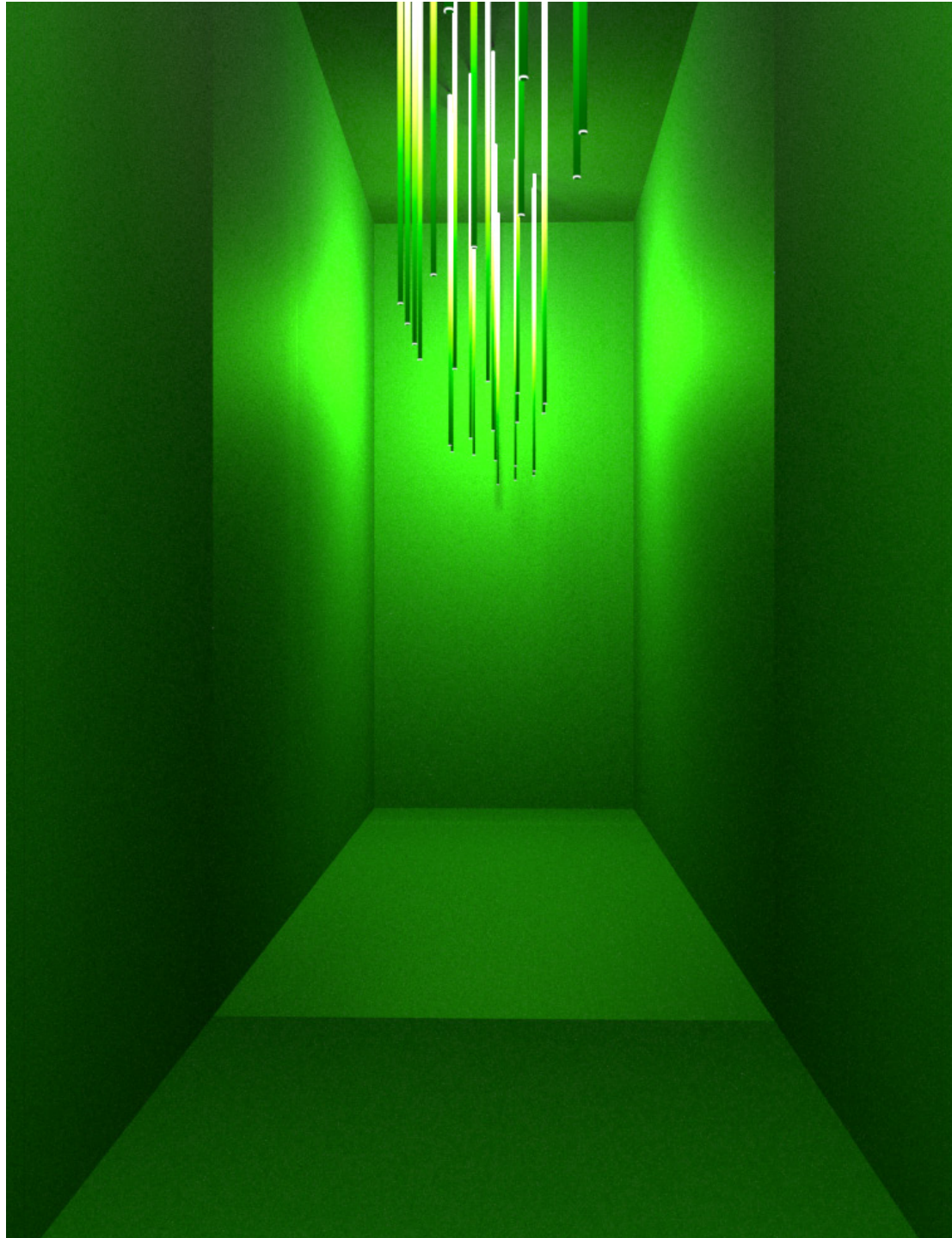


Fig.137 Northern Lights Render

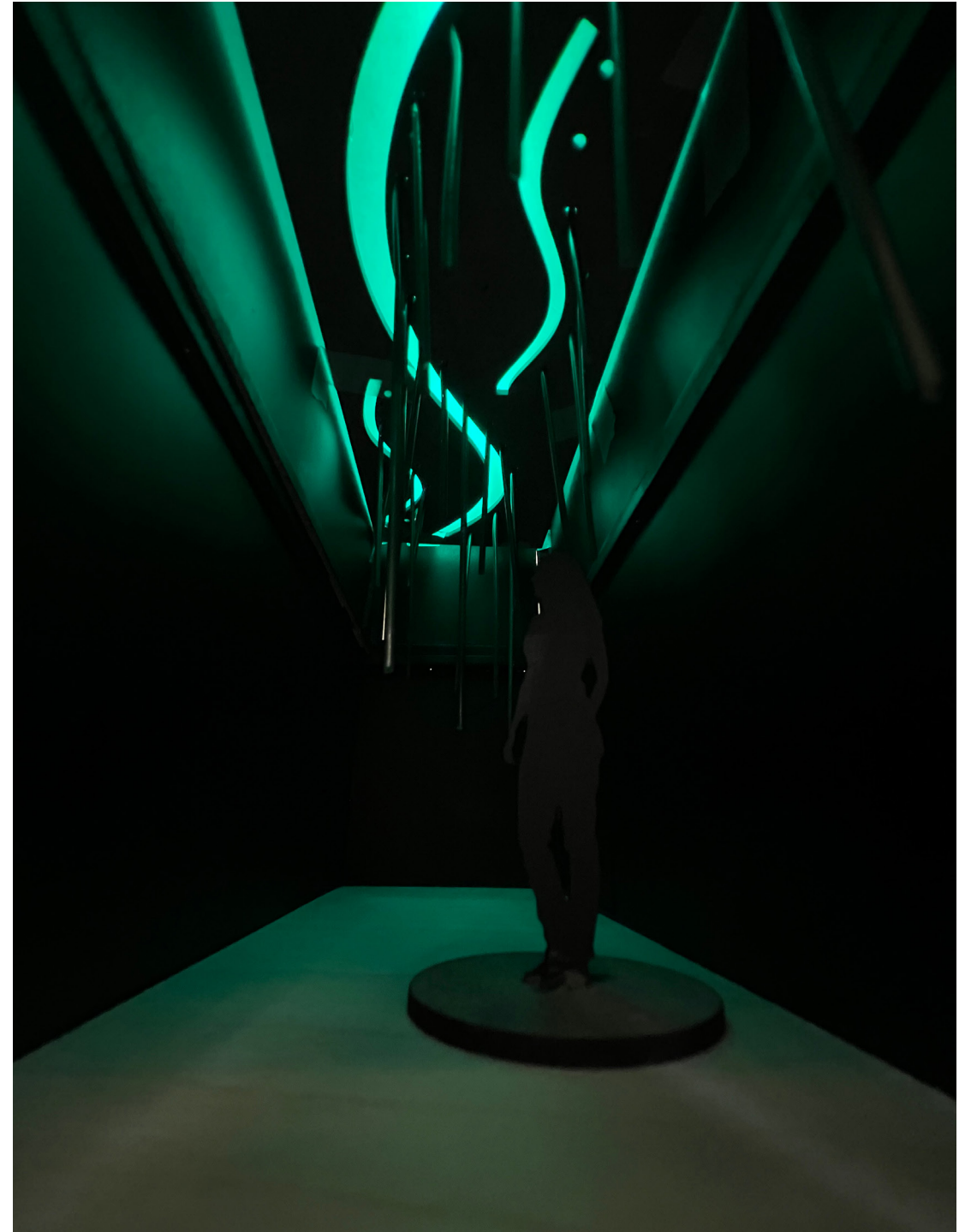
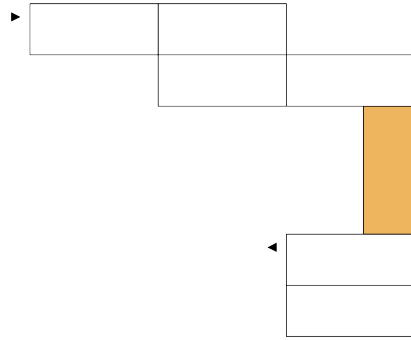


Fig.138 Northern Lights Picture

## ROOM 4



## MIDNIGHT SUN

Midnight sun is a natural phenomenon that occurs in the polar regions during summer, particularly near the Arctic Circle (in the northern hemisphere) and the Antarctic Circle (in the southern hemisphere). It refers to a period of time when the sun remains visible for 24 hours a day, even at midnight, due to the tilt of the Earth's axis.

76 days of Midnight Sun between May and July greets travellers in Northern Norway. The further north you go, the more nights of midnight sun you get.

During the summer months, you can experience up to 24 hours of sunlight above the Arctic Circle, which means more time to enjoy the sights and make new discoveries [23].



It is important to note that this phenomenon has not yet been witnessed in person, which has made the ideation process very difficult. However, having been able to observe the beautiful Norwegian sunsets, the decision to recreate this incredible phenomenon in one of the rooms was made.

This room was also the last to be developed, as the intention was that the location of this room would also be for the Northern Lights. However, after a few days of thinking and conceptualising, it was decided to use the same space to propose another room with another norwegian phenomenon that had an influence with light. This is how the idea of representing the Midnight Sun in this room was born.

Some of the ideas that were proposed are shown in the following sketches and some of them were considered and tested in the workshop to see their viability in reality.

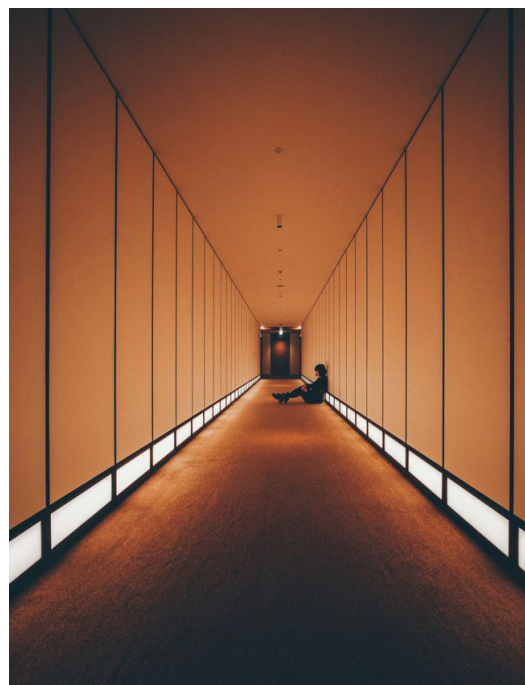
After some testing, the solution chosen was to create a video projection to simulate the trajectory of the sun when the Midnight Sun occurred, so that the double space of the existing space could be used to project from above onto the walls using mapping projectors that adapt the content of the projection to the desired surfaces.

In principle, two projectors should be chosen as it is intended to project onto the different walls of the room. However, it is recommended to consult with mapping projection experts or installation designers for

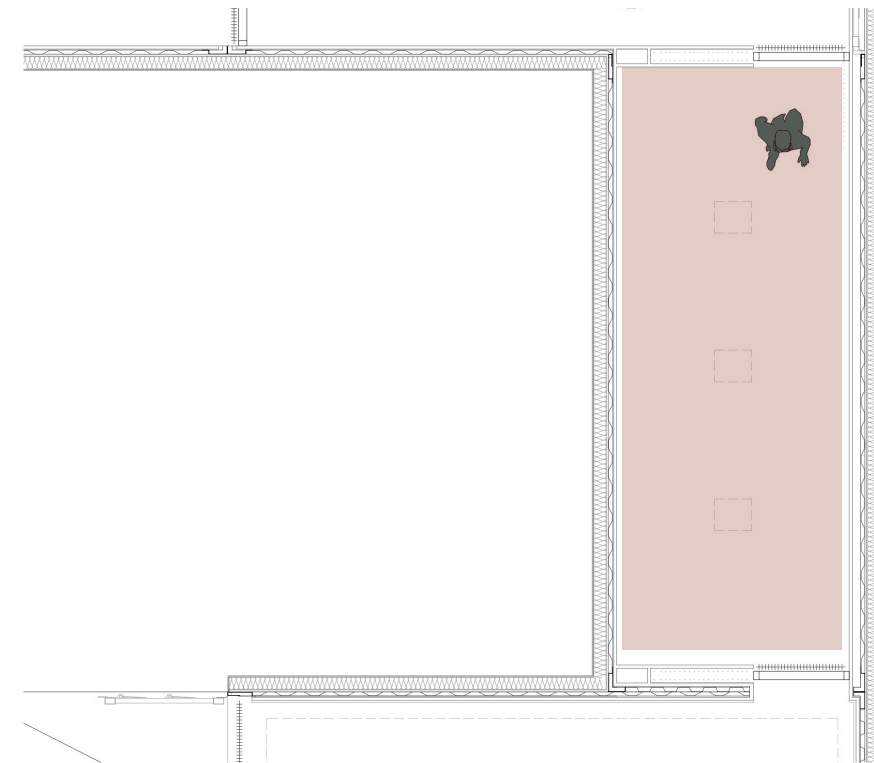
a more precise information on the number of projectors required for an exhibition space such as the one proposed.

Finally, small OLED panels will be arranged in the lower part of the room, (as seen in the picture below) so that meanwhile the video projection is displayed in the walls of the room, these OLED panels will bath the room with different colours in the form of gradients simulating the colours of the sunset: yellows, oranges and reds. Therefore, this colour variation will change at the same time as the videoprojection is being projected into the walls.

Thus, the Midnight Sun will be exhibited somehow creating an immersive experience with colour and sound to the visitors in this room



## MIDNIGHT SUN ROOM PLAN



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Reference:	P2-01
Plan	EXHIBITION - MIDNIGHT SUN PLAN	Scale	1:50	Nº Plano	4

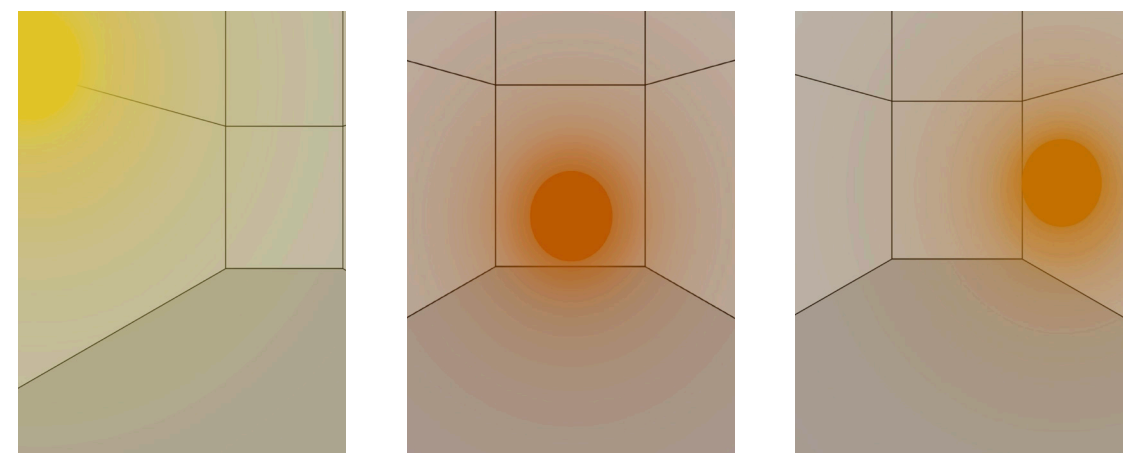
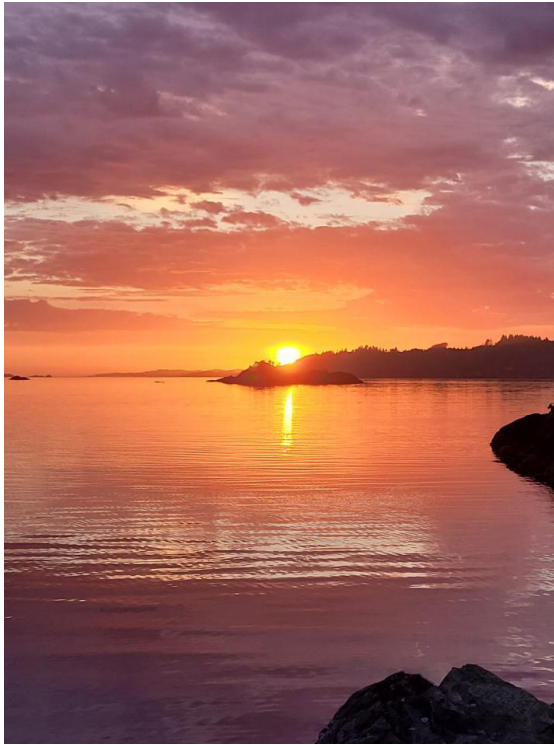
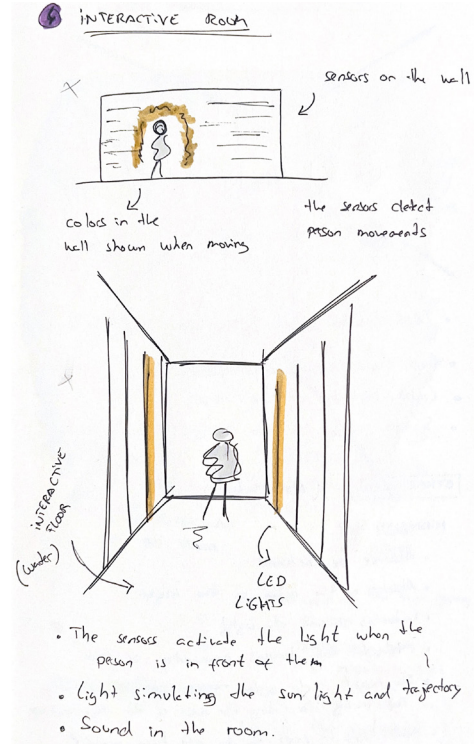


Fig. 139-142 Midnight Sun Developing process

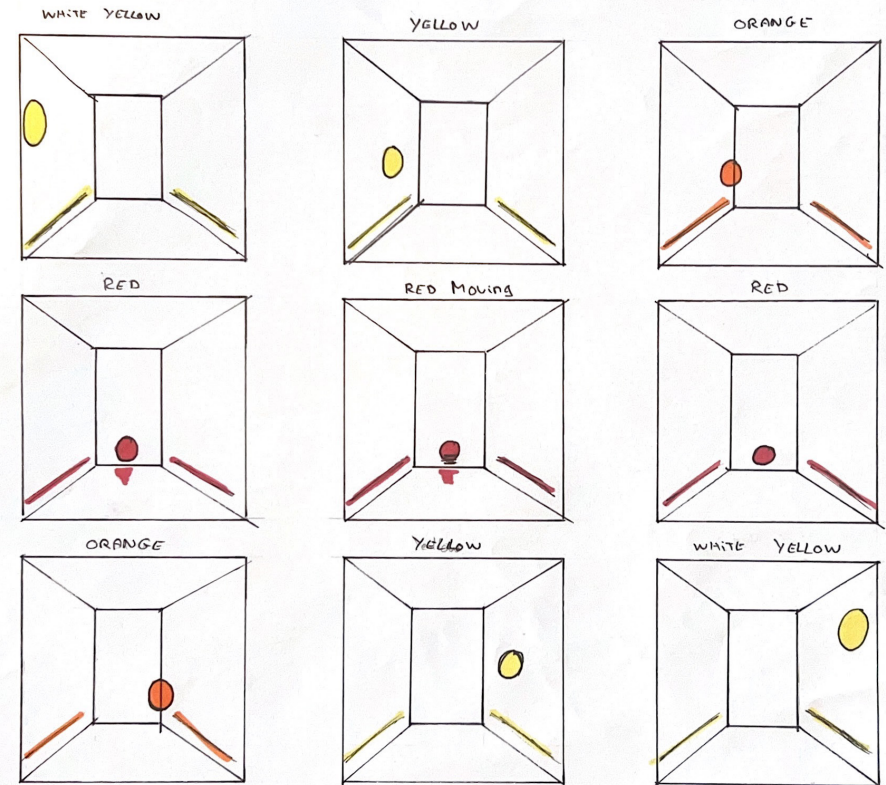
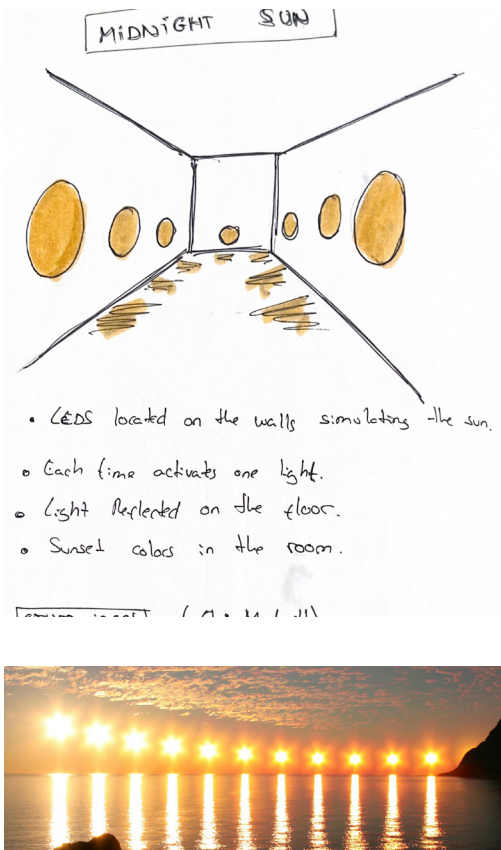
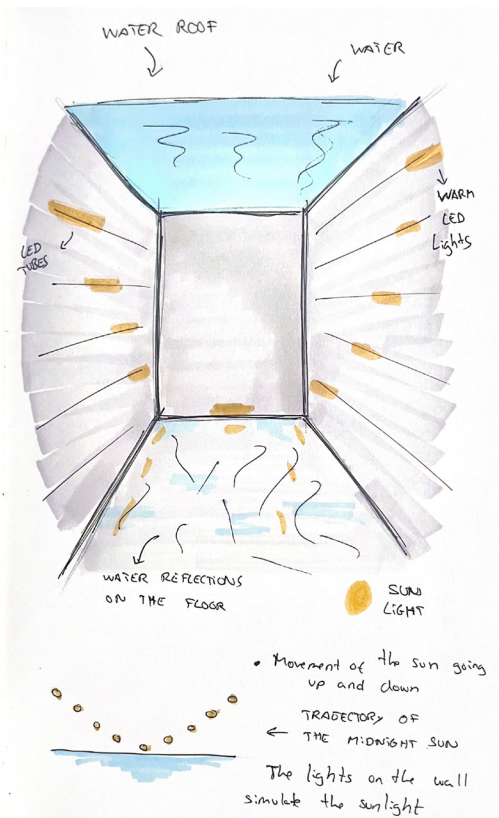
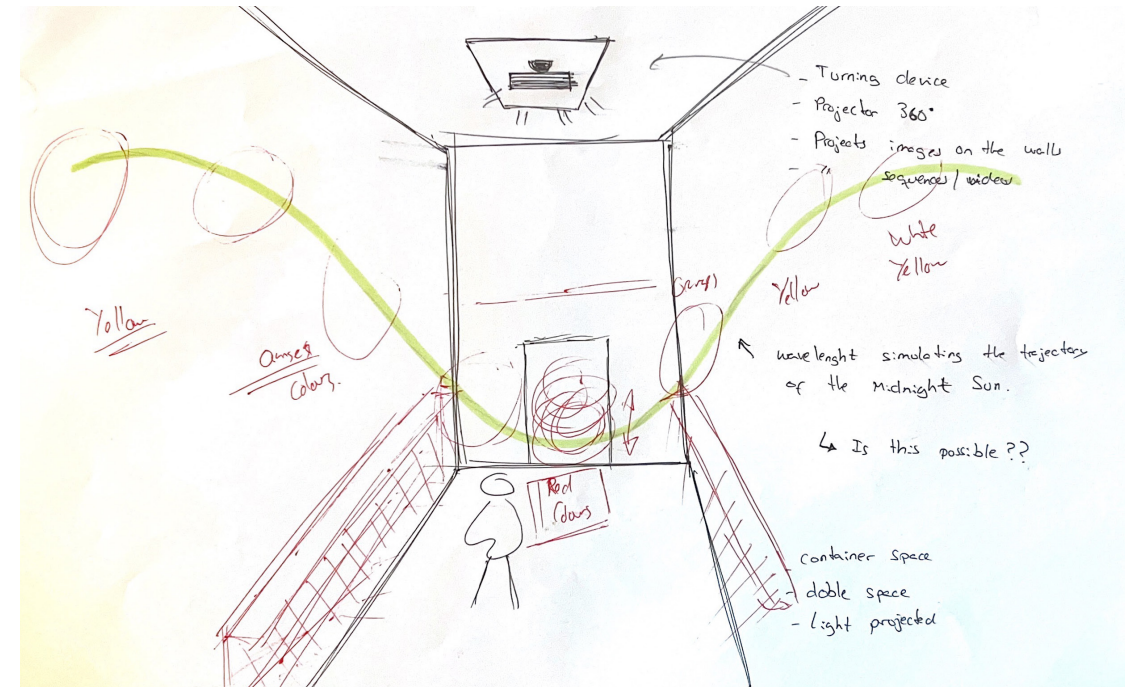




Different ideas were considered in order to re-present the Midnight Sun in the room.



## LIGHT SEQUENCE



## MATERIALITY

### PAVEMENT

For the flooring, as the other spaces, a natural elm wood floor has been chosen.

The pavement has been placed on top of the OSB [1.5+1.5]

### ENCLOSURE

Natural elm wood has also been chosen for the enclosure. It is a continuity of the paving. It has been placed vertically, by means of rectangular and smooth slats. These are varnished to give them the darkest possible tone. The slats are anchored to the OSB panels [1.5+1.5] which, as mentioned above, are used in all the containers to provide insulation from one room to another, in addition to the exterior insulation.

### LIGHTING

For the lighting, there are some OLED Panels placed at the bottom of the walls to create a warm atmosphere as if coming from the sun. To create these warm colours different light colors have been used:

**Yellow lights:** Yellow lights typically have a color temperature ranging between **2700 and 3000 Kelvin (K)**. These lower temperatures provide a warm and soft yellow tone.

**Orange lights:** For orange lights, color temperatures generally range between **2000 and 2500 K**. These lower temperatures generate a more intense and vibrant orange hue.

**Red lights:** Red lights can have even lower color temperatures, in the range of 1500 to 2000 K. These temperatures produce a deep and dramatic red light.

Plus, two mapping projectors will be placed in the second space roof container.

The aim of this space is to provide degraded hues of yellow, orange and red colors generating a warm light to create a dim and pleasant space.

### PROJECTOR

- GS series models
- These models range from 6K lumens all the way to 23K lumens

However, it should be noted that this study goes beyond the scope of this academic work, which is focused on the definition of the interior exhibition project.

Therefore, a thorough search for such elements will be taken into account in case of future research.

## MATERIALITY

### SOUND

To generate the sound in this room, loudspeakers have been placed in the corners of the room, as in the other rooms

These will play ambient music at an optimum volume for all users some kind of waves and seagulls sound as if the visitor was to be on the coast observing the Midnight Sun.



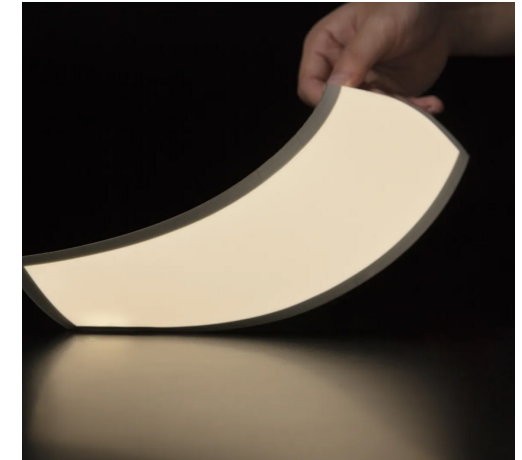
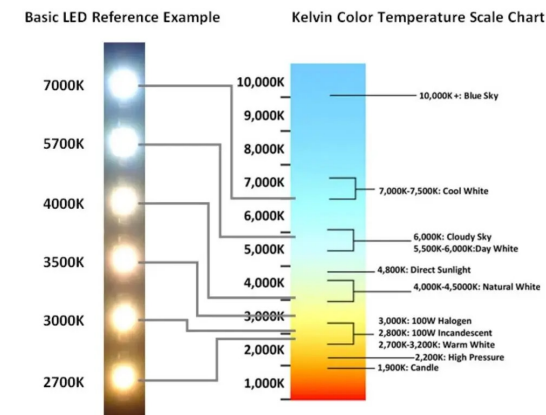
**Quiet operation**  
34dBA (Eco Mode)



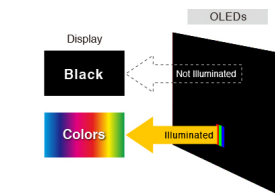
**Christie Twist**  
Built-in warping & blending  
All models except DWJ630-GS



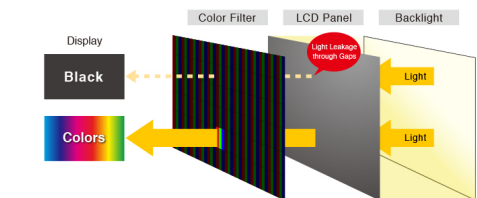
**UST lens available**  
For flexible utilization of installation space



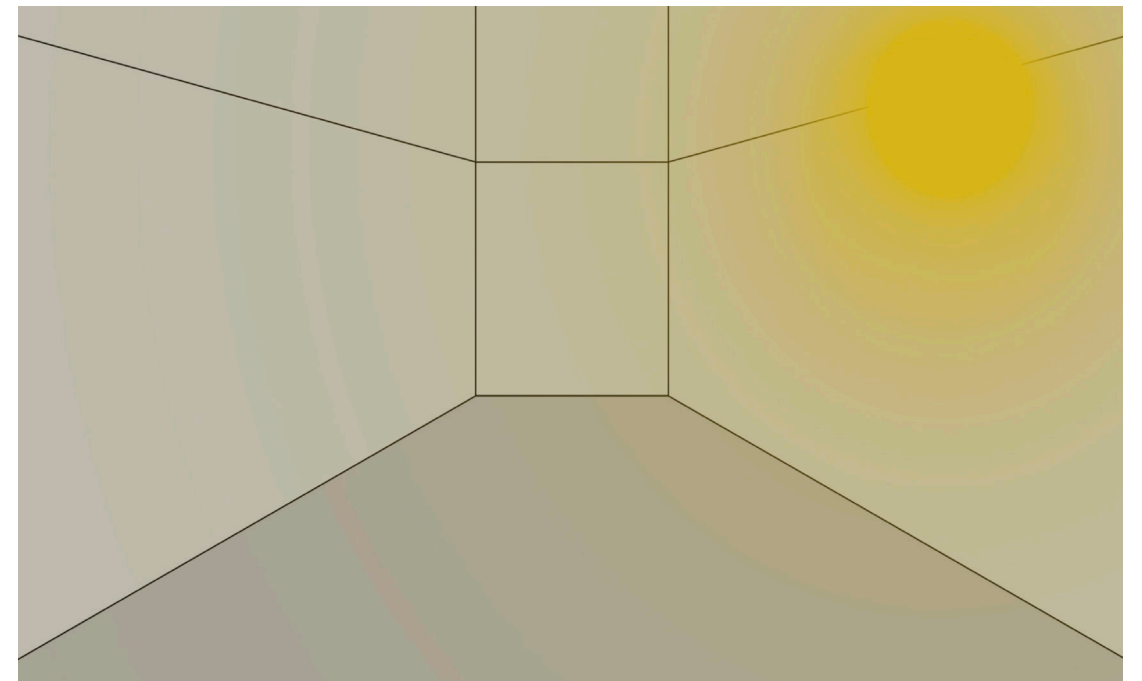
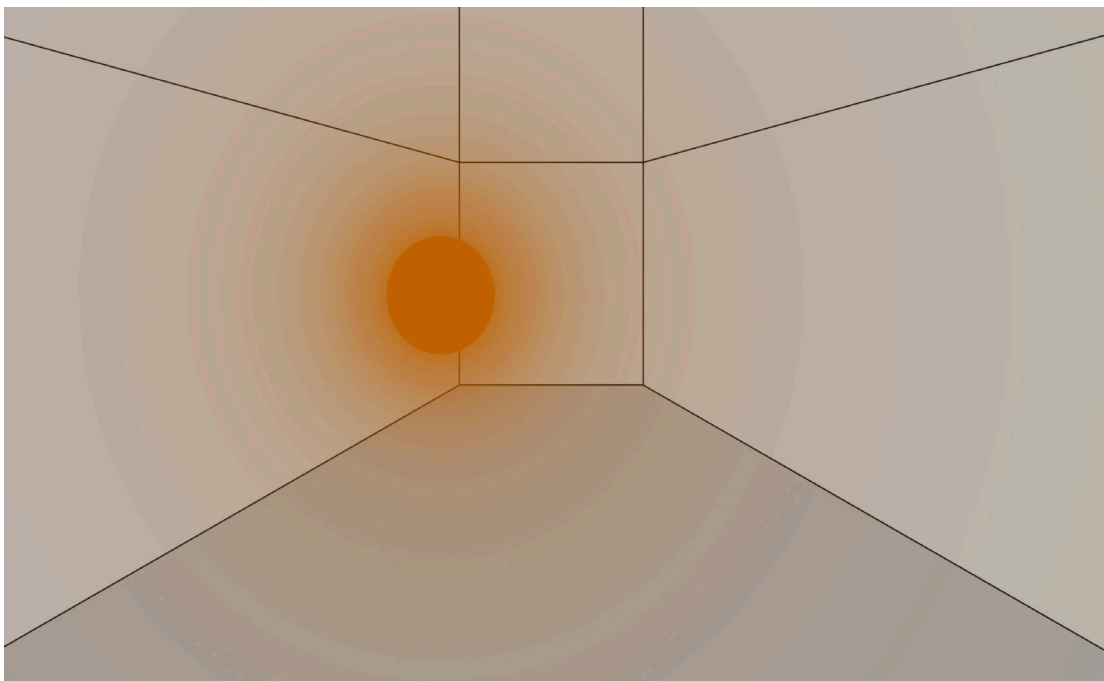
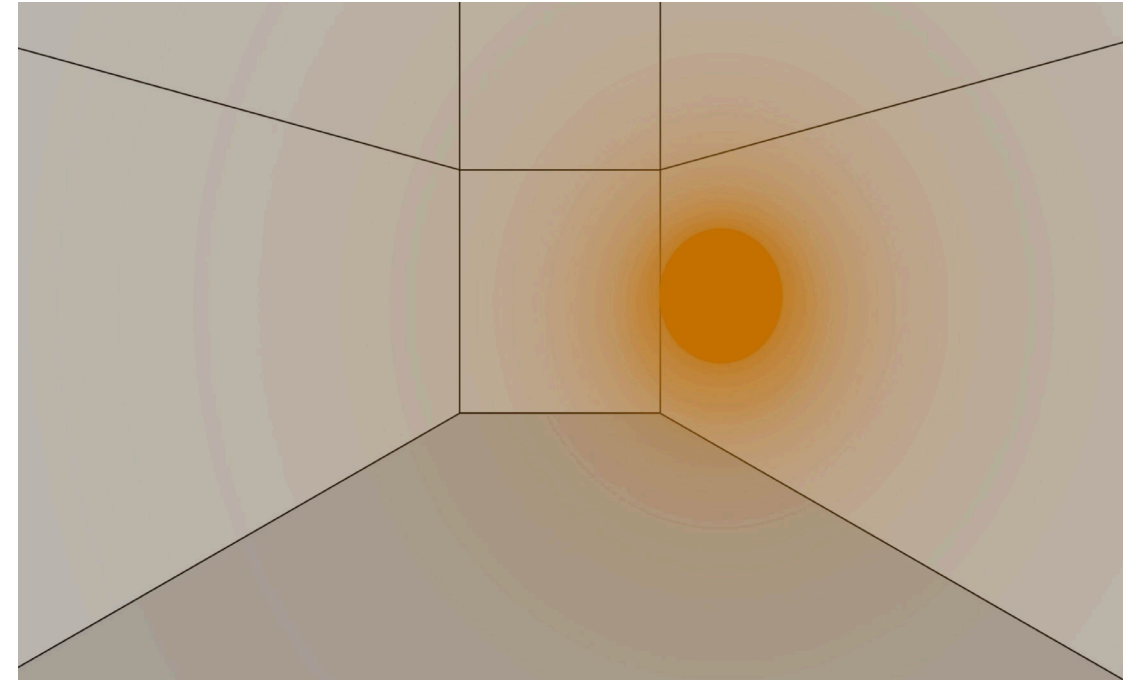
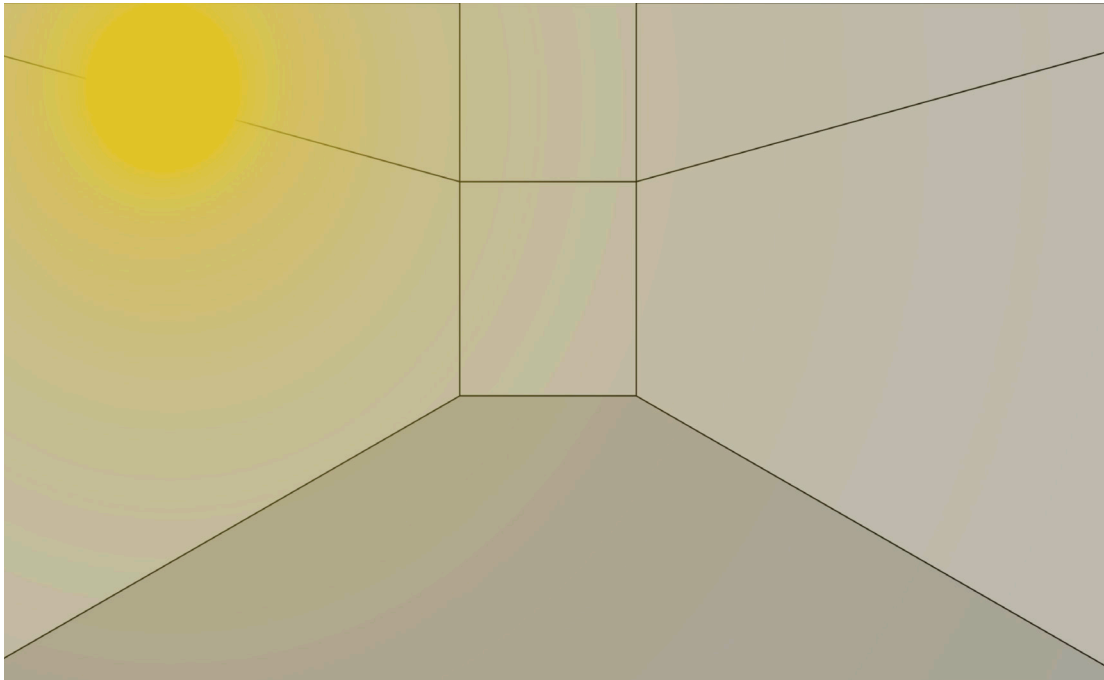
### OLED Monitor



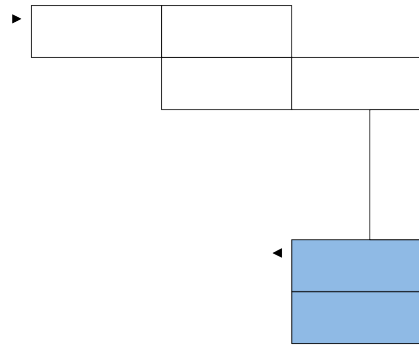
### LCD Monitor



# Previsualization of the Midnight Sun Room



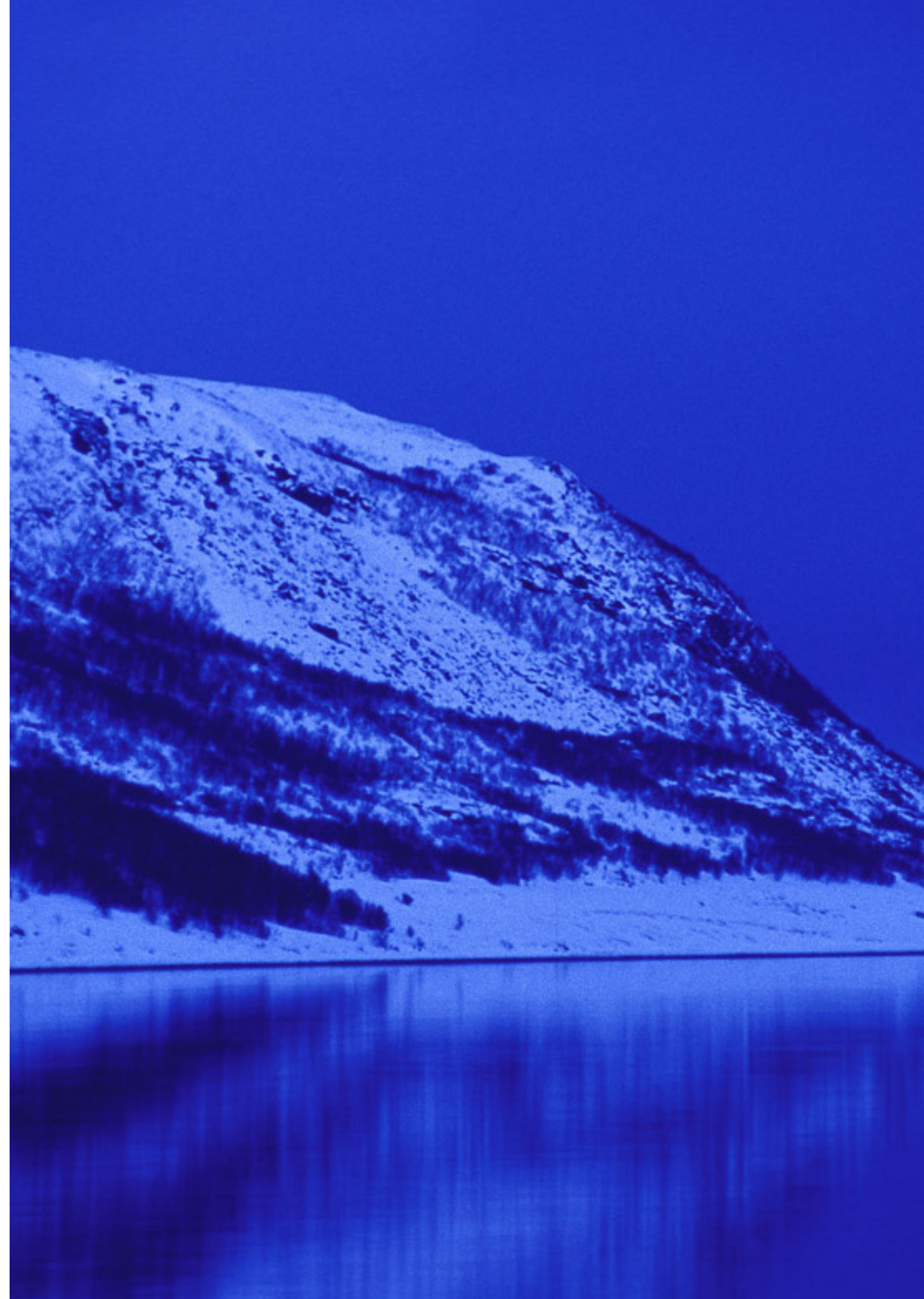
## ROOM 5



## BLUE HOUR

Blue Hours are a natural phenomenon that only occurs in the Nordic countries and especially in the northernmost locations. This event occurs due to the reflection of sunlight on the snow just moments after the last light has gone, i.e. when there is a slight twilight. This reflection creates a special colour that fills the sky with blue and evokes a sense of peace.

The Blue Hour usually lasts for quite a long period of time, until the darkness is complete and this colour is no longer present but black. It is also very characteristic in parts of northern Norway, as this is where there is most snow.



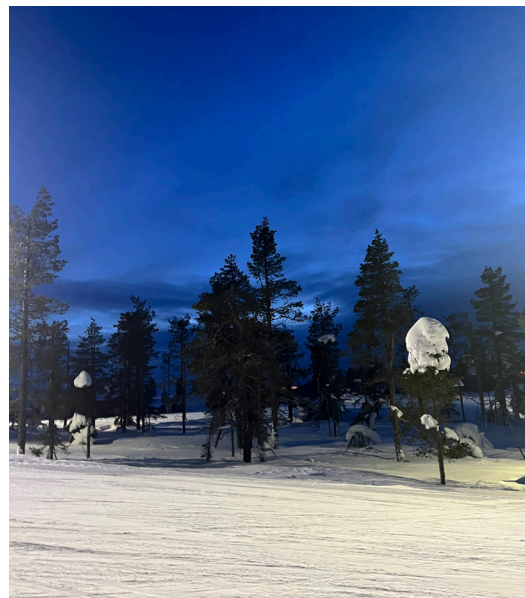
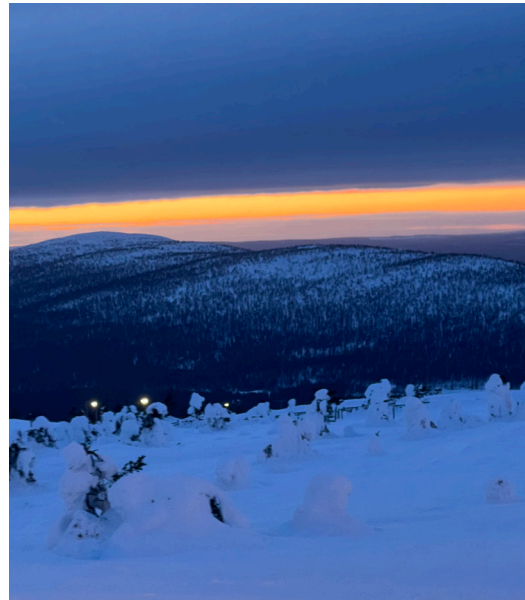
In the last space, the user finds a much larger room than the previous one, flooded with a very characteristic blue light. This room is surrounded by mirrors, placed on all the walls, creating an infinite plane in which it is impossible to distinguish where it begins and ends. So the user can be infinitely reflected by the arrangement of the mirrors when approaching a mirror. This is intended to create an infinity room, i.e. "a room full of mirrors where light is reflected everywhere, introducing the user into an infinite world" [19].

By creating this Infinity Room, the aim is to represent on the one hand, the infinity of sunsets in Norway through mirrors and on the other hand, the beautiful natural phenomenon that can only be witnessed in the Nordic countries: The Blue Hour. This light reproduced in the room will come from OLED panels installed in the ceiling and will flood the room with this bluish tone as shown here [20], [21], [22].

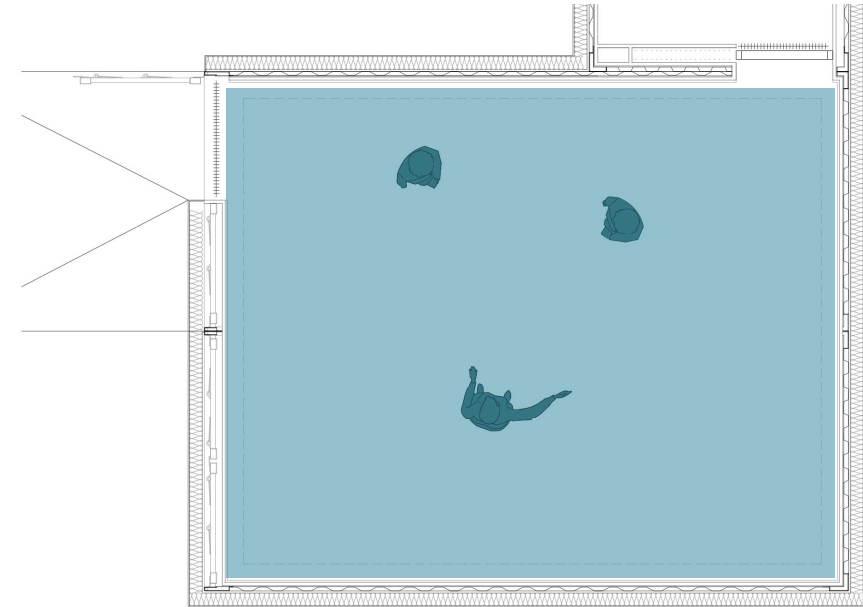
The mirrors will reflect the shapes and the visitors, but not the light. Finally, a carpet floor has been laid so that it can absorb the blue colour of the light projected in the room.

It is worth noting that the duration of sunsets varies according to geographical location due to several factors, such as latitude and time of year. In northern latitudes, such as Norway, sunsets tend to last longer, especially during the summer, because the sun's path to the horizon is steeper, causing the sun to set more slowly.

However, countries at lower latitudes, i.e. closer to the equator such as Spain, France or Italy, witness much more ephemeral sunsets, as the sun tends to set more quickly due to the fact that the sun's path to the horizon is less steep in these regions.



## BLUE HOUR ROOM PLAN



Project	DESIGN OF AN EPHEMERAL EXHIBITION	Date	June-2023	Reference	P2-01
Plan	EXHIBITION - BLUE HOUR PLAN	Scale	1:50	Nº Plano	5

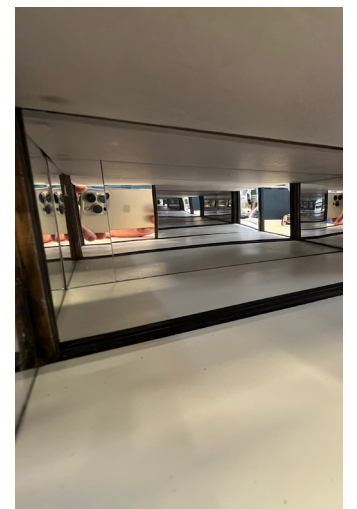


Fig.156-160 Blue Hour Developing process

In addition, this room will have a rather cold ambient temperature, between about 0° and 5°C, so that the visitor will feel the contrast between the winter in Norway and the winter in his home country, which tends to be long and cold.

As mentioned before, the elements in the rooms have been related to emotions, and this room is related to the emotion of calm as a whole. Therefore, what is intended to be conveyed by the course of this room is the peace that comes from observing this natural phenomenon called Blue Hour. Furthermore, according to Eva Heller in her book *Colour Psychology*, she says the following words about the colour blue: "Blue is the only colour in which no negative feeling predominates, but quite the opposite. The colour blue will always refer to friendship, empathy, trust, honesty and all kinds of values that have the capacity to last forever".

Moreover, in psychology it has been studied that navy blue, very typical of the bluest shades during the Blue Hour, is a colour that represents fidelity, commitment and the order of the sacred. A colour that is associated with the infinite and the eternal, just as we want to represent the infinity created by the mirrors in the Infinity Rooms.



A key factor in arriving at the concept from which the idea for the creation of this space arose was witnessing a sunset in Norway during the months of January and February, and especially on a trip to Lapland, where the dark blue light invaded the entire sky and this amazing phenomenon could be witnessed. The sensations felt while witnessing this event were noted down.

The purpose of this space is, therefore, to provoke a feeling of peace and calmness in the visitor when entering this last space, just as it happens when this phenomenon is witnessed in reality, in order to end the visit to the exhibition with a magical sensation.

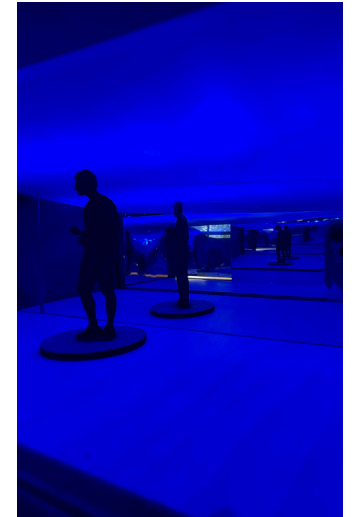
## FIRST LIGHT TESTS



The first light test with the silver foil didn't get the desired result.

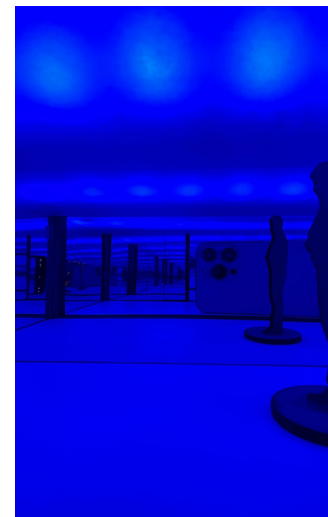


When the mirrors were put, the result already resembled what was intended.

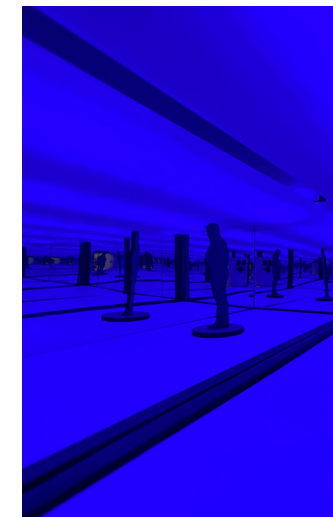


The light was spread out around the room as expected.

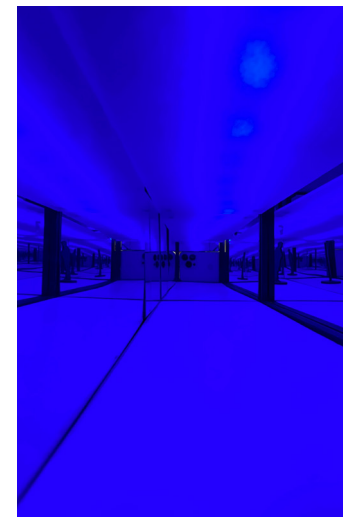
## SECOND LIGHT TESTS



By painting the floor in white the blue light was more absorbed.



Thus it bathed the room in a deep blue color.



The sensation while watching it at the workshop was stunning.

## MATERIALITY

### PAVEMENT

For the flooring, as the other spaces, a natural elm wood floor has been chosen.

The pavement has been placed on top of the OSB [1.5+1.5]

For this room, a white paint has been chosen to paint the floor in order to absorb all the blue light spread around the room coming from the OLED Panel.

It is intended to generate more amplitude in the room through the mirrored enclosures arranged on the walls.

### ENCLOSURE

The OSB panels [1.5+1.5], which are arranged in all the containers, have been left exposed to provide insulation between one room and another in addition to the exterior insulation. On all the walls of the room, mirrors have been anchored to the OSB panels by means of profiles that hold them in place. This is intended to generate an infinite space, as explained above.

### LIGHTING

For the lighting of this space, an OLED panel has been placed on the ceiling along the entire length of the room. This panel provides enough blue light to bathe the room with this deep blue colour.

In addition, it is intended to create a cooler space. For that, cold colours such as blues are used to remind us of winter season.

Blue light is generally in the colour temperature range of approximately 4500 to 6500 Kelvin [K].

Gallium nitride [GaN] LED: In a gallium nitride LED, a thin layer of gallium nitride doped with impurities is used to create a p-n junction. When an electric current is applied to the LED, electrons and holes in the p-n junction recombine, releasing energy in the form of light. The combination of materials and the structure of the semiconductor allows the emitted light to have a wavelength in the blue range.

### SOUND

Finally, loudspeakers have been placed in the corners of the room behind the false ceiling. They play the song. This song has been chosen precisely because it is intended to transport the user to the moment when he/she glimpses this blue in the middle of nature. The music will be continuous and will be at an optimal volume for all users. This auditory support will help the user to have a unique experience while walking in the exhibition.

In order to bring the best experience to the users, this sound could be projected on the room creating them new emotions and sensations while being in the space.

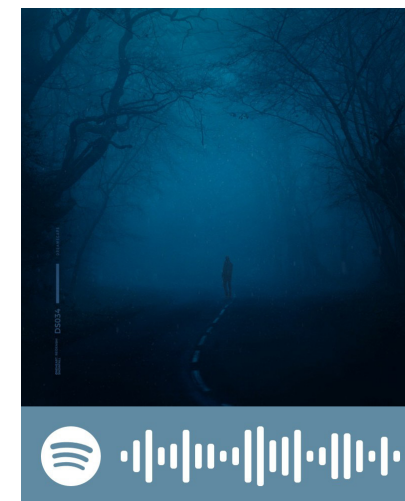
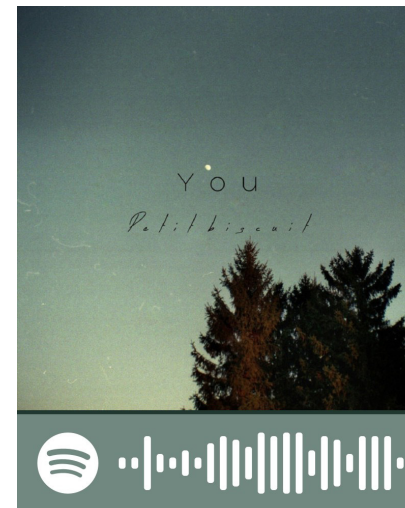


Fig.168 Songs for the room

# Previsualization of the Blue Hour Room

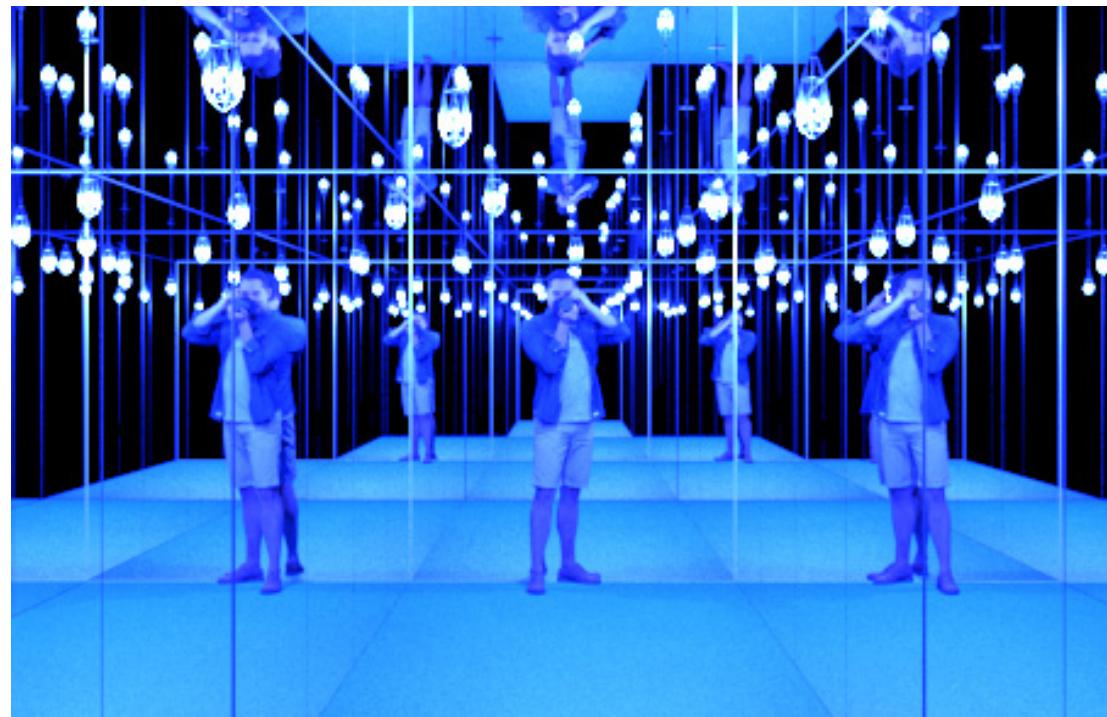
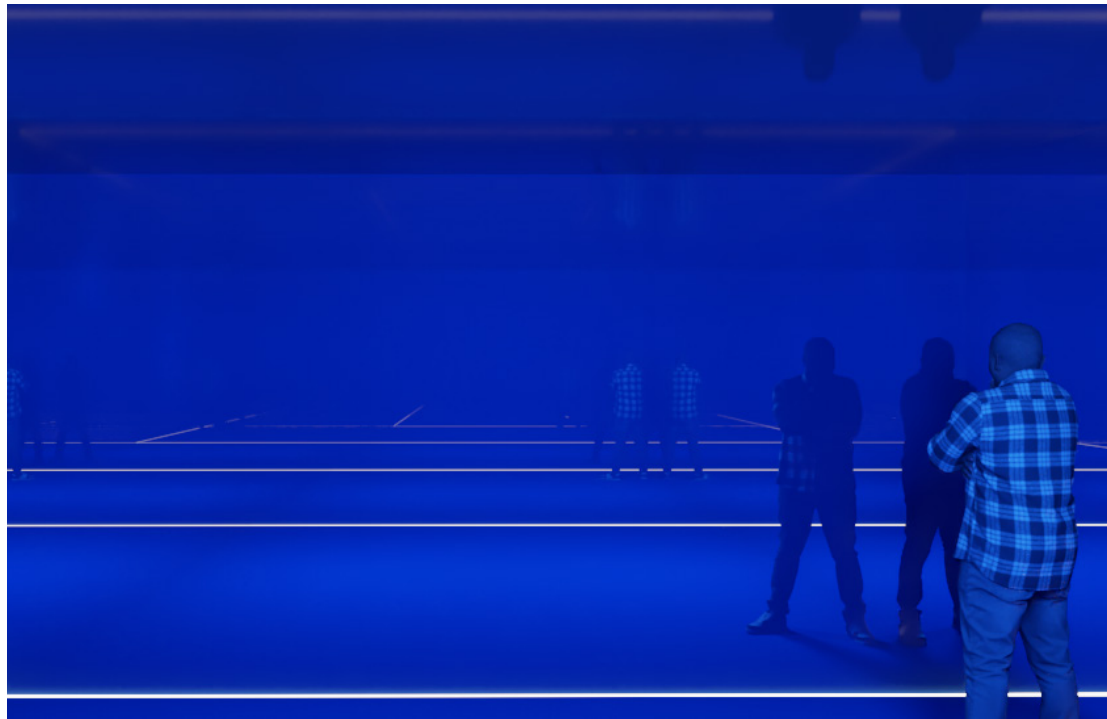


Fig.169 Blue Hour Renders

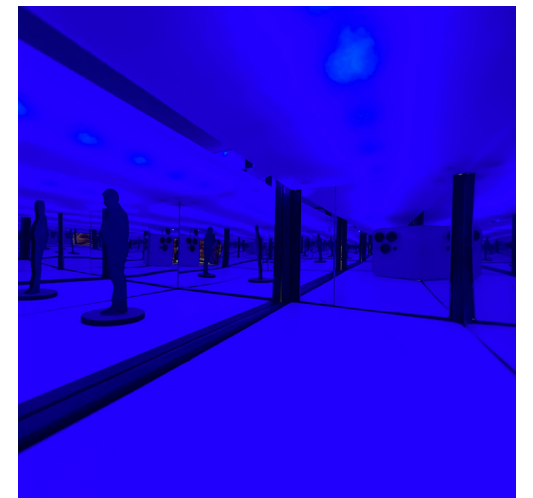
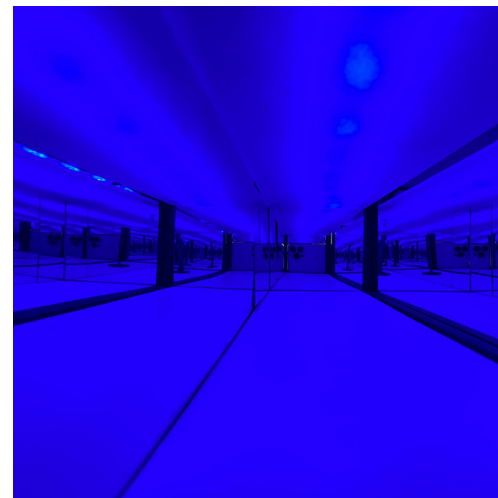
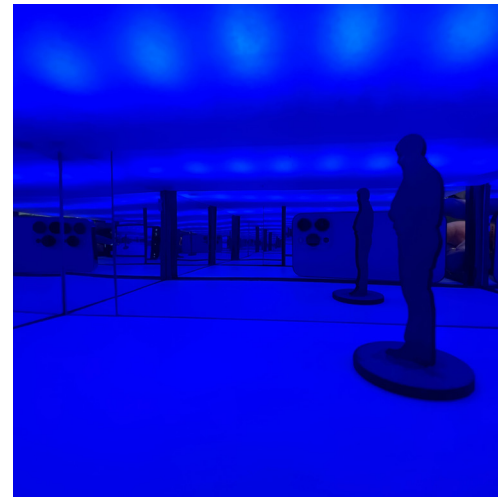
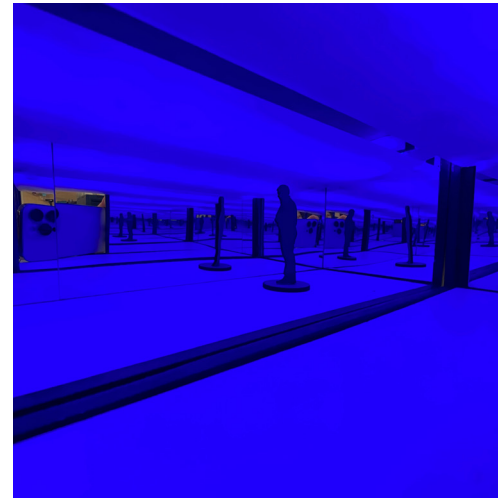


Fig.170 Blue Hour Pictures



## Exhibition Summary

The user experience that is intended to be created throughout the exhibition route is that there is a great contrast between the entrance and the exit of the exhibition; that the user, on passing through it, has very different sensations to those he had just before entering, that he is surprised and that the fact of visiting the exhibition marks a before and after in him.

On the one hand, the user will get to know a culture very different from that of his country, learning new things that he did not know before, and on the other hand, he will witness the most characteristic lights that can be seen in the Nordic countries, and which are so characteristic here in Norway and which many people have not had the opportunity to observe. This exhibition is therefore a good moment for those people who perhaps cannot afford it, to be able to see and witness in first person from their own countries these light phenomena that only happen in this country.

In short, the aim of this exhibition is to create a set of unique sensory experiences for all users as they walk through the exhibition while learning new things and discovering a culture that is very different from their own.



Fig.171 Users with reduced mobility

### **USERS WITH REDUCED MOBILITY**

People with reduced mobility will be able to enjoy this route just like any other user, as it has been specially designed and built to be accessible to all users. All its construction complies with the regulations of each place where the exhibition is located to allow accessibility to all people with reduced mobility as well as users with any other type of disability.

## prototype

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materiality

sketches of the interior of the rooms

assembly

painting process

light testing with the prototype

exterior final prototype



# Prototype

In order to study the viability of the following project, a small-scale model [E 1:20] has been made. The construction of this prototype was essential in order to validate if each of the concepts that wanted to be implemented in each space would work.

Above all, it is worth highlighting the tests carried out with the light to see the viability

of the materials and the placement of the interior elements.

The prototype was also useful to be able to modify what did not work and find better solutions by modifying or improving them.

The assembly process of the prototype model is described in much more detail below.

# Materiality

The following materials were used to build the model:

- MDF Wood 6mm
- MDF wood 3mm
- Pine veneer
- Pine wood
- LED lights
- String LED lights
- Acryl
- Translucid Acryl
- Mirrors
- Spray paint
- Exterior painting
- Metal sticks
- Arduino Board

- Electronic components for the Arduino board (capacitors, LEDs, resistors, power supply, etc).

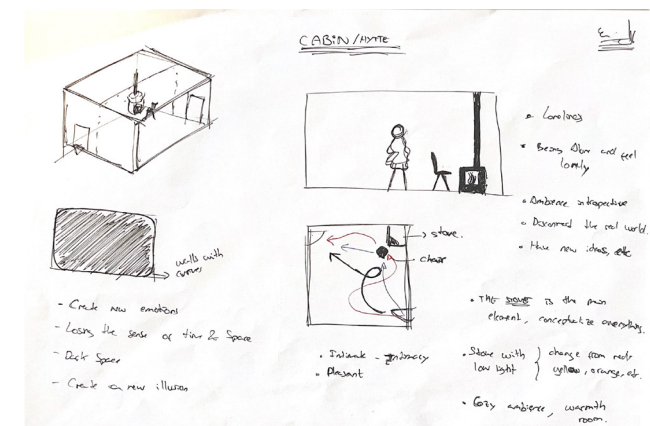
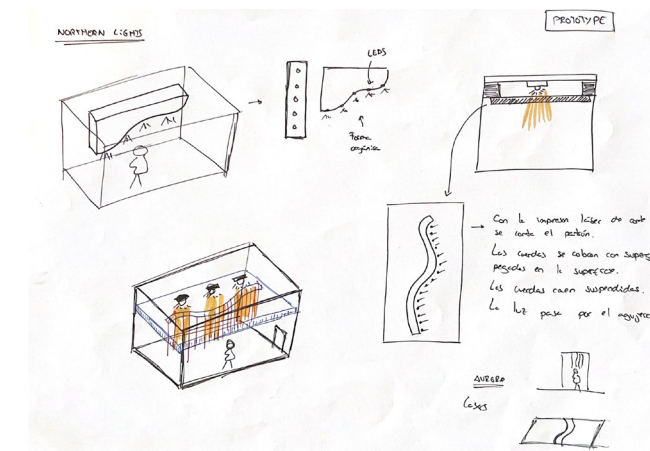
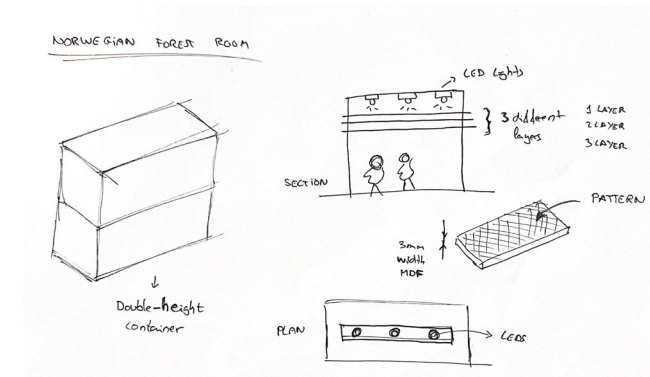
In addition, it was necessary to use the workshop of the Design Department to be able to carry out the prototype assembly. Some material was provided for the university.

# Sketches of the interior of the rooms

In order to plan the interior assembly of each of the rooms for making the model some sketches have been made for clarify some measures or elements and knowing where to

place them.

Some of the sketches made are shown below:



# Assembly

For the assembly of the exterior of the model, we have chosen to use MDF Wood provided by the department to make the wooden crates that will simulate the shipping containers.

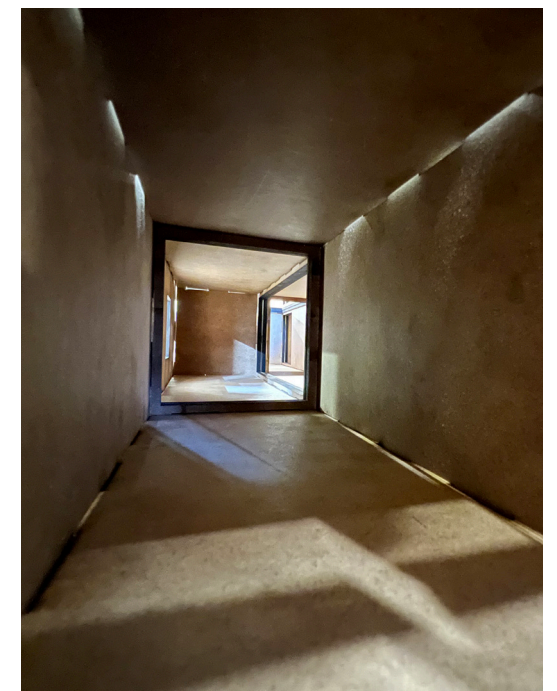
To do this, the laser cutter in the Design department was used and all the necessary pieces were cut to obtain the desired layout. Thus, the wooden boxes have been prepared to simulate the containers for the exhibition space.

The boxes design, was made in a website which automatically created the layout and after some adjustments in Illustrator and

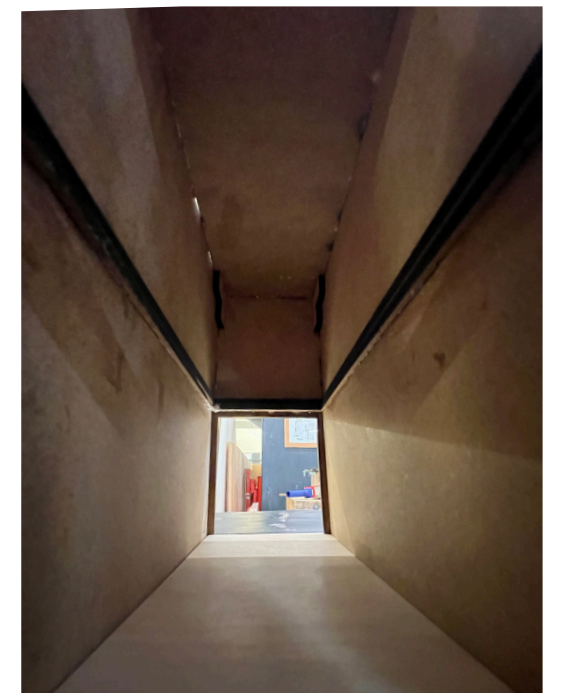
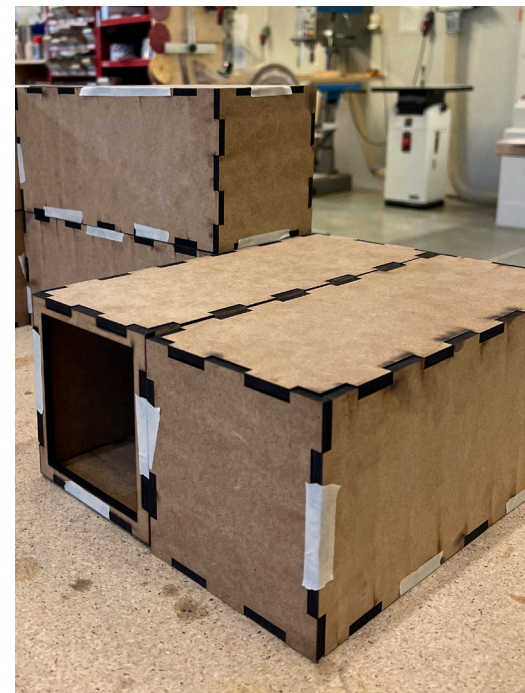
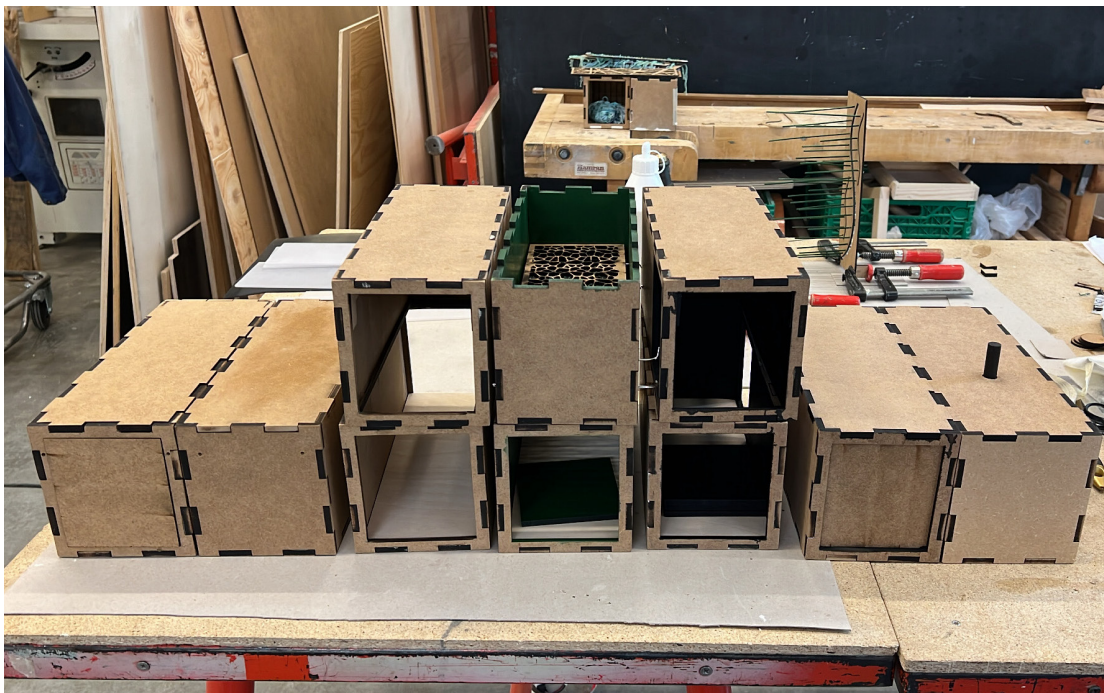
placing the exact desired measurements on a scale of 1:20, we proceeded to cut all the pieces with the machine.

At the same time, for the interior of the rooms, other materials from the workshop were reused and others purchased. Some of them were pine wood blocks or sheets, metals, threads, mirrors and other elements that were essential for the development of the prototype.

The detailed process followed is shown below:



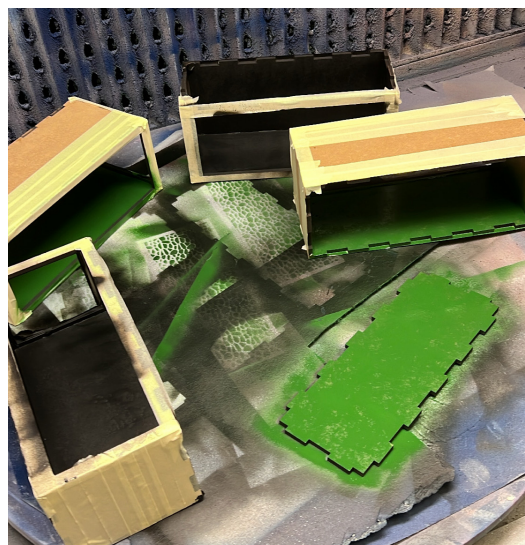
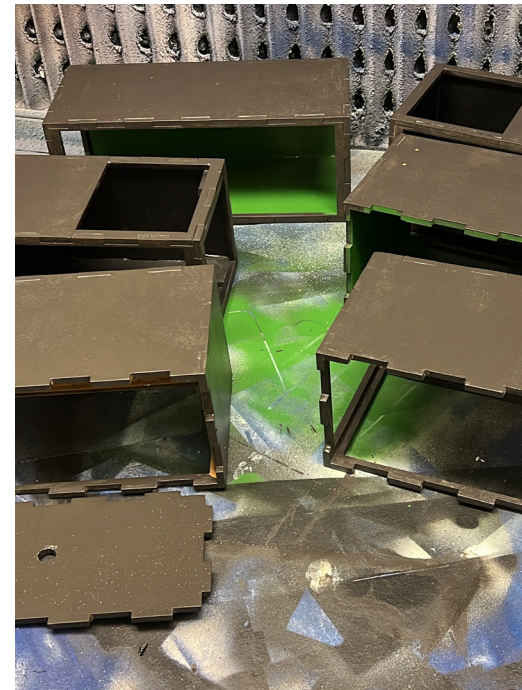
# Assembly



## Painting process

The interiors were painted with spray paint and the exterior was painted using SILK MATE paint to give it a unique appearance.

3 layers of paint were needed to get the aspect that the model has at the end.



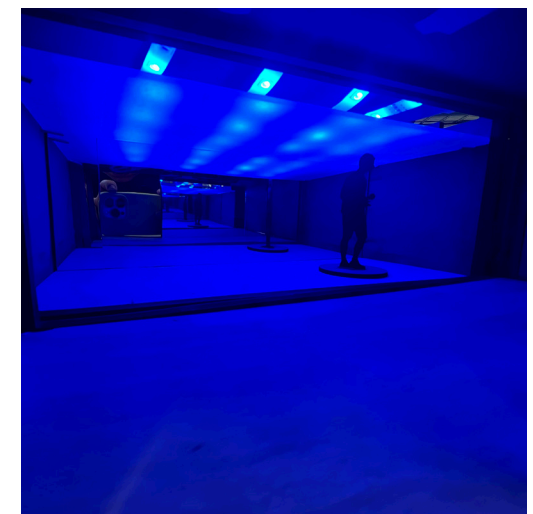
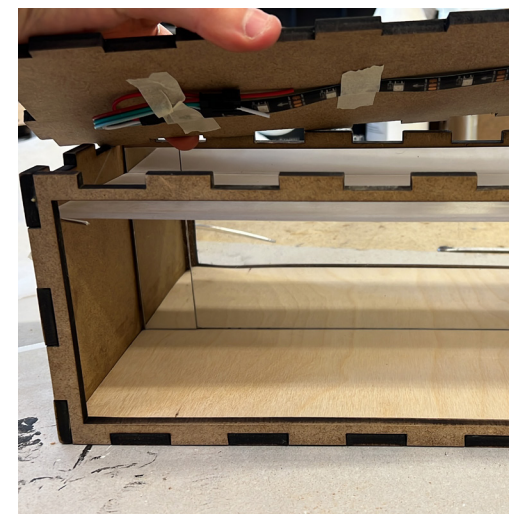
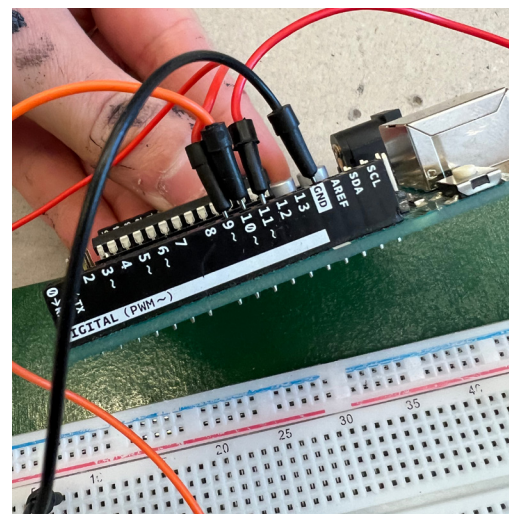
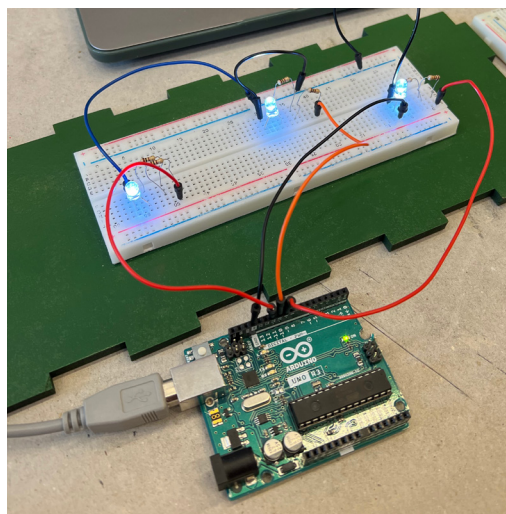
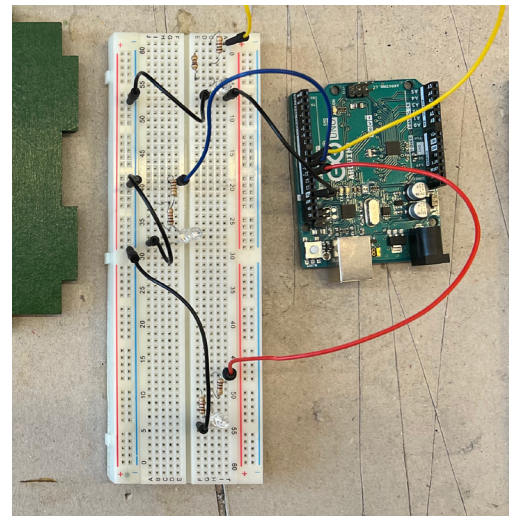
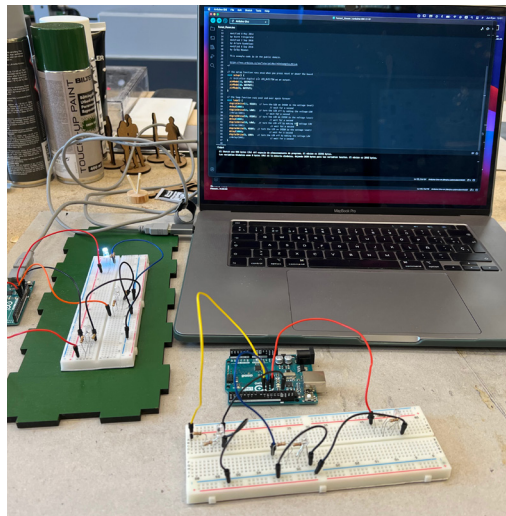
## Light testing with the prototype

This model would not make sense without the use of Arduino, as it has been the essential element for developing the prototype. By using Arduino it has been possible to install LEDs in some of the rooms to create the desired effects in each of them.

However, it was first necessary to learn the program. Finally, after much trial and error, it was possible to create the desired effects in the rooms where the Arduino was intended to be installed.

Once the model was finished and all the elements were placed inside, the light installation was made in order to try if the desired light effects worked or not.

Thus, light tests were carried out in each of the rooms to check their viability. As it can be seen, all of them worked as expected.



## Exterior Final Prototype

The following images show the final result of the prototype.

The colour chosen for the exterior of the exhibition was black because black is considered to be the colour that absorbs all visible light.

As the exhibition is based on Norwegian light and it is in the interior that each of the rooms will represent a colour, it was decided to choose black to clad the wood on the outside of the containers. As if the outside of the structure could absorb all the colours from outside and put them inside, distributed in the different rooms.

It will therefore be in the interior where all kinds of lights and colours can be perceived, but not on the exterior.

The leitmotif of the exhibition is "the space where everything happens inside and nothing outside", as the lights will only be seen in its interior spaces.

Moreover, the structure is striking from the outside because it is made of black coated wood, which is not common in southern European countries such as Italy or Spain, where local materials such as ceramics are used.





05

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communication

# Advertising Campaign

A small phase of communication was made in order to announce the exhibition around the cities and get people to know it.

The aim of this campaign is to catch people's attention and make them to get them interested in coming to visit the exhibition

A general poster that announces the exhibition was done. Later five different posters were made in order to announce what can be found in each of the rooms of the exhibition space.



Fig.172 Advertising posters

Fig.173 Advertising posters

# Advertising Campaign



Fig.174 Advertising posters



Fig.175 Advertising posters

# Renders

A small series of renders have been made in order to locate the exhibition in the places where the exhibition is intended to be held.



Fig.176 Exhibition Renders

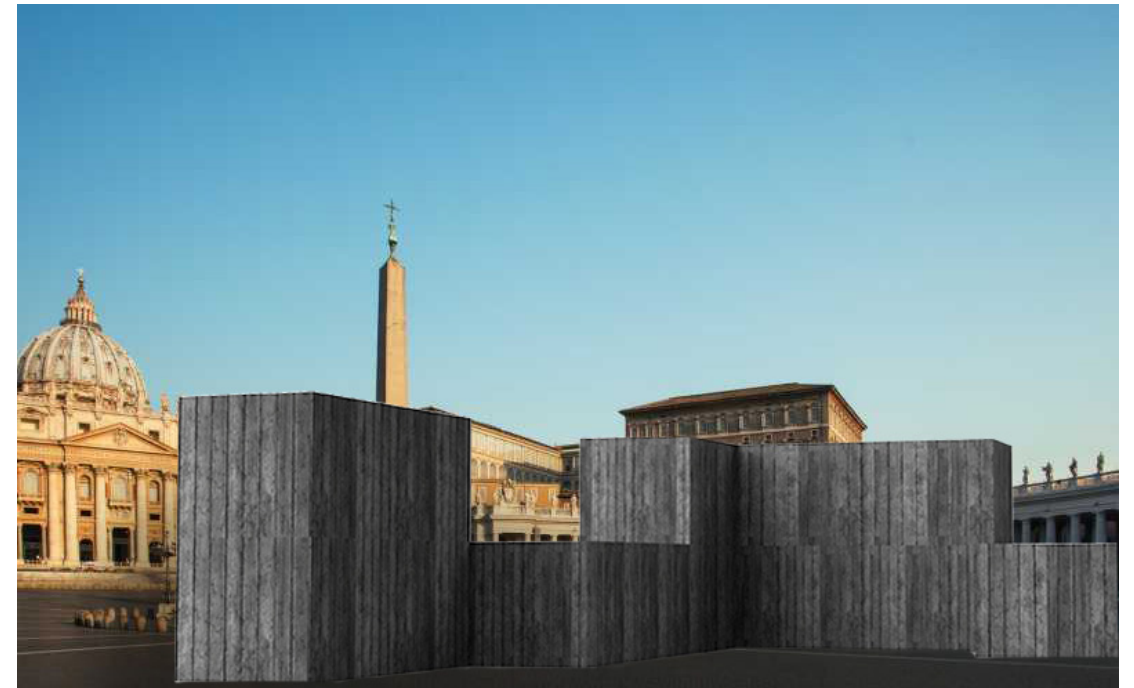


Fig.177 Exhibition Renders

# 06

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conclusions

## Final Conclusions

One of the most important factors to consider during the development of this project has been my own personal experience here in Norway, where I have been able to reflect everything I have experienced while developing this work.

During these five months, I have had the opportunity to experience firsthand the change of light that can be experienced in this country from the middle of winter with so few hours of light until now, where night no longer exists.

Another very relevant factor has been to have been able to visit certain places in this wonderful country where I was able to witness first-hand some of the phenomena that I describe in this work as well as to obtain the inspiration for developing all the ideas such as the Blue Hour or the Northern Lights.

On the other hand, containers have been chosen as the element of construction for this space because they offer different possibilities in the field of construction. One of them is that in addition to being an environmentally friendly option, they are also very affordable.

It should also be noted that the final choice of these elements was due to the fact that the exhibition is designed to be transported from one place to another, so these elements are the most suitable for that. Furthermore, taking advantage that the space inside them will be practically empty, it will optimise many

logistical processes.

Another feature that stands out about these elements is that they work perfectly to be coupled together, so the possibilities they can offer are endless and can generate different spaces between them; from small houses or cabins to larger buildings such as homes or hotels.

As for the transport of the exhibition, this will be done by means of land transport as it is the most environmentally friendly option.

Finally, it should be noted that the development of this exhibition has been conceptual, but a rigorous study has been carried out for its possible construction in all the aspects required for an interior design project.

However, as far as the technical specifications concerning the electrical installations of the exhibition are concerned, these are beyond the scope of this academic work, which is focused on defining the interior exhibition project. In case this exhibition would be realised, it will be necessary to consult with architects, structural engineers and other specialists in the sector in order to be able to develop this proposal properly.

Finally, it should be pointed out that in order to be able to offer the result shown in this work, it has been necessary to carry out an extensive research of many references in

architecture and design, both in terms of construction and the lighting of spaces, as the project is focused on light.

### FUTURE RESEARCH

This project can serve as a guide for future constructions of interactive and immersive exhibition spaces, where concepts based on the same idea or in case it is wanted to follow the same working methodology described throughout this proposal.

07

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NTNU Trondheim, June 2023



