

# **SCIENCE WITHOUT BORDERS**

Interdisciplinary research center

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**CZECH TECHNICAL UNIVERSITY IN PRAGUE  
FACULTY OF ARCHITECTURE**

**AUTOR, DIPLOMANT:**

**AUTHOR OF THE DIPLOMA WORK / DIPLOMA PROJECT**

Academic Year .....2020....., .....Summer..... Semester

**TITLE OF THE DIPLOMA WORK / DIPLOMA PROJECT**

(IN CZECH LANGUAGE)

**TITLE OF THE DIPLOMA WORK / DIPLOMA PROJECT**

(IN ENGLISH LANGUAGE)

SCIENCE WITHOUT BORDERS

INTERDISCIPLINARY RESEARCH CENTER

**LANGUAGE OF THE DIPLOMA WORK / DIPLOMA PROJECT: ENGLISH**

<b>Diploma Work / Diploma Project Supervisor</b>	Ústav: 15120 Department of Landscape Architecture  Vladimir Sitta
<b>Diploma Work / Diploma Project Opponent</b>	Richard Weller
<b>Key Words (Czech)</b>	Decommissioned oil rig, research facility, research center, interdisciplinary research, isolated living, social cohesion, living offshore.
<b>Annotation (Czech)</b>	
<b>Annotation (English)</b>	The project aims to experiment with the possibility of having an interdisciplinary research centre on the offshore decommissioned oil rig and turning isolation from disadvantage to one of the strongest aspects of the idea.

**The Author's Declaration**

I declare that I have elaborated the submitted diploma work / diploma project independently and that I have stated all the used information sources in coherence with the "Methodological Instruction for Ethical Preparation of University Final Works".

(The complete text of the methodological instruction is available for download on <http://www.fa.cvut.cz/En>)

In Prague on .....31.05..........Signature of the Diploma Project Author

*This document is an essential and obligatory part of the diploma project / portfolio / CD.*



Czech Technical University in Prague, Faculty of Architecture

## ASSIGNMENT of the Diploma project

Master degree

Date of Birth: **24.04.97**

Academic Year / Semester: **2020 SUMMER SEMESTER**

Department Number / Name: **15120 DEPARTMENT OF LANDSCAPE ARCHITECTURE**

Diploma Project Tutor: **VLADIMIR SITTA**

### Diploma Project Theme:

See the Application Form for DP

### Assignment of the Diploma Project:

1/description of the project assignment and the expected solution objective

2/description of the final result, outputs and elaboration scales

3/list of further agreed-upon parts of the project (model)

To this list further attachments can be added according if necessary.

#### **1) Sustainable interdisciplinary research facility on the decomised oil rig.**

The task is to create an effective solution for the research facility that would be located in relative isolation on the assumed oil rig and find the means for it to be sustainable and less relying on the external factors.

#### **2) PORTFOLIO, POSTER.**

Drawings scale in the range from 1:100 to 1:500: *site rig plan, sections, module plans, details of modular elements, visualisations, schemes.*

#### **3)1 x MODEL 1:500**

Date and Signature of the Student: *[Signature]* 05.03.

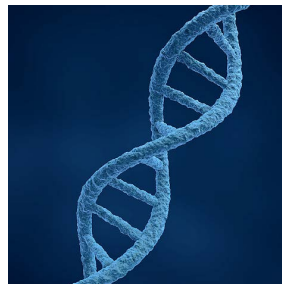
Date and Signature of the Diploma Project Tutor: *[Signature]* 05.03

Date and Signature of the Dean of FA CTU: *[Signature]*

# Reasons for choosing the topic

What is it that made our society progress so much throughout human history? I believe it is our ability to innovate, get into the roots of questions and trying to explain them and come up with technology that make our lives better. And in modern society the role of innovators has been taken by the scientist and researchers that work in specific fields of study and provide the rest of the society with the results of their work.

I have always been fascinated by this profession and till this day I am infinitely curious about the next discoveries that we can uncover. Hence the idea for this diploma project has been set based on my personal interest and curiosity of what can come out of it. I wanted to create a workplace for researchers to further their curiosity, creativity and the ability to be critical and to allow them to share this knowledge.



## Evolution of the idea

At the beginning I was thinking about the idea of allowing scientists of the research center to not be restricted by the governmental connections. So that the placement of the research facility would not be influenced by the legislature of any country, only the United Nations would have regulative power to keep things within reasonable limits.

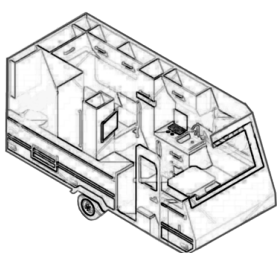
This motivation came to me when I learned about countries that have restricted some specific research and that it resulted in decrease of knowledge of this particular field.

That prompted my thinking about possible ways how to make research "unrestricted" or rather "without borders" and I started thinking what if the facility would be movable and would change location time to time like nomads, making encampment and conducting research.

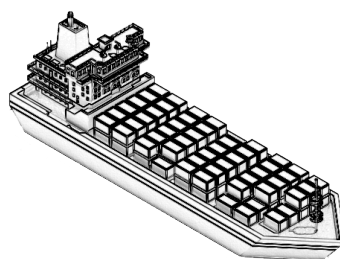
That idea was scrapped, partially, for the reasons that realization of such approach would be way too uncomfortable and costly for everyone involved in it.

Other idea revolved around the use of the boat as the research vessel that would perform similarly to the "nomadic" lifestyle of previous idea, but after consultation with a researcher Petr Cigler who is working in the field of synthetic nanochemistry I found out that the most of the equipment of chemical research is extremely sensitive to vibrations and therefore the boat would not be the viable option.

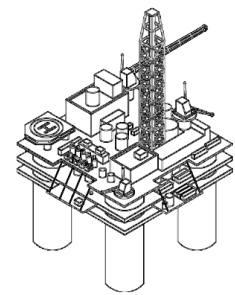
In the end I have stopped on something that would be similar in different way to previous ideas, but more effective in terms of livability and long term involvement - decommissioned oil rigs.



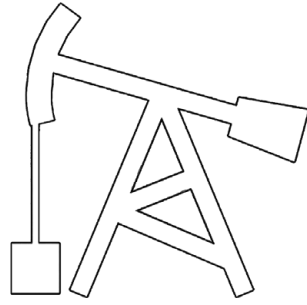
Nomad



Floating



Oil rig



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## Decomissioned oil rig

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Currently there exist around 1 470 oil rigs in the world. Those giant marvels of engineering can cover up to 14 000 m<sup>2</sup>. They are made to drill oil and natural gases which can last for 50 years.<sup>[1]</sup>

But eventually the natural resource is running out and it is time for decommissioning the oil platform which is a very costly process. In 2015 decommissioning reached level of 2.4 billion USD per year and is expected to peak in 13 billion per year in 2040.

It is expected that 600 of offshore oil rigs globally and 100 of them from the North Sea will be decommissioned.<sup>[2]</sup>

It will be a very costly process and can cause financial problems for the UK specifically who owns the biggest amount of those fields and in the same time is in the process of Brexit and possibly losing some financial and research related benefits that used to come from the EU.

So the rigs that fell out of function caught my interest and I started thinking of using it for placing on one of them the research facility.

Your first question would be: how is the research center placed on the rig is better than the one placed on the land? Well, in this portfolio I will try to answer this question in detail, but in short: It promotes and encourages social interaction as trying to turn relative isolation from disadvantage - to an advantage. In such way the center would be an experiment on itself that might be beneficial for our future in case we are planning on setting up our outpost on other planets as in this case they would be similar in function and use to the proposed design on the rig.



Another problem may lie in the decommissioning itself as those oil platforms have positive impact on the environment.

Columns of the platform which go all the way down to the seabed are meant to hold the massive structure of the oil rig, can be made of metal or concrete also over the time become a new ecosystem for the sea.

Barnacles, corals, crustaceans, mussels and fish accommodate them and live in this habitat.<sup>[31]</sup>

The reason for this lies in the fact that in the sandy seabeds reefs are not forming - therefore can not provide homes to the marine life and they can not reproduce. But once those columns are introduced reefs form on them, growing more and further up - producing new artificially made ecosystem where new species later come to live and mate. And that has already happened to most of those oil platforms unintentionally and each is a new artificial hub for the marine life in the North Sea.

Therefore decommissioning of the oil platforms poses a threat to this marine life which had settled there in over 20-50 years.





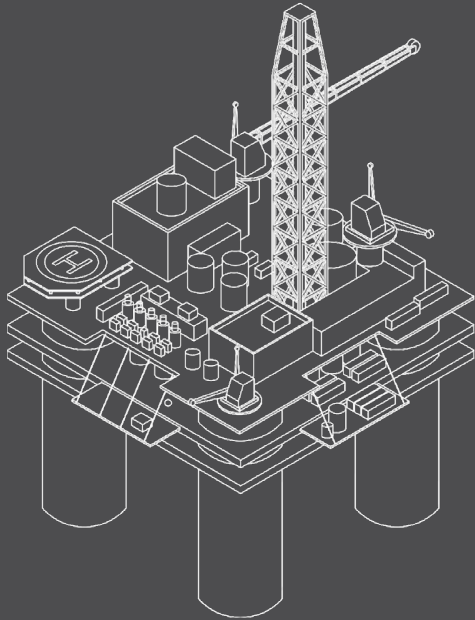
Although the project could potentially be realised on any oil rig (and even encouraged) for sake of clarity of my research and to operate with less "ifs" and "maybies" I chose the location of the oil rig that is located on the North Sea and on the UK territory.

Brent oil field is a set of oil rigs where practically all of the gas and oil that used to be collected there has been used up and soon rigs will get decommissioned.<sup>[4]</sup>

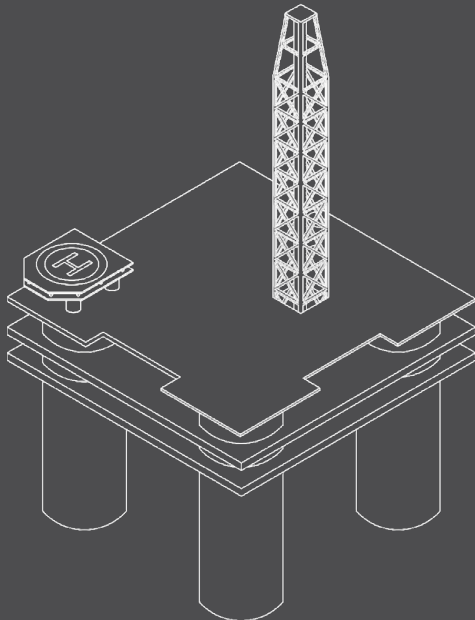
What I propose is to use this opportunity to have those rigs stay and fill them with the function of the research center saving money for our construction and sparing the owner company the need to spend money for decommissioning.

Because when those platforms no longer bring money – they are burden for the company, and they would rather pay the developer to take it away and build a research center than have to decommission it.<sup>[5]</sup>

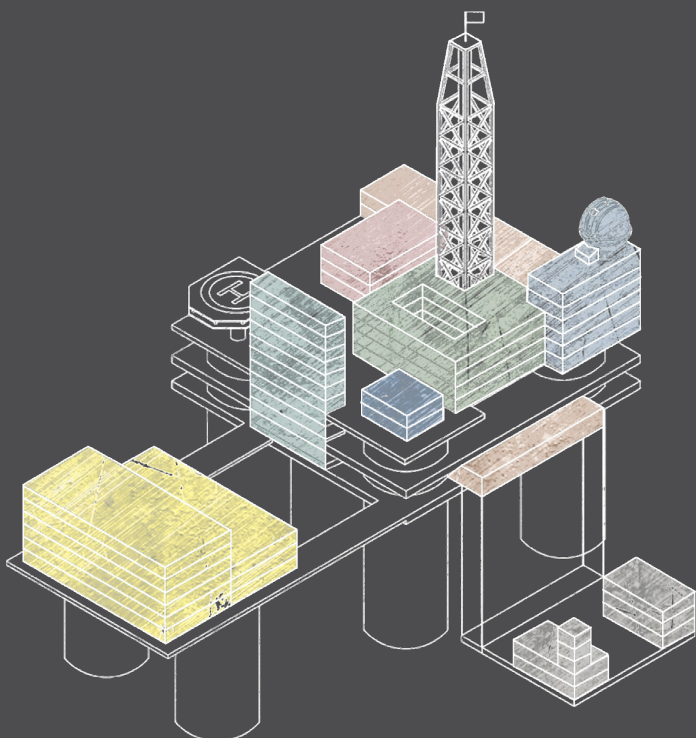




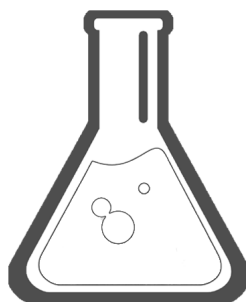
The oil rigs are full of the equipment that is required for gathering the oil and redistributing it in the containers to load on the ships. Some areas on the rig are dedicated for the personnel and satisfying their basic needs for food and entertainment also generally have the small medical facility and administrative areas.



Most of those equipment and spaces could be removed in order to leave the main structure which could be used.



As the space on the rig is now vacant it is possible to fill it with the new modules that would be serving the research center. Because of the spatial limitations it might be necessary to expand the rig through neighbouring platforms as the rigs rarely come alone.



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## Scientific disciplines

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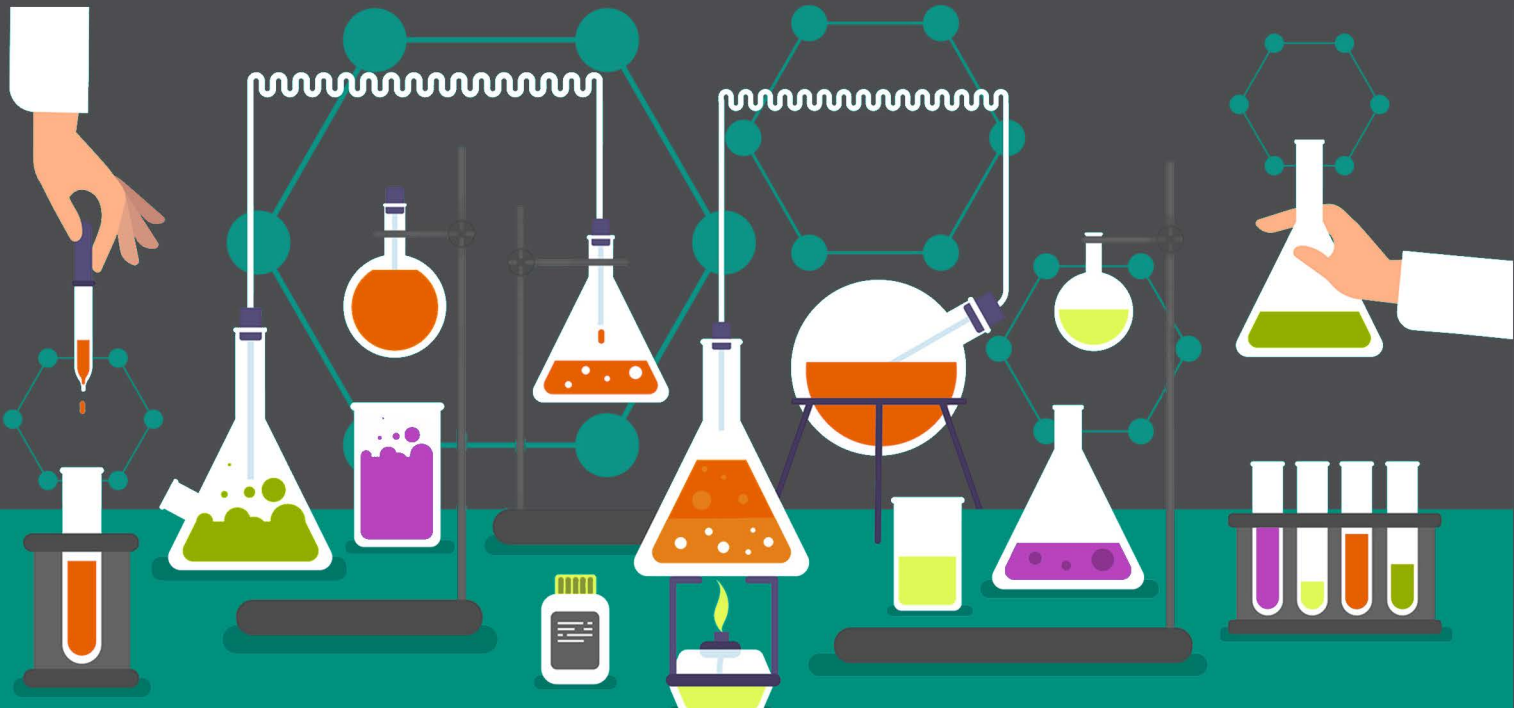
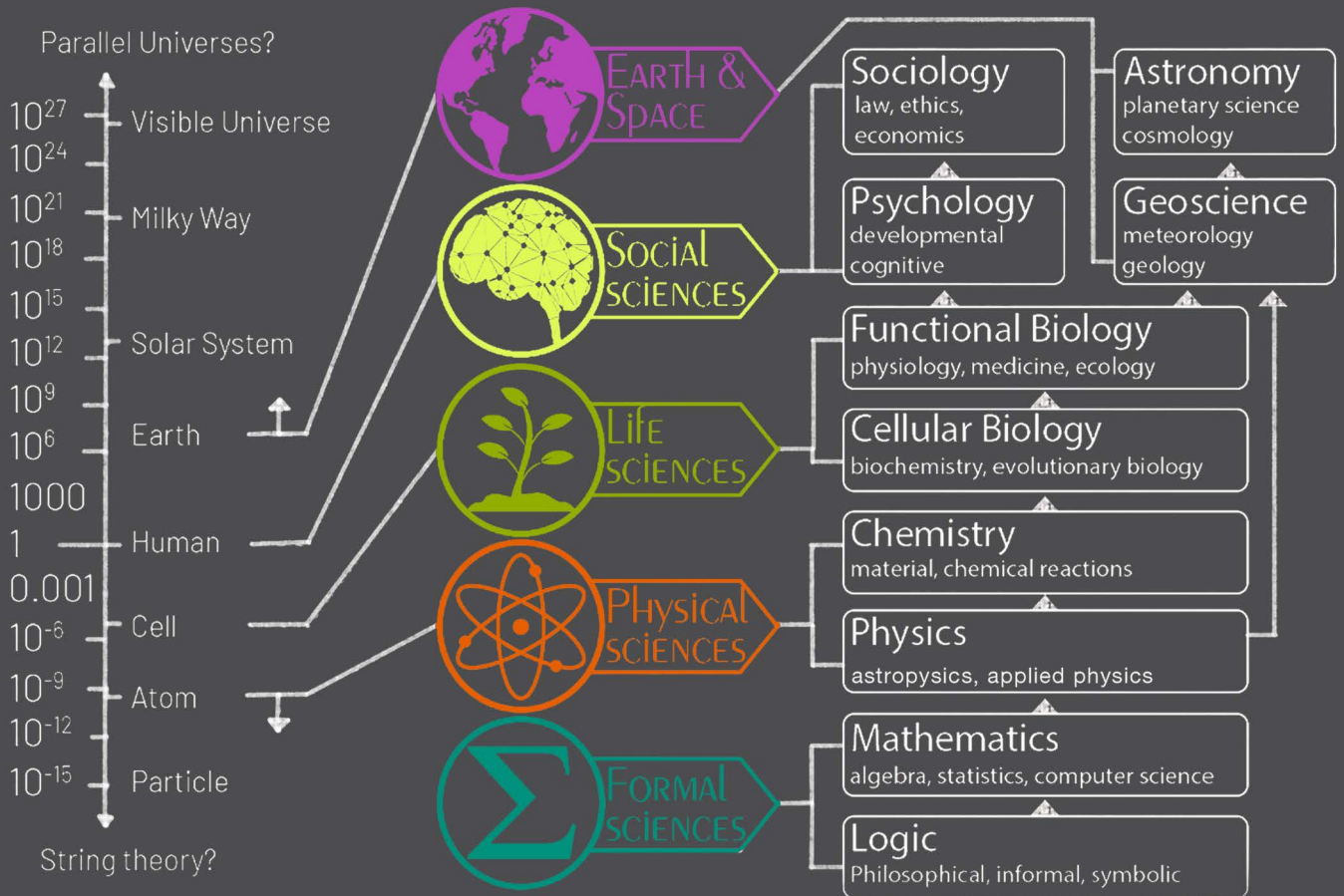
It was important for this research to start with the very basics - what are disciplines of science? What each of those sciences study? Which are more suitable for being placed on the oil platform and which are not? What are their relations to other sciences?

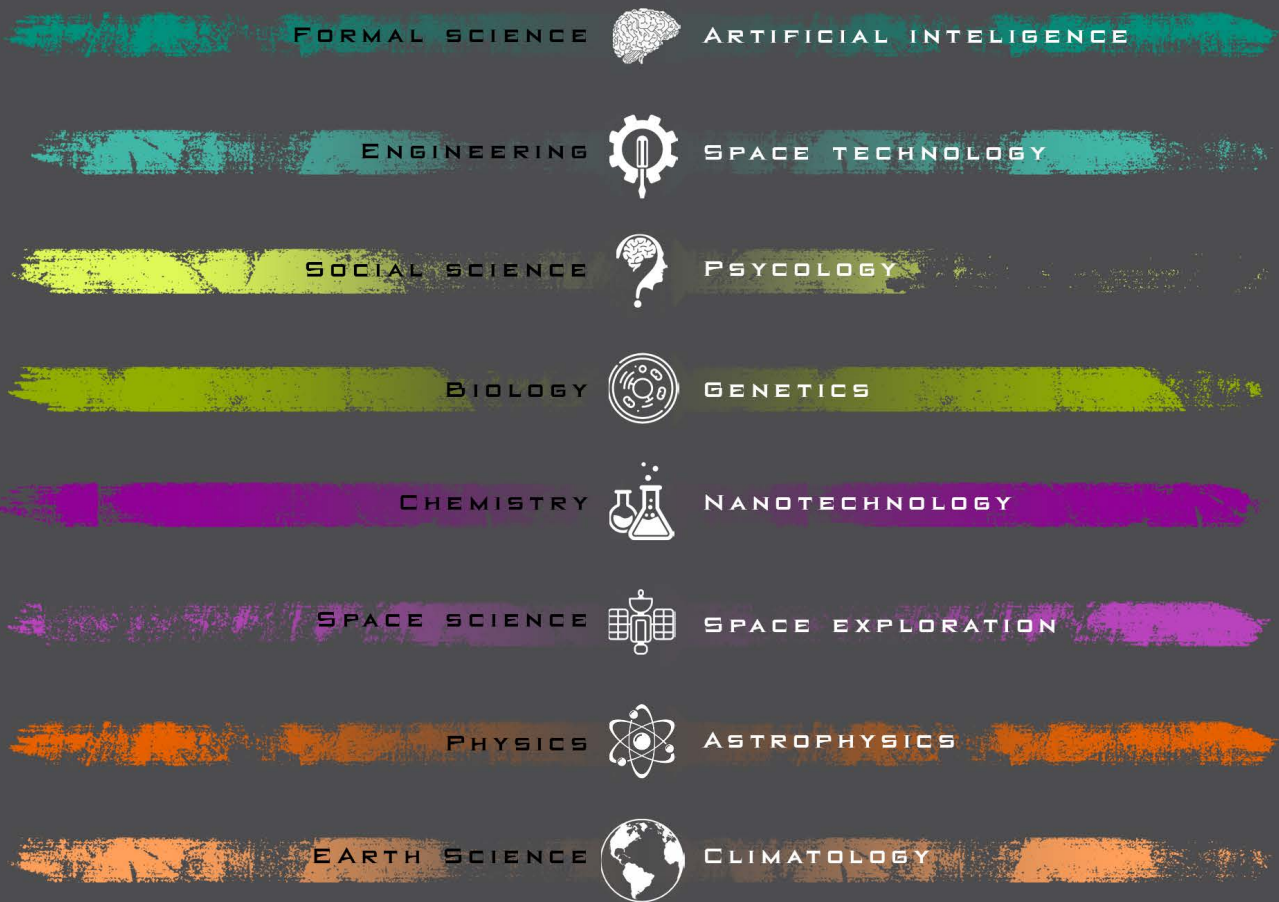
To answer this question I have decided to study how does it all work in the scientific field and it helped me to assess what is valuable for my project.<sup>[6]</sup>

While exploring the divisions of sciences I have stated 5 main fields of science: social, life, space, physical and Formal sciences.<sup>[7]</sup>

Each of them explores different spheres of our environment and every day each contributes a valuable knowledge to our society which pushes progress forward. They also follow the hierarchy of interrelated systems which makes any science a interdisciplinary field where each scientific field has influence on another by the hierarchy that connects Formal, Physical, Life, Social, Earth & Space sciences into the understanding of our environment and the universe.<sup>[8]</sup>

# Structure, scale and hierarchy of sciences





## BRANCH OF SCIENCE

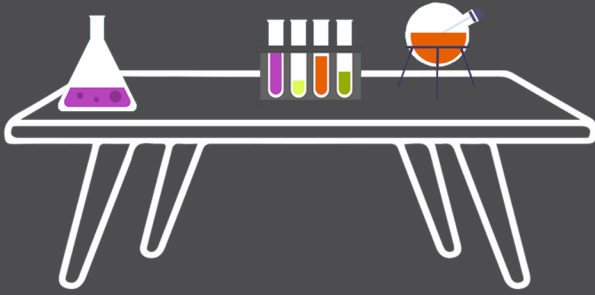
## CORE DISCIPLINE

In this research center I wanted to have an experiment - how to make multiple scientific fields operate together and inspire to share across the disciplines as I believe that open-mindedness is an extremely important trait for any researcher and to have a situation where biologist and engineer have a collaboration, or simply a coffee talk from which either of them inspired and thanks to that can push the research further - would be one of my main goals in this project.<sup>[9]</sup>

From each field of science, I decided to choose the discipline that, in my opinion, is the most relevant nowadays, a contribution from which would possibly change human society for the better.

On top of that, those "Core" disciplines would be supported by the set of different supporting disciplines that have a contribution to the core disciplines. <sup>[10], [11], [12], [13], [14], [15], [16]</sup>

## Wet lab



The type of laboratory where it is necessary to handle various types of chemicals and potential "wet" hazards.<sup>[11]</sup>

### Requirements

- Workspace and sinks that can be cleaned easily
- Materials and finishes that are resistant to bacteria and chemicals
- Piped in hot and cold water, often including reverse osmosis or deionized water
- Biosafety cabinets
- Chemical fume hoods
- Facilities for handling live test specimens
- Specialized refrigerators and freezers
- Controlled environmental areas
- Eye wash stations and hand washing stations
- Drain, waste and vent services

## Dry lab

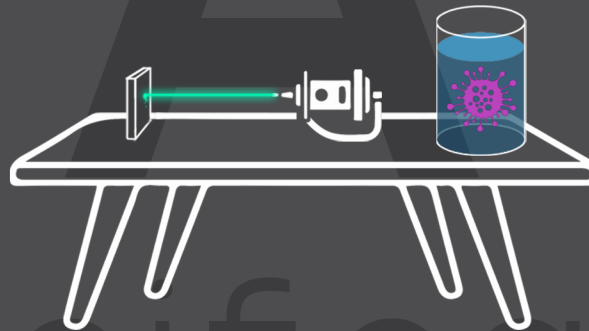


The lab that primarily works with computational and analytical research, modelling and simulation.<sup>[12]</sup>

### Requirements

- Extensive HVAC controls to support cooling and humidity levels of computer labs
- Clean power systems for sensitive computers, research instruments and network communications
- Vibration controls for sensitive instruments that need to maintain calibration
- Fire suppression systems
- Communication integration systems

## Clean room



Usually, a small area that contains hazardous, contagious or/and dangerous materials or a room which requires an extremely low percentage of dust particles in the air for precise measurements.<sup>[13]</sup>

- Airlocks with air shower
- Air ionizers (to prevent a buildup of static electricity)
- Seismic base isolation
- View panels on doors
- Fire extinguishers and blankets
- Vinyl, polyurethane or epoxy floors coating
- Stainless steel or powder coated partitions
- Curved corners (to minimize dust particle settling)
- Hazardous material disposal
- Eye wash stations
- Closed system ventilation with individual exhaust hoods
- Storage with fume hood
- Chemical resistant materials.
- Protective clothing storage



Core discipline



Branch of science



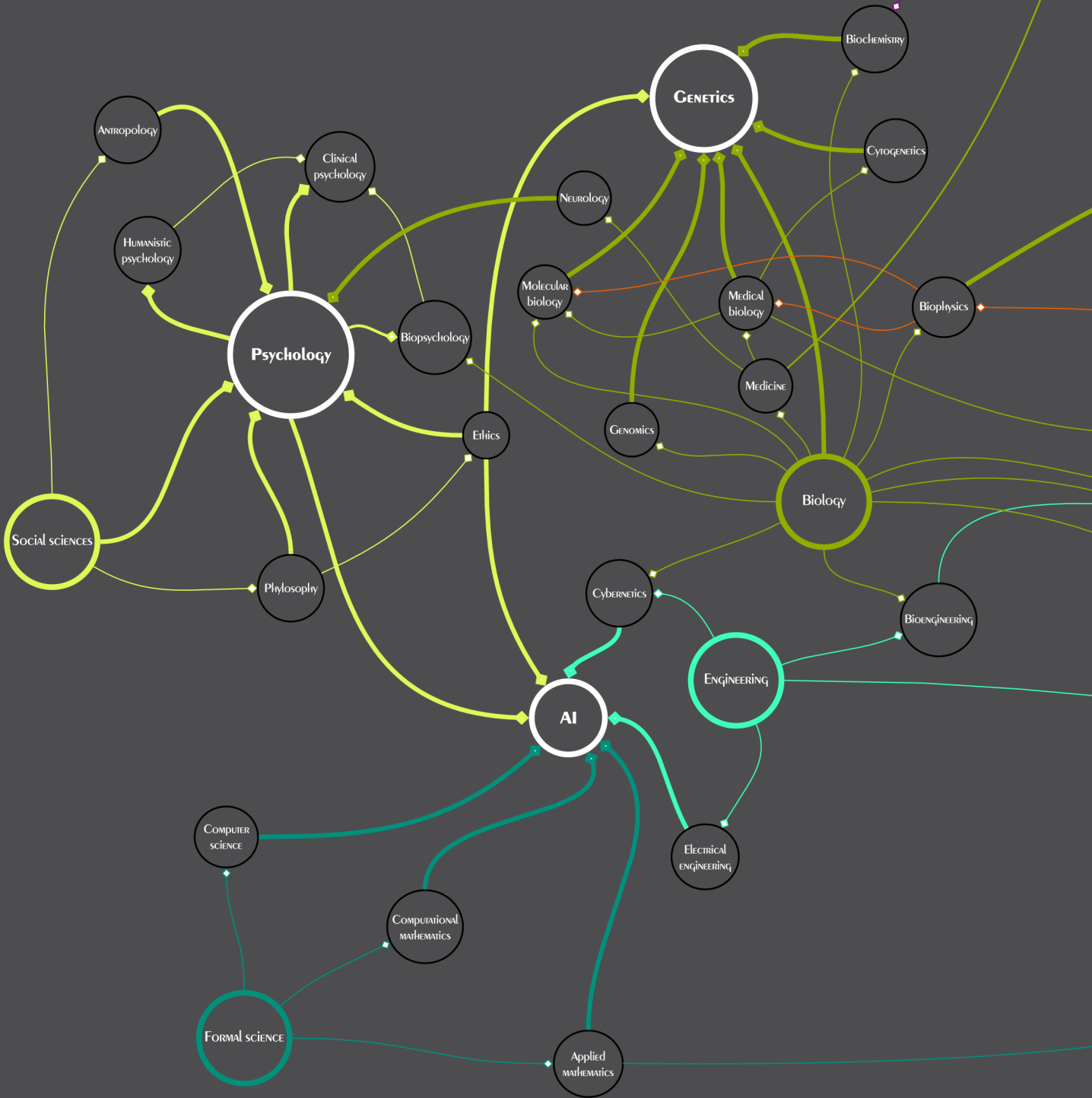
Supporting discipline

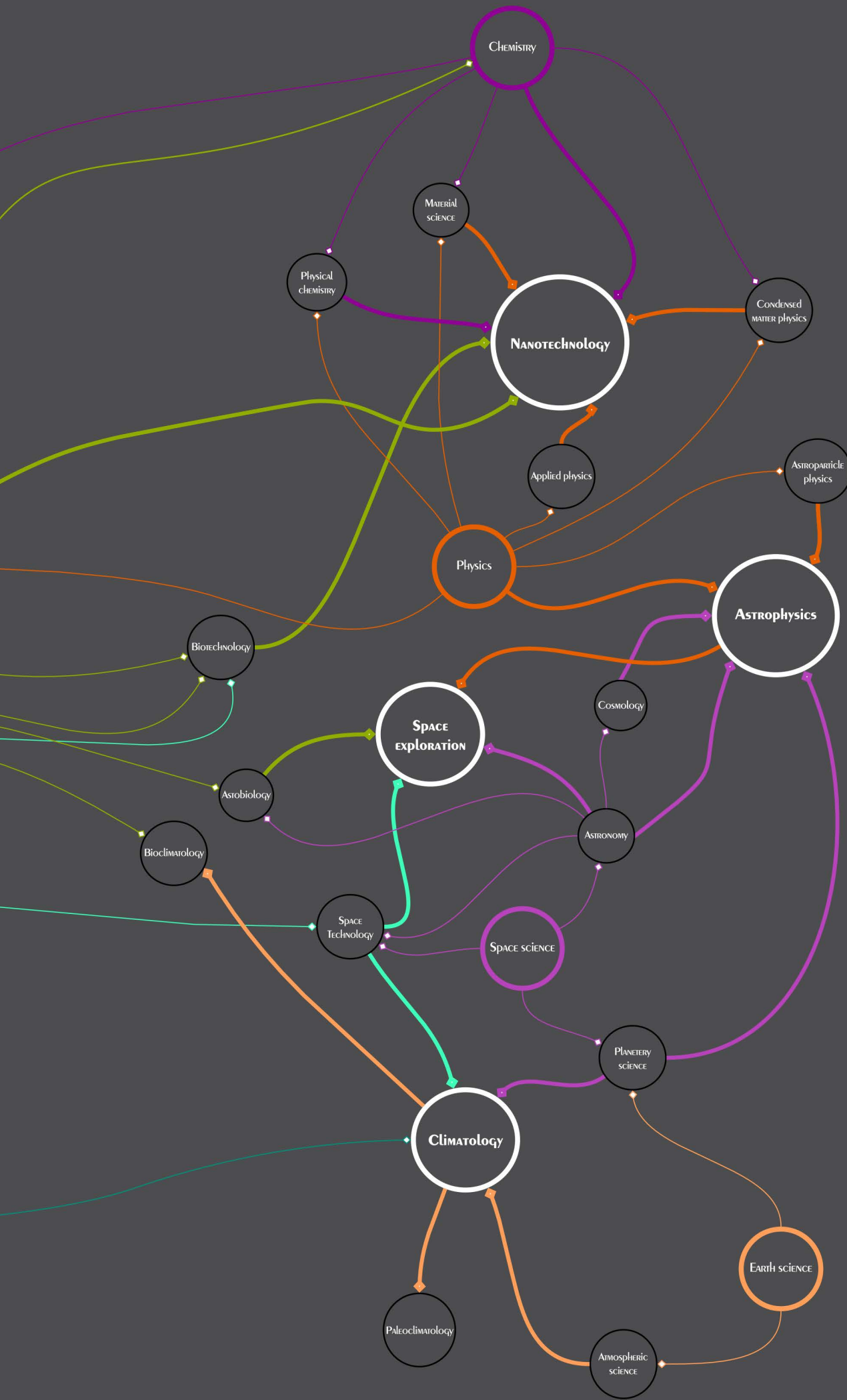


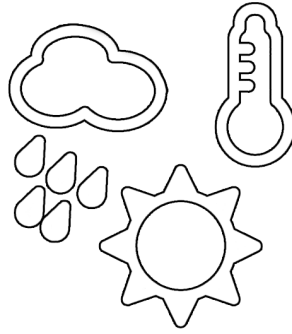
Relation link to the core discipline



Relation link to the supporting







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## METEOROLOGY ANALYSIS

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Because for this project I chose the location of the North Sea it was important for me to learn as much as possible about the location and its conditions such as weather. For that reason, I made a meteorology analysis near the Brent oil field.<sup>[14]</sup>

Each of these data allowed me to understand how should I organize spaces - outdoor/indoor. How to orient the rig and what kind of methods of harvesting energy are effective.

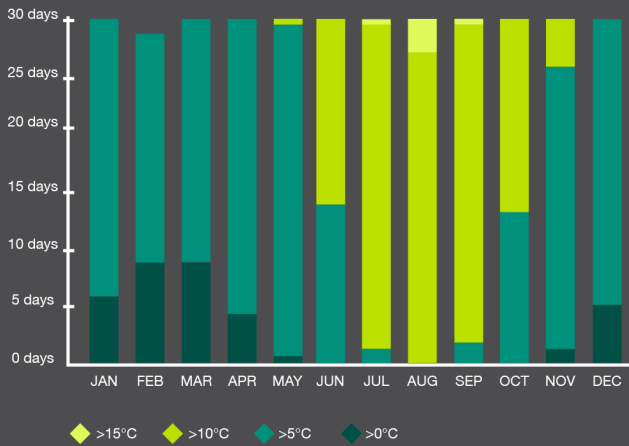
For instance, knowing that there are not many sunny days in this area allowed me to decide that photovoltaics may not be an effect of generating energy for the platform and that I need to provide more openings in the form of the rig to maximize natural light. And knowing where is the strongest wind blows allows me to define where can wind turbines be placed.



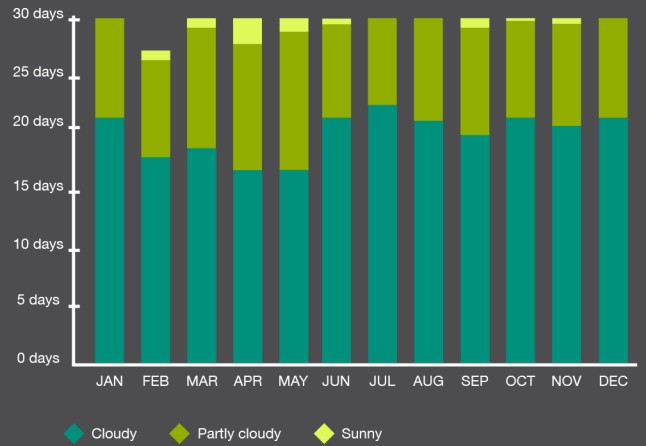
# BRENT OIL FIELD

60°53'59.99" N 1°47'59.99" E

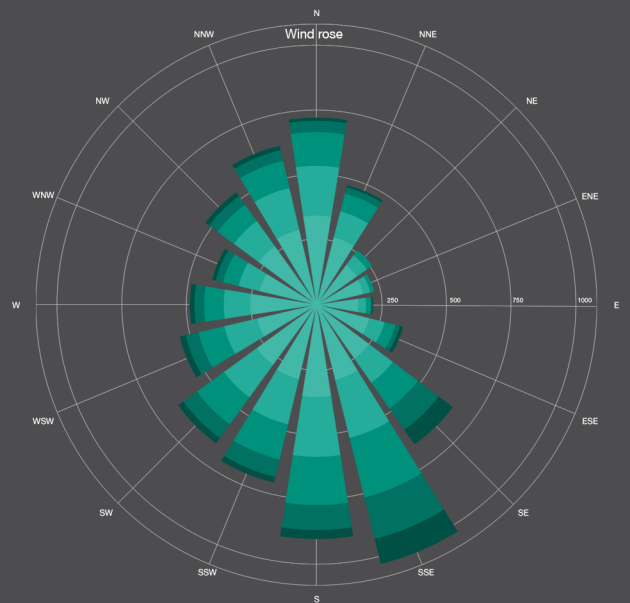
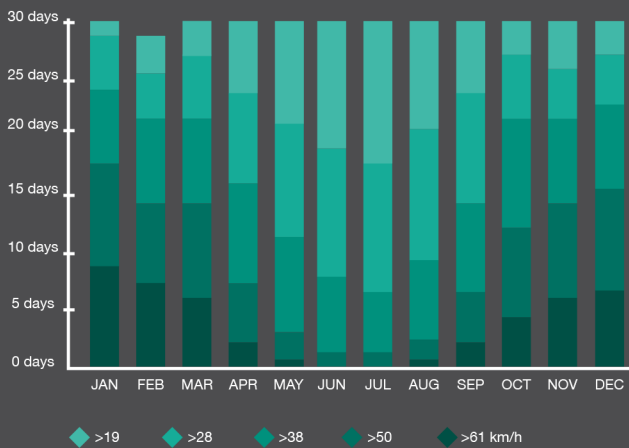
## Temperature

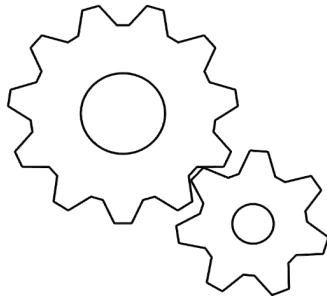


## Cloudy/sunny days



## Wind speed





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## FUNCTIONAL USE

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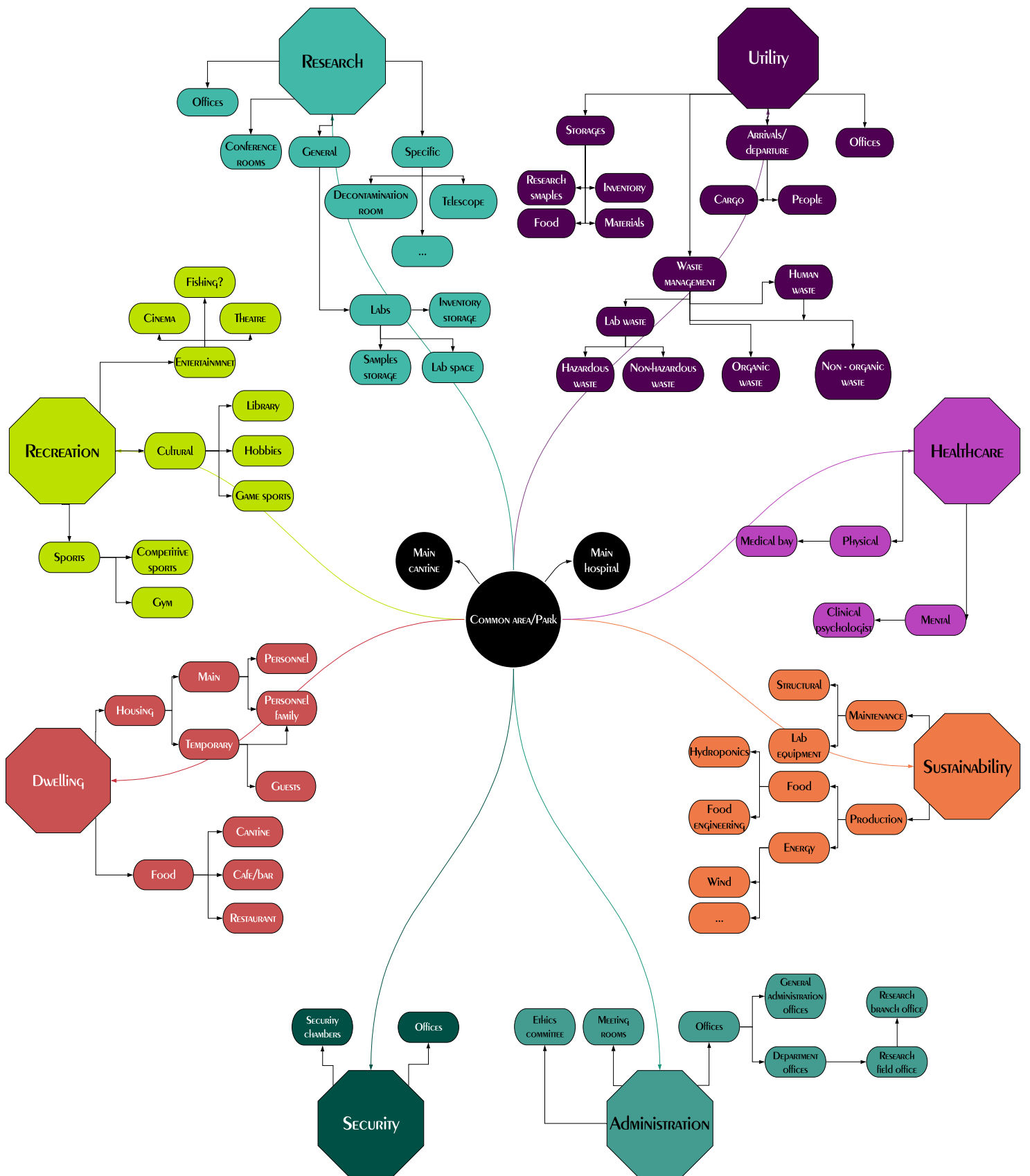
Such diverse space as a research center is more than just labs and offices, and our case is even more extreme. The remote location from the settlements poses additional requirements on the quantity and quality of functions the center has to maintain.

It is important to provide people with temporary housing for researchers and possibly - their family. And for their family - something to do. Kids got to socialize and study, spouse - have some job/hobby/sport to do.

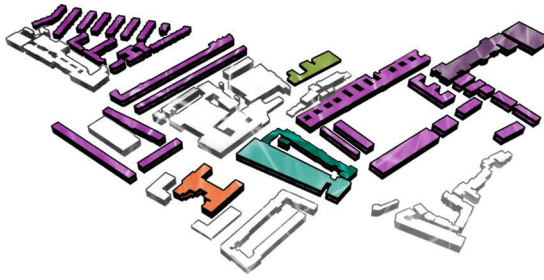
All those people also need to satisfy their basic needs and be able to have recreational places that will inspire social cohesion as the life in the relative isolation can turn out to be tough for every person it would be important to stay with your community and instead of treating this place simply as remotely located job place that causes inconvenience, instead, see it as a small village that got almost everything you need and you are connected to people with who you work and share space.

The rig platforms also need maintenance in order to keep it running at all times. There is a need for security and utilities such as waste management which is an important deal in the middle of the sea.

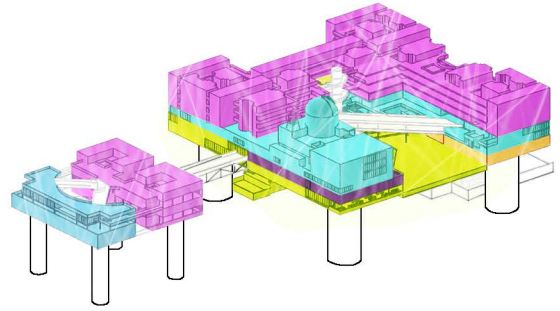
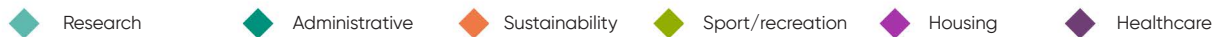
There are also advantages to having the platforms in the sea you can use its kinetic energy generated by the waves, or possibly having floating 10MgW wind turbines that, if placed correctly - could contribute about 1/3 of required daily energy.



## Functions



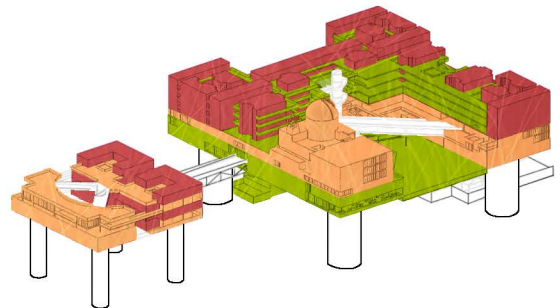
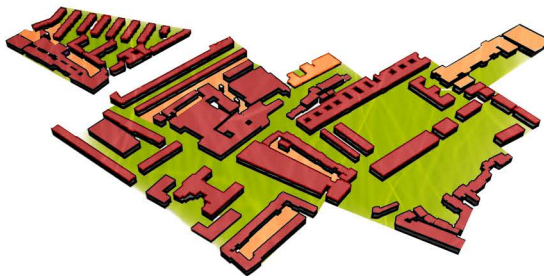
\* Uk, London cancer research center



In the scheme, I wanted to show the basic functional distribution of the rig and at the same time to show how the regular research facility on land in the city looks like in comparison.

This would help to picture the idea of how the aspect of vertical connection of spaces is important - you can think of it as if you take the neighbourhood and fold it with all the spaces and their uses.

## Public - private



In the regular situation in the city, some spaces have restriction on access and type of use - streets and parks are public, households are private and some areas semi-public (time-restricted) and semi-private - enclosed inner courtyard of a residential block (restricted to residents). Restrictions are coming from the need for privacy or/and security.

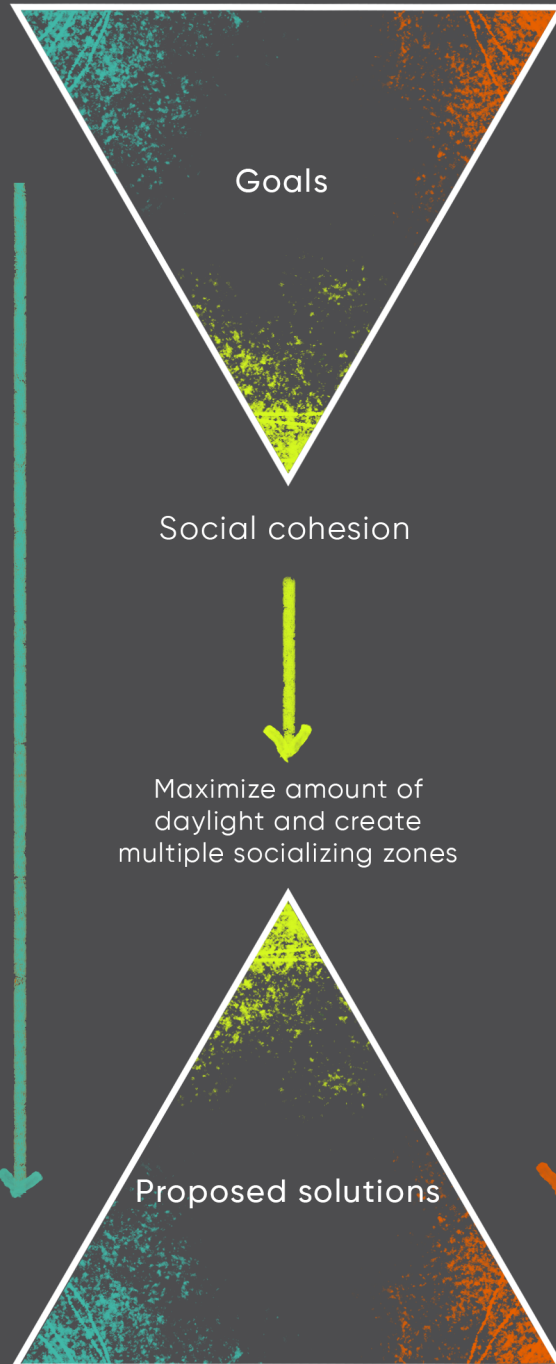
While working on this project I felt that this space distribution would be different on the rig. First of all public spaces could be inside or outside, paved and unpaved, but as you live on the rig the perception of interior and exterior gets a bit blurry.

In the center of the rig, there is a big open space with vegetation and it is covered with a greenhouse-like structure that helps to regulate the temperature inside so that space could be used any season. So, it is interior, right? Technically yes, but you will perceive it as a regular outdoors.

# Spatial and programme goals

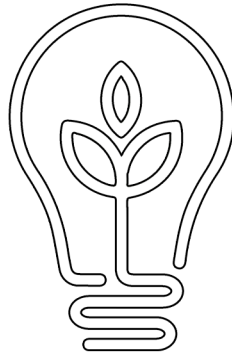
Interdisciplinarity

Sustainability



Locate collaborating disciplines near each other and create 3rd spaces in between.

Produce most of the resources needed for living on the rig to be self-sufficient



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## SUSTAINABILITY

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For such a remote place one of the most important topics that had to be solved was sustainability. Which methods to use for the rig to be mostly independent of the main country infrastructure. By this I mean - how to get food, water, electricity without complete reliance on transportation of those supplies from on land sources. This approach would be beneficial to reduce operation and transportation costs.

For those reasons I have made calculations based on multiple case studies for different spaces and functions on the rig and thanks to that, I was able to access the approximate maximum daily energy consumptions.

Knowing that allowed me to think of methods of energy harvesting, and how would they have to be implemented to produce enough electricity to power all facilities on the rig.

Among those, I found several means such as harvesting energy from wind, because there is plenty of this resource in the open sea, and for the reasons to save space I have decided to chose the new technology of floating wind turbines. A single turbine can generate 10 Megawatt during the day which is around 1/3 of required energy.

Besides the generation of energy there would be need to provide basic produce to sustain people - water and food. For that reason I found several ways how to use the environment to provide those resources.

Water can be harvested by the fog harvesting - as the North Sea has a lot of sea fog. Rain could also be collected from the rig surface and filtered to be pure and ready for consumption. Newly developed material aerogel allows for new methods of water desalination - the aerogel that absorbed a lot of salty water - will release steam of pure water when heated.

## Energy storage

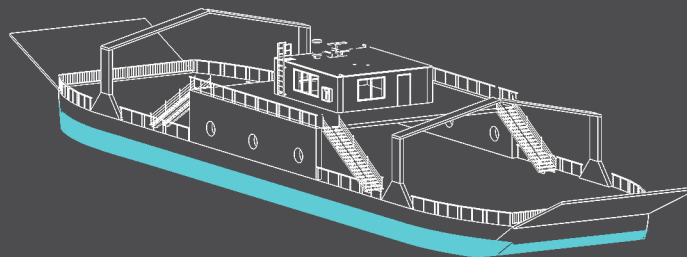
4 200 KWh storage  
1 200 KW power release



x 15

Maximum stored energy:  
**63 000 KWh**

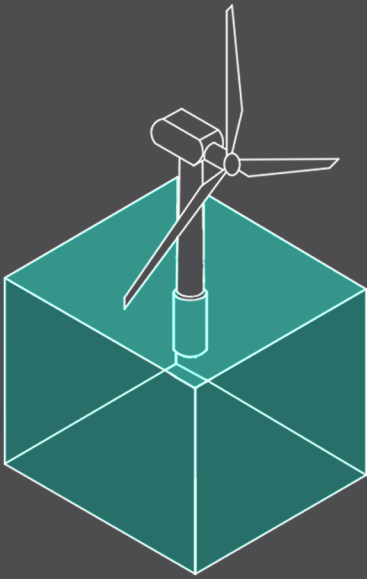
## Daily boat connection



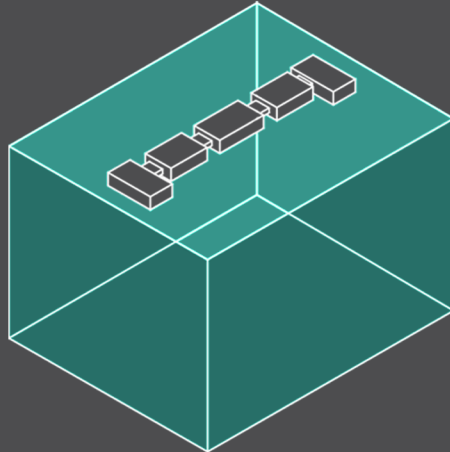
In order to maintain sufficient amount of resources and its variety - every day a boat will be travelling between closest big city and the rig. Among other tasks of this daily expedition are:

- Picking up post to deliver to people who live on the rig
- Buy products that were ordered by the rig users
- Dump excess waste from the rig
- Pick up potential visitors
- Deliver to sell excess biofuel and produced food

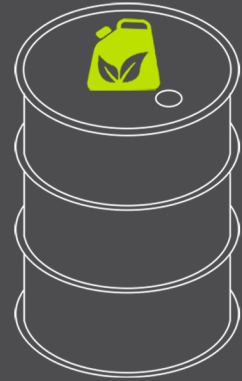
# Energy generation



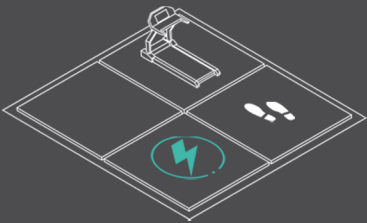
Floating wind turbines<sup>[20]</sup>  
4 000 - 20 000 KWh/day



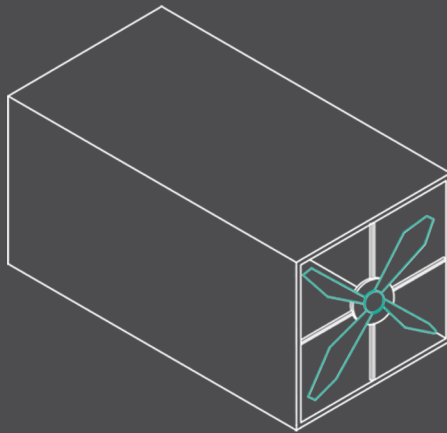
Wave energy converters<sup>[21]</sup>  
1 800 KWh/day



Biofuel<sup>[22]</sup>  
(algae, seaweed)



Kinetic energy converters<sup>[23]</sup>  
637.5 KWh/day



Technical design solutions<sup>[24]</sup>



Waste-to-energy and recycling<sup>[25]</sup>  
330 KWh/day + ~ 10 kg fertilizer

**MAX**  
**DAILY ENERGY CONSUMPTION<sup>[26]</sup>:**  
~ 21 125 KWh

**MAX**  
**DAILY ENERGY GENERATION:**  
~ 22 142.5 KWh



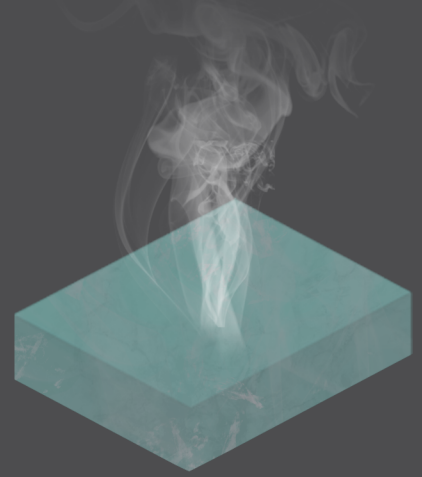
# Resource production



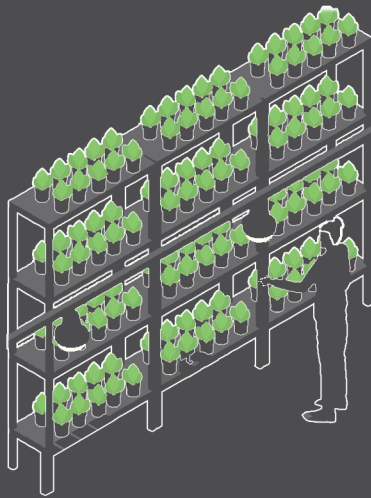
**Fog harvesting<sup>[15]</sup>**  
100 m<sup>2</sup> of material - ≈ 900 L/day



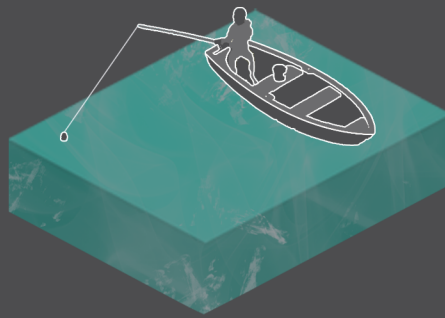
**Rainwater harvesting<sup>[16]</sup>**  
50,000 m<sup>2</sup> of roof - ≈ 138.888 L/year



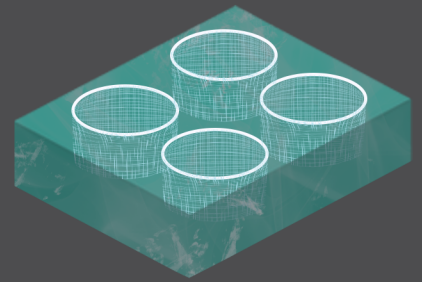
**Aerogel water desalination<sup>[17]</sup>**  
Desalination of the sea water by turning it to steam with aerogel.



**Vertical farming<sup>[18]</sup>**  
1620 m<sup>2</sup> - 129 600 kg/year  
(of grown product)

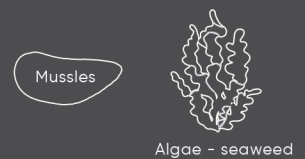
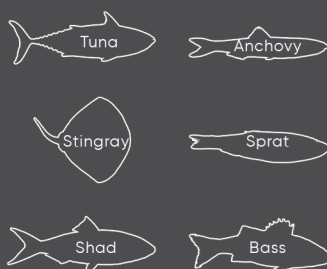


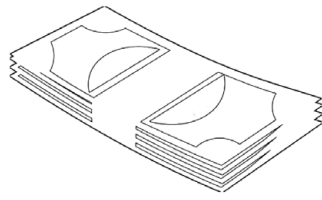
**Fishing<sup>[19]</sup>**



**Sea farming**

Food self-sufficiency (at least partial) - would also an important aspect of the project - for this reason I have implemented methods of vertical farming along with fishing and sea farming.





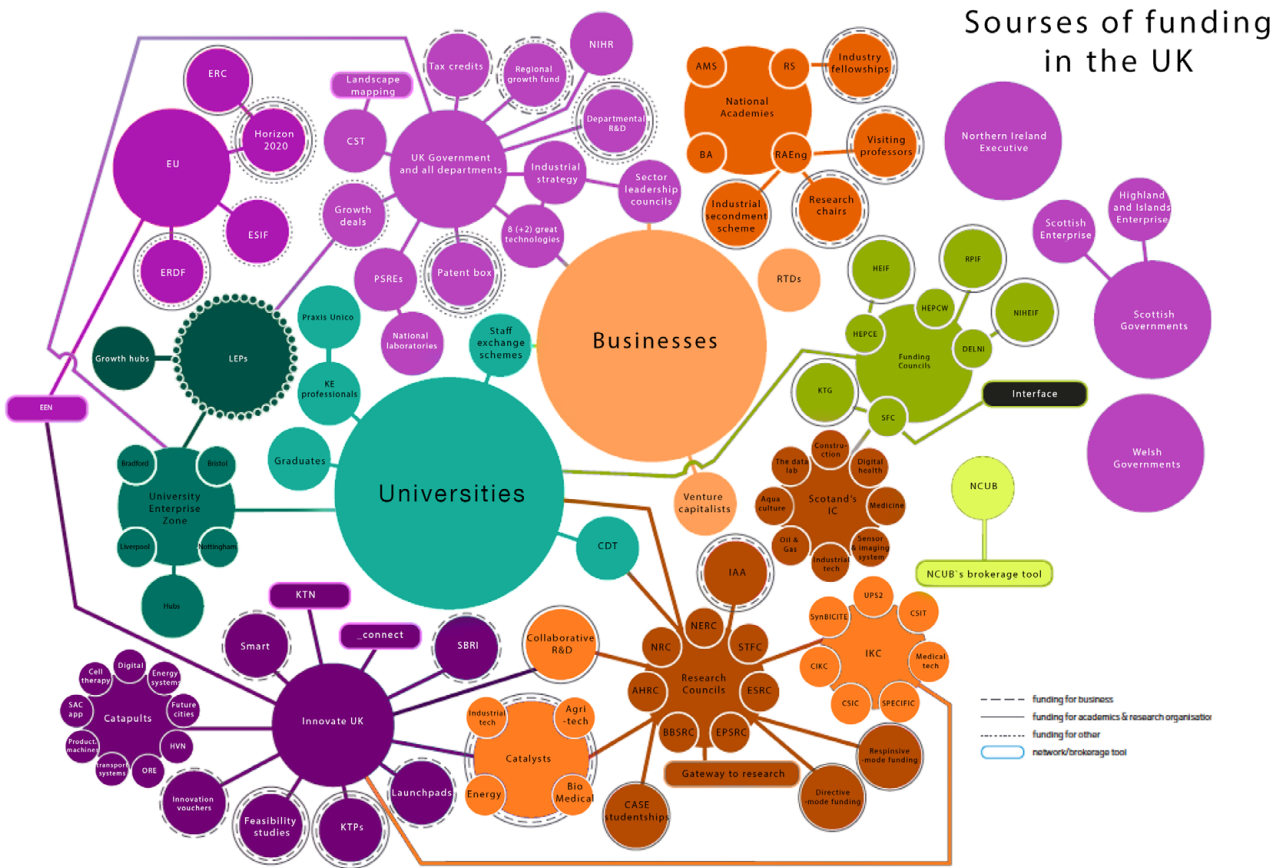
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## FINANCING

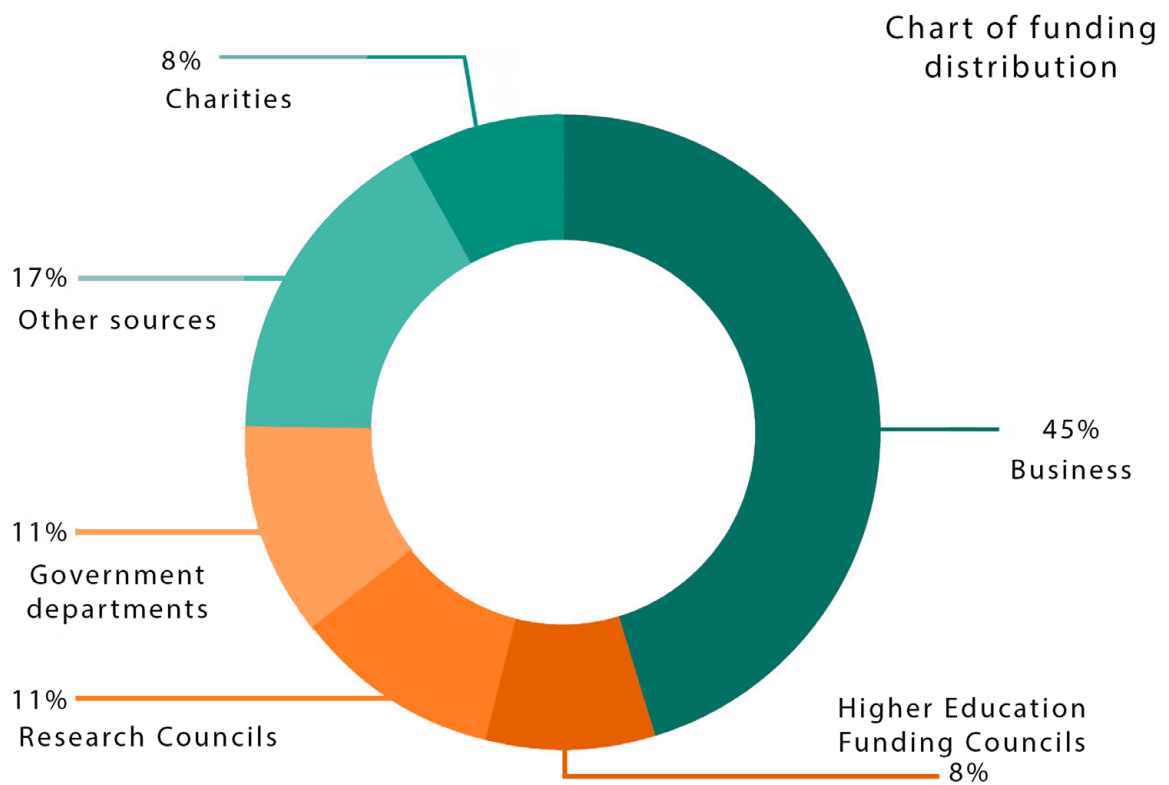
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Every research needs funding - it is a core moving factor for any discipline more funding - the faster you get the results and the better is the research. In every country it is different/ for every discipline it can also vary. But for this example, I wanted to take a look at the funding in the UK and its structure.

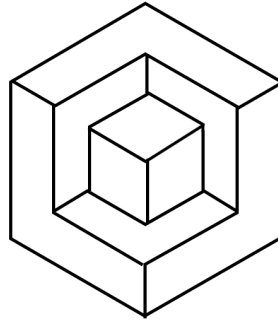
In this example, you can see that in general researches are funded by private businesses although it can vary highly from the prospects of the research - let's just say that the fuel chemistry would get higher amounts of money than some of social sciences from business owners. On top of that/ research facilities that are not part of the universities are not getting any funding from those educational institutions. And considering the situation with Brexit - funding from the EU may also stop.



\*From The Royal Society website [27]



\*From The Royal Society website [28]



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## Modularity

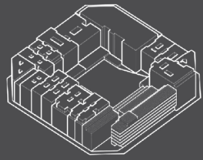
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Possible difficulties with the construction of such space inspired me to think of the ways how to make the project less costly, but to still provide me with good flexibility for the design. The approach which I look first was the modular architecture.<sup>[29]</sup>

You can look at modularity as if it is a spectrum where on one end - there are large-scale structures - such as residential blocks of housing estates and on the other end of the spectrum is a screw that holds most of the furniture in your apartment together.

All of that is a module, and the size of it correlates with the spectrum between lower project cost at expense of design flexibility (urban block) and higher project cost but with a lot more options to design (a screw).

The way I decided to go with it is to find some golden middle to get the best of both worlds and restrict myself to modular walls/slabs, technical systems that would run in between those prefabricated units with sufficient insulation but in the same time allow me to have a larger set of option when it comes to spatial organization.



Urban block

# Modularity



Screw

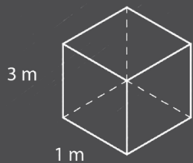
Cost

Walls, HVAC/proposed rig design

Flexibility



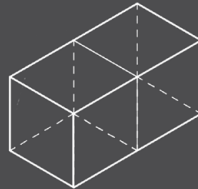
## Spatial organization of modules



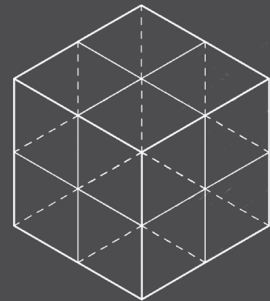
3 m

1 m

Singular unit



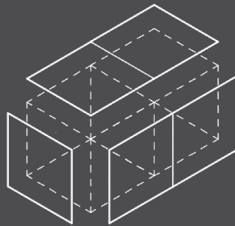
Combination of units



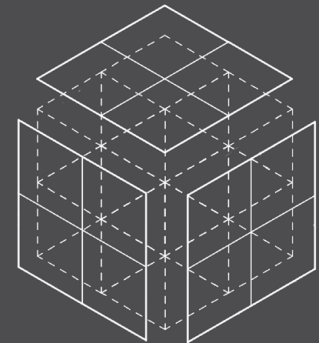
Group of units



Module



Extended module



Large modules



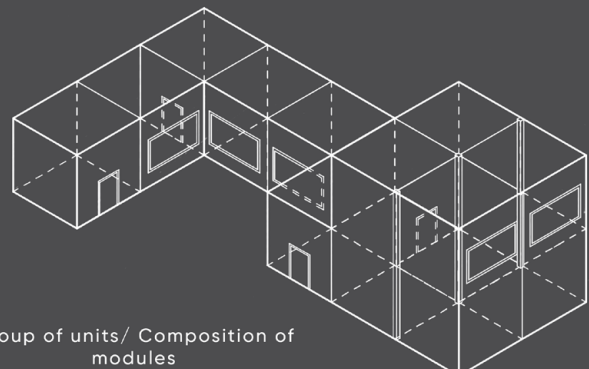
Empty opening

Separating wall

Door opening

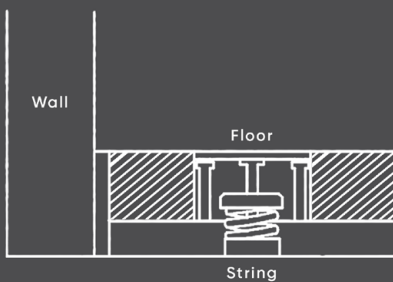
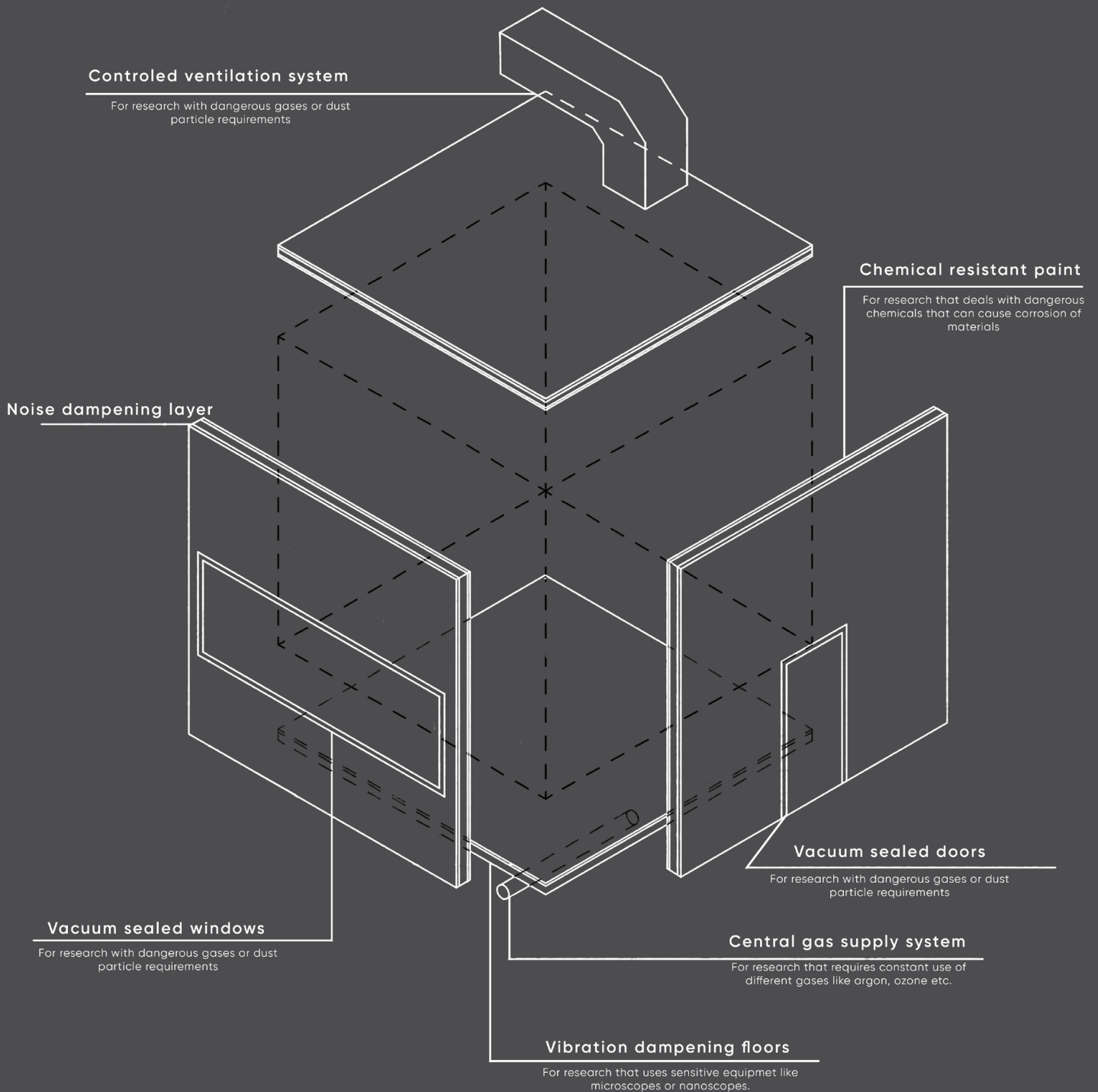
Window opening

Supporting pillars



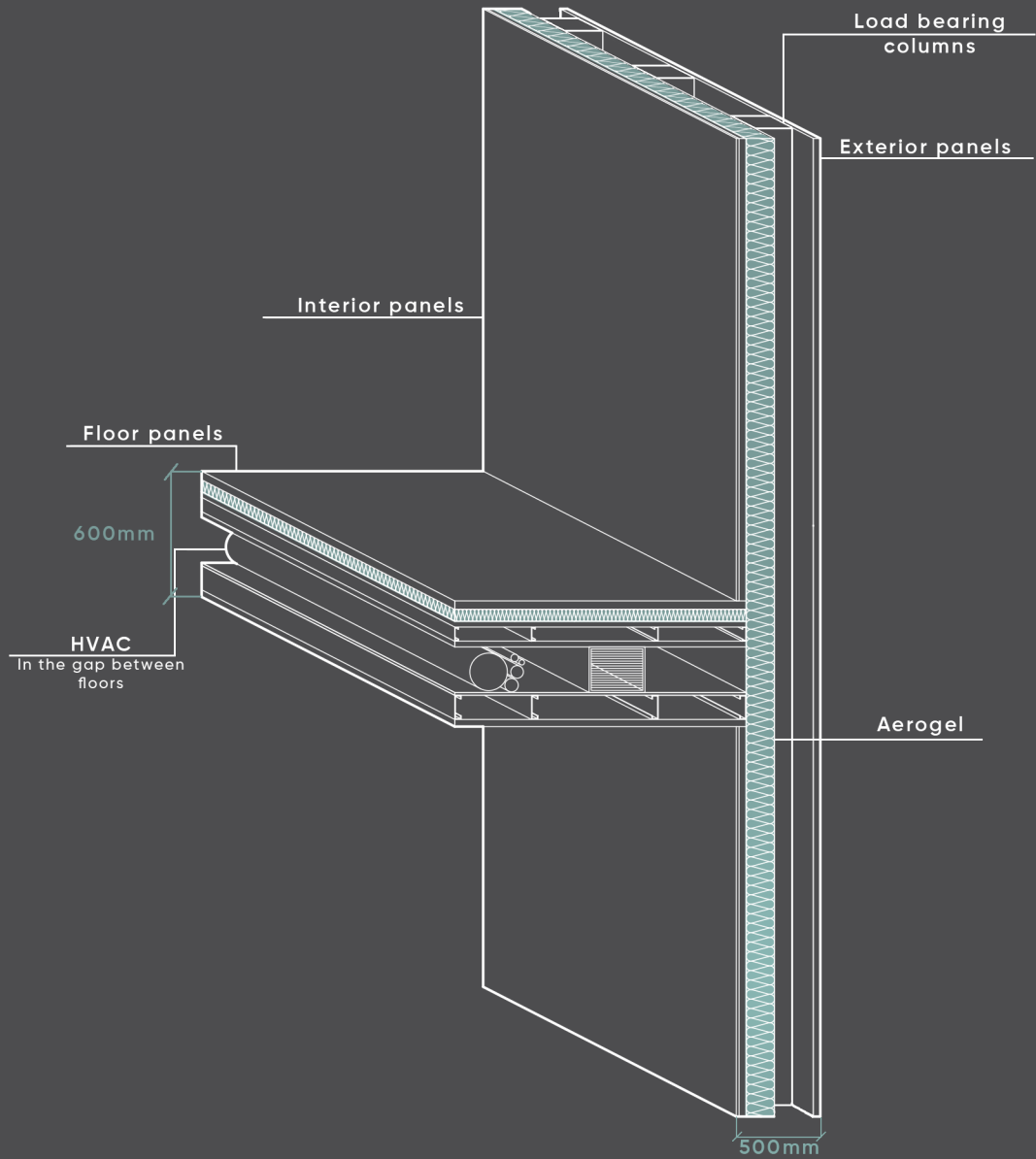
Group of units/ Composition of modules

# REQUIREMENTS FOR (WET) LAB STRUCTURE



String vibration dampening system<sup>[30]</sup>

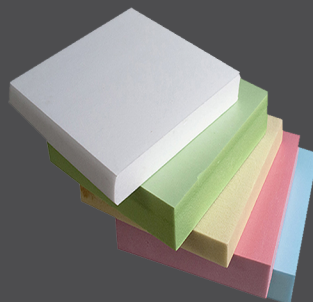
# WALL/FLOOR MODULE SECTION



**Aerogel<sup>[31]</sup>**  
 R-value -10.3  
 per 25mm thickness



**Styrofoam**  
 R-value -4.5  
 per 25mm thickness



**Mineral wool**  
 R-value -3.61  
 per 25mm thickness





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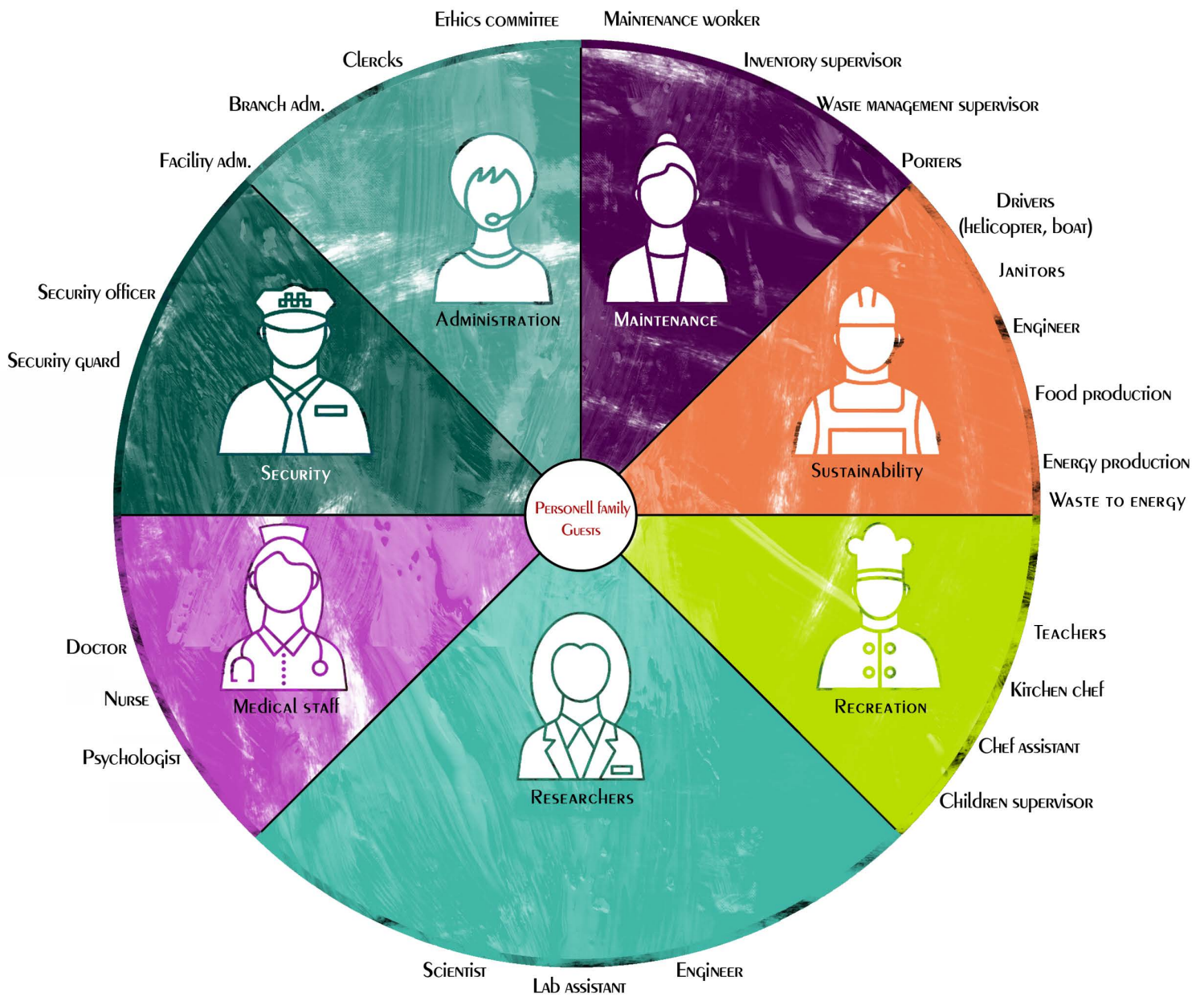
## USERS

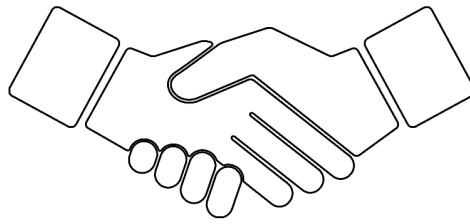
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The program of the research center emphasizes that there is going to be a large number of users from many different backgrounds who have to operate like an organism together to achieve great results and sustain the research platform.

It is also important to consider that some of the users of the research facility are going to be there only on a temporary basis, some researchers might spend there couple of weeks or month, his or her family might come and stay, people who make deliveries by the boat or officials coming on the temporary visit. All of those factors have to be considered while identifying the users and their place within the facility.







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## DENSITY of THE SOCIAL INTERACTIONS

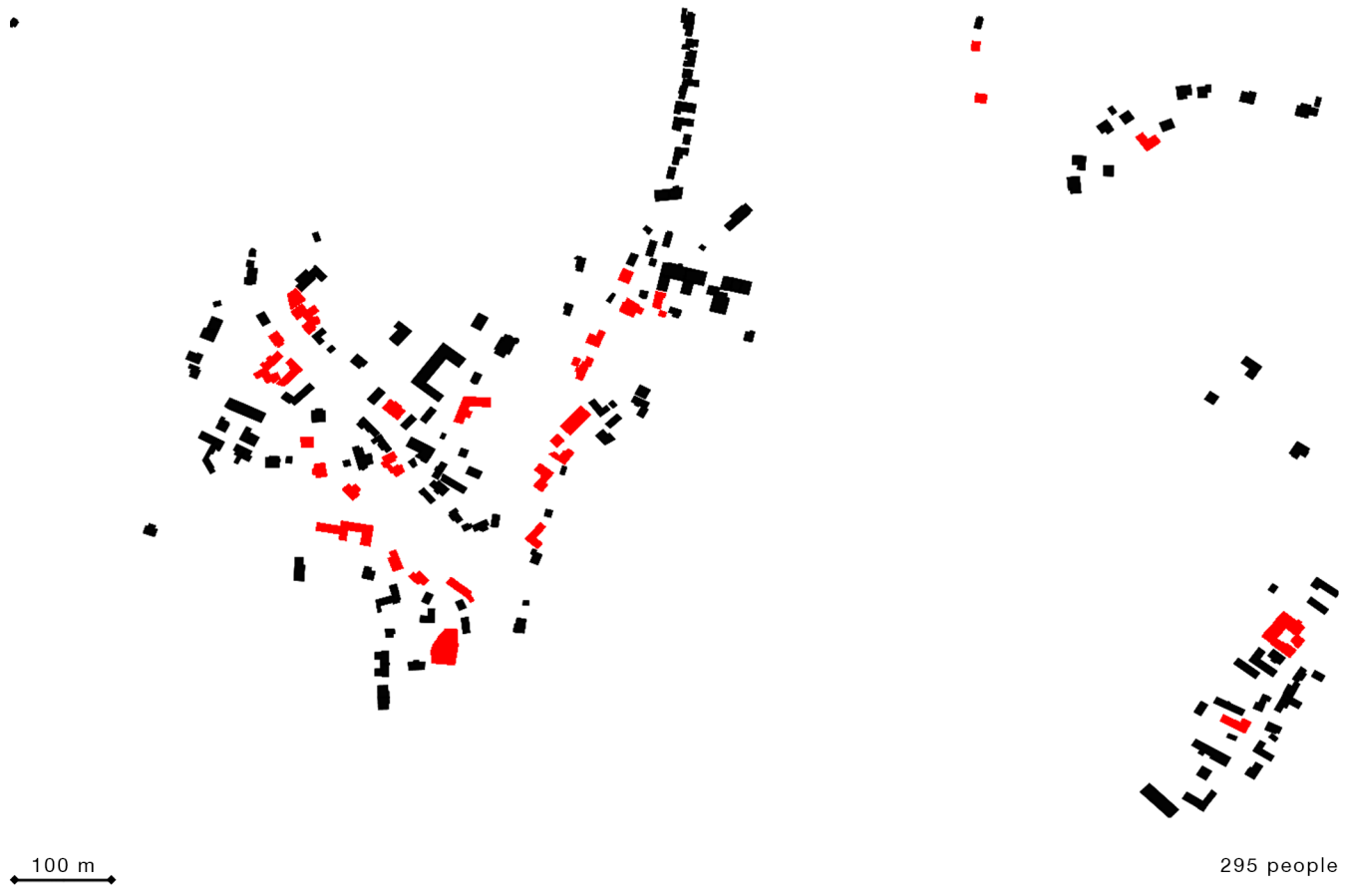
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Thinking about what could help me better understand the density and quality of social interactions I came to imagining it on the scale and population density comparison as if a potential research center on land (in the big city like Prague) and my proposed research facility on the oil rig.

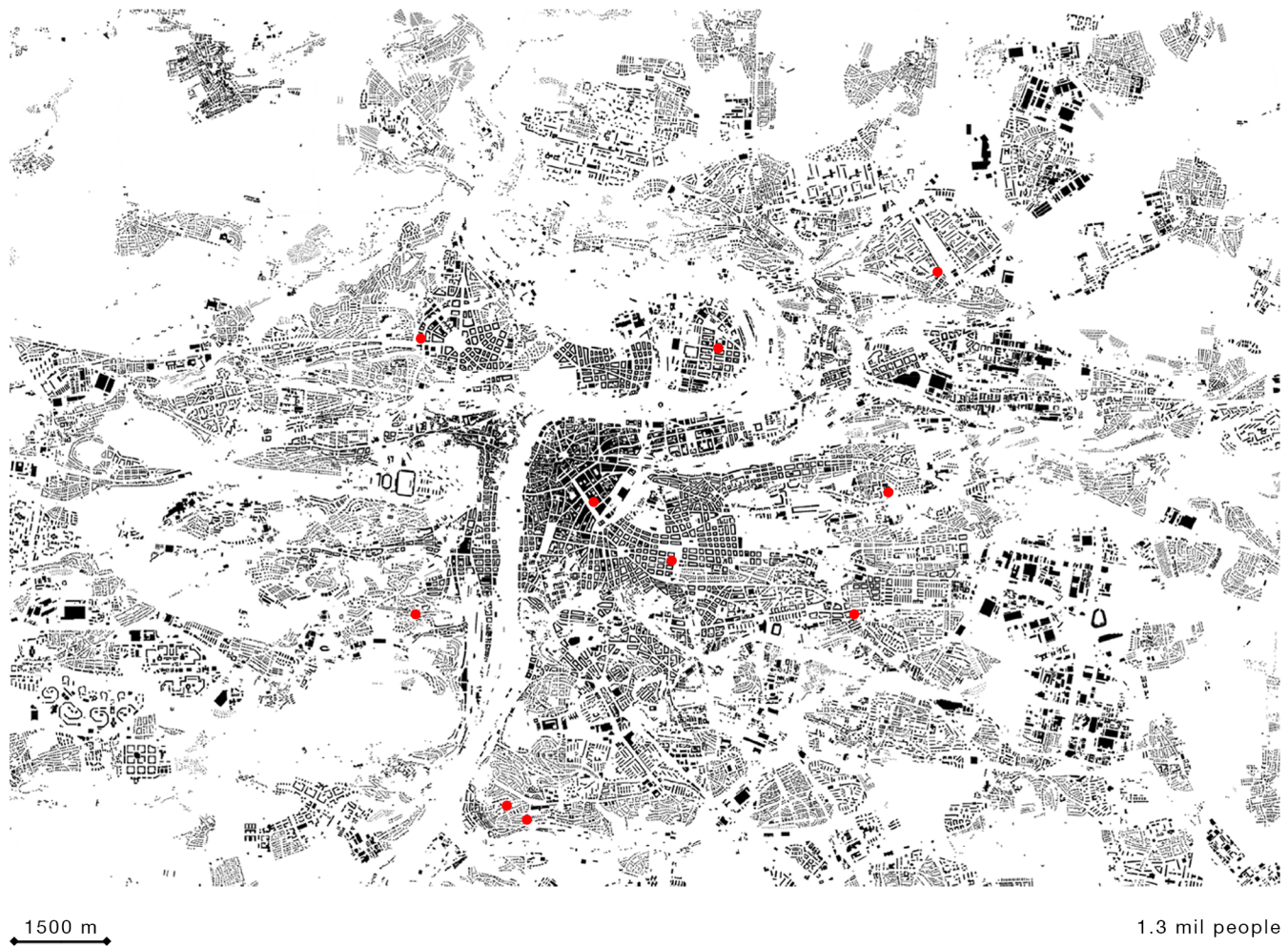
What I came to understand is that scale and population on the rig is similar to the one of the small village - Village is less dense in population and the social circle is generally consist of people who live nearby while in the city - social sorcle of individual is generally more spread due to the distance between places you travel: home - work - etc.

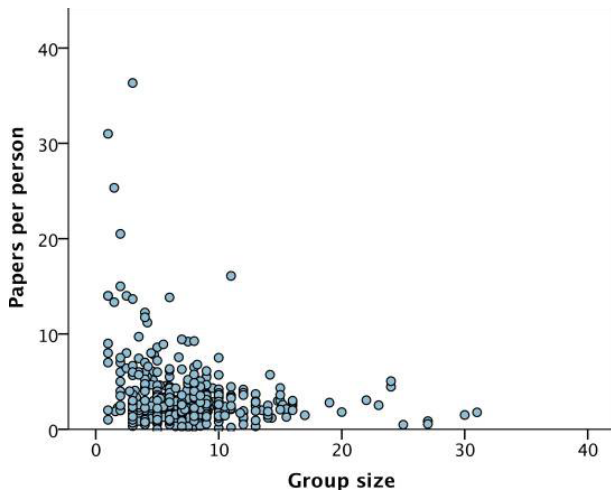
That gave me the idea of what kind of interaction will happen on the rig - even though the main purpose of this place would a research - life would flow in slower pace, for some people, in comparison to the city, people would more likely to talk to someone in their environment and to socialize in the environment of incredibly smart and creative people which will definately have a positive impact on the innovation and taking the best from the interdisciplinary approach.

Vinec, CZ

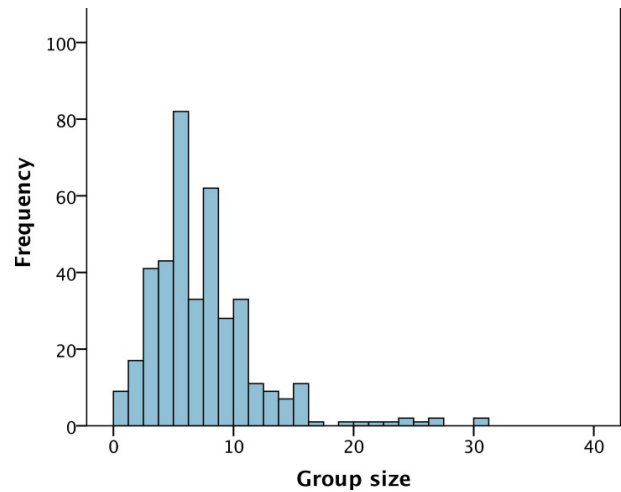


Prague, CZ





Research groups: How big should they be?<sup>[32]</sup>



Having made some research on social aspects of this project I looked at several articles that specify the size of the research group or rather - the correlation between the number of researchers in each group and their productiveness represented as the number of papers they have published.

And what I have noticed is that numbers between 3 -10 seem to show the highest number of published research and based on this fact I decided to take this number to calculate the potential amount of scientist that would be on the rig.

I have also calculated approximate amount of users in other departments on the rig in order to have a better idea with what amount of people I am dealing with.

### Amount of researchers

Amount of researchers per field 3 - 10  
 Amount of fields of science: 41

123 - 410 - Researchers

### Other users<sup>[33]</sup>

Canteen, post, bar, cinema, administrative, fishing/farming, vertical farms, waste-to energy, energy generation, maintenance, hospital, gym, security, janitors:

≈ 125 users

### Total amount of rig users at the start:

≈ 250

### Dunbar's number<sup>[34]</sup>

In antropology and evolutionary psychology there is a concept that suggests a number that is a cognitive limit to the amount of social relationships maintained by the individual. This number lies between 150 - 250 people

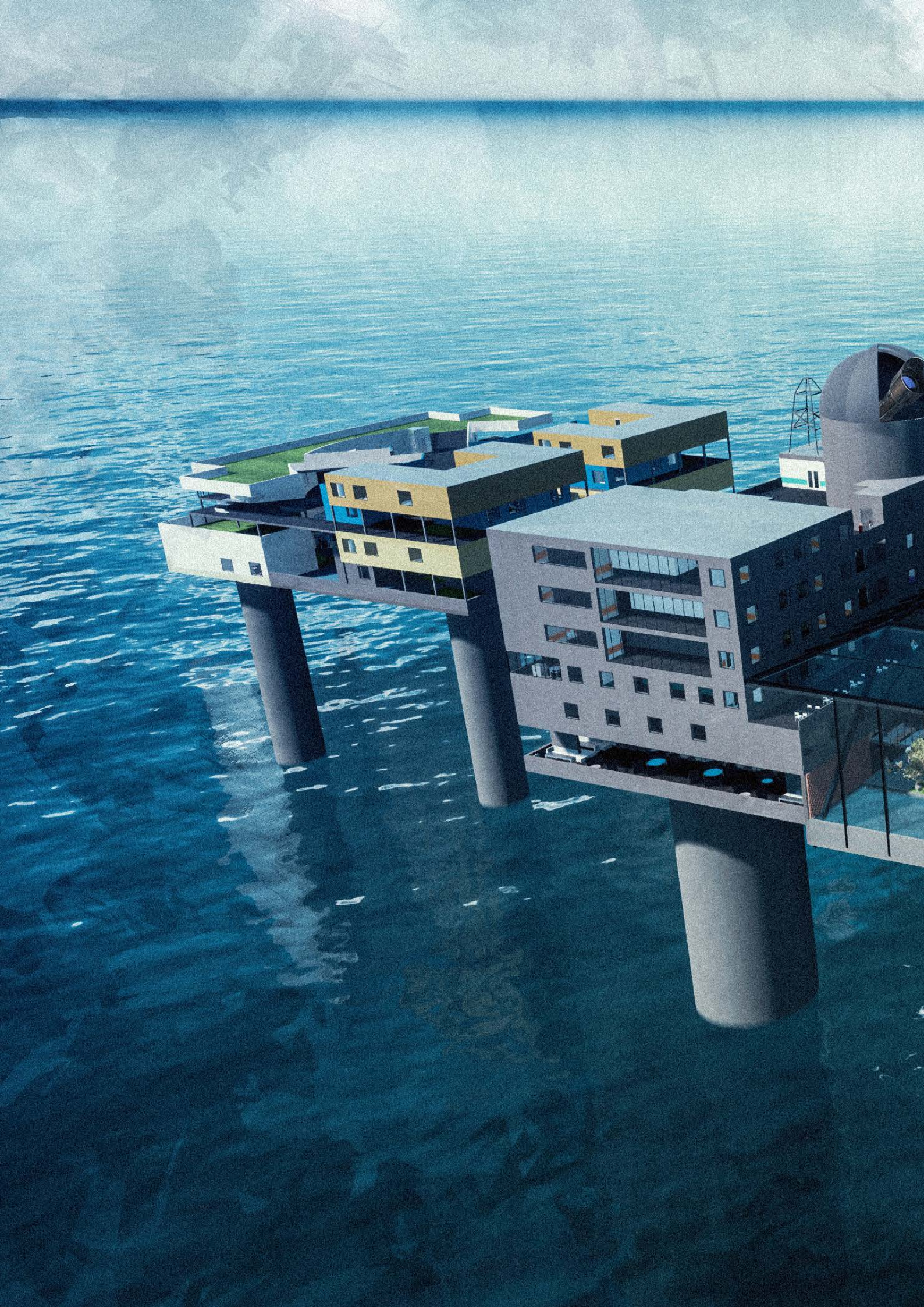
This idea is highly interesting to me in terms of what kind of social interactions are going to happen on macro and micro level. The smaller amount of people in the commune - less it requires restrictive orders and laws.

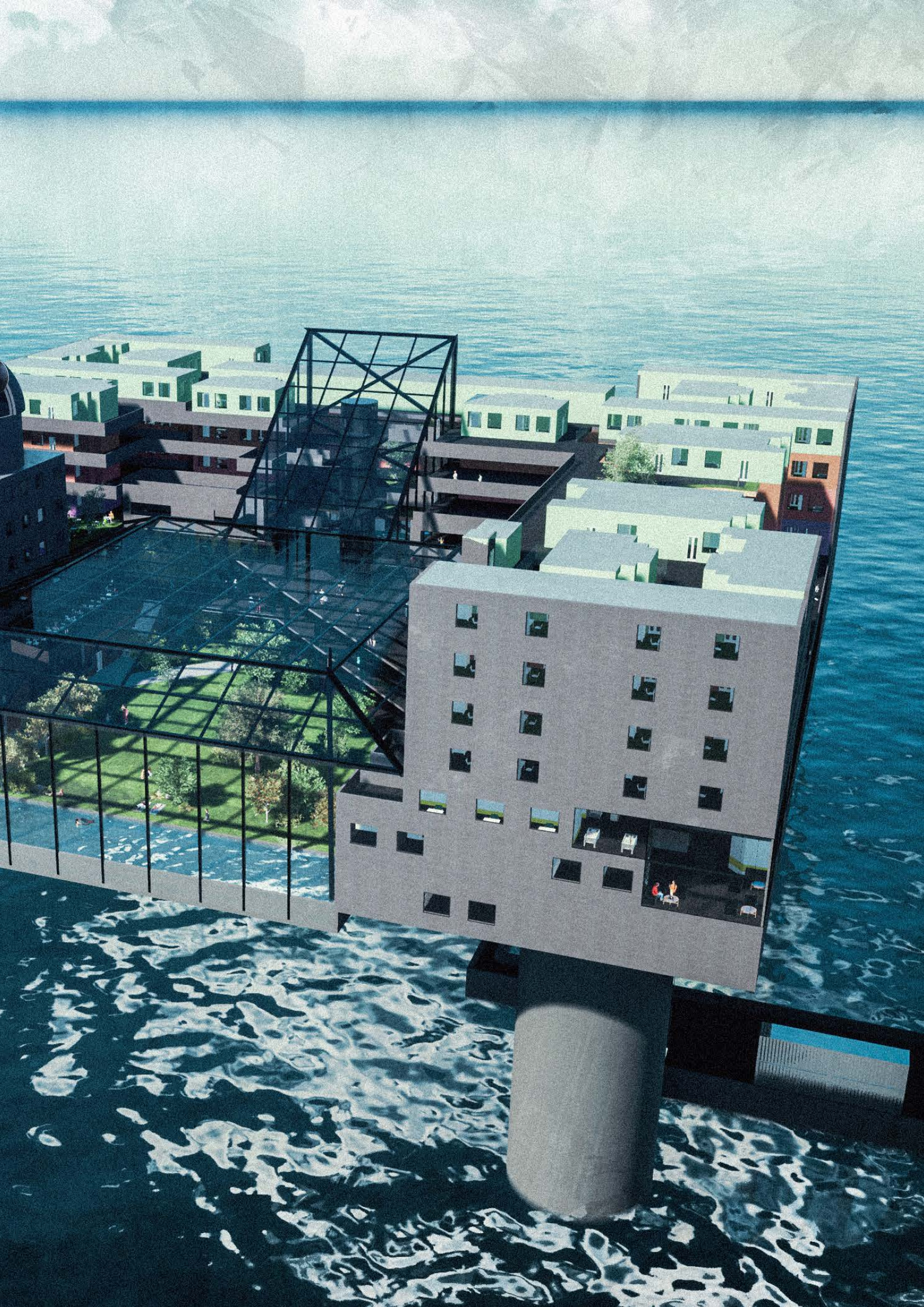
Dunbar explained it informally as "the number of people you would not feel embarrassed about joining uninvited for a drink if you happened to bump into them in a bar"

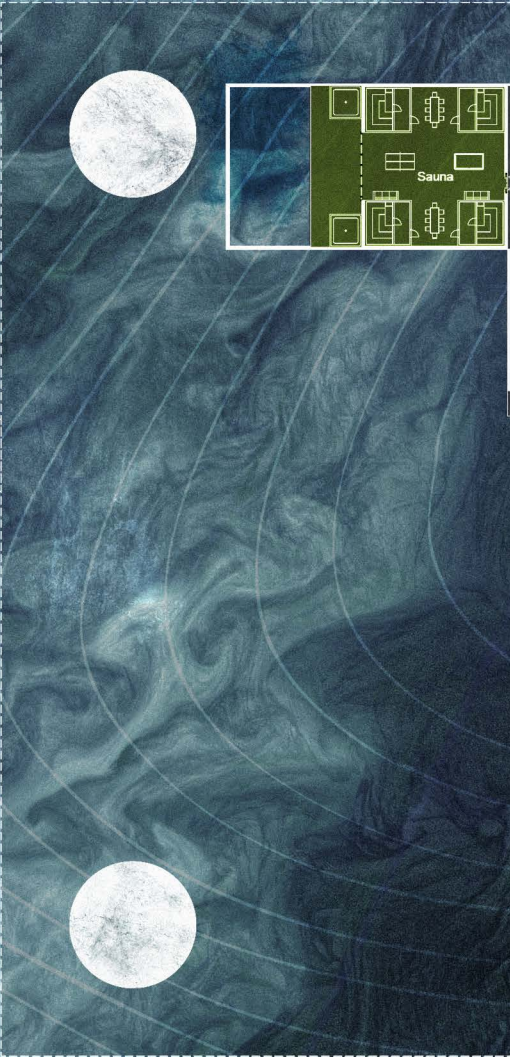
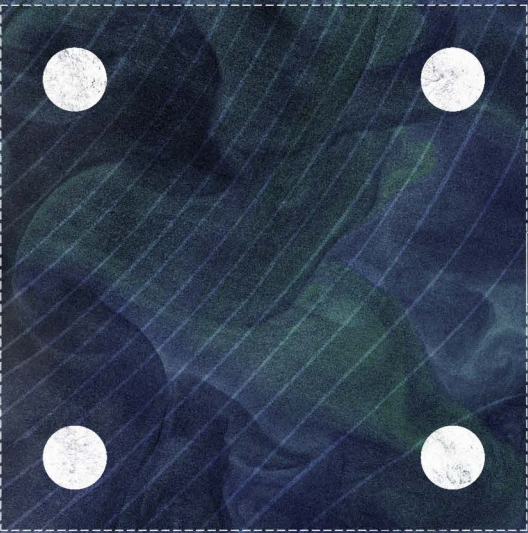
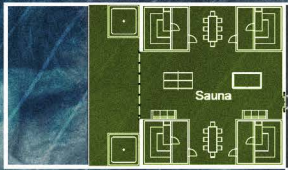
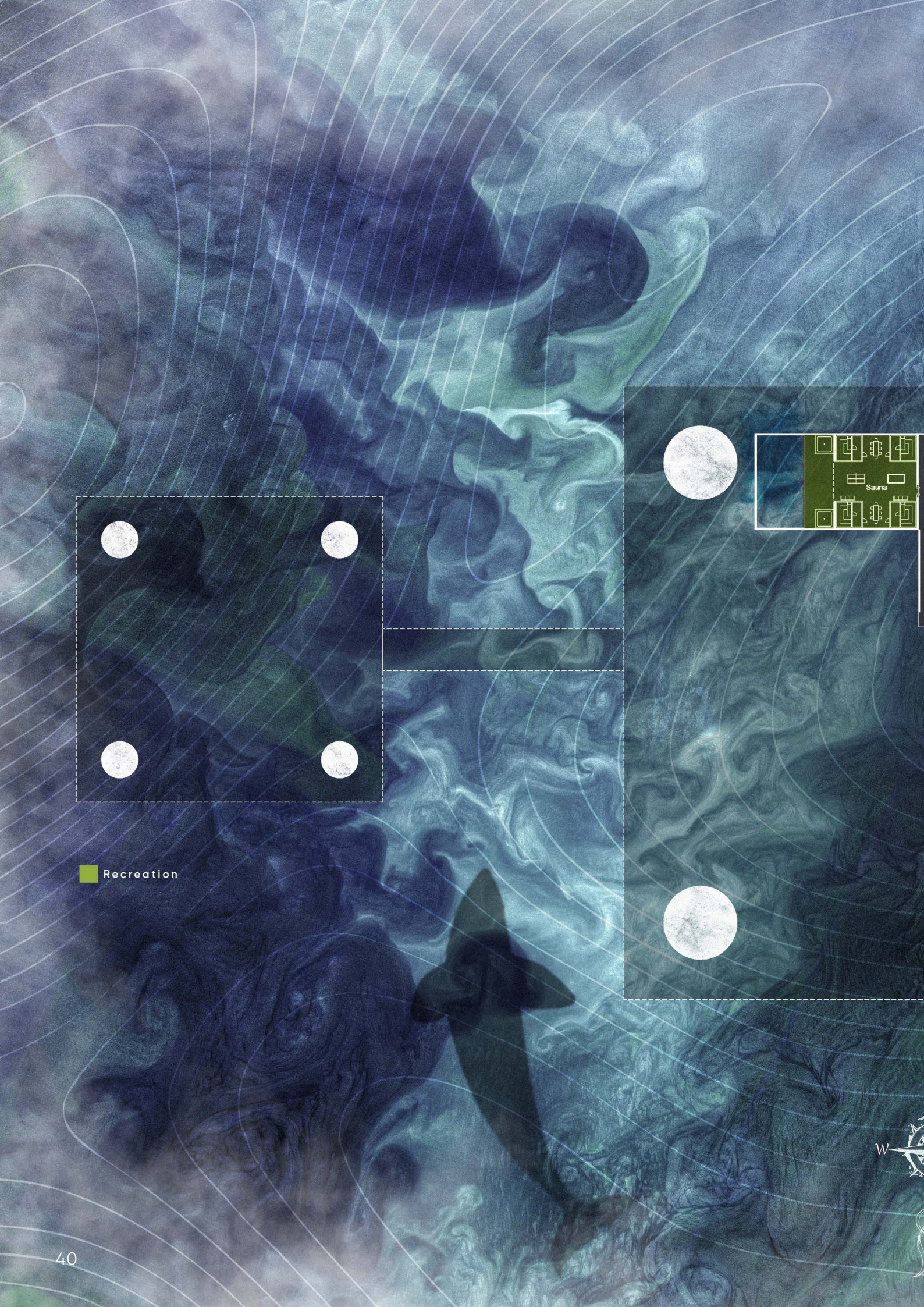
# DESIGN

## PROPOSAL





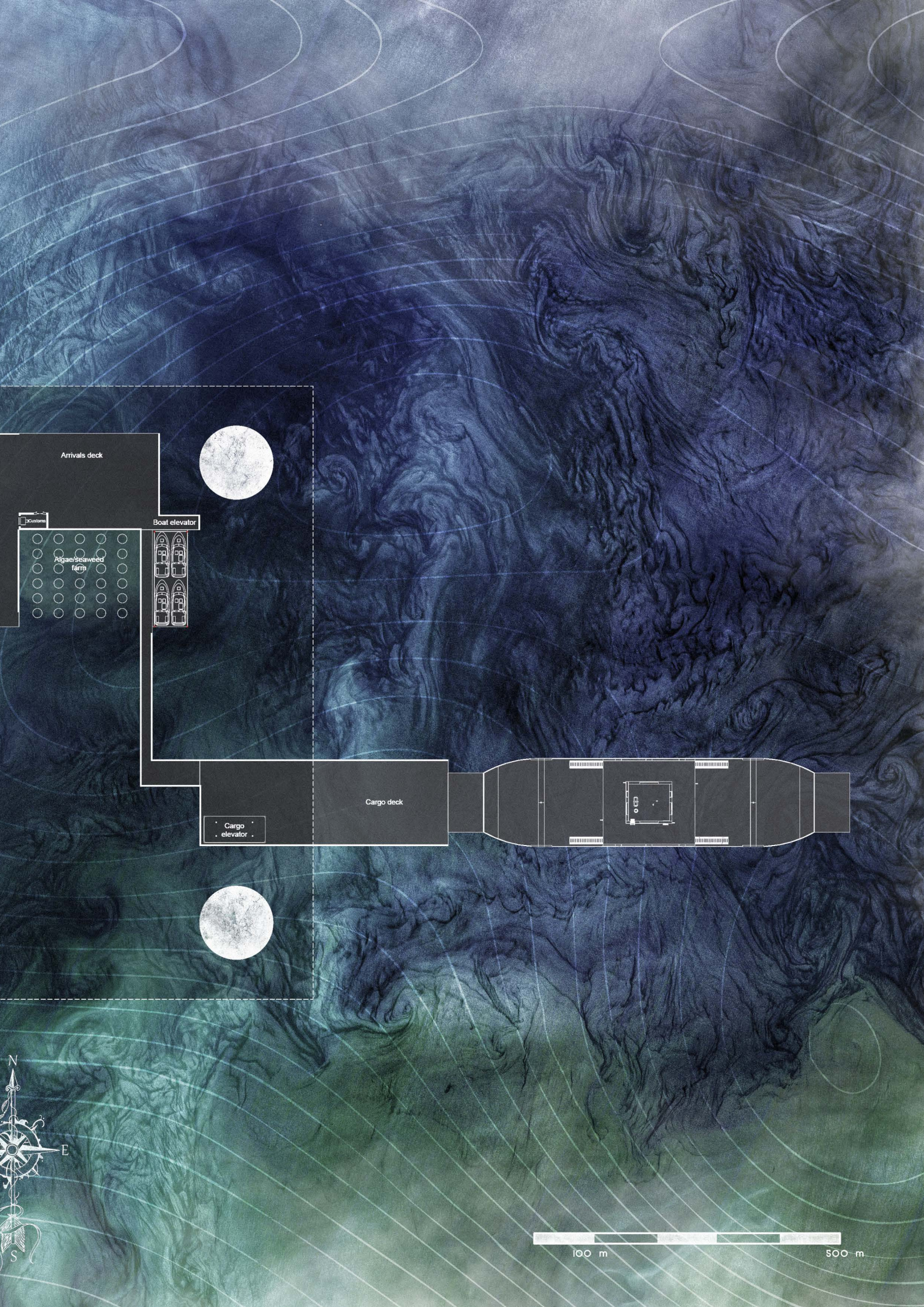




■ Recreation







Arrivals deck



Customs

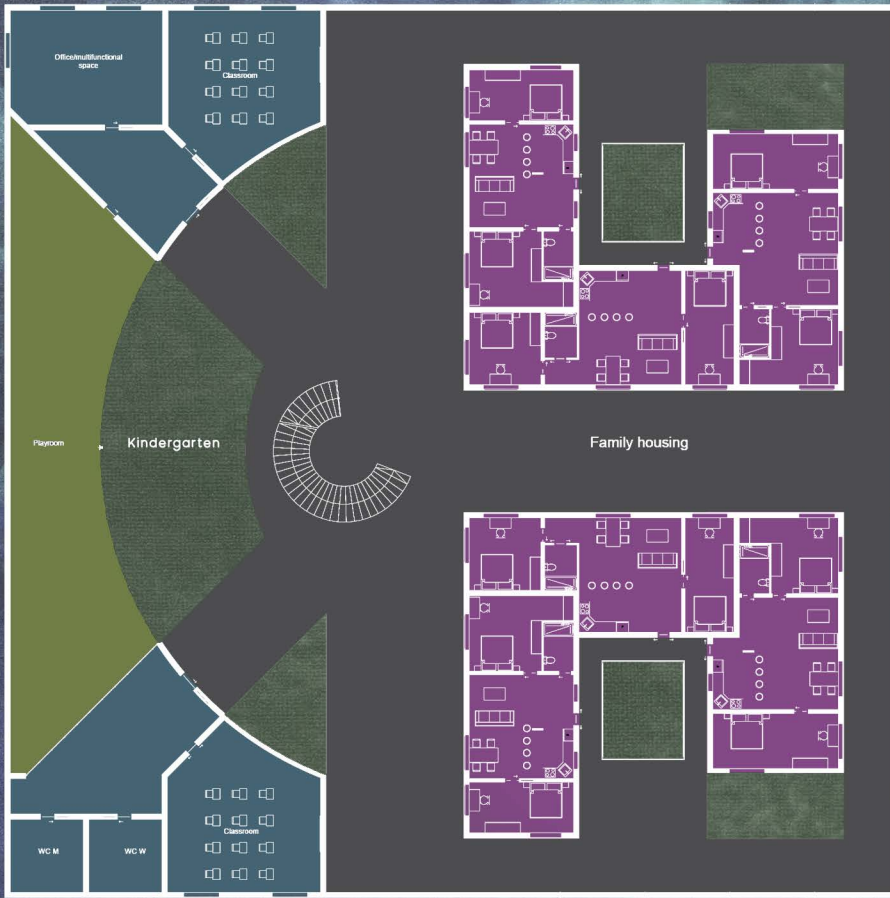
Boat elevator



Cargo deck

Cargo elevator

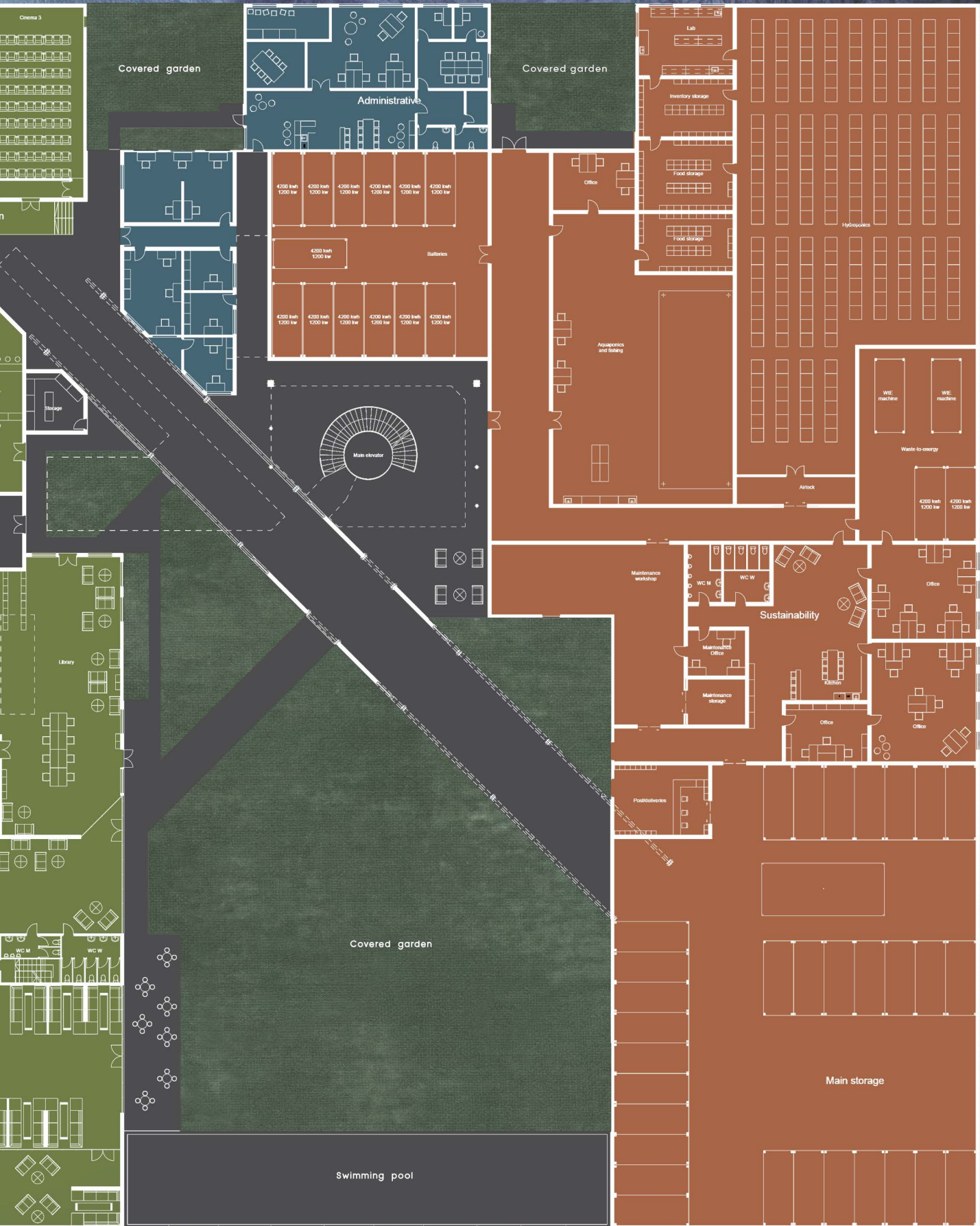




- Sustainability
- Housing
- Administrative
- Recreation

# 1st PLATFORM

+ 25 000. m

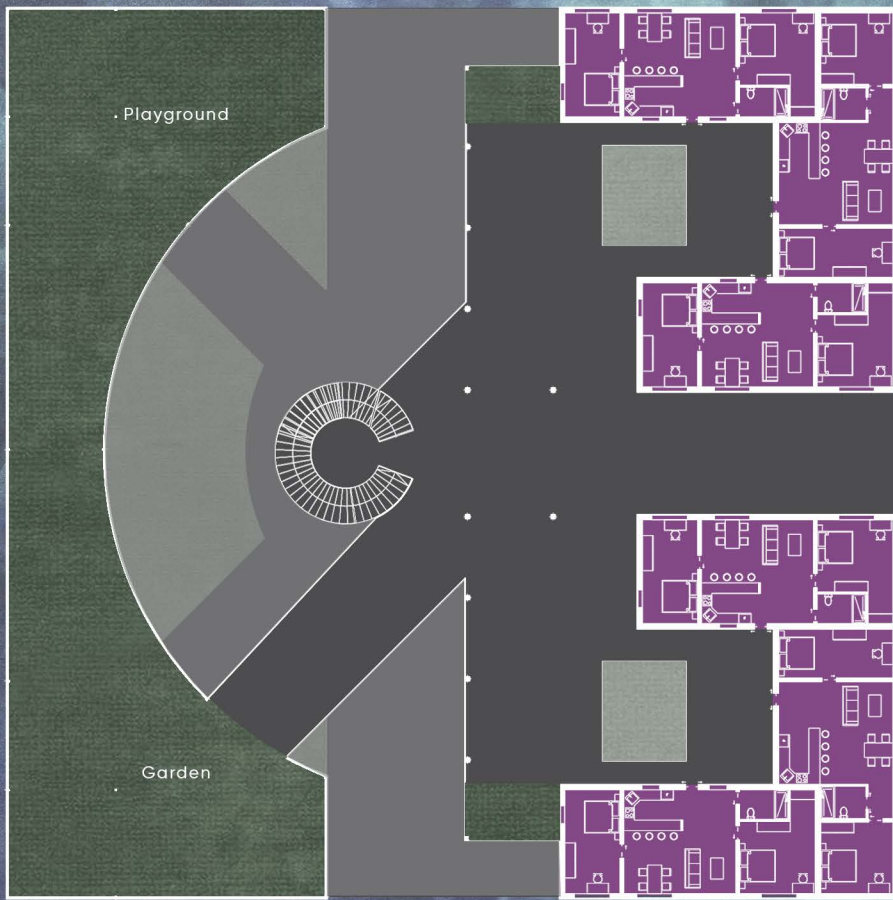


100 m

500 m





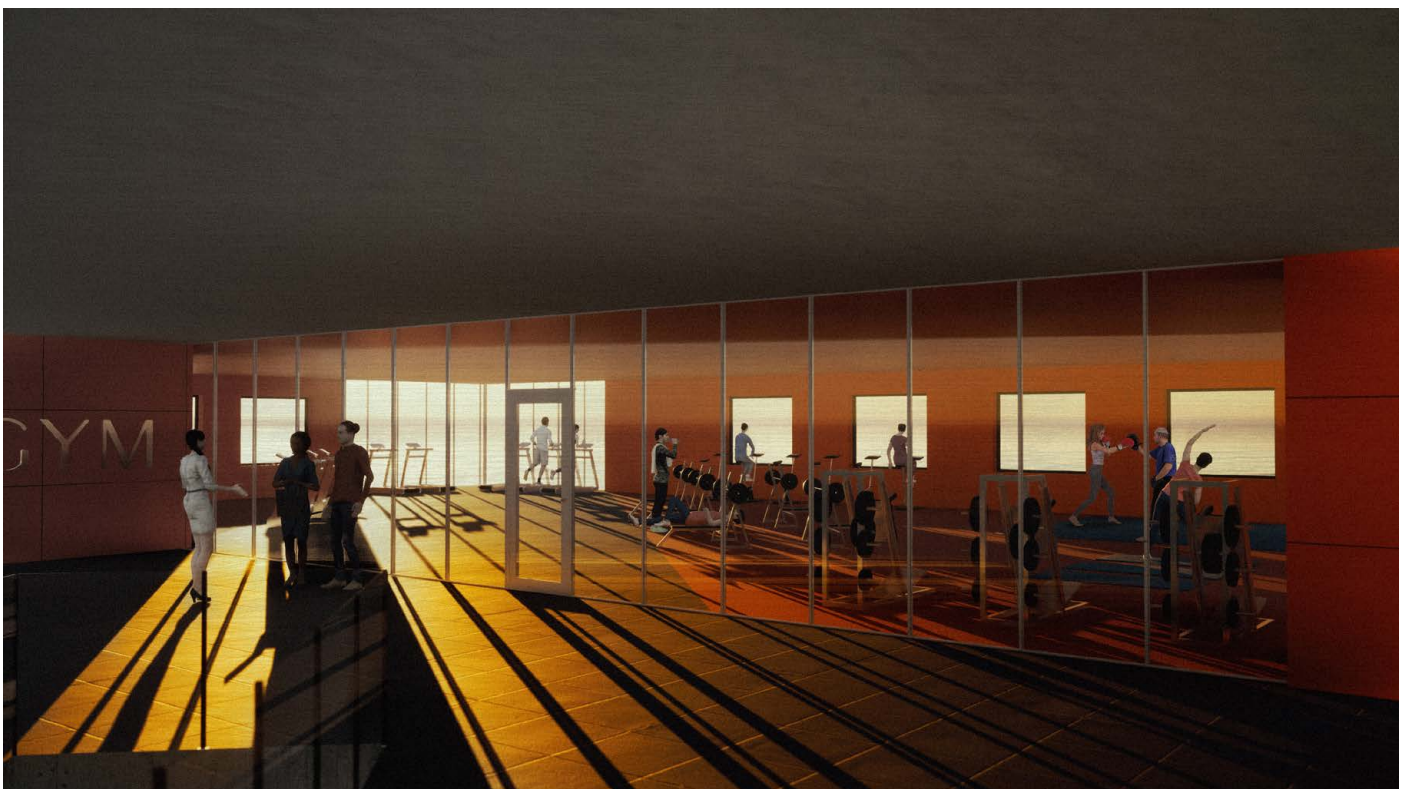
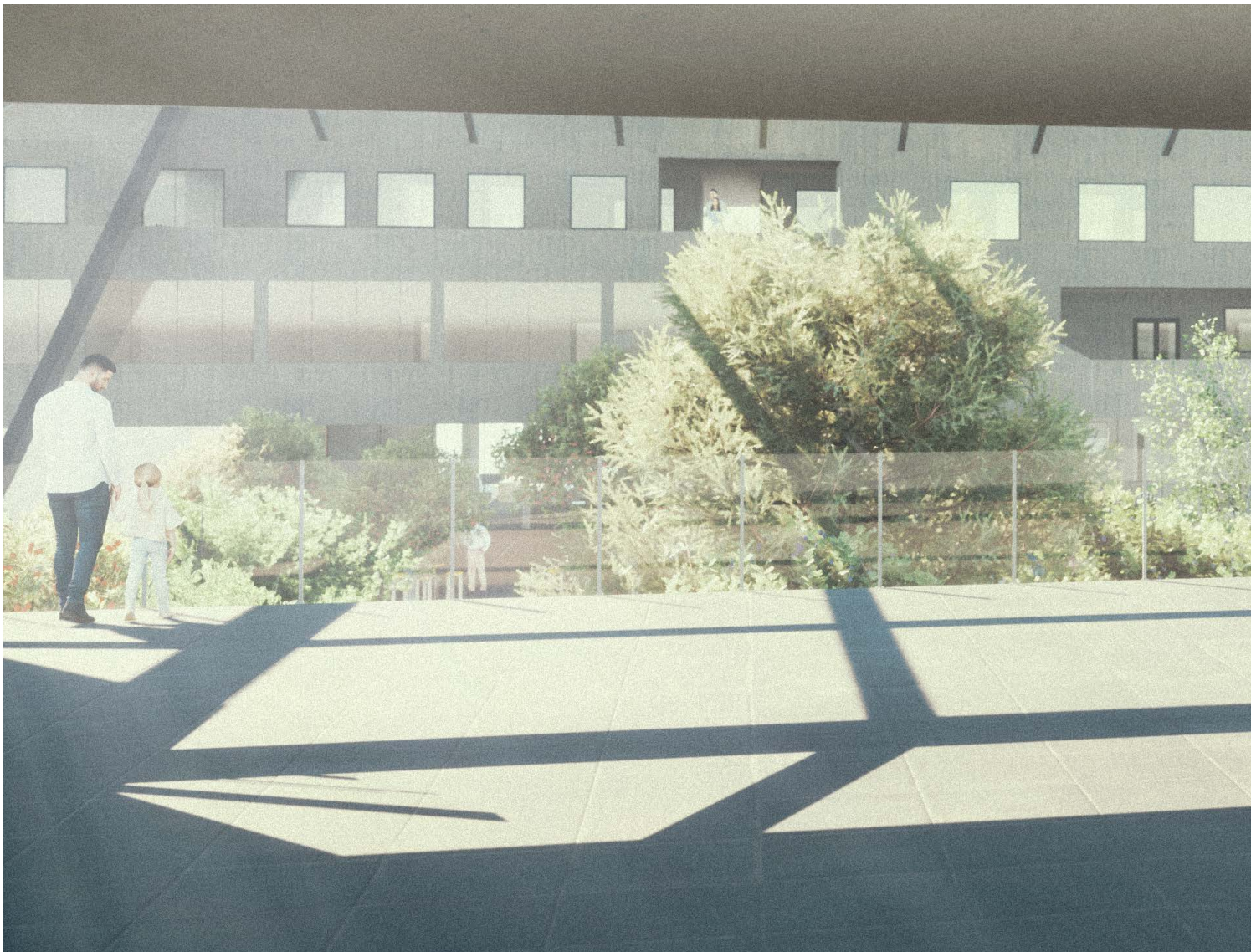


- Research
- Healthcare
- Housing
- Administrative
- Recreation

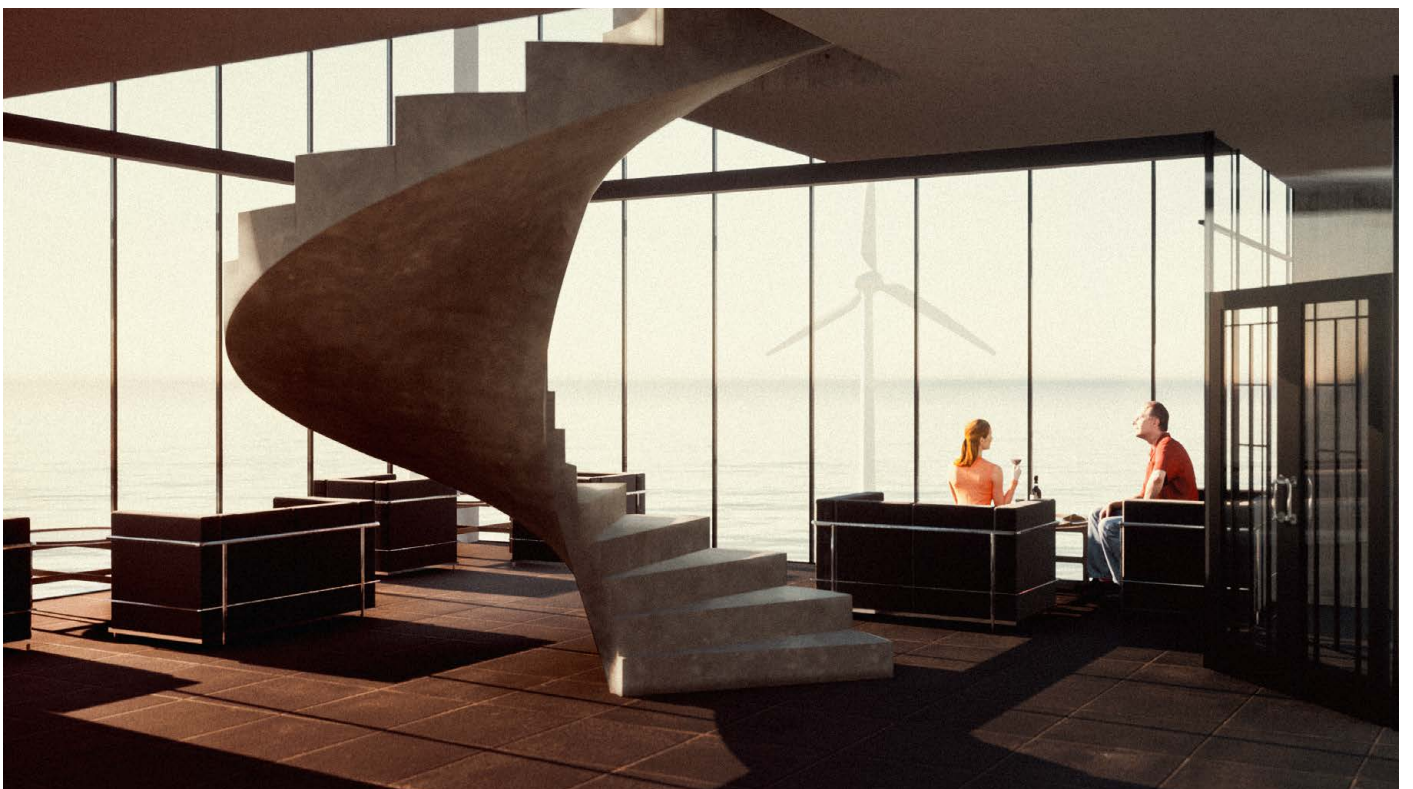
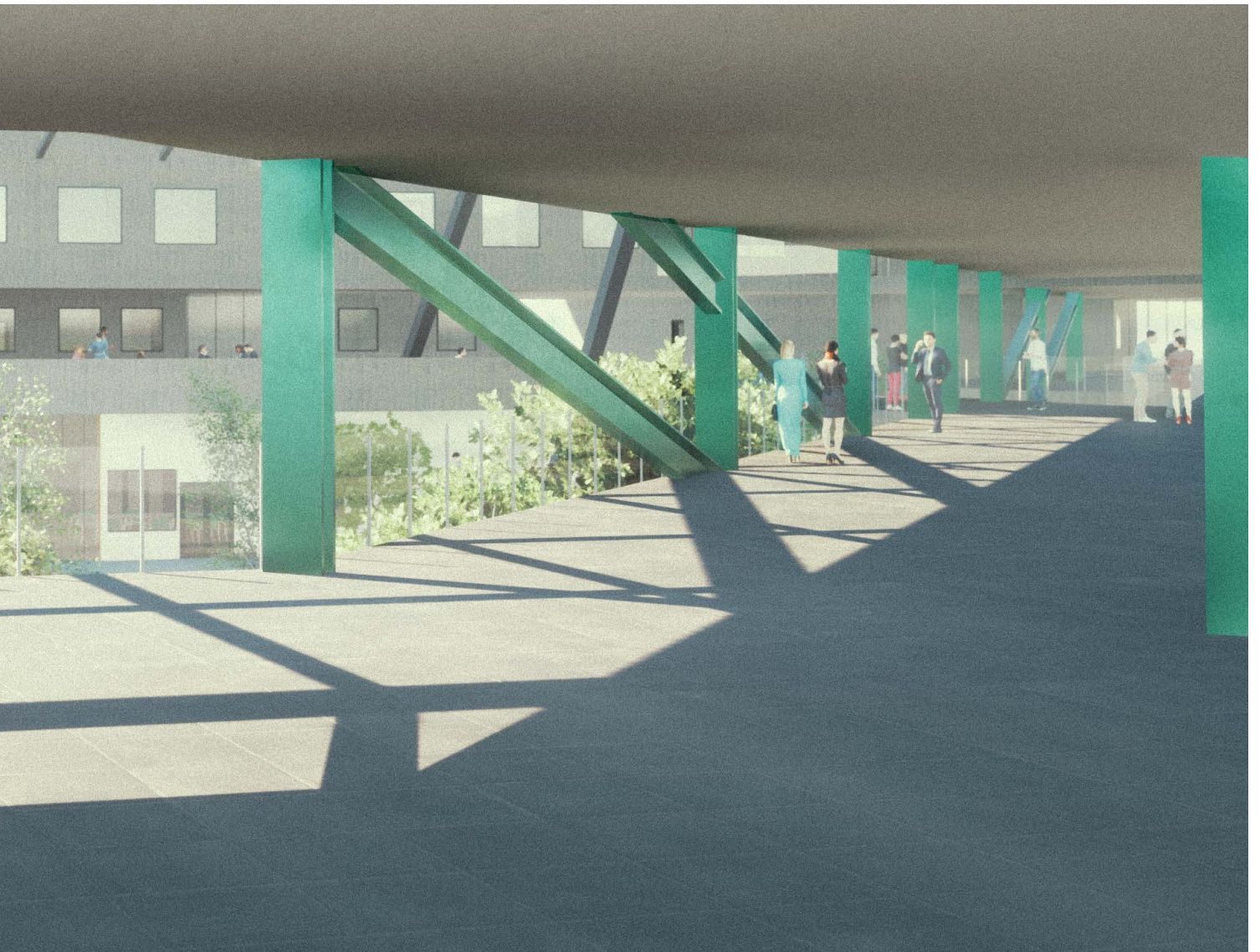
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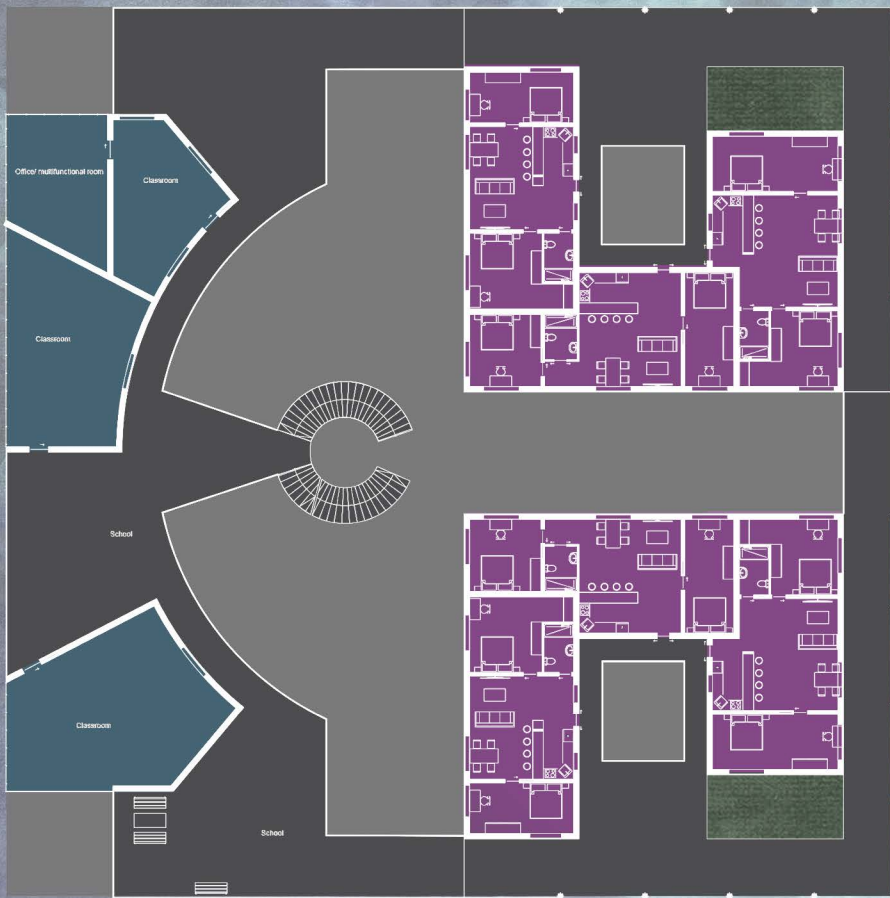
+ 29 500 m











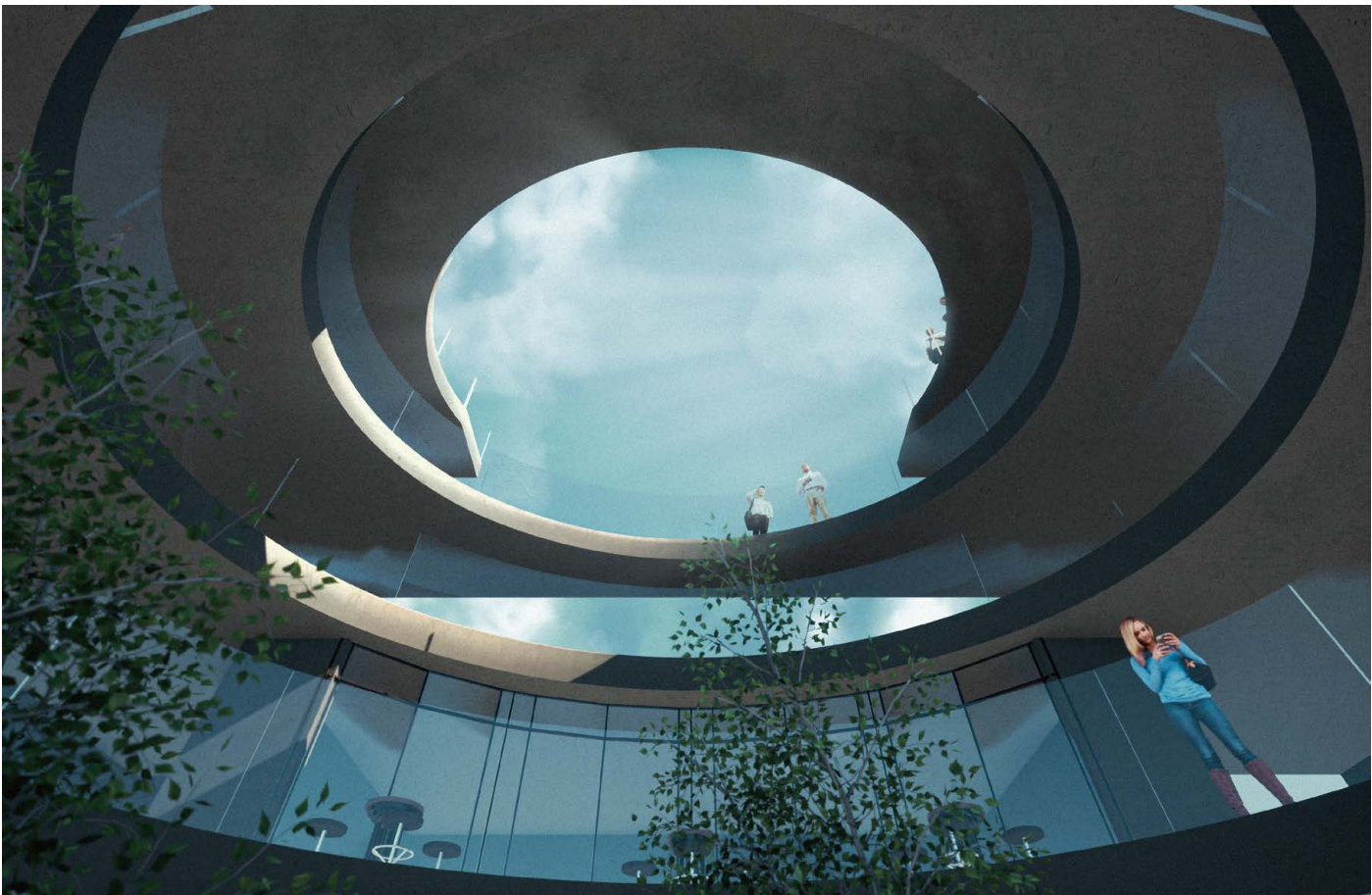
- Research
  
- Housing
  
- Administrative

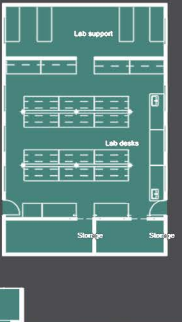
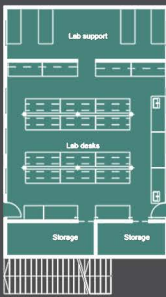
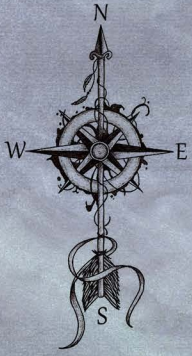
# 3rd PLATFORM


+ 32 500 m











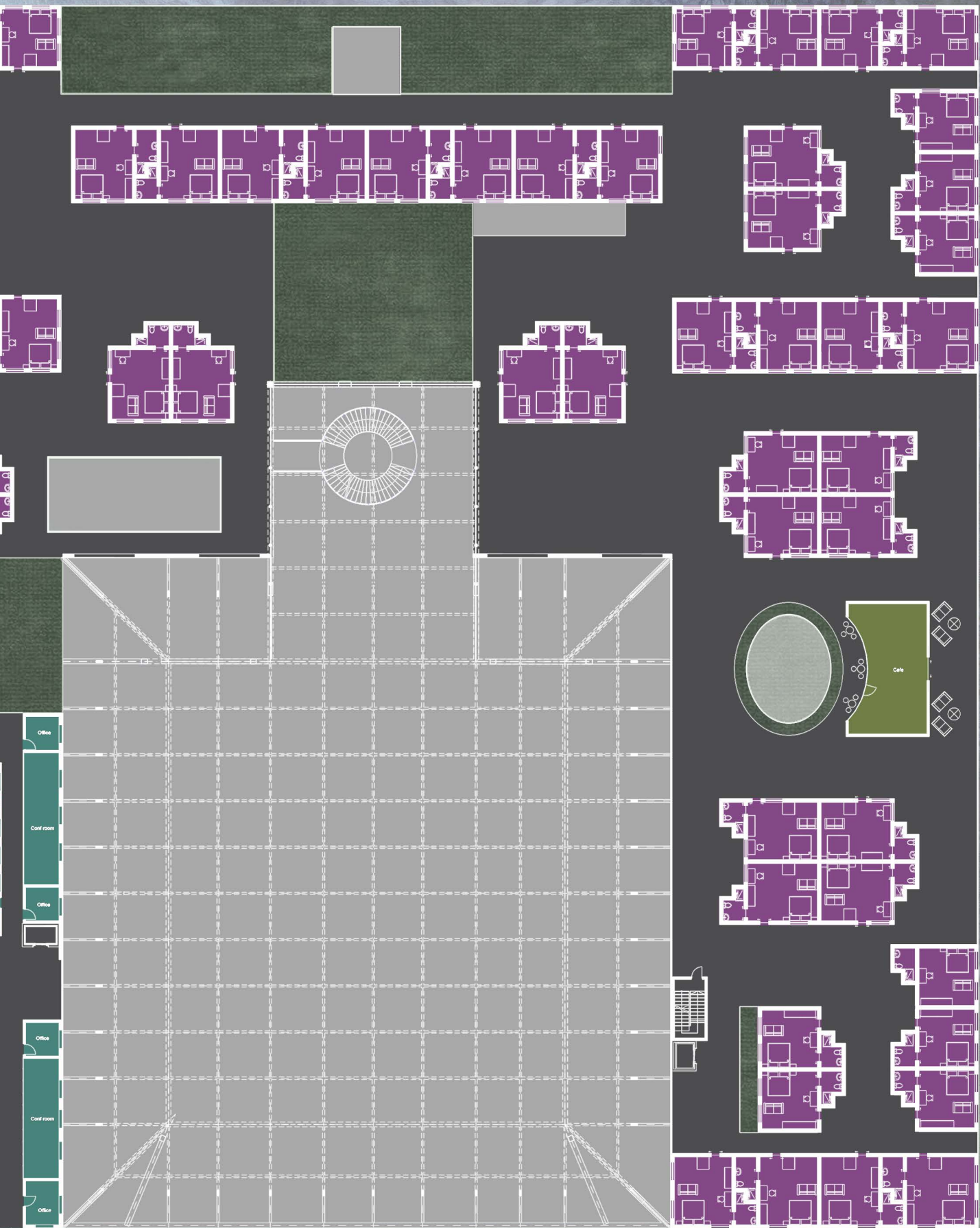
 Housing

 Research

 Recreation

# 4th PLATFORM

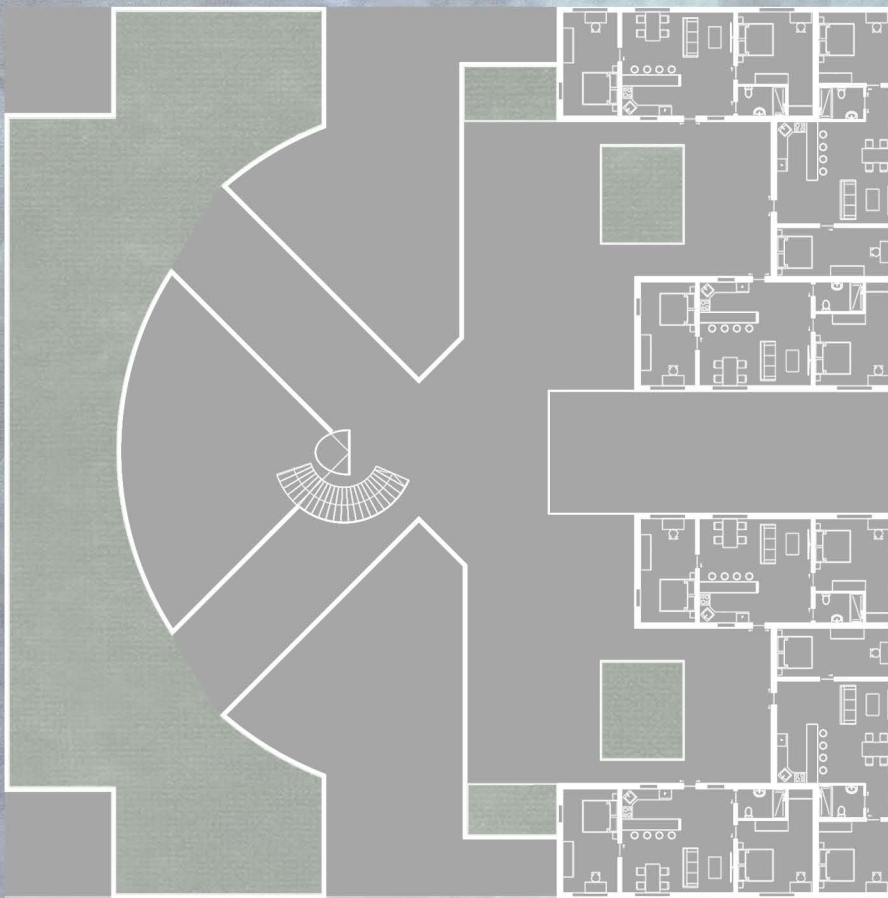
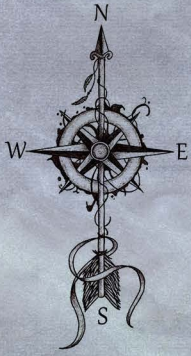
+ 35 500 m









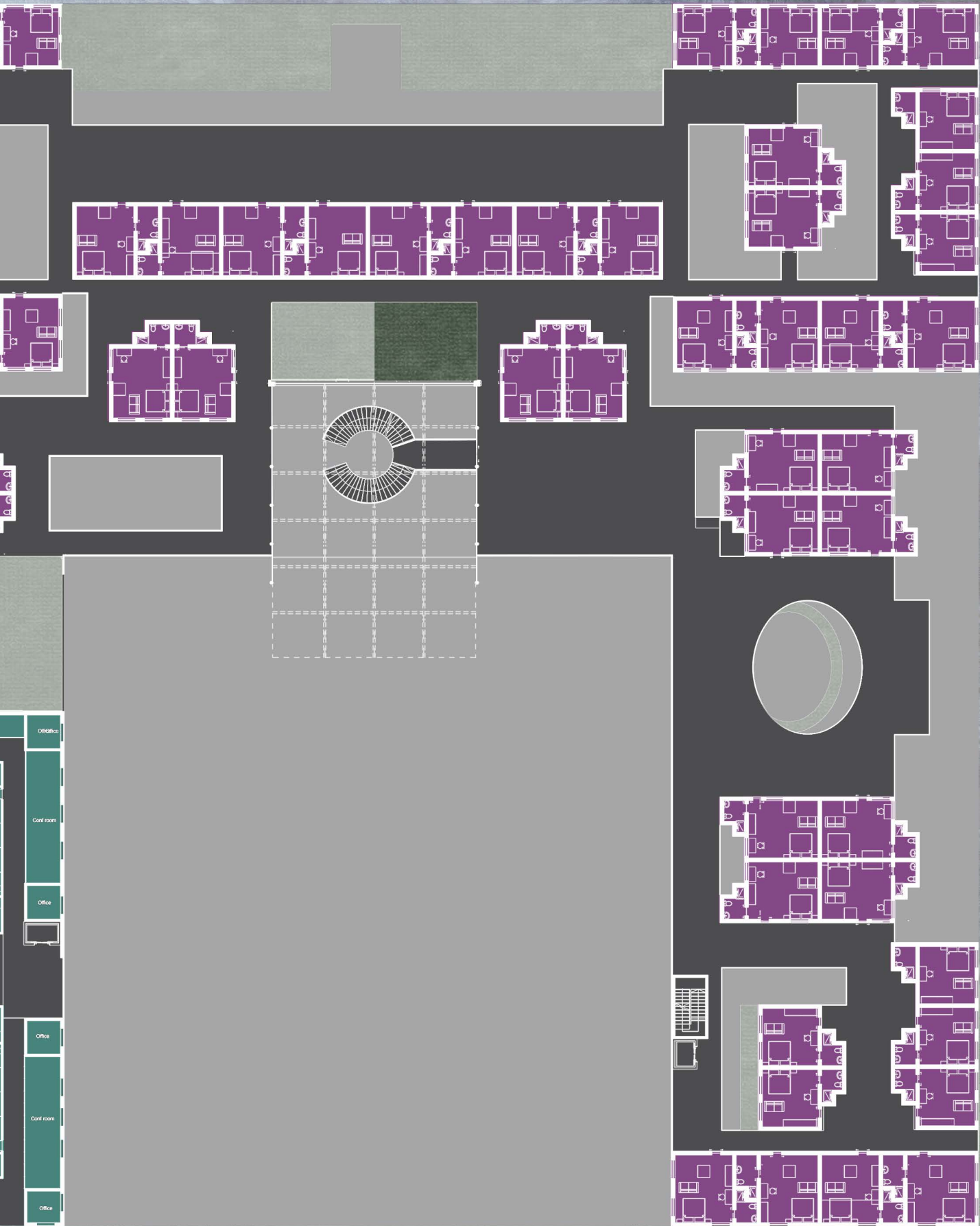


Research

Housing

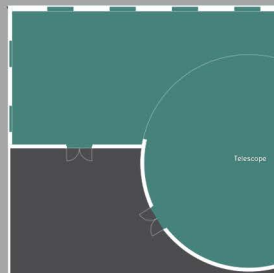
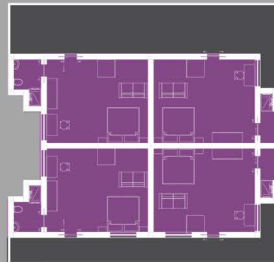
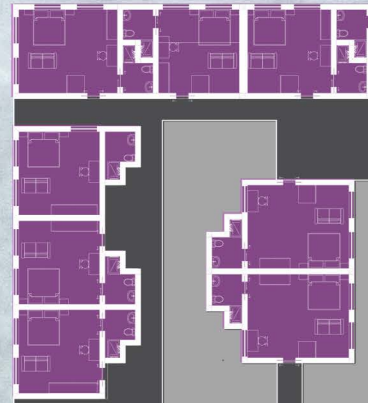
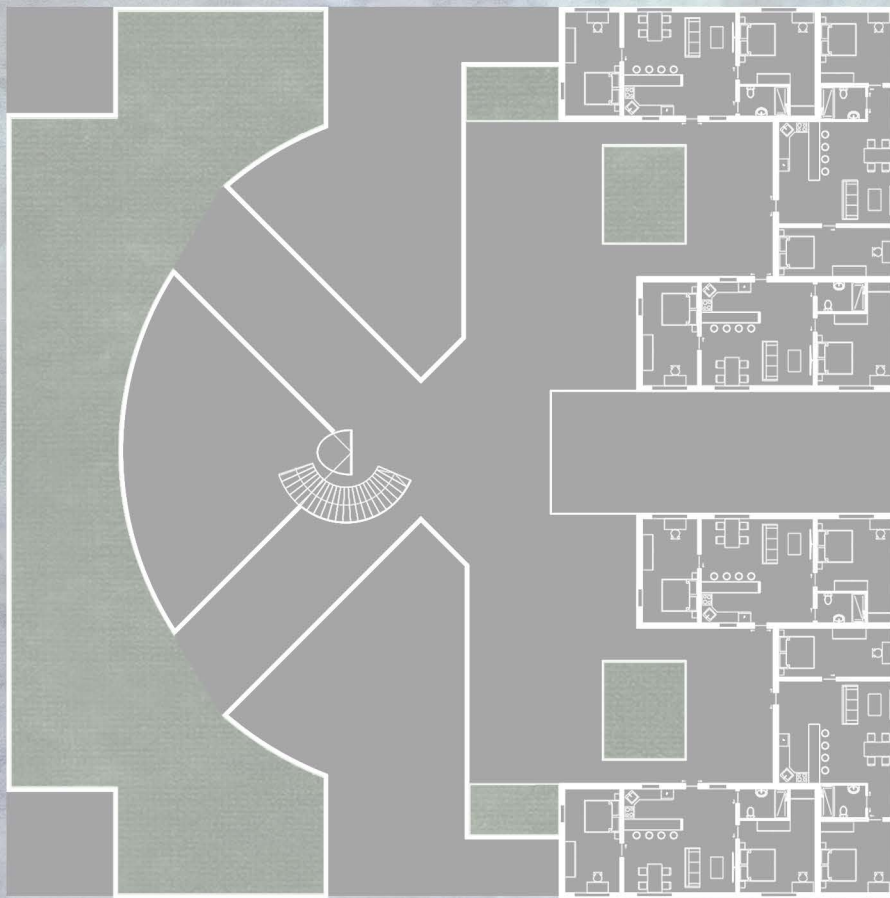
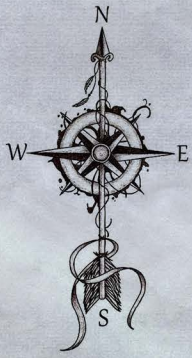
# 5th PLATFORM

+ 38 500 m







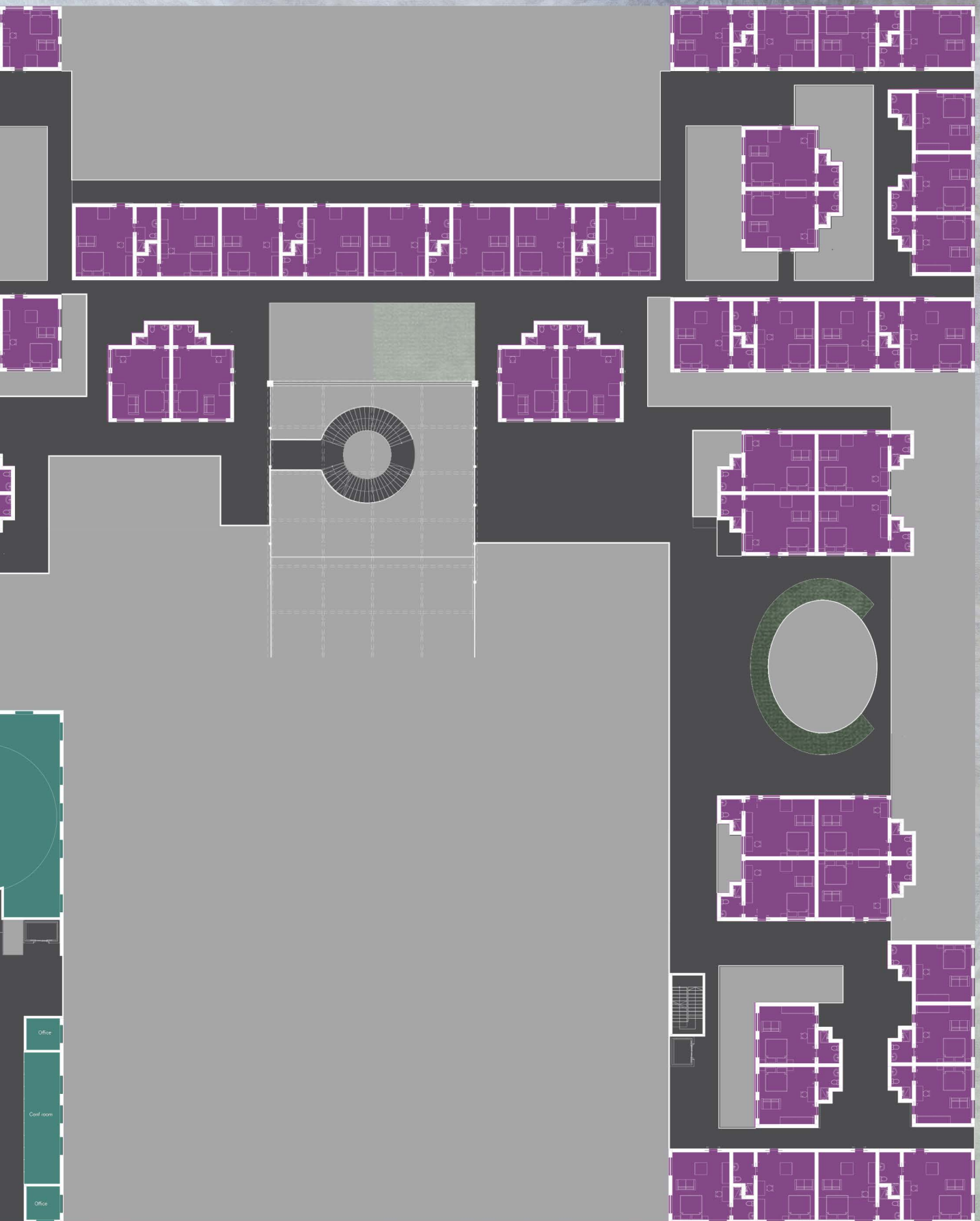


Research

Housing

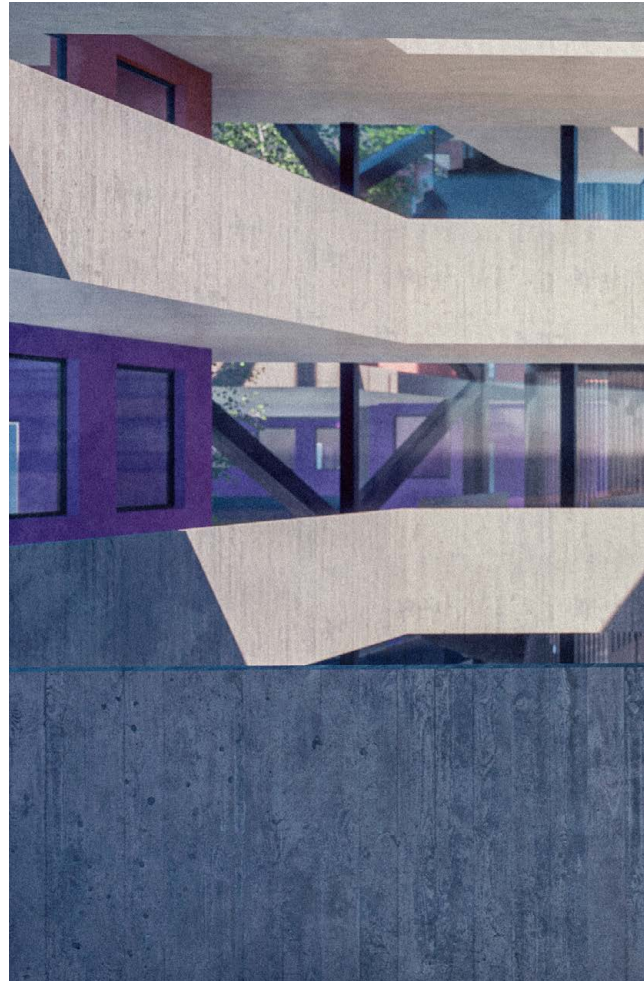
# 6th PLATFORM

+ 41 500 m

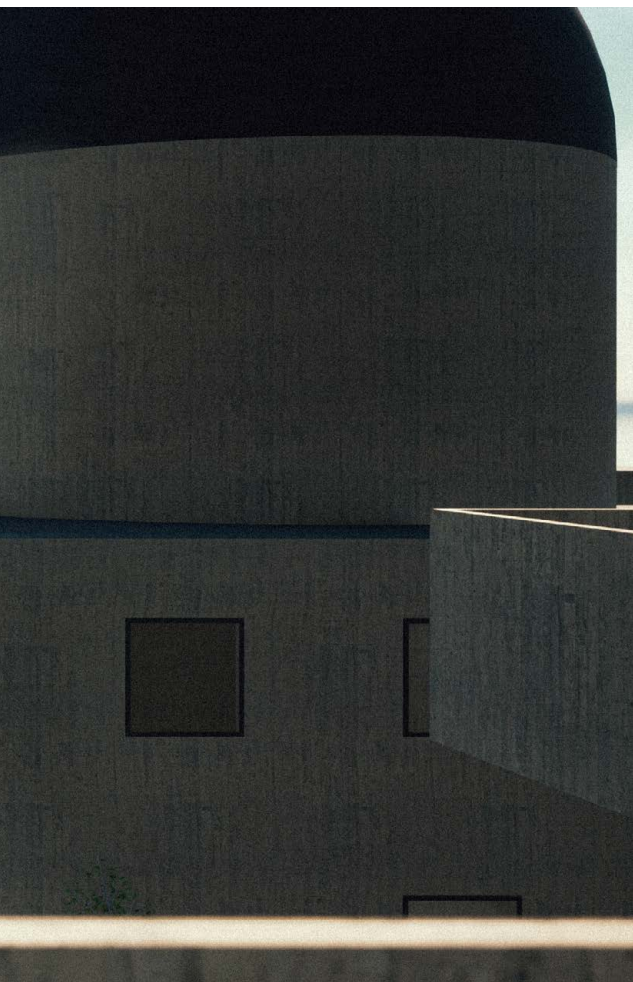


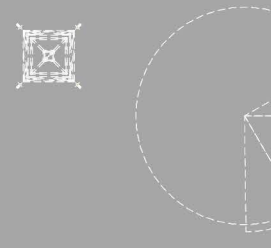
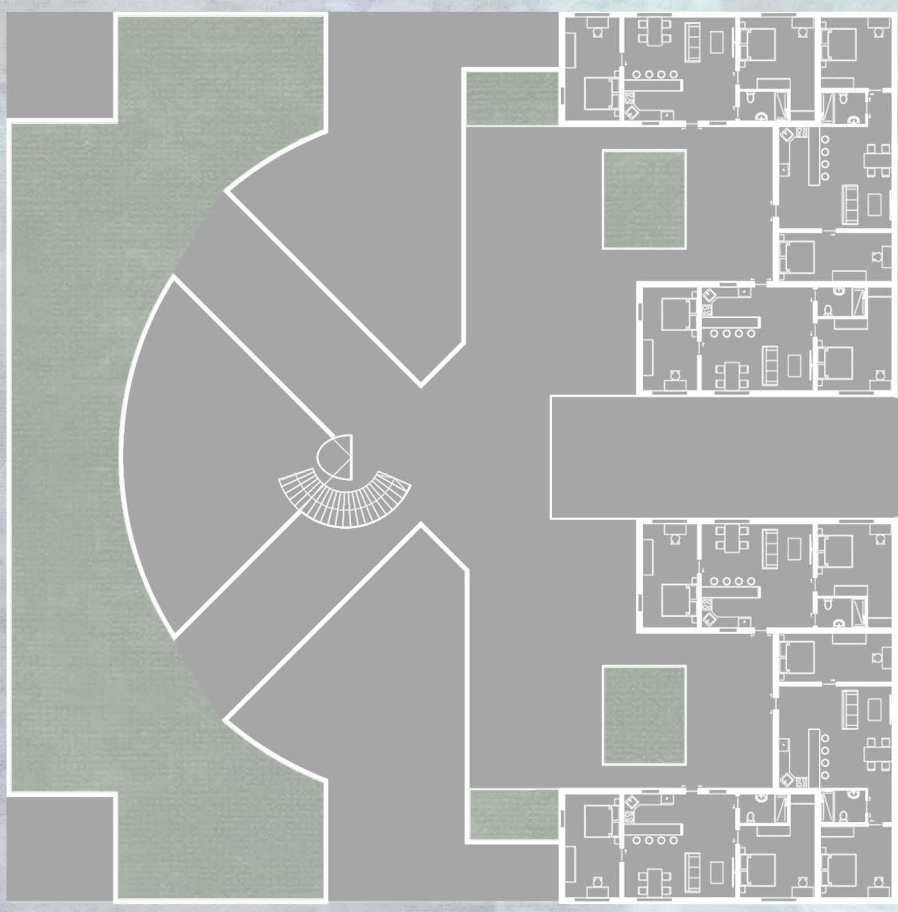
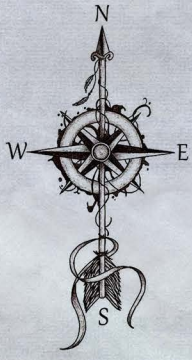
100 m


500 m








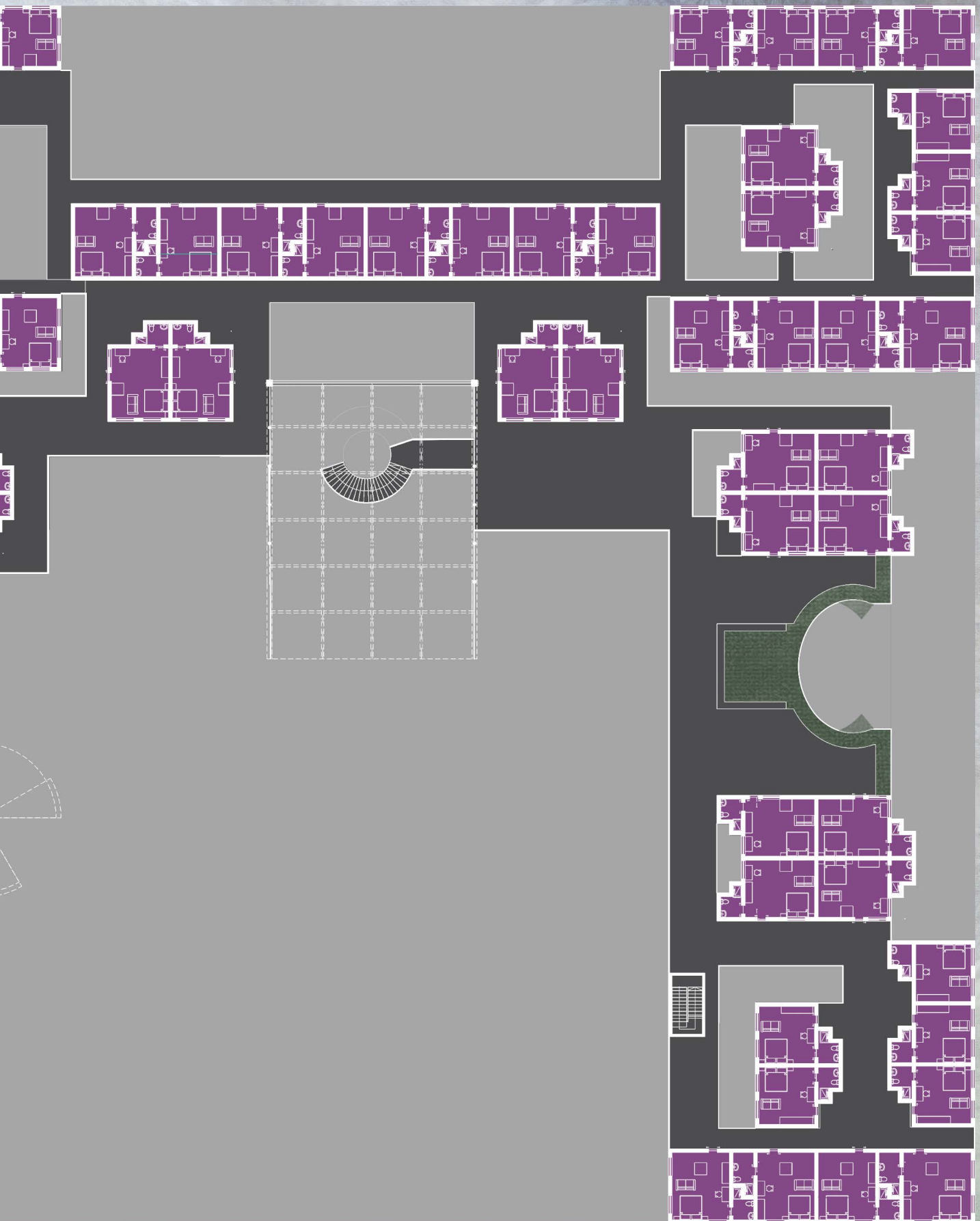


 Research

 Housing

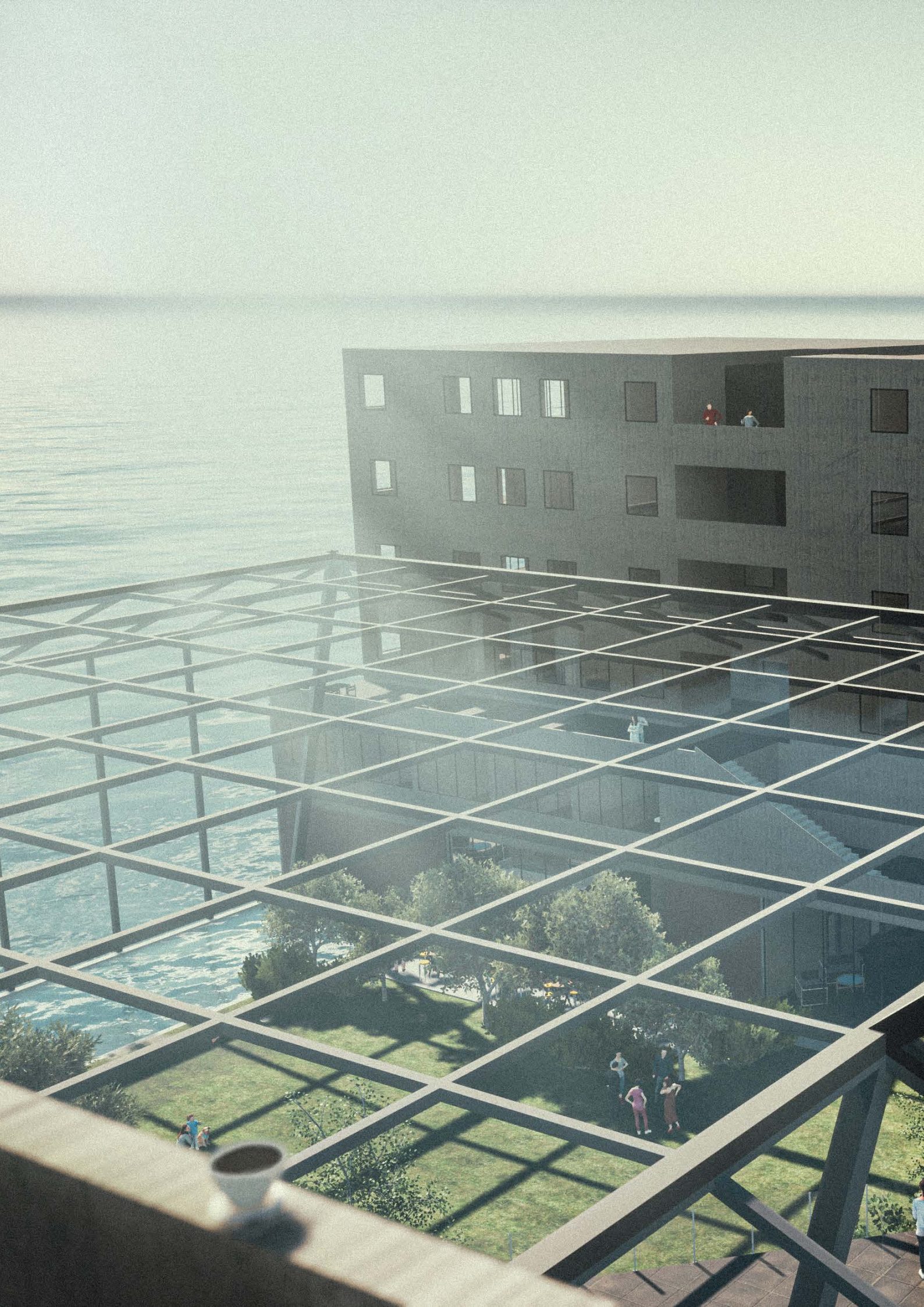
# 7th PLATFORM

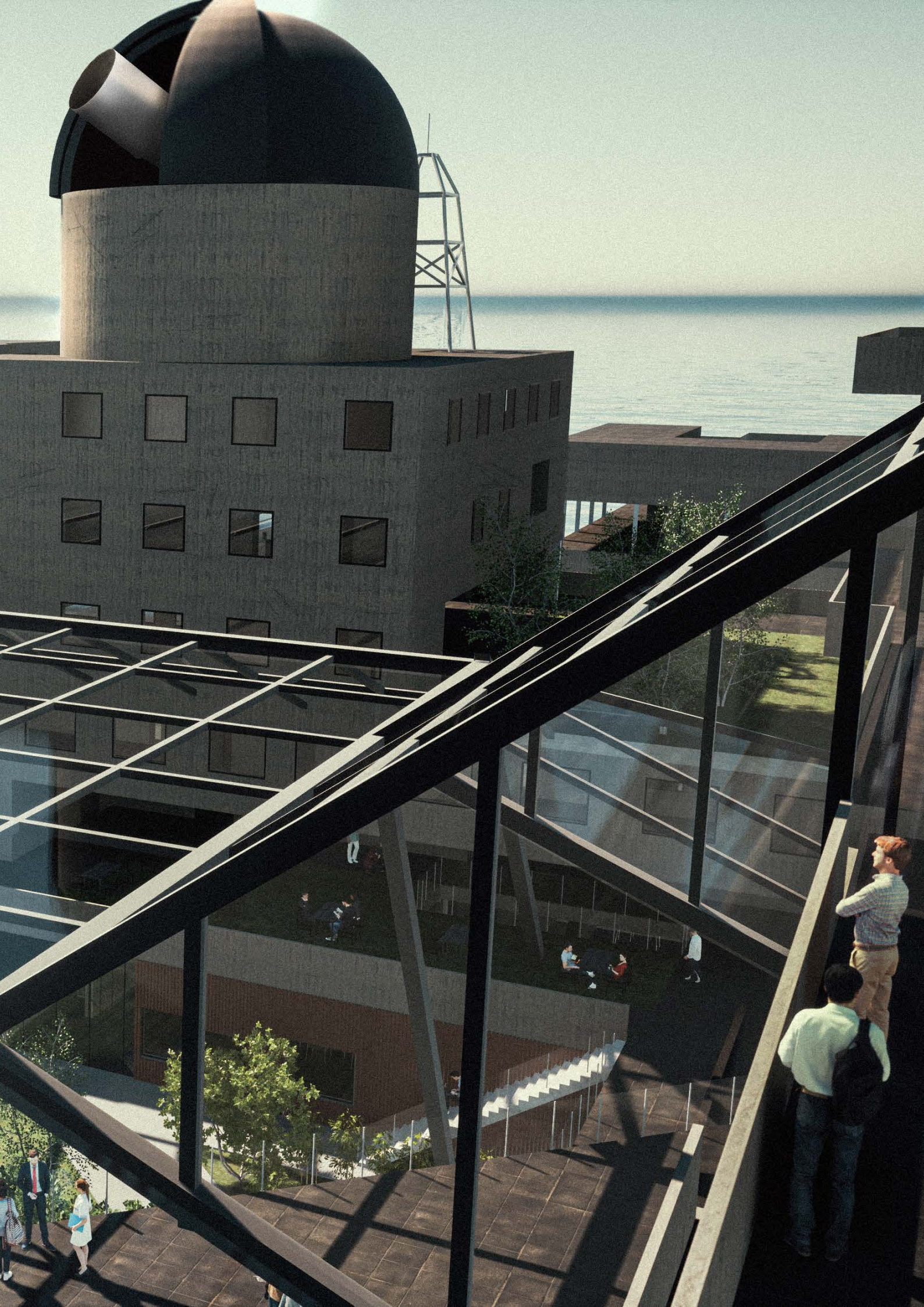
+ 44 500 m



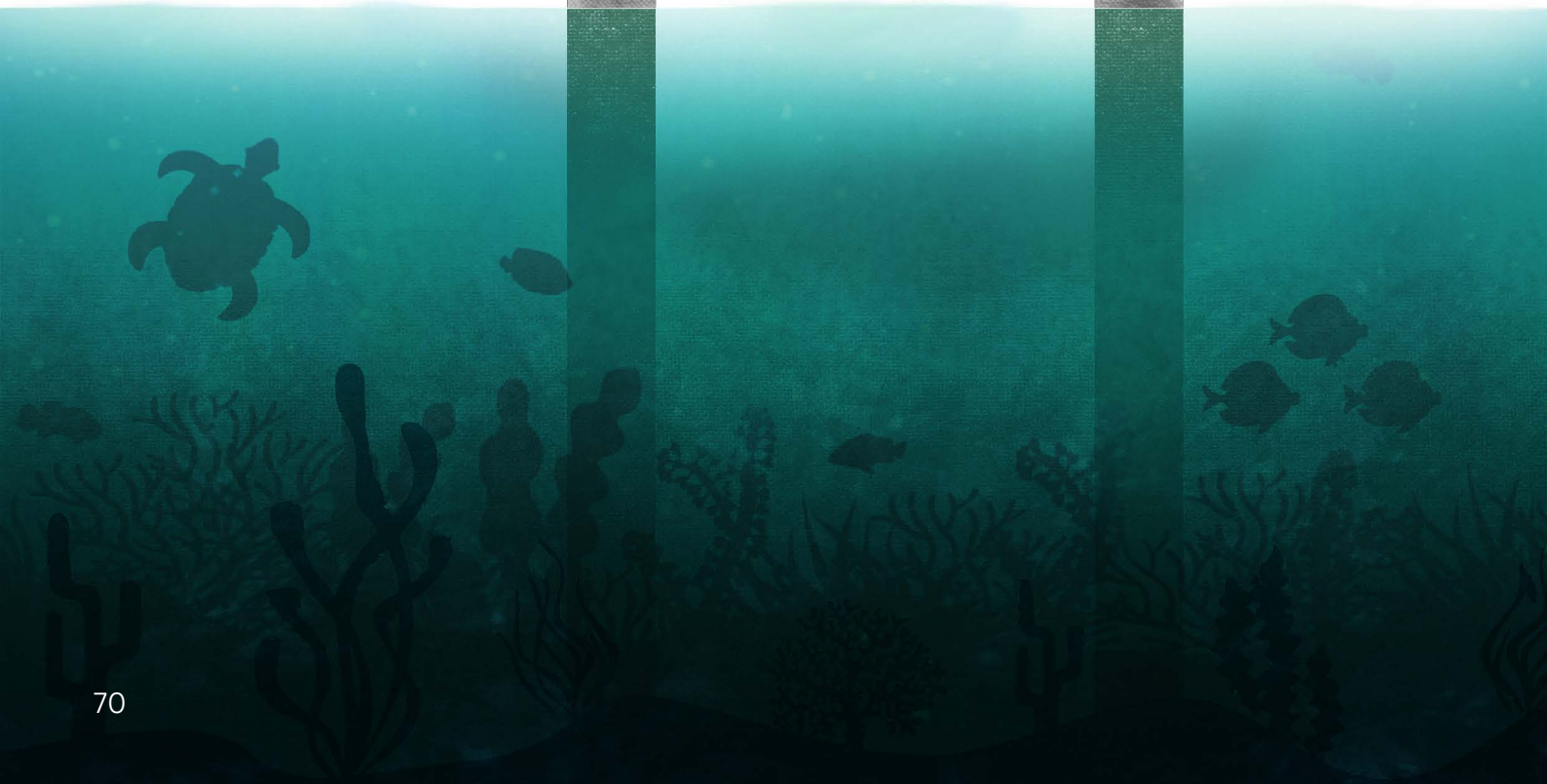
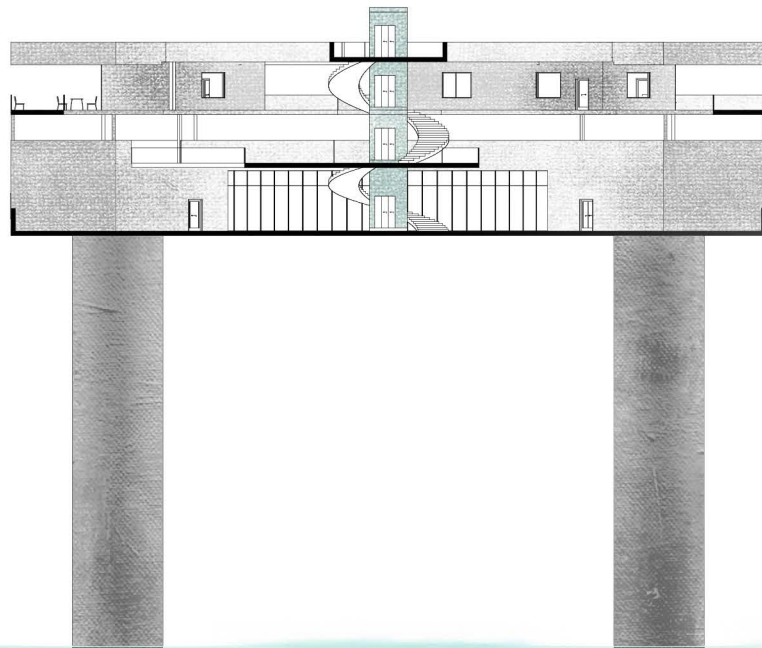
100 m

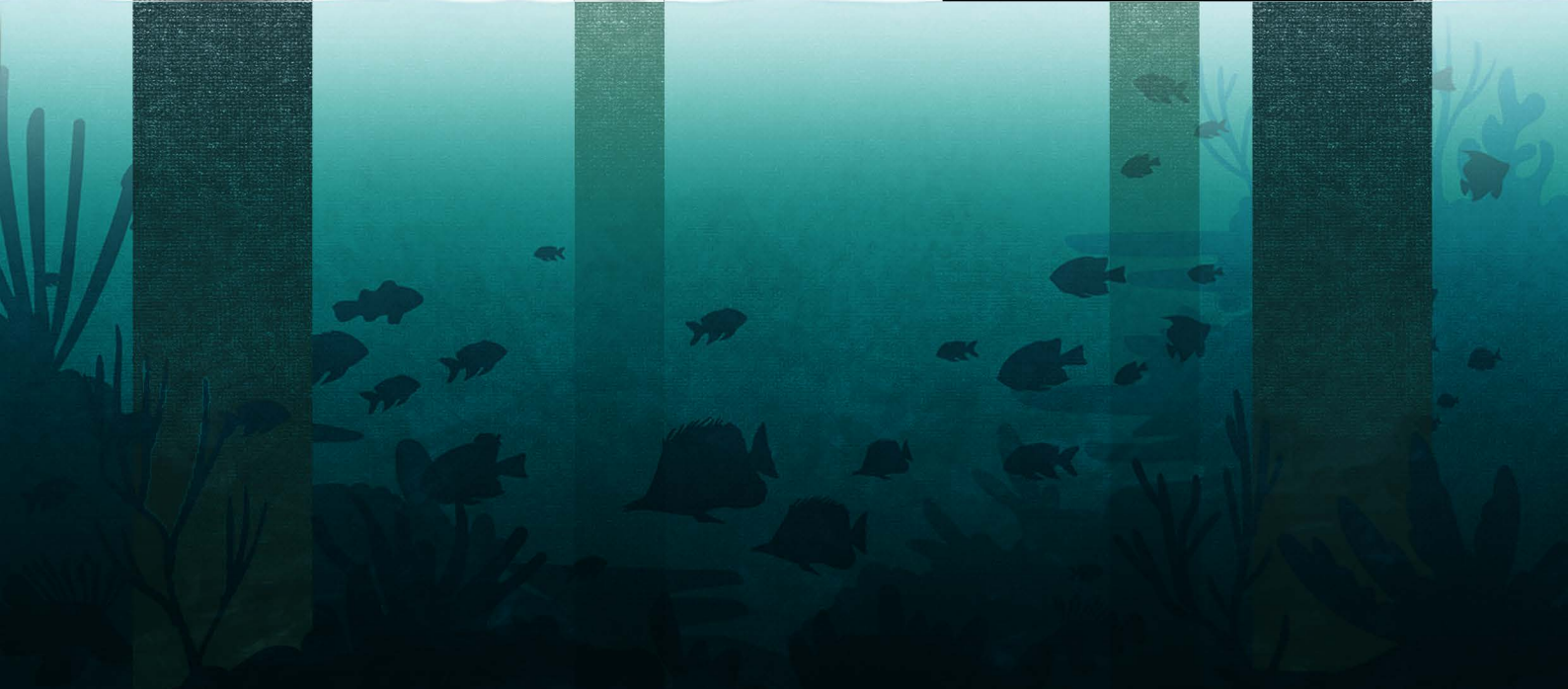
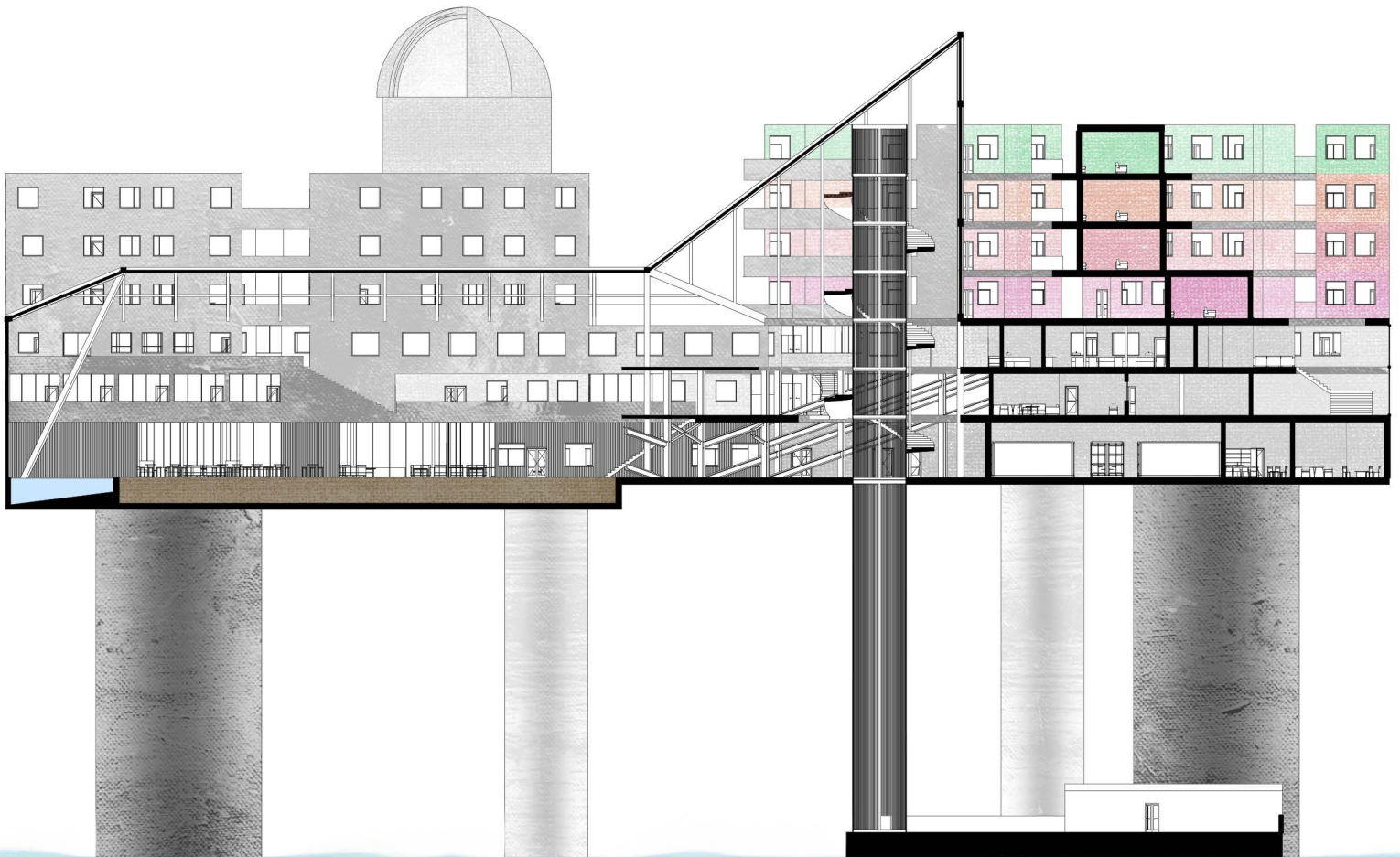
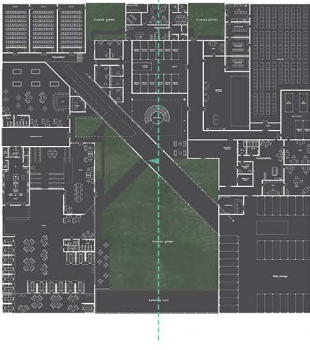
500 m





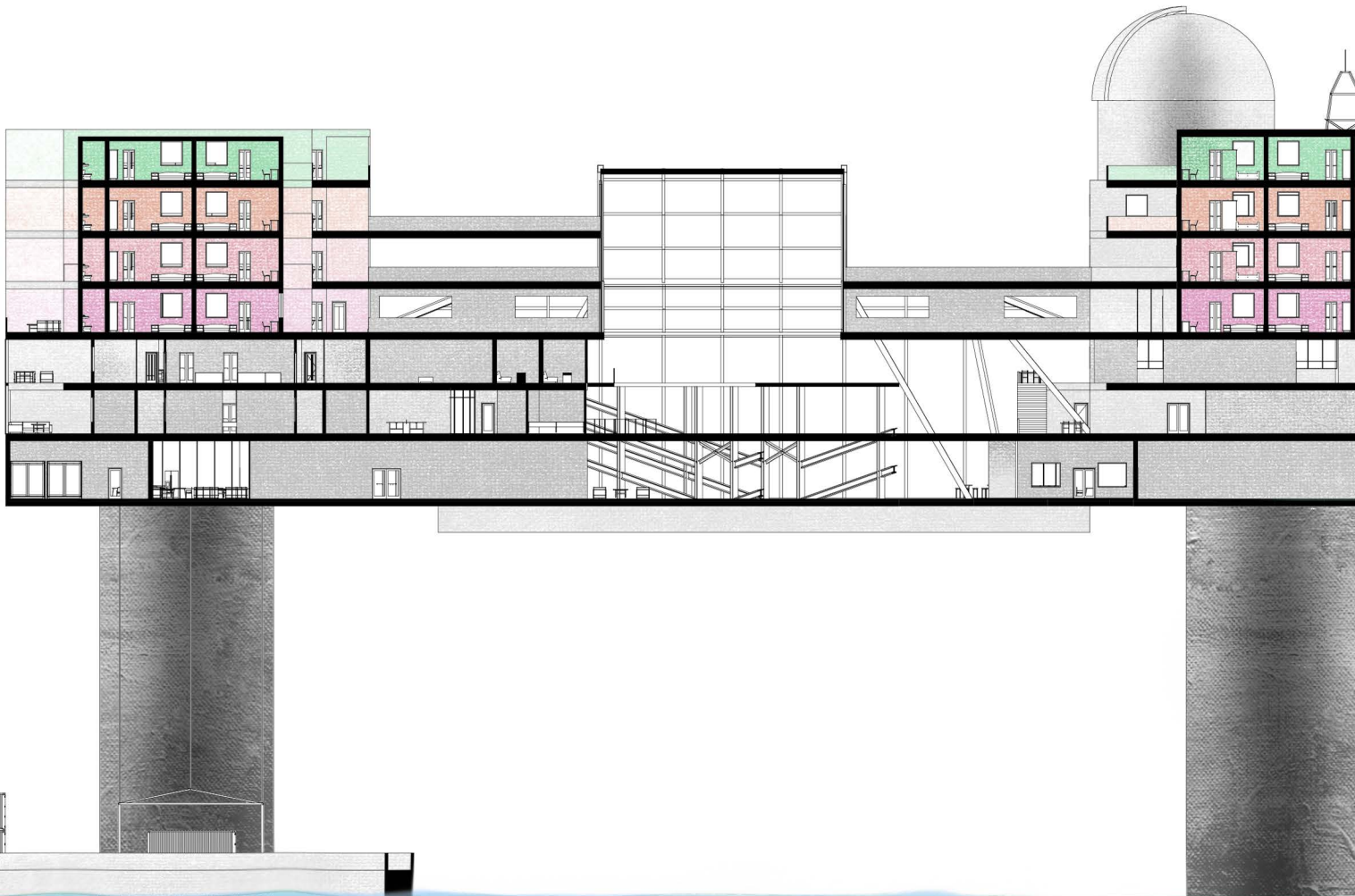
# SECTION 1:500



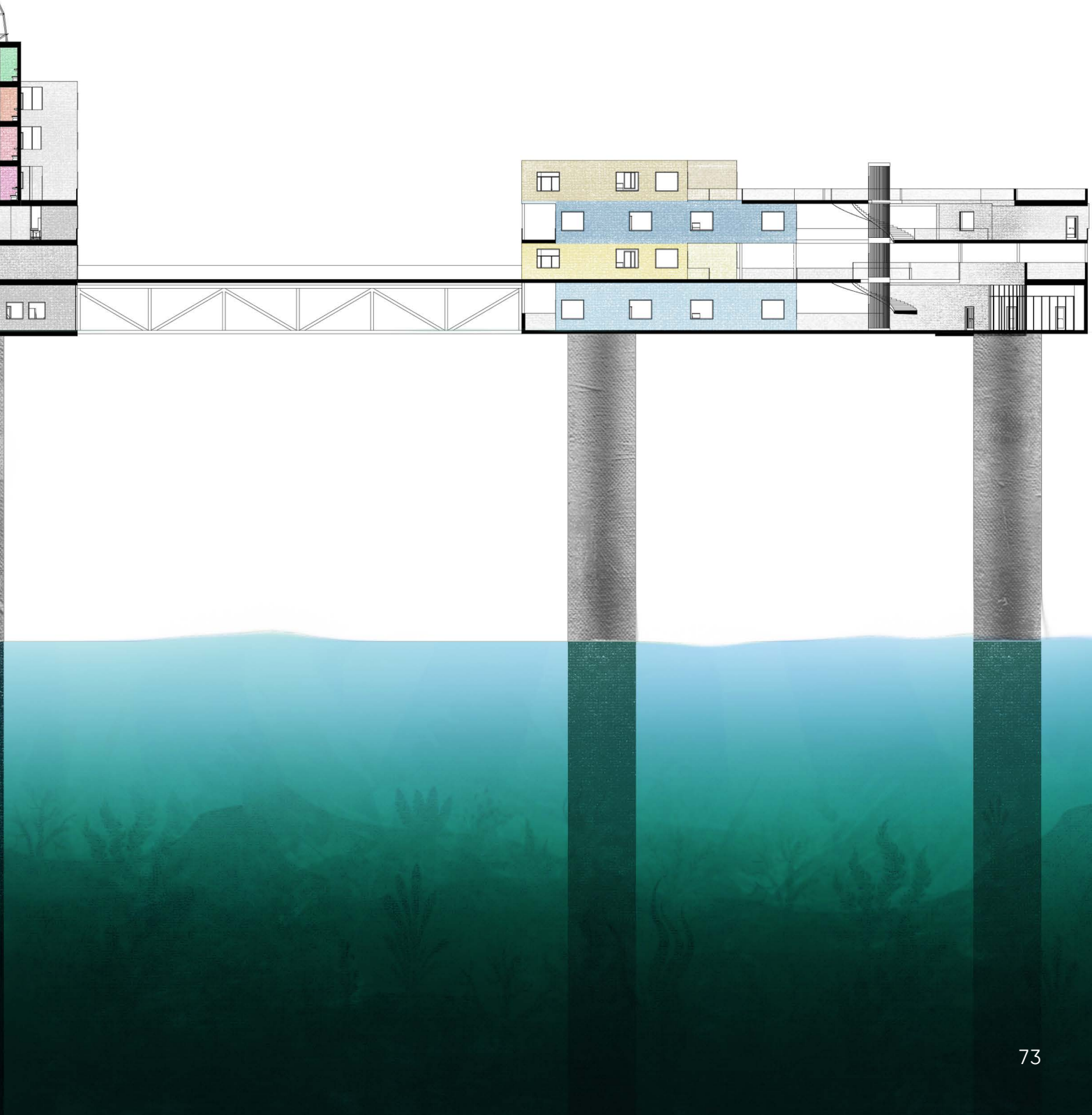
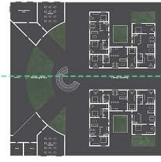


# SECTION

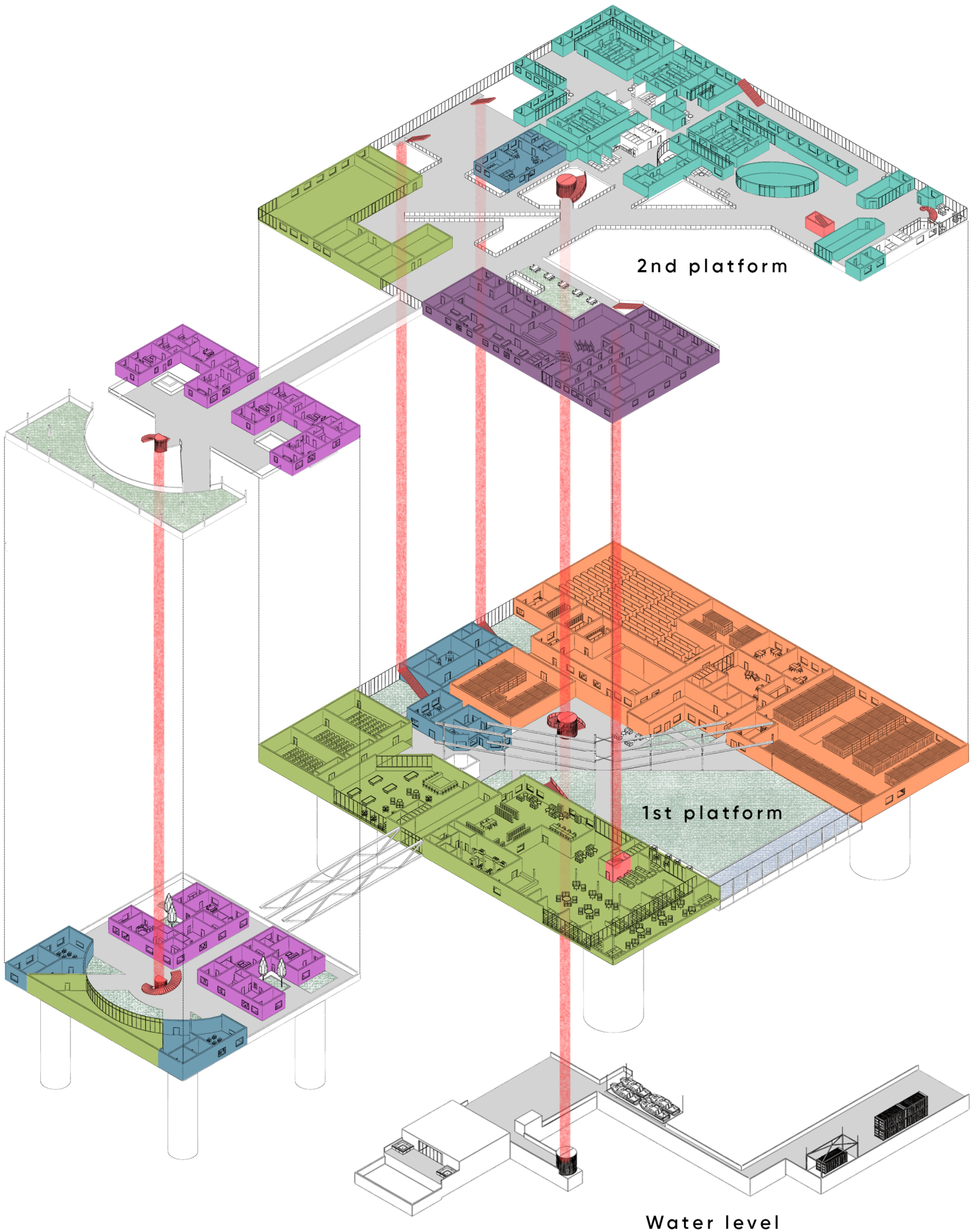
1:500



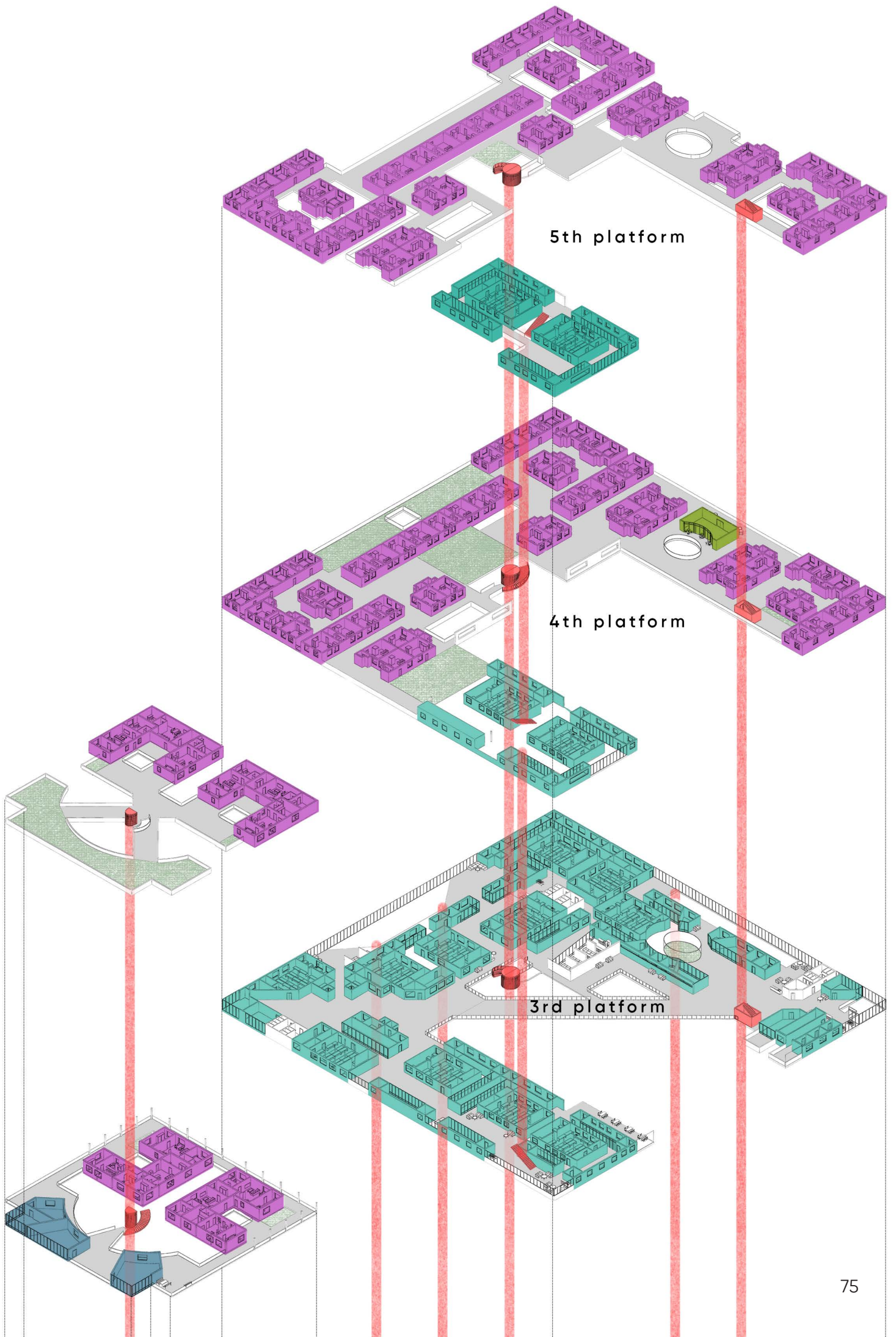


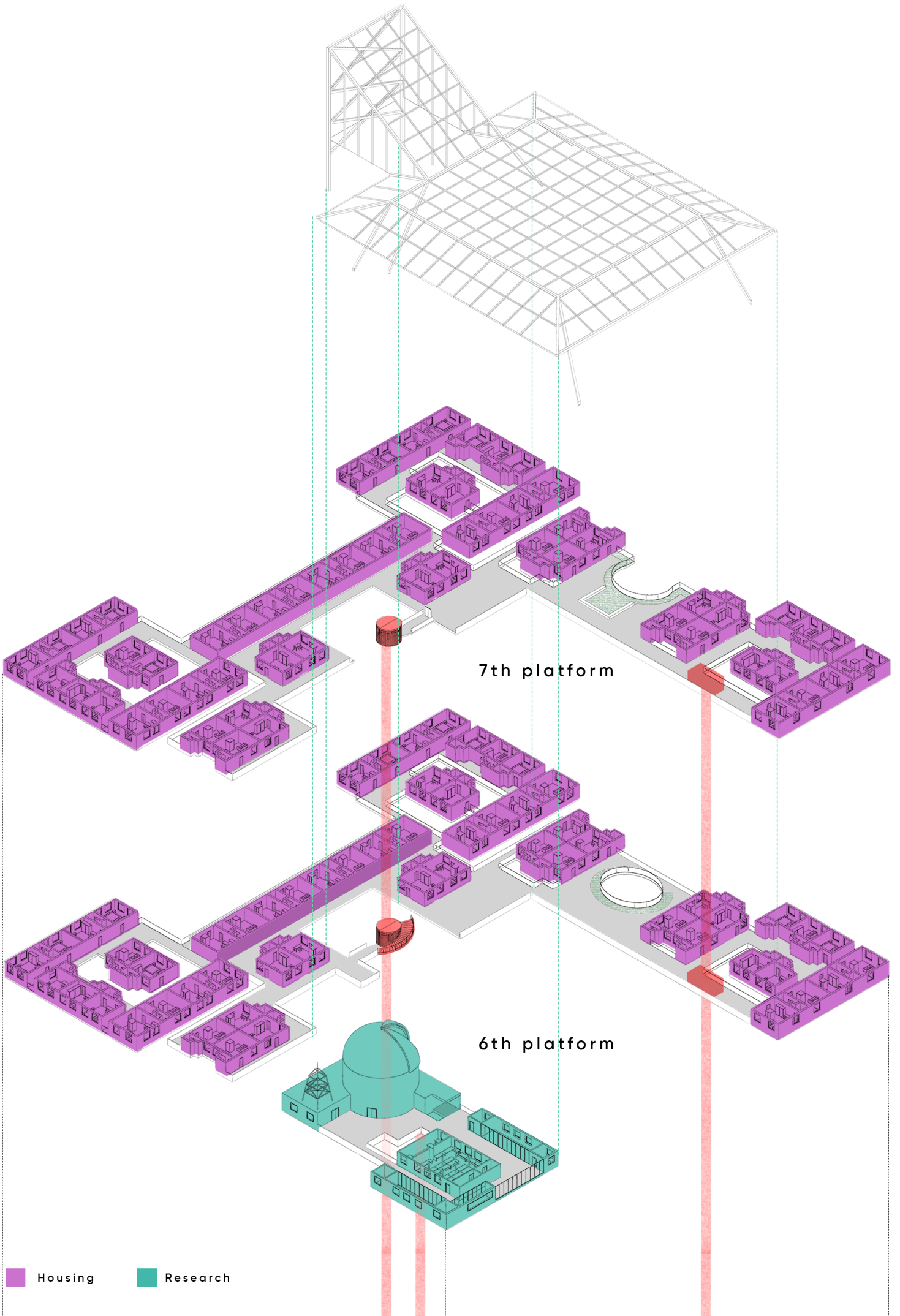


# Exploded view



Recreation    Administrative    Housing    Healthcare    Sustainability    Research





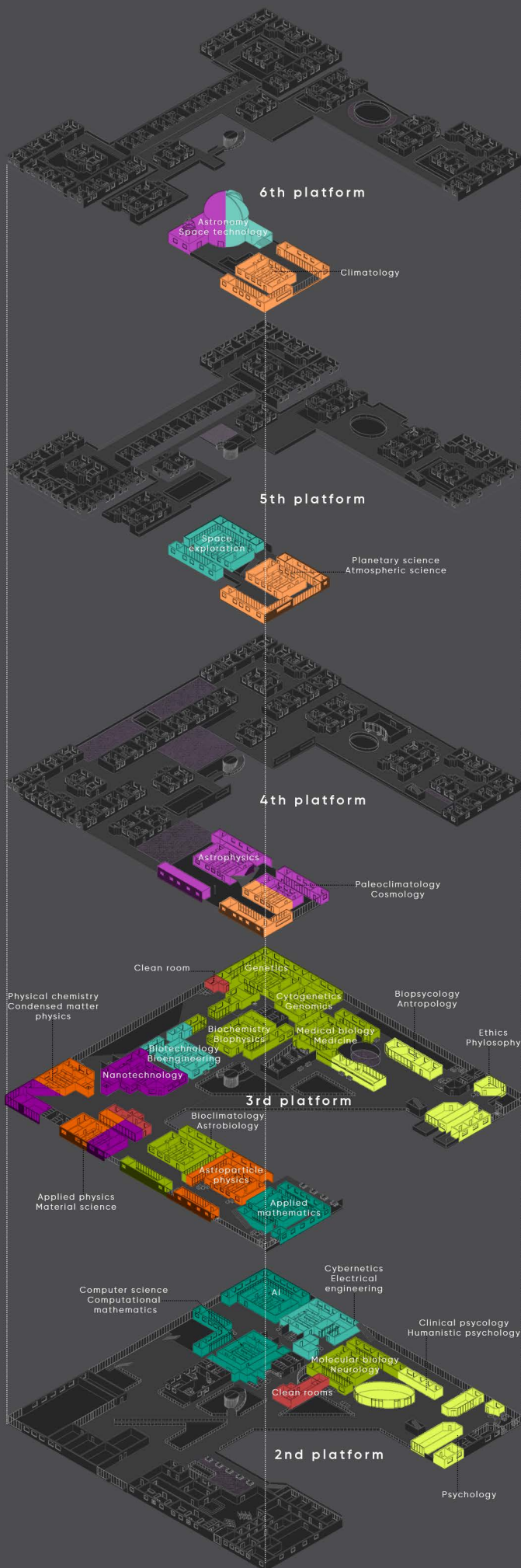
7th platform

6th platform

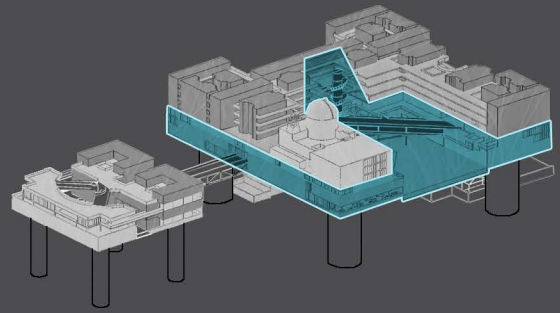
Housing

Research

# Lab disciplines organization

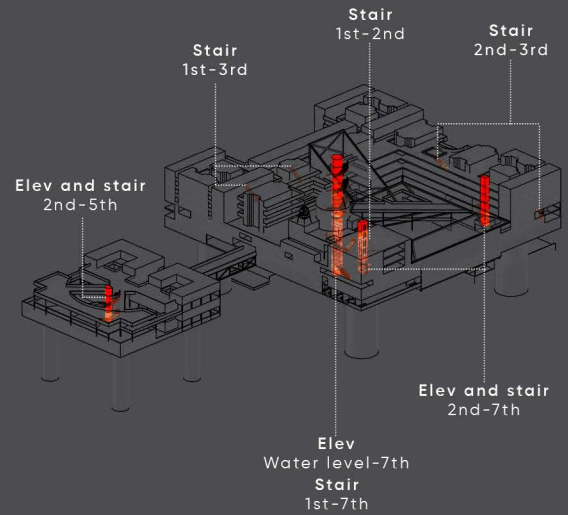


# Climate regulated areas



In order to increase the use and quality of the spaces where most of the social interactions will happen – such as covered gardens and 3rd spaces – first 4 platforms on the main rig are closed spaces with regulated temperature within 23 °C.

# Conections between platforms



Formal science

Engineering

Social science

Biology

Chemistry

Space science

Physics

Earth science

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