

# Refugee Community Village

*An Architectural Response to Humanitarian Crisis*

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\*including blank pages

\*\*One standard page is equivalent to 2,400 characters including spaces



## Abstract

The following paper presents a design proposal for *The Refugee Community Village* located on the outskirts of Aarhus, Denmark.

The project is an architectural response to current and future humanitarian and migration crises by shaping a mixed-use, timber-framed building complex designed to evolve and adapt over time. Following inspiration from naturally occurring growth patterns, the structure is characterized by additive modules superimposed with a structural grid system. The panelized grid superstructure serves as a facilitator for architectural flexibility. Conceived to be capable of expanding or contracting with greater amenity, it supports a variety of infill elements that can be configured to frame a range of programmatic possibilities. The system allows for change over time and according to the needs of the users.

Regardless of its initial purpose it is to be thought as an ever-evolving building system that can transform and fit into other function in the future (e.g. student accommodation, social housing), when the crisis is over.

The project is meant to establish a new typology, connecting and accommodating refugees and locals alike by designing an inclusive community village that covers more than just a basic shelter need.

## Acknowledgements

First and foremost, we would like to express our gratitude to our main supervisor Tenna Doktor Olsen Tvedebrink, for guiding and supporting us through this master project. Providing valuable inputs and giving not only advice but also empathy and understanding during this process.

Special thanks must be also given to Haya Termanini, who shared her very personal and insightful refugee story with us. This has contributed greatly to raising awareness for certain issues and strengthening our motivation. The outcomes of the project were significantly influenced by these inputs.

Furthermore, we want to thank our technical supervisor, Rasmus Lund Jensen, for his guidance and patience.

Finally, we want to sincerely thank our families and friends, for the encouragement and motivational support.

“

*Morals are always erected by people who know where their next meal is coming from. But everything goes, for ourselves, when we are without even a biscuit to nibble.”*

*~ Aksel Sandemose, “A Fugitive Crosses His Tracks”  
(Sandemose, 1933)*

# Typography

Beatrice Warde once said that the typography should be so transparent, designed in such a way, so that the reader does not pay attention to it at all. That the typography conveys thoughts just as voice transmits ideas. French typographer Ladislav Mandel, on the other hand, taught Poul Sørensen that the typeface reflects the culture of the designer's country. This thought became a foundation for a new, complete, modern, Danish typeface - Jante Antiqua.

Each letter was designed carefully, by hand, like in the old days. Especially letters typical for the Danish alphabet, ø, æ, were scrutinized for how they appear in the vicinity of others, if they form a coherent whole. A community. Unity in diversity. Each letter carries meaning only if compiled with others, as a word, sentence or text. On its own it does not mean much. Each individual letter in the typeface is different, each one is unique. But to convey the message they all have to play by the same rules, stick to the line, not stand out. There aren't any better or worse letters in the alphabet, but alone they die. This order and equality form a basis for the current typeface.

Jante Antiqua is just like that. Like the country it comes from. - neutral and not overly modern. At the first glance it looks simple and even geometric, although when looking closely one can see that it consists of only curves.

(Springer, 2019)

Current report is typed with the Jante Antiqua font designed by Poul Sørensen not for no reason. Naming refers to Janteloven, a fictional set of rules that is believed to fractionally explain the egalitarian nature of Nordic countries. In the light of the topic of a current report – foreign integration into perfectly aligned society – Janteloven, which the Jante Antiqua font metaphorically refers to, seems to bring another dimension to the discussion.



# Reading Guide

Current report is divided into six chapters: *Prologue*, *Analysis and studies*, *Project delimitation*, *Presentation*, *Epilogue* and *Appendix*. First three parts (*Prologue*, *Analysis and studies*, *Project delimitation*) form a basis for the latter design and are cumulatively referred to as *Project Framework (Program)*. *Prologue* drafts the general scope and methodology for the project and outlines authors' point of departure in themes related to sustainability and tectonics. *Analysis and studies* chapter is a series of explorations in regards to relevant themes for the project. It is structured by the scale of their application in a descending order. It starts with more general, big scale Sociological Aspects on the Urban Level, continues through Microclimatic Analysis on a Site Level and Architectural & Functional Considerations on a Building level, to very specific and small scale Technical & Aesthetical Considerations on a Structural Level. *Project delimitation* aims at gathering the outcomes from the analysis and summarizing the conclusions, which concretize and catalyze the design process. The final design proposal is laid out in the *Presentation* chapter through various drawings, visualizations, diagrams and descriptive texts.

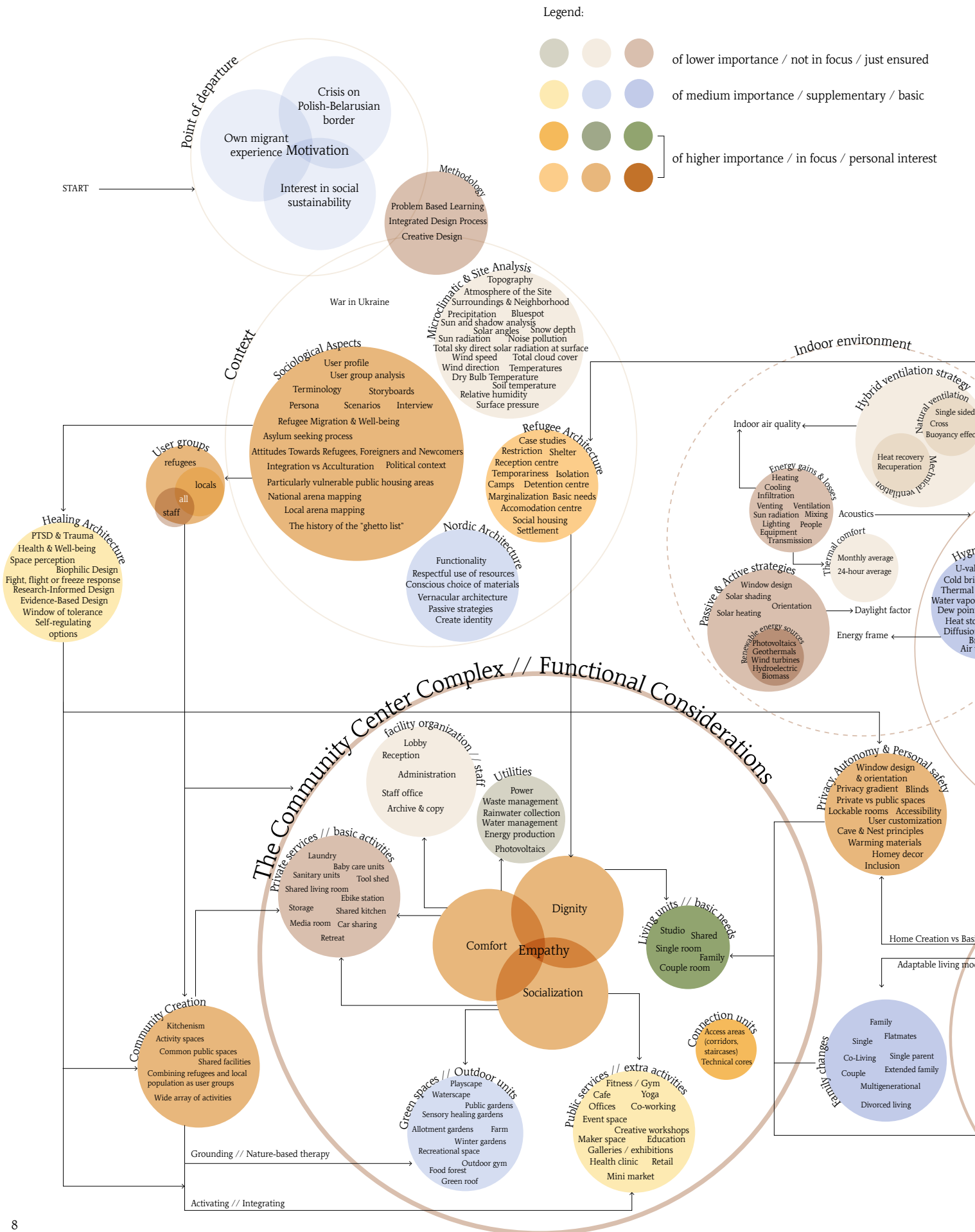
As the *Process* is a manifestation of an Integrated Design it is also an integrated part of the current report. It is not considered a separate chapter on its own, but rather an ongoing documentation of the progress, emerging from the theory, explorations and findings throughout the entire project report - in a form of breaking pages marked with vertical green line on the side of each page and vertical text *Process* in the bottom. This principle is also true for the other sections of the report, where the vertical, bottom page text informs the reader about the location in the report.

Academic papers, studies, literature and other documents or webpages are quoted and referred to using the Harvard reference method. A reference list can be found in the *Epilogue*, alongside the Illustration source list. An *Epilogue* also contains a final conclusion and reflection on a project.

If this report is read digitally it is preferred to use Adobe Reader, a free PDF software one can download through this link: <https://get.adobe.com/dk/reader/>. To see this reports illustrations and graphical material in the desired quality and resolution it is necessary that the reader change the settings to the following:

*Edit - Preferences - Page display - Rendering - Uncheck 'enhance thin lines'*

# Project Diagram

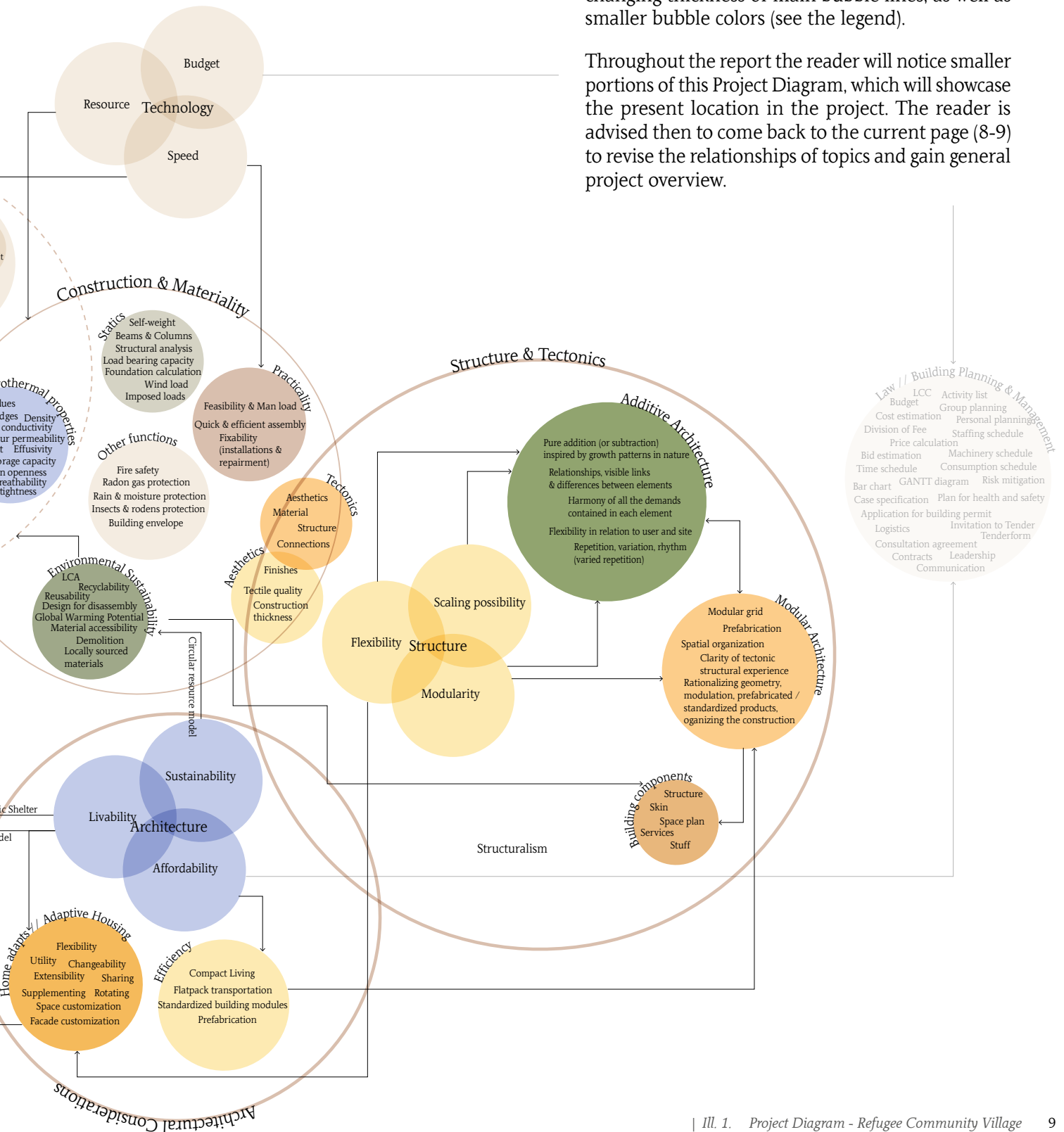


Welcome to the tour around *the Refugee Community Village* project!

Below one can find the diagram illustrating complexity of the current project. Each theme has its causation and results in another set of topics. The project scope carries limitations and not all the aspects are developed equally/further. The subjective hierarchy of importance of the following themes is established with reasoning for it explained further in chapters *'Motivation' & 'Aims and objectives'* on pages 18-19.

In short, the primary focus is placed on user empathy, resulting in an array of programmatic functional considerations. As a response to a refugee migration crisis implementation of an adaptive living model is proposed. Users' needs change – house adapts. Therefore, further explored are topics of flexible, modular and scalable structure with sustainable, livable and compact architecture as desired outcome. This hierarchy is indicated in the diagram by the changing thickness of main bubble lines, as well as smaller bubble colors (see the legend).

Throughout the report the reader will notice smaller portions of this Project Diagram, which will showcase the present location in the project. The reader is advised then to come back to the current page (8-9) to revise the relationships of topics and gain general project overview.







## Terminology

To establish a solid foundation for the development of the project and to ensure clarity and coherence throughout this report, it is necessary to define and specify the meaning behind some of the most significant key words related to the theme.

The most recognized and universal definition of a 'refugee' can be found in the 1951 Refugee Convention:

**Refugee** – *A person who, owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it. ("Convention Relating to the Status of Refugees," 1951)*

It is therefore worth to highlight the difference between a 'refugee' and an 'asylum seeker', which by UN High Commissioner for Refugees (UNHCR) is defined as:

**Asylum seeker** – *An individual who is seeking international protection. In countries with individualized procedures, an asylum seeker is someone whose claim has not yet been finally decided on by the country in which he or she has submitted it. Not every asylum seeker will ultimately be recognized as a refugee, but every recognized refugee is initially an asylum seeker.*

Some of the other broadly used terms such as 'immigrants' and 'migrants' will be referred to in the report, despite there being no internationally agreed-upon universal definition for the latter.

**Migrant** – *[...] a person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons. The term includes a number of well-defined legal categories of people, such as migrant workers; persons whose particular types of movements are legally-defined, such as smuggled migrants; as well as those whose status or means of movement are not specifically defined under international law, such as international students. ("Key Migration Terms," n.d.)*

The term 'migrant' can be considered in the inclusivist approach as "an umbrella term covering all forms of movements" as well as in the residualist approach which "excludes from the term "migrant" those who flee wars or persecution". ("Key Migration Terms," n.d.) The former approach will be applied in this project as a more inclusive term, and the conducted research process will examine and outline the attitudes and reception strategies in Europe and Denmark towards not only refugees, but also migrants in general.

In this thesis project the refugees whom have been granted with the right to asylum on the territory of Denmark will constitute the primary user group. United Nations High Commissioner for Refugees defines 'asylum' as:

**Asylum** – *the grant, by a State, of protection on its territory to persons outside their country of nationality or habitual residence, who are fleeing persecution or serious harm or for other reasons. Asylum encompasses a variety of elements, including nonrefoulement, permission to remain on the territory of the asylum country, humane standards of treatment and eventually a durable solution. ("UNHCR Resettlement Handbook," 2011)*

The aforementioned definition outlines various components that the grant of asylum entails, one of which is a 'durable solution' which can be described as "means by which the situation of refugees can be satisfactorily and permanently resolved to enable them to lead normal lives". ("Glossary on Migration," 2019)

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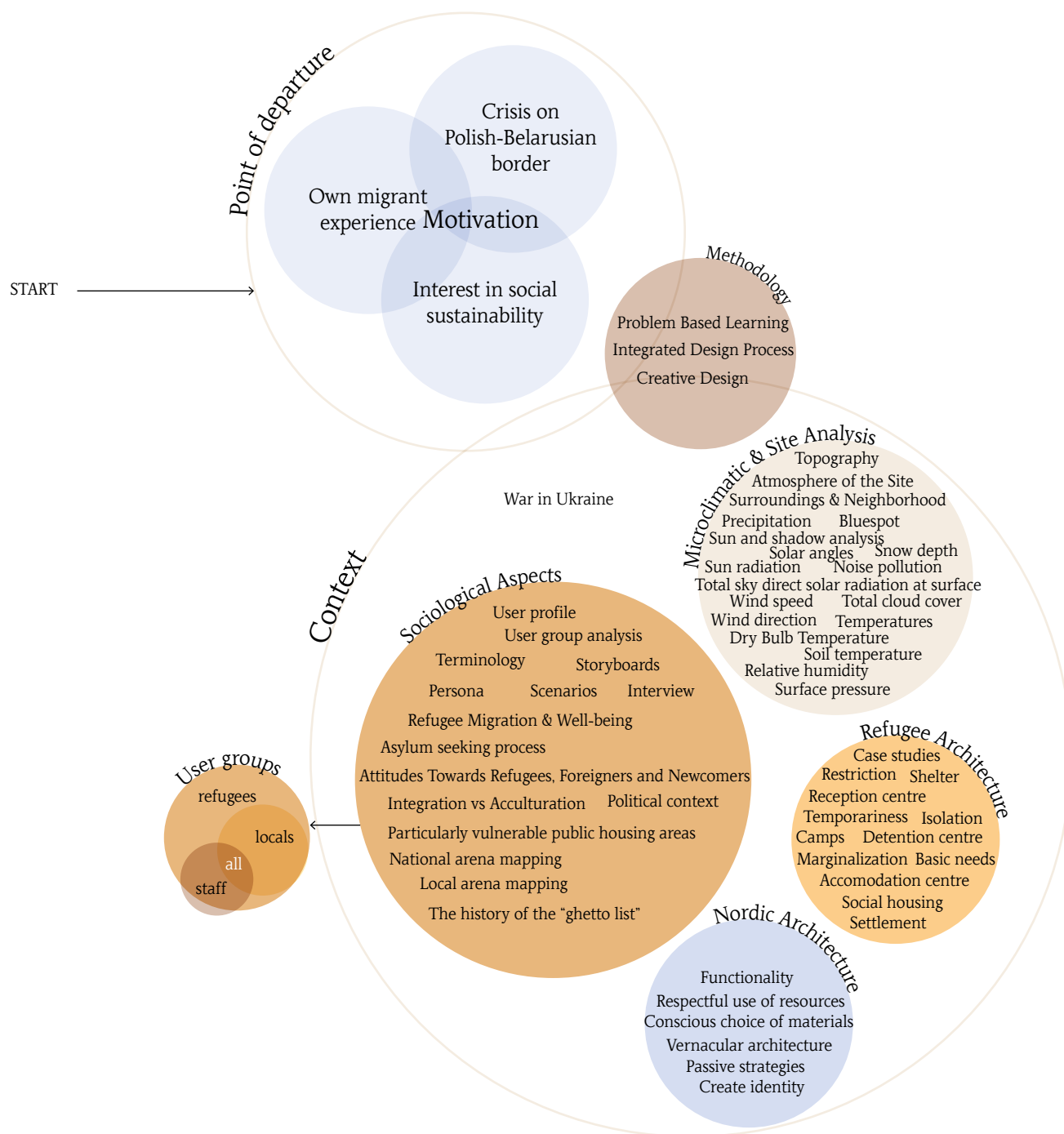
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# 01 | Prologue

# Introduction



(Project Diagram p.8-9)

| Ill. 2. Project Diagram - Context zoom-in

## Preface

This Master thesis is developed during the 4<sup>th</sup> semester of the M.Sc. in Architecture education at Aalborg University in Denmark. As the project concludes the authors' graduate studies, it was of great importance to choose a subject which will constitute an academic challenge and encompass both professional and personal interests.

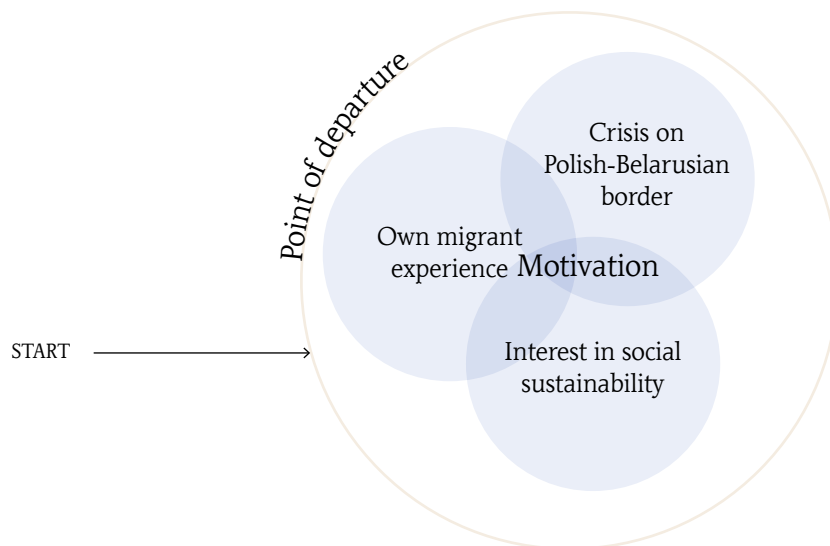
The project will outline a proposal for a "Refugee Community Village", an area where refugees, and possibly asylum-seekers can reside for a limited period, located in municipality of Aarhus, Denmark's second biggest city. The goal is to design an architectural humanitarian facility that would aid in providing safety, sense of community and belonging as well as regaining the refugees' sense of agency. It shall serve as an important stage on the refugees' journey towards a durable solution but also would cater to the needs of the local community, creating a link and an opportunity for the two groups to meet and share meaningful social interactions. The design will be based on principles of modularity and adaptability, and shall be influenced by traditions and best environmental sustainability practices of the Nordic architecture.

## Motivation

The subject of this Master's thesis is a resultant of many factors ranging from the authors' professional interests within the field of architecture, to the personal connection and engagement which stem from own experience and the general geopolitical situation in the world and Europe. The idea to tackle a project centered around a multifaceted topic of migration and refugees has been influenced by the recent human rights crisis at the Polish-Belarusian border which has escalated and been broadcasted in the fall of 2021. The authors of this project come from Austria and Poland and therefore represent different national backgrounds combined with the shared gained experience of being foreign students in Denmark. While it is crucial to acknowledge that there is a world of difference between the authors' largely privileged migrant experience and that of

the main user group of the proposed typology, the previously experienced adversity, can be linked to heightened empathy and compassion towards other people's hardships and more prosocial attitudes (Lim and DeSteno, 2016).

Choosing Denmark as the location for the project has been a conscious choice, as the goal is to explore the chosen typology within a challenging socio-political context, as the country has become evidently less migrant-friendly in recent years (Solano and Huddleston, 2020), while simultaneously drawing inspiration and influence from the highly-regarded, rich traditions of Nordic sustainable architecture. The ultimate motivation is to explore what design and architecture can and cannot do in terms of creating social cohesion and driving positive change.



(Project Diagram p.8-9)

| Ill. 3. Project Diagram - Motivation zoom-in



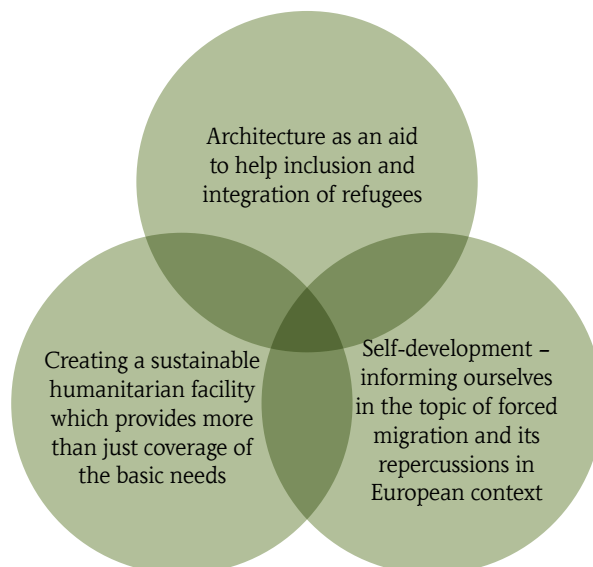
## Aims and objectives

The project's main attempt is to stand in contrary to the current popular belief and general regressive attitudes towards asylum-seekers and refugees in Denmark, and in favour of more prosocial and inclusive perception. The negative notions are starkly evident in the increasingly restrictive Danish immigration policies as well as surveys among Danish population.

The goal is to investigate possibilities and limitations of architectural means impacting the collective mindset through a modern and innovative settlement that in the spirit of social cohesion 'supports the strong and positive relationships being developed between people from different backgrounds [...] within neighbourhoods' ("Glossary on Migration," 2019) by offering a programme that could attract locals and newcomers alike. The intention is to design a sustainable humanitarian development that not only addresses its inhabitants basic needs, but also supports their growth and inclusion in the society. The means of architectural expression should fit the given context and the environmental and aesthetical standards of the contemporary Danish architecture, thus positively contributing to the surrounding area's value and prestige rather than becoming a point of concern.

The other learning objectives for this project are:

- developing a building system that could be reapplied in similar typologies, by working with modular, adaptive, flexible and additive architecture, as well as improving efficiency of the building process which would contribute to environmental sustainability considerations;
- ensuring social sustainability for the primary user group that tends to be overlooked and has not been included in the authors' previous design work;
- applying Nordic architecture practices and influences to an atypical typology which places focus on refugees but also caters to the needs of different user groups;
- exploring the topics of homemaking and community creation in relation to the challenges of migration and displacement;
- integrating environmentally sustainable measures in terms of materiality, passive solutions, building layout, calculations, etc.;
- investigating possibilities and limitations of fostering better human integration through architectural means, gestures and solutions.



The world and society are facing new challenges every day, whether in terms of climatic or humanitarian crises. In recent times, this has tragically become even more apparent than before. To master these challenges, we need common ground, solidarity, and new perspectives.

People leaving their home countries do not do so voluntarily. Severe and troublesome circumstances in the countries they feel belonging leave them with no other option than to escape. They endure long and frightening journeys in inconceivable circumstances, often accompanied by fears and traumas of past experiences. Being forced to leave one's home country indefinitely, in fearful times with an uncertain outcome, carries numerous obstacles. Lack of belonging, unpredictability, psychological pressure, processing of personal tragedies, and an uncertain future are just some of the associated issues. It is therefore all the more important to provide a place that embodies security, belonging and receptiveness.

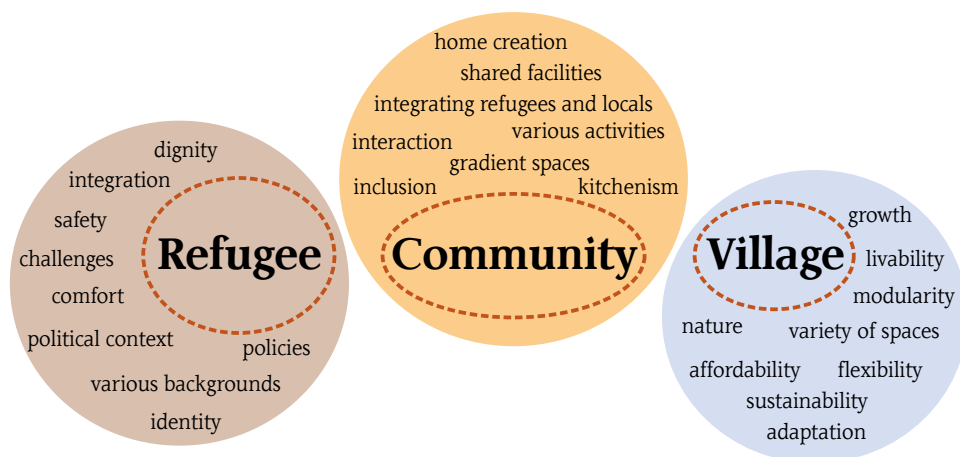
*The Refugee Community Village* seeks to address this need by offering a new perspective on issues such as inclusion, community creation and adaptability in terms of architecture. The project creates a place where both refugees and locals feel welcome and included. It offers space for interaction and exchange, for activities that are activating and restorative in diverse ways. *The Refugee Community Village* creates a new typology of living and engaging with each other. Through aspects of flexibility, it can be individually adapted to needs, situations and settings. It opens possibilities for an adaptable building system in which social sustainability plays a key factor.

After all, the problems we face can only be solved collectively in joint efforts. *The Refugee Community Village* generates a space that makes this possible. A place for interaction, community, inclusion - a place for *connections*.

## Problem Statement

The project focus is placed on exploration of concepts of flexible and additive architecture, as well as compact living as an architectural response to a wave of global and local migrations caused by various circumstances. The primary driver for a decision making process is social sustainability, human dignity, and community creation.

The project's scope is limited to concept proposal and carries limitations in terms of project's further in-depth detailing.



| Ill. 5. Vision

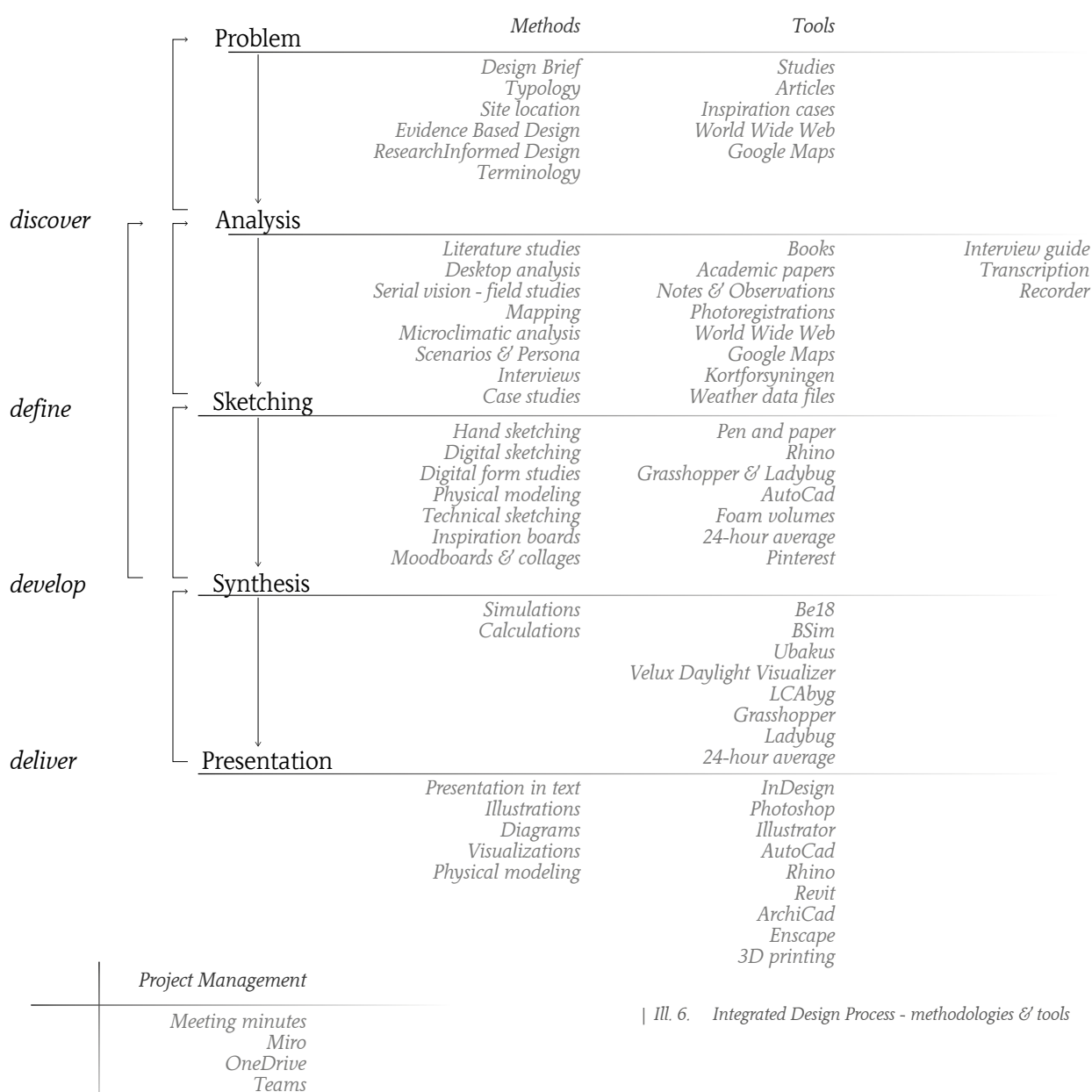
## Methodology

The methodologies outlined in the following section are intended to facilitate a structured and holistic design approach. This does not only involve the organizational framework for the course of the project, but also the combination of different methods to enable an informed and integrated design.

In addition to the Problem Based Learning model, which is commonly used at Aalborg University, the Integrated Design Process, Evidence Based Design, and Research Informed Design are utilized. Furthermore, theories from Brian Lawson and Kees

Dorst and Nigel Cross are implemented to challenge the Integrated Design Process by Knudstrup.

Problem Based Learning is characterized by the fact that at the beginning of each process of design there stands a problem. This is then addressed in a variety of ways through analysis, research and supporting techniques. The result is a combination of different influences that engage with the issue in a multi-layered way. This helps to approach the project from different perspectives and to achieve the best possible outcome. (Kilroy, 2004)



# Integrated Design Process

As the design process can often become disorganised and complex, the Integrated Design Process method is a tool to provide structure to the process. The IDP (integrated Design Process) was shaped by Mary-Ann Knudstrup and is an iterative method that helps to shape a design from multiple viewpoints. One goal is to combine the field of architecture with engineering.

The process is divided into five phases, which are not seen as a chronological sequence, but rather as stages that overlap and repeat as often as desired in iterative loops. This constant back and forth between phases allows for new perspectives and approaches to be incorporated in the design, ensuring a holistic approach. Furthermore, the IDP method reflects the complexity of the design process, which only reaches its end through deadlines and time. (Hansen and Knudstrup, 2005)

The five phases consist of Problem, Analysis, Sketching, Synthesis and Presentation. Each of these stages is characterised by a set of different focus areas. The graphic illustrates how the different phases will influence our project and which tools will be used in the process.

## Problem Formulation:

The starting point of the design process for Knudstrup is the formulation of a problem. Based on this problem, the project develops with the aim of offering proposed solutions. The focus in this phase is on elaborating and formulating the main idea and challenge to be addressed in the project. This approach is the same as in Problem-Based-Learning, where a problem is used to determine the learning objectives.

## Analysis:

Gathering information and knowledge through empirical and desktop analysis to enable an informed design process. this allows the problem to be narrowed down and the focus of the project to be further emphasised. the results are used in the development of the project, for example in the form of design criteria.

## Sketching:

This phase is not only characterised by the merging of knowledge in architecture and engineering, as it is also a phase of combining information and design, hand sketching and digital tools, where creativity meets empirical knowledge. During this process, many different possibilities for solving the initial problem are created. It is about exploring opportunities and evaluating the results, which is an essential phase in the iterative process of designing.

## Synthesis:

After the sketching phase and the exploration of different possibilities, the synthesis phase is about merging the best outcomes to get the final design. With each new loop and each new piece of information from the other phases, it is a matter of combining the findings to arrive at a holistic design. This is a complex part of the design process, as there are many different influences and parameters which should be considered. Hence it is also a matter of setting priorities. In this phase the project should be "optimised" and the building should find its form.

## Presentation:

This is the final phase of the design process. It is about communicating the message of the building as precisely as possible. The aims, design criteria and target values of the project should be fulfilled and conveyed clearly. Communication and visual presentation are the key factors during this phase.

(Hansen and Knudstrup, 2005)



(Project Diagram p.8-9)

| Ill. 8. Project Diagram - Methodology zoom-in

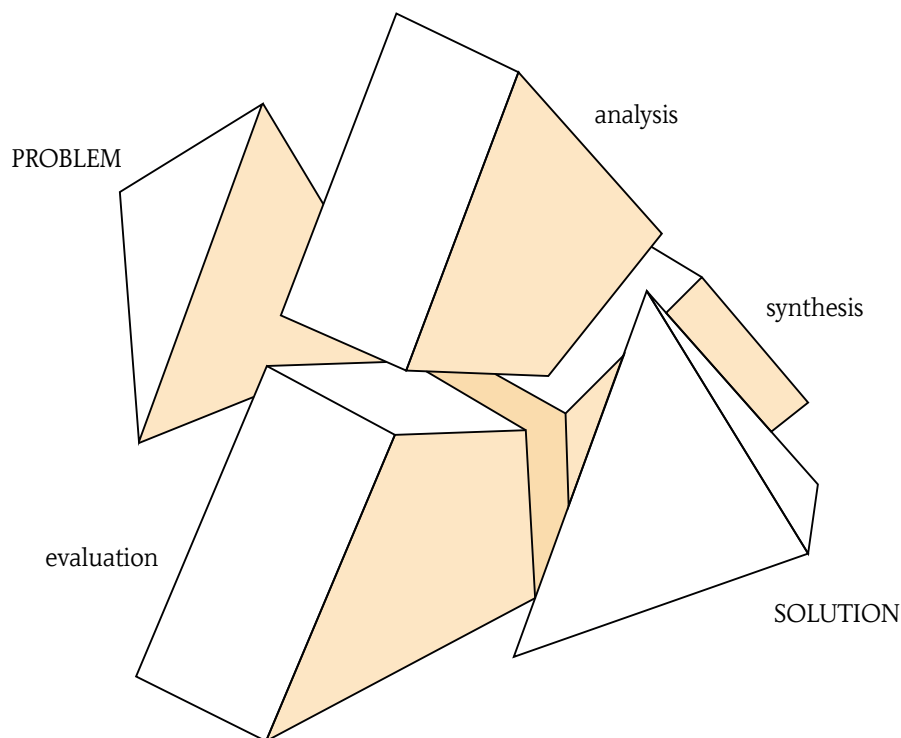
## How designers think? // Brian Lawson

Another approach to structuring the design process comes from Brian Lawson. Similar to Knudstrup, Lawson starts with a problem, yet he considers the design process to be a constant negotiation between problems and solutions.

Lawson does not see a clear definition of sequences or processes during designing, as the design process is such a complex matter. Phases such as analysis, synthesis and evaluation are a constant part of the negotiation. However, as can be seen in the diagram, there is no starting or ending point to this. The

phases are not to be completed sequentially or in a specific order. It is an iterative process of loops in which the phases overlap or occur simultaneously.

As new solutions are found, new problems arise, and the design becomes more and more informed and shaped. There is no natural end to this process. Lawson considers the end of the design process to be when the designer runs out of time or when the judgment is made that there is no benefit to pursuing a certain matter further. (Lawson, 2005)



(Lawson, 2005)

| Ill. 9. Brian Lawson

## Creativity in the Design Process

It is rather difficult to determine the point in a design at which creativity arises. Often it is seen as a sudden event that results in the primary concept. A study linking the design process, outcomes and creativity showed that, the more time was spent on defining and understanding the core problem, the better the scores in creativity became. This highlights that it is crucial for a designer to fully determine and comprehend the design problem.

Nevertheless, solely by formulating the problem a creative result is not achieved. Dorst and Cross link the design process, as does Brian Lawson, to an iterative process between the phases of analysis, synthesis, and evaluation in which the two notional “spaces” (problem space and solution space) are kept informed. The design process is therefore a co-evolution between problem space and solution

space. Creativity derives when a “bridge” between the problem and the solution space is being built, by identifying the main idea of the project. A creative design comes from a constant exchange between problems and potential solutions.

In the beginning of the design process, problem and solution spaces are still unstable as the design is being informed. Due to exploring various possibilities a bridge evolves, which results in a problem-solution pairing. A creative event occurs when this pairing is framed and established.

Surprises in the co-development between problems and solutions prevent the designer from routine behaviour. Furthermore, these surprises introduce originality and creativity into a design. (Dorst and Cross, 2001)

## Evidence-Based Design & Research-Informed Design

Evidence Based Design (EBD) and Research Informed Design (RID) both describe ways of gaining knowledge and their impact on the design process. These methods should not be seen as a separate approach to the design process, but as a complement to the IDP method. EBD and RID can be used especially in the information gathering phases of the IDP process.

The descriptions of Evidence Based Design and Research Informed Design are often very similar and therefore they have frequently been considered as interchangeable terminologies. To highlight the difference between the concepts, it is important to look at the definition of “evidence” and “research”.

Evidence is often referred to as something that furnishes proof. (Definition: Evidence, 2022). In a scientific context evidence is described as:

*“Scientific evidence is evidence which serves to either support or counter a scientific theory or hypothesis. Such evidence is expected to be empirical evidence and in accordance with scientific method. Standards for scientific evidence vary according to the field of inquiry, but the strength of scientific evidence is generally based on the results of statistical analysis and the strength of scientific controls.” (Definition: Scientific Evidence, no date)*

Evidence is a source of knowledge, namely empirical observations that can be acquired through various sources. In the scientific world, this knowledge is divided into categories and thus subjected to a certain hierarchy. (Peavey and Vander Wyst, 2017)

Research is defined as follows:

*„Investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws” (Definition: Research, 2022)*

*“Systematic observation of phenomena for the purpose of learning new facts or testing the application of theories to known facts; -- also called scientific research.” (Definition: Research, no date)*

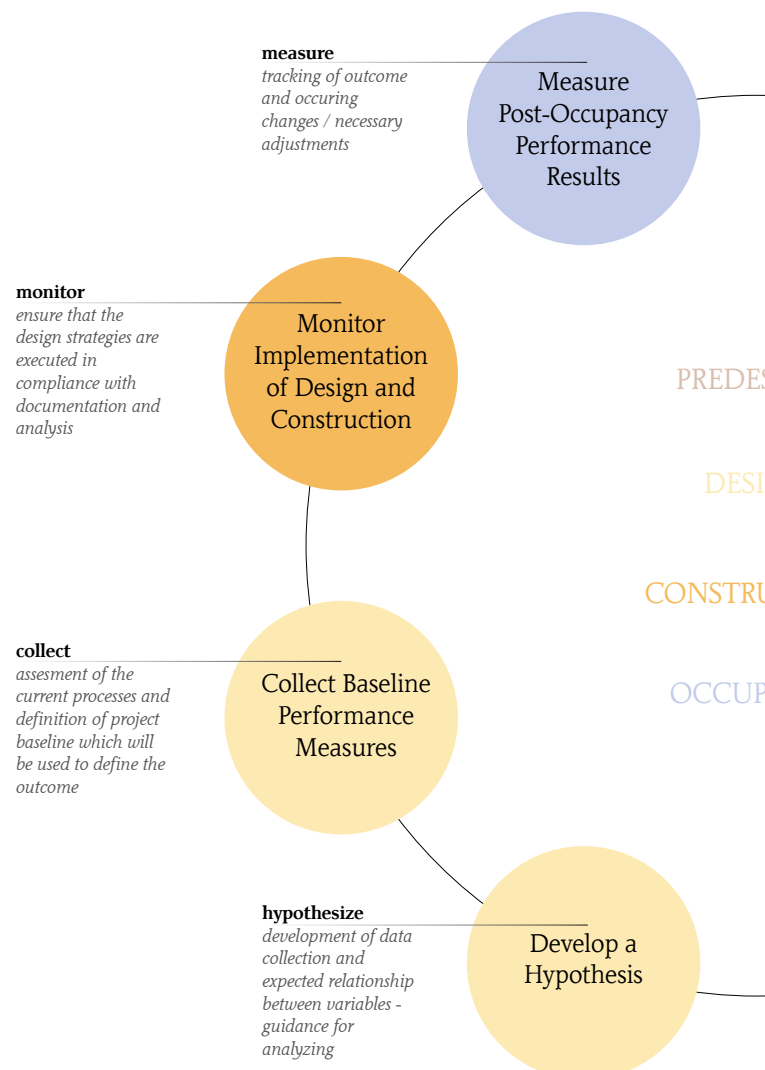
Research is therefore seen as the gaining of explicit knowledge through observation. It is a systematic investigation that leads to new knowledge. Through repeated achievement of the same results or the same findings, this knowledge can become evidence. (Peavey and Vander Wyst, 2017)

Evidence Based Design found its origins in the healthcare environment and gained relevance in 1984 when Roger Ulrich published a study examining the impact of a patient's view on their recovery.

Hence, it is based on research conducted over the last few years that illustrates how physical environmental impacts influence people's behaviour, feelings, and thoughts. Later, this term was also picked up by Hamilton, who described it as follows:

“

*An evidence-based designer makes decisions—with an informed client—based on the best available information from credible research and evaluations of projects. Critical thinking is required to draw rational inferences about design from information that seldom fits a unique situation precisely.” (Hamilton, 2004; Peavey and Vander Wyst, 2017)*





The Center for Health Design subsequently described the Evidence Based Design Process as follows „EBD is the process of basing decisions about the built environment on credible research to achieve the best possible outcomes.“ (What Is Evidence-Based Design (EBD)?, no date) The structure of the EBD process was formulated in an 8-step plan (see corresponding graphic).

This 8-step plan shows analogies to the Integrated Design Process. Contrary to the claims of Hamilton and Watkins about the difficulty of integrating Evidence Based Design into architecture (Hamilton and Watkins, 2009), there is a general application of EBD in the Problem and Analysis phases of the IDP.

Research Informed Design is a much less common and elaborated term. However, it originates from educational disciplines. (Peavey and Vander Wyst, 2017)

Erin Peavey and Kiley Vander Wyst used the following description to clarify the differences:

**EBD** – „: The process of making decisions about the creation of an environmental design by critically and appropriately integrating the sum of credible evidence, practitioner design expertise, client or population needs, and preferences and resources, in the context of the project, in order to achieve project objectives“ - (Peavey and Vander Wyst, 2017)

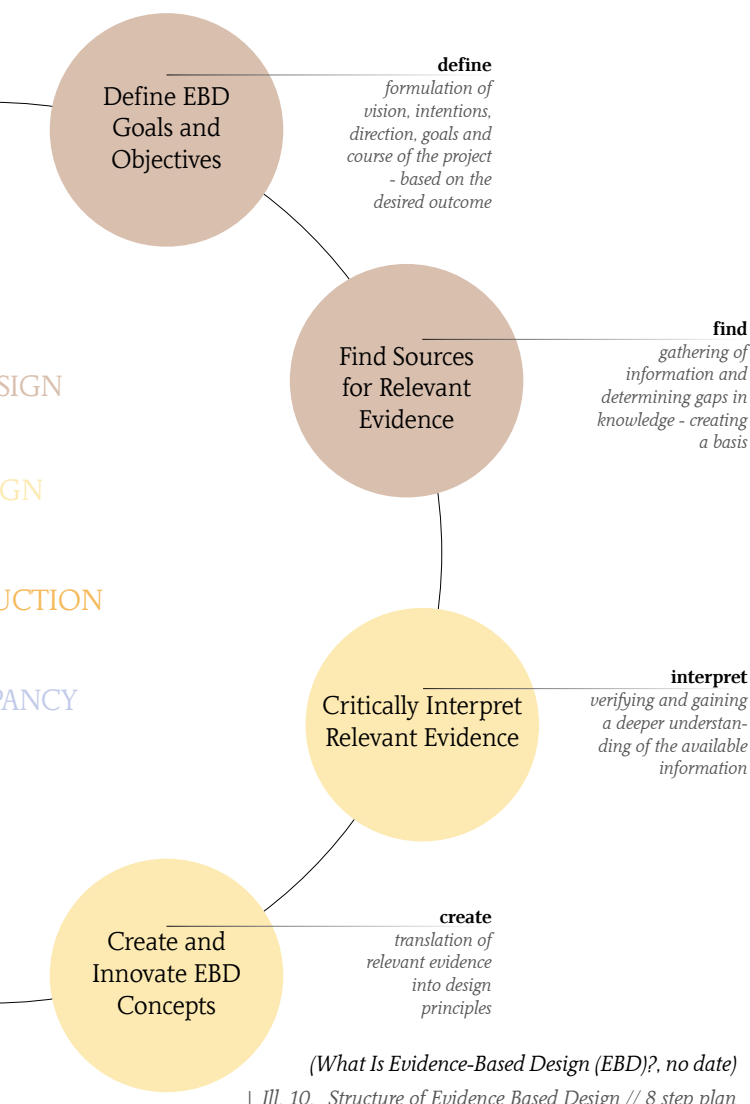
**RID** – “The process of applying credible research in integration with project-, client-, or population-specific empirical inquiry to inform the creation of environmental design and achieve project objectives” - (Peavey and Vander Wyst, 2017)

In both cases, the approaches need to be critically questioned, especially in the context with designing. Can the design process really be limited solely to evidence and research knowledge? Or does it thereby lose the dimension of creativity?

Hamilton also deals with this topic in his article. However, he does not consider that it affects creative output. „This overlooks the challenge of continuously inventing responses to emerging results and new facts, requiring imaginative and ever-changing interpretations of the design implications. Research offers complex and sometimes contradictory findings, encouraging continuous testing of new ideas“ (Hamilton, 2004) He also counters the criticism that EBD imposes new constraints and limits on architecture with the argument that new findings always have to be implemented and that the designer can thus continue to refine the solution to the problem. (Hamilton, 2004)

The Creative Design Process challenges these arguments, because creativity is seen as „the ability to produce original and unusual ideas, or to make something new or imaginative“ (Definition: Creativity, no date). This characteristic is omitted from the descriptions of EBD and RID, but is widely used in the field of architecture.

As explained at the beginning, this methodology complements the integrated design process. Nevertheless, the phases of the project that rely more on creativity, development of new ideas and intuition should only be informed by these methods, but not submerged. The idea is to create an interplay of gained knowledge from different resources, new insights, and further development as well as continuation of the initiated thought processes and originality. Leading to a unified design combining these aspects.



“

*Architecture is based on science as well as on intuition, and if you want to become an architect, you will have to master technology in order to develop your ideas, in order to prove that your intuition was right, in order to build your dreams.”*

*~ Jørn Utzon (Utzon, no date)*



# Introduction To Sustainability

“

*Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.”*

~ (United Nations, 1987)

The term sustainability and the accompanying aspects are becoming increasingly important. This is due not only to the steadily growing impact of the climate crisis on our everyday life, but also to current social events.

In the course of the Brundtland Report and the Agenda 21, which was declared at the United Nations Conference on Environment and Development in Rio de Janeiro in 1992, sustainability was divided into the three areas of *environmental*, *economic* and *social*, all of which have an equal significance. (United Nations, no date b)

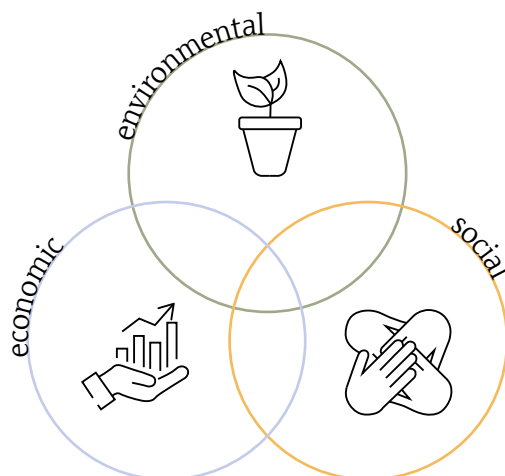
To further specify the common direction and goals in terms of sustainability, the United Nations formulated 17 Sustainable Development Goals in 2015 to be achieved by 2030. These goals apply to all countries and cover the three areas of sustainability. They include topics such as peace, agriculture, education, poverty, energy, climate change, natural resources, science and technology. (United Nations, no date a)

“

*Sustainability is the integration of environmental health, social equity and economic vitality in order to create thriving, healthy, diverse and resilient communities for this generation and generations to come. The practice of sustainability recognizes how these issues are interconnected and requires a systems approach and an acknowledgement of complexity.”*

~ (UCLA Sustainability Committee, 2016)

The research presented in this report will showcase that the main focus of this project in the area of sustainability will point to social and environmental categories.



(United Nations, no date b)

| Ill. 11. Sustainability

## Environmental Sustainability

Environmental sustainability assures a respectful and conscious use of resources. The main focus is on supporting the ecosystem and creating a balance between human culture and the living world. (*Environmental Sustainability Definition & Examples*, 2021) Regulations in this area are often established at the country level and cover issues ranging from air, water and soil quality to wildlife and emissions. (Evans, 2020)

Especially in architecture, environmental sustainability is of vital importance, as energy consumption in buildings represents about 40% of Europe's final energy use and the resulting CO<sub>2</sub> emissions. (*Eco-Innovation: At Heart of European policies: Laying the Foundations for Sustainable Construction*, 2010) Minimizing the use of resources and land, optimizing energy consumption, integrating nature, implementing reusable and renewable materials and the creating flexible and modular spaces which are easy to disassemble and repurpose are only some of the strategies encountered in sustainable architecture. (Hohenadel, 2021)

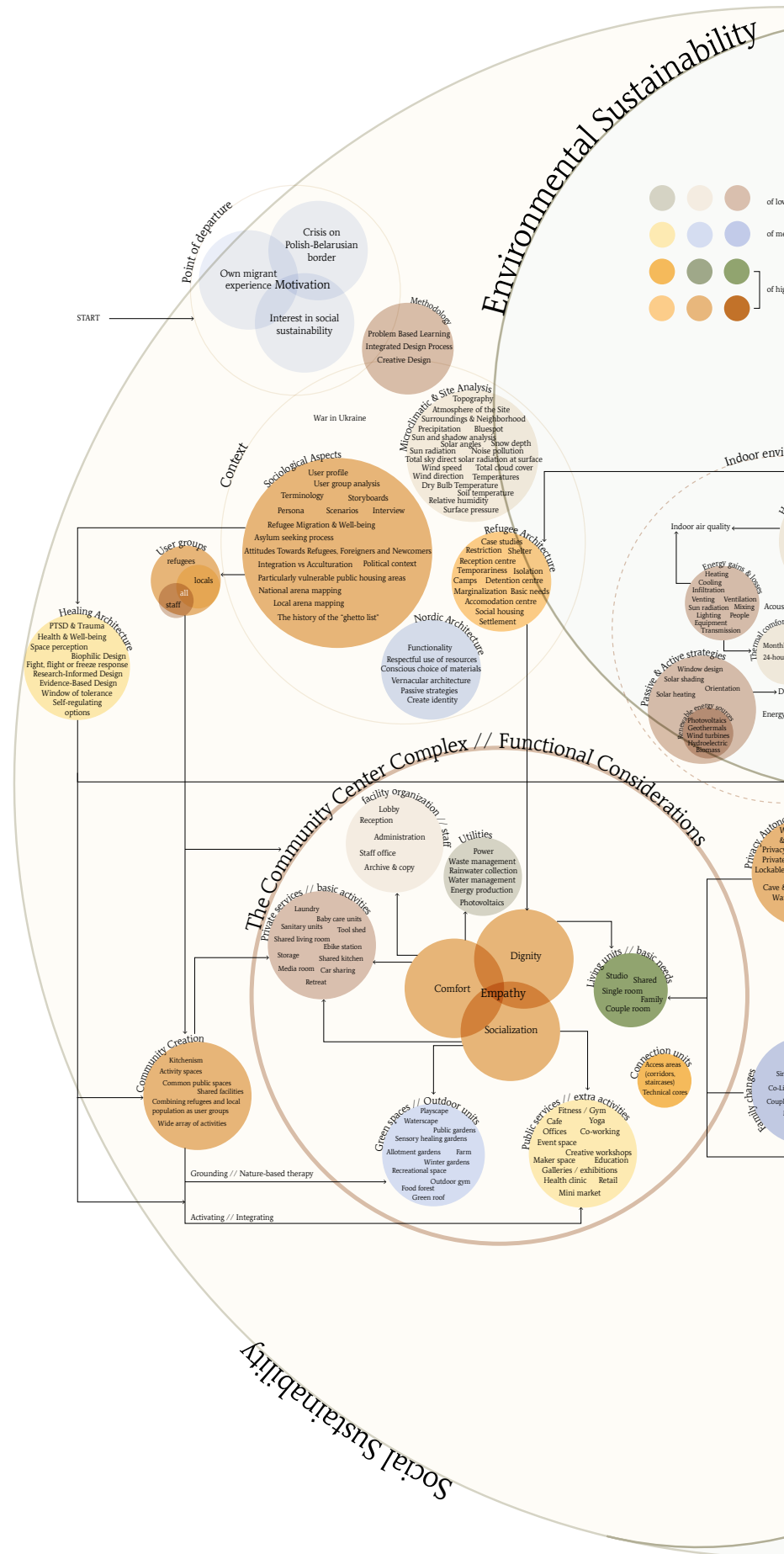
This project is influenced by these factors especially on a structural level. This stage concerns the implementation of flexible systems that require an efficient and resource-friendly use of materials. Likewise in the areas of tectonics and material considerations, where a conscious approach is desired. The topic energy strategies will deal with the applicable regulations and examine the implementation of passive strategies and energy efficient concepts.

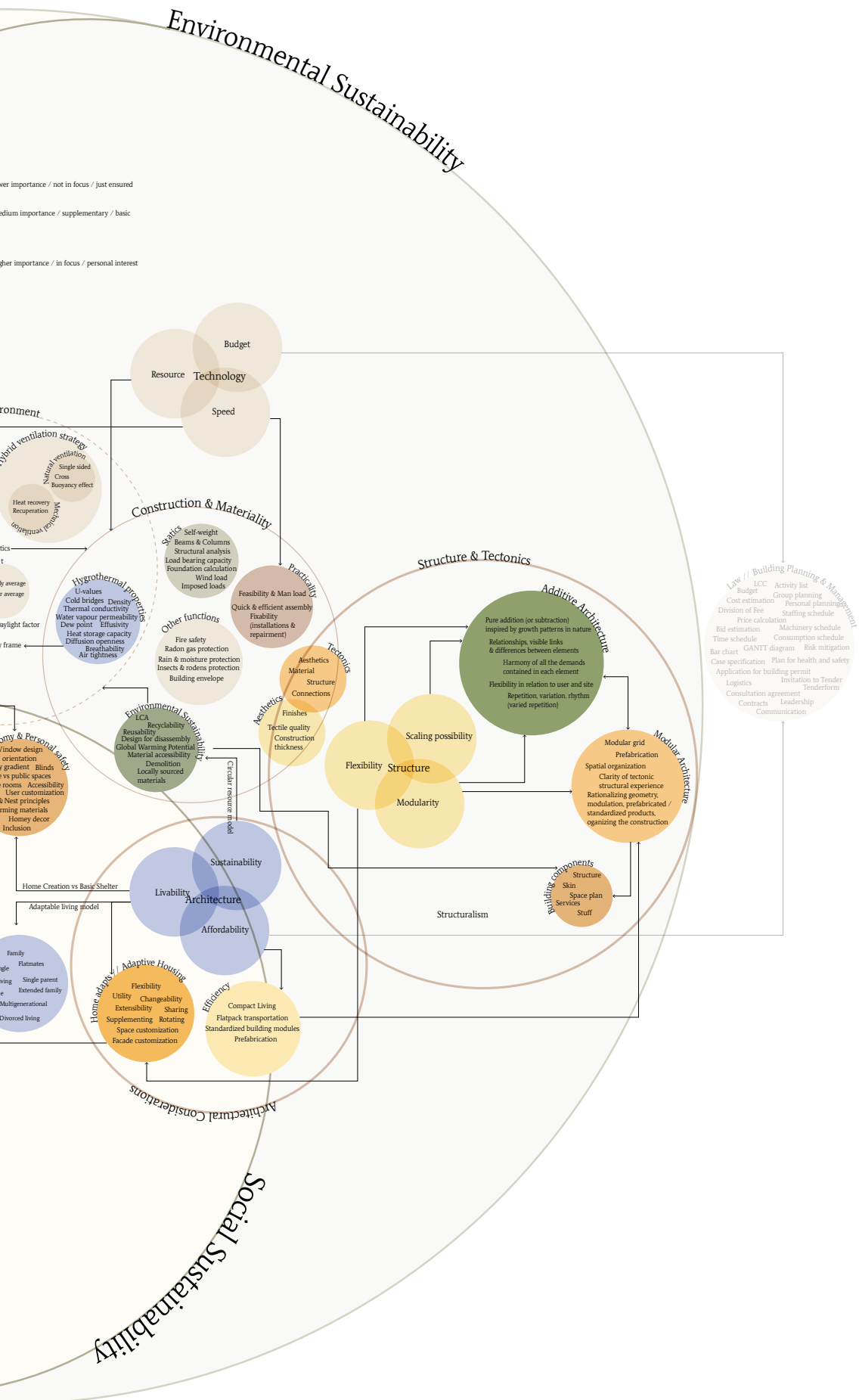
In conclusion, sustainable strategies and approaches will be an essential part of this project. A more in-depth explanation on methods and objectives which will be implemented in the project will be explained in the corresponding topic areas of the research.

## Social Sustainability

Social sustainability is the least clearly defined area among the three. This category includes equity, empowerment, accessibility, cultural identity and institutional stability. (McGuinn, 2020) Concerning the shaping of physical places, the term refers to understanding the users' needs and keeping them in mind during the process of designing to assure and enhance wellbeing. Hence the term social sustainability links creating physical realms with the social world. (ADEC Innovations, 2022)

As one of the aims of the project and the authors is to find out how to achieve better integration of foreigners through architectural means, social sustainability plays an important role. Topics such as homemaking and community creating are further analysed in the research and form the starting point for the design process. Furthermore, the user group is of greater importance and has a major influence on the project's outcome. Designing spaces that positively influence their wellbeing and health while responding to the inhabitants' needs is a further objective of this project.







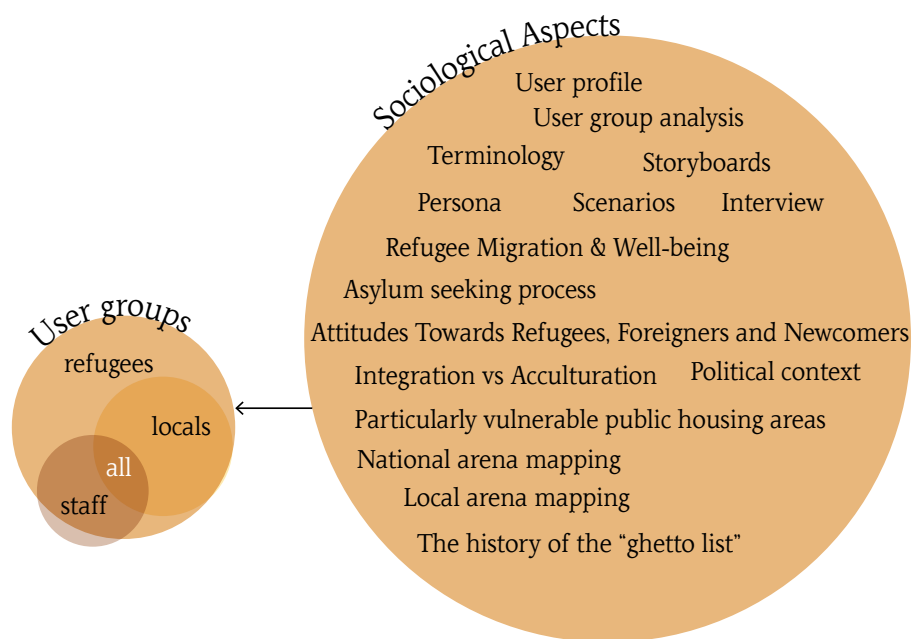


## 02 | Analysis and Studies

## Urban Level // Sociological Aspects

The analysis and studies part is divided into urban level, site level, building level and structural level. Each chapter will provide a deeper insight into the project: first at the general theme of the project, then at the location, and then go on to detail aspects of the building and finally to the technical and structural considerations.

The first section urban level is highlighting some of the social aspects of this project, especially focusing on the user group and the impediments they are facing. The chapter furthermore displays the current situation in terms of asylum procedures and facilities. This is leading up to why the site in Aarhus was chosen.



(Project Diagram p.8-9)

| Ill. 13. Project Diagram - Sociological aspects zoom-in

## User Profile

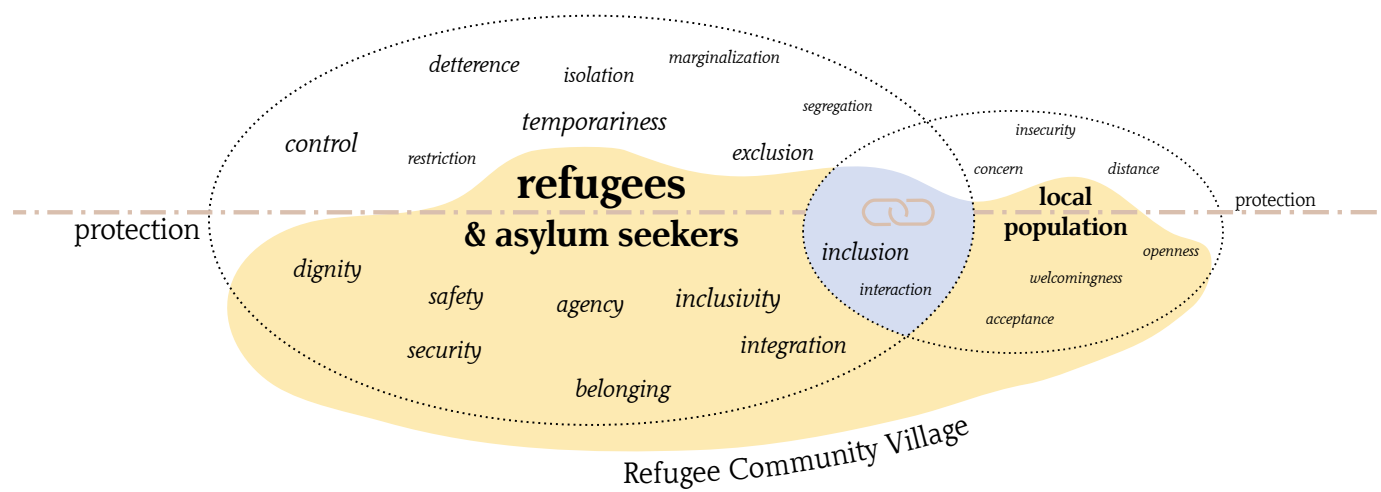
The proposed typology serves as an attempt to bridge a gap between two meeting cultures represented by different users and actors with varied levels of influence and involvement, that nevertheless share a common interest in the project's development.

The main user group that the project is oriented towards are asylum seekers awaiting the decision about their application or the outcome of the appeal after initial rejection, as well as the refugees who have already been granted the permit. Both of these groups are put in a specific and quite challenging position from their very arrival to the country.

The designed typology should constitute a place that a group of 150 or more asylum seekers and refugees could call a home and settle in for a finite time period of approx. 1,5-2 years, after which a turnover of inhabitants would occur. The settlement should stand out from other accommodation centres not only because of its placement in an urban, varied context of a 2<sup>nd</sup> biggest city in Denmark, Aarhus, but also because its programme should attract other users: immediate neighbours and other locals. The development should house additional cultural, educational or recreational functions that would make it an attractive point on the map of the local area. It should also not be considered a

facility that enforces control and restrictions over its inhabitants, but an attractive mixed-use area offering its inhabitants good living conditions as they enter the new society.

The most prominent intention behind the project is to explore if and how architecture can provide a link between aforementioned user groups that have been always portrayed in the contrast and opposition to each other. According to Crawley et al. (2019) municipal authorities concerned about social cohesion in the community, should strive to foster '*meaningful social contact between different groups*'. However, for a meaningful interaction to happen, the user groups should not be segregated neither geographically nor socially (Crawley et al., 2019). Hadjiyanni (2019) calls for all the designers to develop solutions that will be useful in eliminating disparities which can lead to healthier communities and resilient cities. This project will be developed with the attitude that design can and should be a driver for creation of 'Culturally Enriched Communities' where there is room and possibility for everyone to be included and grow. Engagement between members of different groups can foster the sense of connectedness and aid in erasing a binary between 'us' and 'them' (Hadjiyanni, 2019).





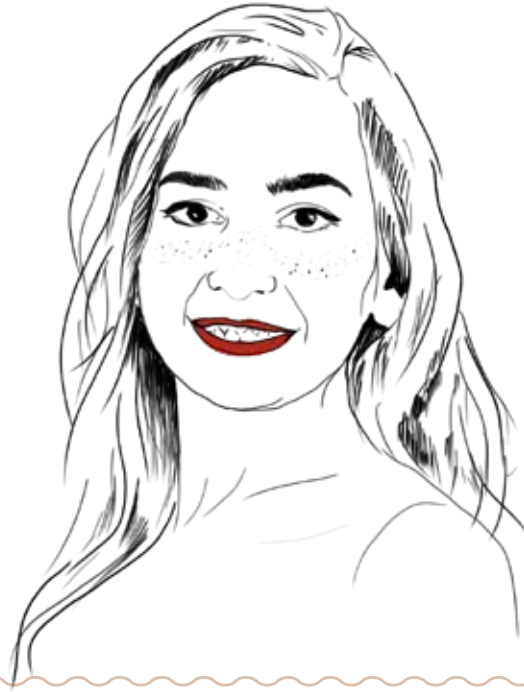
**Asylum seekers** are initially isolated from the rest of the society while waiting and even though they are allowed to come and go out of the facility they have been placed in, they often have insufficient means, opportunities (i.e. lack of convenient public transport in the area or low allowance money) and purpose to travel outside accommodations located in scarcely populated areas. They also are not offered to partake in many socially inclusive and integrative activities, as the assumption is that any such effort might turn out futile, if the application falls through (Bendixen, 2021). Most of the asylum seekers are also prevented from being employed, due to bureaucratic measures (Kreichauf, 2020). To make matters worse, the asylum procedure can last for any time from a few months to 1-2 years, and in some more unusual cases, even longer (Bendixen, 2020).



**Refugees** on the other hand are faced with a challenge of an extensive and strict municipal integration programme just mere moments after the aforementioned asylum applicant experience. They are essentially thrown into a deep end after months or years of uncertainty, temporariness and isolation from the general society (Kreichauf, 2020). It is more likely that over the course of time they have immersed themselves even more into the 'impromptu' community that they have involuntarily created with other inhabitants of the accommodation centres.



**Neighbours and other locals** may not necessarily have positive associations with refugees and asylum seekers, or non-Western foreigners in general due to main media discourse and politicization of immigration in Denmark. One could argue, that these attitudes can be especially present in the chosen location, as it borders the Gellerupparken area, that has been put on the infamous 'ghetto list' in 2011. Even though the area has undergone significant changes over the course of recent years, the bad reputation of a dangerous area, with high percentage of foreign inhabitants and supposedly correlating higher crime rates and lower average education level still prevails.



**Name:** Aaleyah

**Age:** 23

### **Personal background\***

Aaleyah was born in Aleppo, where she grew up and lived until the age of 18. Her life was generally normal until then: she was going to a good school, had funny friends that made her laugh, they all used to meet at the local cafe for brunch on weekends. Her family owned two apartments in the city.

Then, at 18, she was forced to escape Syria due to the life threatening war. She relocated together with her family to Lebanon, then Egypt, then Turkey. She was 21 at this point.

It was right when people were talking more about 'going on a boat'. She didn't think much. She was young, stupid and naive. So she packed her plushy bear, favourite skirt and a picture of her dad and two days later she was on a smuggler's boat from Turkey to Greece. „I have my phone in a plastic bag and I know how to swim. So that's fine!“ - she said to herself and went on. All alone. As a girl. And it is not typical to be a solo girl on that type of a trip... Even worried smugglers ordered her not to admit to anyone that she is on her own, and then they found her a trustworthy „uncle“ for a ride. Not all that bad people, after all. But there is barely enough fuel on a boat to get to Greece in a straight line, so that the guards do not have an option of sending it back when you arrive. To make things even better, no one knew how to sail on Aaleyah's boat. Right is left, left is right. How lovely. The tide was not helping either, people started to panic and scream, and she ended up jumping to the water to push the boat with children in it to reach the land.

In Greece she got along by speaking Arabic, Turkish and English, translating for everyone, and from there she went on foot, by bus (with omitting ambush and stealing) and trains (that she had to jump onto on the run) all the way to Denmark.



*People often say: 'Well, you have to fight for your country and build your country'. And I'm just like: 'okay, why do I need to fight a fight that is not mine? A fight that I didn't even start? Why should I die while other people get to live?'"*

### Interests

Aaleyah wishes she had an activity space or creative workshop where she could draw and read, possibly together with other people. She would also love to have a garden to take care of, to spend time outdoors in a more meaningful way than just mere existence in a temporary facility for months on end.

### Powers

Due to her personal story Aaleyah became truly passionate about spreading awareness and knowledge about how it is to be a refugee. She wants to become an activist and build a platform to talk about those urgent issues.

### Needs

She knows she can not come back to her home country, no matter how hard she wants to. She needs to find another place she can call home. God knows until when. But that's exactly why she is ready to make Denmark her new permanent and beloved home. She just needs to be allowed to do so.

### Feelings

Being in a new country alone Aaleyah is feeling lonely and is missing her family. Beginnings are hard and there is no systematic help in integration. She does not know how to meet new friends and she thinks it would be helpful to have a substitute micro-family, with whom she could feel safe and sound.

### Values

*„The thing is, the system is bad. The people are good. People need a lot of awareness, and then everything would be good. I believe in awareness, not in humanity, but I believe that humans are logical and emotional. If you speak to their logic and give them legitimate information they are very much interested in what you have to say.“*

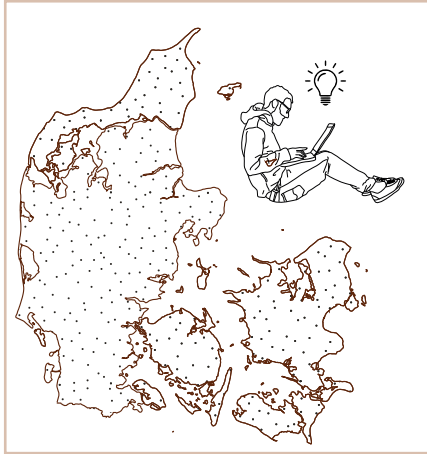
### Aspirations

Aaleyah always dreamed of studying medicine in Syria. She does not speak Danish YET, so she has to choose another study program, as the English-taught program choice is rather narrow. But she is grateful for ANY higher education still being viable for her. In the future she will get a degree and a job in a good office and she will also be fluent in Danish.

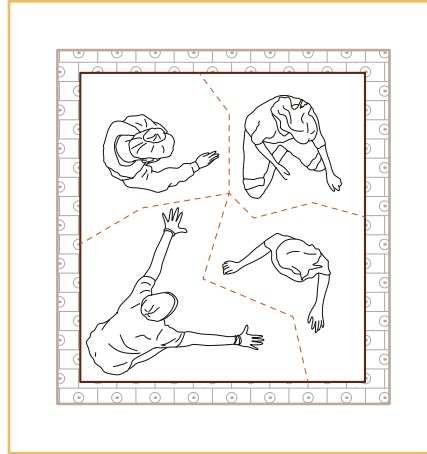
\*Based on a real story

| name and other details have been changed

## Storyboard AS IS



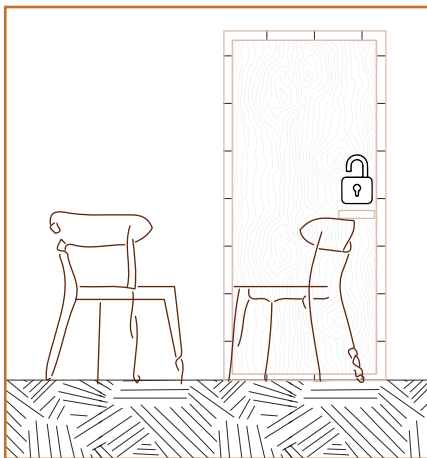
1. Denmark became Aaleyah's primary choice a bit by accident. She has a Syrian friend studying in English there. So it must be possible!



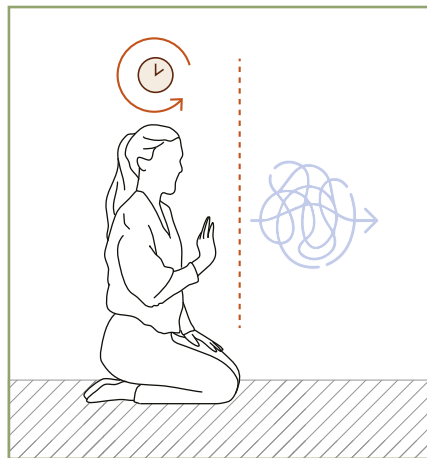
2. When she arrived to Denmark she was pushed back and forth between temporary and permanent refugee camps and then placed in a hostel for single individuals (4 in one small room) in the middle of nowhere, with only a few girls (who were with their families during the day) and around 160 men.



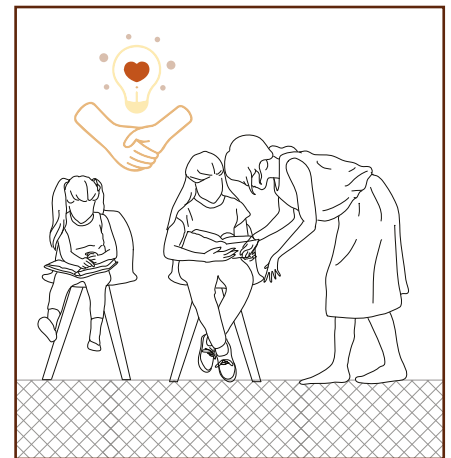
3. They were not allowed to sleep out, did not have anything to do for whole days, weeks, months, years.. that is how people lose their humanity. And they haven't seen a woman in a long while. So she spent 9 months in there in fear and uncertainty, sometimes fainting from stress.



4. Aaleyah could not even lock her room. She would protect herself by leaving a chair blocking the door handle and not drinking too much water, so that she does not need to go to the shared bathroom at night.



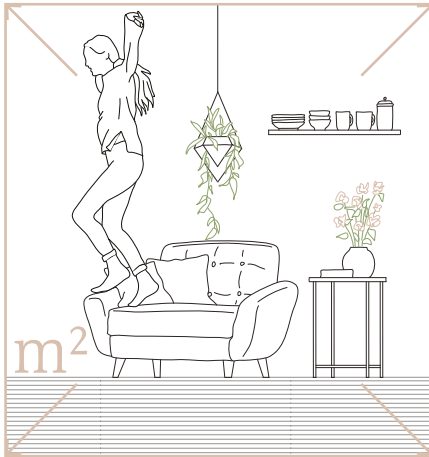
5. She barely remembers this time now, her brain blocked it out as a defense mechanism, as a way to protect herself.



6. To keep her sanity she volunteered as a translator in some other refugee facilities, thanks to her language skills. And she must admit that main camps dedicated for families were actually very nice, taken care of and providing various activities for refugees.



## Storyboard TO BE



1. In a new place where Aaleyah is staying she has her basic dignity kept by providing her with small but sufficient space per one person.



2. Even if space is quite compact she can still feel comfortable in there thanks to some smart storage solutions in the room. She is also sharing a small bathroom just with a few other people or even has her own small toilet!



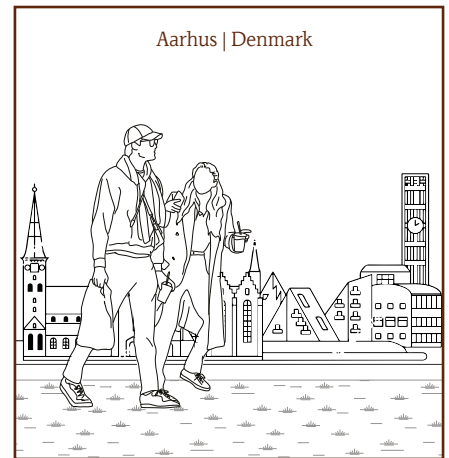
3. She finally does not need to fear for her personal safety and can really unwind her mind and sleep calmly at night thanks to an option to lock her room. She feels like she regained her autonomy and can settle in, or at least to take a breath.



4. As a single individual Aaleyah is living in a new typology dedicated for people like her. She would say it is some sort of dormitory, where she shares small common space with 4 other people. It creates a feeling of micro-community within a bigger group of people residing there. They quickly become her little substitute family.



5. *The Refugee Community Village* provides a wide range of activating possibilities on site in order to occupy individuals productively and in a meaningful way. It helps them to develop their skills, kickstart integration process, strengthen community feeling, and by that to increase general safety in the place.



6. It is also located within the opportunistic city of Aarhus, which helps Aaleyah to meet the Danes and integrate into the new environment quicker.

## Refugee Migration and Well-being

The level of displacement, which is defined as *'the movement of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters'* ("IOM Key Migration Terms," n.d.) has been on the rise in the recent years worldwide. In fact, in 2015 the number of displaced individuals was the highest since the World War II (Sambaraju and McVittie, 2017). That year over 1.25 million people crossed the Mediterranean Sea in hopes to be able to settle in the European Union (Greussing and Boomgaarden, 2017). The number of asylum seekers in Denmark did also peak at the end of 2015 with approx. 21,000 new arrivals (Bendixen, 2021) but it has since gone down drastically, with only 2,095 lodged-in asylum applications in 2021 ("Immigrants and their descendants," n.d.).



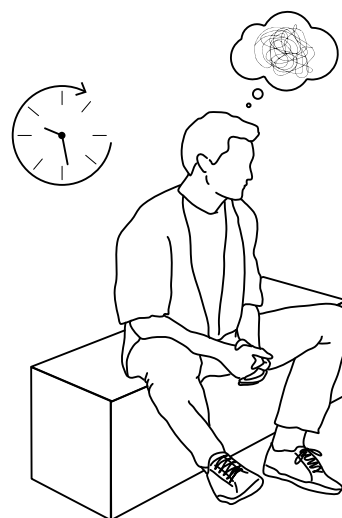
(Immigrants and their descendants, n.d.)

| Ill. 20. Asylum applications in Denmark 2012-2021

Asylum-seekers experience the time leading up to a decision on their application to be very stressful which is a direct reason why the duration of the process and conditions they are placed in while waiting have significant influence on their integration and health (Hvidtfeldt and Schultz-Nielsen, 2018). Due to their often traumatic past experiences as well as challenges in navigating the new post-migration reality, refugees as displaced people are one of the most vulnerable groups within the society (Albers et al., 2021), which by definition means that they have a *'limited capacity to avoid, resist, cope with, or recover from harm'* ("IOM Key Migration Terms," n.d.). Compared to the general population, refugees exhibit higher rates of mental health disorders, such as depression, post-traumatic stress disorder and anxiety. The demanding experience of acculturation

– integrating into a new socio-cultural context while maintaining one's original identity – often leads to acculturative stress (Hameed et al., 2019).

Vitus and Jarlby (2021) have outlined a profile of a group they defined as "young refugees" aged 18-25 in Denmark. The experiences and struggles of this specific group can in many ways be extended to a larger group of refugees and asylum-seekers in Denmark. Even though said group is very diverse in terms of their countries of origin and resources, there are many commonalities regarding their attempts at resettling in Denmark. Due to their past experiences they are especially prone to experiencing physical and psychological trauma as well as exploitation. Their transition into adulthood is marked by uncertainty as they are *'navigating unknown social, linguistic, geographical, and cultural surroundings with potentially new age norms.'* These young people often carry heavy emotional burdens and end up being isolated from the general society as their social interactions are limited due to discrimination and language, cultural and economic barriers. Their struggles with conflicting restrictions and integration efforts often result in *'insecurity, instability, demotivation, loneliness, feelings of exclusion, and an inability to pursue the demands of the MIP [municipal integration programme]'* (Vitus and Jarlby, 2021).



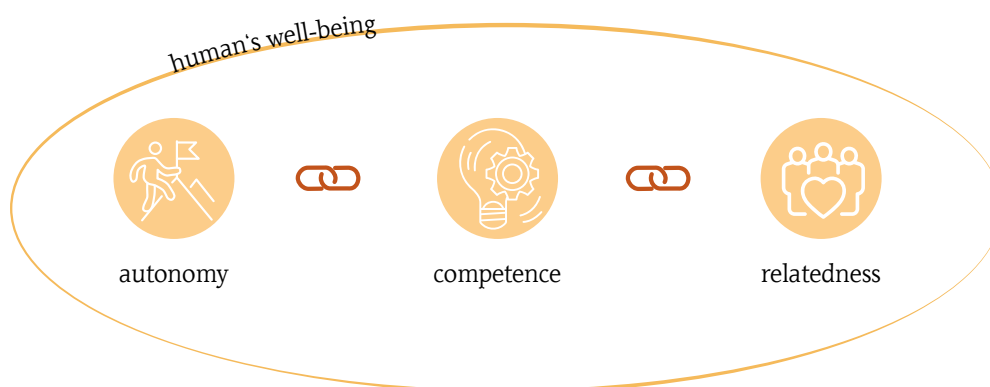
| Ill. 21. Emotional burdens

One of the approaches to counteract the detrimental post-migration effects is to promote inclusion through sense of belonging and well-being of the refugees (Dobson et al., 2021). Resilience, which is the ability to survive and overcome adversity in life, is particularly important for the state of well-being of the refugees and it is dependent on self-esteem and adaptability to stress on a personal level, as well as family and peer support from a social perspective. It has been found that resilience can be improved with use of specific interventions and as a result, the risk of developing mental disorders can be decreased (Albers et al., 2021). Albers et al. (2021) propose using a theory of motivation called Self-Determination Theory, as a theoretical framework for positive integration. The theory defines three basic psychological needs: autonomy, competence and relatedness which are requirements of maintaining any human's well-being (see ill. 22).

The authors suggest that certain actions can therefore positively impact refugees' well-being in the principle of SDT, for example: *'being an active member of a club, for example, the local football club or a choir, can promote relatedness via shared interests'* and *'participating actively in a hobby can support the feeling of being good at something, or of having the capacity of becoming better at a skill, and thus fulfils the need for competence'*. Finally, by giving the individuals room to make their own choices within that framework, the local authorities can fulfil the

need of autonomy and independence of refugees. In that spirit, interventions such as programmes aimed at supporting refugees in finding employment can be a successful way to meaningful integration if they are focused on *'improving competencies (specific to the job [refugees] want to apply for), fostering autonomy (regaining a feeling of being in control by actively searching for a job) and relatedness (by building a support network)'* (Albers et al., 2021)

In their research about professionals' best practices promoting social inclusion in work with refugees, Costa et al. (2021) have pointed at the importance of cultural sensitivity, in the form of showing interest and understanding towards other cultures and their differences as well as willingness to modify certain own behaviours, in interventions aimed at vulnerable persons. Transparency and coherency in informing the refugee about their possibilities, obligations and their consequences as well as accepting their choices are also very important. On the contrary, condescending and victimizing attitudes were proven to be detrimental to developing a fruitful relationship of trust between workers and refugees. Interviewed refugees reported that *'activities that require contact and full immersion in the host society culture, such as field-trip visits to different cities, were [...] a major contribution to gain cultural, geographical and language knowledge, to create communication opportunities and facilitate contact with people outside the support organisation'* (Costa et al., 2021).



(Albers et al., 2021)

| Ill. 22. Theoretical framework for positive integration

## Integration vs. Acculturation

This chapter establishes understanding behind, and differentiation between key terms such as *integration*, *acculturation*, *adaptation*, *assimilation*, etc. which due to being overused in popular discourse in varied contexts, have lost some of their analytical significance and as a result are often mistaken for one another or used interchangeably in everyday speech.

When any intercultural interaction between different populations occurs, cross-cultural psychology observes a large variation of psychological and cultural changes which are referred to as acculturation (Sam and Berry, 2010). Most of the definitions, such as Cole's (2019), describe acculturation from the standpoint of members of a minority as they come *'to adopt the practices and values of another culture, while still retaining their own distinct culture.'* Hence, the term is widely used while discussing immigrants' reality, as they are usually culturally or ethnically distinct from the culture they migrate to (Cole, 2019). However, by definition acculturation is actually a two-way process in which, a result of the continuous first-hand contact between them, changes can occur in original cultural patterns of either of both groups (Sam and Berry, 2010).

According to Sam and Berry (2010), there are various categories of acculturating: integration, assimilation, separation, and marginalization and these appear to correlate with how well one does adapt to the process (Sam and Berry, 2010). In this model, integration *'adopts the receiving culture and retains the heritage culture'* and results in higher levels of reported adaptation than assimilation, which *'adopts the receiving culture and discards the heritage culture'*, separation, which *'rejects the receiving culture*

*and retains the heritage culture'* or marginalization which *'rejects both the heritage and receiving cultures'* (Schwartz et al., 2010). In this context, adaptation is therefore a consequence of acculturation that refers *'to individual psychological well-being and how individuals manage socioculturally'* while assimilation is actually a subcategory of acculturation that takes place when *'individuals do not wish to maintain their cultural identity and seek close interaction with other cultures (or [...] adopt the cultural values, norms, and traditions of the new society)'* (Sam and Berry, 2010).

The outcome of the acculturation process is reliant on the (in)compatibility of two meeting cultures in specific aspects such as values and norms, as well as the dynamics of their contact which can be mutually respectful, mutually hostile or one group can exert dominance over the other. Acculturation takes place on a group and individual level, and the latter can manifest itself in simple behavioural changes but also lead to acculturative stress in the form of uncertainty, anxiety and even depression (Sam and Berry, 2010). In the situation of refugees, both ethnicity and culture understood as *'shared meanings, understandings, or referents held by a group of people'* play a key role in how the acculturation process will unfold (Schwartz et al., 2010). In the past acculturation was regarded as a unilinear process, so the common understanding was that an individual loosens or even loses connection to their culture of origin in the process of adapting to and engaging with the second culture. Currently, a bilinear hypothesis offers that *'individuals can internalize and maintain adherence to their culture of origin (enculturation) and to a second culture (acculturation) with-out losing ties to either'* (Miller, 2010).

Yoon et al. (2013) examined how acculturation, its strategies and enculturation correlate with mental health, and they confirmed that integration acculturation strategy coined by John W. Berry and otherwise known as biculturalism, relates to mental health in the most positive way out of all the categories. The authors' concluded that their finding *'has implications for parenting, education, and policy making in both assisting individuals to develop bicultural competency and creating system-level support conducive to biculturalism (e.g., school curriculum, immigration policy)'* (Yoon et al., 2013).

As per definition, in the context outside of previously discussed Berry's framework, integration is regarded also as a two-way adaptation process between migrants and the receiving society, which entails incorporating them into all major aspects of community life: social, economic, cultural and political. The process comes with rights and obligations for both parties and is intertwined with notions of social inclusion and social cohesion. While integration does not have to imply permanent stay for a refugee, it should grant them access to labour market, services, etc. ("UNHCR Master Glossary of Terms," 2006).

Rytter (2019) delves deeper into Danish-specific context for the term integration, which he claims has been stripped of its analytical significance in social theory due to being overused in the public discourse in relation to largely politicised field of immigration *'to address specific minorities and their more or less unsatisfactory ways of being and belonging in particular nation-states'*. The author argues that the term integration in this specific discourse is not 'innocent' but implies *'specific imaginaries of*

*culture, race and belonging that often disqualify Muslim immigrants per se and cast them as inferior and suspect'*. In essence, Rytter (2019) pinpoints that the word and its use is embedded into the context, reflects the so-called imaginaries of Danish people, which philosopher Charles Taylor would define as what people imagine their own social existence to be like, and that way *'integration'* promotes an asymmetrical dynamic of power between the majority and minority in the country. This specific way of using the term connects to the increase of Danish population's fears of *'the loss of their cultural identity, language and national sovereignty to forces of globalisation personified by the immigrant other'*. (Rytter, 2019)

The aforementioned observations about Danish society are also reflected in Denmark's citizenship policies which are the strictest among Scandinavian countries and imply that the immigrants have to prove themselves and give it their absolute best in their attempt of *'integration'* in the society, which they are likely to fail at, because the policy-makers empathize only with the majority in terms of preserving their values (Brochmann and Midtbøen, 2021).



## Attitudes Towards Refugees, Foreigners and Newcomers

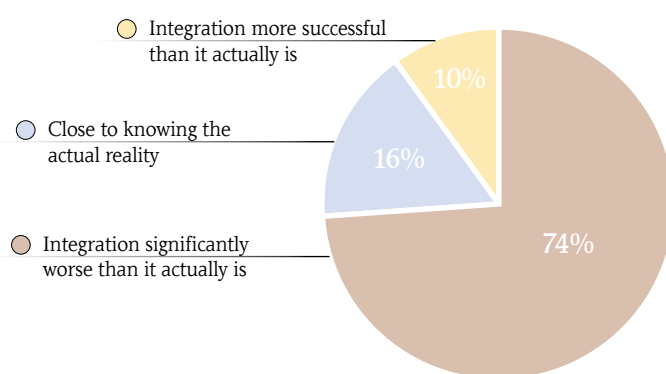
The sudden influx of migrants to Europe in 2015 has been largely covered by news outlets and often dubbed a refugee or migration “crisis” (Greussing and Boomgaarden, 2017). It is worth mentioning that in the media portrayal, the situation was regarded often more as a security and economic crisis for Europe, rather than a crisis lived and experienced by refugees themselves. There was a high level of uncertainty as the “crisis” narrative has been applied to almost all aspects of public life: political, economic and societal. At the peak moment of the so-called “crisis”, Denmark has already been undergoing changes and hardening its immigration laws, and it has since continued to do so (Vitus and Jarlby, 2021). In consequence, back in September of 2015 a majority of refugees that arrived in Denmark had no intention to apply for asylum there, but rather wished to continue on their way to Sweden. Denmark’s restrictions in aspects of family reunification, decreased social benefits and temporary residence permits along with negative refugee-related narratives have already been known and deterred many from attempting resettlement. While the Danish authorities claimed it to be a success, the public reactions were polarized and the country was subject to criticism for not participating actively in solving the crisis from other EU members, including Sweden (Solano and Huddleston, 2020).

Even though the number of asylum applicants declined over the years after 2015, landing at approx. 3560 applications in 2018 (“Immigrants and their descendants,” n.d.), in the Finance Bill of 2019, the Danish government introduced further restrictions and placed focus on return and deportation. The dominant strategies of Danish policymakers in the most recent years were therefore strongly correlated with each other deterrence and temporariness. Martin Bak Jørgensen (2020) noted that *‘Refugees, regardless of their achievements and time of residency in Denmark, are expected to leave. Consequently, integration (as it is portrayed in the Finance Bill) is basically not possible, and refugees remain deportable populations.’* (Jørgensen, 2020).

However, it has to be noted, that the events of 2015 and following government’s actions have also incited a spread of civic solidarity in the Danish society in a form of emerging grass-root-movements and, such as *Venligboerne*, which translates to ‘friendly neighbours’. The initiative had been started in a social centre in Northern Jutland and spread across Denmark as an alternative approach to refugees, with goals such as: *‘providing legal aid, [...], medical support, language training, job-seeking assistance and everyday donations; [...]; setting up*

*social centres; making the problems of the asylum process and integration into Danish society visible; [...]; and articulating the commonalities between people, refugees, and Danes alike’*. The growing network did not affect a political change but it did offer criticism of deterrence policies and offered counter measures including charity donation events to raise funds to help with expensive family reunification processes (Jørgensen, 2020)

Current Danish immigration laws are very much oriented towards discouraging asylum seekers from seeking protection in Denmark. The negative notions are evident in the most recent legislations such as the amendment to the Danish Aliens Act voted on 3rd June 2021, effectively allowing to *‘send asylum seekers to partner states outside the continent while their applications are processed’* (Mathers, 2021) or the declaration of the Prime Minister Mette Frederiksen of *‘working towards a goal of zero asylum seeker arrivals in Denmark’* (Gallagher, 2021). The similar sceptical attitudes have been also detected among the Danish population. In their survey about Danes’ perception of the success rate of the migrants’ integration, Brygger et al. have discovered that *‘74% of respondents were found to believe that progress in integration is significantly worse than it actually is’*. Researchers found that regardless of their political associations, majority of the respondents overestimated crime rates among young non-Western men and underestimated the percentages of employment, enrolment in education and declared support of democracy and equality of non-Westerners (Brygger et al., 2021).



(Brygger et al., 2021)

| Ill. 23. Survey finds that majority overestimates integration problems

Migrant Integration Policy Index is a tool developed to measure and compare integration policies in 56 countries, including all EU Member States. The authors provide a distinction between three dimensions that each country's specific measures are examined within: basic rights, equal opportunities and secure future. Denmark ranks 33<sup>rd</sup> out of 56 with a score of 49/100 and its approach toward migrants is classified as 'temporary integration' which means that while they can enjoy some benefits, foreigners are not afforded the long-term security in terms of permanent settlement. On the contrary it is worth noting that Denmark exceeds MIPEX average score in areas like political participation, labour market mobility, education and health (Solano and Huddleston, 2020).

Vitus and Jarlby (2021) form a similar claim to Jørgensen (2020) and argue that the aim of the national immigration politics of Denmark can stand in contradiction to the intention behind integration politics on a state and sub-state level, which are focused on establishing an economic and socially responsible citizenship of the foreigners. One of the means to achieve that is '*a mandatory municipal integration programme (MIP), which focuses primarily on job training, Danish language classes, and civic education.*' The authors based their research on first-hand testimonies of 'local integration policy workers' and identified three main policies' problematisations which affect young refugees' integration efforts and attitudes as well the local workers' effectiveness in aiding those attempts: '*(1) opposing policies and a short-term perspective, (2) the ongoing tightening of policies and increasing sanctions, and (3) continuous policy changes and complex laws.*' The essential outcome of the study is that the precarious living conditions and stigmatization created by symbolic and actual restrictions imposed on the refugees result in hampering the integration efforts which contributes to a vicious cycle they find themselves trapped in. The paradox of the Danish civic integration approach is therefore that it '*simultaneously aims to integrate immigrants, transforming them into contributing citizens, while also considering them a national security threat*' (Vitus and Jarlby, 2021).

Additionally, regardless of foreigners' country of origin, skin color, reason of migration or any other socio-economic factors, Denmark is generally not an expat-friendly country in regards to integration and belonging (whilst offering generous opportunities in other areas e.g. work or quality of life). In the international study InterNations Survey Expat Insider, which analyzes, among other aspects, the level of hospitality in different countries around the world, Denmark has since 2014 consistently ranked in the bottom 10 in the Index of "Ease of Settling In", constituting of the following categories: feeling welcome, local friendliness, finding friends and language (InterNations Survey Expat Insider, 2021).

“

*While Denmark has consistently ranked in the bottom 10 of the Ease of Settling In Index since 2014, the country doesn't do quite as poorly overall, ranking 37th out of 59 destinations. Just under three in five expats in Denmark (58%) disagree that it is easy to find new friends in the country (vs. 32% globally), and 66% struggle to make local friends there, 30 percentage points more than the global average of 36%. Just 46% rate the general friendliness of the population positively, compared to 69% globally. Two in five expats (40%) do not find people in Denmark to be friendly towards foreign residents (vs. 18% globally). A survey respondent from Mongolia agrees that "it is very hard to get into the network of the locals. I don't have any local friends outside of work."*

~ (InterNations Survey Expat Insider, 2021)

year	no.	out of
2014	58	61
2015	61	64
2016	65	67
2017	last	65
2018	64	68
2019	63	64
2020	63	66
2021	57	59

(InterNations Survey Expat Insider, 2021)

| Ill. 24. Index of "Ease of Settling In" - Denmark's ranking

## Asylum seeking process

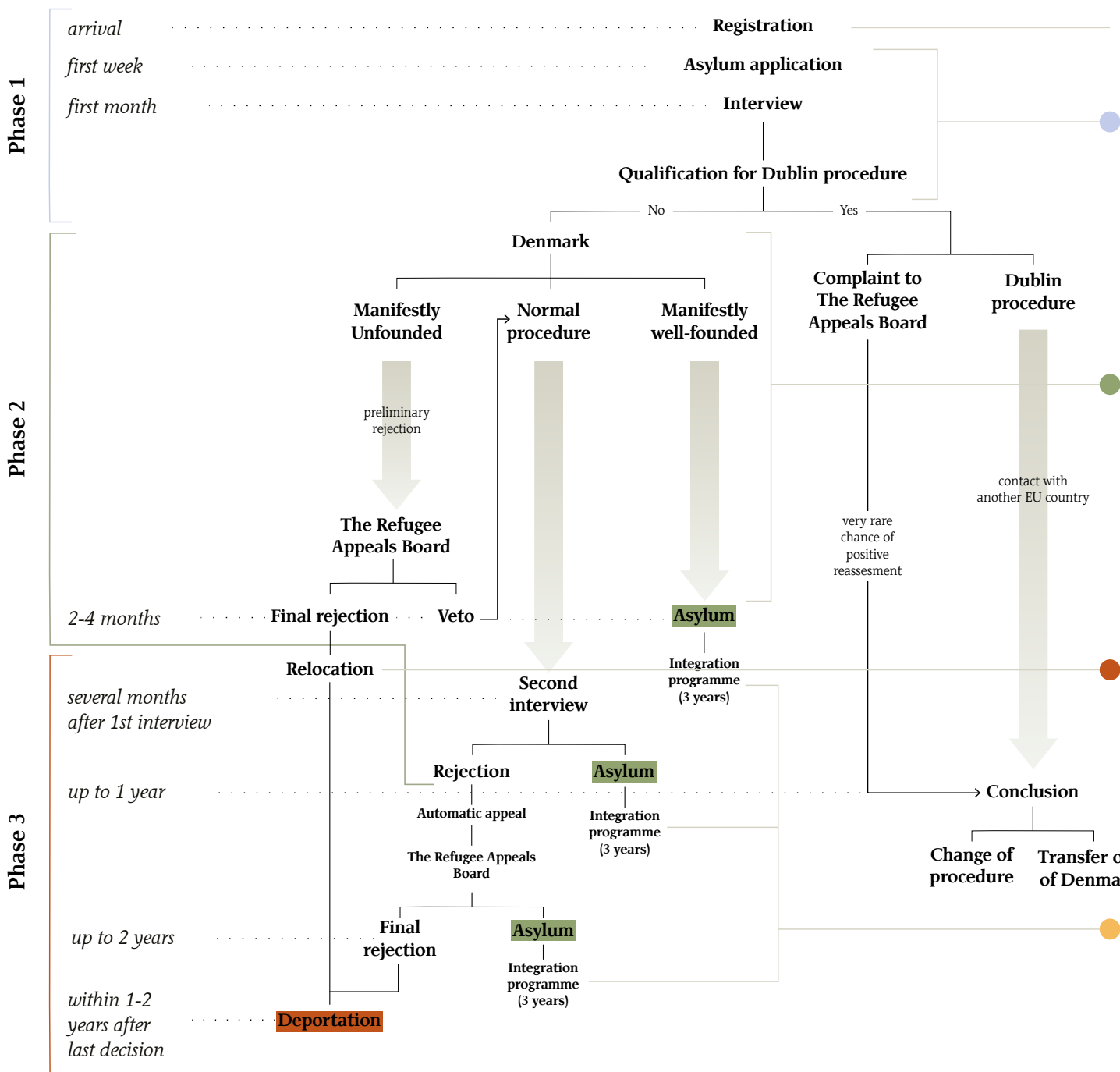
Asylum legislation and associated practices in Denmark have been continuously changing and becoming more restrictive since early 1990s as a result of increasing numbers of arrivals and growing popularity of neo-nationalism and anti-immigration rhetoric (Kreichauf, 2020).

It is possible for a person to apply for asylum in Denmark regardless whether they have entered the country legally or not and it can be done at selected police stations or in the Sandholm Centre

(The Danish Immigration Service, 2021) which is a reception facility, with capacity of approx. 600 inhabitants, where applicants are placed upon registration and can remain in for up to 6 months (Kreichauf, 2020). Most of the asylum centres are operated by the Danish Red Cross, and others are ran by municipalities (Bendixen, 2021a). Asylum seekers move on from Sandholm Centre after a decision which of four possible procedures will be applied: the Dublin procedure, the Manifestly Unfounded procedure, the Manifest Permission

### Timeline

### Process





procedure, or the Normal procedure. First phase determines, if the applicant's situation falls under Dublin Regulation, meaning that they might have some previous significant ties to another EU member, so Denmark can request the other country to take on the case. Otherwise phase two begins, which means the assessment will be held in Denmark and the asylum seeker is moved to an accommodation centre. In case of rejection of the application or lack of cooperation on the applicant's side, they will be moved to a return or deportation centres which is called phase three (Bendixen, 2021b).

## Location

police station  
/Sandholm Centre

Sandholm  
Centre



Short stays - a reception and child centre in old prison barracks.  
Different types of units: family, four pers. rooms with shared bathrooms and double rooms with private facilities.  
Eating in canteen or receiving money allowance for own cooking. Cleaning and laundry chores.  
Laundry, cafeteria, health clinic, resident telephones. Additional common leisure spaces, i.e. sewing room, information cafe and bicycle workshop.

Accommodation  
centres



Often in secluded areas in old military barracks, mainly in Jutland.  
Freedom of movement but with visitor control. Shared rooms for 3-4 people of the same sex, shared kitchens and bathrooms in the hallway. Families sometimes have two rooms and own facilities.  
Mandatory duties, i.e. cleaning shared spaces. Some language education available (Danish and English). Some possibilities to engage in activities.  
Less activities in centres for single residents and no families.

Detention/  
return centre



Isolated, away from public transport, with surveillance, high metal fences, stays outside only up to 24 hours.  
No possibilities of employment or financial allowance.  
No possibility to cook own meals, only eating in canteen at set times.  
Inspections, common violations of privacy. None or almost no activities. Frustration and conflicts among the residents.  
For single men and women. Families housed in Avnstrup with better conditions.

Municipality

An average asylum seeker has spent approx. 1,5 year (approx. 550 days) in the Danish asylum system in 2016. However, in certain cases people spend many years in the asylum centres when their case has been denied but for various reasons they cannot be deported (Bendixen, 2020). Most of the facilities are located in rural, scarcely populated areas which results in asylum seekers having difficulties with *'meeting any Danish citizens, getting in touch with their family members, obtaining counselling with regard to their asylum case, and in general keeping themselves occupied'*. People might also be moved around a lot and the staff can be changed often as a result of constantly changing number of accommodation centres depending on the numbers of applicants (Bendixen, 2021a). According to the Aliens Act, asylum seekers do not have access to social institutions and integration strategies before they are deemed eligible to receive protection status but immediately after, they are faced with multiple requirements placed on them to earn access to the Danish society. Only after 6 months in the system, asylum seekers can apply for a permission to work and live outside the centre but unfortunately, most of them end up missing out on that possibility as in the process they would be required to sign a contract which *'can engender an immediate departure after the first rejection of the case and thus circumvent the possibility to appeal the decision'* (Kreichauf, 2020).

If an asylum seeker is granted a permit, they are assigned to a municipality where they are obliged to participate in a 3-year integration programme (Bendixen, 2021b) and other cultural, language and job-seeking related activities, which is a prerequisite to receive social benefits. The location of resettlement is decided by the Immigration Service and the individual in question does not have a say in it. A paradox of the system is that an asylum seeker is first mostly isolated from any forms of active participation in the society, possibly for months or even years, depending on their situation, but upon receiving an approval, they are expected to integrate as quickly as possible with a set of tight restrictions set in place to enforce that process (Kreichauf, 2020).

(Bendixen, 2020), (Bendixen, 2021)

| Ill. 25. Asylum procedure

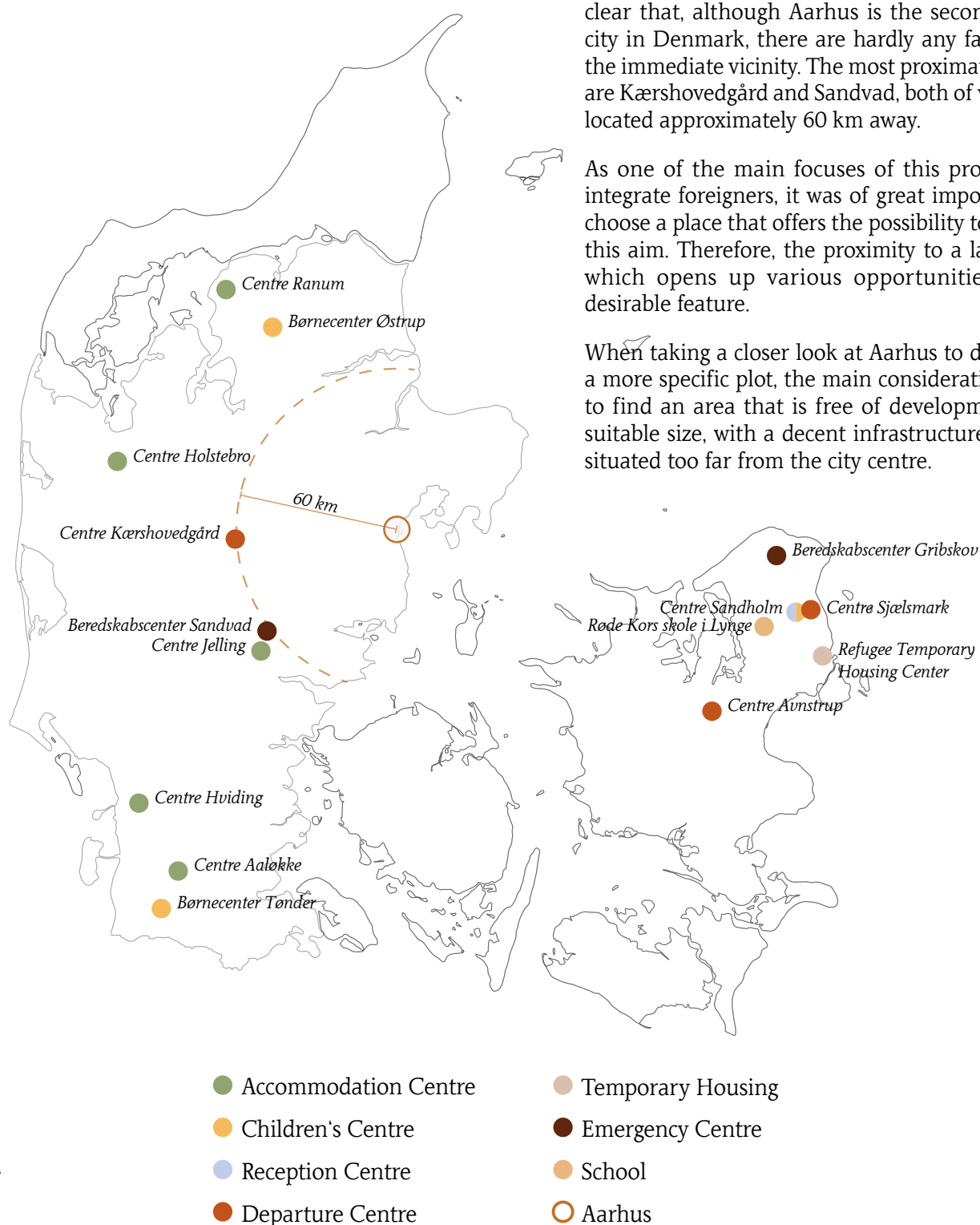
## Introducing the Site and Context

### National arena mapping

As displayed on the map, there are various types of facilities for refugees and immigrants across Denmark, serving different purposes: 1 reception centre (Sandholm), 3 departure centres (Kærshovedgård, Avnstrup & Sjælsmark), 3 children facilities and the remaining 5 accommodation centres all located in Jutland (Udlændingestyrelsen, 2021). While mapping out the centres it became clear that, although Aarhus is the second largest city in Denmark, there are hardly any facilities in the immediate vicinity. The most proximate centres are Kærshovedgård and Sandvad, both of which are located approximately 60 km away.

As one of the main focuses of this project is to integrate foreigners, it was of great importance to choose a place that offers the possibility to support this aim. Therefore, the proximity to a larger city, which opens up various opportunities, was a desirable feature.

When taking a closer look at Aarhus to determine a more specific plot, the main considerations were to find an area that is free of development, of a suitable size, with a decent infrastructure and not situated too far from the city centre.



(*'Røde Kors asylcentre'*, no date) (Udlændingestyrelsen, 2021)

| Ill. 26. Introducing the site and context - Asylum centres in Denmark

## The history of the “ghetto list”

With the realization of no proximate facilities of the similar character with temporary and emergency accommodation for asylum-seekers around Aarhus, there came a need for investigating the legislative situation of local districts in Aarhus. Although there are no facilities of our kind in the Aarhus area, there are concrete rules concerning already residing there immigrants and descendants from non-Western countries, contained in the annual “ghetto lists”.

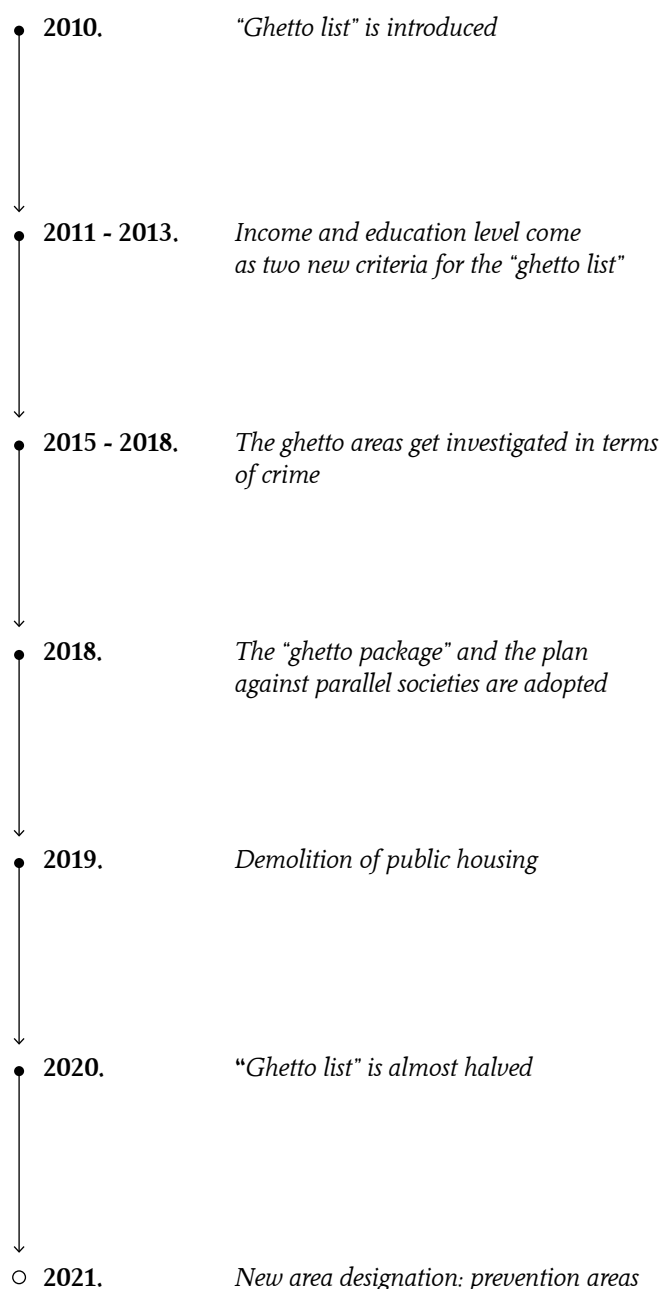
The first “ghetto list” was published on 26 of October 2010 in the Ministry of Social Affairs. Since then an annual list of the vulnerable Danish housing areas have been released each 1<sup>st</sup> of December. It was also that year (2010) when Denmark’s first so-called ‘ghetto package’ was made - *“The ghetto back to society - a showdown with parallel societies in Denmark”* (*‘Ghettoen tilbage til samfundet - Et opgør med parallelsamfund i Danmark’*, 2010), outlining the three criteria to be met (connection to the labor market, crime level and ethnicity) in order to be categorized as “ghetto”.

Another two criteria were added between 2011 and 2013 - now the income and level of education also played a role, which meant that even employed diligent residents, but with low counts in these categories, could potentially contribute to categorization of the area on the “ghetto list” (BL, Danmarks Alemne Boliger, 2021).

As a result of the gang war raging in Copenhagen in 2017, the government decided to investigate the crime levels in the “ghetto areas”. Although only two out of 22 areas lived up to the crime criterion in 2017, a new ghetto package and the plan against parallel societies were adopted with the new year of 2018. It was called *“One Denmark without parallel societies – no ghettos in 2030”* (*‘Et Danmark uden parallelsamfund - ingen ghettoer in 2030’*, 2018). In the updated ghetto package the “vulnerable residential areas” (Udsatte områder) and “hard ghettos” (hårde ghetto-områder) were added to the list, alongside the “ghetto areas” that were already listed in the previous years.

The new plan included demolishing existing public housing in some areas, forcefully relocating inhabitants with the aim of spreading and rehousing them. In the other areas more control was taken in terms of who is allowed to move in. Some housing was to be prepared for sale, attractive for private investors. These decisions were aiming at reducing the share of public family housing (almene familieboliger) to 40% by 2030, transforming the “ghettos” into ordinary residential areas - by demolitions, divestments and new construction (BL, Danmarks Alemne Boliger, 2021).

This resulted in the list being almost halved in 2020 (15 “ghetto areas” in 2020 down from 28 in 2019). This positive development was also driven by increased employment and education rates, and less convicted residents compared to the national average (Antallet af ghettoområder er næsten halveret på den nye liste, 2020).



(BL, Danmarks Alemne Boliger, 2021)

| Ill. 27. The history of the “ghetto list” - timeline

## Particularly vulnerable public housing areas

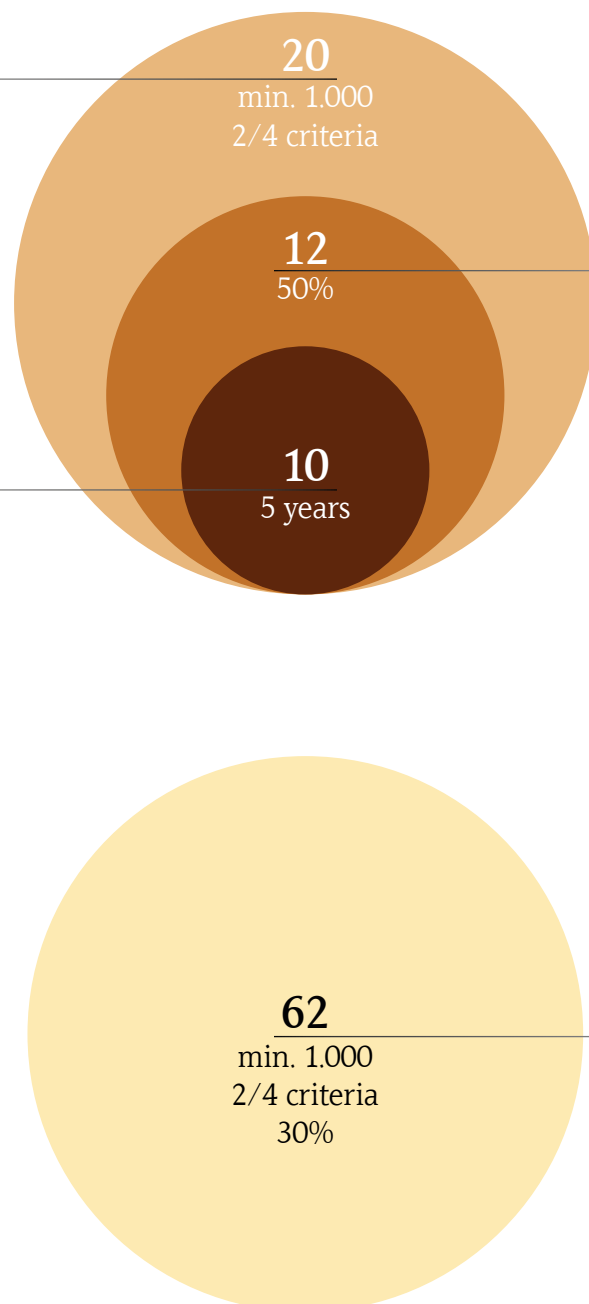
### Vulnerable residential areas

*A vulnerable residential area means a social housing residential area where at least 1,000 residents live and where at least two of the following four criteria are met:*

### Transformation areas

*(formerly called "hard ghettos") Residential areas that have been on the parallel community list for five years are defined in the legislation as a transformation area. The development plans indicate how the share of public family housing by 2030 will be reduced to 40 percent, or the share for which a dispensation has been granted.*

Area (in Aarhus)	No.
Bispehaven	2.128
Gellerupparken / Tovesøj	5.135



As of 1<sup>st</sup> of December 2021 a new vocabulary was introduced and the stigmatizing word "ghetto" was cancelled. From now on "ghetto areas" are called "parallel communities", and "hard ghettos" are now referred to as "transformation areas". Also, on 15<sup>th</sup> of June 2021 new legislation has passed called "Agreement on Mixed Residential Areas – the next step in the fight against parallel societies (prevention areas)" ('Aftale om Blandede boligområder - næste skridt i kampen mod parallelsamfund (forebyggelsesområder)', 2021). It introduces new designation areas: "prevention areas" all around the country, imposing

new restrictions, giving instructions and ensuring they will not further develop negatively (Ny aftale skal forebygge parallelsamfund, 2021).

Currently there are 62 prevention areas ('Forebyggelsesområder', 2021), 20 vulnerable residential areas ('Udsatte boligområder', 2021), 12 parallel communities ('Parallelsamfundslisten', 2021), and 10 transformation areas ('Omdannelsesområder', 2021) (Faldet i antallet af udsatte boligområder fortsætter, 2021).

**Parallel communities**  
*(formerly called "ghettos")*  
*A parallel society is defined as a social housing residential area with at least 1,000 inhabitants and where at least two of the criteria relating to employment, crime, education and income are met, and where the proportion of immigrants and descendants from non-Western countries exceeds 50 percent.*

### Labor market



**< 40%** 18-64 y.o.  
*unemployed or under no education*  
*(2 years average)*

### Crime



**3X more**  
*convicted of crimes*  
*(than the national average)*  
*(2 years average)*

### Education



**< 60%** 30-59 y.o.  
*with only basic education*  
*(of all residents in the same age group)*

### Average Gross Income

*of tax-paying 15-64 y.o.*  
*(excl. education seekers)*



**> 55%**  
*of the average gross income for the*  
*same group in the region*

**Prevention areas**  
*A prevention area is defined as a residential area (incl. social housing) with at least 1,000 inhabitants and where at least two of the criteria relating to employment, crime, education and income are met, and where the proportion of immigrants and descendants from non-Western countries exceeds 30 percent.*

### Labor market



**< 30%** 18-64 y.o.  
*unemployed or under no education*  
*(2 years average)*

### Crime



**2X more**  
*convicted of crimes*  
*(than the national average)*  
*(2 years average)*

### Education



**< 60%** 30-59 y.o.  
*with only basic education*  
*(of all residents in the same age group)*

### Average Gross Income

*of tax-paying 15-64 y.o.*  
*(excl. education seekers)*



**> 65%**  
*of the average gross income for the*  
*same group in the region*

Area (in Aarhus)	No.
Frydenlund	2.324
Århus Vest	3.688
Vejlbys Vest	1.078
Skovgårdsparken	1.419
Langkærparken	1.951



## Local arena mapping

The site chosen for this project is located on the very borders of transformation areas Gellerupparken / Toveshøj and Bispehaven. This results in inability to offer long-term accommodation for immigrants and descendants from non-Western countries in *the Refugee Community Village*. Moreover, the

facility has to support the goals described in the development plan in the transformation of the area from a monofunctional residential area to an attractive “multifunctional” district with businesses, educational institutions, workplaces, etc., opening up to the rest of Aarhus (Helhedsplan Gellerup, 2007).

● Langkærparken

● Bispehaven

● Toveshøj

● Site

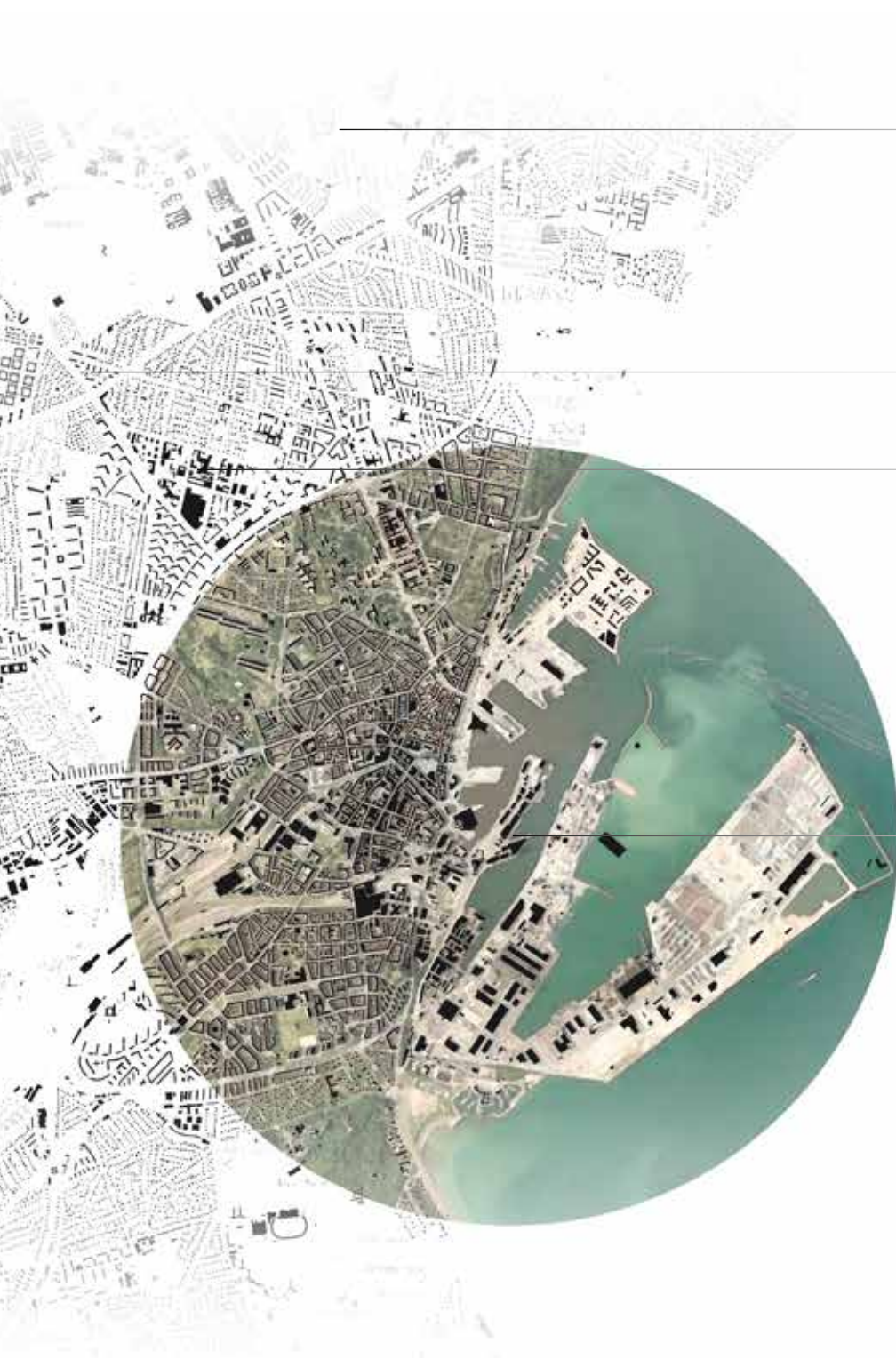
● Gellerupparken

● Skovgårdsparken

● Prevention areas

● Transformation areas

● Site



Vejlby Vest ●

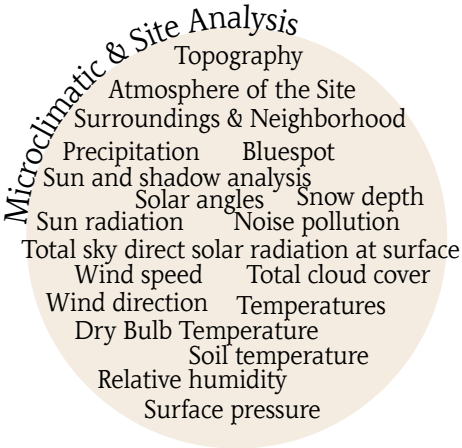
Århus Vest ●

Frydenlund ●

Århus Center

## Site Level // Microclimatic Analysis

The site level is focusing on the microclimatic aspects and the atmosphere of the chosen location. This is to provide an overview of which aspects need to be considered and implemented into the further design process.



(Project Diagram p.8-9)

| Ill. 30. Project Diagram - Microclimatic Analysis zoom-in





## Neighbourhood's atmosphere

A site visit was very crucial for the development of this project, as the intention was not only to take photographs and become familiarized with the chosen plot itself, but also with its neighborhood.

Over the years, Gellerupparken has earned a reputation of being troublesome and back in 2011 it has been put on a list of so-called 'hard ghetto' areas, today renamed as 'transformation areas' ("Gellerupparken," 2021). Since then, a new development strategy, including a master plan developed by studio EFFEKT in 2009 ("Gellerup," n.d.), have been created and a lot of changes and new-built additions have been made in the area. Some buildings from the original masterplan have been demolished as a required part of the transformation. Most notably there are new apartment complexes, offices and public buildings along the Karen Blixen Boulevard and the quite beautifully transformed picturesque Gellerup Park in the middle of the area (see Ill. 26.).

Despite that, the word of mouth still seems to be, that the area is dangerous or sketchy at best, so it was important to investigate, what the project's authors' perception would be.



("Gellerup City Park", n.d.)

| Ill. 31. Gellerup Park by EFFEKT



(*"Gellerup", n.d.*)

| Ill. 32. Gellerupparken in 2008



(*The Danish Agency for Data Supply and Efficiency, 2022*)

| Ill. 33. Gellerupparken in 2022

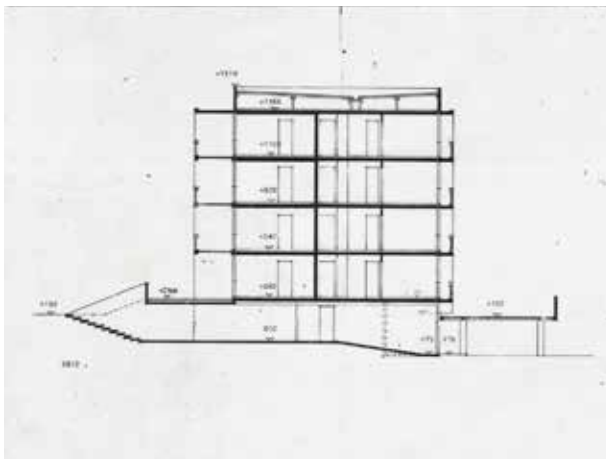


## Gellerupparken

As a modernistic settlement of four and eight story precast concrete apartment blocks, designed by architects K. Blach Petersen and Mogens Harbo and built between 1968 and 1972 ("New book - Gellerupparken," 2021), Gellerupparken offered a lot of quality to its future residents. What stands out to this day are the spacious green areas in between the blocks, reduction of vehicular access and the placement of the parking lots allotted to each building below the level of the ground floor units and the recreational green areas. Additionally, all of the various one- to five-room flats have an enclosed balcony with a quite large glazing. Back in the 70s, it was also very attractive that each apartment had one or two bathrooms and central heating ("Gellerupparken," 2021). Architectural inspiration can be drawn from the original, prefabricated modular frame system of the characteristic apartment blocks as well.

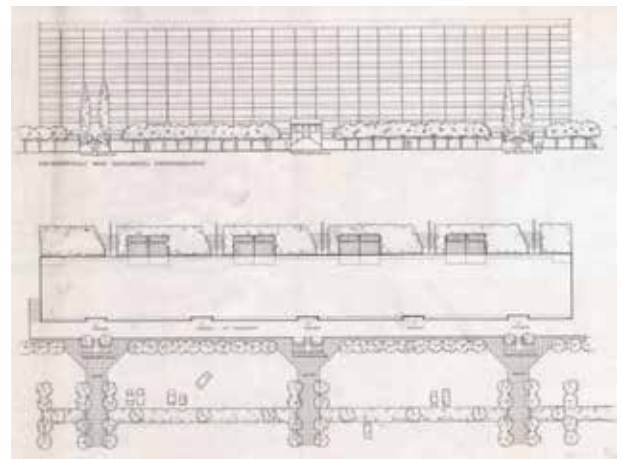
The general physical state of the buildings today seems to be acceptable although the tear-and-wear is noticeable. The exposed prefab concrete elements in the facades are minimalistic and can seem rough or brutalist even, which can contrast the majority of Danish historical and contemporary architecture. It could definitely be beneficial to conduct an external renovation of the buildings, but it seems radical and uncalled that the same type of buildings in the area were torn down as a result of an arbitrary administrative measure. What is more, throughout the settlement many yellow posters claiming 'Vi flytter ikke' can be spotted, alongside some occasional Danish flags. The inhabitants seem to be attached and unwilling to move out of the area they have often resided in for many years.

Even on a rainy, gloomy day, Gellerupparken does not appear to be scary or uninviting, as there is a lot of promise in the new mixed-use developments popping up in the area as well as a lot of functionality and consideration in the layout of the original concept.



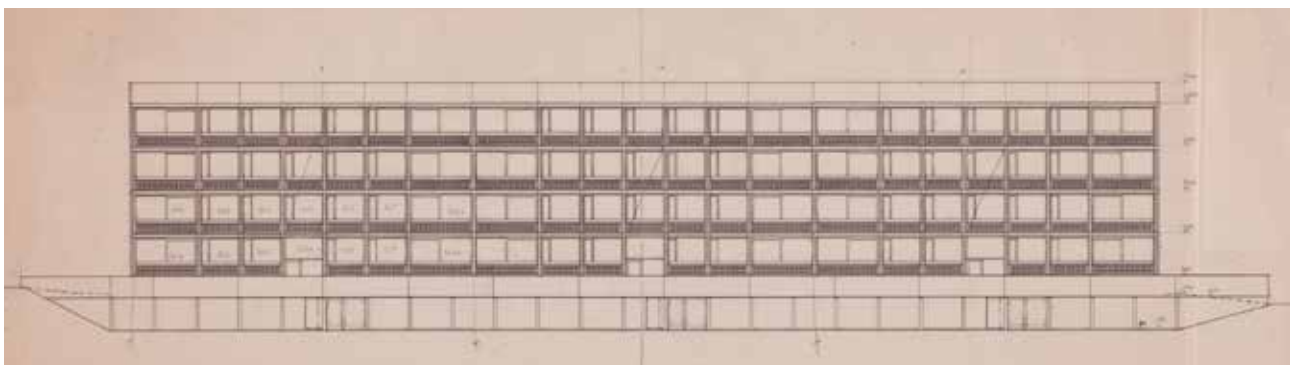
(Blach Petersen, 1969)

| Ill. 34. Section of a four-story building



(Blach Petersen, 1969)

| Ill. 35. Drawings of a building by Gudrundsvej



(Blach Petersen, 1969)

| Ill. 36. North facade of a four-story building



Early in the process, analyses of the climatic conditions for the area were conducted. Especially the bluespot analysis showed that certain areas should be taken into account. These were taken under consideration in the initial master plan studies. The microclimatic analyses and master plan proposals can be found in the Appendix 2.

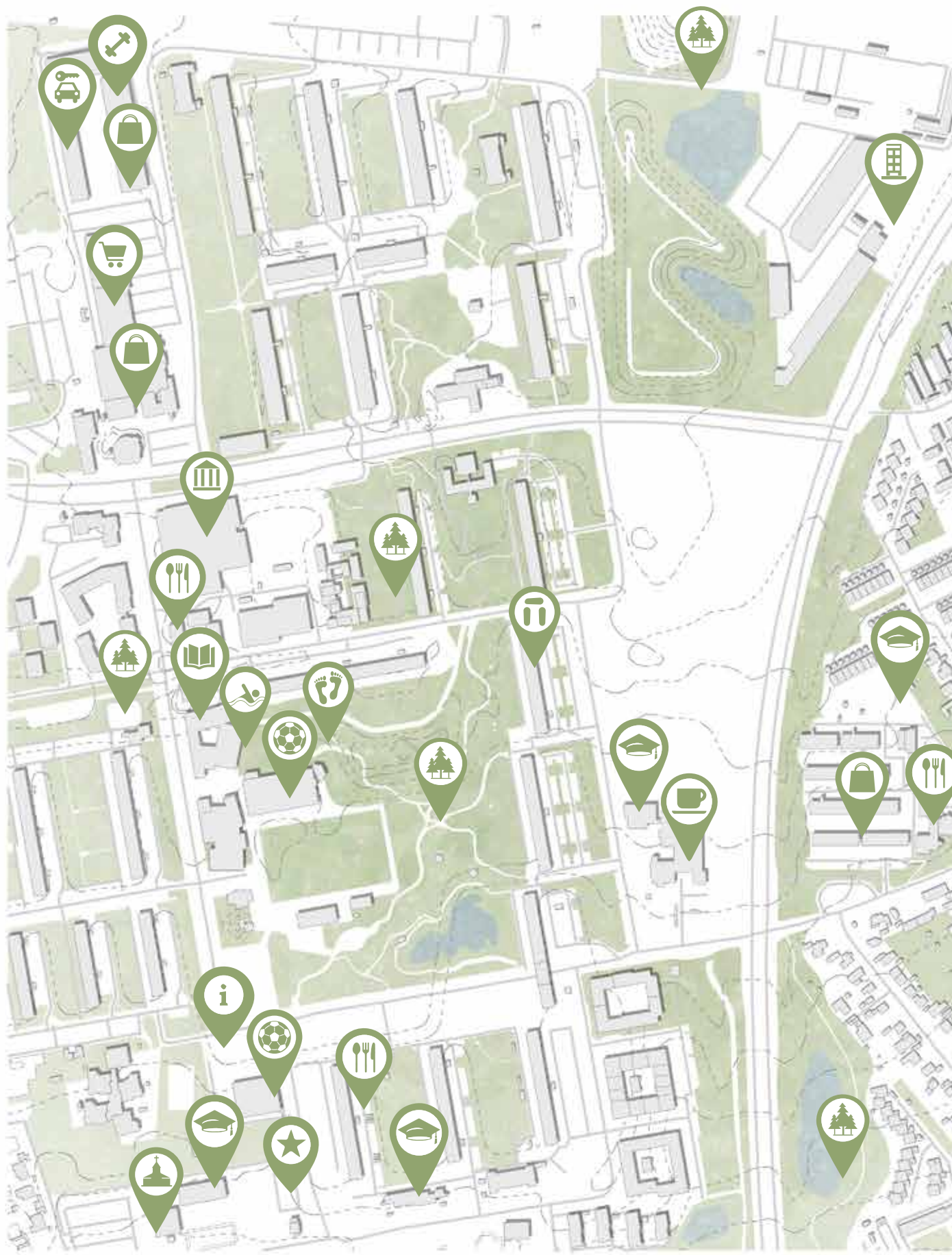
An important aspect, especially in terms of how to connect to the neighboring areas, was an overview of the access points to the project site. In addition, the various functions that are located in the vicinity were included in the mapping process. Attention was paid to whether there are missing functions in the surrounding area or whether there are already spaces in the immediate proximity that are beneficial for an interaction between the user group and locals.















*Grocery // Shopping*



*Governmental office // Museum*



*Business center // Coworking office*



*Library // Schools & Kindergartens*



*Cafe // Restaurant*



*Park // Forest // Common garden*



*Gym // Sports hall // Climbing // Swimming*



*Information center*



*Car rental*



*Church*

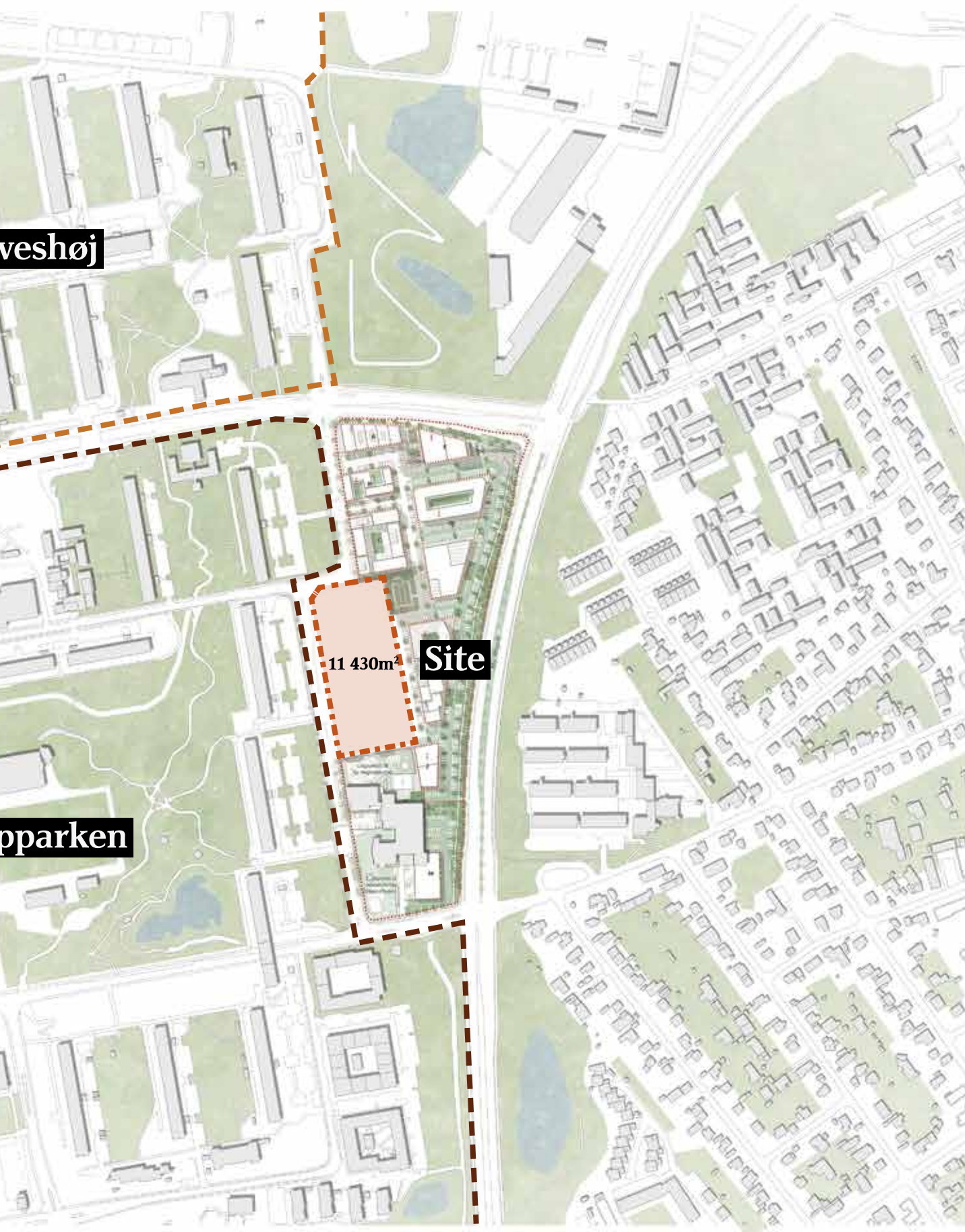


*Event space*

During the other sociological analysis and development of the aim for the project, it became clear that the focus should be on a building system that represents a new typology. In order to narrow the project scope and focus more on the elaboration of this building system, the initial masterplan studies were put on hold and the existing local plan was used ("Lokalplan nr. 1103," 2019). Based on the initial mappings, a plot of this local plan was selected on which the project will be concentrated - as it is a modular system, it can still be applied to a larger area at a later stage if this becomes desirable.

The chosen plot is bordered by Gellerupparken and the already existing health care and kindergarten facility. Furthermore, it is located at one of the access points analyzed earlier. A more detailed description of the chosen plot can be found in the next chapter.







## Topography

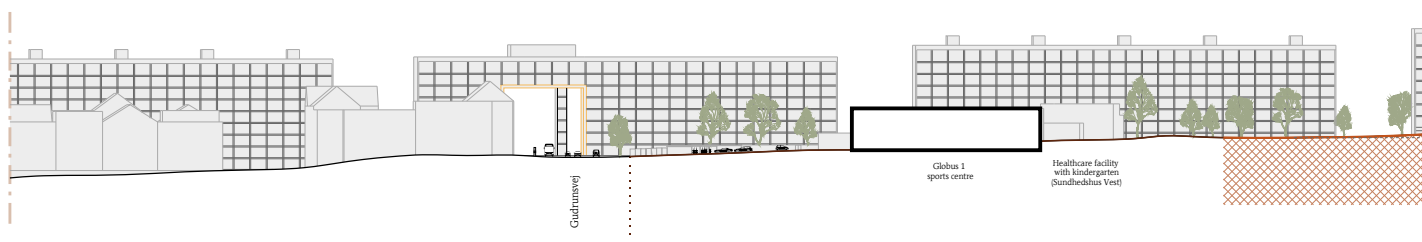
The building proposal should establish a connection to the neighbouring buildings and their background/history and not represent a stand-alone project. This connection should provide added value for the residents.

The chosen plot is a part of a larger, roughly 340m long and 150m wide site in Brabrand, part of Aarhus Municipality, covered by a Local plan no. 1103. The site which is surrounded by three roads: Åby Ringvej, Edwin Rahrs Vej and Gudrunsvej slopes down towards the south, creating a height difference of approximately 7m which is decipherable but does not pose a bigger challenge. It creates the opportunity to improve access to daylight through different building heights and arrangements.

There is no significant vegetation or connection to landscape qualities on the site. A connection to the outdoor environment and greenery is therefore sought at a site level.

Another very formative factor is the lateral boundaries by roads. The most heavily frequented road is the one to the east, which has an influence on the design especially with regard to the arrangements of functions on an urban as well as building level. Dealing with these strong boundaries will also be interesting in terms of the desired connections of this project to the neighbouring developments and properties.

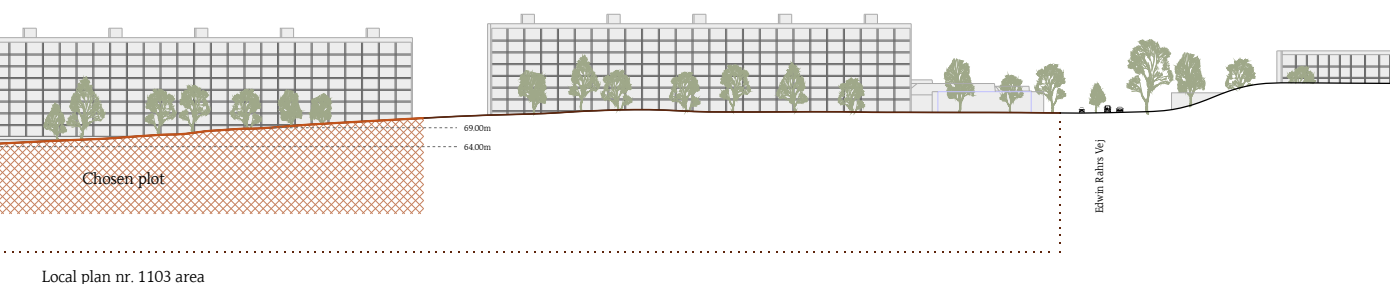
The final building plot is a south-western excerpt of the larger previously described area and a choice has been made to assume that the remaining site will be developed according to the Local plan from 2019 ("Lokalplan nr. 1103," 2019). The specific fragment measures about 70 meters in width and 165m in length with an area of 11430m<sup>2</sup> (1,14ha). It has been selected due to its location away from the most busy road and in the proximity of the Globus 1 sports centre complex and a new healthcare facility joined with a day care for children. These are all functions already fostering community creation and interaction of local population.





("Lokalplan nr. 1103," 2019)

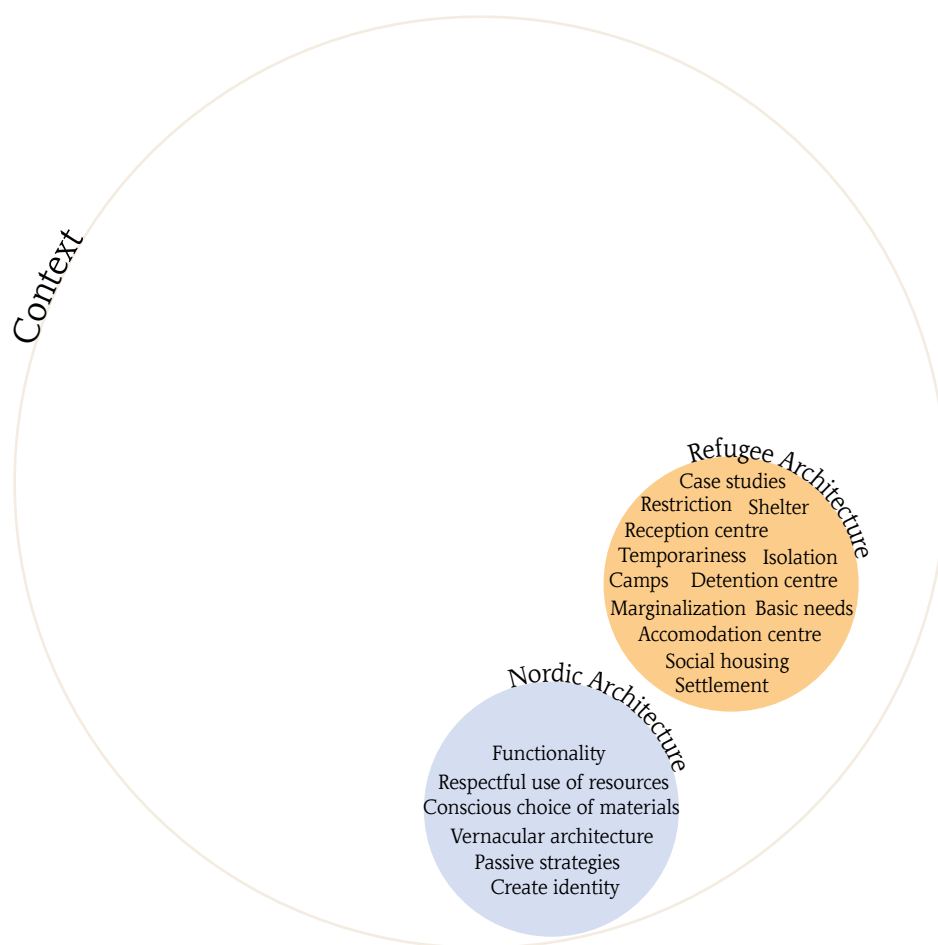
| Ill. 41. Aerial photo of the site with surroundings



| Ill. 42. Topography section

## **Building Level** // Architectural & Functional Considerations

The building level is displaying various themes which are influencing the design of the project and the resulting atmosphere and quality of the building. These themes cover a variety of aspects, and their implementation and effects are relevant in different aspects of design.



(Project Diagram p.8-9)

| Ill. 43. Project Diagram - Context Architecture zoom-in





# Nordic Architecture

The expression Nordic Architecture is commonly referred to and is associated with simple, functional, and aesthetic architecture that respects the environment. As the project is situated in a Nordic context, it is of interest to integrate aspects that are common in Nordic Architecture. While asking the question, how can this identity be combined with the backgrounds of other cultures to create a welcoming atmosphere?

As for the term Nordic Architecture and how it has developed over time, or what it stands for:

Until the 19th century, the Nordic countries did not have great influence on architectural styles. Most of the buildings were built in other historical styles or were based on vernacular architecture. (in most Nordic countries vernacular architecture is based on timber constructions, while in Denmark it goes back to masonry). Through the influences of vernacular architecture, the buildings always offered practical solutions to problems often encountered in Nordic countries, such as maximising daylight during the winter months. (Reuben, 2019)

At the beginning of the 20th century, the term Nordic Architecture and its connotations gained importance. The Nordic countries rejected historicism and began to combine the new international style, technological innovations, and the traditions of vernacular architecture. The most prominent characteristics are incorporating functionality, comfort and simplicity while being in balance with nature. (Reuben, 2019)

Some representatives of Nordic Architecture are:

- Sweden: Gunnar Asplund, dealing with the combination of minimalistic aesthetics and humanistic qualities
- Finland: Eliel Saarinen and Alvar Aalto, softening functionalism with organic and humanistic touches
- Denmark: Arne Jacobsen and Jørn Utzon
- Norway: Arne Korsmo and Sverre Fehn, creating a balance between contemporary forms and contextual considerations
- Iceland: Guðjón Samúelsson, focusing on considerations for landscape

(Reuben, 2019)



(Stockholm Public Library by Gunnar Asplund, 2018)  
| Ill. 44. Stockholm Public Library, 1928, Gunnar Asplund



(Guthrie and García Barba, 2013)  
| Ill. 45. Cathedral Museum of Hedmark, 1988, Sverre Fehn

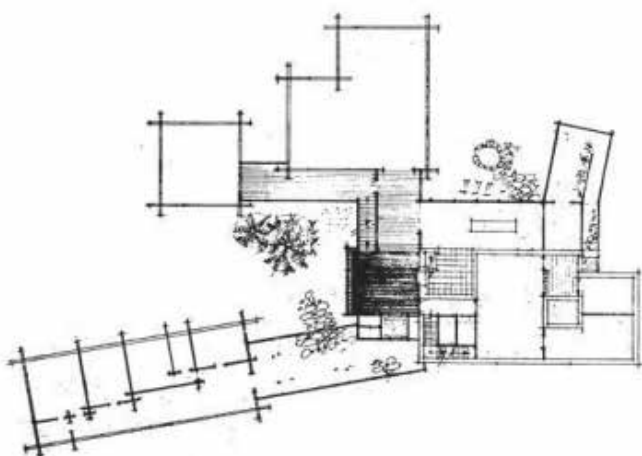


(Brekkestranda Fjord Hotel, 2012)  
| Ill. 46. Brekkestranda Fjordpensjonat, 1966-70, Bjørn Simonnæs

Jørn Utzon and his theories on additive architecture will be examined in more detail later in the research part. Other architects mentioned above, and their theories will be discussed in further depth in the following section. (Champion, 2019)

The humanistic qualities in Asplund's work relate to human scale and proportion. Like other Nordic architects, Asplund referred more to an architecture of place than an architecture of time. In order to focus on his users, he tried to engage their imagination and curiosity. Asplund worked with what he called "focal pointers" and "clues". Focal pointers are meant to clarify functions of the space while clues are intended to encourage exploration of the architecture by creating a glimpse into further spaces. (Champion, 2019)

Aalto derived the flow and structure in his architecture from nature, using the Karelian house as a metaphor. (Champion, 2019) Karelian Architecture is about the awareness of site and tradition combined with detailing. It is a question of the honesty of materials, lightness, and the fact that it is an element of nature. Aalto compared the Karelian house to a biological cell, as it had the possibility of organic growth and addition while being based on vernacular practice. Aalto's idea of a "growing house" was a paradigm for architecture influenced by nature. Karelia buildings show how human life and nature can harmonise in the best possible way. (Ferrer Forés, 2010)



(Ferrer Forés, 2010)

| Ill. 47. Additive Plan for Villa Tivistbo by Alvar Aalto, 1944

Sverre Fehn was very mindful of the context, combining intensive considerations on materials and site investigations in his architecture. The aim was to use the place as a support and thus bring the beauty of the surroundings to the front. It is about spatial hierarchies and contrast as well as the dissolution of inside-outside relationships of conventional rooms. An important point is the use of materials, as they "write a story inoperable from structure". Materiality is not limited to the detail or the building, but also relates to the site and culture. (Champion, 2019)



humanistic qualities //  
human scale



architecture of place //  
contextual considerations



honesty of materials //  
lightness // nature

| Ill. 48. Key factors of Nordic Architecture

Key representatives in the discussion on Nordic Architecture are also the theories of Pallasmaa, Christian Norberg-Schulz and Nils-Ole Lund.

In his work *The Eyes of the Skin: Architecture and the Senses*, Pallasmaa linked architecture to the senses. He criticised that the visual sense is the most dominant when it comes to experiencing the built environment and appealed for architecture to engage all the senses, allowing our bodies to create a reference to space and time. (Pallasmaa, 2012) In the context of Nordic Architecture, Pallasmaa believes that through new works, old works appear in a new perspective and their essence is revealed, allowing to create identity. He does not see the traces of time as a negative, but rather that a building's patina enhances it by telling the story of life and time. (Pallasmaa and Zumthor, 2012)

Christian Norberg-Schulz often addresses the genius loci or spirit of a place. The concept of genius loci goes back to an ancient Roman belief that everyone has a guardian spirit that gives life to people and places. Together with Heidegger's concept of gathering, the meaning of the term genius loci emerges. He finds that architecture has its justification in its poetic connection to place and not in tackling social meaning. (Haddad, 2010)

“

*The existential purpose of building (architecture) is therefore to make a site become a place, that is, to uncover the meanings potentially present in the given environment.*

~ Elie Haddad (Haddad, 2010)



| Ill. 49. Existential purpose of Architecture

Nils-Ole Lund criticised Norberg-Schulz for his empirical analysis of architecture, saying that the social message is lost. Lund's interpretations of Nordic Architecture regards humankind as an important element and thus shows a socio-political-cultural approach. (Macdonald, 2013) Nordic Architecture is characterised by good workmanship, user-friendly design and aesthetic elegance. (Lund, 2008)

The history of Nordic Architecture shows that this concept emerged from necessity and function and is nowadays known for combining modernism with functionalism to create spaces that relate to context and human scale. Scandinavian architecture stands for simplicity, a balance with nature, conscious choice of materials, use of light and designing

with consideration for the environment. (Hodgson, no date) The architecture of the Scandinavian countries is characterised by social commitment and responsibility, as the development of functionalism is directly linked to the emergence of a welfare state. (Miller, 2019) It is architecture that combines tradition and modernity in a minimalist way and creates identity, characterised by a strong connection to social consciousness, climatic conditions, and nature. Material considerations are applied in a tectonic way, enhancing the expression and sense of Nordic Architecture. (Carter, Kirkegaard and Tyrrell, 2013) In order to gain further insights into the term tectonics and implement aspects in this project, the meaning of it will be further investigated in the structural level of this report.

The theme of Nordic Architecture will be applied in various areas in this project. For one in terms of functionality, conscious choice of materials and respectful use of resources. Furthermore, the approach of vernacular architecture in a Nordic context is interesting. This includes not only strategies for maximising daylight, but also the question of how this identity can be combined with the typology of the project.

Among the different points of view in theory, Pallasmaa and Lund are the most interesting for this project. Aspects of Asplund's work such as the use of focal pointers and clues could also be valuable for the project.

tl;dr:



functionality



respectful use of resources



conscious choice of materials



vernacular architecture / passive strategies



create identity



*Apparently nobody wants to know that contemporary history has created a new kind of human beings – the kind that are put in concentration camps by their foes and in internment camps by their friends.”*

*~ (Arendt, 1943)*

A seemingly neutral term often used in relation to displaced people is a *refugee shelter*. A shelter is most commonly regarded as some form of protection, and therefore it applies to not only solid and purposeful but also improvised and temporary structures and spaces (Scott-Smith and Breeze, 2020). Scott-Smith and Breeze (2020) argue that the protection provided by a shelter can often be partial as shelters can only protect in some aspects, but not in others, with the prime example being *'government-run reception or detention centres, which can provide cover from the rain, but they might also serve to contain or restrict people's movement'*. These types of shelters sometimes are regarded as serving to 'protect' the state and local population rather than refugees (Scott-Smith and Breeze, 2020).

Camps became a dominant feature in strategies of dealing with forced migration only from 1940s on, when people fleeing or freed from Nazi regime and Soviet Army were sheltered and housed in settlements created across Europe (McConnachie, 2016). McConnachie (2016) argues that due to great variety in size, extent of containment or time of their establishment, the term *refugee camp* has never been sufficiently defined. Many authors found it impossible to specify the term pointing to many contradictions it implicates – refugee camps are spaces of 'care and control' and 'compassion and repression'. McConnachie (2016) also states that what differentiates refugee camps from other *'spaces of marginalization and exception'* is their primary function: containment. Eventually, the author coins her own definition for a *camp of containment*:

*A site that is spatially bounded (i.e., it is an identifiable site); temporally limited (i.e., it exists pending an end to conflict or an alternative durable solution); is biopolitical (i.e., is designed and administered for a category of population rather than for individuals); and segregates residents from a surrounding population by formal or informal restrictions.*

(McConnachie, 2016)

While the degree of restriction of movement, interaction with the population outside and control in camps can vary, all such environments inevitably lead to estrangement and alienation as the dynamic between camp residents and locals is not one of equal entities. The UNHCR's policy evolved over the last years – from 1997 when refugees were only able to receive aid in camps, to 2014 when it was advised that creation of camps should be avoided (McConnachie, 2016). In 2017 UNHCR Filippo Grandi recognized that the case of refugees needs to be addressed in urban areas where most refugees migrate to and live (Kühl and Behrens, 2018).

In this chapter, case studies of different shelters that exhibit or are related to characteristics of camps of containment, will be presented, discussed and contrasted with concepts focused on creating settlements fostering dignity, agency and inclusivity of the new settlers. These analysed cases will serve as groundwork for developing a different typology that is not a camp, but can be seen as a form of multidimensional shelter that places its main user group – refugees and asylum seekers – as equals to the other users – the local community.



| Ill. 50. Architecture for refugees - keywords cloud



# Architecture for refugees

## Refugee camps

“

*There is nothing more permanent than the temporary (Ουδέν μονιμότερον του προσωρινού)”*  
~ Greek proverb (“One Year of Mavrovouni Camp,” 2021)

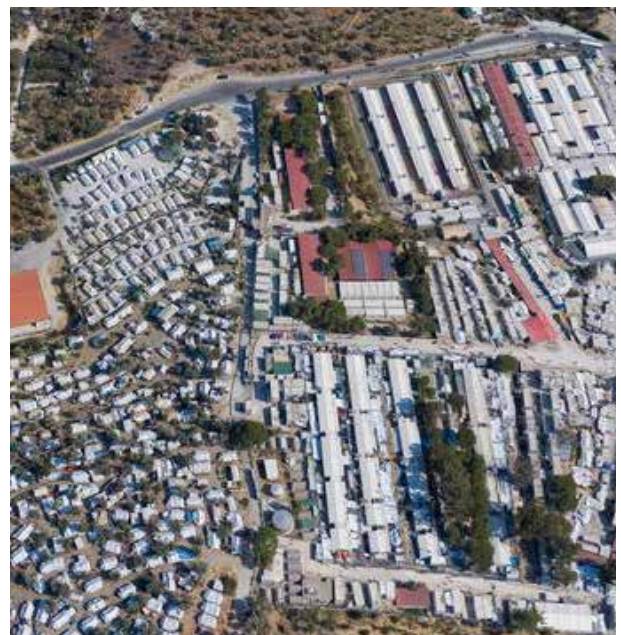
### Moria Hotspot / refugee camp, Lesvos, Greece, 2015

Following the rapid surge of migration in 2015, a part of European Union's agenda was to establish hotspots located at the external borders of the bloc. One of the first ones was located in Moria on a Greek island of Lesvos. At first the hotspots were serving as reception and transit points, with newly arriving people continuing on their way further into the continent, but the European attitudes changed a terrorist attack in Paris in November 2015. As a result, a deal between EU and Turkey was made, which constituted that the latter would accept persons who illegally migrated to EU in return for a financial compensation of six billion euros. At this point the conditions in the hotspots started to deteriorate, as they changed their main function from identification and transit to detention and implementation of return schemes. The prolonged procedures led to people being stuck in those camps for months or even years and the capacity was quickly reached and then exceeded drastically. (De Becker et al., 2020)

The refugee camp in Moria became the probably most known example of a refugee camp and over the years it has been heavily criticized as multiple human rights violations have taken place there. The original capacity of the camp was estimated at 3,000. Over the years the camp has spread far outside its official boundaries into the surrounding Olive Grove. In March of 2020, the number of inhabitants has reached 20,000. The living conditions in the camp were very poor, people were sheltering in tents located randomly and in a very close proximity to each other. De Becker et al. (2020) have noted the lack of organised waste management, limited access to water and electricity and a scarce presence of sanitary facilities with long lines piling in front of them. The congestion of people and forced bad hygiene led to the spread of many diseases. That combined with many cases of violence within the camp constitutes an unsafe and hostile environment to live in. Over time the camp's inhabitants started to expand their tents with self-made structures, and some improvised shops offering products and services have been established alongside the main path, practices that made the camp slightly more city-like (De Becker et al., 2020).

The camp was deliberately set on fire and burned down in September 2020. The occurrence followed multiple protests and riots demanding better quality of living earlier that year as well as an unprecedented crisis that was the Covid-19 pandemic. People in the camps had no possibility to apply to WHO's recommendations as they strongly focused on personal hygiene and social distancing (De Becker et al., 2020). The state of permanent temporariness continues to be the reality of many inhabitants of the non-existent Moria camp. Majority of them lives in a tent camp located on Mavrovouni beach (Papadimitriou, 2021).

The Moria camp was never designed to accommodate immigrants long-term. Over extended periods of time people were housed in temporary shelters that offered only the most basic protection from atmospheric conditions. There was no urban planning involved when the camps structures spread outside the original premises. People lived in cramped areas in structures of poor quality, without a sense of security, privacy and belonging. More importantly, their situation is still unresolved and the EU states' unwillingness to intervene is largely at fault.



(Papadimitriou, 2021)

| Ill. 51. Moria camp's expansion beyond its original borders

### Shelters for Migrants and Travelers – Ivry-sur-Seine, France, 2016 / Atelier RITA

This emergency shelter for 400 people was built on top of filter basins of a Eau de Paris plant, only about 7,5km away from the very centre of France's capital. The architects tried to arrange the development as a little town, with six yurts placed in the middle, serving as multipurpose rooms for the new community. The six two-story buildings can be accessed from the ground floor level as well as a set of simple, metal outside galleries connecting them on the first floor. Buildings are simple volumes placed on piers, clad with horizontal wooden planks, with accents of turquoise blue on doors and some facades. Each living unit provides private rooms and family units for 67 people. The construction took only 4 months and a week and the modular system was developed to be reused, as the planned lifespan of the shelter was 5 years. Aside from living units, the settlement is equipped with three classes, administration, computers room, learning room, technic room and laundromat (González, 2018). There is a social centre and health centre and people can spend their time participating in activities organised by volunteers, such as language lessons, manual workshops and even excursions to partnering museum and such (Bascoul, 2018). Individual inhabitant was thought to stay there only up to 6 months (González, 2018). The facility is temporary both in terms of its assumed lifespan and the duration of an individual stay, but what has to be noted, both the structural and architectural quality of the settlement can account for a safe and dignified shelter with an attractive functional programme and a possibility to maintain a sense of one's privacy.



(González, 2018)

| Ill. 52. Site plan of the shelter



(González, 2018)

| Ill. 53. Inside the settlement



(González, 2018)

| Ill. 54. Yurts in the centre as multipurpose rooms



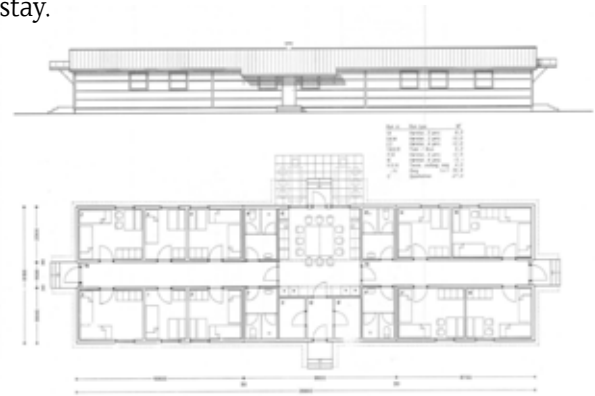
# Architecture for refugees

## Danish context

### Refugee villages/flexible asylum centres for Bosnian refugees in Denmark, 1990s / Holm & Grut

A curious and inspiring example of early modular housing for displaced people are the so-called 'refugee villages' designed to quickly and temporarily accommodate approx. 20,000 asylum seekers from Bosnia, who arrived in Denmark in 1992-94 as they were fleeing the Balkan War. The architects developed a system of three modules, prefabricated in a factory in Esbjerg, which were then placed on site around a joint corridor and finished-off with roofing. The final buildings measured 8 x 30m, each with a common kitchen in the middle, and rooms along either side of the corridor. The units were arranged in clusters of 7 or 14 on 52 plots. To give the settlements an extra quality, the architects focused on layouts, creating courtyards and differentiating between typologies and functions. Part of that strategy was also painting the wooden planks on the facades in various pastel colours.

Despite these efforts, many inhabitants had felt, that they were living in camps, rather than more friendly-sounding 'refugee villages'. There were complaints about overcrowding and lack of privacy due to thin walls. But it is likely that these attitudes were connected to problematic immigration policies, which much like in the present day, prevented refugees from working or getting educated, rendering them isolated, bored and restless throughout their stay.



(Whyte, 2021)

| Ill. 55. Flexible asylum centre - floor plan and elevation



(Whyte, 2021)

| Ill. 56. Flexible asylum centre - overview



Despite their original assumed lifespan of 5-10 years, these settlements have actually survived much longer and some of them have been repurposed and transformed. By 1998, 9 of the 52 villages were even transported back to Bosnia as a part of a questionable repatriation plan. Others have been used as educational facilities, prisons, student accommodation, hotels and event venues. Whyte and Ulfstejrne (2020) visited the municipality of Kljuc in Bosnia in 2017, to find that most of the units transported from Denmark on trucks were still intact: some housed displaced people, some adapted to other uses such as retail, offices and even assembly halls. Two units were even transported

locally to serve for touristic functions in a forest and by the river. For the units still serving their primary housing function, the municipal plan was to convert them into a youth hostel.

Whyte and Ulfstejrne (2020) claim, that the general blandness and lack of specific identity of these settlements, combined with their mobility, led to 'their continued usefulness and renewed meaningfulness, which in turn derived in part from the flexibility of their design'. They became easily applicable and adaptable to various new contexts. Another interesting conclusion the authors make, is that even though those villages served to isolate the refugees and enforced their temporariness through the design, 'the movement of the buildings also generated a wide range of social engagements' and 'social relations were forged through these shelters'.



(Whyte, 2021)

| Ill. 57. Flexible asylum centre - transportation

# Architecture for refugees

## Social housing in Germany

Following the big refugee influx in 2015, Germany has become one of the countries which accepted the largest number of newcomers. It was a time when fast and flexible housing solutions were needed on a large scale. An opportunity presented itself for architects to design housing with public funding, where a real challenge was to create more integrated, community and city improving settlements than short-term ad-hoc camp-like shelters (Kühl and Behrens, 2018).



(Wohnheime in modularer Holzbauweise in Freiburg, no date)

| Ill. 58. Wohnheim für Geflüchtete - connection units



(Babo, no date)

| Ill. 59. Wohnheim für Geflüchtete - bathroom modules assembly



(Wohnheime für Geflüchtete, no date)

| Ill. 60. Wohnheim für Geflüchtete - project overview

**Wohnheim für Geflüchtete – Freiburg, Germany, 2016 / Franz und Geyer Architekten, Jochen Weissenrieder Architekten, stocker.dewes architekten**

This housing project was completed in a time span of 6-12 months as a collaboration between three offices. Architects designed a timber modular system fit for future scenarios: disassembly, reconfiguration and reuse in a different location or conversion to student or social housing at a later date. The facades are clad with untreated wooden planks, and the materials come from regional suppliers. (Kühl and Behrens, 2018). The system was used to build 3-storey dwellings on three plots in the city of Freiburg, which could house a total of approx. 1000 refugees ("Wohnheime für Geflüchtete," n.d.).

The perceived quality of the used materials, landscape design and spatial layout of the settlement does not appear to be temporary, very low-cost and unappealing, as is often the case with emergency designs for displaced populations. Design for disassembly and repurposing is a sustainable solution that increases functional flexibility and therefore the value of the settlement.

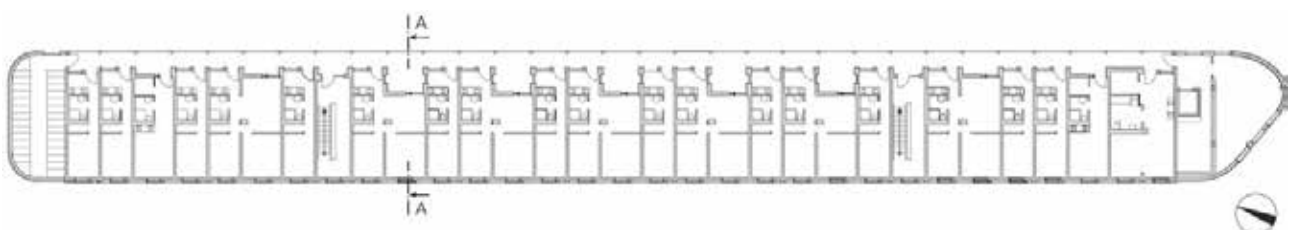
**Wohnen am Dantebad, München, Germany, 2016**  
**/ Florian Nagler Architekten**

Another apartment building made of prefabricated modules was designed and built at Dantebad in Munich in under a year in 2016. The timespan between establishing the construction site and welcoming first tenants was only 180 days. The building was lifted over an existing parking lot which was preserved with a loss of only few spaces. On top of the supporting concrete construction, prefabricated CLT timber elements, such as partition walls, were stacked, which expedited the completion (Herrmann, 2018). Half of the apartments were reserved for refugees so that they can live alongside the local people instead of being segregated and isolated. By including a mixed group of future tenants and creating permanent housing instead of temporary solutions, the architects could aim to improve the overall liveability of the area through 'incorporating commercial and community facility spaces and improved public space amenities such as playgrounds and sports fields' in the project (Kühl and Behrens, 2018). Including valuable complimentary functions in the developments largely aimed at housing refugees can positively affect the local populations perception of newcomers.



(Herrmann and Müller-Naumann, 2018)

| Ill. 61. Wohnen am Dantebad - apartment block



(Herrmann and Müller-Naumann, 2018)

| Ill. 62. Wohnen am Dantebad - floor plan



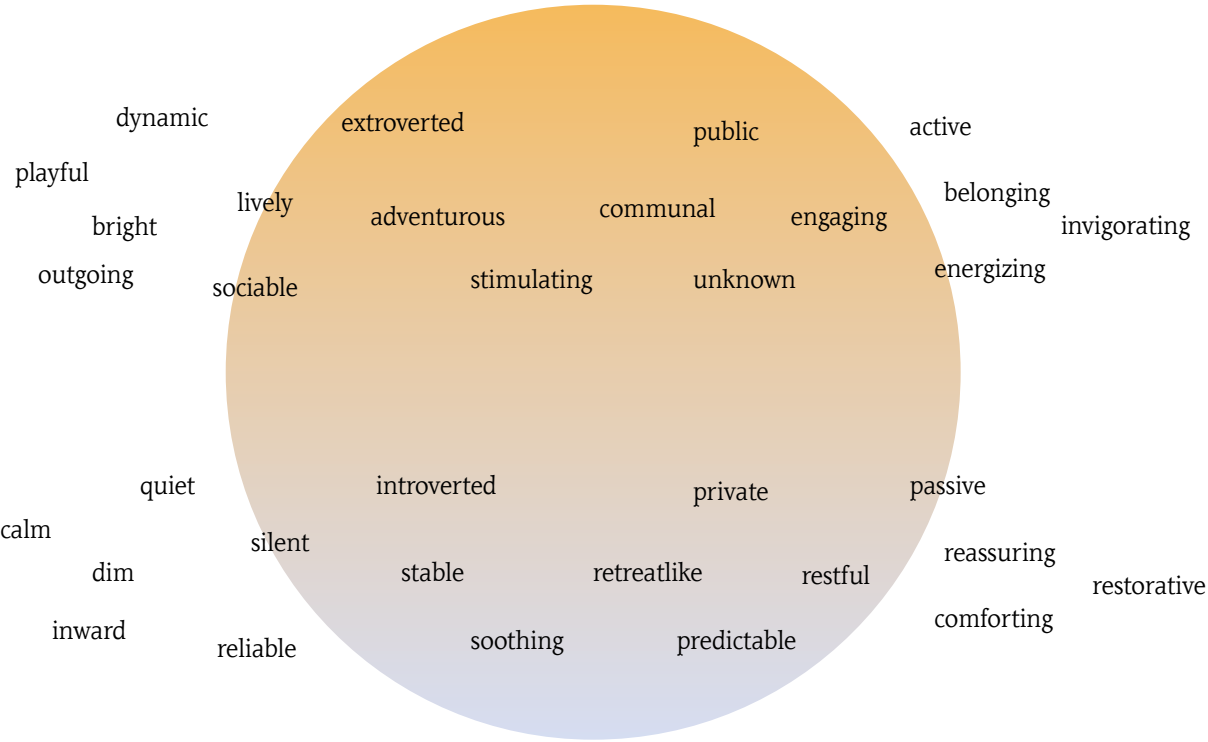
(Herrmann and Müller-Naumann, 2018)

| Ill. 63. Wohnen am Dantebad - bathroom modules assembly



(Herrmann and Müller-Naumann, 2018)

| Ill. 64. Wohnen am Dantebad - connection units



| Ill. 65. Gradient of environments - self-regulating opportunities



## Healing Architecture

Healing Architecture deals with an array of topics that aim at creating a spatial environment directed at broadly understood human well-being. It can be looked at from many perspectives, ranging from e.g. homelike environment, access to views and nature, light, noise control, barrier-free environment, to room layout (DuBose *et al.*, 2018). As the primary user group of the current project are refugees that flee their countries as a result of extreme situations, it is foreseen that some of them can be dealing with mental health issues like PTSD, anxiety and depression. Although the project does not constitute directly an example of any form of a healing facility, nor aims at facilitating users' healing process per se, it is still an important consideration to provide optimal conditions for mental health reclaiming in their new place of residency. In a few following chapters highlighted will be some of the little gestures that can be implemented with that goal in mind.

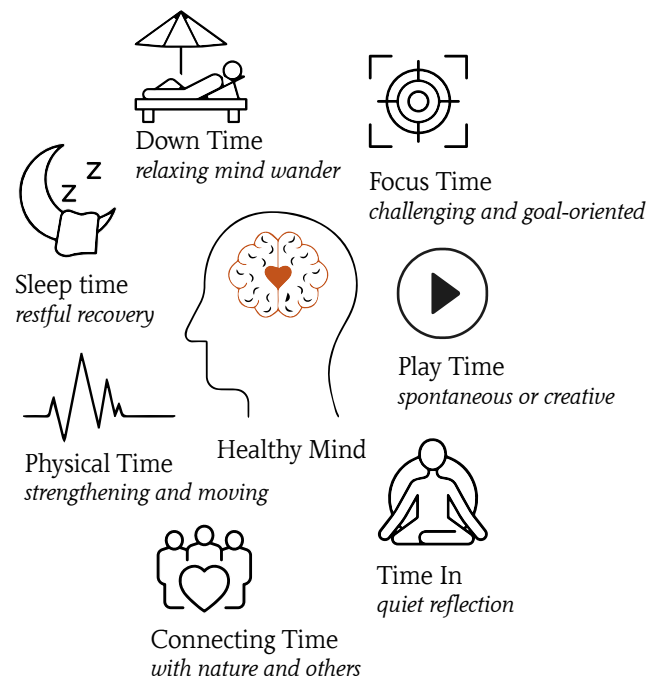


(Project Diagram p.8-9)

| Ill. 66. Project Diagram - Healing Architecture zoom-in

## Window of tolerance

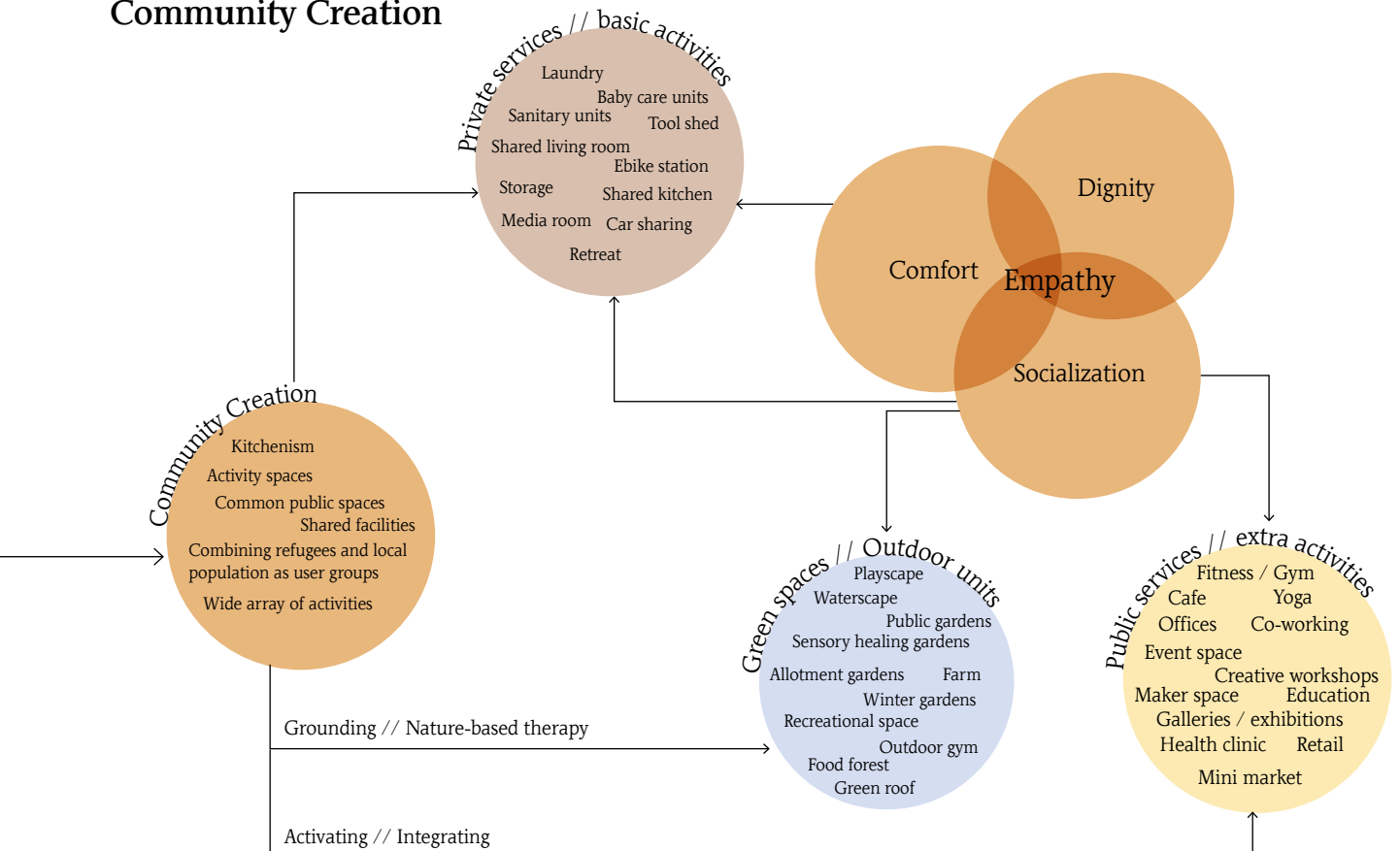
The term Window of Tolerance was first developed by Dan Siegel (Siegel, 1999) and is now being used in Psychiatry and Neuroscience to describe a mental state of good 'arousal', a personal space within which one's brain can function optimally and can readily receive stimuli, thrive, learn and play, relate well to situations and people around. It is when one can feel comfortable and safe, perform daily tasks without anxiety, exhaustion or feeling out of control (Siegel, 1999). But as a result of extreme stress or traumatic events an individual can be thrown out of this optimal state. What can then happen is either hypo- (freeze) or hyperarousal (flight/fight) response characterized respectively by paralysis, emotional numbness and depression or chaotic hypervigilance, panic or even anger (Van der Kolk, 1996a, 1996b). Either of those states stand in a way of optimal functioning. Dysregulated individuals can use psychotherapy and other supplementary techniques to return to their optimal state within the window of tolerance, potentially expand it and better deal with stress. Everyone responds individually to what is up- or down-regulating in the particular moment, but generally helping methods are: grounding and mindfulness skills (nature, yoga and meditation), breath work, movement and rhythm (running, jumping, any physical activity), sounds (exposure to music), creative works (arts) (Wahbeh *et al.*, 2014; Gallegos *et al.*, 2017). Hence opportunity for variety of those activities is needed for optimal functioning of any individual (Rock *et al.*, 2012), especially the one with traumatic emotional luggage (Gill, 2017).



(Siegel and Rock, 2011)

| Ill. 67. Healthy Mind Platter for Optimal Brain Matter

## Community Creation



(Project Diagram p.8-9)

| Ill. 68. Project Diagram - Community Creation zoom-in

## Interpersonal bonding // 'kitchenism'

One of the aspects that can aid integration in a new country is to reach a feeling of belonging and community. Inspiration in this regard can be sourced from e.g. Maggie's cancer centers built around the world since 1996, where great importance is brought to creating community and support group. Maggie, a writer and gardener diagnosed with breast cancer herself, influenced by her own story wanted to make the experience of cancer more manageable for everyone by establishing an informal environment, because, as she believed, "with the right support, nobody would 'lose the joy of living in the fear of dying' when diagnosed with cancer" (*Maggie's – everyone's home of cancer care*, no date). One inherent element of each Maggie's center is a space for "kitchenism", often placed as a first element one sees upon arrival. Phenomenon of the "family table" is revolutionary in a healthcare facility. "The kitchen is the social hub of every center and the kitchen table is the focal point for social interaction; a place for people to sit, drink tea, eat biscuits, and converse – fulfilling the fundamental human need for conversation, mutual support, and friendship" (*'Kitchenism'*, 2016).

“

*It says to the sufferer: your affliction is a normal part of life. Here is a haven where all of you may meet, share stories, and work on what is an essential part of life – not something to deny. It says to those who arrive for the first time: come in, you count”.*

~ Charles Jencks, "Can Architecture Affect Your Health" (Jencks, 2013)

Similar needs for support have refugees, whom oftentimes tragic situations forced to give up everything they ever had, and who are now thousands kilometres away from a place they used to call 'home'. Their stories matter. Therefore, incorporating bigger and smaller kitchen-table-centered spaces can be a good tool for community creation within *the Refugee Community Village*.



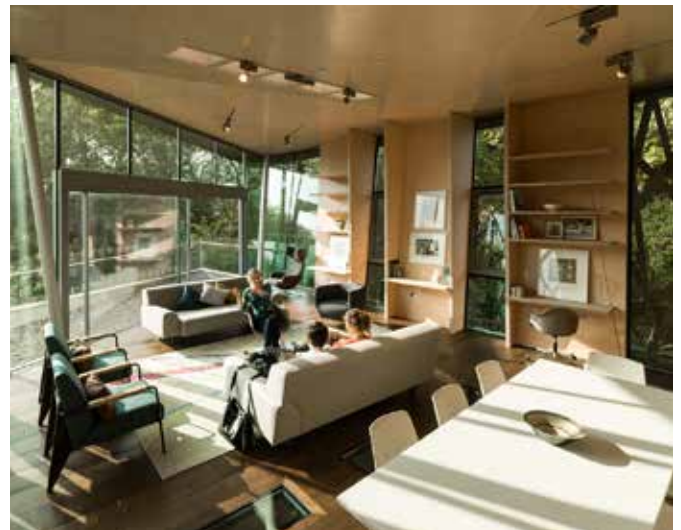
(Dow Jones Architects, 2019W)  
| Ill. 69. Maggie's Centre Cardiff



(Foster + Partners, 2016)  
| Ill. 72. Maggie's Centre Manchester



(CZWG, 2011)  
| Ill. 70. Maggie's Centre Nottingham



(WilkinsonEyre, 2014)  
| Ill. 73. Maggie's Centre Oxford



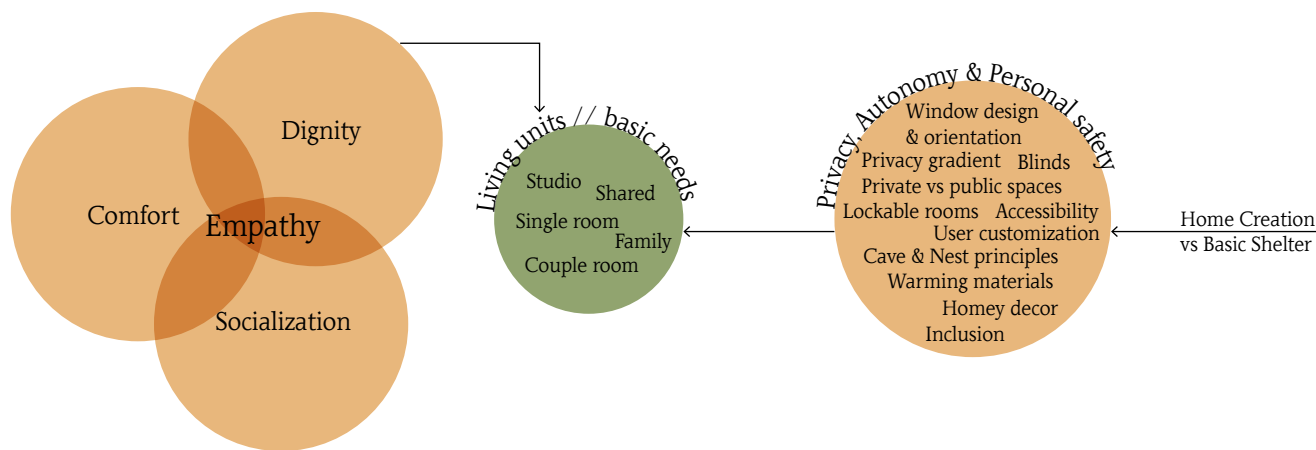
(Reiach and Hall Architects, 2014)  
| Ill. 71. Maggie's Centre Lanarkshire



(Heatherwick Studio, 2019)  
| Ill. 74. Maggie's Centre Yorkshire (previously Leeds)



## Privacy, Autonomy & Personal safety



## Home creation vs Basic shelter

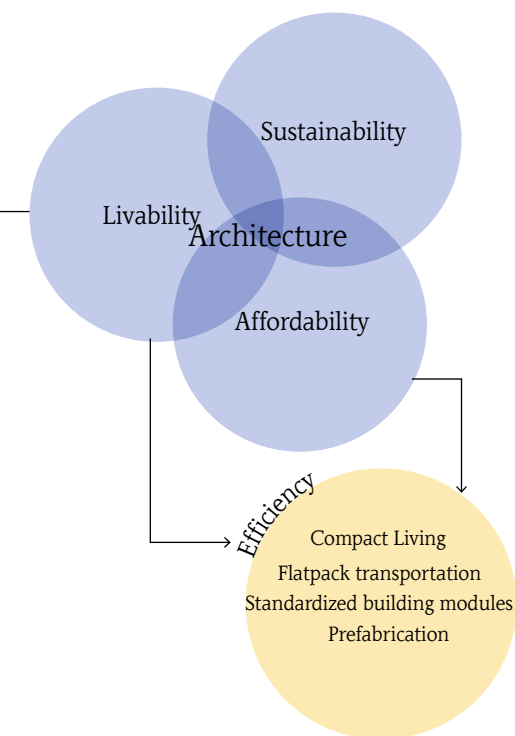
The house is a frame, the home is its fiction. It is inside of our homes where the restoration sanctuary is. Hence, we should strive to create the best possible framework for a comfortable life to unfold. As architects, it's one of our greatest tasks to create this stimulating framework for immersion, contemplation and rest, as the need to dwell and seek cover is a basic human need that we cannot dismiss when shaping living spaces.

Following the ideas sourced from work and writing of Japanese architect Sou Fujimoto (Harvard GSD, 2011), the interior can be habituated by the user either following the nest principle, where inhabitants are given the opportunity to build up the *home* according to their liking and customs, or cave principle, where the frame is predefined, and the user seeking shelter has to assimilate their life to contain in it. Either way, user customization in home creation is an important aspect, because what happens when buildings don't allow people to be who they are?

User customization even on the smaller architectural scale (e.g. lockable rooms, personal décor, window blinds) can strengthen privacy and personal autonomy to allow the residents to settle and unwind even in the temporary or emergency situation. Generally, for creating an embracing atmosphere inside of a space implementation of different textures like woods and fabric textiles adds tactile dimension and warmth to the space with the natural tones, making it feel more homey. Moreover, presence of plants is shown to aid human well-being and liven up the space, which is further elaborated in biophilic design patterns (Browning, W., Ryan, C., Clancy, J., 2014).

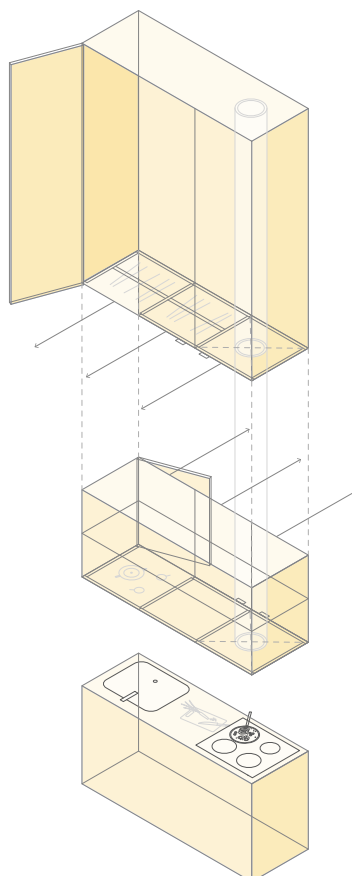


## Compact Living



(Project Diagram p.8-9)

| Ill. 75. Project Diagram - Livability zoom-in



| Ill. 76. Compact living - floor-to-ceiling cabinets

Compact living might appear to be crucial while accommodating a wave of migrants, therefore considerations in regards to downsizing most of the living units naturally come into play. But small living is not only about the actual size of a unit. A lot of it has to do with space utilization, perception and functionality, and applying some of the following ideas (sourced from observations of architectural and interior design realm and other qualitative methods), might come in handy:

- **Multifunctional surfaces** – desk from one side serving as a bedside table on the other? Using space for various purposes increases functionality of the room.
- Choose a **broken plan layout** – small wall sections can help dividing the functions in the space with simultaneously maintained impression and benefits of an open plan.
- Open up the space with a **shelving hatch** – semi-open shelves accessible from both sides can be a smart way of separating the space without fully closing it up, allowing for daylight to still go through. And they apply as multifunctional surfaces too!
- **Sliding door panels** – are another way to divide spaces in a flexible way. Close up the unused sleeping area during the day or slide the panel to cover a messy kitchen making the space more aesthetically pleasing.
- Use **mirrors** to create visual space depth – nothing makes a space seem bigger and light-reflecting than a big wall mirror. Use it in narrow or darker places.
- Boost **light** with big windows and choose light, warm colors – lighted up rooms appear to be visually bigger compared to the dark interiors.
- Make it **cohesive** – maintain a united appearance of both walls and furniture for the space to flow seamlessly.
- **Build-in** a lot of **storage** – one of the typical problems in a small space is lack of storage area. Surprisingly, there is a lot of storage space available in the room, when furniture is fixed e.g. under the bed, in floor-to-ceiling wardrobes or under the stairs. Closed storage helps to avoid clutter too!
- ← • Use the space **all the way to the ceiling** – a lot of space can be left unused near the ceiling. In rooms with double-height still opt for floor-to-ceiling cabinets, making them accessible from different sides/floors as there might be a problem with reaching the upper shelves from down below. From the hard-to-use side, cabinets can be closed with a fake door panel in order not to disturb the space visuals.
- **Decorate vertically** – posters, hanging baskets, additional narrow shelves.

## Module Types Delimitation // Design Process

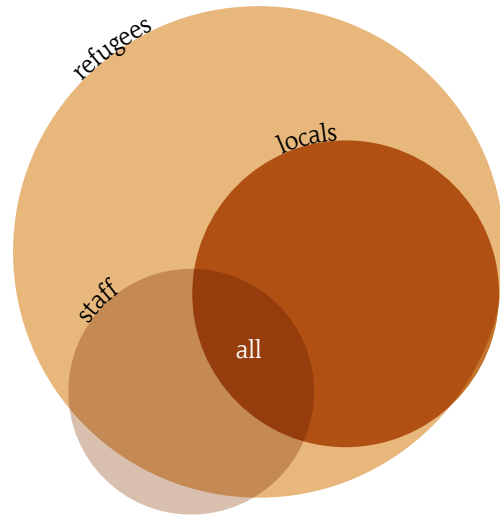
After the preceding analyses, the users and their needs were examined more closely. The first step was to divide them into user groups, zoning and needs. This analysis was illustrated graphically in bubble diagrams called *'Initial functional division'*. It can be seen that the respective areas overlap very appropriately.

Further development focused on the spaces that need to be created to meet the needs of the user group. Therefore, it is important to understand and recognize the diversity of perceptions. Refugees have often experienced traumatic events, and the spaces and functions should be of varying character to allow the user group to find themselves in their window of tolerance. Furthermore, the accommodation should not only provide for the basic needs of the residents, but become a place where they feel belonging and safe.

The initial considerations on which modules / spaces are needed are based on the pillars of well being, which become even more important when dealing with people with dramatic experiences. Therefore, *the Refugee Community Village* should accommodate activating and calming activities, which usually follow the gradient of private and public spaces. Thus, the spaces allow for self-regulating of the inhabitants. This is not only an essential point for the users to feel comfortable, but also for them to develop a sense of belonging and affiliation.

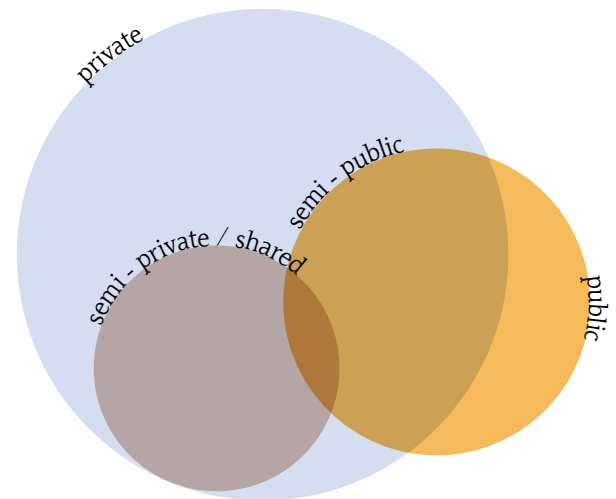
In the module types, it is apparent that this project is not only about single, individual persons, but also aims at families and other life constellations. Therefore, a wide range of spaces is considered (see ill. 81).

### Function division // User groups



| Ill. 77. Initial functional division // User groups

### Function division // Zoning

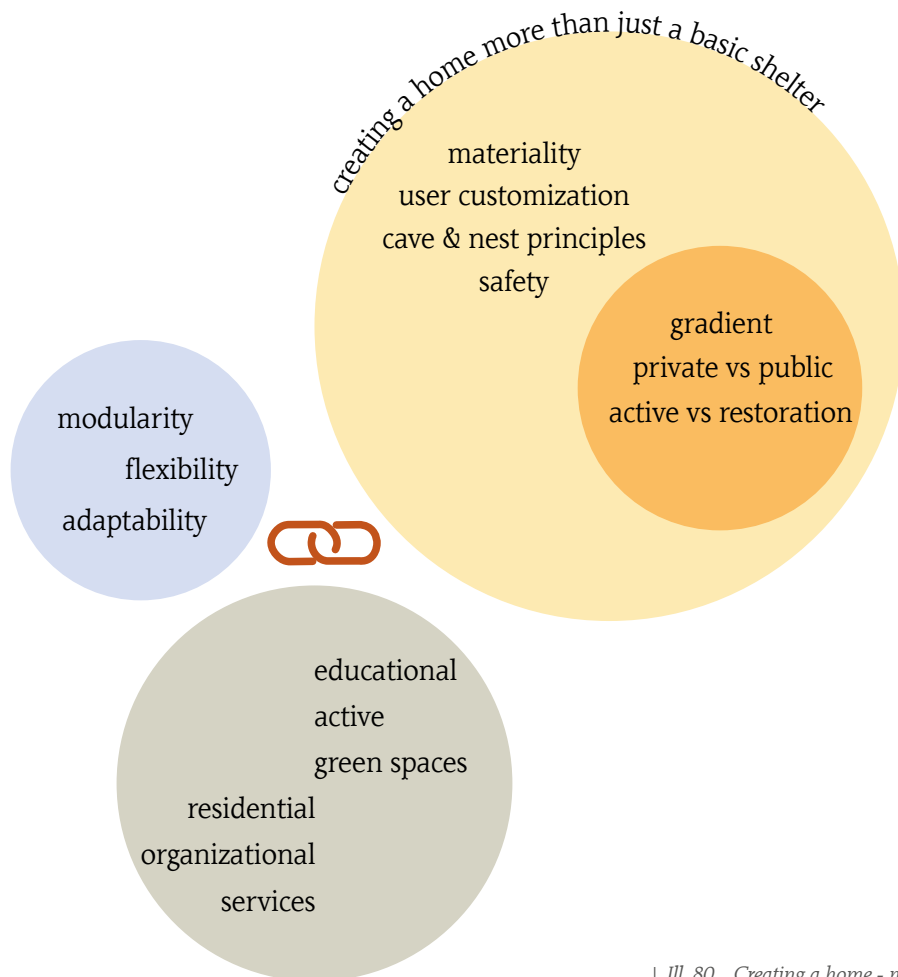


| Ill. 78. Initial functional division // Zoning

### Function division // Needs



| Ill. 79. Initial functional division // Needs



| Ill. 80. *Creating a home - more than just a basic shelter*

## Module types

### residential

- | kitchen
- | bathroom
- | living space
- | private room
- | common room

### organizational

- | lobby
- | reception
- | administration
- | staff office

### educational

- | workshop
- | education
- | galleries
- | meeting room
- | co-working space
- | open offices
- | retail
- | cafe

### active

- | gym
- | yoga
- | retreat

### green spaces

- | outdoor gym
- | communal garden
- | sensory healing gardens
- | pergola
- | recreation areas
- | indoor green areas
- | playground

### services

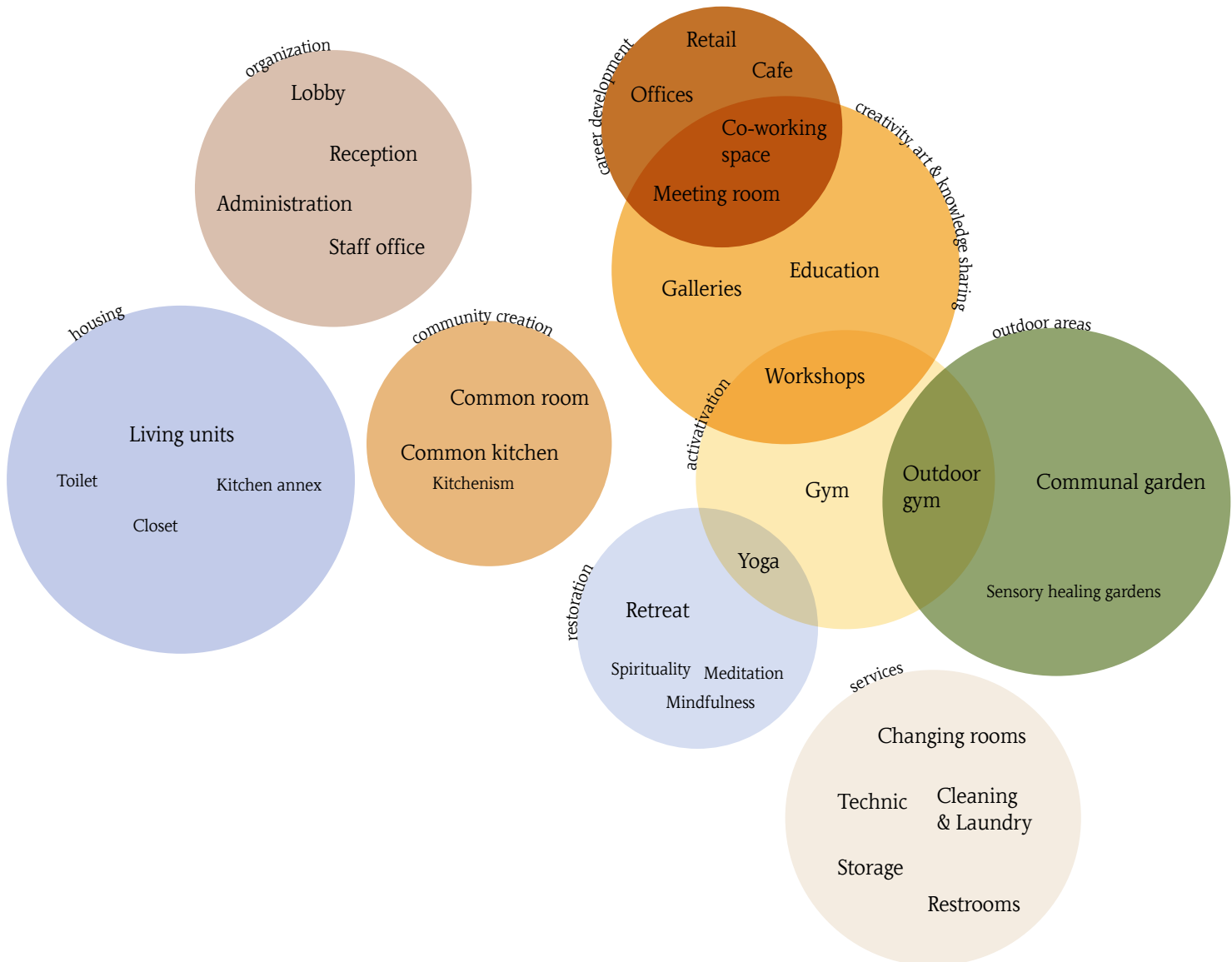
- | changing room
- | technic
- | cleaning & laundry
- | storage
- | restrooms
- connecting module**
  - | hallway
  - | staircase

| Ill. 81. *Initial considerations for module types*

This spread offers a more detailed overview of the different spaces and their connection to each other.

One focus is on a mixture of refugees and locals. Another important aspect is the aforementioned gradient between private and public and a variation of spaces to allow for self-regulation amongst users.

As the project scope carries limitations, the focus is placed on the living units and some of the more public areas will not be detailed further in the process.



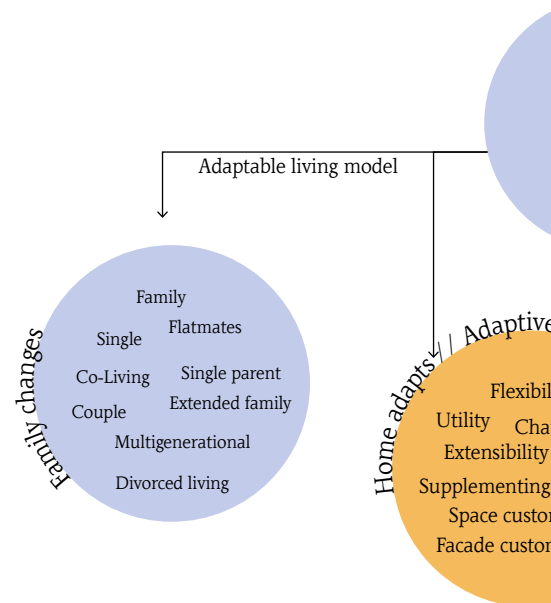
| Ill. 82. Relations between spaces

space	function	user	zoning
lobby	organization	all	public
reception	organization	all	public
administration	organization	staff	semi-public
staff office	organization	refugees, staff	semi-public
living units	housing	refugees	private
family units	housing	refugees	private
couple units	housing	refugees	private
shared units	housing	refugees	private
single units	housing	refugees	private
common room	community creation	refugees	semi-private/shared
common kitchen	community creation	refugees	semi-private/shared
kitchenism	community creation	refugees	semi-private/shared
gym	activation	refugees	semi-public
yoga	activation // restoration	refugees	semi-public
retreat	restoration	refugees	semi-private/shared
meditation	restoration	refugees	private
mindfulness	restoration	refugees	private
spirituality	restoration	refugees	private
outdoor gym	activation // outdoor areas	all	semi-public
communal garden	outdoor areas	all	semi-private/shared, semi-public, public
sensory healing gardens	outdoor areas	all	semi-private/shared, semi-public, public
workshops	activation // creativity, art & knowledge sharing	all	semi-public
education	creativity, art & knowledge sharing	all	semi-public
galleries	creativity, art & knowledge sharing	all	public
meeting room	career development // creativity, art & knowledge sharing	all	semi-public
co-working space	career development // creativity, art & knowledge sharing	all	semi-public
open offices	career development	all	semi-public
retail	career development	all	public
cafe	career development	all	public
changing rooms	services	all	semi-private/shared
technic	services	staff	semi-private/shared
cleaning & laundry	services	refugees, staff	semi-private/shared
storage	services	refugees, staff	semi-private/shared
restrooms	services	all	private

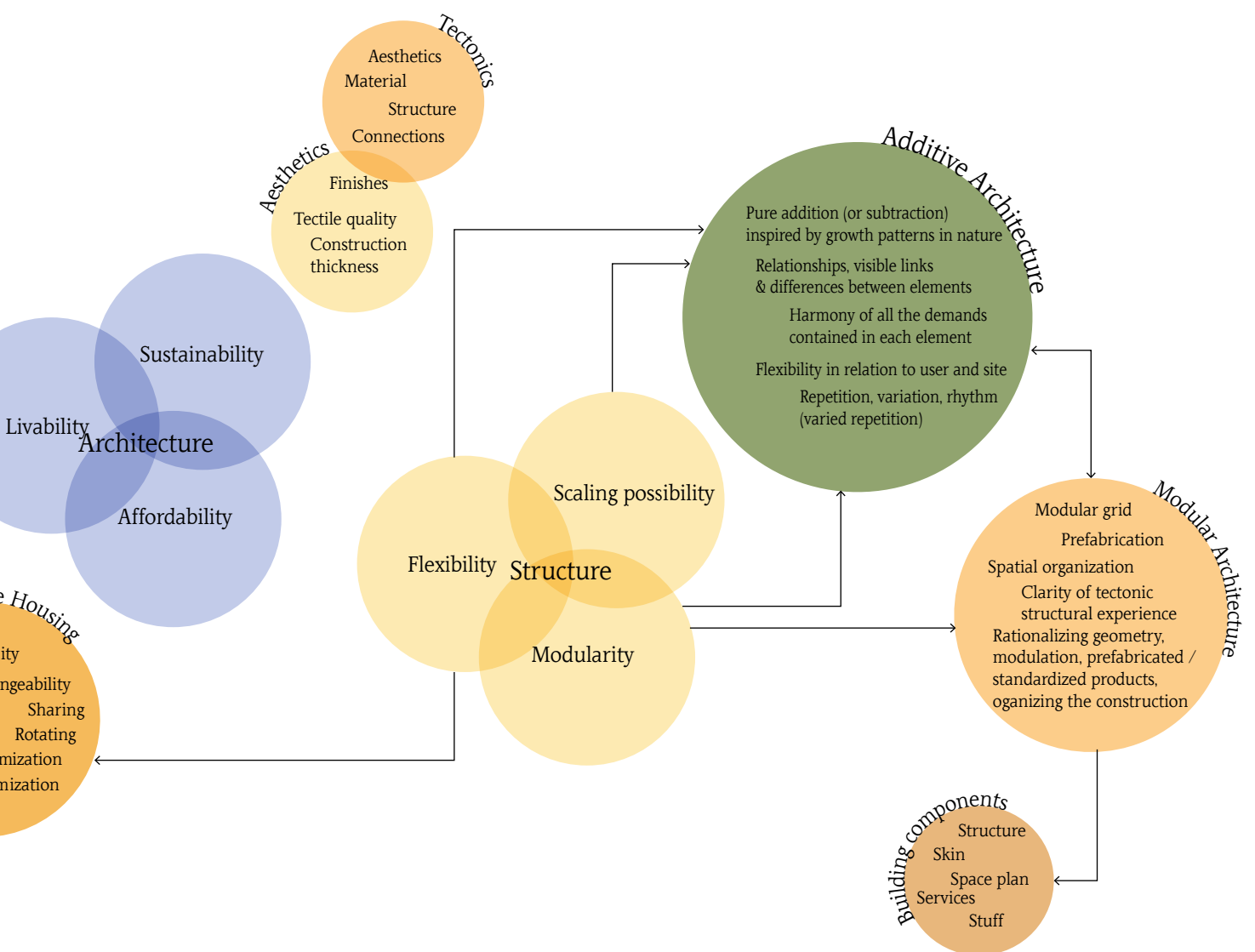
\*colors of the table correspond to the diagrams 'Relations between spaces' & 'Initial functional division // User groups' & 'Initial functional division // Zones'

## Structural Level // Technical & Aesthetical Considerations

The structural level is dealing with themes evolving around energy aspects, material considerations and construction as well as research regarding flexible and modular structures. This chapter concludes the derived program and zooms in to a more detailed level of the building.







(Project Diagram p.8-9)

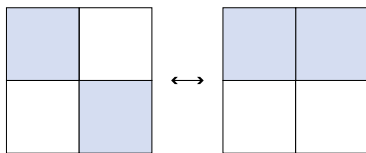
| Ill. 84. Project Diagram - Structure zoom-in

# Adaptive Housing - Flexibility

In an architectural realm the discussion around adaptive housing is generally leading to a common widespread agreement that flexibility is a quality to be pursued (Bech-Danielsen, 2008). Design that is adaptive to the users and their needs can serve for a long time, bringing this face of sustainability into equation. Architects can work with flexibility in different ways and to ease the process the following categorization was introduced in 1983 in the book "*Fleksibilitetsformer i boligbyggeriet*" (Rasmussen and Bloch, 1983):

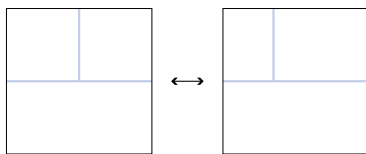
## Usability // utility

The physical framework of the home (both outer and inner walls) is static, and the flexibility is achieved by organizing and dimensioning the individual rooms in a way so that they can be used for different functions and purposes e.g. by refurbishing of the space.



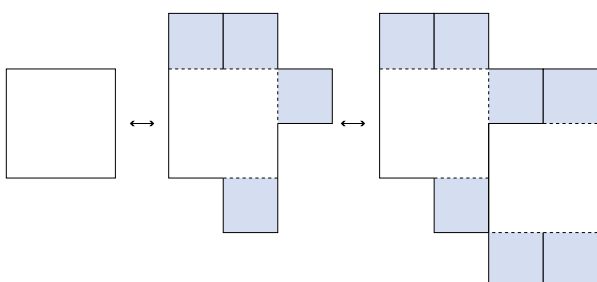
## Variability // changeability

The area and outer framework of a home are static, and the flexibility is achieved by moving inner boundaries (e.g. light-weight movable inner walls) in a way that allows for bigger or smaller rooms or for more or fewer of them.



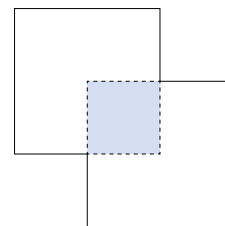
## Extensibility

The area and outer framework of a home are dynamic and can be changed as needed. This can be done with the following examples:



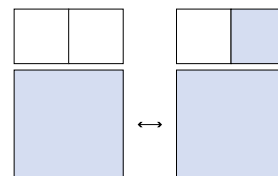
## Sharing

Reducing or expanding of the individual homes depending on corresponding changes in the adjacent homes.



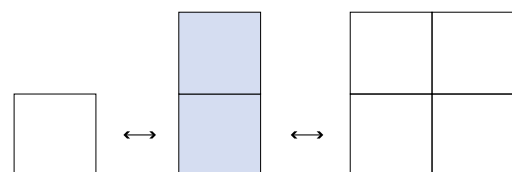
## Supplementing

Individual homes supplemented with areas that are designed as 'common' to the entire building complex e.g. by renting guest rooms or office space, which then temporarily (and as a result of a need) become a part of the individual apartment.



## Rotating

Housing complex offering varying sizes of apartments, allowing for residents to move around between them as needed.



## Limitations

The easiest to apply in real life is *Usability (utility)* principle, as it deals with a small scale of a change and can happen within an envelope of one housing unit – with no influence to the others. For the same reason *Variability (changeability)* principle is viable, especially if the primary grid structure makes for the static frame and external envelope, leaving the inside as an open floor plan.

Accounting for human behaviour it is assumed that only a few of residents would let go of assigned space once they have been allocated to it, resulting in limited actual flexibility while working with *Sharing* and *Supplementing* subprinciples. In practice, *Sharing* subprinciple can also be hard to implement following the assumption that expanding one apartment typically would require another one to be curtailed. This in turn would command for statistically unrealistic synchronization of complementary life situations of neighboring users – one family shrinking in size when another enlarging.

The idea of *Extensibility* could, however, work if the new extension did not interfere with the other already existing units.

*Rotating* subprinciple also has a way to work in real life to some extent, as the change would happen over longer period of time – e.g. with bigger life changes. It is a part of human existence to move houses depending on the space requirements in the certain moment of life. It is even more dynamic in *the Refugee Community Village*, where residents do not spend their entire lives, but instead change every few years and since many of them find themselves at different stages in life and represent different family models it is foreseen that accommodating for different scenarios can result in flexible in this sense and inclusive community.

## Approach to flexibility// Design Process

The project is an architectural response to current and future humanitarian and migration crises and as such is to be seen as a proposal for a ready building system, designed for disassembly, that could be easily replicated and reapplied, or later reused, in other locations - in case of an urgent need for accommodation due to yet another migratory emergency situation. Thus, the system is to be flexible in relation to the site, allowing for varying (and dependable on desired outcome due to the building context) final expression - ranging from more strict to more organic, yet composed of simple modular cubicles.

As the situational project site is only one moment in time, the system can also transform its initial refugee community village function to fit new circumstances and serve other needs e.g. become a student accommodation or social housing in the future, when the crisis is over - therefore be flexible in relation to the user.

Additionally, the building complex should allow for user adaptation and work with flexibility types that are assessed as viable in the previous subchapter called *Limitations*.

Although the real-life feasibility of the different ways of working with flexibility is considered, the proposed outcome should still be seen as exploration of those concepts, pushing the boundaries of conventional design process, and therefore carrying limitations in regards to conventional constants of architectural projects. Also, as the scale and timeframe of applied flexibility varies, this adaptive approach poses questions about the perception of what is permanent and what is temporary.

*The Refugee Community Village* can be built in steps - from one small cluster of cubicles growing into a bigger complex over time. Once built the structure can stand nearly permanently in the given location or be disassembled after many years in use. In the meantime, it can change its entire user group. Every few years, as the family changes, or comes and goes, the occupants can rotate between the existing apartment types to facilitate their needs. Sometimes it is also possible to change the inner walls of the family unit. Small change is also visible in everyday life, by allowing for user customization by redecorating spaces and rearranging furniture inside of the rooms.

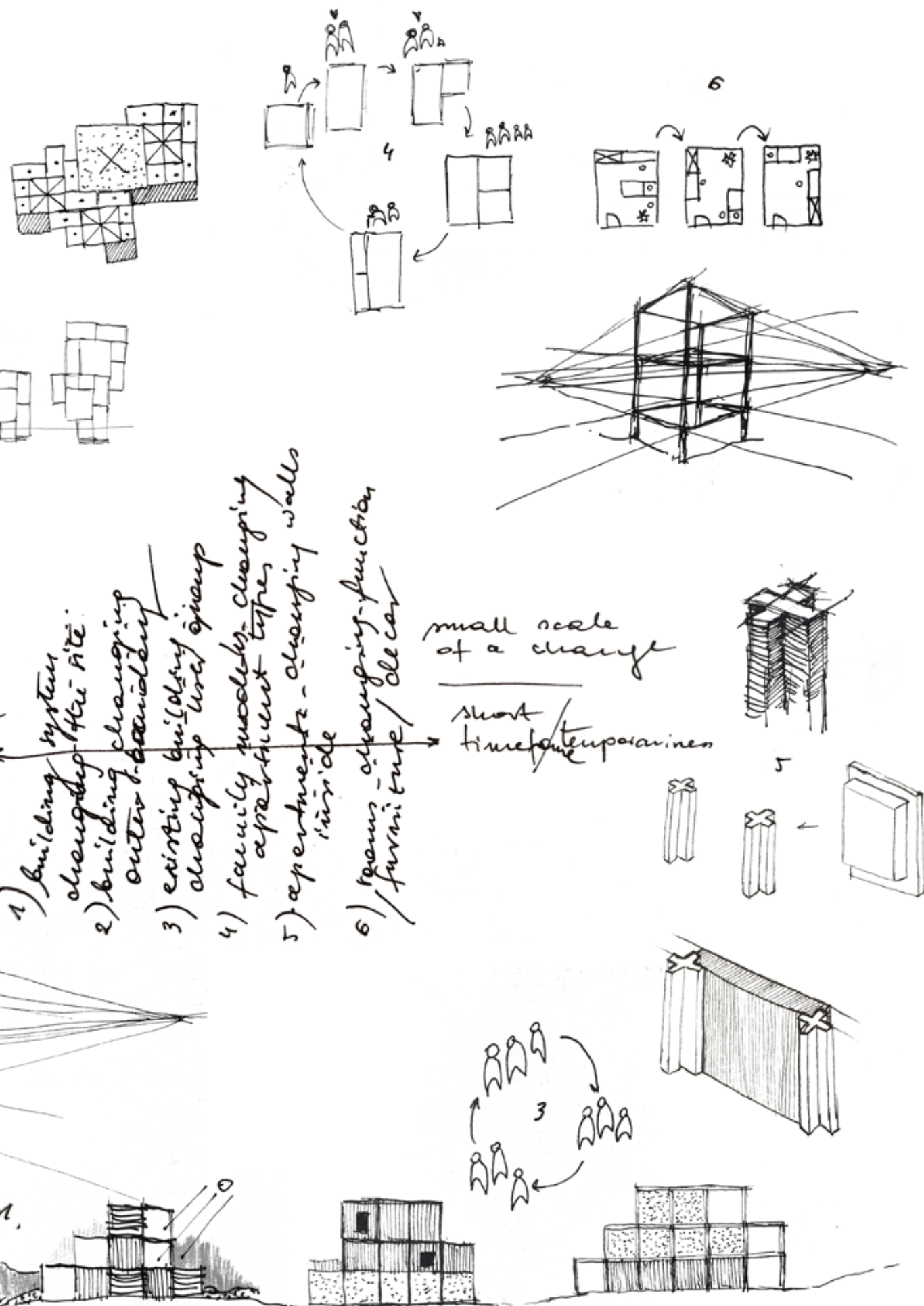
As a result, the project becomes a new typology, where topics of permanent and temporary living blend together, allowing residents to settle 'permanently' in a temporary situation.



- 1) building system changing the site
- 2) building changing outer boundary
- 3) existing building changing
- 4) family models - changing apartment types
- 5) apartments - changing walls inside
- 6) rooms - changing-function / furniture / decor

small scale  
of a change

short  
time / temporary





“

*My laboratory is the beach, the forest, the sea and seashore...*

~ Jørn Utzon

Initial thoughts on the principles of addition have their beginnings in Jørn Utzon's observations of natural environment. He wrote in his essay from 1948 titled "The Innermost Being of Architecture" that "*Something of the naturalness found in the growth principle in nature ought to be a fundamental idea in works of architecture.*" (Utzon, 1948) (Jørn Utzon Logbook Vol. V: Additive Architecture by Editio Bløndal - Issuu, 2009). The term 'Additive Architecture' itself sources back to 1965 and his realization that the natural and cultural additive systems are organized according to hierarchies and found everywhere in the additive world. It also was, according to Utzon, in essence of architecture. His architectural role was understood as adding and subtracting, making sure that the transitions are organically and visibly linked by acknowledging the differences, relations and distances – alike the growth patterns in nature or the transitions in societies.

Utzon has been noting patterns of addition all around, like in beans piled up side by side – red, green, white brown; but also in Asian cultures, e.g. when seeing Chinese temples with stacked timber structures being in essence the same exact elements, just in different sizes (Thomas Bo Jensen, 2009). As Kirkegaard and Hvejsel said, the architecture of a Danish architect Jørn Utzon is a '*fusion of form and structure inspired by nature and the visual universe of different cultures*' (Kirkegaard and Hvejsel, 2014).

Meanwhile Mogens Prip-Buus, Jørn Utzon's friend, in the 'Introduction to Additive Architecture' outlines how additive principle can be seen also in the Danish society - individuals form a family connected in a farm, farms form villages when connected with a societal set of rules and expectations in a village moot, then they form a shire, and regions, and realms, and so on, ending up with a pyramidal structure quite differing from the initial individual (Prip-Buus, 2009) (Jørn Utzon Logbook Vol. V: Additive Architecture by Editio Bløndal - Issuu, 2009).

In 1970 Utzon evokes further in his "Additive Architecture" manifesto how this phenomenon can be found in other aspects of life - he brings up a group of deer at the edge of a forest or pebbles on a beach, even a setup of elements on the Danish lunch table (Utzon, 1970). Same as the tree grows cell by cell, element by element, same the architecture should rise with such principal clarity (Thomas Bo

Jensen, 2009). With these examples in mind, many of which were sourced from nature, *he saw that an infinite variety can be generated by a modest number of elements*' (Kirkegaard and Hvejsel, 2014). Utzon writes: "*Such a pure addition results in a new architectural form, a new architectural expression with the same attributes and the same effects*" (Utzon, 1970). With the use of additive principle he wanted to ease achieving the harmony in all the demands made on design, so that they would be met within each individual element, without relying on the whole to fulfill them.

“

*A consistent utilization of industrially produced building components can only be achieved if these components can be added to the buildings without having to be cut to measure or adapted in any way.*

~ Jørn Utzon (Utzon, 1970)

Moreover, he concluded that in order to satisfy the demand for freedom, buildings should be designed more flexibly, by allowing for addition of many different components, and going away from identical box-type house with a given size and fixed partition walls (Utzon, 1970) (Thomas Bo Jensen, 2009). Together with Mogens Prip-Buus they realized, that in another face of additive architecture – removing what was once added, detaching the elements when needed – may stand the answer to the discussion about architecture facilitating everchanging life and humans, strengthening their freedom and flexibility. They asked a question: If a house is a framework around a family, why does it rarely adapt to the changes stemming from the circle of life? (Prip-Buus, 2009) (Jørn Utzon Logbook Vol. V: Additive Architecture by Editio Bløndal - Issuu, 2009)

One aspect for handling of the architectural quality of wooden architecture can be flexibility in relation to user and site, but another one is also interaction between form, logics and material (Wraber, no date). To break the narrative of prefabricated wooden houses being considered temporary, boring and monotonous (Wraber, no date), Utzon aimed at creating modular system that would not merely rely on repetition of the same prefabricated elements, but instead introduce variation in their expression (Thomas Bo Jensen, 2009). He was looking for ways of how to deal with varied repetition as an organic principle. Utzon's additive architecture is thus a synthesis of geometry, modulation and prefabricated / standardized products - an interplay of form and structure. (Christiansen, 2011)

With prefabrication and standardization of building elements one is capable to optimize the construction and rationalize the geometry. It brings advantages in connection to production control, costs and erection time (Utzon, 1970). It is Utzon's direct response to the economic situation, the need for housing and the building techniques available after World War II, but also a search for ways to allow for variations in order to achieve an architecture of growth (Christiansen, 2011). Moreover, such repetition creates new spatial perception, where architecture can appear more free and allow for open spatial sequences (Christiansen, 2011).

“

*Walking in a Danish beech forest is like going through a hall of pillars. This hall of pillars dissolves into branches and into a leafy crown represented by the roof”.*

*~ Jørn Utzon; about the Paustian House, a furniture showroom in Copenhagen opened in 1987*

As Carter, Kirkegaard and Tyrrell outline in “The nature of tectonic architecture and structure”: *‘the metaphorical evocation of the birch trees, not only provides the spatial organisation, but also clarity of tectonic structural expression, with triangular gussets between the columns and beams providing lateral stability (Carter, Kirkegaard and Tyrrell, 2013).*

tl;dr:



*pure addition (or subtraction)  
inspired by growth patterns in nature*



*relationships, visible links  
& differences between elements*



*harmony of all the demands  
contained in each element*



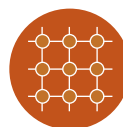
*flexibility in relation to user and site*



*repetition, variation, rhythm  
(varied repetition)*



*rationalizing geometry, modulation,  
prefabricated / standardized products  
– organizing the construction*



*spatial organization,  
clarity of tectonic structural experience*

## Case studies:

### Kingo Houses in Helsingør (1958)

Kingo Houses is an courtyard housing scheme complex consisting of 63 L-shaped houses, where the surroundings, especially environmental factors such as orientation towards sun, view and shelter from wind, played a vital role in the design process (see ill. 87). The additive chain of simple housing elements, each of them inscribed in a 15 m square, followed slightly undulating terrain and topography lines in an organic manner. It was meant to emulate the principle seen in nature, where the minimum units, like cells, rise forms with countless of flexible connections. The complex was designed for low-income workers following the idea of affordability in additive architecture. Kingo Houses can be seen as a prototype for the Fredensborg Houses. (Kirkegaard and Hvejsel, 2014) ('Jørn Utzon > Kingo Houses | HIC Arquitectura', no date)

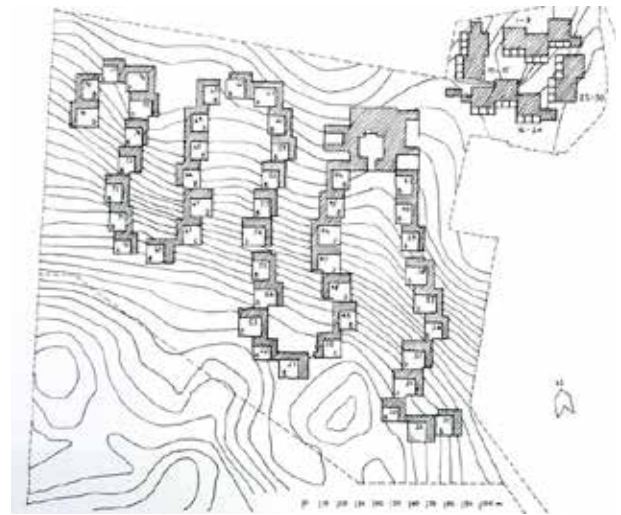


('Jørn Utzon > Kingo Houses | HIC Arquitectura', no date)

| Ill. 87. Kingo Houses

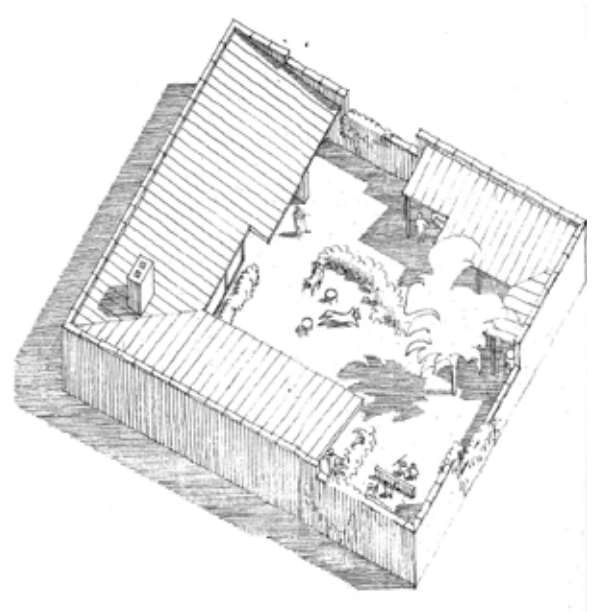
### Fredensborg Houses (1963)

Fredensborg Houses is another cluster of individual homes, consisting of 30 terraced houses with gardens and 47 L-shaped atrium houses. The inner patio acts as a transition space to allow to access and adapt to a natural environment adjacent, opening up towards the more naturalized landscape. Similarly to Kingo Houses, the complex is to a great extent subject to the existing topography, resulting in unique spatial configuration. One can say that the housing elements together form grounds resembling 3 palm fingers with a thumb. Yet again the organization of the housing units follows the additive approach by starting modestly with one element and growing into the whole complex, with respect to landscape and orientation (see ill. 88) - almost like *"flowers on the branch of a cherry tree, each turning towards the sun."* (Jørn Utzon). Materials used for the houses were traditional Danish materials – tiles and wood, making the construction more local and accessible. Fredensborg Houses were designed for the Danes who have spent a long time abroad working as a diplomats and the like, and in order to support their return it resulted in many considerations such as: the gradient of public and private spaces, the community link, and accessibility to common shared areas in this collective residential cluster becoming an important aspects of the project (see ill. 89 and 90). (Kirkegaard and Hvejsel, 2014) (Urbanization in Fredensborg | arquiscopio - archive, no date)



('Fredensborg Housing - Utzon architecture', no date)

| Ill. 88. Fredensborg Houses



('Jørn Utzon > Kingo Houses | HIC Arquitectura', no date)

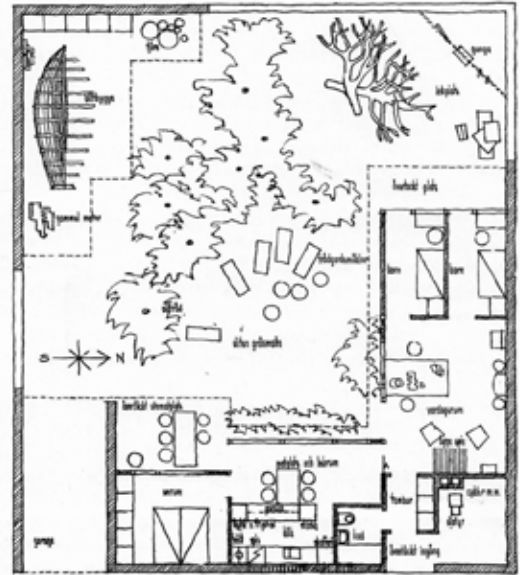
| Ill. 89. Fredensborg Houses

Utzon himself highlighted the importance of understanding of materiality, life and various human sense impressions in context of additive architecture in the following quote:

“

*A desire for well-being must be fundamental to all architecture if we are to achieve harmony between the spaces we create and the activities to be undertaken in them. This is quite simple and reasonable. It requires an ability to create harmony from all the demands made by the undertaking, an ability to persuade them to grow together to form a new whole – as in nature; nature know of no compromise, it accepts all difficulties, not as difficulties but merely as new factors which with no sign of conflict evolve into a whole.”*

~ Jørn Utzon, “The Innermost Being of Achitecture”  
1948 (Utzon, 1948) (Jørn Utzon Logbook Vol. V: Additive Architecture by Editio Bløndal - Issuu, 2009)

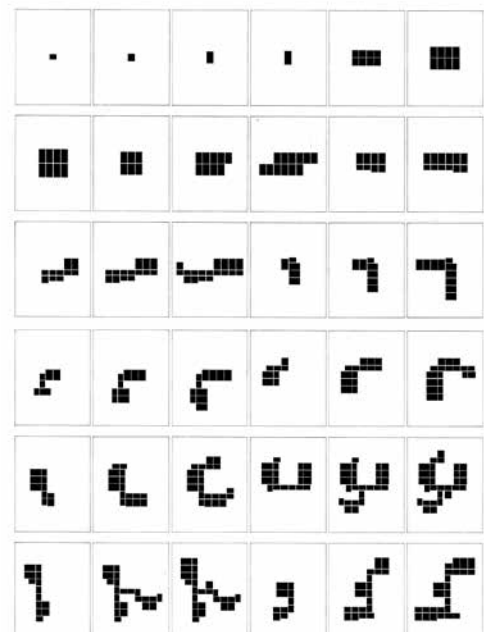


(‘Jørn Utzon > Kingo Houses | HIC Architectura’, no date)

| Ill. 90. Fredensborg Houses

### Sectional Housing System “Espanciva” (1969)

Utzon designed a building system consisting of four different module sizes, that could be put together in countless ways, allowing for the building form to grow or shrink in a way that served the site, the climate and the needs of the residents. However, one could say that such a high degree of flexibility and freedom in terms of composition might be problematic in regards to aesthetics. With the open system a builder could achieve both very simple and very complex forms (see ill. 91). Wraber (Wraber, no date) questions the ability to ensure desirable proportions and order in case of Expansiva open system, as it would be hard to predict how users might put the elements together, and as the elements differed in sizes and heights it could potentially be hard to ensure aesthetic and spatial qualities (Wraber, no date). Wraber concludes, that according to her findings “*it was therefore neither a good idea to have a too high nor a too low degree of flexibility if aiming at creating a dwelling that should be perceived as being of high architectural quality to a large group of people and at many different sites*” (Wraber, no date). Nonetheless, Utzons approach was very innovative for its times, as the building in principle could expand indefinitely. The modules were made of standard materials and sizes, which aimed at decreasing the construction cost of the structure significantly. Unfortunately, Espanciva was never put into production and only one physical prototype house was made, and is located in Hellebæk functioning as a private residence. (‘Modul, repetition og rytme’, no date)



(‘Modul, repetition og rytme’, no date)

| Ill. 91. Sectional Housing System “Espanciva” (1969)



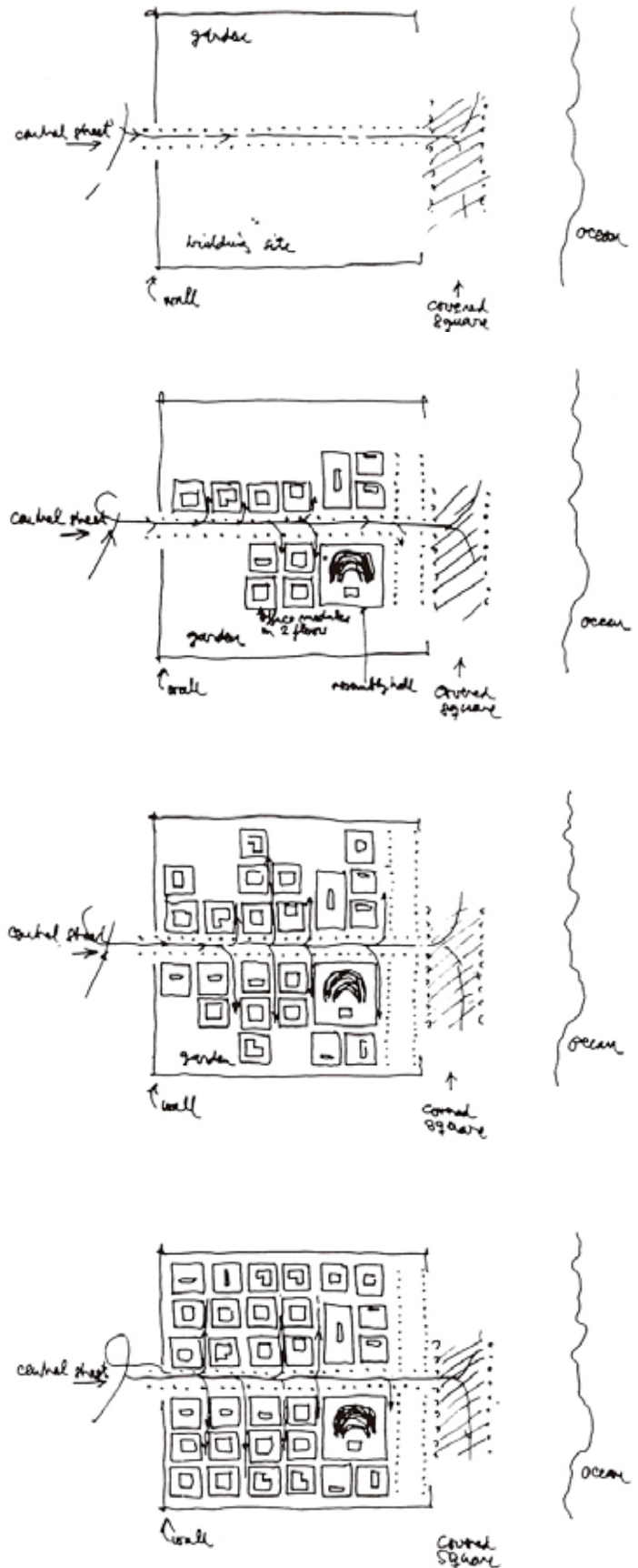
## National Assembly, Kuwait (1983)

National Assembly of Kuwait is a perfect example of modularity in additive architecture, where repetition of a component appears as a resource, aiding in solving complex constructional and geometrical problems in a rational way. Utzon's awareness of construction in the design process helped to simplify and rationalize complex structure. As a result of combining prefabricated components and structural assembly it was possible to achieve maximum flexibility for the user with simultaneous economic affordability of a project and maintained unified, but also organic expression of the form. (Kirkegaard and Hvejsel, 2014) External boundaries of the National Assembly can grow sideways by adding extra modules, which in its essence of flexibility refers intentionally to the traditional Islamic bazaar architecture (Utzon, no date). In Utzon's description of ideas behind the project highlighted were also aspects such as wayfinding and communication between departments in the National Assembly, climate considerations in regards to shading, relation to the site and general cultural symbolism (see ill. 92) (Utzon, no date). Relationships and differences between the elements, creating the variation, were very important in Utzon's work and the idea of mere repetition of prefabricated structure was far from his ideal (Thomas Bo Jensen, 2009). Due to evolution of building techniques in these times, new spatial forms could emerge. In case of the National Assembly in Kuwait the concrete structure was made of prefabricated elements that were *'structurally designed to express the load, they are carrying, the space they are covering – there are different elements for different spaces'* (Utzon, no date). On the contrary of widely known hidden constructions the elements in National Assembly were meant to be left visible (see ill. 93), strengthening relationships and links mentioned in his initial thoughts on principles of additive architecture.

“

*In the National Assembly Complex you see very clearly, what is carrying and what is being carried. You get the secure feeling of something built – not just designed.”*

*~ Jørn Utzon, “The importance of architects” (Utzon, no date)*



(National Assembly, Kuwait - Jørn Utzon, no date)

| Ill. 92. National Assembly, Kuwait





*(National Assembly, Kuwait - Jørn Utzon, no date)*

| Ill. 93. National Assembly, Kuwait

After researching flexible and modular systems, the first floor plan ideas were sketched. A puzzle was developed in which the individual rooms could be combined as needed.

Initially, there were room units that could be joined with common areas (kitchen, bathroom and common room) to create a dormitory typology.

For families, smaller accommodations or single rooms, the modules were divided into bedrooms, living rooms, kitchens and bathrooms. These could be arranged in different combinations to create a variety of dwelling units.

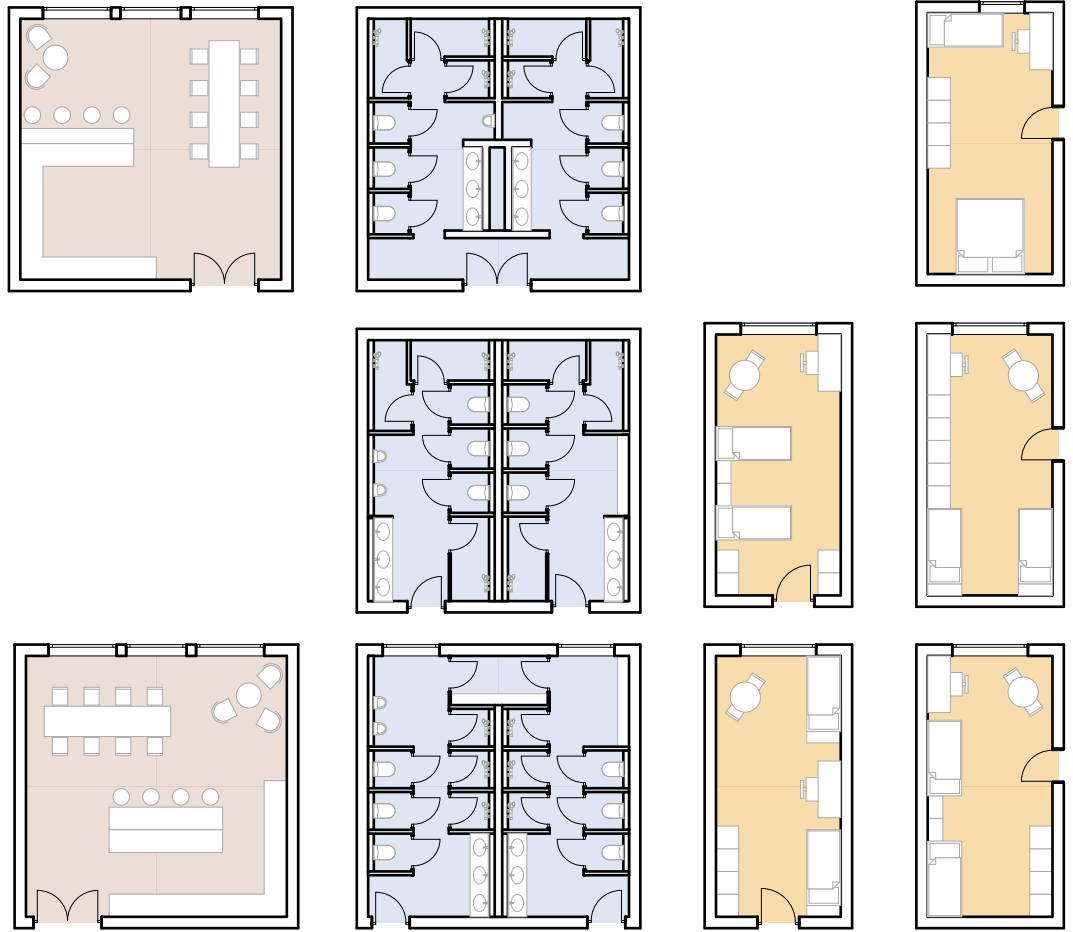
These modules were to be oriented along a central passageway, allowing the technical functions to be placed in the corridor area as well. This way, they would not be affected by significant changes, even if the arrangement of the modules changes over time.

In the initial versions, the central aisle was still very large and further consideration was given to how the aisle could be utilized in addition to being seen as an empty passageway. In the course of these considerations, it became more and more apparent how important the term connection is for this project. As a result, these areas were given more value and the access with a central corridor no longer seemed appropriate.

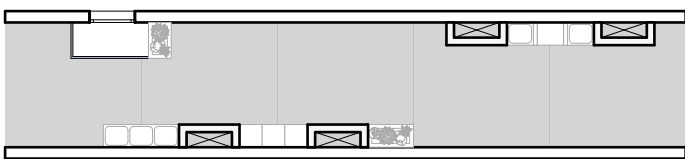
On the next page, some possible combinations are shown.



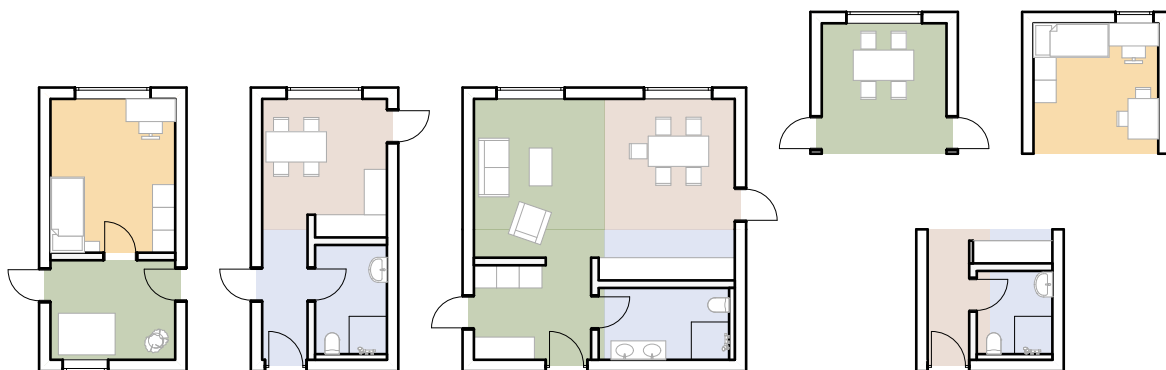
## Dormitory type 'puzzles':

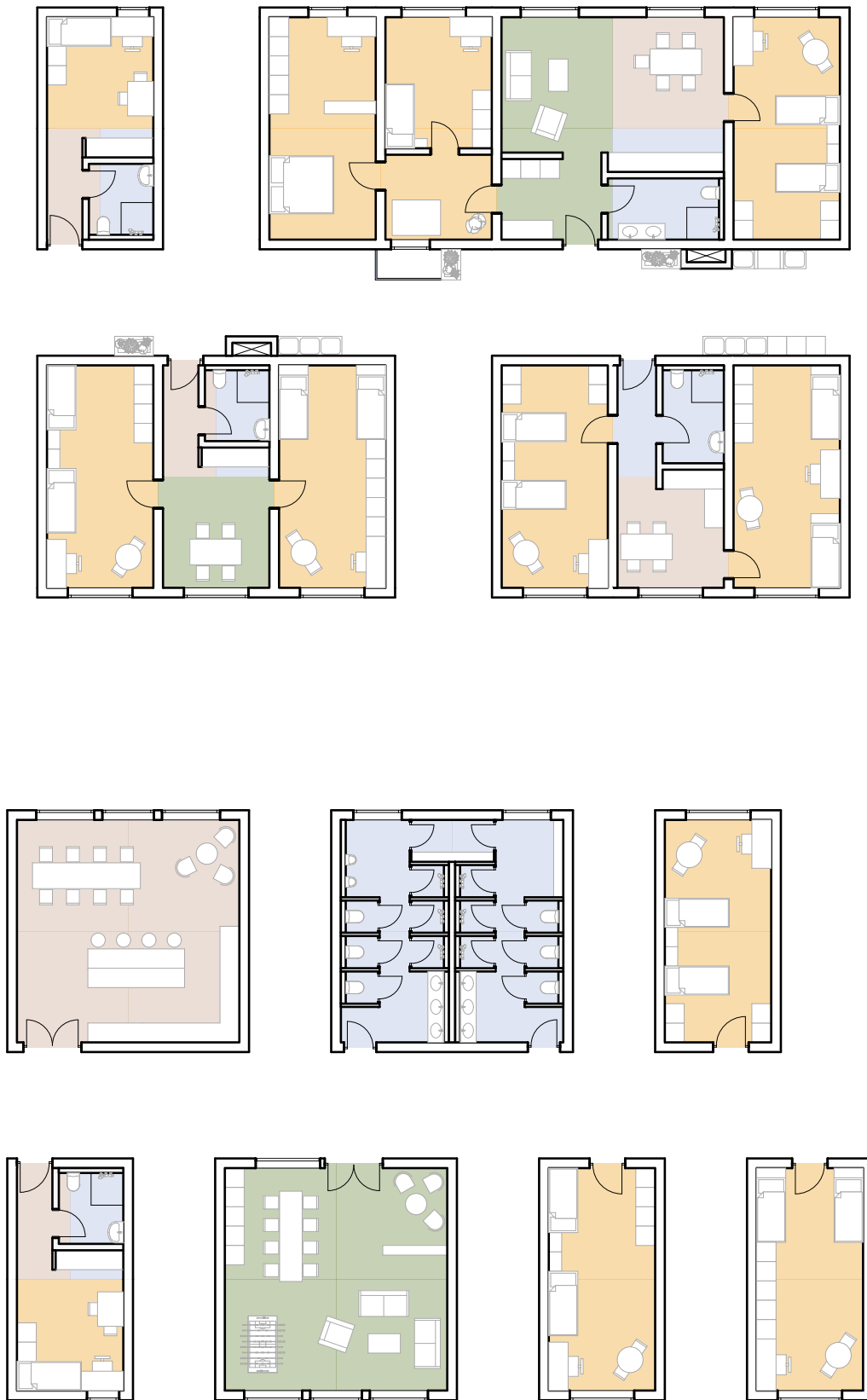


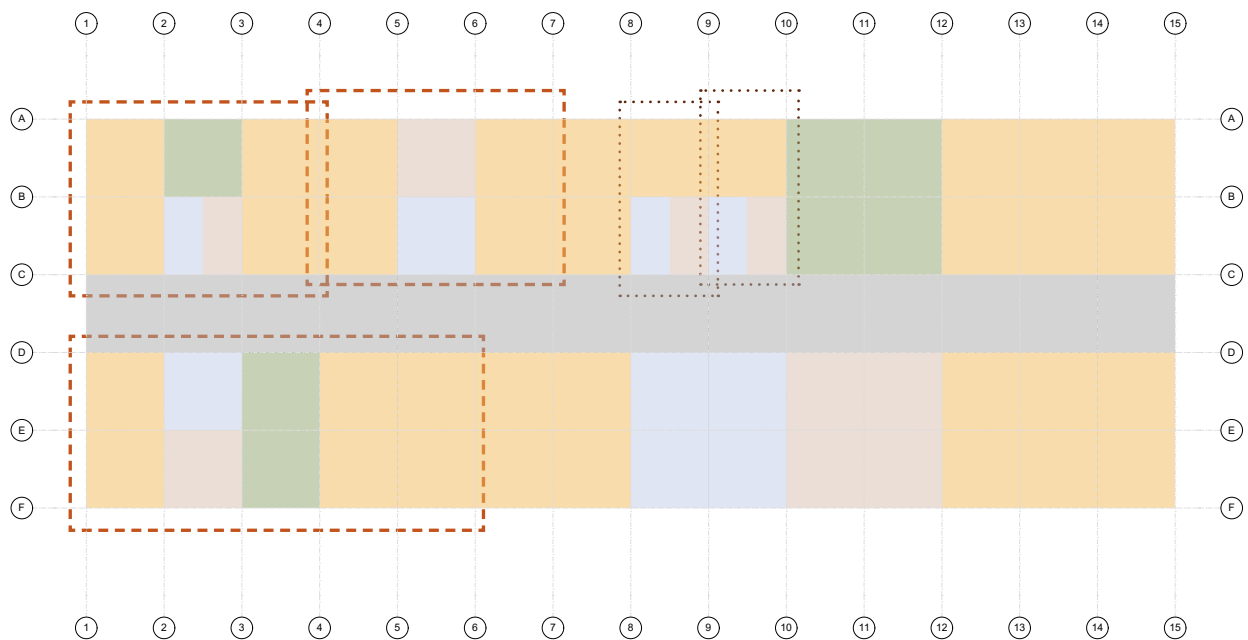
room types can be also used  
in the other typologies



## Family units, smaller accommodations or single rooms:







| Ill. 96. Possible puzzle assembly

----- family units, smaller accomodations

..... single rooms

rest: dormitory typology



# Aesthetical Intentions



(데코보코, no date)



(Studio Precht, 2019a)



(White Arkitekter, 2018)



(Studio Precht, no date b)



(Effekt, 2018)



(Mozses, no date)







(Keizerkoopmans and Vivid-Vision, 2020)



(Osamu Nishida, Taichi Umino, and Hirotaka Isshiki, 2014)



(Mengyi Fan, Oliver Thomas, and Maria Erman, 2018)



(Monologue, no date)



(Undurraga Devés arquitectos, 2018)



(Studio BELEM, 2020)

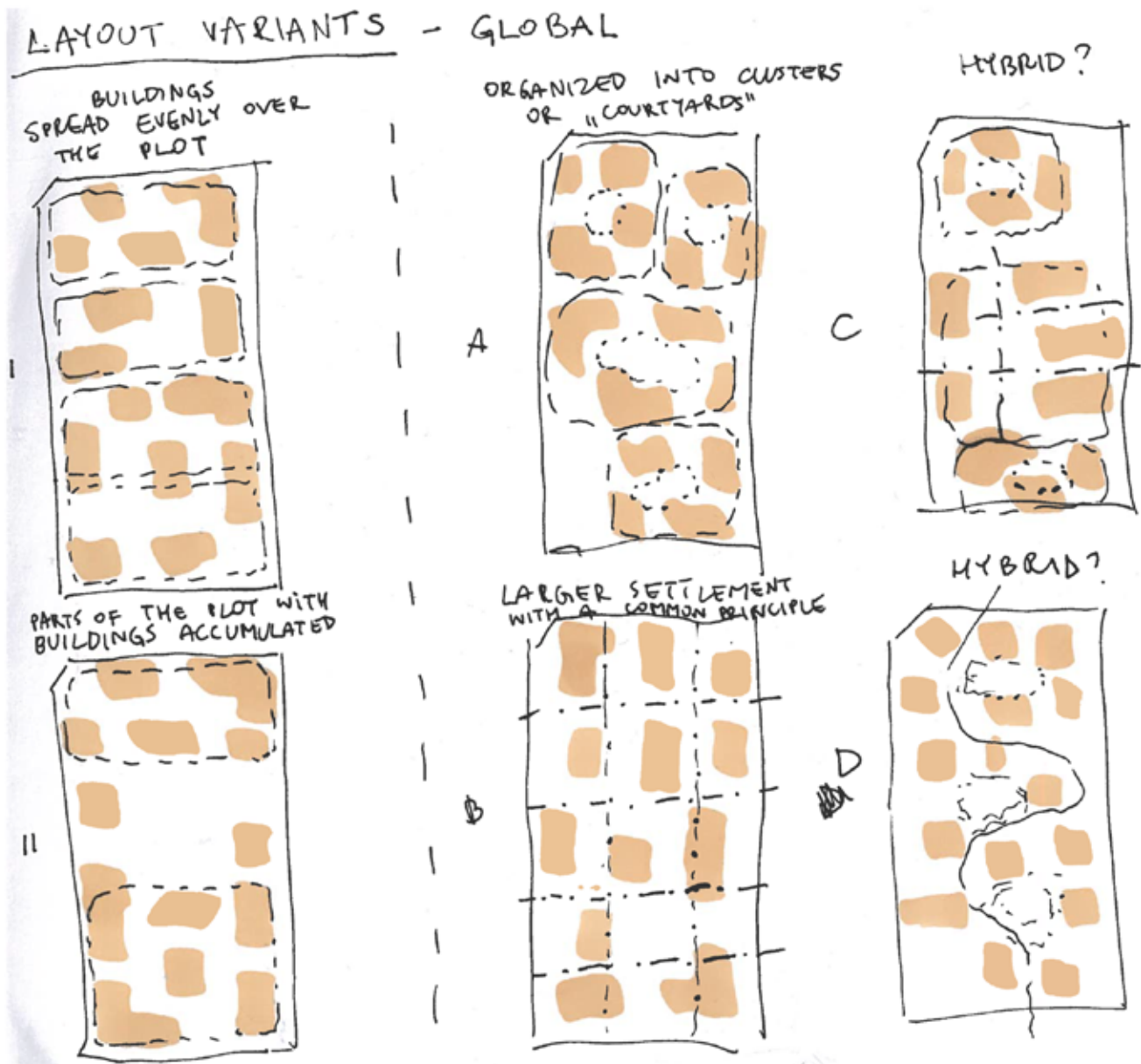
(various sources)

### Layouts

In the initial phase, different variants of how the buildings should be arranged in relation to each other were explored. This was accompanied by considerations of how to distribute the community areas in the clusters.

The hand sketch studies display variants of building compositions. The layout should provide different spaces for exchange between habitants and locals. Furthermore, the area should be inviting and not uniform, in order to enhance flows and activities. Variation C and B are seen as too strict for these goals. Therefore, the arrangement of the clusters should be a mixture of variation A and D.

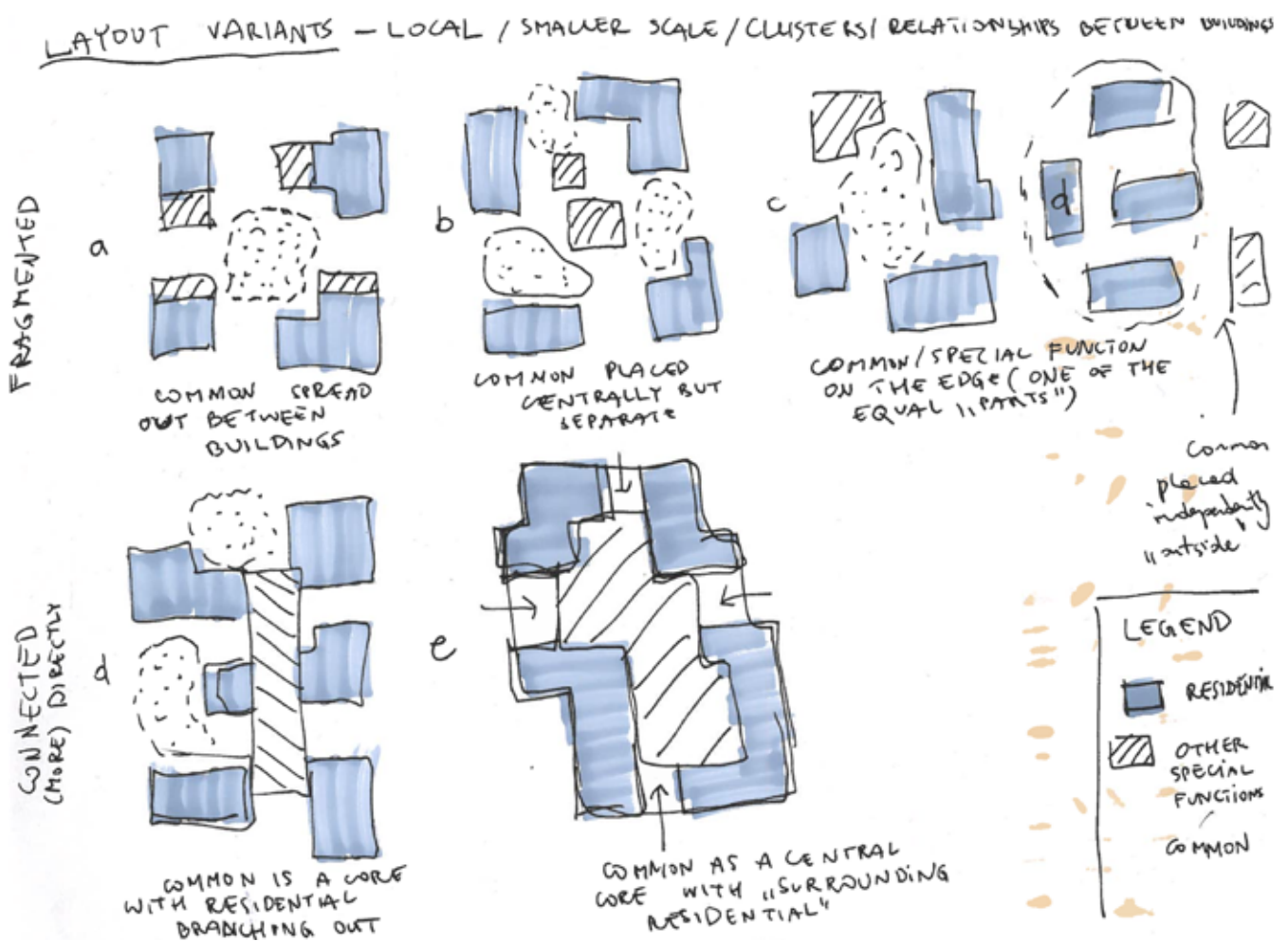
The aim is to have smaller communities in each cluster which creates a stronger sense of bonding. At the same time, there should be connections and interactions between the different units, just as indicated in hand sketch D.





The placement of the community spaces should again be a mixture of the types outlined. Here, too, it should be a mixed type between a and d.

In this way, the common areas are to take on the concept of connections not only in the literal sense that they connect the building units with each other, but also in the figurative sense – to be a place for connections between residents. Furthermore, there should be community spaces distributed across the plot with different functions. This should encourage people to explore the site and not just stay in their own cluster.

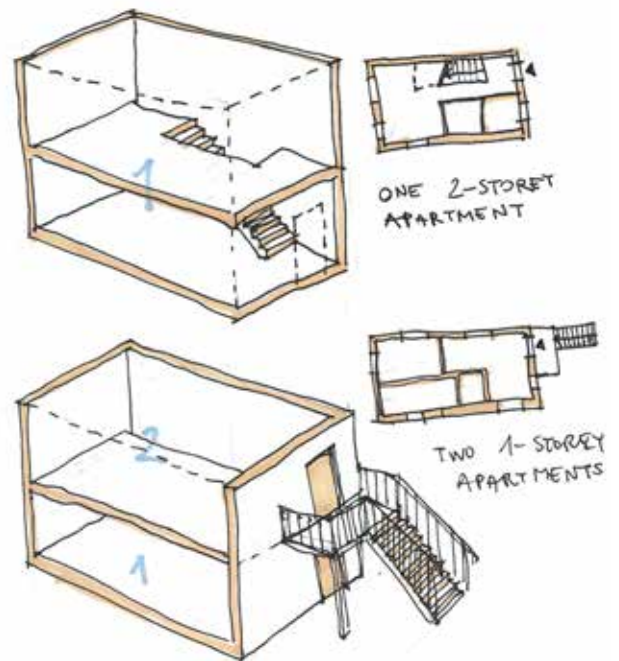
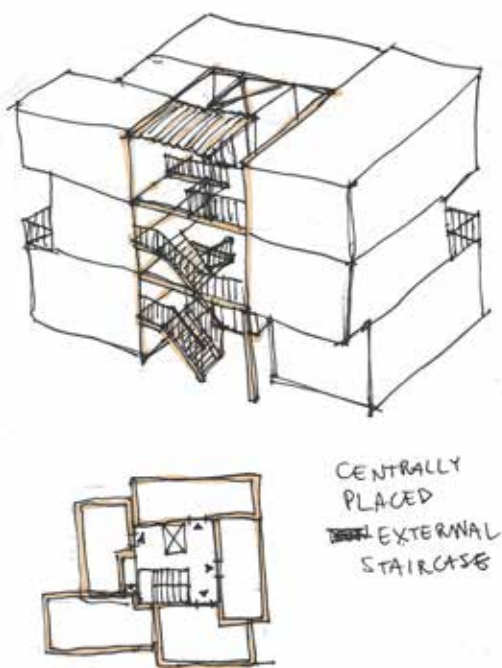


## Volume studies // Design Process

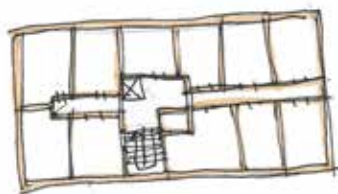
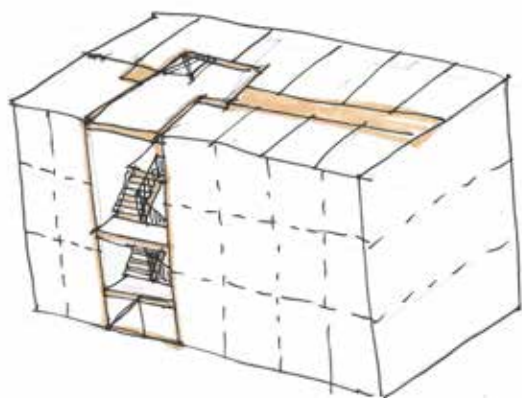
### Access Types

Further analysis included studies of how the individual buildings could be accessed.

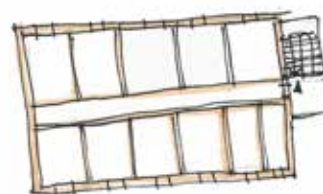
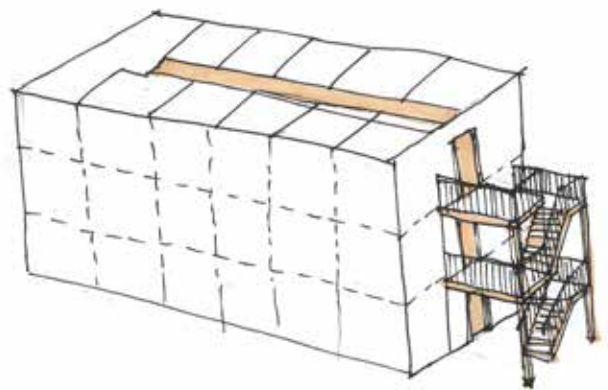
The most important result was that it should not be a closed interior access. The preferred variants were therefore those that could be accessed from outside without creating additional corridors.







INTERNAL  
STAIRCASE  
CONNECTING  
MORE DIRECTLY  
DIFFERENT  
FLOORS, (CAN  
BE PAIRED  
WITH OTHER  
COMMON  
FUNCTIONS)



EXTERNAL  
STAIRCASE,  
EACH LEVEL  
OF PLATS ON  
ITS OWN

| Ill. 100. Access types // hand sketches

## Volume studies // Design Process

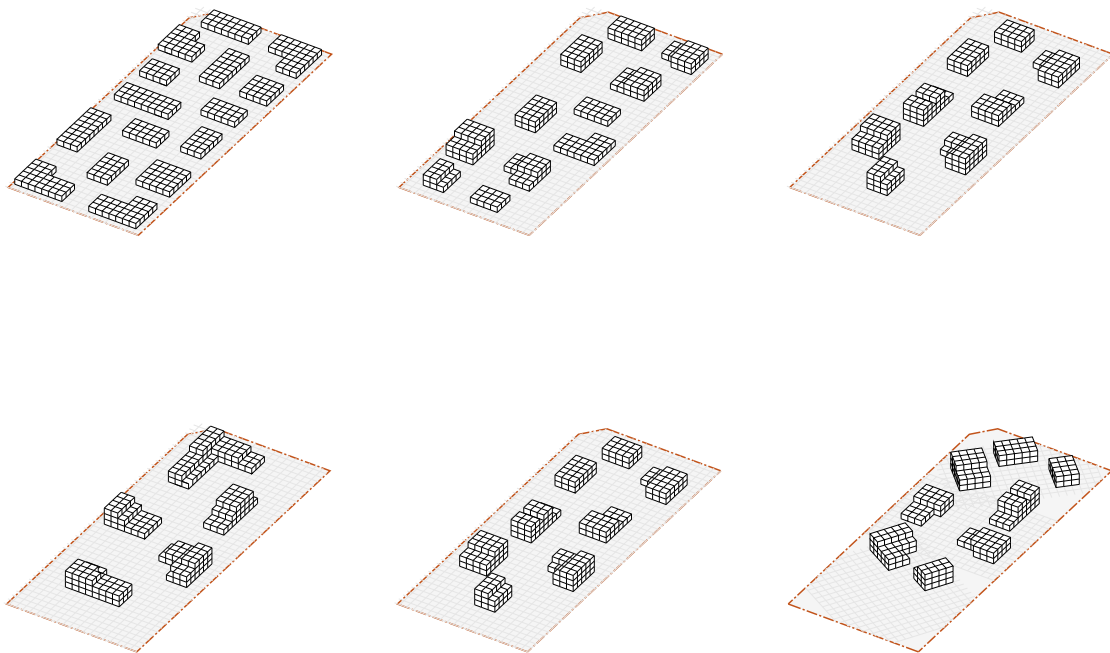
In a next step, 300 modules were placed on the site in different variations.

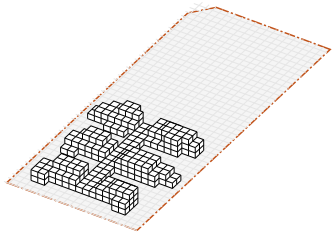
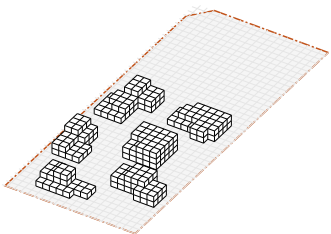
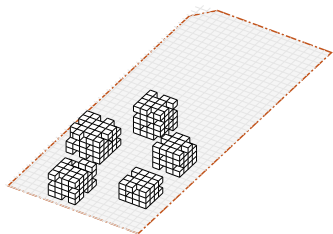
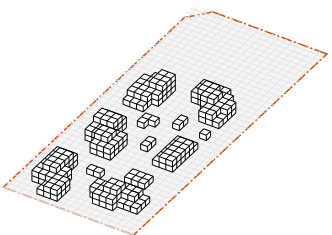
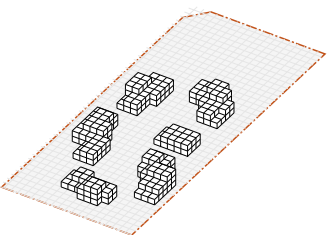
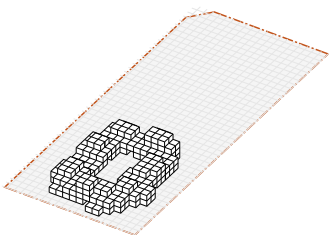
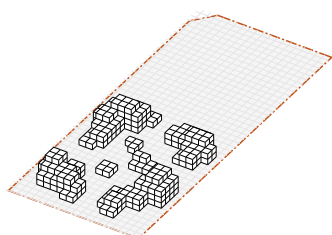
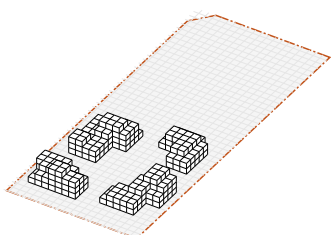
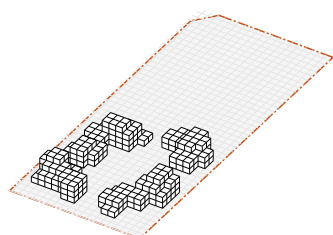
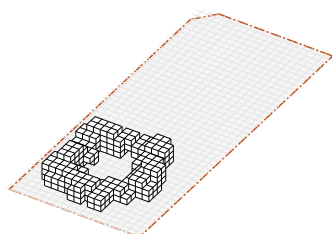
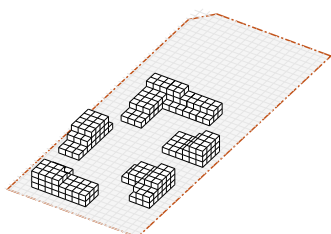
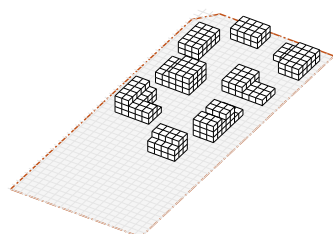
This was to give a sense of proportion of the built environment, as the reference projects were in different scales.

The intended design expression is more difficult to achieve when there are only single-story buildings spread across the plot. Buildings that are too high and placed densely together on the site do not convey a human scale and therefore they are not suitable. A mixture of 1 - 3 story buildings spread over the plot and thus creating spaces in between is the most preferred approach.

This allows to create a variation of niches for the habitants and locals to explore. Furthermore, the project will not exceed human scale and creates an inviting atmosphere. By moving around on site different perspectives should be given to the users and provide more interesting experiences.

300 units were chosen as this corresponded to the initial estimate of 150 people.

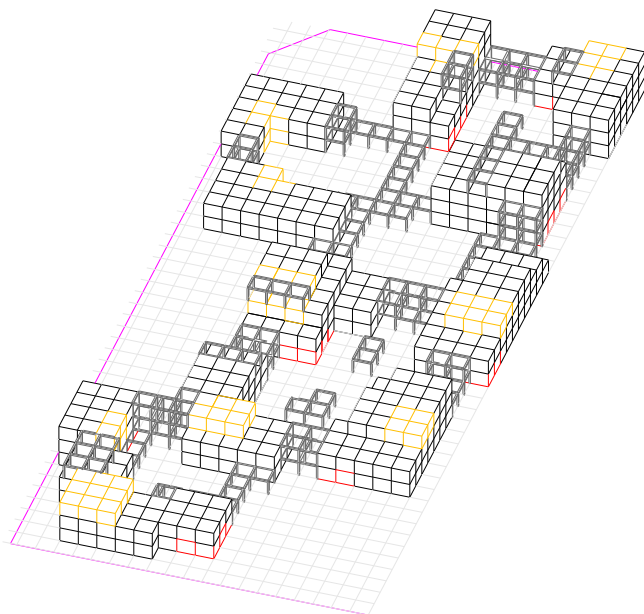




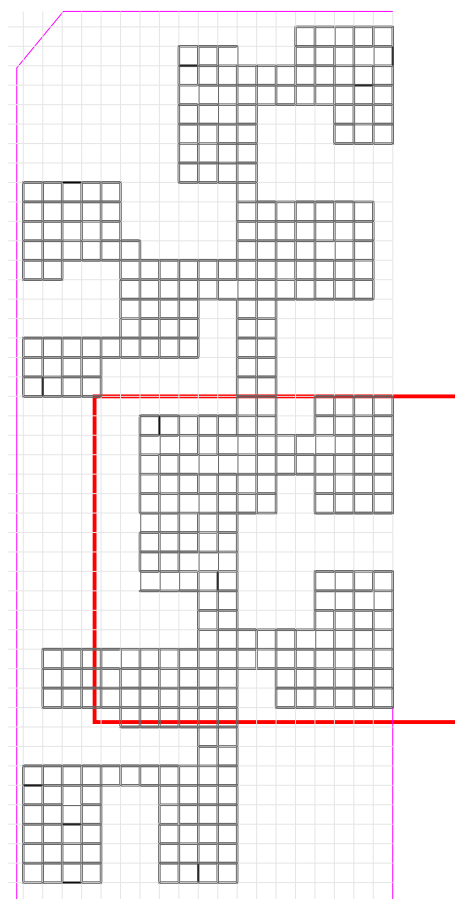
The arrangement of modules can result in very different expressions. As a comparison, a very strict, geometrical order and a more organic shape are illustrated on the following pages.

The yellow areas in the 3D views represent community areas for the smaller community. The red areas represent the public zones.

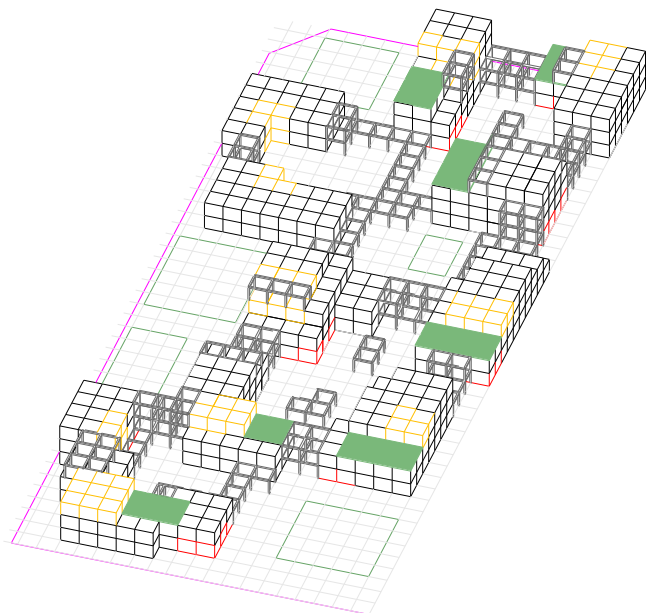
The analysis showed that an organic arrangement loosens up the otherwise very strict grid structure and thus makes it more approachable. The general site orientation is thereby less directional and invites users to explore the structure by creating different niches. This is supposed to make the users curious to move around the plot and enliven the site.



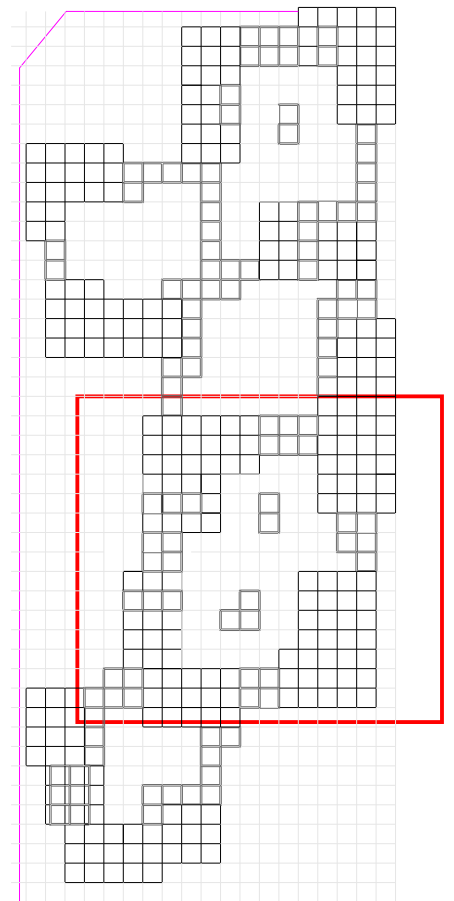
| Ill. 102. Geometrical expression - isometric view



| Ill. 103. Geometrical expression - plan view



| Ill. 104. More organic expression - isometric view



| Ill. 105. More organic expression - plan view



## Volume studies // Design Process

### Shadow Analysis

The shadow analysis shows that the buildings shade themselves too much with the proposed building volume. Therefore, the design was revised and de-densified.

The times for the analysis are based on the longest and shortest days of the year. The respective times are mid-morning, midday and mid-afternoon. Morning and afternoon times differ slightly. This is to make the analysis more comparable, as the sun sets or rises earlier or later in the given cases.



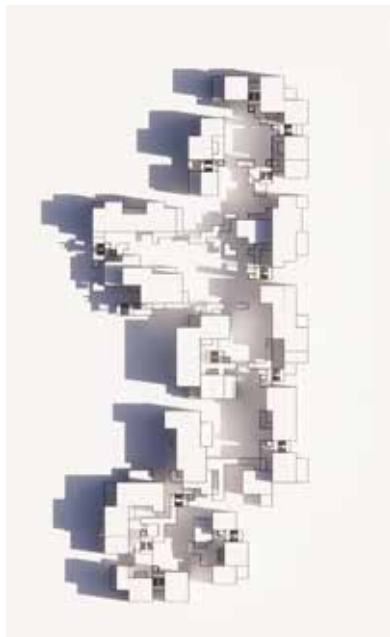
21.03 // 09:00



21.03 // 12:00



21.03 // 15:00



21.06 // 09:00



21.06 // 12:00



21.06 // 16:00



21.12 // 10:00



21.12 // 12:00



21.12 // 15:00



(alcolea+tarrago, 2020)



(MAK architecture, n.d.)



(La Compagnie du Paysage, 2019)



(Kooy, 2016)



(Meesvisser, 2021)



(KENK architecten, 2003)



(Lanoo, 2021)



(Helbling, 2016)



(Bossi, 2021)



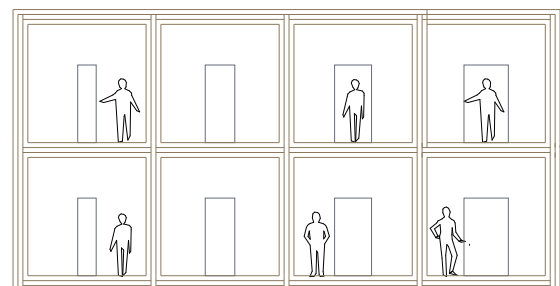
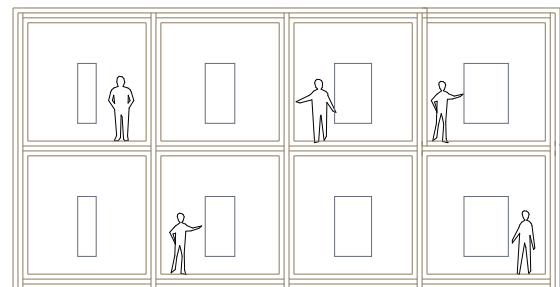
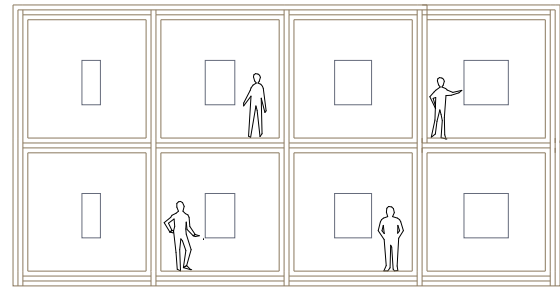
(AAVP architecture, 2017)

Windows constitute a link between the external appearance, the atmosphere in the room and the energy performance of the building.

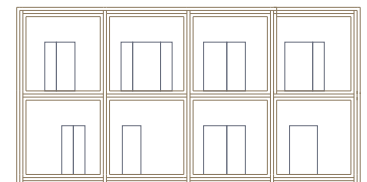
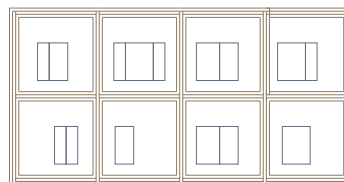
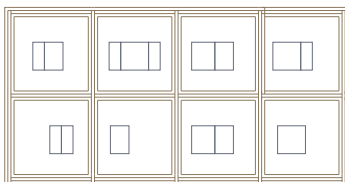
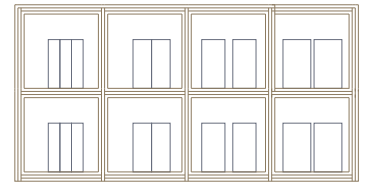
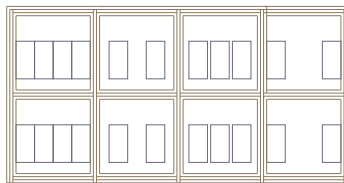
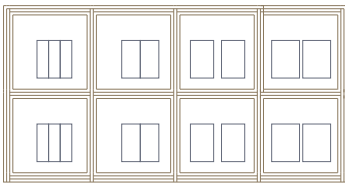
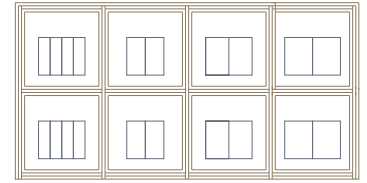
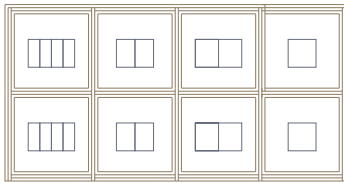
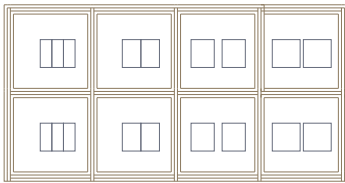
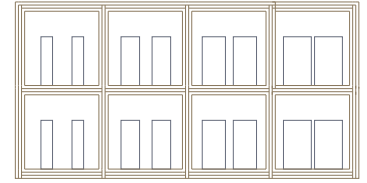
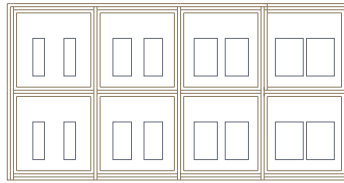
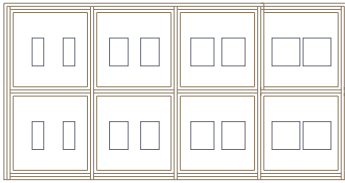
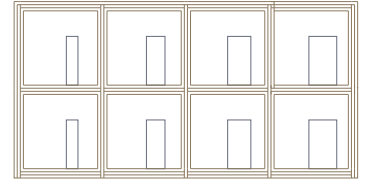
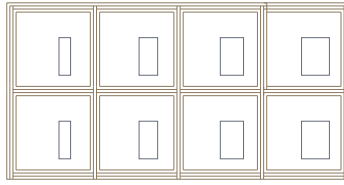
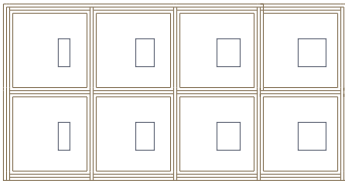
The initial studies were limited to the width of the window and the height of the sill. The variations in expression differ significantly in the atmosphere they convey - of the interior space and the façade expression.

A smaller window with a higher windowsill makes the interior appear more private and intimate. While a floor-length window offers more connection with the outside world and simultaneously makes the room appear public and extroverted. The façade thus shows how public or private a space is.

The next page displays some explorations of different window arrangements.



| Ill. 108. Window studies





According to these considerations, three different types of windows were chosen. The width is about a quarter of a façade panel and the height is in line with the doors. The different gradations of sizes indicate whether it is a private or more public space.

The largest dimensions of 2.1 m are used mainly on the ground floor and in the common rooms of the dormitory typology. The smaller dimensions with a height of 1.2 m and 1.6 m are used in the private rooms.

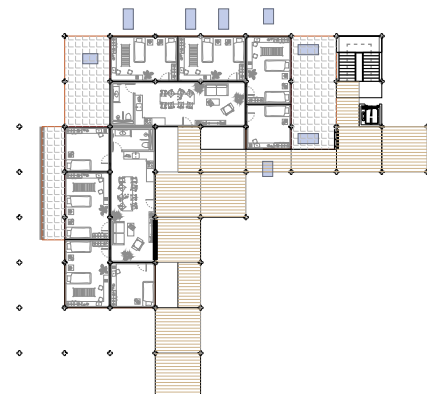
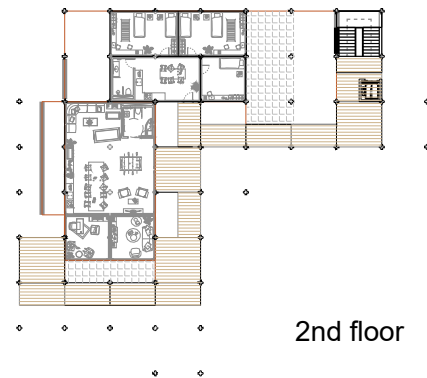
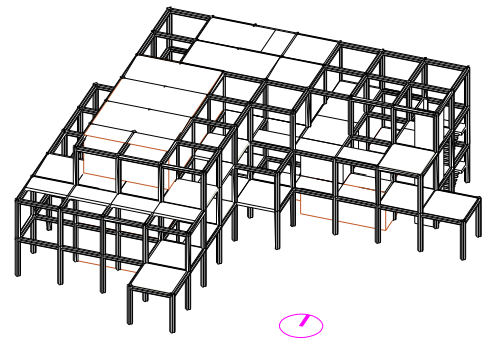
The initial daylight studies are shown in the Appendix 3.

The original idea was to leave the façade as a rendered surface, with the wooden grid structure emerging. In this sense, the building complexes refer to Gellerupparken, where the façade is also strongly geometrically structured, as it is characterized by the precast concrete elements.

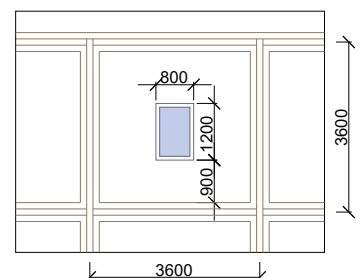
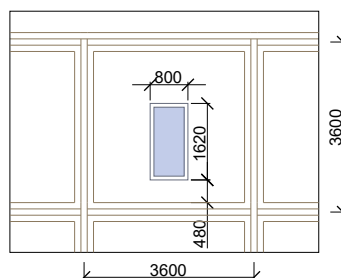
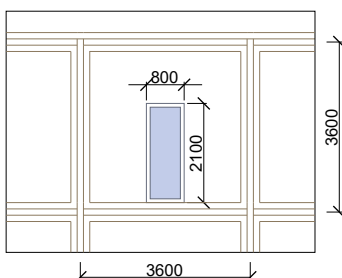
To reinforce the distinction between public and private functions, a wooden cladding was chosen to highlight the public functions, instead of the render surface.

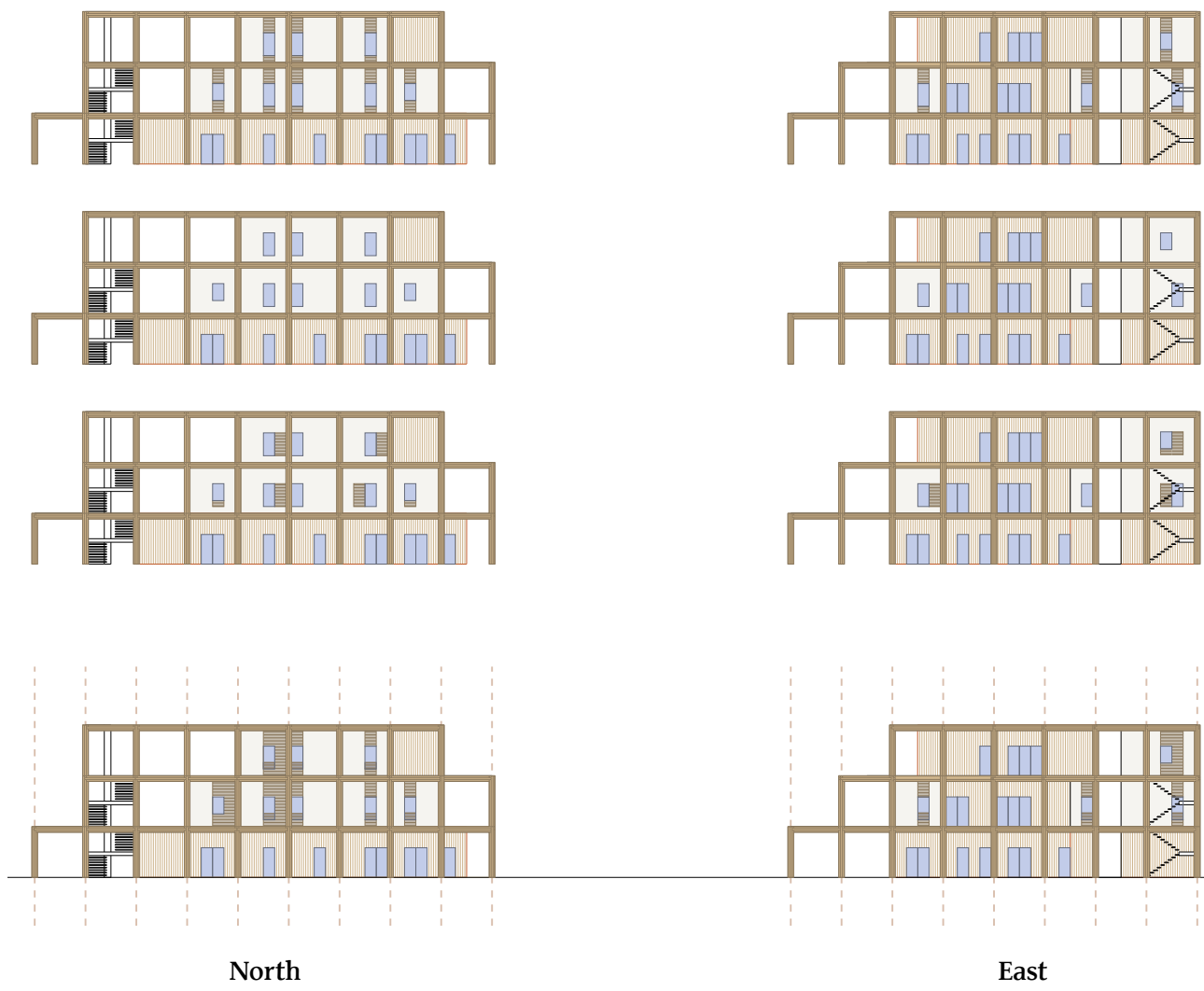
In order to make the façades both aesthetically and tactile more interesting, iterations were made as to how the windows could contribute to achieving this.

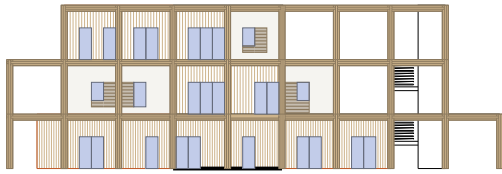
The next page contains façade considerations showcased on an exemplary block. The plans for the chosen dormitory block are displayed on the side.



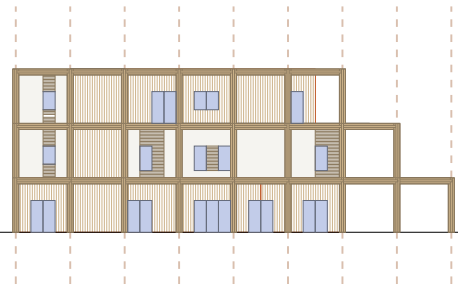
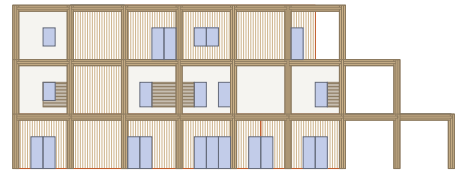
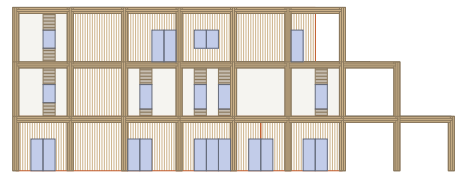
| Ill. 111. Dormitory type for the facade considerations on the next page







South



West

| Ill. 112. Facade considerations

## Tectonic Considerations

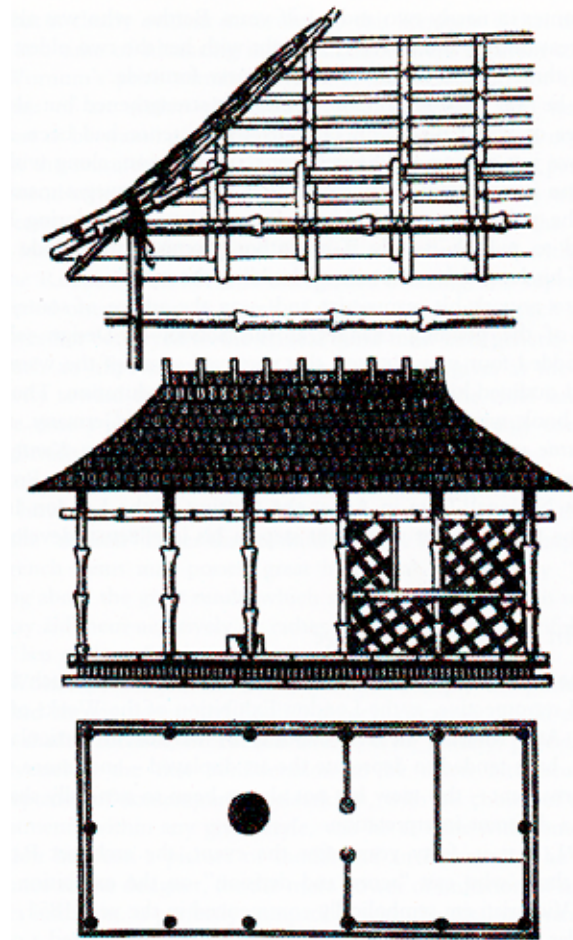
The expression tectonics has often been used with different connotations in architecture. It is an interplay of structure, material and aesthetics. To better understand the different approaches, a brief etymological excursion is applicable - the term tectonic comes from the Greek word *tekton*, which can be equated with a carpenter or builder. Over time, this term evolved into something more abstract, no longer tangible. From the practical notion of a carpenter, it became a more generic notion of construction and eventually an aspect of poetry in the buildings sector. (Frampton, 1990)

Various architects and theorists have examined the term tectonics and interpreted it in different ways. A small selection and development of the expression is aimed at providing an overview.

For Karl Bötticher, the concept of tectonics involved an integrated exploration of function, structure and symbolism. For him, architecture is not only based on the form of the building, but goes back to the dynamics and the interplay of forces. He advocated that architects should also include an analysis of social and physical forces, thus making architecture an interplay of form and space. Architectural tectonics is seen as an active intervention in the natural and cultural order. (Schwarzer, 1993) In addition, he created a division into "onthology" and "representation". "Onthology" refers to the functional, structural and cultural purpose, while "representation" refers to what relates to aesthetics and artistic properties. (Al-Alwan and Mahmood, 2020) Bötticher thereby accepted that the essence of architecture lies in its function and construction, while establishing a connection to the artistic side of architecture. Art must therefore relate to useability and nature - an interplay between building and human culture that creates a sense of place. (Schwarzer, 1993)

Semper carried on with investigations on tectonics focusing on the interplay between materials and handcraft, linking it to his 4 ideas - the hearth, the enclosure, the terrace, and the roof. (Semper, 1851) The influence of Bötticher on Semper's work is undisputed. (Maulden, 1986)

Sekler divided tectonics into "structure" and "construction". Whilst structure reflects the ordering principles, construction refers to the physical appearance of these elements. The combination of these two corresponds to tectonics, which is the only concept that is exclusively limited to the field of architecture. Thereby the architect becomes the master of tectonic expression and by tectonic articulation the building creates emotional response. (Schwarzer, 1993)



(Semper, 1863; Dahl, 2017)

| Ill. 113. Caribbean Hut, exhibited at the Great Exhibition of 1851 in London, displaying his 4 ideas – all elements of ancient architecture in a highly original way (vitruvian archetype)

The concept of tectonics was greatly influenced by Frampton, who re-introduced the term in a critical movement. Frampton subdivided the architectural factors of tectonics into object, detail, joint, material, construction, structure and interaction and brought an artistic dimension to the term, which he described as the "poetics of construction". (Schwarzer, 1993) Marie Frier Hvejsel summarizes that "*Frampton's account of the tectonics as 'poetry of construction' is significant as it aspires, simultaneously, to the imagination of the architect and the perception of the inhabitant*". (Hvejsel, 2018)

This artistic component, which was emphasised by Frampton, was also brought into play by Borbein, who compared tectonics with "the art of joinings". (Leatherbarrow, 1997)

Frascari's work *The Tell-the-Tale Detail* focuses on joints and detailing. Frascari defines detailing as creating harmony and providing opportunities for innovation by connecting buildings on a functional and aesthetic level. Details determine the performance of architecture, not only in a technical context but as well in an aesthetic respect. In order to emphasise the importance that Frascari attaches to details, he presents a number of examples in his work. These are intended to underline that the profession of architecture is as much art as craft. (Frascari, no date) Summarised in Frascari's words:

“

*This is because of the understanding generated by the detail as joint. Architecture is an art because it is interested not only in the original need of shelter but also in putting together spaces and materials in a meaningful manner. This occurs through formal and actual joints. The joint, that is the fertile detail, is the place where both the construction and the construing of architecture take place.*

~ (Frascari, no date)

Tectonics is therefore a difficult concept to grasp and can be examined and analysed from numerous perspectives. To this day, the term is much discussed, especially in connection with sustainability, the holistic approach in architecture and the increasing importance of digital tools and their fusion with the architectural work.



(Olsson, 2016)

| Ill. 114. Arrhov Frick, Detached House, Viggso

The term can be broadly defined in three categories:

- scenographic object, which focuses on the representation of an image and does not deal with the technical characteristics of an object.
- technological object, which relates to purpose fulfilment and measurable characteristics
- tectonic object, which can be further subdivided into onthological and represenational. (Maulden, 1986)  
Onthological describes a constructural element that combines static roles and cultural status. Hidden constructional elements are categorised as representational. (Frampton, 1990)

The term tectonics combines the technical aspects of architecture such as structure and construction with aesthetics, context and cultural aspects. It is reflected in the art of details and the connection of materials creating space that can be effortlessly legible and comprehensible.

Hoda Al-Alwan and Yusur B Mahmood have expressed it in their text as follows:

“

*Tectonics is the essence of architecture that deals with the aesthetic aspects of structure, construction and materials. It tends to consider the handicrafts, details and joints as an essential part of architectural practice and as an important means of showing cultural expression by using the simplest techniques and materials. Tectonics creates emotional interaction between people, nature, and culture by its dependence on the human ability to understand the inspirational relations between the elements of the building.*

~ (Al-Alwan and Mahmood, 2020)

The intention is to incorporate these theories into the project and to create architecture that merges structure and aesthetics, aiming to achieve a sense of place that reflects the understanding of space.

tl;dr:



aesthetic

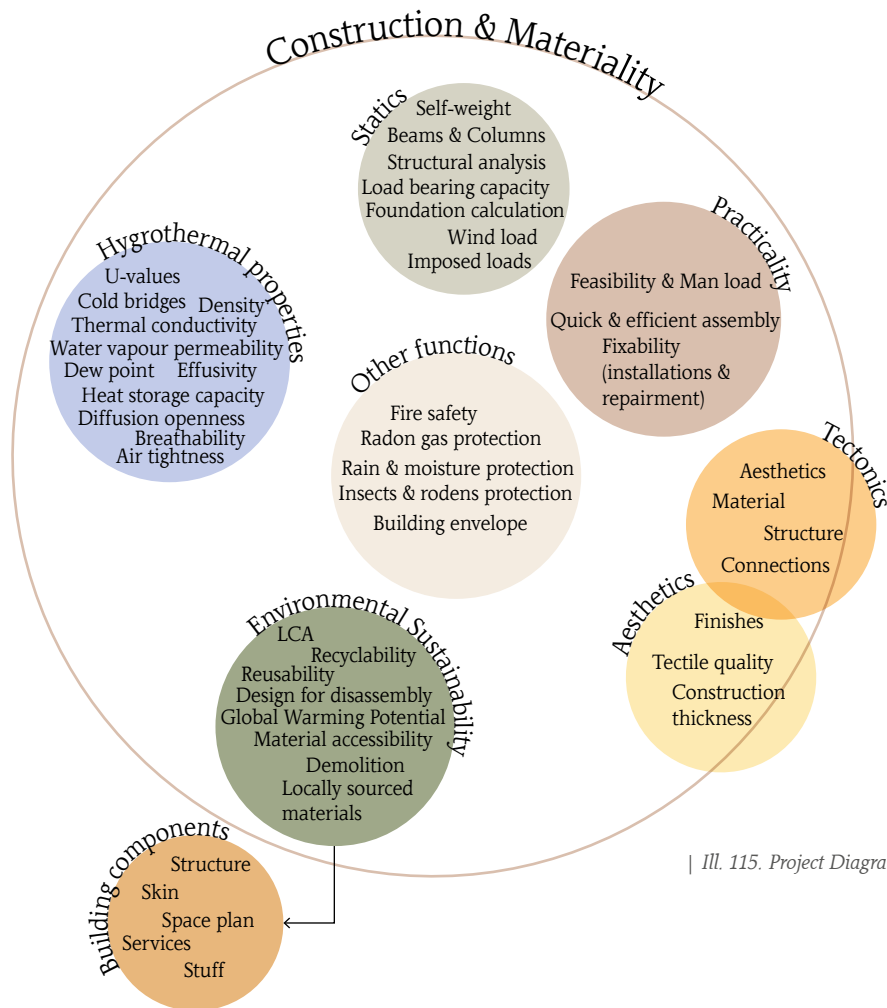


material



structure





(Project Diagram p.8-9)

| Ill. 115. Project Diagram - Construction zoom-in

“

*Embodied energy is a calculation of all the energy that is used to produce a material or product, including mining, manufacture and transport.”*

~ (Crawford, 2020)

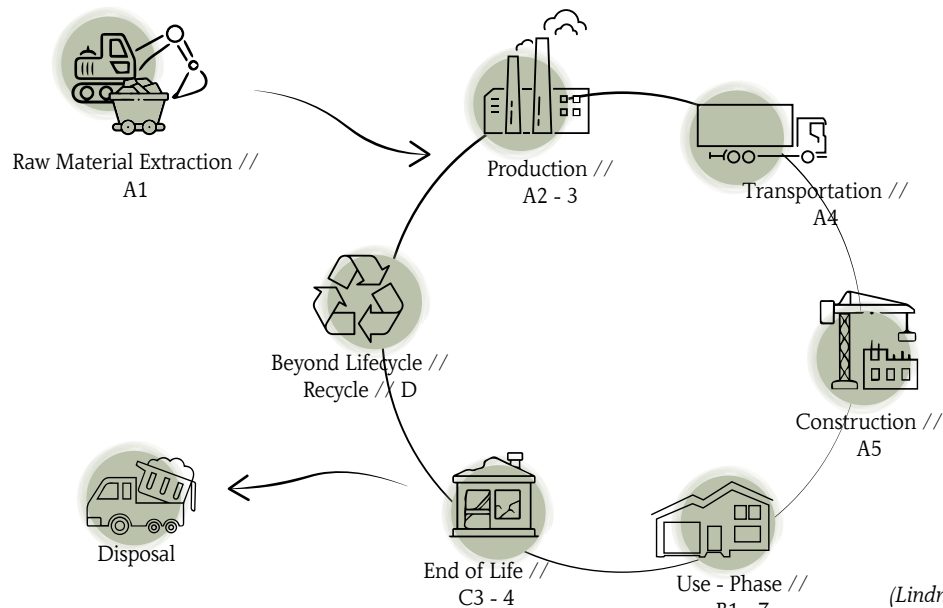
The choice of materials has a great influence on the desired outcome. Not only in terms of external appearance, but also when it comes to the atmosphere created and interior qualities of the space. Therefore, the subject of sustainability and resources is also very important when it comes to materials.

As already addressed in the chapter on sustainability, the building sector accounts for a significant share of energy consumption. Reducing this through various measures falls under the topic of environmental sustainability. Another very important aspect of sustainable architecture is the reduction of CO<sub>2</sub> emissions. With regard to sustainable design and materials, there are various issues; It is important to use natural resources consciously, to recycle materials, to use materials with low embodied energy and to use renewable materials from a verifiable source. (Sassi, 2006)

In order to measure embodied energy, one has to take into account the energy content of the material and the quantity of material consumed. (Embodied Energy, no date)

One method to measure the impact of different materials on the environment is LCA. LCA stands for Life Cycle Assessment and calculates the potential environmental impact of the product used and the associated resource consumption. It takes into account the different phases of a product's life, from raw material, production, transport and use to disposal. (Hvad er LCA: generelt om LCA, no date)

In order to gain an understanding of the materials used in this project, the LCAByg programme is applied. It can be implemented to create a life cycle assessment of a building or to compare different materials with regard to their life cycle.



various sources:  
(Jørgensen et al., 2021);  
(Lindner and Kittelberger, 2020);  
(unfold consulting OG, 2021)

| Ill. 116. Life Cycle

In addition to the conscious use of materials, the topic of construction is also related to sustainability and life cycle. Since the focus area of this project encompasses topics such as flexibility, the type and manner of construction likewise plays an important role. In order to combine a sustainable and flexible approach, the keyword “design for disassembly” is taken up. Even more so in the context of LCA, since design for disassembly has a significant impact on the end-of-life options of a component.

A short definition for Design for disassembly (DfD):

“

*DfD is the design of buildings to facilitate future changes and dismantlement (in part or whole) for recovery of systems, components and materials, thus ensuring the building can be recycled as efficiently as possible at the end of its lifespan.”*

~ (Cutieru, 2020)

This approach is based on the concept of circular economy, where resources should not be used as landfill or waste at their end of life, but rather find a further application in a “reduce, reuse, recycle loop”. Precisely because the construction industry utilizes so many materials and is a major contributor to CO<sub>2</sub> and energy consumption, the DfD strategy allows to extend the lifetime of materials and components by returning them to the material loop. (Cutieru, 2020)

Designing buildings with circularity in mind is challenging because one should be aware from the beginning of the design process which scenarios may occur in the future. It is therefore advisable to consider the building as layers and to reverse engineer the building process and the associated supply chain. (*What Is Design for Disassembly?*, 2017)

There are four different ways in which the stage of demolition can be replaced by disassembly. (These can be seen in the graphic.) Which principles can be used depends on which strategies have been introduced in the design to make design for disassembly possible. Some of the different strategies will be mentioned later in the text. In general, the strategies that make material recycling and component remanufacture possible are similar to each other and those that make component reuse and building relocation possible have a stronger link. Generally, there are three broad areas in which to design a building with disassembly in mind. (Crowther, 2005) These are:

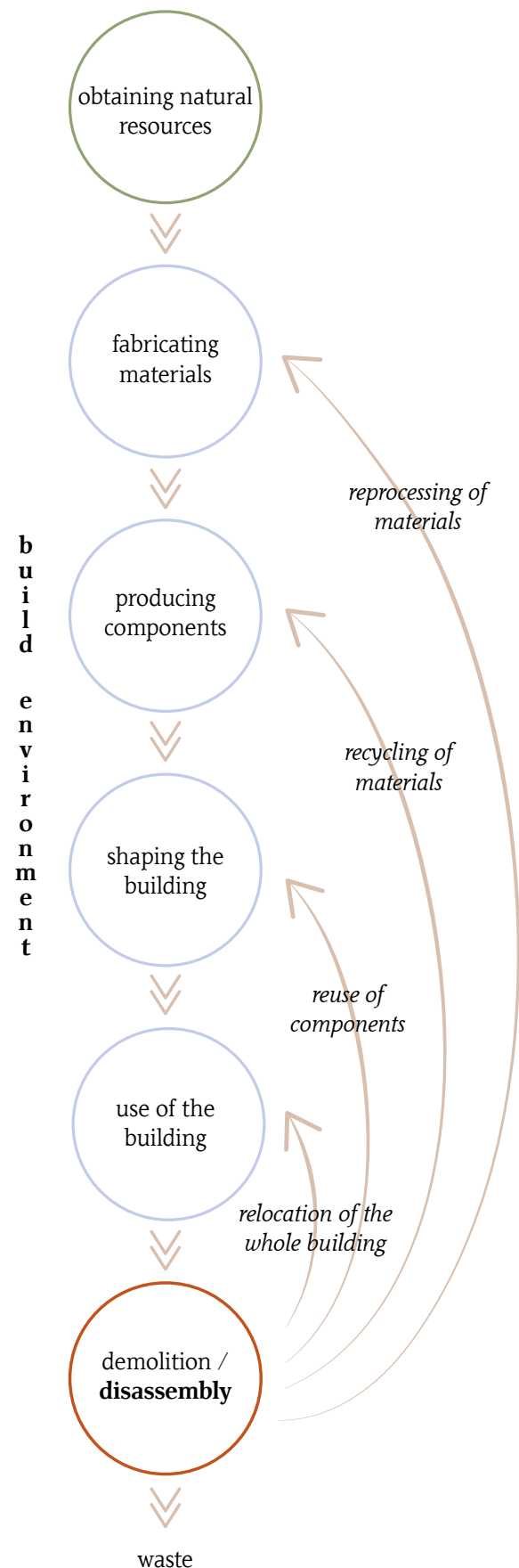
- A holistic approach towards an environmentally sustainable construction
- Seeing the building process in layers with various service lives (such as site, structure, skin, services, space plan and stuff)
- Being aware of the diverse assets of distinct end-of-life scenarios

(Crowther, 2005)

Design for disassembly must be seen as a whole picture and often different approaches are in conflict with each other. It is then important to weigh which ones offer a better option in the long term and to make these decisions based on a broader context. Nevertheless, there are certain principles how to design for disassembly. (Crowther, 2005) Some of them are listed below:

- Reduce the variety of types of building components, materials and fasteners: this helps later in the disassembly and in the recycling process; furthermore, the transport to various collection points for recycling materials is reduced
- Refrain from using composite materials: this prevents one material from becoming contaminated with smaller quantities of another material, and thereby makes it easier to reuse
- Refrain from finishing materials (such as coatings): makes recycling more difficult – if these coatings are required to maintain certain standards in terms of fire resistance properties and the like, they naturally have priority
- Design an open building system: as a result, areas are not designed for a specific use and thus offer more room for change and adaptation to accommodate different purposes
- Separate the construction in different parts (structure, cladding, internal walls and services): this allows to work in parallel or to make changes in case of a later conversion without affecting other areas
- Size of components should fit with means of handling: this aspect should always be taken into account, but even more so when it comes to design for disassembly, as this plays an essential role when it comes to the decision if disassembly and re-assembly is profitable

(Crowther, 2005)



(Wasim Salama, 2017)

| Ill. 117. Design for disassembly



# Tectonic Considerations, Materials and Construction // Design Process



(Shigeo Ogawa, 2013)



(Aulets Architectes, 2020)



(Team Yellowtrace, 2015)



(Nielsen, 2021)



(Olsson, 2016)



(Ott, 2019)



(Precht, 2014)



(JAG Studio, 2022)



(Positano-Opfot, 2017)



(Shinkenichiku Sha, 2015)

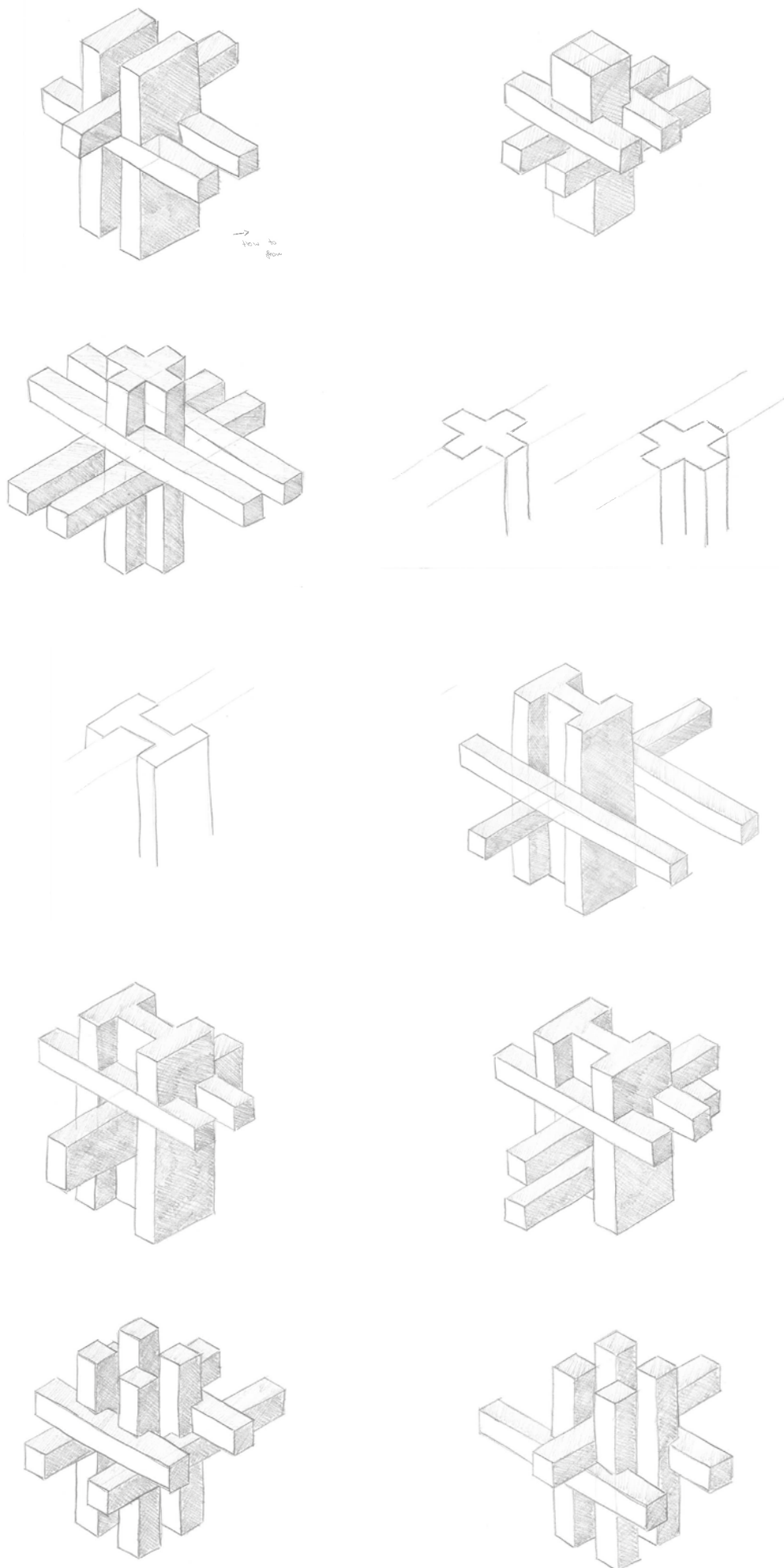


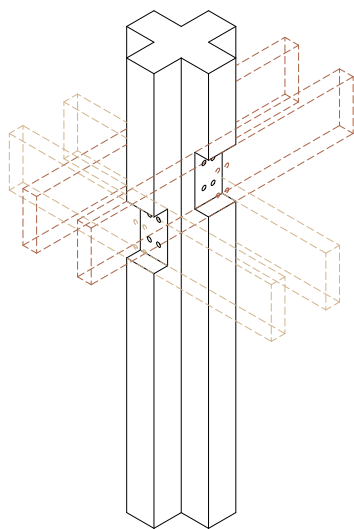
(Schmitt, 2020)

(various sources)

| Ill. 118. Tectonics Moodboard







| Ill. 120. Exploring connection of column and beams

The grid is a very defining element in the appearance of this project, moreover, connections are an important theme in the concept, therefore, they were also given an important part in the design process.

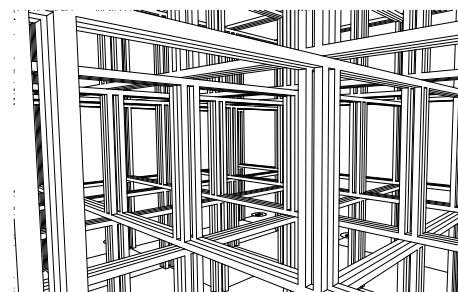
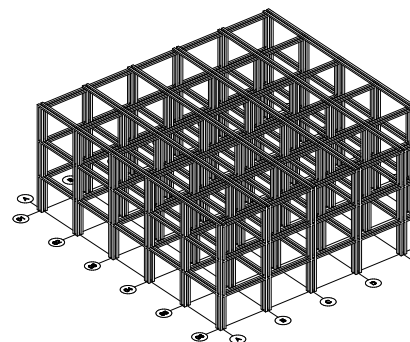
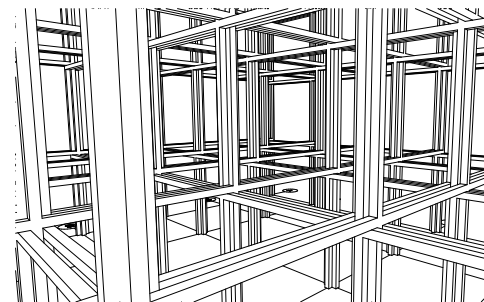
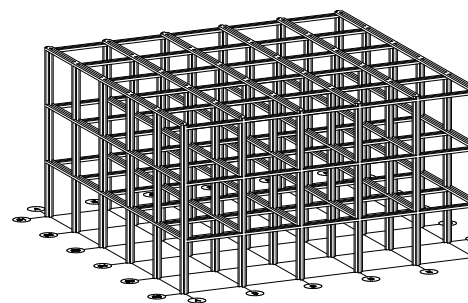
In a first step, different projects were tectonically studied, a selection of which can be found in the images of the mood board. The focus was on projects where spaces are strongly defined by wooden beams and columns. The next step was to visualize different methods of joining and to work out possible concepts and preferences. This was done by hand-sketching some ideas. The expression of the connection to the walls in the different versions was kept very conceptual in this step. The first preferences were the cross column and the “negative cross column”, therefore, these two were given more attention in the following stage. An initial consideration at this point was to consider the possibility of directing the technical elements of the building through shafts created by the grid.

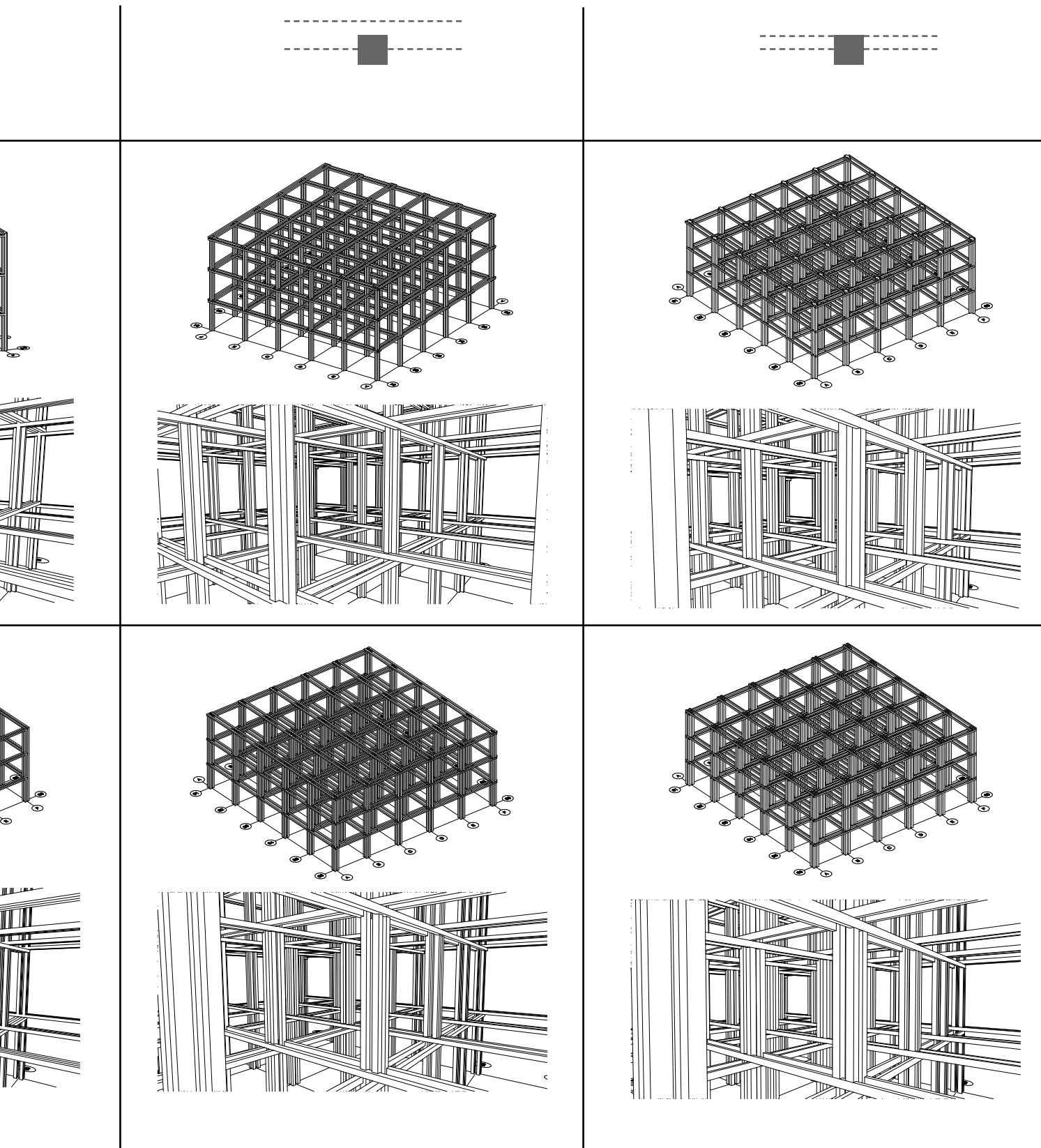
The thickness of the columns was initially assumed to be composed of squares with a side length of 200 mm (the total column 600 mm).

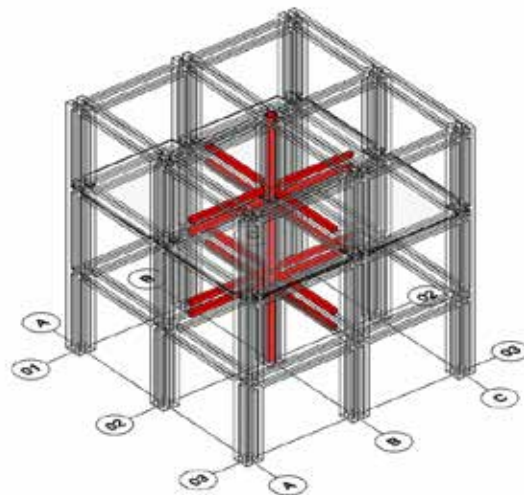
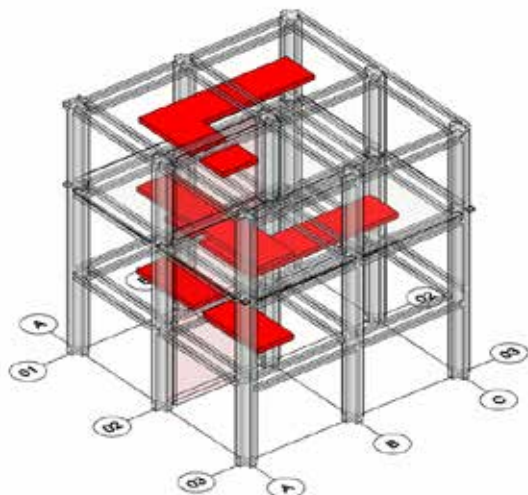
beams



columns







| Ill. 122. Conceptual ideas for placement of shafts

Simultaneously, different wall types were analyzed. The most interesting for this project were a CLT construction and a post and beam construction. In the comparison between the two methods in LCAByg, the CLT design performed worse. This is mainly due to the CLT element and the adhesive it contains. Especially in the waste treatment phase (C3) this influence is visible. The individual tables can be found in the Appendix 4.

The outcome was that the structural element is a cross column in combination with CLT elements, despite the higher GWP value. One of the main arguments for this decision was the interest in design for disassembly and the advantages of CLT in this context.

The column diameters were reduced to 150 mm (total column 450 mm) after analyzing an example project by Praxis Arkitekter at the library of Aarhus architecture school.

	U-value	GWP
CLT	0,14 W/(m2K)	56,44 CO2-eq.
Post and Beam	0,16 W/(m2K)	40,74 CO2-eq.



(GXN, 2018)

| Ill. 123. Spring steel fuge

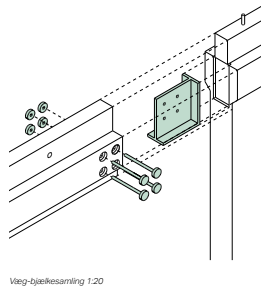
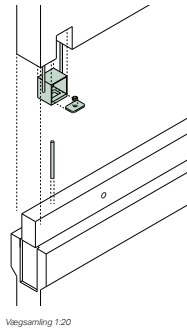
In a further step, the construction was analyzed and revised regarding design for disassembly. Of interest here were flexible plug-in connections and pre-fabrication of wall panels. Reference projects and analyses from a publication by InnoBYG, in which various architectural firms participated, were used to support this process. Elements were taken from these and incorporated into detail drawings, to gain a better understanding of these systems and their influence on the construction and overall expression. For the pre-fabrication of the wall panels a solution with a rigid woodfibre insulation was found. This does not only allow for pre-fabrication of the whole wall panel, but also is more suitable in terms of sustainability of materials, compared to other insulations.

This investigation furthermore resulted in a change of the beams. The original rectangular cross-section of the beams was changed to crosses, as these are more suitable with the chosen construction principles.

Similar construction principles were then applied to the floors and roof. An important aspect in the elaboration of the ceiling systems was the construction of a suspended ceiling, which leaves space for installations. Therefore, principles with CLT rib panel ceilings were explored,

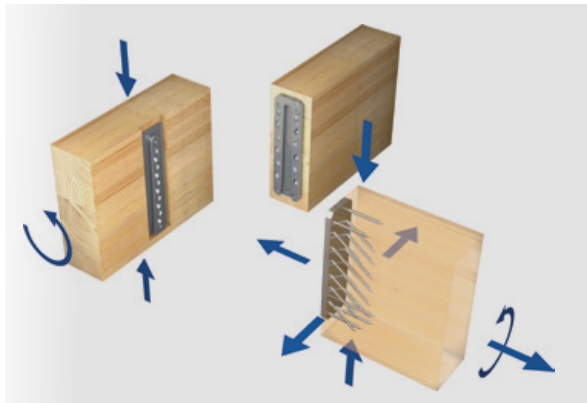
The elaboration of various details can be seen in the Appendix 4.





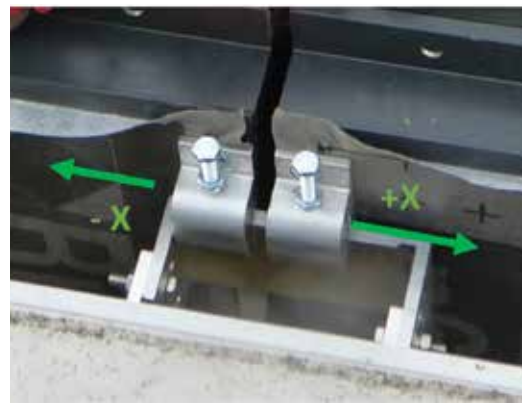
(Bruun and Boysen Feddersen, 2018)

| Ill. 124. Flexible plug-in grid



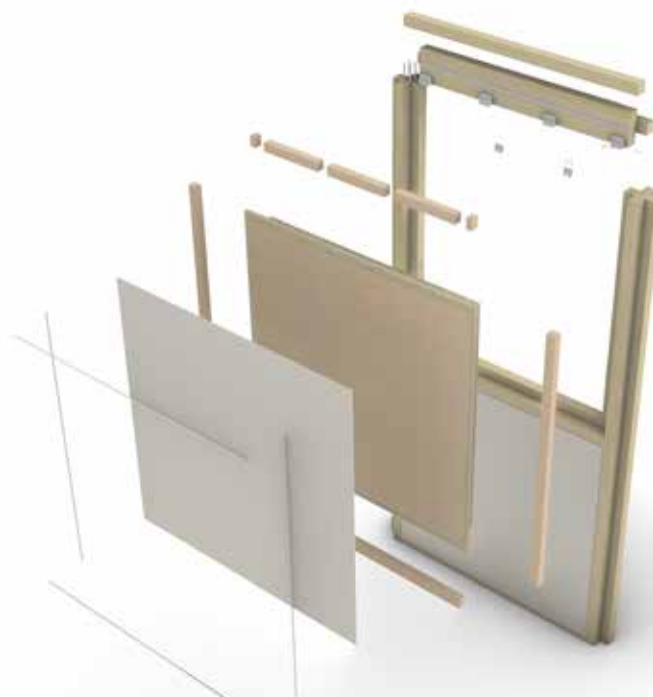
(Sherpa, no date)

| Ill. 125. Connectors



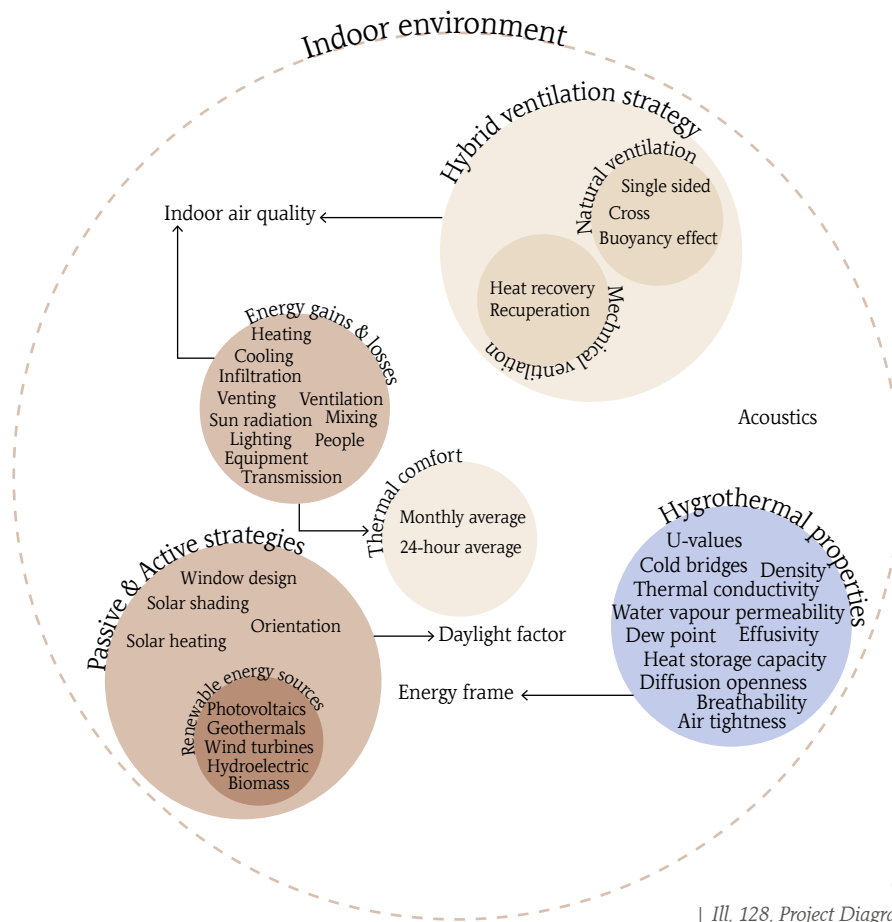
(Torres et al., 2021)

| Ill. 126. Systems fixing design // possibility for adjustments in x and y axis



| Ill. 127. Exploded view of prefabricated wall + mounting system





(Project Diagram p.8-9)

| Ill. 128. Project Diagram - Indoor environment

## Energy Performance

To ensure that the building complies to the regulations regarding energy performance, one block was calculated in Be18.

As the main focus of this project is on the development of a system, there were no particular objectives in terms of energy consumption. However, attention was paid during the design process to ensure that the u-values of the individual components achieved a good performance. This now considerably helps with the energy performance of the complex.

Furthermore, due to the implementation of PV cells on the roof surfaces of the second floor it was possible to decrease the total energy frame from previously 42,00 kWh/m<sup>2</sup> year to 17,00 kWh/m<sup>2</sup> year. Without additional PV cells the building complex would not reach the requirements for the energy frame according to BR18. By incorporating solar cells, the building even falls into the low energy class.

The inputs are determined according to SBi-213, edition 6 and the entire calculations can be found in the Appendix 5.

## Indoor Environment

To create a comfortable living experience for the residents, the indoor climate is essential. During the design process short iterations with daylight studies and 24-hour average calculations have been done, however the development of the modular system has been in the foreground.

The approach in terms of indoor environment is to demonstrate by means of a room that good indoor climate conditions are achieved. This is exemplary since the idea of the project is to create a building system.

The chosen space is a dormitory common room, located on the first floor. It is shared by 6 people, so the occupancy is relatively high during the day. Furthermore, the kitchen instruments create internal loads. One of the main reasons why this room was chosen is, that it is an important room for the smaller community. It should be a space where the residents feel comfortable and can spend time together. A space that is also related to the concept of this project - *connections*.

The primary goal of the BSim calculations was to analyze the thermal comfort, by reducing the hours with over 27°C and 28°C to a minimum. At the same time no hours with less than 20°C should occur.

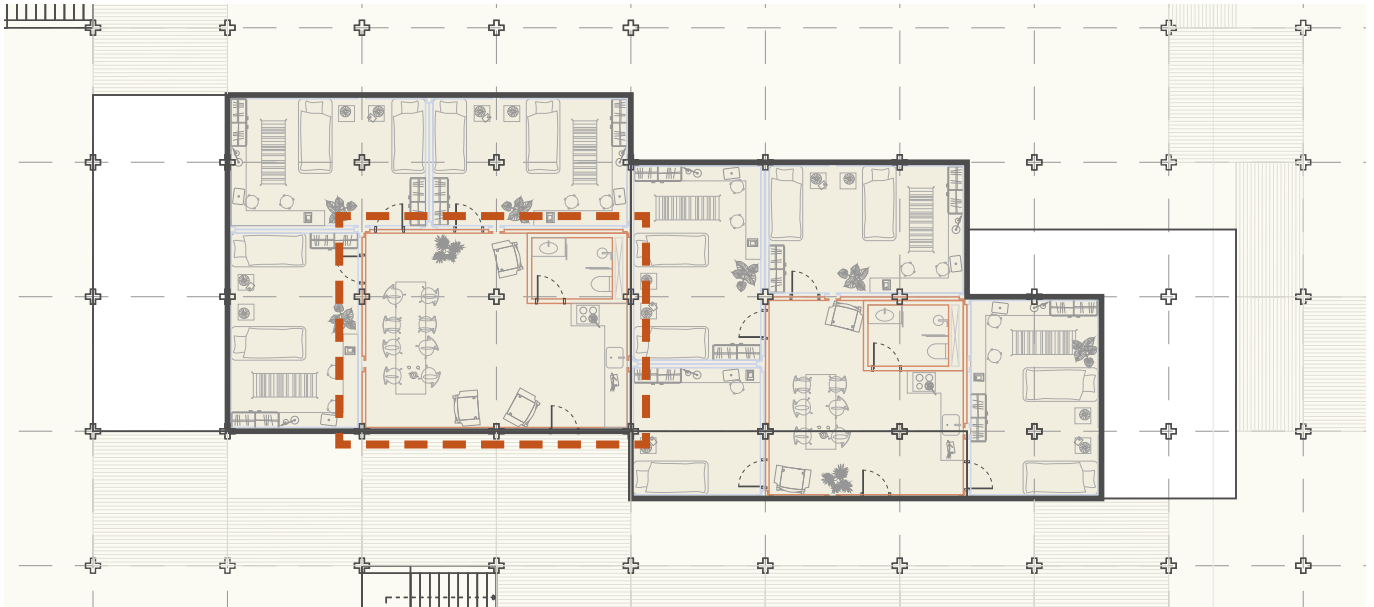
It became apparent that the critical months are mainly between May and September. The process is explained in the following part.

In order to examine the critical months in more detail, especially with regard to the different orientations of the exterior facade, iterations were carried out using the 24-hour average. These iterations can be found in the Appendix 5.

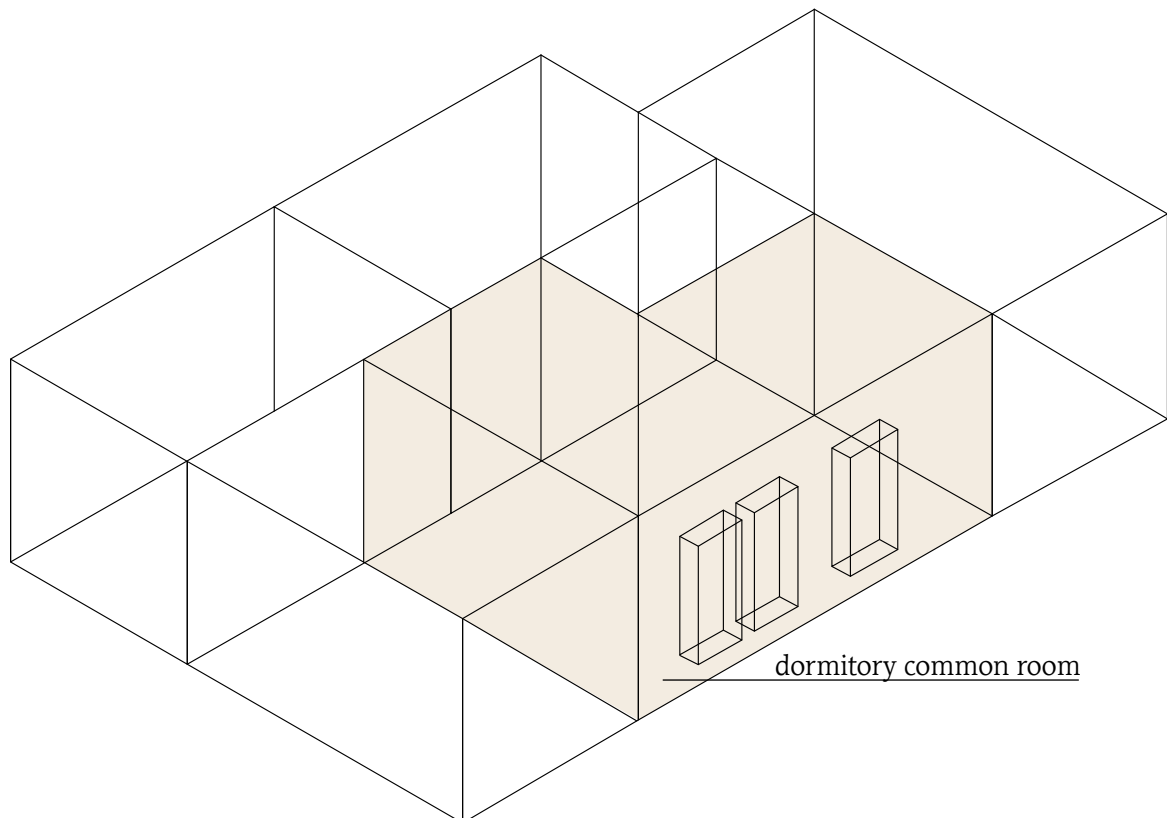
<i>hours above</i>	27 °C	28 °C
before adjustments:	1248	670
after adjustments:	58	17

<i>critical months</i>	<i>top mean before</i>	<i>top mean after</i>
May:	23,9 °C	22,1 °C
June:	25,3 °C	22,6 °C
July:	27,5 °C	23,6 °C
August:	27,3 °C	23,3 °C
September:	25,7 °C	22,8 °C

General information



| Ill. 130. Common space for the smaller community on the first floor



To ensure thermal comfort in the dormitory common room, calculations with BSim were conducted.

The starting point was a simplified model in BSim of the common room as well as its surrounding rooms. The different constructions for walls and floor types were added. Afterwards the various systems were inserted to get a first overview of the conditions. The systems schedules were included perfunctory and later on, adjustments in the schedules were made. The impact of these adjustments will be demonstrated on the next pages.

The windows can be opened 50% in order to use natural, single sided ventilation. No shading was added to the windows.

Investigations in the following part will also showcase the impact of shading and user behavior (people load) on the simulation outcome. These parts are, same as natural ventilation, only partially predictable, as user behavior is hard to influence.

The outcomes shown are the result of various iterations, testing different versions. There are diverse outcomes, the ones demonstrated display one solution, valid for the thermal zone of the common room.

Common room		m
Length		7,2
Width		3,6 // 5,4
Windows (2x)		0,8 x 2,1 // Afrac: 0,5
U-value		[W/m²K]
Roof		0,098
Floor		0,09
Exterior walls		0,14
Interior walls		3,6
Interior floor		0,238
Windows // with frame		0,8

| Ill. 132. General information

## Input and information about the systems

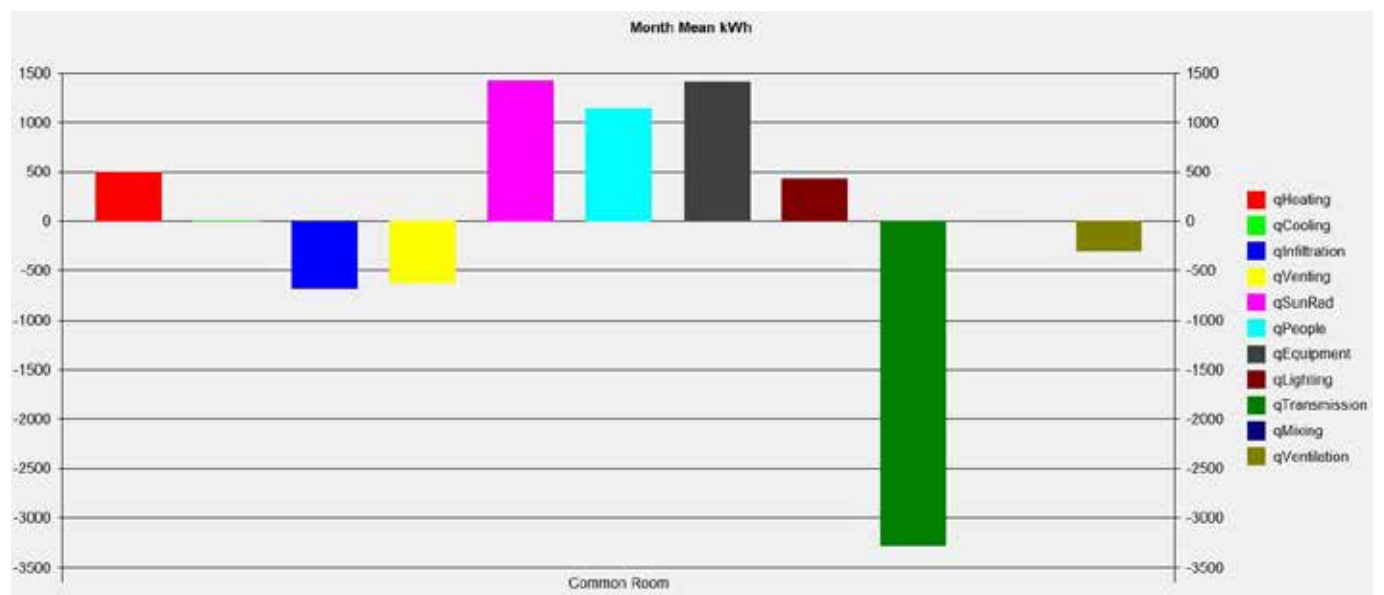
Infiltration	Area [m²] 32,4	Volume [m³] 106,9	l/s 0,13	l/s pr m² 4,21	m³/h 15,16	h-1 0,142	Time Always	
People Load	people total	activity level	heat gen.	moist gen.	CO₂ gen.	Note		
inhabitants	6	2 met	0,432 kW	0,264 kg/h	73,44 l/h	breakfast, lunch and dinner together and some smaller get-togethers during the day		
Lighting	task lighting	general lighting	gen. light. level	lighting type	solar limit	Note		
	0,05 kW	0,1 kW	400 lux	Fluorescent	0,2 kW	not used in summer		
Natural Ventilation	basic air change	max. air change	Note					
	1,5 [/h]	3 [/h]	only in summer // single sided					
Equipment	heat load	part to air	Note					
	0,2 kW	0,5	basic kitchen equipment // 80% used all time					
Heating	max pow	part to air	factor	set point	design temp	min pow	te min	Note
	15 W/m²	0,5	1	25°C	-12°C	0,5 W/m²	18°C	only used in winter
Ventilation	supply	pressure rise	total eff.	part to air	max heat rec	max moist rec	max pow	
input	0,03 m³/s	400 pa	0,8	0,5	-	-	-	
output	0,03 m³/s	400 pa	0,8	0,5	-	-	-	
recovery unit	-	-	-	-	0,88	0,6		
heating coil	-	-	-	-	-	-	2	

| Ill. 133. Input and information about the systems

## Output // starting point

### Heat Balance

2019	Month	Hours	Common Room										
Common Room	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	497.84	97.22	87.30	96.04	0.00	0.00	0.00	0.00	0.00	0.00	39.16	79.32	98.81
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-675.50	-78.09	-71.65	-84.50	-56.95	-44.94	-38.90	-34.84	-34.06	-39.54	-48.57	-65.96	-77.51
qVenting	-626.51	0.00	0.00	0.00	0.00	-151.53	-127.11	-106.08	-110.20	-131.60	0.00	0.00	0.00
qSunRad	1415.27	49.91	83.79	148.65	154.49	146.14	129.48	137.20	158.03	166.38	137.43	63.83	39.94
qPeople	1135.30	96.42	87.09	96.42	93.31	96.42	93.31	96.42	96.42	93.31	96.42	93.31	96.42
qEquipment	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.40	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.10	52.10	57.85	63.45
qTransmiss	-3279.30	-373.59	-328.23	-356.25	-231.87	-165.13	-171.98	-211.75	-229.23	-248.86	-263.27	-321.84	-377.30
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-298.08	25.04	-17.88	-69.00	-119.39	0.00	0.00	0.00	0.00	0.00	-132.30	-21.71	37.16
Sum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	23.7	21.4	21.6	22.0	23.1	23.9	25.3	27.5	27.3	25.7	23.1	21.7	21.3
AirChange(/h)	1.1	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.8	0.8	1.4	1.4	1.4
Rel. Moistur	39.4	31.8	31.4	28.6	35.0	41.9	47.4	48.3	46.8	46.0	45.7	36.6	33.2
Co2(ppm)	793.8	778.9	777.7	776.9	777.9	816.3	816.2	812.7	813.6	829.4	774.6	774.7	776.8
PAQ(°)	0.3	0.5	0.5	0.5	0.4	0.2	0.0	-0.2	-0.1	0.0	0.2	0.4	0.5
Hours > 21	7558	465	460	587	712	692	706	744	744	716	737	541	454
Hours > 27	1248	0	0	0	4	70	169	427	409	161	8	0	0
Hours > 28	670	0	0	0	0	29	81	246	237	75	2	0	0
Hours < 20	492	147	81	37	0	10	2	0	0	0	0	63	152
FanPow	190.80	27.90	25.20	27.90	27.00	0.00	0.00	0.00	0.00	0.00	27.90	27.00	27.90
HtRec	3564.24	641.35	568.94	621.12	309.45	0.00	0.00	0.00	0.00	0.00	257.37	517.17	648.83
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	355.17	95.03	59.00	39.34	3.34	0.00	0.00	0.00	0.00	0.00	1.82	53.44	103.20
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FloorHeat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FloorCool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentHeatPu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentHeatPu	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

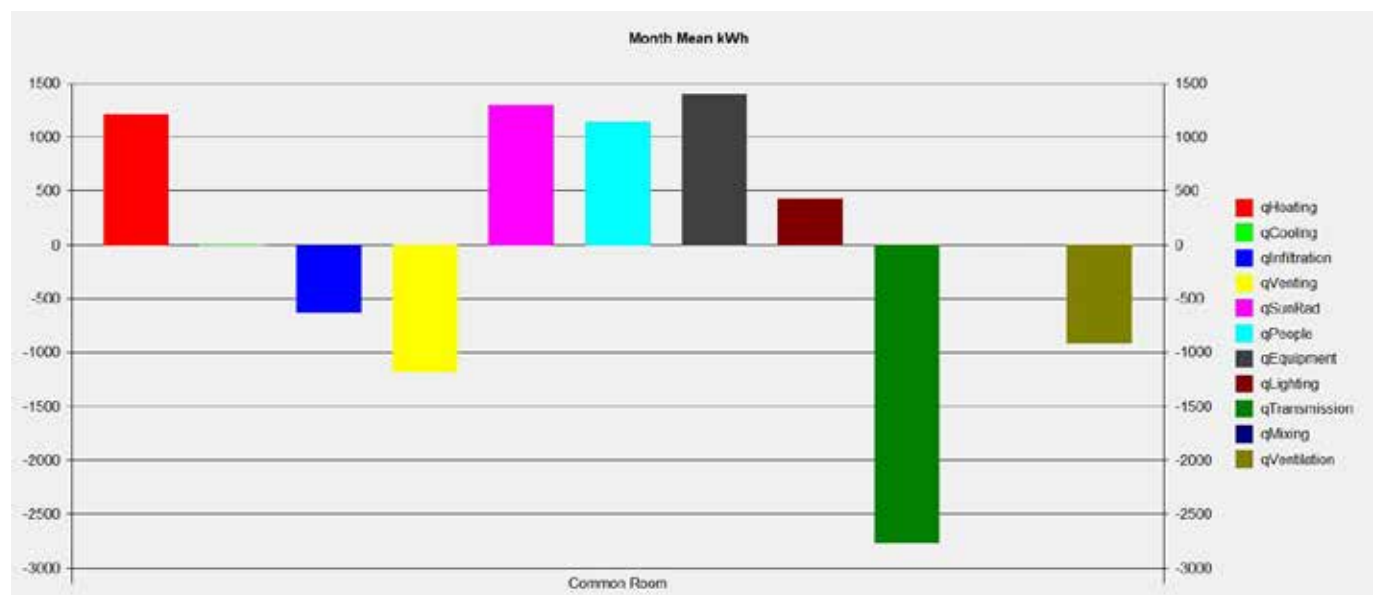




Output // termination point

## Heat Balance

2019	Month	Hours	Common Room										
Common Rr	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	1211.92	240.42	218.38	255.16	44.56	0.00	0.00	0.00	0.00	3.95	10.95	198.18	240.30
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-624.29	-80.35	-73.62	-87.01	-56.43	-37.90	-28.34	-19.52	-18.58	-28.50	-46.60	-67.63	-79.80
qVenting	-1174.16	0.00	0.00	0.00	0.00	-293.65	-231.26	-240.96	-246.82	-161.47	0.00	0.00	0.00
qSunRad	1293.33	49.91	83.79	148.65	154.49	126.86	112.93	115.88	126.34	133.29	137.43	63.83	39.94
qPeople	1135.30	96.42	87.09	96.42	93.31	96.42	93.31	96.42	96.42	93.31	96.42	93.31	96.42
qEquipment	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.50	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.20	52.10	57.85	63.45
qTransmiss	-2766.16	-410.07	-361.54	-399.38	-227.75	-85.81	-52.24	-37.19	-56.81	-129.77	-239.05	-353.11	-413.44
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-907.03	-79.42	-113.67	-182.49	-168.59	75.04	-9.60	-33.67	-19.59	-71.21	-130.30	-107.62	-65.91
Sum	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	22.6	22.1	22.4	22.9	23.0	22.1	22.6	23.6	23.3	22.8	22.5	22.3	22.0
AirChange(h)	2.4	2.0	2.0	2.0	2.0	3.3	3.4	2.6	2.6	2.8	2.0	2.0	2.0
Rel. Moistur	38.6	26.0	25.8	23.0	31.5	41.3	51.3	55.9	54.4	52.0	43.4	31.3	27.4
Co2(ppm)	518.4	538.5	538.0	537.6	538.7	481.0	477.4	431.7	433.1	631.4	538.8	536.8	537.6
PAQ(μg/m³)	0.4	0.6	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.5	0.5
Hours > 21	8570	744	672	744	720	686	687	715	710	690	738	720	744
Hours > 27	58	0	0	0	0	0	0	38	20	0	0	0	0
Hours > 28	17	0	0	0	0	0	0	15	2	0	0	0	0
Hours < 20	0	0	0	0	0	0	0	0	0	0	0	0	0
FanPow	406.91	41.85	37.80	41.85	40.50	39.71	37.90	4.65	2.79	35.65	41.85	40.50	41.85
HtRec	6115.67	930.37	827.00	927.72	516.86	381.65	226.06	0.00	0.00	181.20	437.18	749.67	937.96
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	437.71	47.20	25.77	11.17	18.22	130.23	65.63	0.00	0.00	33.68	25.86	26.15	53.80
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FloorHeat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FloorCool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentHeatPl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentHeatPl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00



## Schedule adjustments

In order to optimize the thermal comfort in the room, adjustments were made to the time schedules of the individual systems. The first step was to adjust the times of the heating system to ensure that no hours were below 20°C.

Previously the heating was running from September to April during the day. In the adjusted version the operation time between November and March was increased, whereas the operation time in October and September was decreased.

### Heat Balance // heating adjusted

2019	Month	Hours	Common Room										
Common Room	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	1185.44	239.16	216.41	244.11	39.75	0.00	0.00	0.00	0.00	0.69	9.25	196.33	239.75
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-692.37	-80.99	-74.84	-89.26	-58.00	-44.96	-38.90	-34.84	-34.06	-39.57	-47.94	-68.75	-80.26
qVenting	-626.84	0.00	0.00	0.00	0.00	-151.73	-127.11	-106.08	-110.20	-131.73	0.00	0.00	0.00
qSunRad	1415.27	49.91	83.79	148.65	154.49	146.14	129.48	137.20	158.03	166.38	137.43	63.83	39.94
qPeople	1135.30	96.42	87.09	96.42	93.31	96.42	93.31	96.42	96.42	93.31	96.42	93.31	96.42
qEquipment	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.40	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.10	52.10	57.85	63.45
qTransmiss	-3528.51	-417.16	-376.22	-424.15	-246.02	-164.91	-171.98	-211.75	-229.23	-249.38	-252.69	-366.14	-418.87
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-719.28	-70.42	-95.81	-144.42	-143.94	0.00	0.00	0.00	0.00	0.00	-113.61	-91.63	-59.47
Sum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	24.1	22.3	22.7	23.4	23.4	23.9	25.3	27.5	27.3	25.7	22.9	22.6	22.2
AirChange/h	1.1	1.4	1.4	1.4	1.4	0.8	0.8	0.8	0.8	0.8	1.4	1.4	1.4
Rel. Moistur	38.4	29.6	29.0	25.9	34.3	41.8	47.4	48.3	46.8	46.0	46.3	34.4	31.0
Co2(ppm)	793.1	777.5	776.0	774.8	777.4	816.3	816.2	812.7	813.6	829.4	774.9	773.4	775.5
PAQ(-)	0.3	0.5	0.5	0.5	0.4	0.2	0.0	-0.2	-0.1	0.0	0.2	0.4	0.5
Hours > 21	8677	744	672	744	719	692	706	744	744	716	732	720	744
Hours > 27	1254	0	0	2	9	70	169	427	409	161	7	0	0
Hours > 28	668	0	0	0	0	29	81	246	237	75	0	0	0
Hours < 20	11	0	0	0	0	9	2	0	0	0	0	0	0
FanPow	190.80	27.90	25.20	27.90	27.00	0.00	0.00	0.00	0.00	0.00	27.90	27.00	27.90
HtRec	3424.09	615.16	540.73	592.01	297.93	0.00	0.00	0.00	0.00	0.00	266.75	487.74	623.76
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	52.73	14.98	4.35	0.39	0.03	0.00	0.00	0.00	0.00	0.00	5.24	7.14	20.60
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

| Ill. 136. BSim Output - heating adjusted

Especially the months from May to September are critical in terms of overheating. Here, adjustments have been made with the time schedules of natural ventilation and the ventilation systems. Especially the months of august and September were more difficult in this respect. In September, the ppm value was challenging.

Natural ventilation is used in both cases between May and September. In the adjusted time schedule the time of usage in July and August increased and decreased for the month of September.

Ventilation is utilized in the adjusted version in the early hours, midday and during the afternoon / early night. Previously the ventilation was used during the whole day.

## Heat Balance // ventilation system & natural ventilation

2019	Month	Hours	Common Room										
Common Room	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	1211.78	240.42	218.38	255.16	44.56	0.00	0.00	0.00	0.00	3.81	10.95	198.18	240.30
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-626.67	-80.35	-73.62	-87.01	-56.43	-38.05	-28.57	-20.08	-19.43	-29.09	-46.60	-67.63	-79.80
qVenting	-1217.18	0.00	0.00	0.00	0.00	-299.07	-234.74	-252.56	-264.53	-166.27	0.00	0.00	0.00
qSunRad	1415.27	49.91	83.79	148.65	154.49	146.14	129.48	137.20	158.03	166.38	137.43	63.83	39.94
qPeople	1135.30	96.42	87.09	96.42	93.31	96.42	93.31	96.42	96.42	93.31	96.42	93.31	96.42
qEquipmen	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.50	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.20	52.10	57.85	63.45
qTransmiss	-2805.82	-410.07	-361.54	-399.38	-227.75	-89.51	-56.96	-45.91	-69.44	-139.81	-238.90	-353.11	-413.44
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-943.77	-79.42	-113.67	-182.49	-168.59	65.03	-17.72	-34.11	-20.08	-88.73	-130.45	-107.62	-65.91
Sum	0.00	-0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	-0.00	-0.00	-0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	22.7	22.1	22.4	22.9	23.0	22.2	22.6	23.7	23.6	23.0	22.5	22.3	22.0
AirChange(1/h)	2.4	2.0	2.0	2.0	2.0	3.3	3.5	2.6	2.6	2.9	2.0	2.0	2.0
Rel. Moistur	38.5	26.0	25.8	23.0	31.5	41.2	51.1	55.4	53.7	51.5	43.4	31.3	27.4
Co2(ppm)	518.3	538.5	538.0	537.6	538.7	480.7	477.3	431.5	432.8	631.2	538.8	536.8	537.6
PAQ(-)	0.4	0.6	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.5	0.5
Hours > 21	8575	744	672	744	720	682	689	715	713	694	738	720	744
Hours > 27	99	0	0	0	0	0	0	56	38	5	0	0	0
Hours > 28	29	0	0	0	0	0	0	18	11	0	0	0	0
Hours < 20	0	0	0	0	0	0	0	0	0	0	0	0	0
FanPow	406.94	41.85	37.80	41.85	40.50	39.65	37.94	4.65	2.79	35.71	41.85	40.50	41.85
HtRec	6099.82	930.37	827.00	927.72	516.86	376.82	222.93	0.00	0.00	173.38	437.11	749.67	937.96
CIRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	426.84	47.20	25.77	11.17	18.22	125.70	63.26	0.00	0.00	29.80	25.77	26.15	53.80
CICoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

| Ill. 137. BSim Output - ventilation

With almost 100 hours above 27°C and 30 hours above 28°C, overheating is still a problem, especially in the summer months. However, this is reduced to approximately 6 days per year. To improve this number even further, solar shading devices have been added. These have contributed to a significant improvement. However, it has to be mentioned, like natural ventilation, they are very user-dependent.

## Heat Balance // solar shading

2019	Month	Hours	Common Room										
Common Room	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	1211.92	240.42	218.38	255.16	44.56	0.00	0.00	0.00	0.00	3.95	10.95	198.18	240.30
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-624.29	-80.35	-73.62	-87.01	-56.43	-37.90	-28.34	-19.52	-18.58	-28.50	-46.60	-67.63	-79.80
qVenting	-1174.16	0.00	0.00	0.00	0.00	-293.65	-231.26	-240.96	-246.82	-161.47	0.00	0.00	0.00
qSunRad	1293.33	49.91	83.79	148.65	154.49	126.86	112.93	115.88	126.34	133.29	137.43	63.83	39.94
qPeople	1135.30	96.42	87.09	96.42	93.31	96.42	93.31	96.42	96.42	93.31	96.42	93.31	96.42
qEquipment	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.50	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.20	52.10	57.85	63.45
qTransmiss	-2766.16	-410.07	-361.54	-399.38	-227.75	-85.81	-52.24	-37.19	-56.81	-129.77	-239.05	-353.11	-413.44
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-907.03	-79.42	-113.67	-182.49	-168.59	75.04	-9.60	-33.67	-19.59	-71.21	-130.30	-107.62	-65.91
Sum	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	22.6	22.1	22.4	22.9	23.0	22.1	22.6	23.6	23.3	22.8	22.5	22.3	22.0
AirChange(1/h)	2.4	2.0	2.0	2.0	2.0	3.3	3.4	2.6	2.6	2.8	2.0	2.0	2.0
Rel. Moistur	38.6	26.0	25.8	23.0	31.5	41.3	51.3	55.9	54.4	52.0	43.4	31.3	27.4
Co2(ppm)	518.4	538.5	538.0	537.6	538.7	481.0	477.4	431.7	433.1	631.4	538.8	536.8	537.6
PAQ(-)	0.4	0.6	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.5	0.5
Hours > 21	8570	744	672	744	720	686	687	715	710	690	738	720	744
Hours > 27	58	0	0	0	0	0	0	38	20	0	0	0	0
Hours > 28	17	0	0	0	0	0	0	15	2	0	0	0	0
Hours < 20	0	0	0	0	0	0	0	0	0	0	0	0	0
FanPow	406.91	41.85	37.80	41.85	40.50	39.71	37.90	4.65	2.79	35.65	41.85	40.50	41.85
HtRec	6115.67	930.37	827.00	927.72	516.86	381.65	226.06	0.00	0.00	181.20	437.18	749.67	937.96
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	437.71	47.20	25.77	11.17	18.22	130.23	65.63	0.00	0.00	33.68	25.86	26.15	53.80
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

| Ill. 138. BSim Output - solar shading



Since it is not possible to predict how often the room will be used by the residents, simulations were also made in which the use of the room differs from the original assumption. It was considered that in summer the residents sometimes have lunch and dinner in the community common areas and not in the dormitory common room as originally calculated. This highlights the impact of people load,

### Heat Balance // change of user profile // people load

2019	Month	Hours	Common Room										
Common Room	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)
qHeating	1208.99	240.38	217.84	254.10	43.61	0.00	0.00	0.00	0.00	3.95	10.70	198.12	240.30
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qInfiltration	-618.21	-80.42	-73.59	-86.80	-56.26	-36.63	-27.51	-17.91	-16.91	-28.09	-46.56	-67.64	-79.89
qVenting	-1013.11	0.00	0.00	0.00	0.00	-239.62	-201.25	-200.93	-207.04	-164.27	0.00	0.00	0.00
qSunRad	1299.68	49.91	83.79	148.65	154.49	129.68	115.83	116.25	127.23	132.66	137.43	63.83	39.94
qPeople	765.07	83.03	75.00	83.03	80.35	29.46	28.51	29.46	29.46	80.35	83.03	80.35	83.03
qEquipmen	1401.60	119.04	107.52	119.04	115.20	119.04	115.20	119.04	119.04	115.20	119.04	115.20	119.04
qLighting	429.50	64.05	52.05	49.60	45.20	0.00	0.00	0.00	0.00	45.20	52.10	57.85	63.45
qTransmiss	-2665.31	-409.34	-359.77	-395.40	-224.19	-64.56	-37.96	-13.76	-33.18	-125.01	-236.96	-351.92	-413.26
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
qVentilation	-808.21	-66.65	-102.83	-172.22	-158.40	62.63	7.17	-32.15	-18.60	-59.99	-118.77	-95.79	-52.62
Sum	0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	-0.00	0.00
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7
tOp mean(°C)	22.5	22.1	22.3	22.8	22.9	21.7	22.3	23.1	22.9	22.7	22.5	22.3	22.1
AirChange(/h)	2.2	2.0	2.0	2.0	2.0	2.4	2.6	2.5	2.5	2.9	2.0	2.0	2.0
Rel. Moisture (%)	38.2	25.4	25.2	22.5	31.0	40.5	50.5	56.6	55.1	51.3	42.9	30.7	26.8
Co2(ppm)	473.8	515.4	514.9	514.5	515.4	384.5	376.8	375.7	374.8	569.6	515.7	513.8	514.5
PAQ(-)	0.4	0.6	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.5	0.6
Hours > 21	8389	744	672	744	720	598	641	687	682	701	736	720	744
Hours > 27	23	0	0	0	0	0	0	17	6	0	0	0	0
Hours > 28	6	0	0	0	0	0	0	6	0	0	0	0	0
Hours < 20	0	0	0	0	0	0	0	0	0	0	0	0	0
FanPower	374.12	41.85	37.80	41.85	40.50	21.88	21.25	4.65	2.79	37.35	41.85	40.50	41.85
HtRec	5865.68	938.51	832.98	931.10	520.34	192.52	111.97	0.00	0.00	192.20	444.18	756.62	945.28
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HtCoil	410.01	52.15	29.75	14.36	21.91	90.00	44.11	0.00	0.00	37.41	29.37	30.68	60.26
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Humidifier	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

| Ill. 139. BSim Output - people load





## 03 | Project Delimitation

# Schedule of Accommodation

In the *Refugee Community Village* proposal there can be up to around 260 people.

On average, there is 17m<sup>2</sup> of living area per person.

For 242 to 261 people

total area 4465,08 m<sup>2</sup>

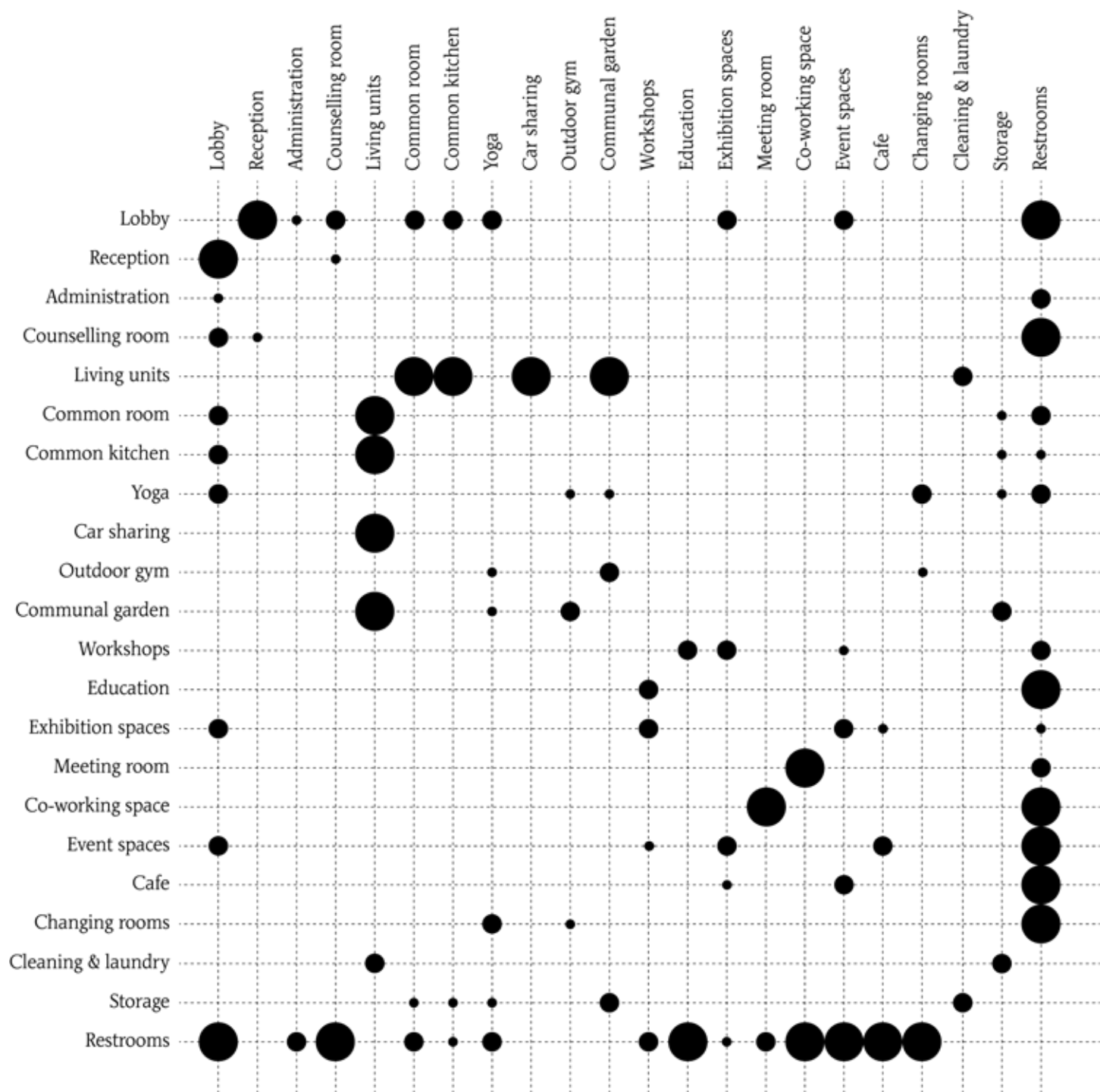
function	area	inhabitants per unit	number of units		
			groundfloor	1st floor	2nd floor
private // living units					
<b>single unit // TYPE A</b>					
bedrooms					
A1 dorm (1)	12,96	1		12	1
A2 dorm (1,5)	19,44	2		27	5
facilities					
A1 common space (2,25)	29,16	6, 6, 7		2	1
A2 common space (2)	25,92	4, 5, 5, 6, 6		4	1
A3 common space (2,5)	32,4	6		1	
A4 common space (3)	38,88	6, 6, 7, 7		4	
				50	8
<b>couple unit // TYPE B</b>					
B1 studio (2)	25,92	2		8	4
B2 studio (2)	25,92	2	6	4	2
B3 studio (3) (w/ hems)	38,9	2	3	<i>continuous</i>	3
B4 studio (3)	38,88	2		7	1
B5 studio H.C. (2,25)	29,16	1	8		
			17	19	10
<b>family unit // TYPE C</b>					
C1 (5)	64,8	3 to 4	14	4	1
C2 (9)	106,42	4	3	<i>continuous</i>	3
			17	4	4
<b>totals</b>			34	73	22
Access points					
Staircases	12,96		11	11	11
Elevators (0,25)	3,24		10	10	10

inhabitants total	total [m <sup>2</sup> ]	other comments
		singles, roommates, flatmates, co-living, substitute family - micro community, kollegiet / dormitory type
13	168,48	<i>6 inhabitants on average, 3-4 dorm living units paired with common unit with bathroom and kitchen</i>
64	622,08	
	87,48	
	129,6	
	32,4	
	155,52	
<b>77</b>	<b>1195,56</b>	
		couples, single parents
24	311,04	<i>2 inhabitants on average, contains kitchenette and private bathroom</i>
24	311,04	
12	233,4	
16	311,04	
8	233,28	
<b>84</b>	<b>1399,8</b>	
		family, divorced living, multigenerational, extended family
57 to 76	1231,2	<i>4 inhabitants on average, unit contains bedrooms, small kitchen and bathroom</i>
24	638,52	
<b>81 to 100</b>	<b>1869,72</b>	
<b>242 to 261</b>	<b>4465,08</b>	
	427,68	
	97,2	

function	area	number of units	total [m²]	other comments
<b>semi-private // private services</b>				
common room	64,8	7	453,6	<i>second floor</i>
counselling room	12,96	6	77,76	<i>second floor</i>
laundry	12,96	4	51,84	<i>first floor</i>
laundry	19,44	1	19,44	<i>first floor</i>
			<b>602,64</b>	
<b>semi-public // public services</b>				
<i>all on ground floor</i>				
co-working				
office 01	25,92	1	25,92	
office 02	19,44	1	19,44	
office 03	103,68	1	103,68	
office 04	45,36	1	45,36	
office 05	51,84	1	51,84	
restroom	19,44	1	19,44	
storage	6,48	1	6,48	
workshops				
workshop 01	51,84	1	51,84	
workshop 02	64,8	1	64,8	
workshop 03	58,32	1	58,32	
entrance	32,4	1	32,4	
restroom	19,44	1	19,44	
storage	12,96	1	12,96	
cafe				
cafe	64,8	1	64,8	
staff room	12,96	1	12,96	
restroom	6,48	1	6,48	
storage	12,96	1	12,96	
administration				
administration office	77,76	1	77,76	
staff office	25,92	1	25,92	
restroom	12,96	1	12,96	
education // meeting rooms				
education	64,8	1	64,8	
meeting room	19,44	1	19,44	
entrance	12,96	1	12,96	
restroom	19,44	1	19,44	
multifunctional area				<i>space for events // exhibitions // yoga // gym</i>
entrance // reception	45,36	1	45,36	
multifunctional space	58,32	1	58,32	
lockers	19,44	2	38,88	
restroom	19,44	1	19,44	
			<b>1004,4</b>	



# Functional connections



Matrix diagram

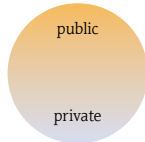
- Large black circle: Mandatory
- Medium black circle: Recommended
- Small black circle: Low priority

# Game rules // Design Principles

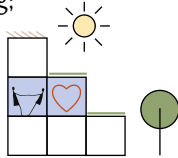
## Human aspect



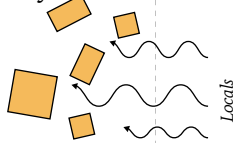
1. The project must allow for inclusion of various user groups and family models (e.g. lonely singles, couples, bigger families, handicapped people);



2. The project must offer variety of activities ranging from introverted retreat (private) to extraverted activation (public), in order to allow for self-regulation and aid personal safety, autonomy and well-being, but also foster community creation, social integration, cohesion, and sense of belonging;

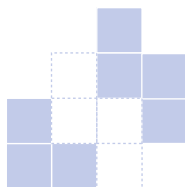


3. Dormitory typology must be created to ensure substitute family concept where smaller community is created within bigger community;

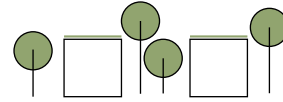


4. The project must offer facilities attractive for the local community outside of the primary user group (public services);

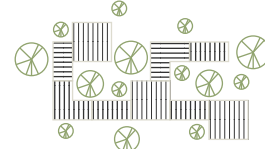
## Spatial organization



5. Form can only exist when defined by its counterpart, a negative space of absence. Hence, between the clusters there must be more than one empty modular unit, creating daylight voids and outdoor community niches, and resulting in village de-densification;



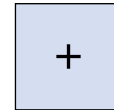
6. Greenery must be present in a form of variety of outside areas between clusters, green roofs visible from the top floor, vertical façade plants, plant beds, trees and bushes;



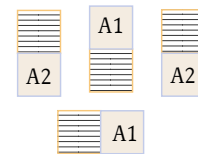
7. 'Horizontal outdoor connection units' (also referred to as 'corridor bridges') are to be designed for accessibility, connecting the clusters, and implementing greenery. They should serve more than a mere commuting function;



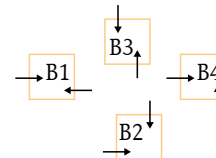
8. 'Vertical access points' are to be established by a junction of a staircase unit and an elevator unit in front of it, creating an unified expression throughout the village;



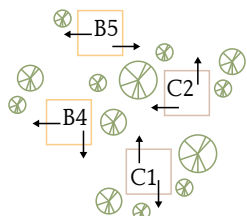
9. Additional value shall be added to the living units by implementation of the following points:



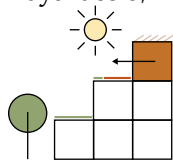
- Dormitories (type A) should always have community patio space unit nearby. They shall always be a part of public 'corridor bridges';



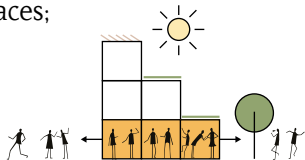
- Smaller living units, Studios type B1-B4, should implement ideas of compact living - smart interior design solutions allowing for saving space while maintaining its functionality;



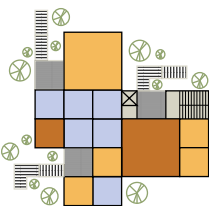
- Bigger living units (studios type B4, B5, or apartments type C1, C2) should receive additional value in a form of access to the outside, private terraces or balconies. They should always face S,E or W;



- Private services (public spaces dedicated for refugees) should be located on the top floor, allowing for access to roof patio terraces;

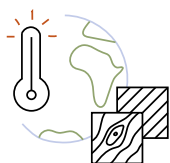


- Public services (spaces available to the local population) should be located in the ground floor, allowing for a flow of external communities;

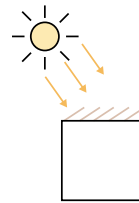


- The project must feel like a village, a weave of various indoor and outdoor spaces and activities, resulting in an organic overall expression, but composed of organized and geometrically rational modules (varied repetition), allowing for clarity of tectonic structural experience;

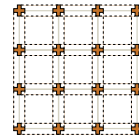
## Materials & tectonics



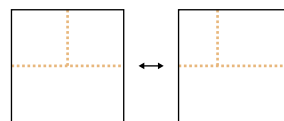
- Materials used for construction of the building should have as little Global Warming Potential as possible without compromising properties of the structure (LCA);



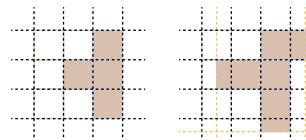
- Solar panels are to be implemented on the highest roofs for solar energy harvesting;



- Grid system of columns and beams should be a primary load bearing structure to ensure freedom in unit placement;



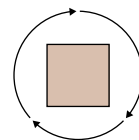
- Secondary inner walls should be lightweight, allowing for changeability of the floor plan;



- While placing the units one shall fit to the main/primary grid wherever possible. Otherwise it is allowed for half/secondary grid where needed;



- The concept should follow the principles of additive architecture, where pure addition or subtraction of elements is possible. Therefore, infill panelized building elements should follow the principles of plug & play or click-in mounting systems, where different panels of façade, floor and roof are offered, and can be dispatched as desired;



- The project must implement ideas of design for disassembly and allow for potential reuse of elements;



# 04 | Presentation

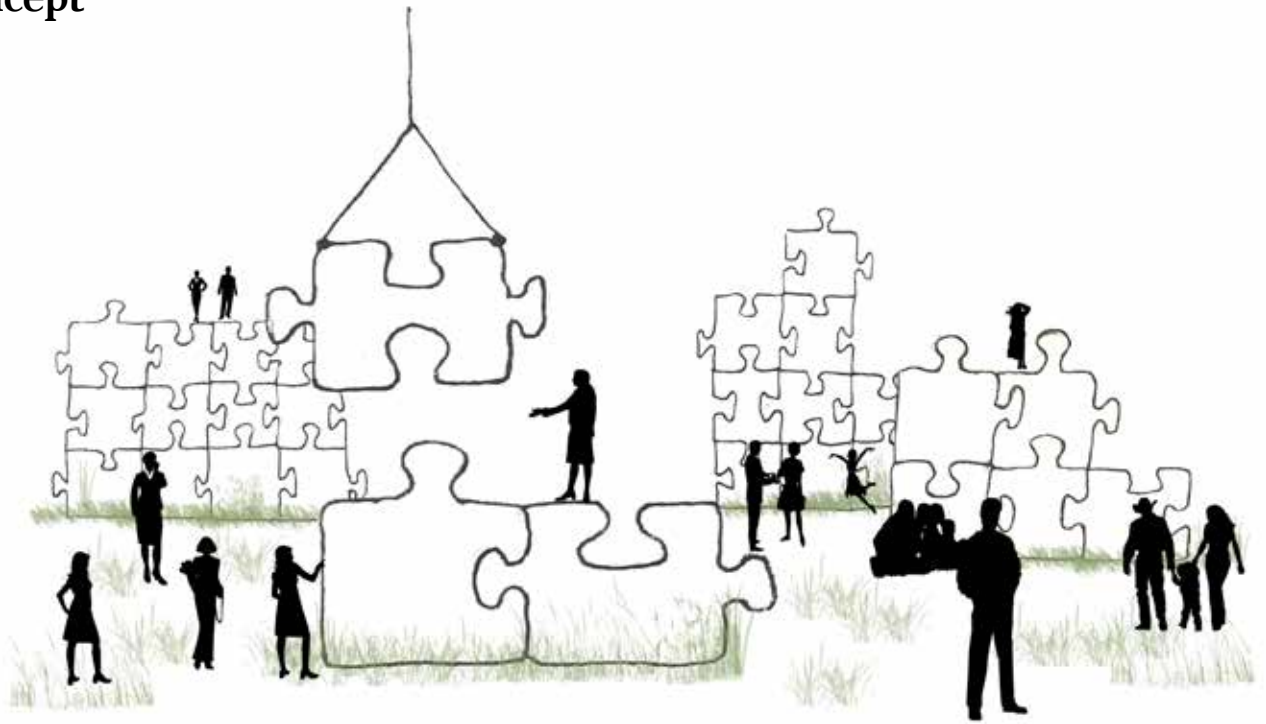






| Ill. 144. Project overview sketch

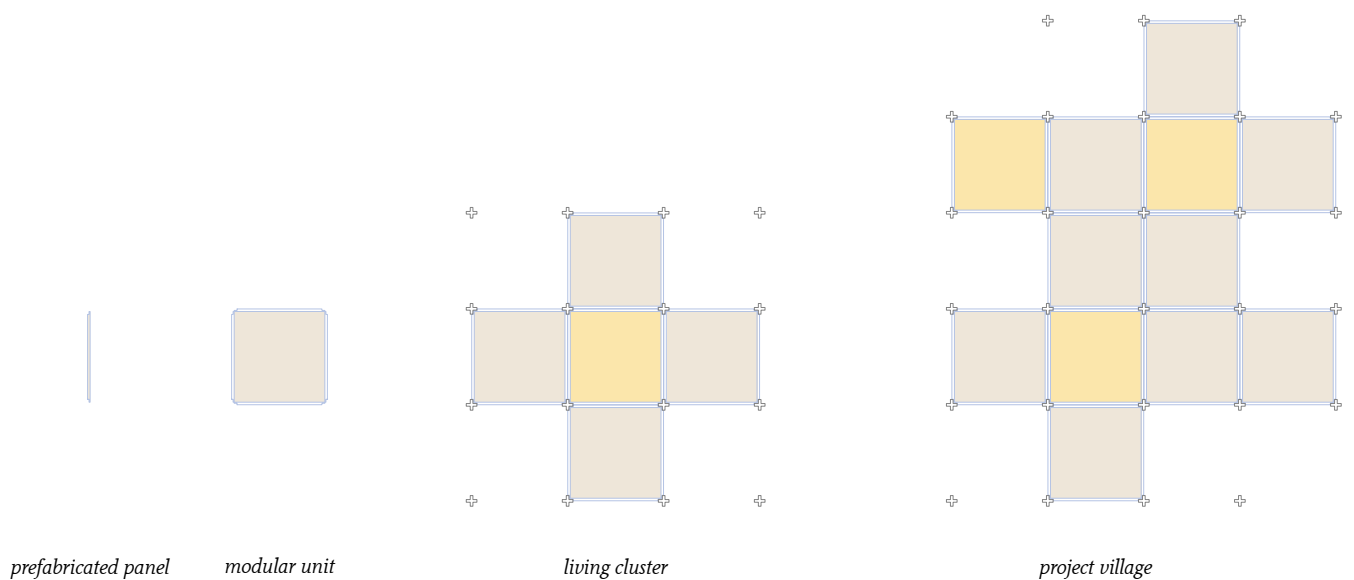
# Concept



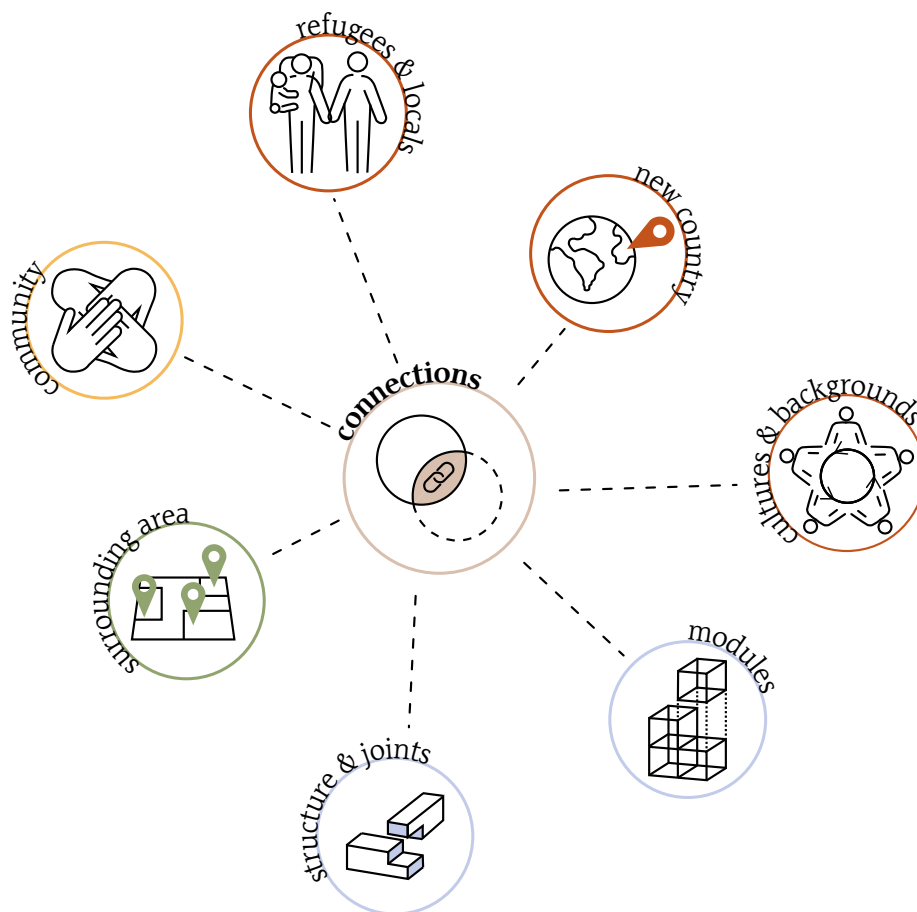
| Ill. 145. Conceptual sketch 'puzzle game'

*The Refugee Community Village project is a modular building system designed for adaptation and evolution as an architectural response to current and future migration crises - adjusting to the dynamic situation.*

*The Refugee Community Village project shall be seen as a 'puzzle game', where various scales of 'puzzles' are connected together creating bigger and bigger systems of dependencies. Proposal is only one out of countless possible outcomes of the 'puzzle game'.*



The project revolves around the connections of those 'puzzles'. Connections of countries, cultures and backgrounds, social connections between people, their needs and life space, functional connections of modular units, tectonic connections of structural joints, prefabricated panels... and connections of authors' conceptual ideas. The project highlights importance of relationships, connections and links between its elements, their differences and limitations.



| Ill. 147. Connections Diagram

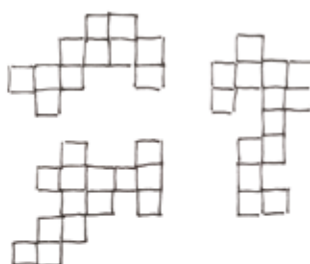
## Concept // Sketches

These conceptual sketches illustrate in a variety of ways how the modules can grow and how they are connected. Several modules form a block, which grows into a cluster. The connections between the blocks are to be created via outside connections.

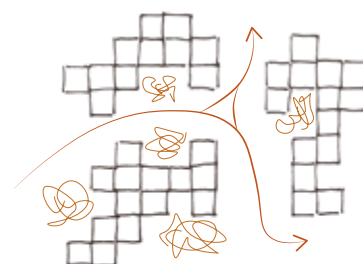
The organic arrangement of the modules creates paths and spaces in between the blocks. These spaces naturally divide the plot into smaller units, creating a gradient between outside and inside, as well as private and more public areas, and allowing residents to feel more secluded for social interactions.



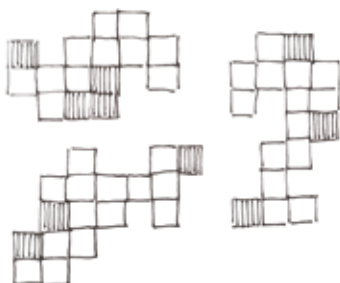
one block



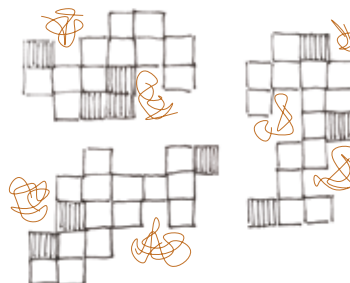
creating clusters



pathways // niches



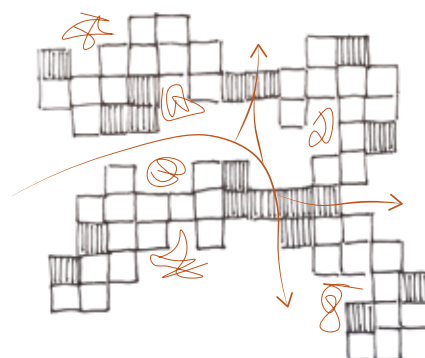
designing outside common areas



niches

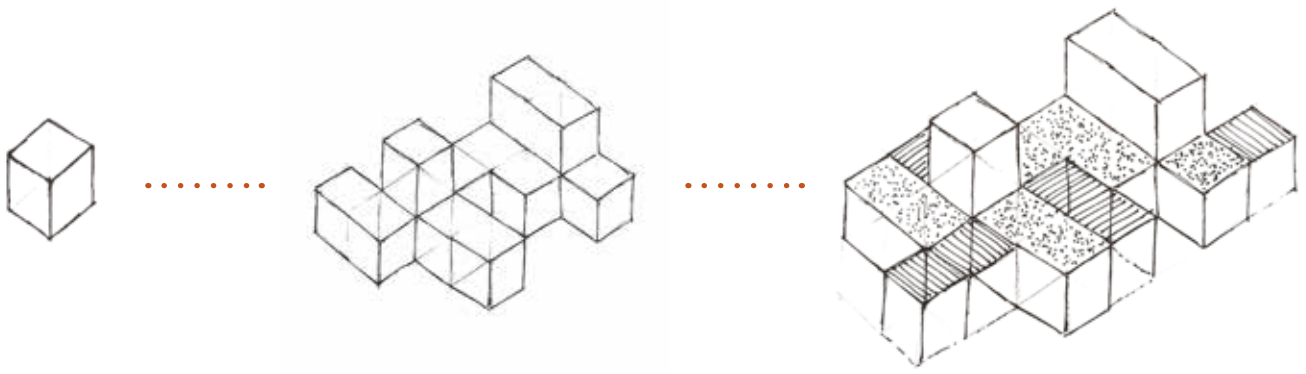


connecting blocks

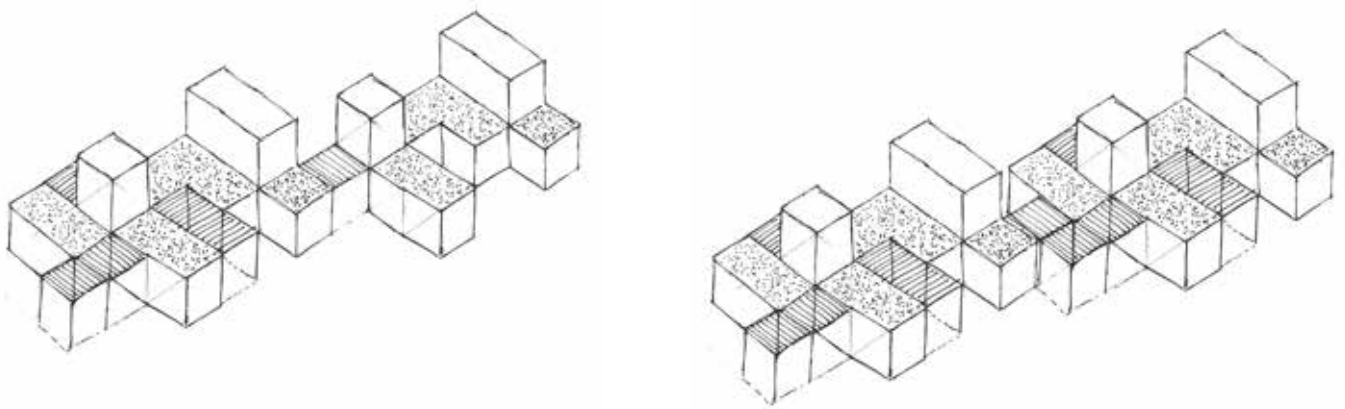


growing // adding additional blocks

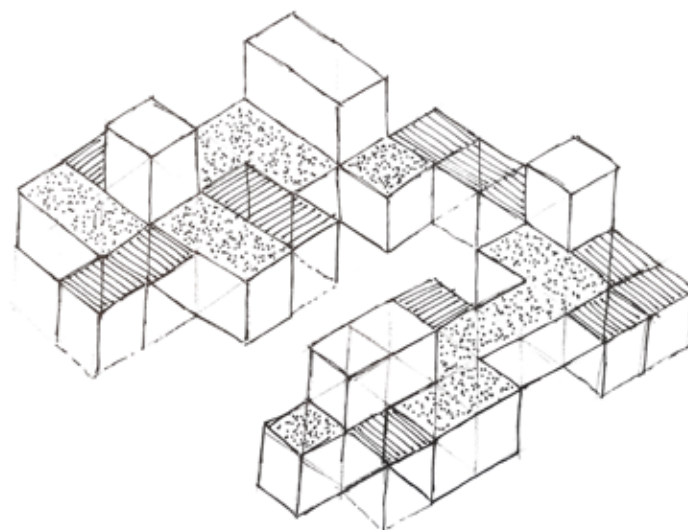




| Ill. 149. One module becomes one block with outdoor connections



| Ill. 150. Block is extended by connecting new modules



| Ill. 151. Block is extended by connecting a second block through outdoor areas



## Site Plan // 1:400



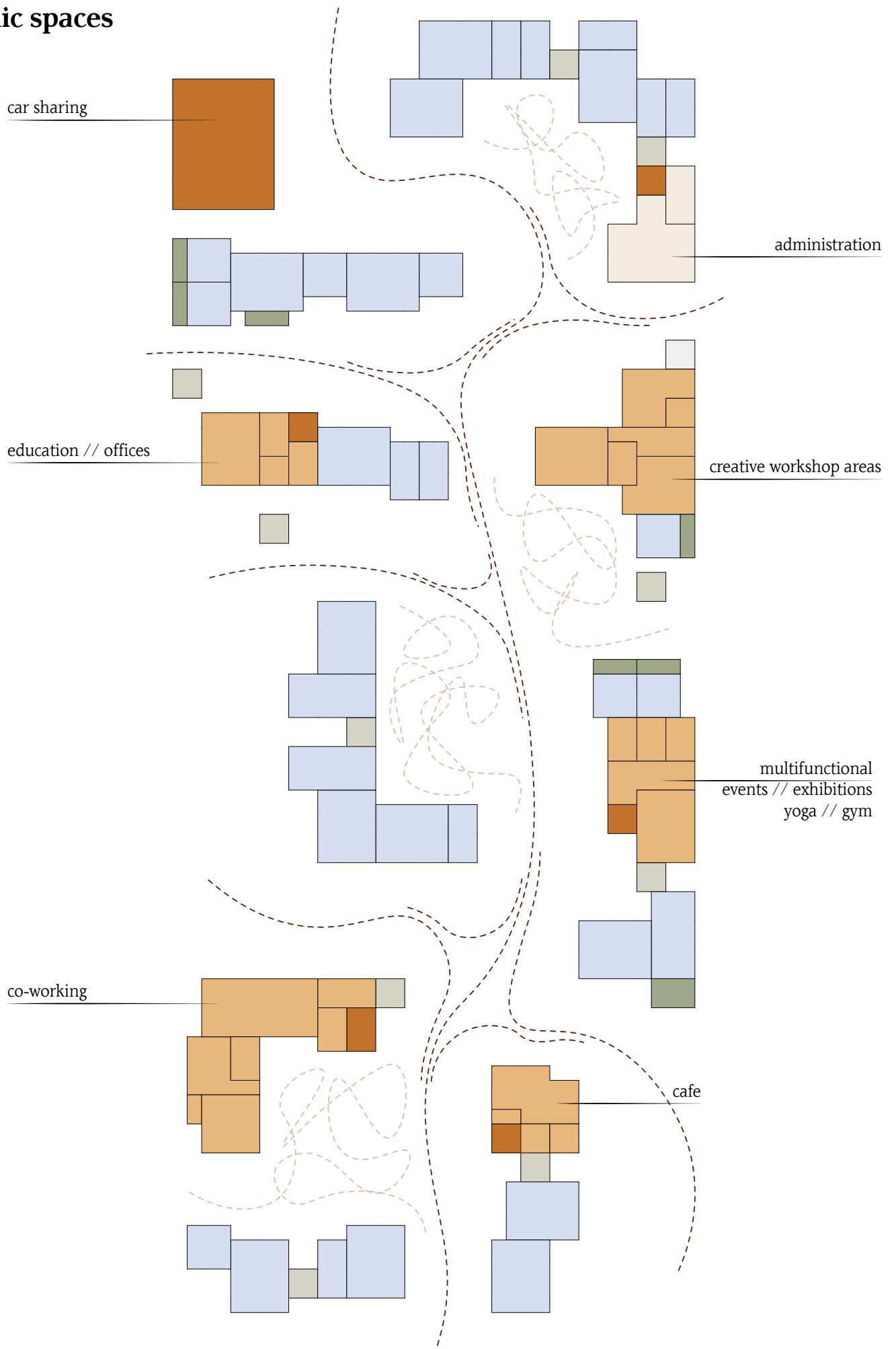




1m

Presentation

# Public spaces



The ground floor is the primary place of interaction and exchange between locals and refugees. To facilitate this, various public functions are located on the ground level.

The arrangement of the modules naturally creates different flows. The more linear flows provide a longer view of the plot, while the created niches enable smaller flow movements that encourage visitors to experience the site. As a result, an interesting and exciting composition of spaces is achieved that can always be explored and discovered time and again. This fusion of spaces not only introduces a gradient of spaces between public and private, but also encourages visitors to interact with the site and allows for more opportunities for interaction. Residents as well as locals feel as if they are walking through a small village, which, due to its human scale, yet provides a homely and secure feeling.

The residential units are distributed over all three floors, with a focus on the first floor. It is a floor occupied primarily by single individuals forming substitute families - micro communities within bigger community village. This so called 'dormitory typology' is created by the clustering of the living units together with a shared space unit. Second floor is primarily reserved for the residents of *the Refugee Community Village*, holding space for common kitchens, patios and other functions.

The main aim was on creating different points of connection with the local community and refugees, as well as between the refugees in their living areas. The illustrations on this page illustrate the flows and functions as well as the gradient of privacy in both vertical and horizontal axes.

A more detailed look at the living areas and floor plans can be found on the following pages. The living modules are kept rather small to encourage the use of the community. However, great care was taken to design the spaces in a functional and homely way to ensure that the user group feels safe and comfortable. Compact living principles are applied to accommodate a big wave of migrants on the relatively small area, simultaneously maintaining human dignity.

*private services // basic activities*

*living units*

*public services // extra activities*



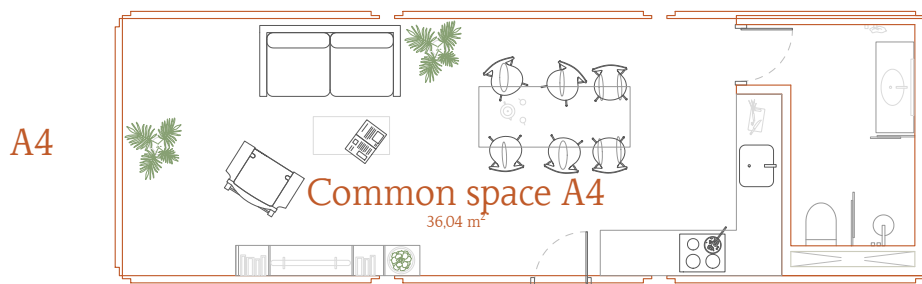
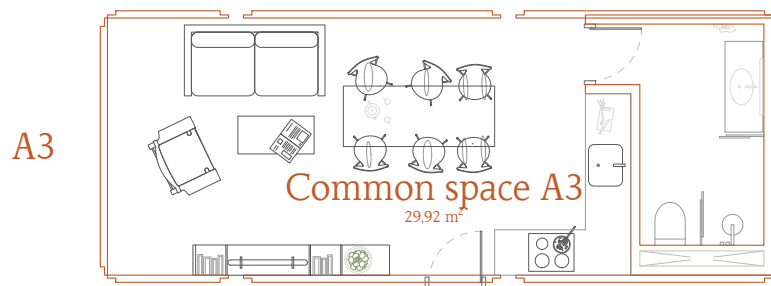
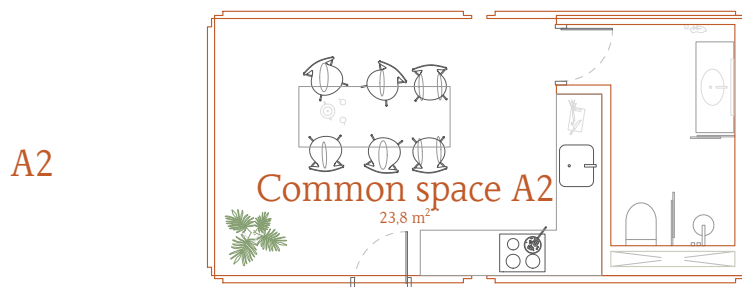
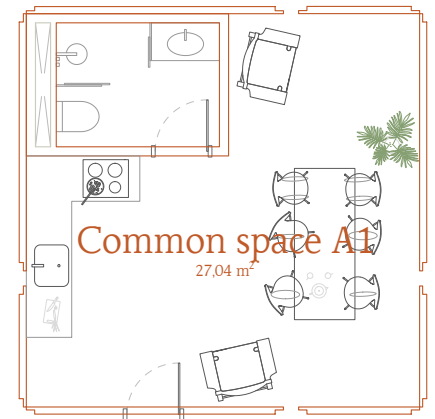
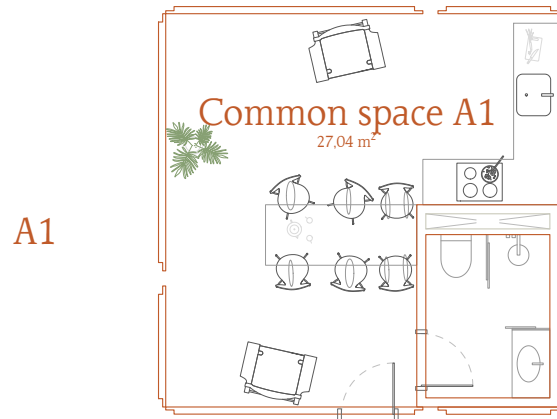
| Ill. 154. Programmatic Section - sketch

## Living units // 1:100

### Type A - Dormitory typology

3 - 4 Dorm room units paired with common spaces unit with bathroom and kitchen // 6 inhabitants on average

#### Common spaces





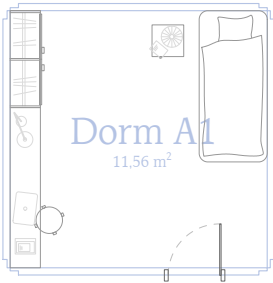
Dorm rooms

Substitute Family / Micro community  
Co-living  
Kollegiet / Dormitory  
Single individuals  
Flatmates  
Roommates

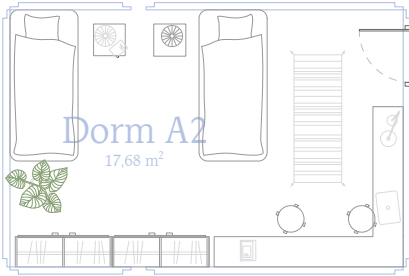
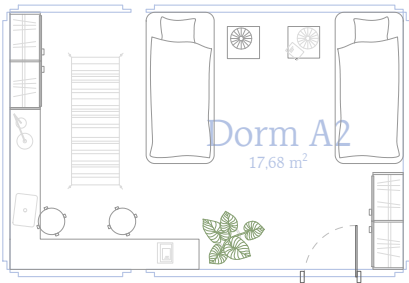
Type A

Single room in Shared Dormitory

A1

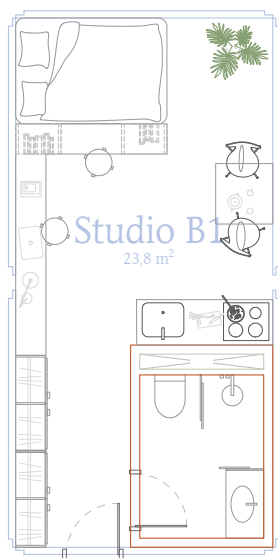


A2

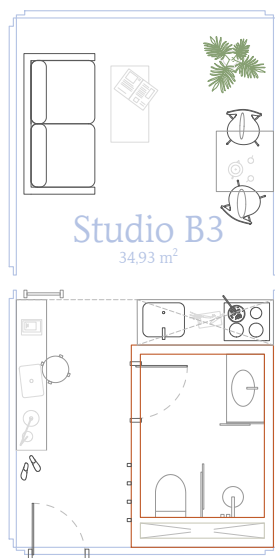


## Type B - Studio

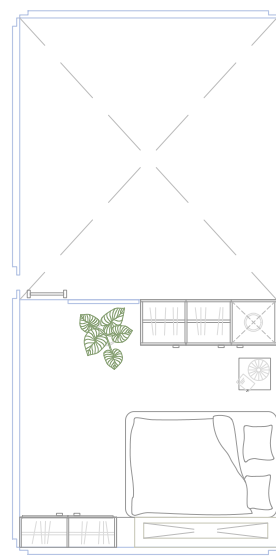
B1



B3a

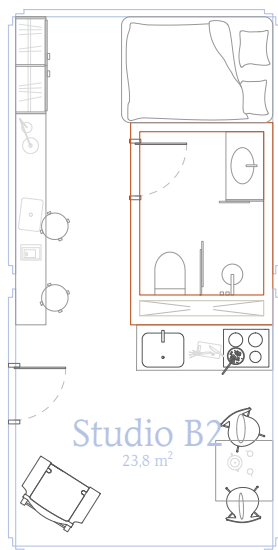


B3b

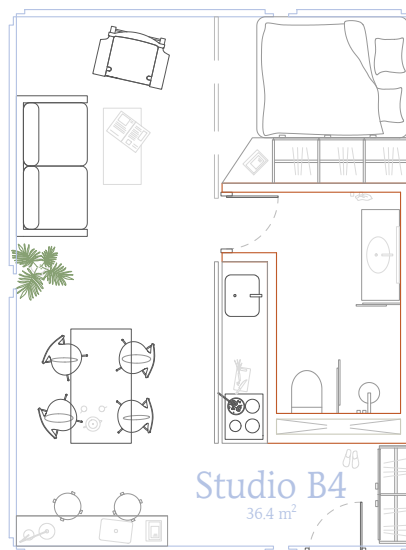


+

B2



B4



Couples

Single parent

Handicap

Type B

Couple room in a Studio Apartment

B5

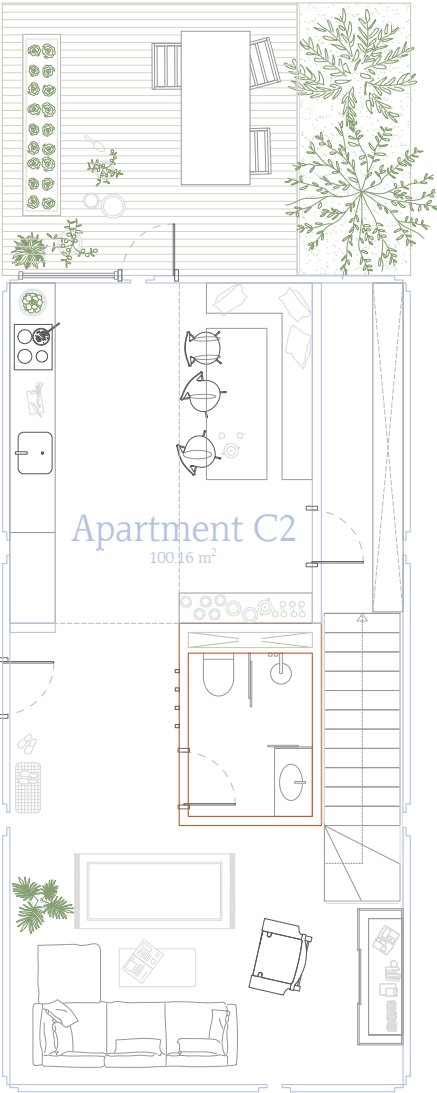
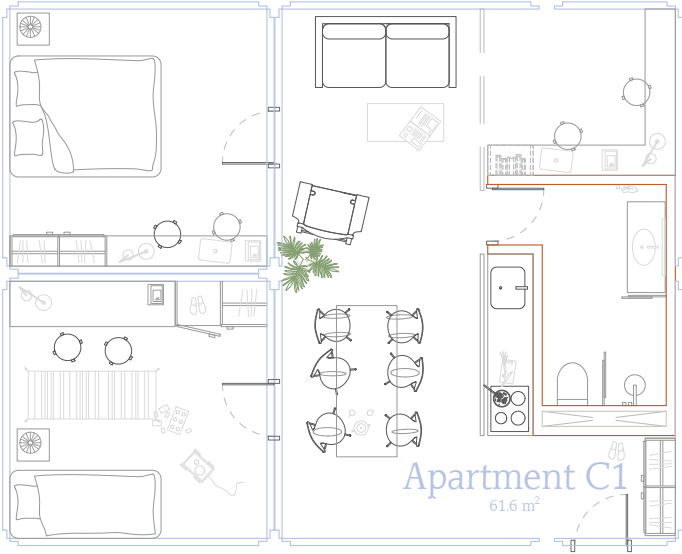


H.C. Studio B5

27.04 m²

# Type C - Apartment

C1



C2a

C2b

+



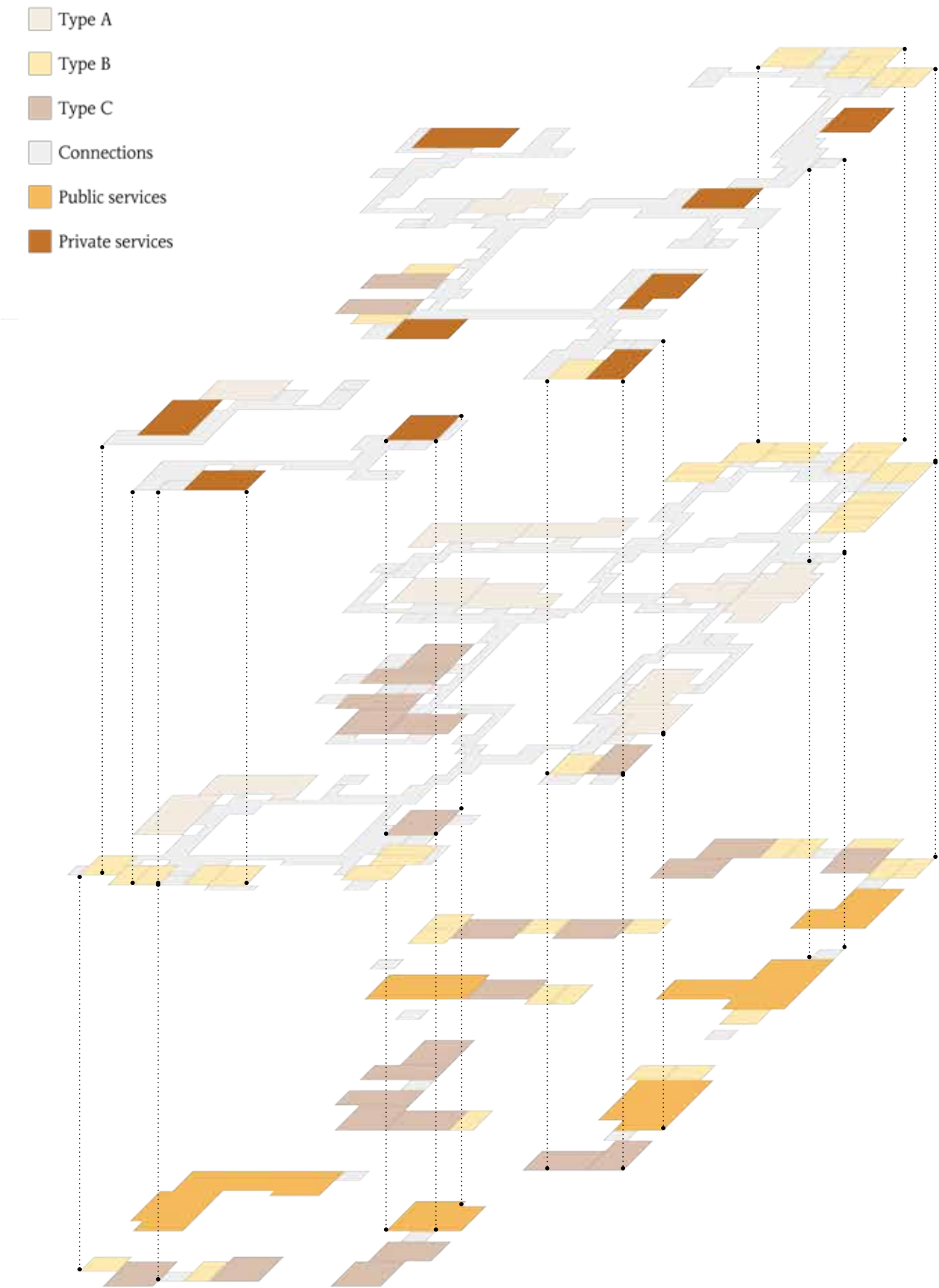
- Divorced living
- Extended family
- Family
- Multigenerational

## Type C

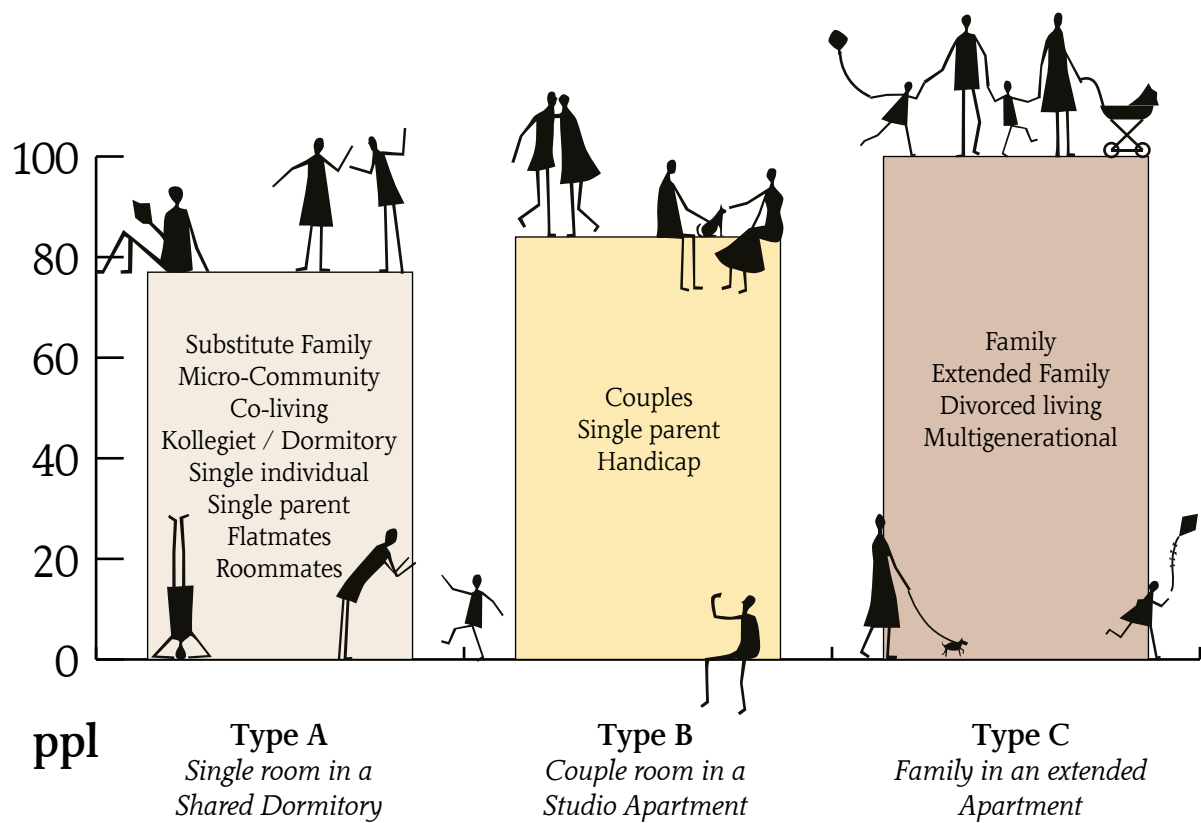
Family in an extended Apartment

4 inhabitants on average, unit contains bedrooms, small kitchen and bathroom

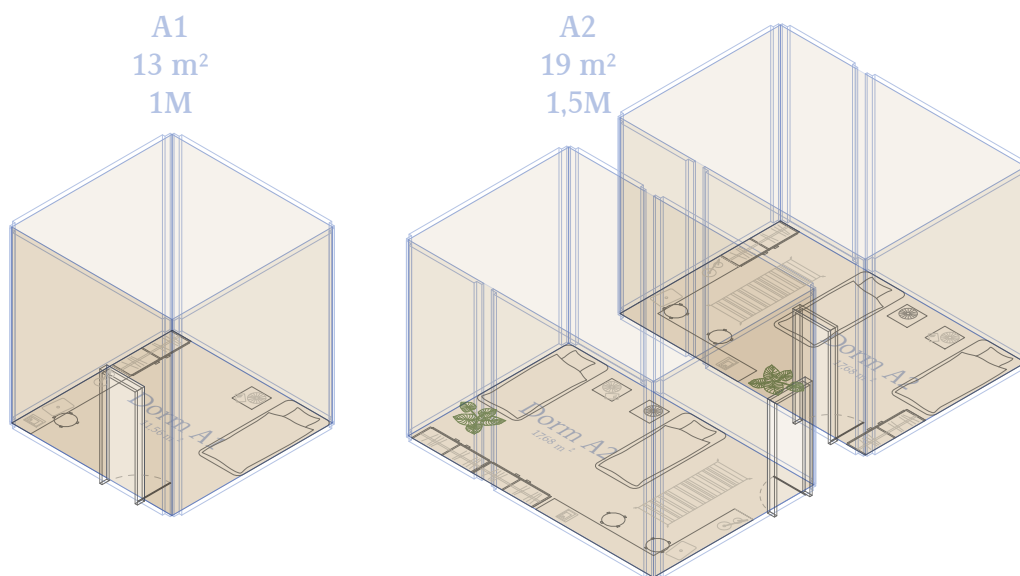
# Apartments distribution



Presentation



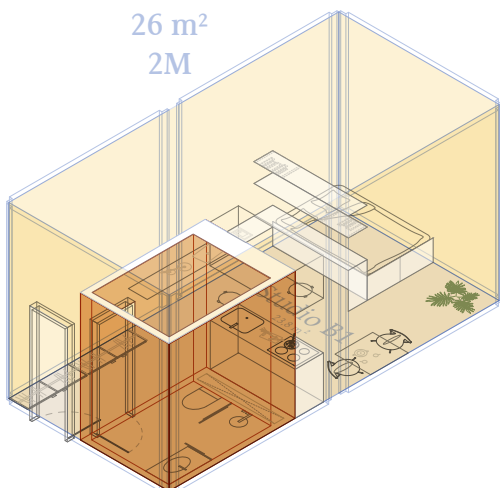
| Ill. 160. Apartments distribution - proportion according to number of people housed in Type A, B and C



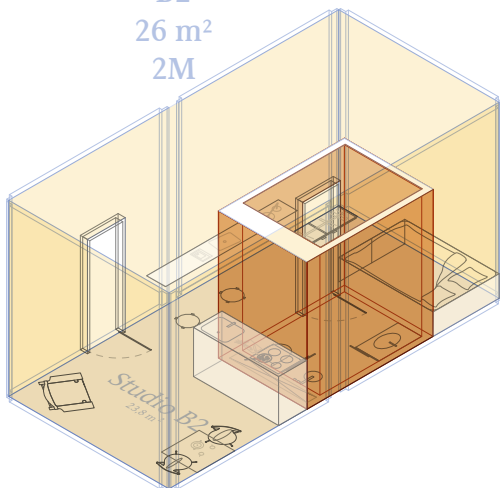
| Ill. 161. Type A - Dormitory rooms // total count: 45



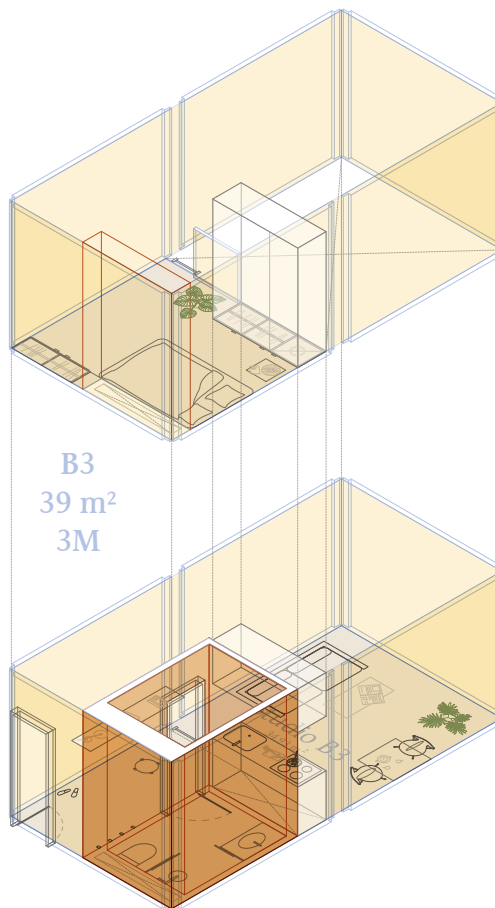
B1  
26 m<sup>2</sup>  
2M



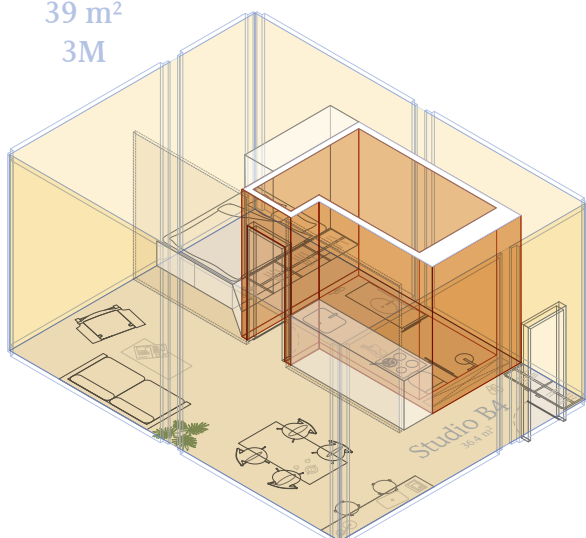
B2  
26 m<sup>2</sup>  
2M



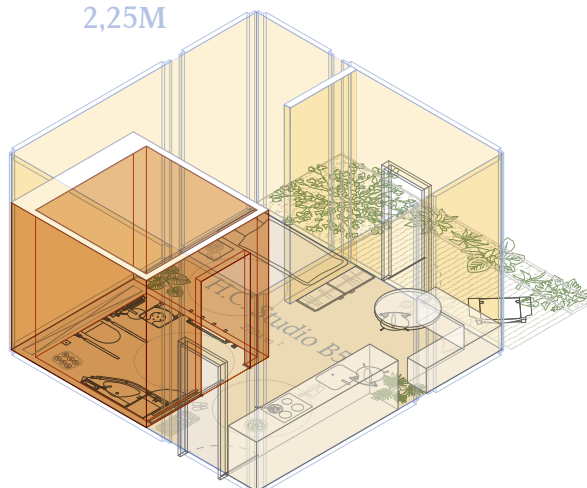
B3  
39 m<sup>2</sup>  
3M



B4  
39 m<sup>2</sup>  
3M



B5 (H.C.)  
29 m<sup>2</sup>  
2,25M





| Ill. 163. Studio B4 - interior



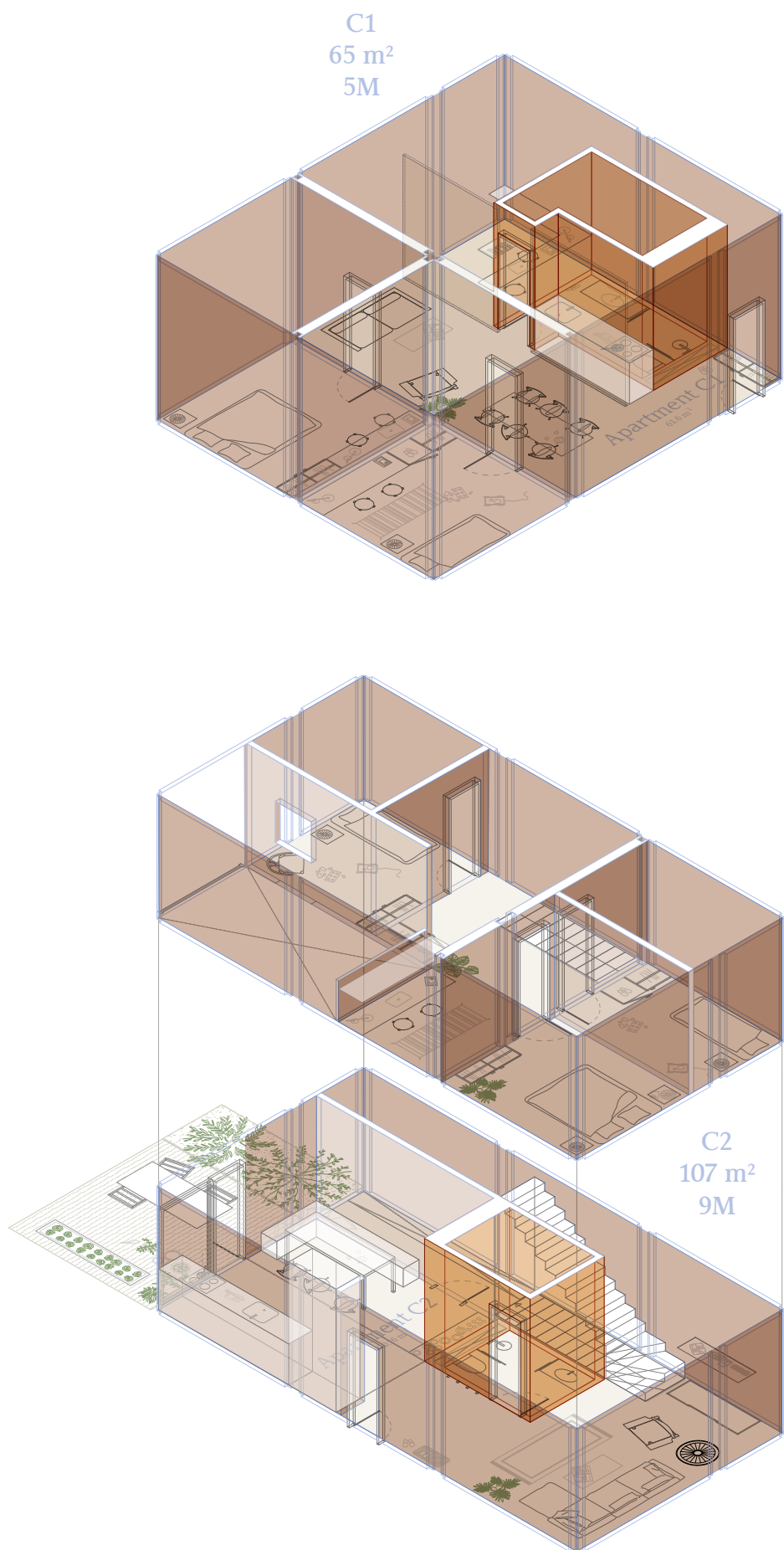






| Ill. 165. Apartment C2 - interior





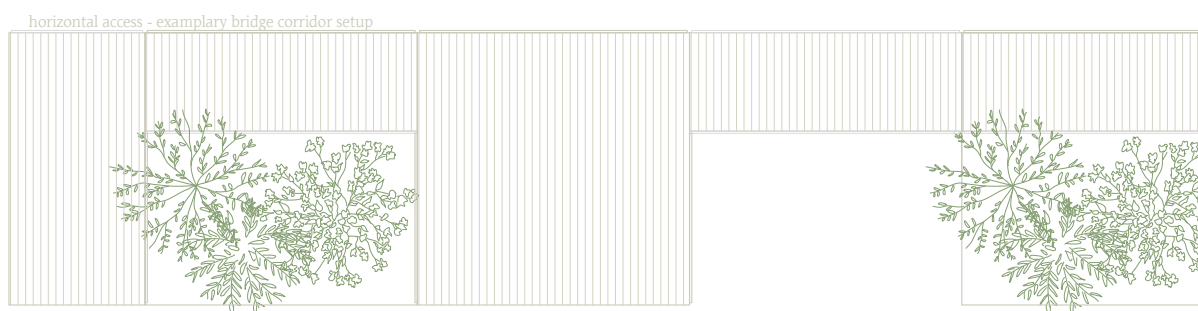
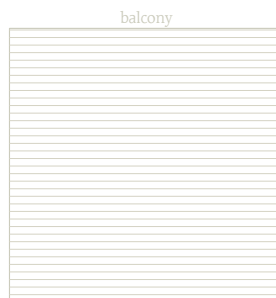
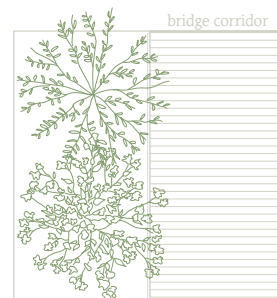
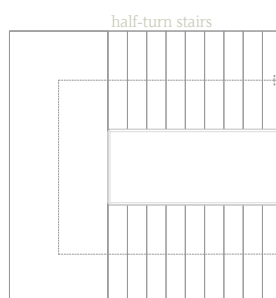
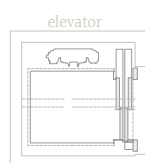




## Connection units // 1:100

### Access areas - 'bridge corridors' & 'vertical access points'

The 'puzzles' of functions (living units, public and private services) are connected together with 'puzzles' of bridge corridors and vertical access points units, creating a system of commuting web as well as providing an outdoor space, where the community can interact. The connecting elements are exposed and spacious allowing for recreation and interaction between the refugees on the first and second floor.















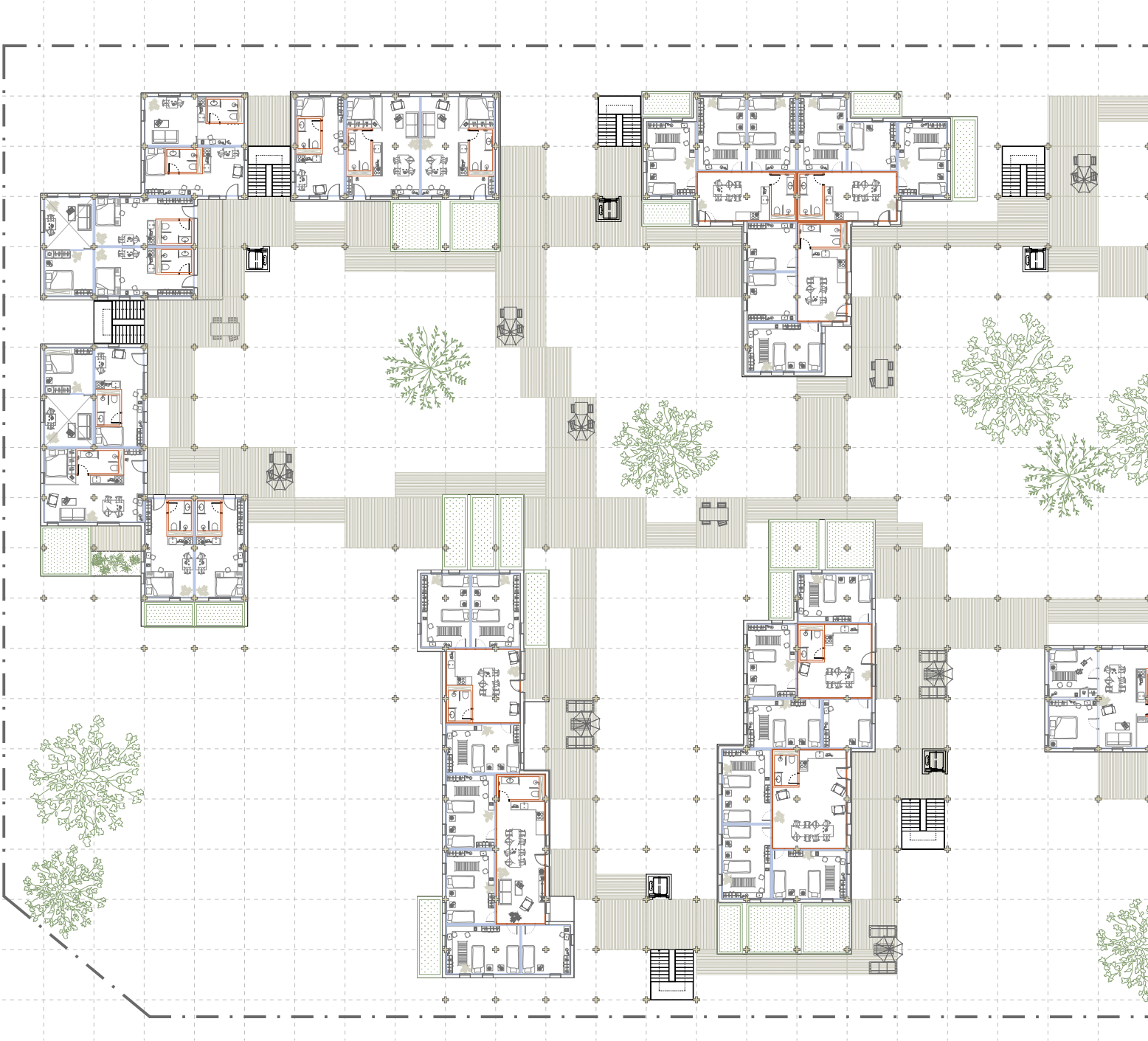
Groundfloor plan // 1:400





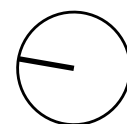
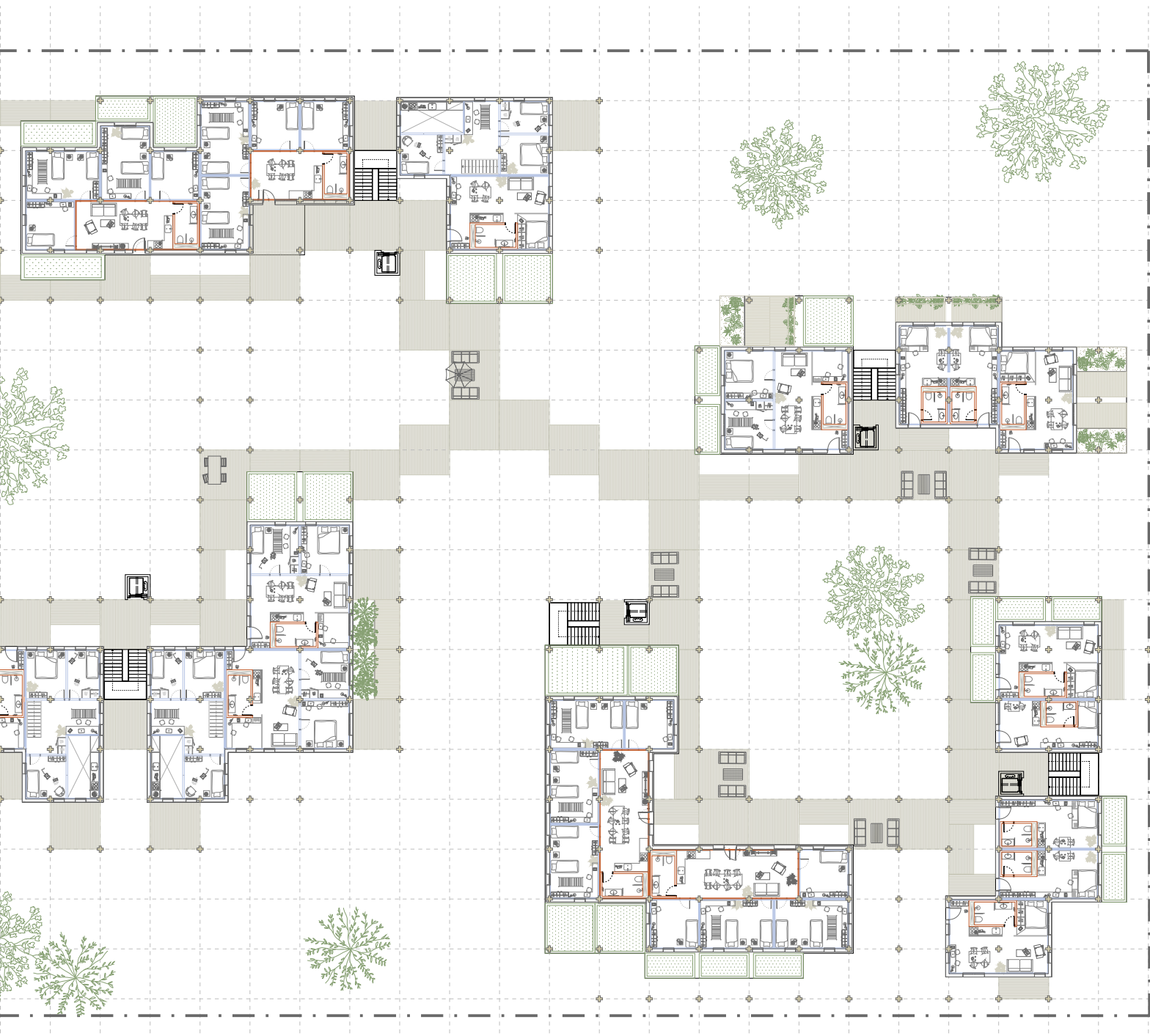


First floor plan // 1:400

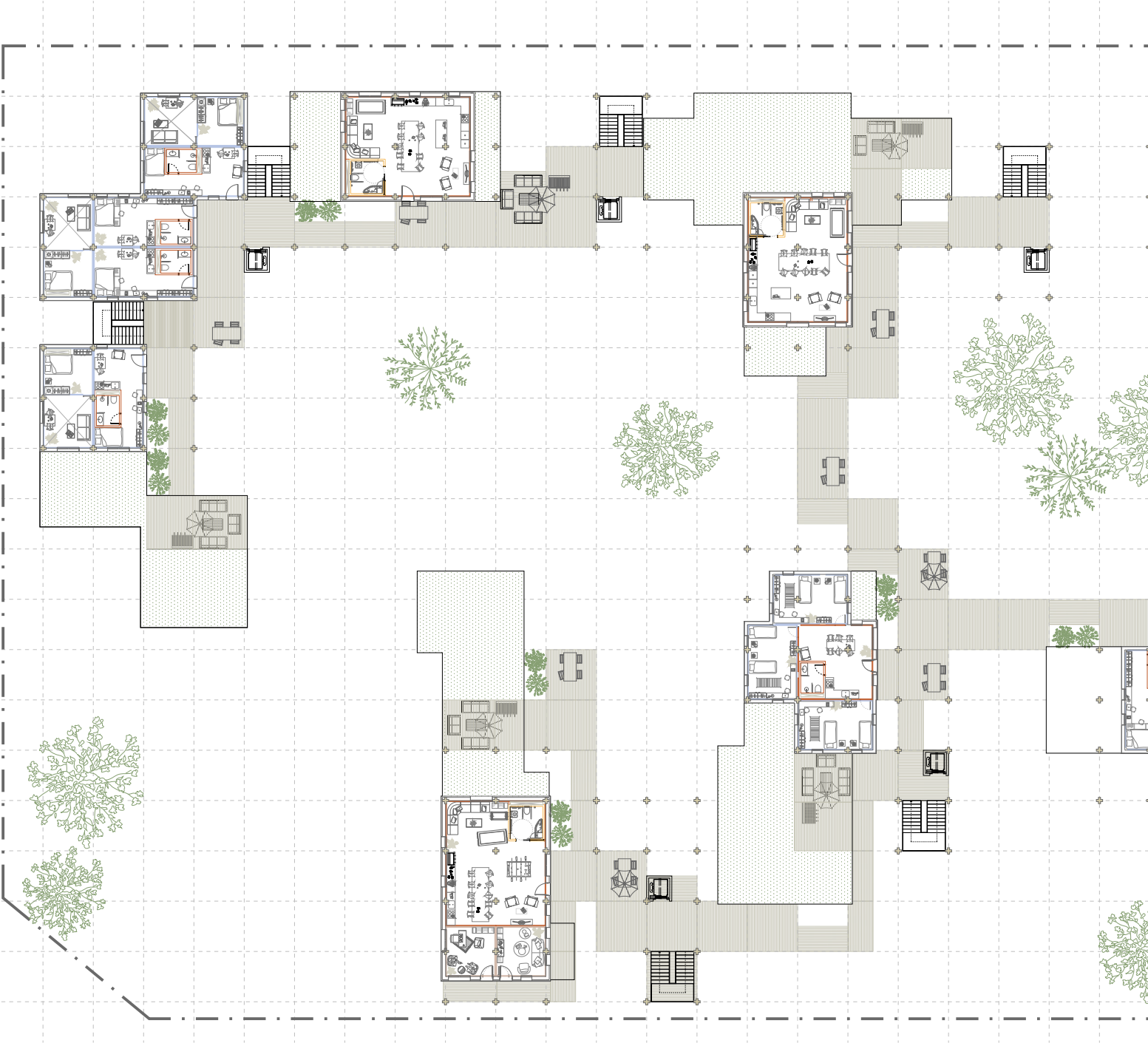


Presentation

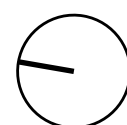
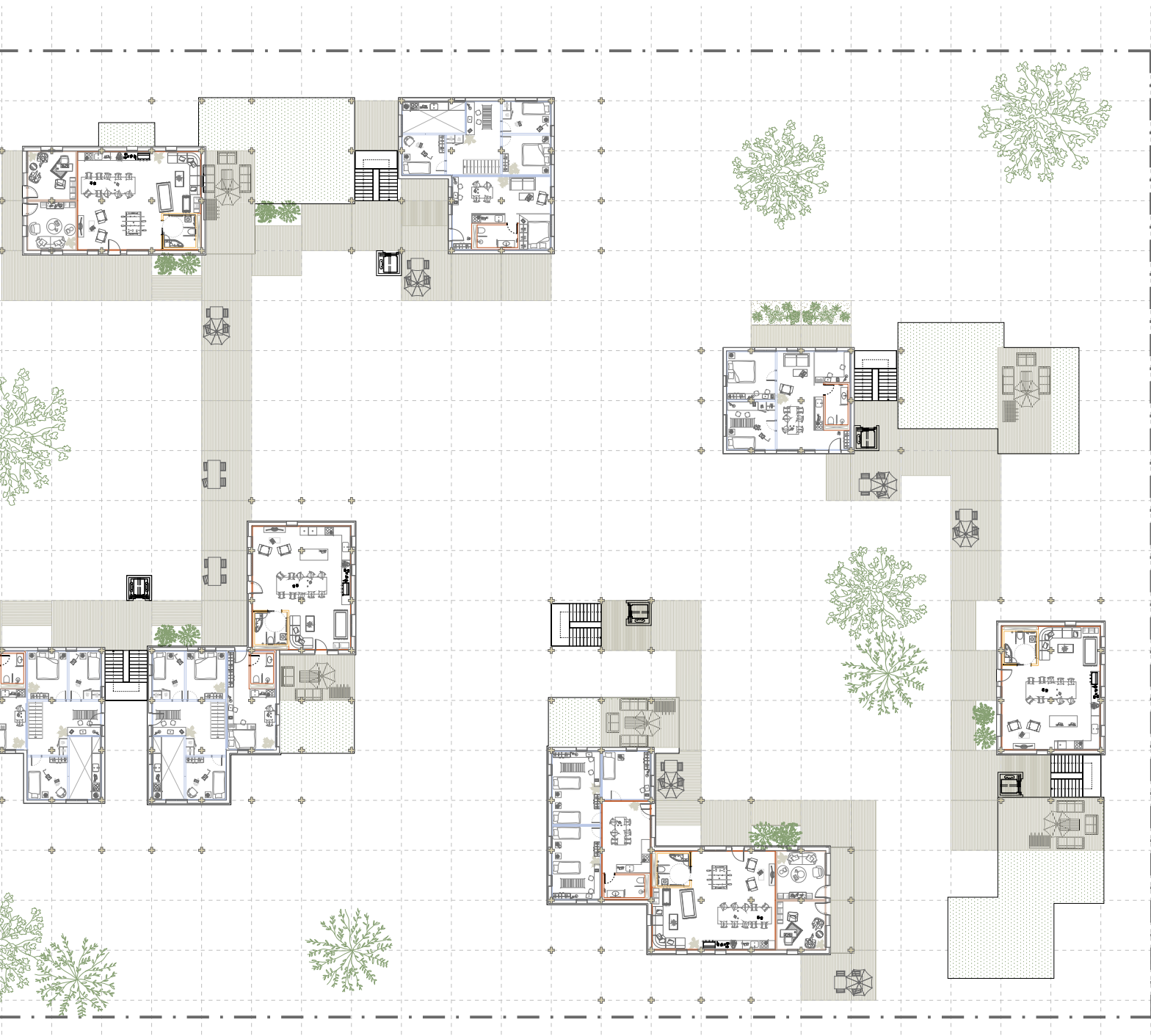




Second floor plan // 1:400



Presentation



# Elevations

Regarding the materiality of the facades, the common public functions are covered with a wooden cladding and private living clusters have a render finish. It is achieved due to the choice of multifunctional materials for construction of prefabricated facade panels - accommodating both finishes.

Three sizes of windows are proposed with varying heights a width corresponding to one fourth of the facade panel.



| Ill. 173. Elevation North







| Ill. 174. Elevation South



| Ill. 176. Elevation East



| Ill. 175. Elevation West





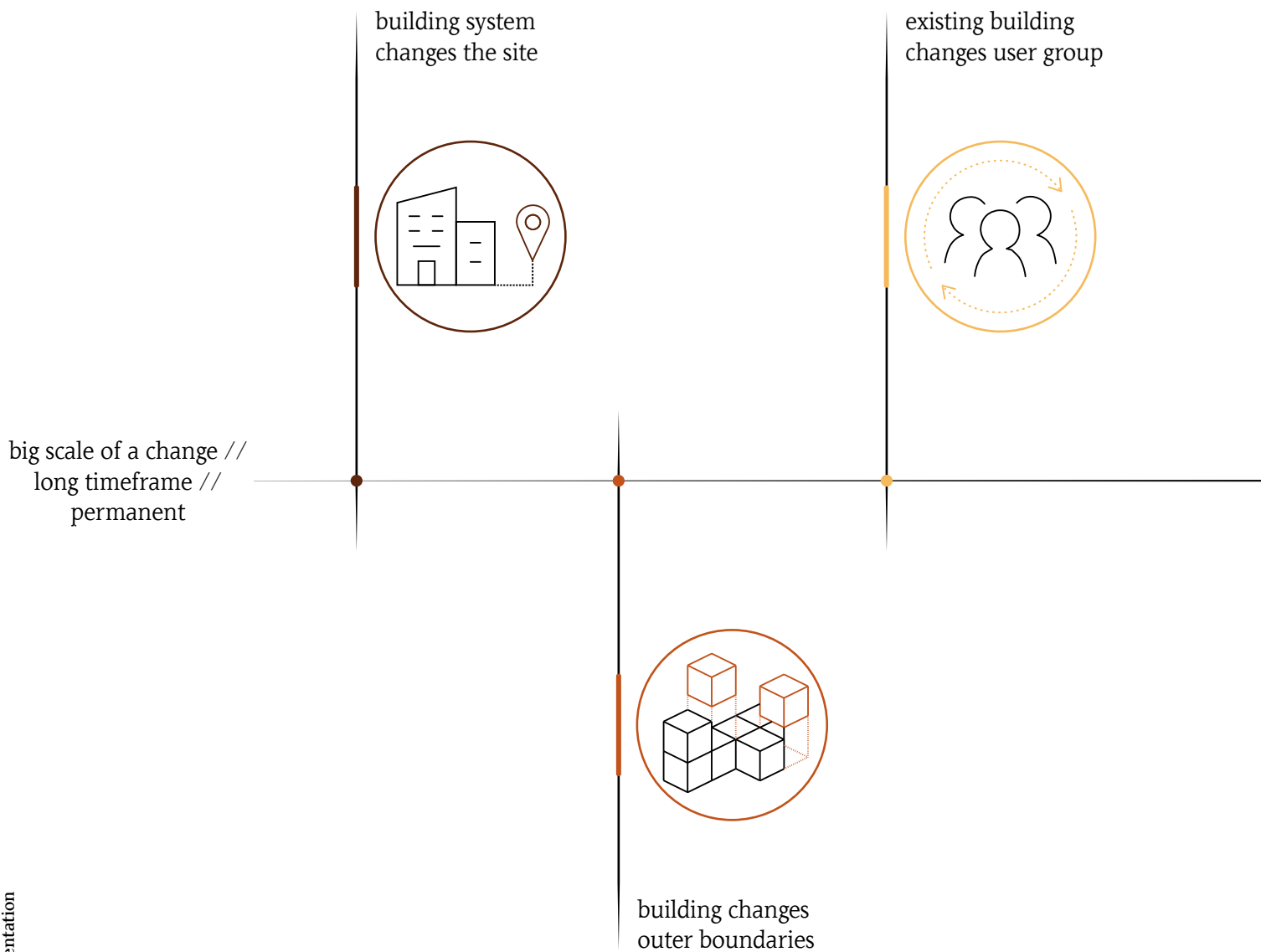


# Flexibility

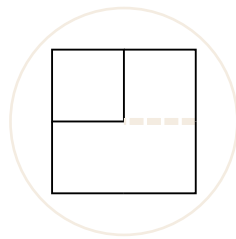
Flexibility of *the Refugee Community Village* can be expressed on a timeline, illustrating the range of changes and ways of how the project can evolve over time.

Some changes will happen over a longer period of time, as they are not as easy to implement due to required bigger and organized operation. This makes the built solution more permanent on the given scale. Other changes are smaller, and therefore the outcome is considered as more temporary, as it is easier to change them more regularly and implement readily without using many resources.

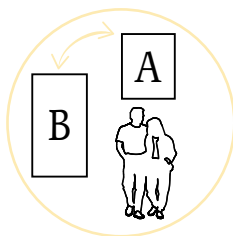
On the following page one can see an example of flexibility in relation to the user, where residents can rotate between proposed apartment types, depending on their size and current needs of *the Refugee Community Village*.



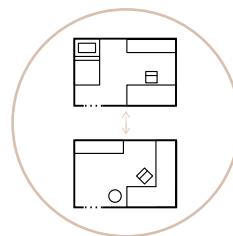
apartment changes  
walls inside



small scale of a change //  
short timeframe //  
temporariness

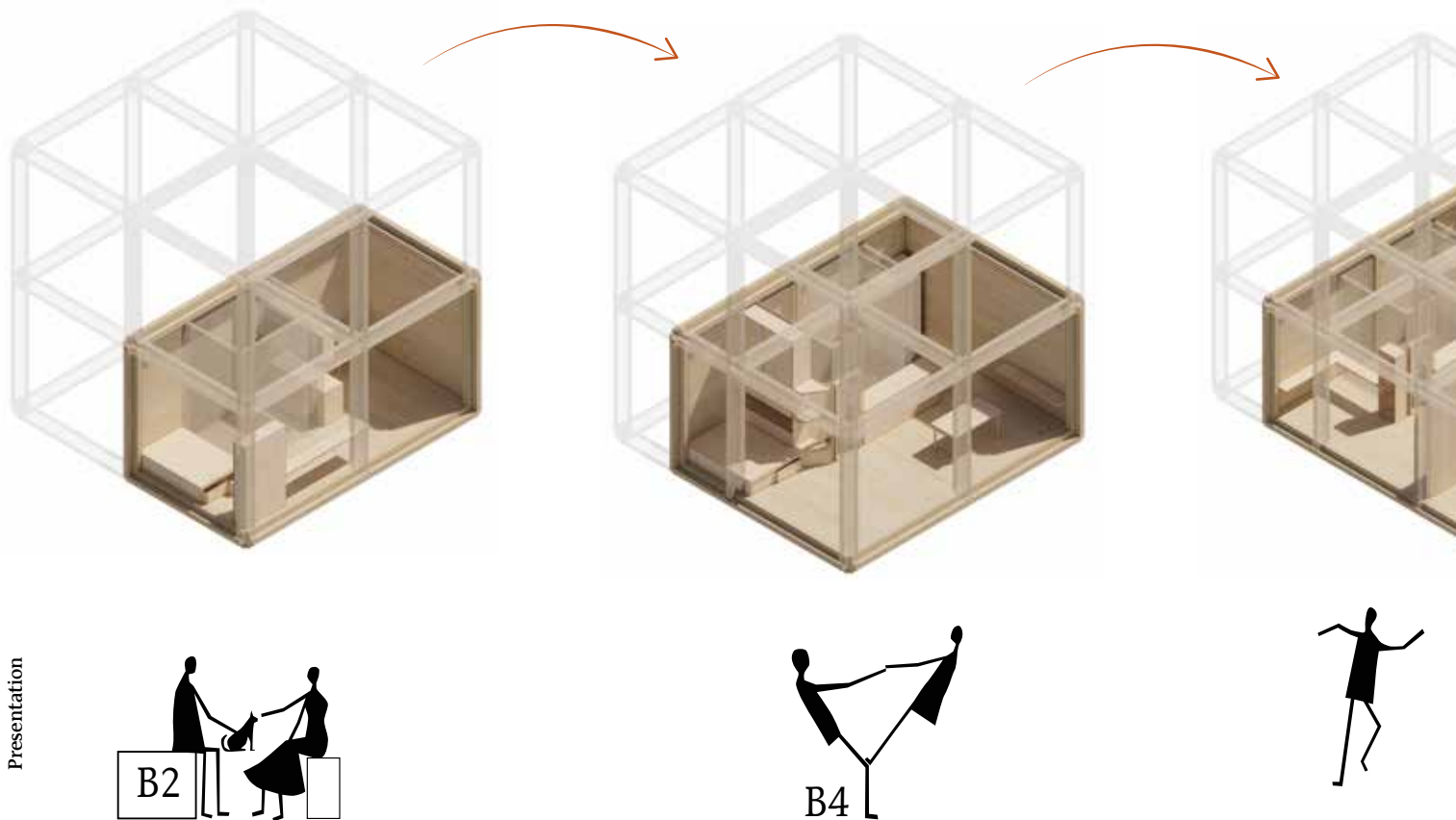
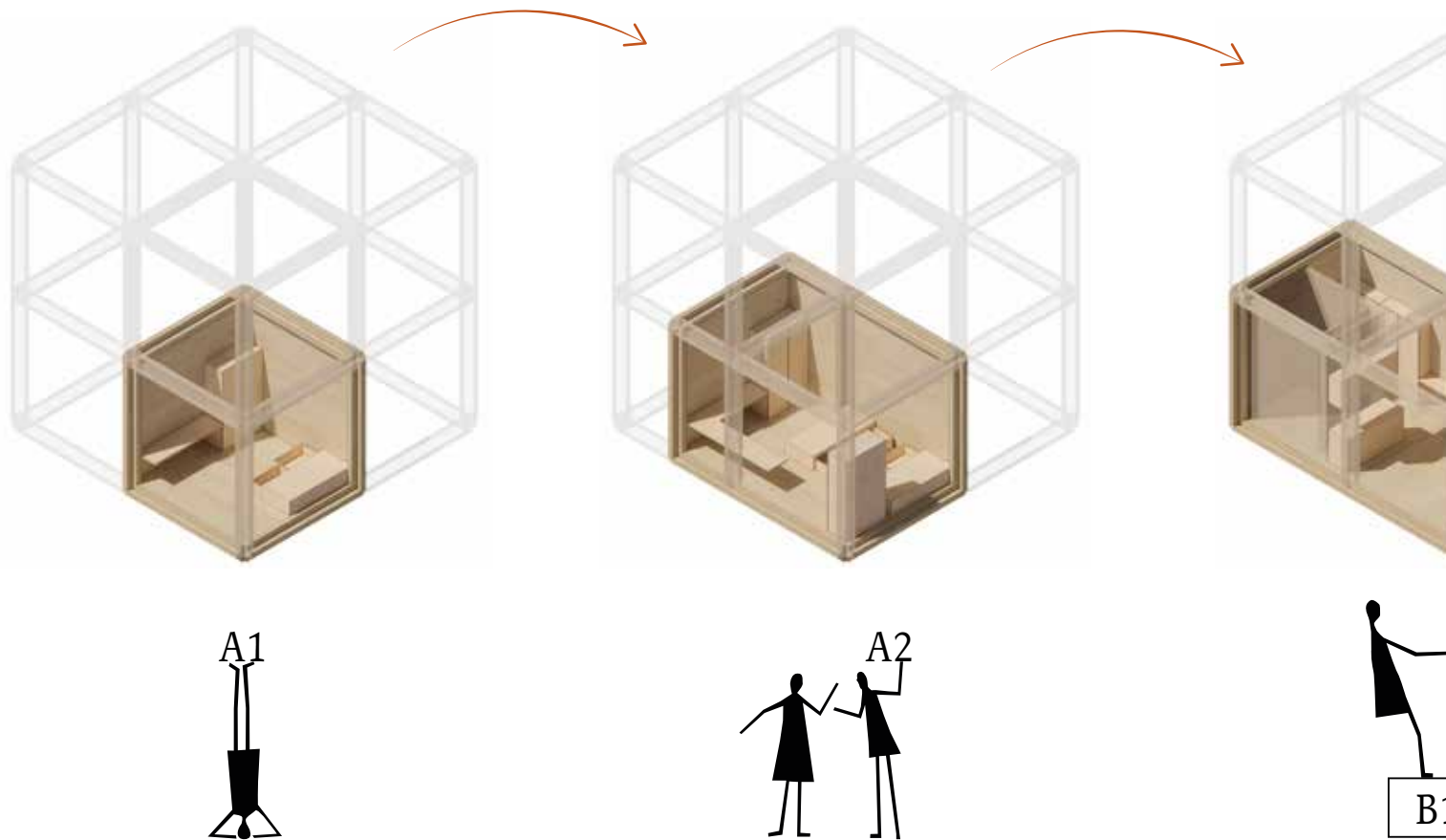


residents change  
apartment types

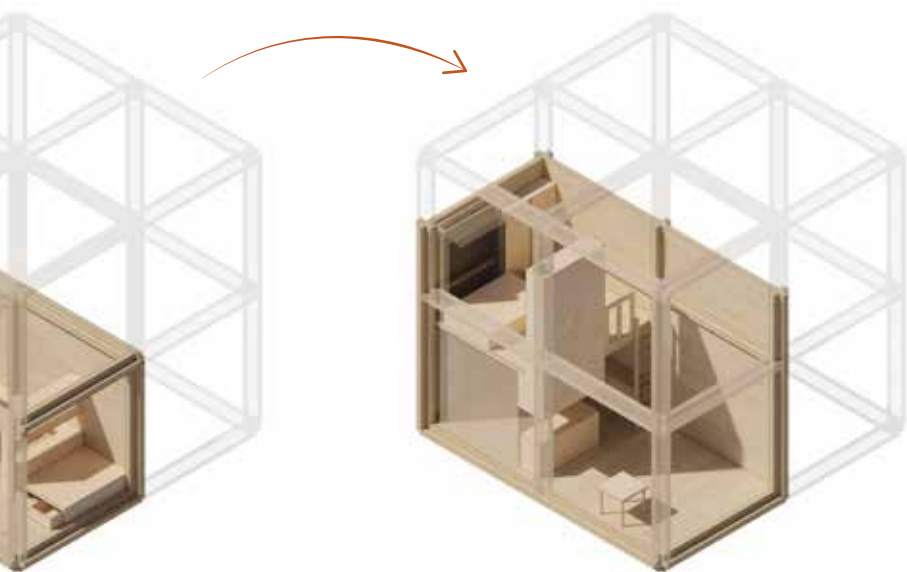


rooms changing  
functions

# Scenarios // Family changes - house adapts



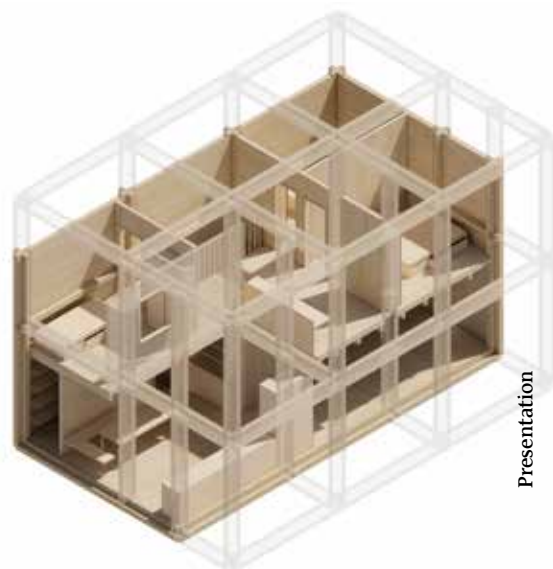




C1



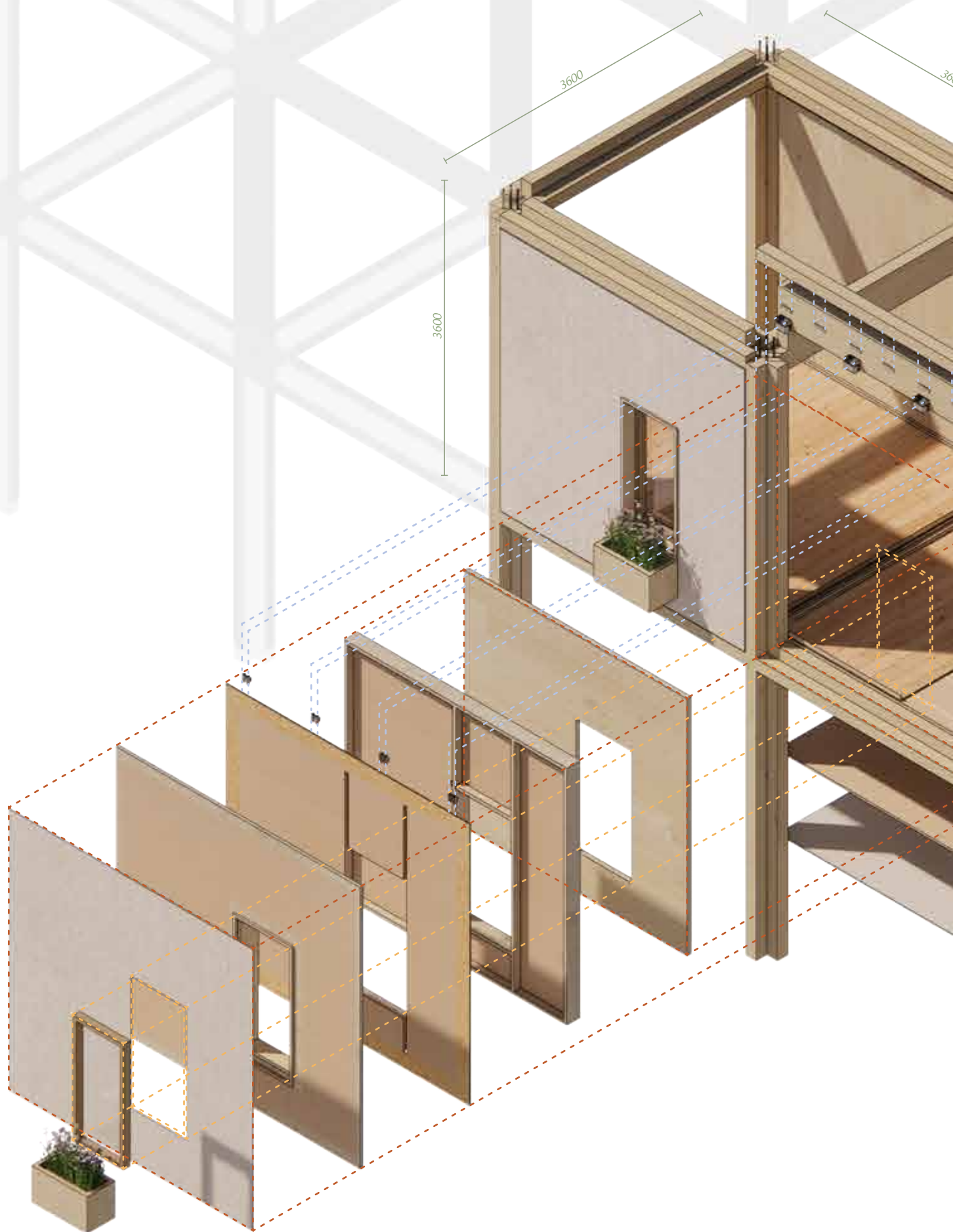
C2

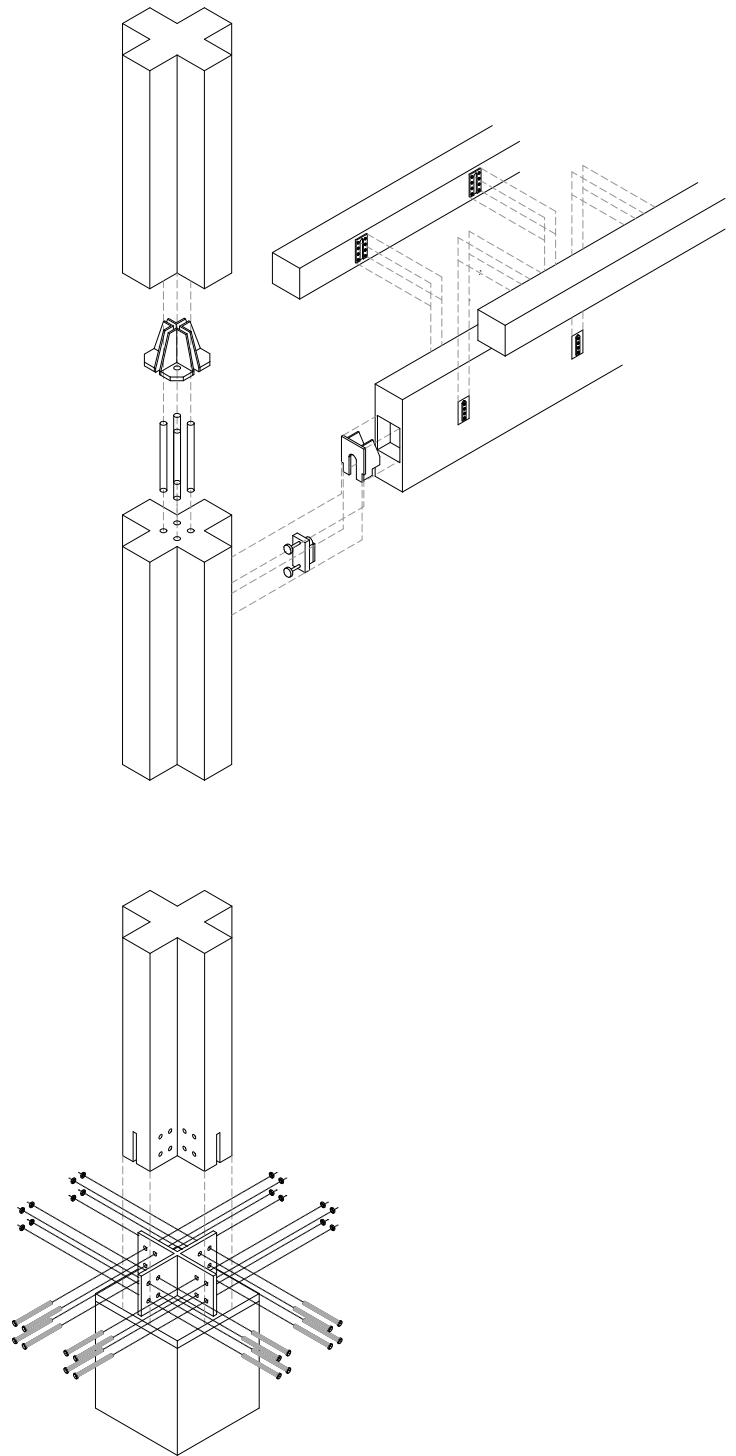


Presentation

# Building system

Presentation





| Ill. 181. Tectonic principles

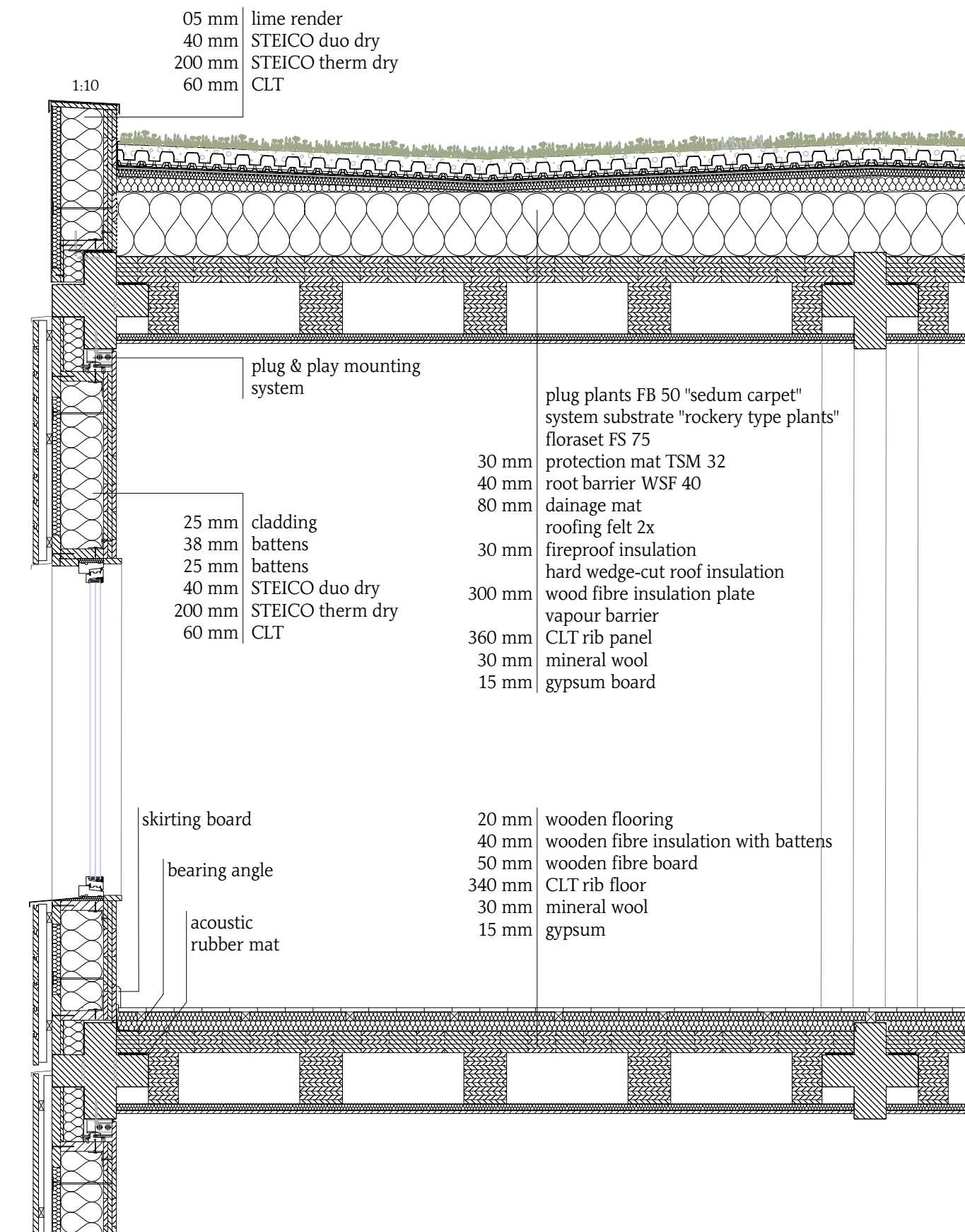
## Panelization

The project's glulam superstructure is designed for panelized infills, with ease of assembly, disassembly, repair and programmatic flexibility in mind. Wall and floor panels are of hygrothermal high-performance, containing necessary layers for thermal, air, vapor and water, fire and acoustic control. The panels are prefabricated off-site and then transported and mounted by crane with plug & play or click-in system within the grid openings, enclosing the interior spaces. During installation of the panels inside the grid, edges are sealed with moisture and air-resistant flashing tape, ensuring airtight construction. Bathroom units are also prefabricated and installed during assembly. Windows and doors are assembled on site, as well as final render or cladding layer.

## Construction section









## Project overview

The project proposes implementation of green roof areas on the lower, and visible to the residents roof areas, in order to incorporate more greenery into the village.

Additionally, solar panels are installed on the highest roofs, where the human eye can not reach, and the harvesting of solar energy possibilities are the most optimal due to little shading.

The current layout of *the Refugee Community Village* is only a proposal of connections of the developed building 'puzzles', leaving the space for further discussion regarding other possible outcomes of the building system concept and the limitations that it carries.





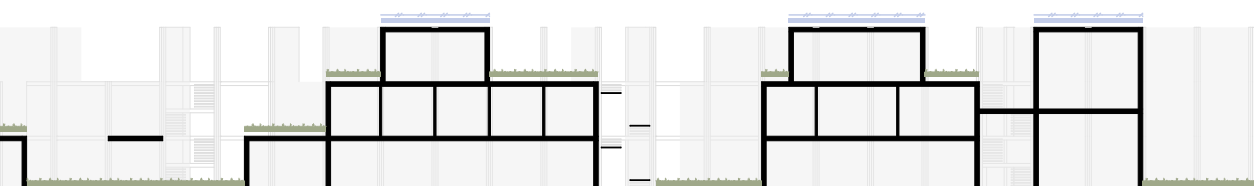
| Ill. 185. Project overview



PV cells



greenery // green roofs



| Ill. 184. The Refugee Community Village section // 1:500



# 05 | Epilogue

# Reflection

## Project-specific reflection

### Complex and weighty topic

This thesis project touches on a profound and a complex matter of the hardships and struggles of its primary user group – displaced people. As mentioned in this report, the approach to the 'issue' of migration proves to cause polarization within many societies, and Denmark is no exception here. The approach assumed by the authors is an empathetic one, with a strong conviction that any human is born with a set of universal inherent human rights. If one's rights are endangered, a moral obligation of others with more privilege is to aid in restoration of their safety and well-being. Therefore, it was the authors' first and crucial assumption that these foreigners arriving in a new country seek, and deserve, not only a basic shelter and temporary asylum, but a safe place that they can feel a sense of belonging to and that would aid in regaining their agency. Rather than dwell on the cause of migration, this thesis identifies the problems that its main user group faces and how some of these issues can be addressed through architectural means.

### Research was vital & extensive / prolonged process / highly complex theme

The research phase is an important initial part of any comprehensive project, but an argument can be made, that it was of even higher significance in this case. Being aware of the increased vulnerability of the refugees and asylum seekers and the challenges they face after migrating to a new country, the conducted research was prolonged and continued throughout almost the whole process, with a focus on matters of social sustainability and inclusion. The process proved to be long and extensive and as a result, the first design iterations came later than initially expected. Additionally, the authors set out to explore themes more related to the Danish context, such as Nordic traditions, additive architecture and tectonics. Considerations were made to create a concept of system, that could be reapplied in other locations and contexts, and therefore the modular construction was chosen. In light of all this, the complexity of the project increased rapidly, as the initial idea was implemented and expanded with new considerations. Therefore, while any comprehensive architectural project is a large network of interconnected elements and aspects, this project introduced an extra layer of implemented topics. An attempt to harness and depict this complexity has been made by introducing the project map, which is meant to help guide the reader through the report.

### Short timeframe: some aspects left conceptual

Over the course of the four months designated to develop this project, it became clear that it will not be possible nor feasible to equally and meaningfully include all of the many initial aspects, or at least not within that timeframe. A conscious choice was made to accept, that many parts of the project will only be touched on a surface-level, with conceptual considerations rather than specific, concrete solutions. The team acknowledges that a significantly longer time would be needed to have a full, ready-to-build and bulletproof solutions.

### New typology? Or just a regular approach to an often omitted user group

The development that has been designed could be regarded in two ways. In terms of the user group combination (refugees and local population) and the functional programme, it can be considered a new typology, as even in the search of case studies, it was evident that the architecture aimed at refugees largely consists of temporary camps of different, and sometimes questionable, quality and durability or simple, often modular, affordable housing estates. Here an attempt is made to create a 'village' within a city, which is not surrounded by fences, there is no containment or involuntary control involved, but rather a safe starting point in a form of compact but quality housing, supplemented with a variety of multipurpose semi-public and public indoor and outdoor spaces. Therefore, housing units offer safety, privacy and more dignified experience, while the supplementary services create a possibility to reach out, interact and connect with others. On the other hand, it could be argued that the settlement is among many of the mixed-use developments with a dominant residential function and complimentary services. The difference is that there do not seem to be many of those developments where refugees or immigrants are the assumed inhabitants. The unwritten 'rule' is that a refugee needs a basic shelter, and provided with they should be grateful and possibly not overly demanding or problematic.

### What architecture can't do: Social tectonics and gentrification

Ideally, the meaningful interaction would occur both among the residing refugees (through the set of semi-public spaces located in the top floor and many outdoor connection units) as well as between the inhabitants and the local population, that would be drawn to a variety of public services such as co-working areas, cafe or multipurpose workshops and event spaces. However, there are less desired possible outcomes that can happen out of the



architects' control. In some cases, the differences between the two user groups prove to prevent the interactions and two results can follow. Firstly, if the local, more wealthy population takes a large interest in the new development, their big influx might result in the newcomers resorting to their own, secluded spaces, and limit their interactions to other inhabitants. In a longer time period this can result in gentrification, where the poor and marginalised are slowly repressed, the rental prices go up and the original inhabitants move away from the area. The second, less radical outcome, is that the groups do not interact as much as intended, and that the settlement is mainly utilised by its inhabitants and immediate neighbours. This case scenario is acceptable to the authors of the project. While idealistically it would be great if the user groups can integrate, which is a two-way process of mutual adaptation, the main user group on its own is enough to sustain the need for the creation of this typology. The authors of the report choose to not condition the validation of the refugee user group depending on how well they might be able to integrate with the receiving society in their new and unknown circumstances. That being said, to the best of the authors abilities, the offered design is aimed at two user groups in hope of adding the general value to the area.

Another thing that architecture cannot change are the systemic problems the asylum seekers and refugees face in Denmark. The policymakers are responsible for adjusting and developing laws and procedures, but the architects can put humans in the centre of the design and aim to provide the best living conditions possible in pre-set conditions. In contrary to other refugee accommodations in Denmark, the settlement is located in a big city with easy access to public transport. In light of the fact that asylum applicants cannot be employed for at least the first 6 months of their stay in the country, the large problem for many is the lack of activities, boredom and seclusion. For the single newcomers without friends or family solitude and isolation are core issues. Additionally, in many cases, the mental health and general well-being of the individuals is poor when they arrive due to traumatic past experiences. These problems are further solidified by feeling of temporariness and uncertainty. This is why the programme of the project is extensive and aims to offer a variety of complimentary functions to occupy the time of the inhabitants and give them a possibility to meet and connect with people. The project's user group is evenly divided between families and single people. The latter are often left in a disadvantageous situation, as the current facilities for individuals are less developed and the general conditions are poorer than in those for families.

## **Danish context / site specifications**

In an attempt to learn about the existing conditions and attitudes towards refugees and foreigners in Denmark, a critical research of the current policies and practices had to be made. It is important to note that Denmark is not an only European country with fairly harsh immigration policies and the research is not meant to be confrontational, but informative and objective. Still, a conscious choice has been made to establish the project in Denmark, as all three of the authors currently study and reside here and have their own migrant experiences that give an extra layer of curiosity about the theme in general. The authors see themselves as privileged to be able to live and get education abroad, away from their countries of origin and in respect to Denmark, its traditions, values and inhabitants, they see the potential and need to extend that courtesy to underprivileged vulnerable group that are refugees.

The chosen site, right next to infamous once-called-a-ghetto Gellerupparken, can be seen as controversial but the authors stand by their choice, as they see a lot of social and architectural potential in the area itself. The stigmatisation of areas based on the racial and nationality profile of its residents seems to further develop the problem rather than paving the way to fixing it. Gellerupparken is still considered sketchy and dangerous even years after having been put on the 'ghetto' list despite the many major changes and additions in the area. Moreover, its inhabitants seem to be strongly attached to the area. It is important to mark that the proposed typology should not be considered social housing, as it is a residential settlement where an individual can reside for the first 1,5-2 years of their stay in Denmark, during which they can get accustomed to their new reality and lead a stable and comfortable existence in respectable conditions with access to infrastructure and the like. The choice of site was not accidental, but since the main goal was to design a reusable building system, fitting into the context was not among the strongest drivers in this project.

## **Flexibility vs complexity of the project**

One of the main challenges in this project was finding a balance between flexibility of the offered system and solutions in relation to the increasing complexity of the project. Flexibility in an architectural modular system can be understood and developed in a number of different ways as has been described in the previous chapters. In the search of a replicable building formula the authors encountered some contradictions. On one hand, flexibility of the system can be represented by a wide variety of offered units and functions. Placing them within an arbitrary grid sometimes helped solve problems but other times created new ones. There is a struggle to find

perfect balance between complicated variety and simplistic repetition. It was an important aesthetical consideration to strive for a more organic, free-form shape that was still comprised of geometrical, uniform modules which would be relatively easy to prefabricate and build. The result is a compromise, where some complications in terms of plan solutions, building envelope and daylight conditions challenges are the price paid for a more varied and interesting architectural expression of the settlement. In the limited time devoted to this project, the authors' goal was to solve main issues in principle, but many aspects of the project would need further, more detailed development.

### **Implementation of technical aspects**

Due to a largely conceptual level to which the project has been developed, the authors are aware that many more thorough environmental and technical aspects should be implemented in the project and that would be one of the main prerogatives if the time schedule would be extended. The prolonged theoretical research phase can be seen as a reason for this occurrence because it delayed significantly the entire design process in relation to the original assumption. It is worth mentioning that a concept that this project presents has been largely theoretical but has also been applied to real conditions and circumstances on the chosen plot. The solution that can be seen in floor plans should not be considered as the only possible and perhaps not even the best one that could be offered within the constraints of the same system on the same plot. It is merely a proposal, showcasing the possibility and a variety of connections and arrangements of units into buildings and clusters.

### **Relevance of the topic / immigration on the rise**

After conducting this four-month-long process, preceded by additional extra time for the topic and site choosing before a thesis proposal submission, the authors can see the relevance of the chosen theme and typology even more than at the beginning of this endeavour. The topic of refugees and immigration as a main focus of the thesis has been decided on back in December 2021 and since then, the number of refugee accommodation centres in Denmark has doubled. The reason for this is most likely the Russian attack on Ukraine resulting in an influx of Ukrainian refugees in Denmark, which in many ways helped guide the general public's eyes to the issue of refugees. In a bitter conclusion, it has been finally highlighted that not all displaced people can expect the same amount of compassion and help. Similarly, the original motivation of this thesis, which was an outrageous treatment of migrants on Polish-

Belarusian border, is still relevant, albeit already long forgotten by most mainstream media. People are still illegally repressed and pushed back-and-forth between the two countries and their asylum requests in Poland are ignored and not processed by authorities. The authors of this project do not differentiate between potential refugees based on their country of origin, ethnicity, etc. The proposed typology is therefore aimed at displaced people seeking stability and safety regardless of their individual circumstances. This thesis serves a purpose of highlighting an important topic and self-informing about one of the most pressing issues in current times. Immigration can be expected to increase in upcoming years due to the climate crisis and the authors believe that more humane and durable solutions should be developed and implemented.

## **Interpersonal/team-work and process related reflection**

### **Remote work / working part time / progress physically together**

All three group members have chosen to and agreed with each other to extend their 3<sup>rd</sup> semester internships into part-time student jobs at their companies. For this reason, the majority of group work involved in creating this thesis was conducted remotely, as only one group member resided in Aalborg over the course of the semester, while other two lived in Copenhagen. This decision resulted in more limited time to conduct the design process and that is reflected in the level of advancement in this project. However, it has proven to be worth to be able to combine both professional obligations with the thesis project, as a lot of practical skills gained at the workplaces were used throughout the project. Additionally, even though juggling these responsibilities proved to be demanding and stressful at times, going to work 2-3 days a week has proven to improve the general mood and team's morale, as it was a welcome opportunity to reset one's brain by getting involved in other projects and initiatives. That being said, having met up physically a few times over the course of the project has significantly boosted the design. The authors recognize and value the possibility to work in each other's physical presence as it was way easier to discuss ideas, compare sketches and proposed solutions and move more dynamically with the process. It would certainly be beneficial to meet physically together as well as with the supervisors more often, and that is what should have been done, had it not been for the distance, travel prices and work obligations.

**Setting a clear goal / mutual liking and respect / common understanding from the start about idea and direction / being able to choose the group / similar interest in the group**

In general, the group work and decision-making process were easy and unproblematic over the course of this semester. This can probably be tracked down to the group and idea formulation process. The group was formed due to general mutual liking and respect of the members but also the clear common interest expressed in the chosen topic. The vision for the project has been coherent and consistent from the very early stages to all the group members and everybody contributed equally and to the best of their abilities. The tasks were formulated together by the whole team and then distributed freely according to individual specific interests and wants. There was a collective understanding that everyone has to contribute meaningfully but also that there are specific periods or occasions when one team member cannot contribute as much as usual. These occasions were clearly communicated and accepted by the other teammates which resulted in comfortable and easy-going group work atmosphere. Thanks to the mutual trust, teammates would make some decisions on their own as they have invested the most time in investigating the given topic. That would later be communicated to and discussed with others to come to a common agreement.

**Difficulties in presenting a concept in a clear and consistent manner**

One of the biggest and still ongoing challenges in a project of this complexity of ideas and themes was presenting it in a clear and consistent manner. There is a multitude of ways to communicate ideas in a visual and engaging manner, but the limited time factor has to be taken into consideration. To some extent, because the understanding of the concept between the group members was luckily so clear and unified, it sometimes resulted in insufficiently communicating the nuances and specifics of the ideas to the 'outside world' or people not familiar with the project. It can occur also in this report, that there might be omissions which the authors have failed to notice due to having assumed that some things are almost 'obvious' to them. The team has put in a presentation prepared to the best of their abilities but limited in some aspects due to lack of time to revise or produce extra content. Documenting the entire design process is also challenging due to very practical matters. Despite best efforts such as choosing fonts, colour palettes and layouts very early on, it is not possible to create perfectly consistent-looking graphics that would later

add extra coherence and aesthetical value to the report as a whole. Alternatively, it would be possible to produce very consistent materials if they were graphically prepared and joined into a whole at the very end when the process is complete. However, that proves hard to achieve for a number of reasons. It is difficult to motivate yourself to go back to previous materials to 'touch them up' for presentation after having spent long months on the project already. There is also the eternal struggle of finding a right moment to finish the design process, which naturally never comes on its own. In light of that, it is always too tempting to continue developing, solving, adding and reconsidering rather than stopping and focusing on a presentational aspect of the design. That is unfortunately where some things can get lost in translation if they are not communicated clearly due to lack of time or an oversight.



# Conclusion

The project explores how architecture can contribute to integration. It describes a building system for refugee housing that focuses on interactions and creating a sense of belonging. Through the exploration of modular systems, the building structure is intended to be flexible and transformable over time as well as being implementable in different settings.

The starting point for the project is a clarification on terminology, which leads into a description of the methodologies used and the underlying motivation for this project.

The initial analyses concern the process of asylum seeking, the associated challenges and the attitude towards refugees. The various concepts surrounding these topics and their influence on the project are further elaborated on in the analysis part of the report. An essential part of this study is an interview, which is often referenced in the course of the project and is decisive for many conclusions. The most important impacts of this interview are explained by means of a persona at the beginning of the project.

The site for this project was chosen in advance based on an analysis of the current distribution of asylum centres in Denmark and the criteria of being close to a city in order to provide more integration opportunities for the residents. The immediate proximity of the site to Gellerupparken and the resulting influences on the project are further discussed in the analysis chapter.

The initial development of a masterplan for the plot was not pursued further and is therefore only included in the appendix.

Topics such as healing architecture or additive architecture, tectonics and materials as well as reference projects and their approaches are discussed and analysed in more detail. These analyses are repeatedly interrupted by an explanation of the design processes carried out for the respective topics. The end of the analysis chapter is marked by the project delimitation, in which the scope of the project proposal is graphically defined.

The concept is based on the aim of creating connections. The word connections can thereby be interpreted in various ways. Referring to connections between people, between cultures and backgrounds, as well as connections in a more technical sense, between modules and structures.

An essential part of the design is flexibility and adaptability. Therefore, in the presentation part, a lot of emphasis is put on describing those approaches in more detail. Another focus of the presentation is to illustrate the created atmosphere. *The Refugee Community Village* is meant to be a place of interaction and consequently connection spaces are an important part of the project and the architectural expression.

In order to keep the building on a human scale, the strictly geometric grid was transformed into an organic entity through the placement of the modules, naturally creating gradient spaces and thus enabling the development of different interactions.

When developing the living units, an important aspect was to make them functional and at the same time welcoming. They should cover more than just the basic needs and provide the residents with a feeling of security.

The project aimed to develop a building system that can be used in different contexts and scales. It should enable refugees to develop a sense of belonging and thus contribute to their well-being and integration. Moreover, through interaction with locals, a place for exchange and education should be created. In this way, it corresponds to a new typology in which refugees and locals are brought together.



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# Illustrations

Illustrations with no indicated external source are self made by the authors of the current report.

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## Appendix

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## 06 | Appendices

## Appendix 1. Interview with a Refugee\*

### \*Transcript of a spoken language

Haya Termanini is an Architectural Technologist with working experience from multiple Danish offices such as CEBRA or Schmidt Hammer Lassen Architects. Beside her profession she is an activist, story teller, feminist and, most importantly for a current report, a refugee, coming from Aleppo, Syria. She is advocating for refugees and women rights, being vocal and attending various events, meetings and political panels on the Danish national arena.

*Prior to the actual interview there were some personal exchanges, which seamlessly transitioned into the interview. therefore, the recording started at a later point during the meeting.*

PAT: started recording. Great.

HAY: So yes, there's different rules apply to the people who live there, just because the fact that they live in Gellerup. And it doesn't matter what's your background, it doesn't matter if you just move too Gellerup or not, it's just if you live in this circle, like radius, then you have these. Like, you cannot get an apartment there if you're not employed, you cannot get an apartment - like there is a certain number of ethnicities that should be there like percentages, and so on. And yeah, what else? There is something special about Gellerup. There is some failures though because for example, you can apply to get the apartment where you employed, but when you lose your job or you go to a a-kassa after you get the apartment, it's fine. So, that's for example, some of my friends got in there like that, but the apartments in Gellerup, the old one, especially are one of the best ones because they're very spacious. They're the very big they have two bathrooms. They have like integrated balconies within the building like a terraces. And so on, they were one of the best. The area was it still planned to be very futuristic this like because I was very self-sufficient city. The people who live in Gellerup, they don't need to go to the city center but it was never finished in back. I think it was in the 70s. I'm not sure about the numbers right now, but it was designed, but it was never finished because the economical crisis happened. So they never finished the design. It was only about couple of the buildings that got finished. And then when there, if the first refugees came in the 90's, they important workforce is from Turkey to build it. So there was like this special visa for Turkish people to come and build this area because they did it work force and then they were placing the workers and the Gellerup. And that's why the first kind of immigrants refugees who started there. And then another, in the mid 90s, something happened, like another war, in the Middle East happened and then

refugees came, and they also put them there because they didn't know where to place them in the city. So they were like, we will place them there. And the best place was all on dept, so the Kommune took it and placed the people, but it was very successful because they had like a language school and if you can look at the, you know, there's a library, you can go and look at the archives and there is pictures of like the events that we're happening there. Like Gellerup was never a ghetto.

PAT: Yeah, it doesn't look like they're even right now.

KAT: It doesn't feel like a ghetto either when we walked there.

KAS: We've been talking also that the spaces between the building are actually pretty nice in terms of settlement like that.

HAY: Yeah.

KAS: You know, it's greenery and there is some thought into where the parking is a little lower than there's like something, yeah, there's a lot of things which don't seem all too bad about it, also the quality of the buildings. Do, you know actually if the one, because I always wonder if they qualify an area as ghetto you have to arbitrarily like this demolished some building, right? Like, just the percentage of them.

HAY: No, you don't need to demolish the buildings. You just need to take people out of the building. So, it's not about the building, it's about who lives in the building.

PAT: Yes. But they also decided to demolish some of them.

HAY: They decided to demolish some of them. and I asked actually the company why they decided to demolish those and not the others, and there is a lot of miss-information about it, because some of the buildings got demolished because, for example, they wanted to open a road. There is one road that they needed to kind of to connect it to the main

road. So they demolished couple of the buildings there. And then the other ones, they demolished it because they don't know.

KAS: I'm just asking because for example, but it seems like that maybe then the information is running like is like a very popular because we were designing in Høje Tastrup with my company and there's like an area and it's called Gadehavegård and it's also kind of - Arkitema won the master plan and the master plan did have to do, whatever he told from my co-workers, to have to account for some buildings being demolished, like it percentage of the settlement has to be in and in fact if you look at it you can see some billings are kind of like just half of it is left. Some is repurposed. Some is just all together scraped and we kind of went there and it's not, for sure it's not about the quality of them because they all could be the same and they kind of actually don't look too bad.

HAY: No, no. It's like modern yes. Modern architecture like my mother doesn't like LeCorbusier and so on. That's like how they got inspired from. But the thing is it's really hard to judge because it was never finished and everyone seems to forget this idea about Gellerup. It was never a finished master plan. So some people say you know, it is the worst thing that happened to Aarhus and there was a huge discussion and debates about it in the newspapers. But you cannot say that it's the biggest mistake that happened because it was never finished, you know, how can you just something that isn't? But it is true because it wasn't finished a lot of people there because of those concrete blocks the way that if you look at the bird view they are like into blocks blocks blocks, and then as people were walking there and I asked some of them they would avoid walking in some streets because it's not litten enough. So there was not a big sense of safety in some of the streets, like small roads. There's also a bit hard to - yes, I think there was a road coming up here or in the middle. Those dirt ones are getting destroyed. Yes, I remember. Yeah, and there was also something about opening up the plan and that's the new kind of architecture we have like, when you look now at the architects, how they're designing also on a master plan. They wanted as much open as possible and with these blocks, it's not possible.

KAT: Yeah, I think the green ones are the ones they're planning like new. So you can really see how they're like, trying to have these like, it turns, instead of like one barrier, right?

HAY: Yeah. But for example, for me, I was like, so why didn't you destroy this block instead of this

block? What? Like, how was the decision made except for the openness? Like I understand there was the two or three of them that is really clearly they need to go. And then, when I asked, they were like, people, people who were in the who lived there said that they like for example, an important person lives in this building. Know someone important. So they didn't want their building to be destroyed. But I don't know how like how actually that is, but that's something I heard when I was doing the interviews. So for example, so like people because people who lived in here, most of them have been living there for like 20 years. And like so and the apartment is there so big. So it's - and they pay almost nothing for it even like if you go to see the apartment prices, everything around Gellerup, not in Gellerup right now. If you go to the Google maps, there's some row houses just next to Gellerup and those are the cheapest houses you can find almost. My friend, just bought one for three millions and it's like 110 square meters, double floors. It's usually only thing about it is that it's next Gellerup.

KAT: But actually also the connection to the city is really good and everything.

PAT: Yeah, yeah.

KAT: There's no problem at all.

HAY: No, no. The people don't like to, there's a bad reputation about Gellerup because they say that there is mostly not-Dane's that lives there. So not a lot of people like that. And they are scared because they, there's this story about Gellerup that when people moved in they throw out some things that were left in the apartment's like TVs that are not working or something like that and there's this huge story that people who just moved in from the Middle East, took those devices, just throw them out of the window. That's from the red house when I interviewed the people like they were from Afghanistan or something like that and they, they suppose that they didn't know what is those and then people started to buy like chickens and raise them in the buildings. So I mean you'd say cute, other people say uncivilised, so they were kind of shocked but I also don't know if the story is right, or not, because I wasn't living there I just heard it again from the people I was talking to - and yeah, what else Gellerup, Gellerup?

PAT: What do you think is missing in this place? Is there something that they still need? Because they have the integration centre, but it's like you say that it's for the people that live there, right? So they are not really, it's not like the Danes can go and also



learn something there?

HAY: I actually don't know if Danes go and learn something from there like from that. If they actually, I do know, it's for all the people that lives in Gellerup, not just the people who are refugees.

PAT: Okay.

HAY: So, but I am not sure if Danes kind of take advantage of that or like do they really need it or go there. I do know that even when you, like the people that live in Gellerup, they are very happy for it.

PAT: But they live there?

HAY: Yes, the ones that live there. They are happy for it because there is a lot of articles in the newspaper. But the ones that lived there, when Gellerup was a ghetto, the ones who just moved there some of them they don't know what's going on. So they already have this pre-images and assumption about what is the place and so on. So they don't like it. I mean get over past problems but that I think in my opinion, for example, when Gerllerup was when that year, I don't know, the Kommune or the architectural office had workshops with the people, most of the people come from the Middle East. And in order to have a new master plan, they wanted to be able to vote to accept the master plan. So there was voting and then they were asking people what they want in the Gellerup and then they were like all the people were like, we want a mosque, we want this, we want that, and they promised them, you will get that. But of course, this never happened. And then they never told them about demolishing, like, I know, my friend, Anna, actually Anna, and her friends they are still living in that building, that are gonna be demolished, and they're going on demonstrations and so on to not get them. So maybe you should interview them. She's from a political career, I can just put you in contact. She's Danish, but she speaks very good English and she's very in like, she's an activist, so she's an open person.

KAS: We have seen some of those posters, some people have them under...

HAY: Yeah, Yeah. So she's like she and her friend is one of those people who are defending the - Yeah, so she might know way more so I do know that the demolishing wasn't part of the master plan. It came on the second master plan so it wasn't part of the proposal when the people approved it. That's one thing. And I don't think that's a nice thing to do. Yeah. It's like where is the integrity. And when I called the architectural office to ask them about some decisions, they weren't cooperative.

PAT: But then you think that the demolition is not connected at all to the fact that they want to diminish, the percentage of the residents or like the housing there.

HAY: Ah no.

PAT: Because they were, there was a talk that they want to switch the function that they will rent it out to private people, like, so change the people that own it, right? Or that they will include some other functions to change the percentage of how much is the actual housing and then

HAY: To move the percentage, they kicked people out the delivered them, like the notification they need to move and that was even in the building that are not gonna be demolished. So it's not, they wanted to, of course, it's easier to kick people out from the ones that are demolished because it's be like, we're gonna demolish, you're building, so you have to leave. So, and they gave them an option: You either go live in this place which is a bit there here, those green ones (*pointing at map*) and some of them another place or you have, we are gonna demolish and you have to leave. So we offer you something, you take it and they every person gets one offer.

PAT: Mhm, take it or leave it.

HAY: And it's not necessarily a good offer or a bad offer. It's a luck thing, but the notifications that got to people, they were random some say, it's random or most of the people, it wasn't like, kind of people who had like, a criminal record or something like that. No, no, no it wasn't something. It was just very random some of them lived in, like, of course, everyone who lives in those buildings (*pointing at map*) were gonna leave but also some of them live in the other ones. Because some of them are already renovated. So they moved people out when they were renovating.

PAT: Yeah. Okay. So the ones that they demolished is to open up the spaces and change them masterplan?

HAY: Yeah, some of them are but the others are - I don't know why. Again, there's three of them is in the middle of the road so those got demolished and that was that's completely like clear. You can look at the

PAT: Understandable, yeah.

HAY: You can see it from the two plans. But some like for example, why number 44 not number 43, I mean I'm not an architect, right? When I look at it,

I would not know. I'm not like a landscape architect, you know? So when I wanted to find the answers to that, I called the company but they were like, yeah, we don't have time for that. Like okay, thank you. Can I put that in my report? She said, yes, I put it in the report.

PAT: Can we find that report somewhere?

HAY: Yeah, yeah, it's on the, I can send it to you.

PAT: Okay.

HAY: And I can send you as well, the interviews and I have a lot, a lot of resources about social sustainability and because the idea of my study in here was how did the new master plan affect the society? Did it actually solve the ghetto problem or did it not? And I did that report, like two years ago, two years and something ago and then I went to this event actually some two months ago and then they were studying something about materials and their effect on the humans as architecture but not just the interior architecture but exterior materials that people you that architects, that people use when they're building and how does it affect and there was a conclusion that for example it could be that you know, what wasn't so welcoming because you can look at all those concrete walls and it's so like, you know, it's so harsh. It's so it's very high, it's very high like the buildings, there's not so much roads, and not so much light in between. And it doesn't make sense when I think about it that, the plan, maybe if it was finished, it would have fulfilled its purpose. Because there is some small things, like there's already a library in Gellerup and there is, I think it's here, is it? I don't know, if this is the library or it's, there (*pointing at map*) There's a library and there is a swimming pool and there's other climbing wall and everything in the garden. Yeah, it's like a small city. And like the whole approach of Gellerup was to make it this small city. That is everyone wants to live in. So people are gonna, people were like, the half of the building were like sold after two years of announcing that they're building something, which was the only place with a skylight with a pool that has a skylight that you can see the sky and people were going there swimming. They like when you read it about in the university, even the city architect that was responsible when the master plan was released he was like, everyone speaks shit about Gellerup but no one gave Gellerup the chance to be finished. So that's a very important point, I think. And for me, I was some of my friends working out. That's why I wanted to know where what's happening. But I think, I don't know what Gellerup needs, I think, because they put it in the website and they have everything. Schmidt Hammer Lassen is designing the library and

the swimming pool like this whole cultural hub there and they are kind of and just delayed by it because there's not enough funding and the Kommune trying to get funding, there's always problems funding and get all that's not nothing new. What else they have? They don't have I they have schools, kindergarten, but maybe a tour guide, someone telling a historical, a museum of Gellerup.

PAT: Yeah, because it sounds like, you know, if you have pre assumptions, then it's and you've never been there. Like, we expected something way worse, reading all of the judgmental like comments about the place and then you go there and it's actually like, it's great. You know, it's not that bad. It would be any other like important wouldn't be anything special, right? And it's having this, this legend the myth of like this area. It's on the list for so long. Such a big problem.

HAY: It is a hard ghetto.

PAT: Yeah, exactly. Hard ghetto, the vocabulary chances right now, right? Around the ghetto. So and then we also found this like survey that the Danes were responding. 74% of the responders said that the integration with the refugees is like, way way, way worse than it actually is in reality. So it's really shows that.

HAY: But that's the thing that takes the statistics that like, for example, the thing with there is this stats Denmark or something, that's releases statistics every year. And for example, with refugees who came in the 90s and so on first Denmark didn't have the resources to integrate them. And the thing is with refugees that came in 2015, for example, they always compare those refugees to refugees who came in the 90s and they assume that they're gonna not integrate the same thing. But first, we're in a different world, it's a different era. There is more resources to integrate refugees right now and of course, no refugee is gonna integrate. If you're gonna put them outside, the city where there's no, in a facility where people didn't want to live. So like you put you received people who know nothing about your culture and instead of welcoming them and putting them in the society, you throw them somewhere far and then you are. Yes I know that if that someone wanted to integrate blah, blah, blah they can move and so on but people back at that point. Even if you look at the psychology of the people at back at that like in the 90s, it's different there wasn't internet that has like there was no Facebook. So that's why. And then would you look at the statistics? They are like, okay, now actually we see that the integration is very good. When women are much more in work than before, and we're surprised,

it's because of the rules that we are made because we have so much hard rules. That's why people have to integrate and it's not that people want to integrate. If you're just you don't expect them to come first. Well, first year, they're here. They're waiting in the camps to get their residence permits, it took me, nine months and I'm considered a fast one. Some people stay for three years. So one year, they are waiting to get a resident permit. And then on the second year, well, they get, for example, in my case, someone welcomed me. And I was like, I want to study and do this and that, and she's like, no, you cannot do that. You have to learn Danish first. Well, actually, there is programs in English that I could, I could be in, and I did that because I knew someone who was doing it, but I do know a lot of refugees who came, they don't know about the system. So for example, they post their life, where they do another high school in Danish, they learned Danish. And then so, there is this three years where they are really preparing themselves. Well, all of them came, most of them came with high school degree but because they weren't told that you, you have this option of going to studying in English. For example, they had already

KAS: The three years are after you are granted some kind of permit, right?

HAY: Yes.

KAS: Yes. First you go through the process where they decide if you're even allowed to stay.

HAY: Yes for one year and then you take three years at least to study like some kind of gymnasium and because you have to, the first year, after you get your resident permit, you have to prepare for getting into gymnasium because they will not let you into the gymnasium until you have a certain level in Danish and math. So you have to have like a free course and then some people can finish gymnasium in two or three years. It's called US or VUC. So, that's like one and two and three. So, one year four waiting one year, for preparing two or three years for studying, that's five. And the statistics have showed that most of the people are now in the job market after five years now, wow, they actually finished preparing to be in the job market. Wow, shocking. And now they're actually working. Can you believe it?

KAS: So what are you actually allowed to do during the first, you just said it took you nine months and that's some people,

HAY: Nothing,

KAS: Nothing, you're not even allowed to

HAY: It's the most depressing part of my life that I have, when I have never been thin in my life, but in when I was living in that camp, I think it might like I dropped in weight for 52 and I was not sleeping. I was, it's very you're in a limbo, you're just, you're not allowed to work, you're not allowed to do anything. I mean, in my case, I was translating for people in the I was going to the main camp to translate for people who lived there. And that was something I would do. But you, if you if you don't want to do that then you don't do anything.

PAT: So it was partially to occupy yourself and not go crazy.

HAY: Yeah.

PAT: Just be productive and useful in any way.

HAY: Yeah, there is like they teach, how is it? There is a Danish class every week once. But then the Danish class is always always, always the letters because there's always new people coming to the camp.

PAT: So it's very like beginning and beginning and repetition of a beginning. Yeah, okay. That's impossible to progress with that.

HAY: Yeah, so you wait and you wait and you wait and then you know, what's the worst is that After you get your resident permit. So you go through two interviews asking you, why do you think you need? Why do you want to take asylum in here? Let us know why we should let you stay in here and then they will be like, okay, we will let you know and then they let you know that you'll have been accepted as an asylum seeker and then you would expect that you, okay? Then I'll pack my stuff and go. No. No, we have to wait three months from the decision.

KAS: Still in the accommodation centre, somewhere in the

HAY: Yeah. After you get even the letter that you got accepted as a refugee in Denmark you have to wait three months to move. So, there is the six months or, like, for example, from me, it's nine months, it could have been six months, It was nine months because I had to wait those and I mailed like wrote to the them, like, so why can't I leave? Like, I don't need anything. No, this is the system. You have to wait.

KAS: So were you then assigned to specific Kommune where you were supposed to



HAY: Well, you ask for a Kommune but they only put you at that Kommune if there is an actual reason for you to be there. So most of the people would ask for Copenhagen but no international could get Copenhagen because no one wants because Copenhagen has like problem with housing and they would prefer they wouldn't prefer to put refugee there. For example, I knew Obada and I know about Obadas brother and at that point Obada and Obadas brother were studying in Horsens. So we I said, in the second interview that Obadas brother is my boyfriend, so they put me with him in Horsens.

PAT: Smart.

HAY: Yeah. But for example, that my friend have asked to be in Copenhagen because her sister is in Copenhagen, they put her in north of Denmark.

KAS: And then you have to be there three years of the integration program.

HAY: You have you not three years. You don't have the right as refugee to change your municipality until three years except for three main reasons which is studying, working or marriage. Also hospital actually. Sometimes. But after three years, you can go.

PAT: But, I mean, it's crazy to think that she had a sister in Copenhagen but, and that would help her to like feel belonging and integrate.

HAY: And her sister was living in Denmark for 20 years.

PAT: Yeah. So it's even separating when you already have some support system. It's not just aiding it at all.

HAY: And they're like that the person who was interviewing her told her well in Denmark. This is not like something important. Like you shouldn't be living with your family. What are the middle east? Well yes I am.

PAT: Yeah. Like the young Danes don't really move that far themselves.

HAY: No, no. but that's Danes you know. It's fine.

KAS: Oh my god. Okay?

HAY: Like you don't need your family. If you are like you should be self-sufficient.

PAT: And prove it to us,

HAY: Yes. Put you in the north of whatever and

integrate and if you don't integrate, we blame you.

PAT: And are there any like tools to integrate that are given to you by the..?

HAY: For me, my experience was super bad because of the minute I came in, it was also the woman was very racist. The one who was working in a job center to welcome people herself and was a refugee from Bosnia, and was adopted. And but she was well known in the whole municipality that she's the most racist person and she got fired in the end. But when I first came, she was like she we were all like four who were placed in Horsens and she welcomed us and like the way she was talking to us was very much undermining extremely and when we walked, I walked, which we went to the bank. We opened bank accounts and blah blah, blah. And then we, she was like this is your temporary apartment and you have to move out from here in six months. If you find a place, if you don't find a place, you also have to move out and we will try to find your place. But if we can't in six months and we you also have one option and one option only, if you don't take it, then you have to also to move out. And I'm like, yes, I didn't need to know that right now. And then she's like, okay, let's take, you are not allowed to smoke in the apartment. I was like, I don't smoke and then she's like, yes, but you're not allowed to smoke in the apartment. I'm like, okay. And then she walks to next to the microwave and the stove and she's like this is a stove and I'm like yes I see. I know that, she's like, you know how to use it. And I'm like well it depends which stove it is right, there's that touch one, and there is the gas one and I think I am fully familiar with the both and then she's like, and this is a microwave, do you have microwaves in Syria? And I was like, oh well, we had three in my mom's apartment and two in my and mines brother apartment. So I think I do know how to use this one. Yes. She was very like, but there was also, this reputation more like something that people were thinking that refugees from the Middle East are living in tents, and they were surprised that we have phones.

PAT: And that's actually often like even put against you like, why do you need help if you have if you're not poor. So there's this image of like, very poor refugee that is living in a tent or like not any knowing

HAY: We are not poor, we are not poor and that's why they wanted to take our belongings. That was a rule, like,

KAS: Yeah, jewelry.

KAT: But it's the same with phones. Like, when you, when people see refugees with phones, they're like they have everything they have a phone, right? Like yeah, That they actually needed to stay in touch with their family.

HAY: Yes, we had a life. Yeah, no. We had a life. It's not like we came because we wanted. The thing is we our life was going on like any other person. Like how I'm living today, I was going to a restaurant and I was going to a school and I had my life plan to study this and that and I had my friends and then suddenly a war happened and I had to leave. So, of course, I took my stuff that I could bring with me. And I went on the way to seek refuge somewhere.

PAT: Yeah, exactly.

HAY: So I like, that's it. I am not a person who is poor and not - refugees are just like normal humans, who their life got disturbed or stopped by conditions that are out of control, which is war.

PAT: Exactly.

HAY: So they have to like, what well what should I do, I have to tear my what's close apart and come and ask like I'm not homeless, I am homeless, I am homeless right now. Oh actually, I do have my home, I just cannot go to it.

PAT: Yeah, exactly. And I often just see people being like, hey, they have clothes that are not looking that bad. So why do they even ask for help? Like they have money, they have phones, they have clothes. So I mean, you know, there's the secret idea

HAY: Yeah, because a phone and clothes can make me a country and can make a university I can study in and can find me at like I can make my own job from my clothes and from my phone, maybe I should start trading.

KAS: One of them newest revelations in Poland right now is that there's a girl on TikTok from Ukraine who has been actually making those all things considered pretty funny videos from like being in a shelter back there and now in Poland and she, I think she recorded the video which was her taking out different clothes she got in those packages from helping packages from people and it's been already told for a people just use it, the occasions to grow out their old shit. And there are, I mean for sure they have to want everything, even some kind of torn 20 year, old dress after grandma, something like that. And but she from what I've been told, I haven't watched it but she's just kind of does it everything in the same manner but people

get so offended. I've heard that she might make a funny comment that she got this funny blouse, this funny something like a granny sweater. It's like so offended that if she doesn't want it then,

PAT: So ungreatful

HAY: Yeah, because, you know, she's a refugee, she should not have any taste you should take. Like if you leave her this amount of chai latte she should be like, Oh my god, this is chai latte, I have never ever tasted chai latte.

KAS: Super thankful. Yeah,

HAY: But it's like this, like it's very it's not just about refugees, it's about everything it's about women. When women gets like, for example, a higher salary or something, they should feel super thankful because people are like, you know, I think it was also in the company I used to work with they were like we decided to treat our internationals the same as Danes.

PAT: Oh, Thank you.

HAY: And I'm like, what? You know, we are not like we usually we're not supposed to give everyone the same salary, except if they are from the European union. And are you, because they were, are you from European union? I was just like no and then he was like, yeah, you know, we are at Zebra have this policy that we treat all of the people are the same, even if they're not from the European union. And I'm like, well, two things in here. One, I am part of the union. As in the construction union, second one I'm a refugee in Denmark. So technically, I should have the same rights as they.

KAS: But what a think to pat yourself on the back for.

HAY: But that's the thing. That's the whole thing about solidarity, right? Or about like being, people think if they are standing with someone, even with Ukrainians right now. Like for example, people are coming right here, right now and everyone is be like Ikea is posting. Oh look. We are helping people. We're giving them free beds and free bikes and blah, blah blah and, Yes, great that you're doing that. Well I hope you help the rest of the people then.

PAT: Yeah, yeah.

HAY: I hope you keep this nice initiative that you are doing great initiative, amazing. There is so many people to help and I hope to see Ikea helping the other people as well.



PAT: Yeah, exactly. Because we already even before because I feel like it's like I could see more and more in the media of like the double standards of the refugees, not equal to the other refugee, but it crossed our mind already before as well. Like our spike for the topic was such a massive racism, and, like, complete refusal of, like, helping people that are starving in the forests between Poland and Belarus, right? Yeah. And then there. Yeah. And they are from the Middle East. So, there is like this, massive blockage in the heads of people, in this case, from Poland, of letting people, in their scared, there's like a lot of hate speech towards people that helped them and so on and then

KAS: But it's still happening, that's the worst

PAT: And it still happening even right now and then there is another situation with Ukraine that's happening and everyone is like these are our brothers. We have to help them and it's great that we do. It's so amazing to see that my country is for once United and having one opinion, finally, on something and helping and like organizing so much, even though it's mostly up to people not our government. But like still, but still great amazing. But then it's just like I cannot help but ask what's the difference, seriously? Like what why why is it so easy to see the blond Ukrainien

HAY: Because it's easy. If something is happening outside your window. It's different than what's happening 1,000 kilometer away and this is completely human nature. And it's hard to accept it. I myself cannot accept it, but that's the at least, you know what? People are capable of being empathetic in Poland. So, you know, it's there.

KAS: Yeah, but you would hope that there's some sort of reflection at this point because there's also the thing about numbers you would have right now, the border guard, their official Twitter account. They would like tweet, one tweet is, we have welcomed so far two million, something Ukrainians in Poland and it's like an actual number. And every day, they post like a probably an update, today, this many thousand, right? And then the second tweet will be, we have stopped 2500 attempts to cross Belarusian Poland, border from the beginning of January. So you kind of it's so crazy because it was compared now the numbers when it started with the border and everyone was like, there's gonna be a wave and come and whipe the Polish people, and European values out, whatever. Right? And now you can clearly, in theory, see the comparison that is actually it's a couple thousand of people who could be at least humanly treated in processed and if they're not allowed to stay in.

KAT: But they were the ones without European values., that's what they are most afraid of, because they can see that, like the Ukraine has European values whereas the Middle East is seen as not having that?

HAY: And that is just like the what's wrong with you? And that's my question like why? Why? The problem is that we that humans don't look at each other as humans. They look at where they come from people. From Ukraine, are looked at better because they are from Ukraine and not because they are from Ukraine, because they are from the European Union

KAS: And it's very nearby for polish people

PAT: Yeah, nearby Europe.

HAY: Yeah, and in Europe and this whole European Union is built on this idea. You have to stand up together. European Union is the greatest. We are great. If we are together, we have to help each other. But when you look it's it's what like what used to be done our whole life it's, you always have to have an enemy to put people together. And in that case, the enemy is Russia. The enemy is the Middle East, the Islamist, not the Middle East Islamist and that lives in the Middle East because the Middle East are all Muslims. And all Muslims are bad. And they are all Muslims like of course the majority is but however, so the idea is that there is this like they the people have been fed their whole life, since world war two Europe stands together we're stronger together and we want to fight against Russia and yesterday, there was this philosophers psychologist who's in Aalborg based in Aalborg, he's very known and himself, he never politically engaged in anything yesterday. Post, I am not gonna defend the special law, but because no, because all refugees are the same despite where they come from. But I think that the Danish people have more empathy with the Ukrainians because Ukrainians are fighting for freedom and democracy for whole Europe. Yeah, it's the whole Europe fight, it's not just his point is right, the but is not needed, but

KAS: Definitely, that's also the reason of people helping this much because it's also empathy.

HAY: They are helping this much not because of that, there is also this thing when everyone is showing off that I'm helping Ukrainian, it's like a trend when, like someone is wearing this blouse, everyone wants to wear this blouse. And when was it, we see, architectural office, engaging in political, and being we feel sadden for Ukraine.

PAT: Yeah. I can definitely see a lot of it is another way for marketing for them, for the good brands to like, hey, we are also in solidarity with the crisis donating

KAS: Yeah, one company was like, oh we're donating 50,000, like what is 50.000 for your guys, I mean, do you have to really send out an email to like everybody?

HAY: And mention how much you donated, why you mentioned you have donated? Like, why is it so important to prove you actually helped.

PAT: Yeah.

HAY: You can help. I'm not saying anything.

KAS: Yeah, No, we did actually get a mail like that and it was even said, so all of your hard work has contributed to our donation because we are earning the money for the company. And I think everybody was just like.

HAY: Yeah, yeah. Like, when was it that the prime minister of Denmark would come to a demonstration? There was a demonstration for Ukraine and all the parties the left and the right came and

KAS: Normally they're all against refugees.

HAY: Yeah. Yeah. Oh, they don't call them refugees. Even the language, they don't call Ukrainians refugees they call them Ukrainians.

PAT: Brothers.

HAY: brothers and sisters and friends.

Kas. the language in the media and that matters so much.

HAY: But honestly, like even with this special law that have been released recently, it's not good for Ukrainians. Because as much as Denmark saying that it's standing with Ukrainians. For example, this law have been said, you only wait four days in their reception camp and then you can go to work or to study or to do whatever you want, only four days, maximum, four days and then you go. But the resident permit that they're given is only two years, expires, 17th of March 2024. And then they're only allowed to extend one year at a time. If the grounds they are in here is still valid. The other thing is they cannot pursue uni, like higher education. They don't have the right to free education in Denmark because technically, Ukraine is not the European Union. And

in their resident permits it's like if you want to study as a bachelor or master you have to pay from your own, so they are here but they need to know that they need to go back. It's very clear that's Denmark policy

PAT: They are movable, we also talked about it. That's like that the problem with also integration and belonging and settling in and trying to find your place is the idea that yeah, okay, even if you're getting helped here temporarily you still have to figure out something else. Next, is this feeling of being the me in a suitcase and you know, that we'll have to leave. So it's also much harder to actually establishing your life in here.

HAY: It's everyone forgets. That actually refugees would go back. If they, if their country is getting better, they will go back except those who get born in here from the second generation and the third generation. It's harder for them to go back to something, they don't know. But the people who are already here, let's say it's only a one year or two years conflict. Everyone will go back. Let's for example, in the Afghanistan situation even people went back at some point and for Iraq, people went back at some point and then when the war happened again, they came back and this was just like a cycle. But this putting this idea in the heads, we would never gonna be belonging here. You should never think that you are gonna stay in here or think that Denmark is your country. You have been born in there. That's why you should go back there. And like all this, all this talk about. Well, you have to and fight for you country and build your country. It's just like, okay, why do I need to fight a fight that is not mine. A fight that I didn't even start. Why should I die while other people get to live?

KAS: No, this is an awful thing to say as if any of us in the European countries like our generation have ever had to fight for for being the country.

HAY: Like if you think about how much Danes are privileged, it's not like they fight.

KAS: Yeah, no, they

KAT: I think no one can understand what it's like, you have to have so many reasons to actually leave your home country like what is how bad has to be the situation that you're willing to give up everything you ever had

HAY: Exactly.

KAT: And take that journey like that's not a walk in the park and be like, oh now I'm in a new country.

So it's like,

HAY: But the thing you see here, for example, in the media, not just here in Denmark everywhere. They portrayed refugees as they came for the welfare system and to take the money from the government and to stay on the social health. And I'm like, no, like look at all the refugees like 30,000 Syrians 100 something from Libanon, Palestine, some from Somalia all of them are integrating the ones who are not integrating, are the one who actually have problems. So you need to actually look for why they're not integrating, PTSD, all those kind of things. Free psychological help was never an option for refugees in Denmark, and until now it's not an option for refugees in Denmark, except Ukrainians.

PAT: So would just say, there are any integration help that is being given or like, would you name some certain things that have to be changed? If they're not there yet in the Denmark? Like what could be given to aid integration?

HAY: I think there should be like, for example, if there was this opportunity of the single people who came like for example, me or other single people who came without their families to be assigned to a family that's that's actually a program that UK every person who comes alone is assigned to a family that is from, that is British. So they support him and they kind of the equals him. It's like a mom and dad, That option is not valid in Denmark, there is nothing like that. And this is a great a great way of showing, you know, okay, you have lost your family. We have this family for you. It's gonna teach you the tradition of this country. And it's a way that people Denmark can, really make sure that people are learning about the culture

KAS: And that the people, the locals who have been here because if you lock everybody up in a facility somewhere, then how can they integrate

PAT: For like three years or something

KAS: With the local population. You only want integrate with the people. maybe, if anyone at all, then the people you're locked up with.

HAY: Exactly. And like it's very like it doesn't need to be. There is some programs in this FGU and something like that they have this school and something like that where people can be assigned to a company, but that's if they already have a degree. For a while and then the company should hire them after. But then the company started to take advantage of that or some of them at least. So they would just keep hiring the praktik, like, for people

and then not hiring them in the end. And when you are on working, like seven hours and earning 10,000 a month, it's nothing. Like, you can manage it for six months, seven months. But then after that, you want to, you want to feel appreciated. And it's not controlled. There is other places where they're actually like that's very successful like companies like Sweco and how is called, there's a bigger construction company and engineer. Rambøll, Novo Nordisk. Those have used that program and they already have a lot of refugees and there's always something in the local newspapers about them it's just yeah, I would say in Denmark it's it's a luck thing. It's not organized at all the way refugees are treated. For example, in my case, I had to find my own thing in my friend case, she was kind of, they had a nice neighbours, her and her family, and the neighbours kind of told them what they can do and stuff like that and helped them a lot. I was alone and that's why in a small city so I didn't have someone to usefully do something. So I was unlucky and that sense.

KAT: But that's then even harder. Since you said that was like the worst nine months of your life and then actually getting the strength again to like pull yourself together.

HAY: Yeah, yeah. And that's why I moved out of Denmark. It's like, you know, when I was in the UK, I was thinking about settling out in the UK

PAT: For when you went for exchange you mean?

HAY: Yeah, because there is this option because UK is not part of the Dublin agreement so you can break the fingerprints. If you go there and apply as a refugee. But when I got accepted from Schmidt Hammer Lassen in Aarhus, I was just like it's a good company that, when I moved to Aarhus my life started to get better because I there was lots of NGOs and so on and those people kind of help you and so on

KAT: So it's all on NGO basis? Like it's all voluntary work

HAY: Exactly, it's all voluntary work and it's all work that is not even, it's not Kommune-based, it's not society-based. It's I was sitting in the, in the dome and then an event happened and that event was organized by MS. And then it was about because we were in Ramadan and they organized like an evening in Ramadan, it's a very Islamic thing. So, I was curious about who are those people that are doing that and I talked to them and I was just like, they were just come volunteer with us for like a month or something and then since then I like I



started my activism life. I started to like, give, give people more like these discussions, about awareness about how is it to be a refugee and stuff like that. Like having a platform basically and having actual society that was helping But not in Horsens, not, not from, not even from my teachers, like in the university,

PAT: Yeah, I remember Carsten being really shocked that people can bombard buildings in Aleppo. These are so cultural buildings, how can you do that? And then I remember Obada standing there, like, completely shocked and he was like, there are people dying there. Buildings are not the biggest problem in the whole situation. You know? And it's a teacher saying that, so it also like shows how unaware or how ignorant, a lot of people, us and Danes are.

HAY: Yeah, even like you know our teachers in VIA, None of them would say like, you know, come to us or be like, do you need help? Like, they know we come out of Syria, They are watching the news. And the basic thing to do is be like, so how is the situation? Do you need help? Do you have a family here? No. I've never got asked these question and that's the basic question.

PAT: Yeah

HAY: But again, it's understandable. And I go to this conversation with all my Danish friends, even for example, would this guy, I just met today, we talked a bit about being from Syria and he's like, so the fight in Syria, is it for democracy? Or is it against? Is it because of this Islamist? And I was just like, what Islamist? You know, Islamists have the ISIS thinking out in 2013, 2014 revolution, started in 2010. And you know, there was those ISIS, most of them is coming from Europe. Like they are fighters who went volunteering to fight in Syria, but they come from their origins. They just believe in the Islamic State. So like again he's like, yeah some of them are.

KAT: I mean, even I know people who became wife's of like

HAY: Yeah, Yeah. And they went to Syria and so on. So it's what it is and let's face it. Like not all people, not all Middle Eastern are bad, all good, but not all Danes are good or bad. They're just people. Doesn't matter where they come from, just it's a choice.

KAS: But yeah, this is like, if you have a shooter like Breivik in Norway, right? It's like one guy

HAY: Oh, he's sick. He's sick.

KAS: Yeah, he's like now in a nice, pretty prison, something and - I mean, I think the Norwegian prisons are pretty cozy, right?

PAT: Yeah,

KAS: So, yeah, but if it's a person either of Middle Eastern descent, maybe not super white, even if they we might be, but they don't look super white, it's already the first thing. It's gonna be all terrorism, or Islam

PAT: Yeah, what are his intentions?

KAT: Yeah, or even people from like European countries that go there to fight there then seen as like, oh, they were like taught by propaganda. It's not because, like they are bad it's because. Like the Syrian people were bad because they put the propaganda into them.

HAY: Yeah. Yeah. And it was like, I don't like nine women from Denmark and their children stuck in the in camps, between Turkey and Syria and they, they are Danish they are Danish citizens. And the courts wanted to return, like to send them back home to Denmark. But Denmark didn't want to take them in because they were fighting for the Islamic State. But they are not, they are not. They cannot stay there in jail because their Danish and they asked to go back to Denmark. And it's very much fine to send people back home to Syria where there is a regime that's killing them, but it's not fine to take your own citizens that killed people in another country.

PAT: And what's your path because you were 18 when you left, because of the situation of course. And then you went through Turkey or how was your

HAY: Well I went with my family first to Lebanon and then because we're trying to find a university for me, and then again the latest situation in Lebanon is not very stable. So we decided to go somewhere else again in Arabic country, which was Egypt. And then we tried to find myself a university there, but I wasn't also very happy in Egypt and with some personal problem with my family. I found myself a way to go to Turkey. So I went to Turkey and started there, studied Turkish at the University for like six months or something. No, not even, like three months or something like that and some, and then I had a bad experience with a teacher, I was talking Obada on the phone and then he made a joke about. I should just come to Denmark and study English, and it was like where people were taking the boats and I was 21. And I didn't think too much. I didn't

think honestly, I just did it.

PAT: On a boat?

HAY: Yeah, on a boat from Turkey to Greece and then walked from like walking, buses and trains from Greece to Denmark. So like Greece, Macedonia, Serbia, Croatia, Hungary, Austria, Germany and Denmark.

PAT: Why Denmark?

HAY: Because Obada was studying in English and I was like, everyone told me to go to Sweden because then you take the residency in five years and that's a decision in five years. But my fixation was that I wanted to study in English, and someone was already doing it and I didn't the only thought process I had, maybe I should have thought more. But the only thought process I had was someone was doing it, I just do that. This university has programs in English. I didn't even check because I was fixated all the time to be a nerd, like I am a nerd person. So, I was always looking at the university name and the writing of it, and the programs and so on. And I was supposed to start, when I was in Syria, I was gonna be studying in medical school. And I wasted three years on my life because I used to study anything else but medical school. And when I came here, I like, I kind of, part of me didn't want to look at the university or what any other program or try to go to somewhere else because I knew if I do that, I would pursue medical school. I'll try to pursue it and I just need to let it go for now. So.

PAT: How did you know Obada? How did you meet?

HAY: We met in Turkey. He was studying with my cousin in school and then we were all going out together. Like so

KAS: So, were you at all aware, how the process was here?

HAY: No, no, Obada came in a family reunification. So he just flew from Turkey to Denmark.

PAT: Okay, yeah, easier.

HAY: I didn't know and I honestly, that's but that's my personality. I'm that person like, I just go for it. And at that point I was just like, okay boat. Called my uncle, he lives in Romania and he's he has some shady stuff, he knows shady people. I was like, do you know someone, a smuggler and he's like, yeah and then he

PAT: Oh, okay I'm on board.

HAY: And then he's like, can you meet the smuggler in Mersin at your mom's place? I'm like yes. And then I went to my mom's place and that's when I told her. Alright. Yeah, I called her, I'm coming. And then I, but my stuff was in the university dorm, I didn't take them with me from Turkey because I was like, okay I'll just go meet the smuggler and I just filled my backpack so I still had my clothes and my like stuff that I bought still in the dormitory and then I went and then I met him on Tuesday and he's like there is a boat going on Thursday or Friday, Friday, and then Friday evening. But you need to leave from here to Bodrum. Mersin is a city on the Mediterranean, but Bodrum is closer to like Greece, you can see Greece from there. Like okay, and then he's like, you need to leave in two days. So, like Tuesday, I would need to leave on Thursday or you can leave tomorrow and then we will just find your place to sleep. And then I was like, okay. And then my mom was like okay do you want to do it? I'm like, yes. And then she's like, okay. I mean, honestly, even like my family is very like, I'm coming from a very dysfunctional family so it's not the best but it's fine. And yeah. So she's like okay. And then she was like, just call your brother and say goodbye if something happens. I'm like, you can call him, I don't want to call him and then even when I talked to my brother, he's like, okay so my mom tells me that you want to go on the boat and I'm like, yes, no one asked me in my family why do I want to do that? Or try to change my mind or be like, do you really want to do that Haya? Aren't you scared Haya at 21 years old. But again, I'm happy they didn't but still not good not to do that. However, the day I go and I don't know, I'm like okay I need to put my phone if something happens, I know how to swim so that's fine.

KAS: By the way, which year was that?

HAY: In 2015.

KAS: So back when you can actually pretty quickly go into reception centre in Greece and go through it.

HAY: Yeah, yeah. It was like, well, it wasn't so bad, but it wasn't so quickly. But I was lucky in Greece because, I knew English and Arabic and Turkish. So I was translating for everyone there and then one family, figured out that I'm on my, because it's not typical for girls to be alone on this kind of trip. If you look at, If you look at the numbers, I have I know a lot of Syrians and I have worked in three refugee camps and I asked so many people if there is another single girl, who came without a family to



Denmark? There is none. Yeah, so it's not something typical and it's not something people are used to see. And at first, I didn't understand, I only realized that like two, one year or two years ago after living here. So when I was like, I was like, okay, I know how to swim blah, blah, blah, I'll just wrap my phone in some plastic or something. So, if I jump into like, you know water, I took my, a very weird collection of things because I only had, he said one backpack. That's it. Only like here backpack and that's it. So, I took my father's picture. I took like a teddy bear. I brought, when I was living in Syria I also, we didn't, we didn't know that we are gonna leave for, like 10 years. We thought it's like one or two years and we'll go back or after I finish university and then we go back and continue. So, we also packed very light. So, it was just like a skirt made of wool that I really like

PAT: Sounds so simple.

HAY: A teddy bear. What else? A jacket that I got from my friend in Syria and weird shit. Yeah, sentimental stuff. I didn't pack any. I mean, again, I didn't think too much. That was the key. And then when, on Wednesday, I decided to go at night. And then, what happened was that Turkey released this new law as people who don't have resident permits in Turkey cannot take airplanes. They need, because there is refugees in Turkey on resident permits. And since we don't need to be refugees in Turkey. If you have money, it's not necessary, but in Denmark it is necessary. So, my family and me, we weren't refugees so I could go in the airplane but everyone else who was coming with me on that airplane, who was supposed to be in the boat, couldn't land there, like couldn't board. So, I arrived at, like, around the Wednesday night or Thursday, Thursday night, and the guy looked at me and he was like, it's 11 at night, we are gonna drive from the airport to the, where the bus, the buses go. And then from the buses, he's gonna like drive me to the point with other people. And then he realized it then, because there is two smugglers. So, the first one he's like, you are alone and I was just like, yes, it's like, where is your family? I was like, well, my brother is in Dubai. My mom lives in Mersin, and he's like, that's not the question. Why are you alone? And I was just like, he's like, oh my god, don't tell anyone you're alone. And I'm like, okay, what do we have? And then he drove me to another person and then kind of took him to the side and was just like whispering a bit and then he was. But they all feel so responsible and then he was like, okay, your boat is not gonna go on Friday. You either have to wait until Sunday or you need to go now. I was like, he's like, do you have a life vest? And then he's like, okay, I'll send you a live vest and then he looked me like this, I promise you, I'll send you the life vest. And he's like, okay, what's

your name again? I'm like Haya and then he's like, okay, Haya, don't tell anyone you're alone. Okay, big problem, and you are gonna, I'm gonna, we're gonna go to this car right now and you're gonna, you're gonna be with five like one, two, three, four, four men. And he's like, I know one of them, and he's nice. So we will say that he's your uncle okay. Sure my uncle. Sure. And then he takes the guy to the side and be like so we have the situation. This girl is alone and we, yeah, have to make sure that no one knows that. And they're like, okay? And then we drive to the point and it was very funny, it's a very funny story. I find it, still I find it very funny, because everyone was surprised when I was alone. Everyone is surprised still when I say, they're like you came to Denmark alone? So you're not with your family? Even Danes.

KAS: I really like that the smuggler were so surprised.

HAY: They are not the bad people. They were, he didn't send me the life vest as well.

PAT: Wow, he kept his word.

HAY: He did, send me the life vest. He's like someone came around like, at night, because we were waiting until the boat comes or like the boat they, it's a rubber boat. So, they will, we would wait in an old building next to the beach and then they would tell us when the boat is there. So, we run to the boat and we board. There's no one checking you're boarding pass.

PAT: Scan the QR

HAY: So, someone just came with the life vest. They're like, someone sent you this. What is this? Because it's dark,

PAT: But then it's all for money, right? So

HAY: It's 900 dollars. It's like what, 6000 DKK

PAT: And have you seen your family since then?

HAY: I go to visit every two years or something once.

PAT: But where are they now? Like your brother and your mom?

HAY: My mother or my brother now is in Egypt, actually. But my mom is still in Turkey.

PAT: Okay.

HAY: It's fine, I'm not attached to my family. I mean, obviously.

KAT: Yeah I mean after that Goodbye I feel like that's just

HAY: Yeah.

PAT: And then you arrived to Denmark and then what happens?

HAY: And then when you arrive in Denmark you have to give your fingerprints and give your fingerprints and then you wait in a centre for two days or depends, maximum three days. And then they sent you to another refugee camp. And then that is temporary for like also a week or something. And then they send you to another one, a more permanent one until you get your interviews. You in Sandholm they show you like a video about, Now, you have arrived to Denmark. Now you have to do this, Denmark is a country with this, and this and that blah, blah, blah. It's very, it's very like movies, you know. They sit you in a big room that is painted white with chairs that are not very comfortable and a screen that is not even big and has a video that is very simple and very boring. And then they give you a paper you need to fill about like your name, write your story in the language, you prefer, but they assume that you want Arabic. I wrote it in English though.

PAT: Good.

HAY: So yeah, And then, after you were sent to the permanent camp you wait for some time until you get the first post, which is like an invitation for a face to face interview with a person who's gonna assess your case. Then you go to Copenhagen, so they move you from your camp to Copenhagen again, Sandholm, that's where all the interviews are. My camp was in northern Denmark, so it takes lots of time, but it's paid by them but, you're not allowed to sleep there. You just have to do the interview and then you go back. You have to sign every week that you are there. Because if you don't sign every week, you're not allowed, or in some camps you're allowed to cook and other camps there is food, depends, you are allowed. There's allowance of 250 DKK a week. You take it in cash. You only take it when you're signing the paper every week. And but, it's like, practical things, you need to be in the camp at 10. You can't leave after that. You have to clean after yourself. You know, we were 60, again, if you were a single person, it's not the best even in Denmark, because that's where the cultural difference comes. So, for example, in Denmark, they have single person. It doesn't matter if it's a woman or man,

but then there is not a lot of single girls come. It ends up that there is mostly men in a hostel in the middle of nowhere. And it's like four people in a room that has 40 rooms. So, we have four times 40. That's 160 people and four, five women. How nice is that? And those men haven't seen women for a long while, and they're not allowed to go out.

KAS: They are not allowed to go?

HAY: They are allowed to go out, but they're not allowed to sleep out and some of them has like heat wave, get horny, and some of them get, like smoke weed, take drugs, everything. So that's why I was like, what I said, it's the worst to be in a camp.

KAT: That's where you stayed for nine months?

HAY: Yes, mostly. But then I was speaking with the, because one day someone tried to break into our like, into my room. Because even the three girls, yes, there is girls in there in the camp, but those girls have families. So, they would go to their families, and only come back when the signature time is. So I spoke with the camp responsible and I was just like, and that's when I was staying at Obadas mothers place sometimes, because again, they're not my family. And I like, I didn't know Obadas mother at that point and they, we have this thing in the middle east. If a girl is living alone or alone, other people have assumption that she's not a good girl. And of course, Obadas mother, first image of me was just her assumptions but then after getting to know me. She realized I'm a good person. I just have, I just come from a very dysfunctional family and I'm very naïve. So, it was, yeah. So, I was going to her place sleeping there sometimes, but always coming, for me they made it, I could, after, in the last three months, they said I could, because I was getting really bad in that camp so I fainted like a couple of times for no reason.

PAT: The weight loss and the problems, or? For what reason were you, but I mean like the

HAY: I think it was stress. I don't, I've never fainted like in my life or something it was just when I was in the camp, it was super like, but I could notice it only after that I was either depressed or stressed or something I wasn't alright, So, it was the last faint because I would faint usually, but then I would wake up very fast. But the last, like, when I lost my consciousness, like last one, they had to wait like 14 minutes until I'm awake, and then they moved me to the hospital. And then my numbers would show quickly, normal blood pressure, everything and like, are you eating? Are you like, yes. And then the camp responsible, he's like maybe you should go for two

weeks this time and then just come every two weeks. We don't think that you should stay here, and that was the last three months.

PAT: How did you protect yourself for all these months?

HAY: Well, I put a chair in front of the door.

PAT: Okay. So you're can hear them?

HAY: Yeah. People, it's not it's not, I wouldn't go to the bathroom at night, that's it. You don't drink water. You don't go to the bathroom and it's shared bathrooms. I mean they did divide, because it's like a big hostel. It's called Danhostels. So, part of the hostel is for women and part of it is for men but since men are more than women, then the woman parts is having like four rooms and then they're sharing the toilets and the showers and since there is not a lot of women, then they are very clean. So, when those are very dirty, the men come and the kitchen is shared between all of those people. So, you have to see people downstairs and there's no food in that. So, you have to cook.

KAS: So, you have to use the kitchen.

HAY: There's no fridges or nothing in the room so you can just buy ready food. And again, how can you buy ready food if you don't have money?

KAS: You get allowance for 250? And then, but you have to go out of the centre to make shopping?

HAY: And the shopping is like, that centre, that is a hostel. So, it's only popular in summer and people go to those hostels because they want to be far from the city. So, it's in the middle of nowhere and there is a bus, comes every, every one hour and a half, in the weekdays, every two hours in the weekend and the last bus from the city is at five or six.

PAT: Yeah. Okay,

HAY: It's not good. No, I cannot say any good thing about it Once we had like an international. Yes. So once we woke up and there was this street signs saying Syria this way, Iraq, this way Afghanistan this way. It was the way of the lovely people to show us how welcoming they are because they didn't know, they were still thinking that we're missing home, so they wanted to tell us that it's very close by, we should go. And it was in the newspaper. So, the organizers organized this international dinner and they invited people to live in the area to come and try our culture's food. Well, some people came but they weren't very yeah. But that was the only event

that happened. I actually don't have my, I don't have so much clean memories about lots of things in my life and being in there is one of them. I remember, just some things, but I don't like those nine months, I can just pick up three or four memories that. Yeah, because, yeah, it's a way that the body sometimes uses like a denial. So, that's, yeah, I don't remember so many things.

PAT: But if there's, you know, that amount of men that you are scared of because of course your situation and then they are also supporting the stereotype of a refugee that is to be afraid of for the Danes because of how, in the situation they are in, it just like spinning vicious cycle that, if they are not being helped, then they are becoming more and more

HAY: Those refugees, they have been there, they've been in Denmark for years without citizen, without resident permit.

PAT: Yeah,

HAY: And when they hear you're from Syria, they want to talk to you and they want to actually be with you. So their case is like, you know if we are together then maybe their case can go through faster. Some people pretend that they're from Syria. So, their case was going faster as well. It's a whole, like it's corrupted, it's sad, there's a lot of wrong things from both sides, it's not just the government, that is wrong because there is bad refugees. I was with those bad refugees and I, when I see them, I know them When I was coming on this boat, we were like four or five Syrians and the others were from Africa and other people like, you know, like from other places in Middle East or somewhere. And then the boat. There's one thing about the rubber boat. They don't fill it with gas or good oil because if they fill it the guards on the Greece, Greak side might send you back and when, that's why they don't fill it. So, they think it might be enough, so you arrive there but no one in the boat knows how to drive a boat. Yes, that's also another thing. Why would they put someone in the boat that knows how to drive the boat? That means that smuggler has to be with us on the boat but then he would be in jail in Greece so basically they would just ask someone, so do you know, Does someone know how to drive a boat? Everyone was silent on my boat and then the guy was like, okay, you move it right, it goes, left. You move it left it goes, right. See that light? Go to that light.

PAT: Good luck and you don't have fuel to like, sustain you for long.



HAY: They don't tell you that you figure it out just there. So the boat was, you know it's like here. What I can't show you on the map where, it's not like so far from each other. But, let me see

KAS: I think for us and for our limited experiences, because I have had this talk already with my previous boss Abed, he's from Syria and he's sort of, I mean he's, his English is very limited but we had sort of the conversation about his way to Denmark and it was exactly the same feeling as now, it's, you guys talk about it so casually and for us it's so hard to comprehend at all but it's not a.

HAY: So this is it from here to here. *Pointing at map* See, I mark the places I was in, it's this one Kos and Bodrum, so this island.

PAT: Okay, crazy.

HAY: So, let's say the boat stopped like, well, because we were in the city centre. Stopped about like, here or so. You know, it's not, it's like 20 minutes swim or 30 minutes swim. So it's not a lot but the boat was out of gas and we are all refugees, we are all from the Middle East or like, you know, we are on the same boat. Literally, yeah. And you would think naturally that people would help each other. But no, so some people were prepared for this, and they were the people from Syria. Two guys, when I was 21 so and they were like, older than me, they had like wetsuits under the clothes, took off the clothes and started to jump into the water and just swim. But the thing is because the tide, the tide was the other way. So when they jumped they are putting pressure on the boat, the boat is going back and it's vicious. It's scary. It's, people are screaming in the boat. People are getting stressed because they are feeling that the boat is going back. And when you see two people jumping then, other people start to jump and other people start to push the boat, and everyone was like just thinking about themselves, which I understand until a certain extent. But then, you know, if everyone jumped in the water and pushed that fucking boat, there's babies on the boat. That's what, that's what I did. I jumped, like I went into the water and I started to push the boat. Someone noticed and, or a woman noticed and she's like a woman is pushing the boat and you are just there. So, we, everyone was like, yes, good idea. Let's push the boat.

KAT: So you actually like, motivated others and then that's how you

HAY: I'm really good at motivation

KAT: But that's how you actually made it to

Greece.

HAY: Yeah, We pushed the boat together. But, you know, like think about it this way. Like Europeans looking at the middle easterns in bad way, Europeans, helping the Ukrainians and not helping the Syrians, It's natural. I mean, I have no expectations from humanity whatsoever After the boat and the boat is one thing. There is also the train. There's a boat and there is a train and there is a bus and there's like when we were in a bus, they told us that sometimes other cars comes from other places of they make like a ambush for the bus so they steal the people's money and we were gonna be ambushed, but we were lucky that there was like a red cross car coming behind us. So every other car just disappeared. In the train, there is this one train in Croatia that comes only once a day and it doesn't stop, the train, no, no, no. It just slows down for the people to jump and not, that's not the worst part. The worst part is that when you jump, you have to keep holding on because the other people that also want the train want to take you off the train. Why? Because they want their friends to be in the train. Why? Because we're all refugees, true, we're all on the same train, boat in the same fucking shit, but still

KAS: Every man for himself.

HAY: Everyone for themselves. I am like, you know. I was a very like, I don't know why. I don't know if I'm a very naive person or what I am, but I think after getting into that, this whole trip that I took, I've seen some things, I, sometimes I wish not to tell people about it because it's very dark. It's not good to know. And I wish not, because I lost believe in humanity. I believe that everyone is selfish. I know that everyone is selfish but some people choose solidarity. Sometimes. And some people still believe in, you know, love all those shit that I grew up with, which is beautiful but when shit hits the fan, everyone for themselves. So, yes I should not go to a kindergarten.

KAT: Don't use your motivational speech there.

PAT: And in the camp itself. Was the, could you close your door? To your room, could you close the door?

HAY: I could close the door but keys weren't allowed.

PAT: Keys weren't allowed? What do you mean?

HAY: No, keys were not allowed.

KAT: So you had to lock it with a chair?

HAY: Yeah.

PAT: Okay.

HAY: I asked for a key and they gave me a key in the end. But yeah.

PAT: So from the standpoint of the facility, like, you were working there as translator?

HAY: In the main camp, not in this, because I was in a small camp, right? I would go sometimes to the main camp where the families are and those camps are very nice. They're very well taken care of, there is activities for kids.

PAT: The main ones?

HAY: The main ones.

PAT: Okay.

KAT: But then the smaller camps are only for a single people?

HAY: So, they can fuck themselves, literally.

PAT: Yeah, so then in the one that you were saying in from the facility point of view. I assume first thing that comes my mind would be helpful for you to feel safer if you could lock the door from the start, right?

HAY: Because also, they want you to be safe because some people are very depressed, so they don't want people to lock themselves and do something bad to themselves.

PAT: Yeah, but then who is more dangerous. Other people or you yourself to yourself, right? You never know.

HAY: Yeah. Like you're not allowed to have knives in the, inside. You're not allowed to have sharp stuff.

PAT: Yeah, I was just wondering since you have architectural background, do you see something that would be very, very, very much needed from the architectural standpoint in such place.

HAY: Well definitely, it's like a room that is small designed for one person, don't put 4 people in it. I would say the area around was very untaking care of, because it was winter and so on. There wasn't storage in the space. There wasn't, like, I would say a bathroom in each room in just a small toilet rather than four bunk beds. What else? There was a sink though, but not a toilet. What else? I don't think

that hostel was supposed to be a refugee camp, in total. It's not designed to be refugee camp or at least if you want to be a refugee camp then people, Yes, all the people are the same and all people are equal and men and women are equal and shit blah, blah, blah, blah, blah. But when people are stuck in one place for 10 years, they lose their humanity.

KAT: Especially if they're not allowed to do anything.

HAY: Exactly. If there is activities, you know, like an activity room for people to draw, or to read or something like that

PAT: Yeah, occupy yourself with something, that feels more meaningful then just sitting and waiting for not knowing what

HAY: There was no garden to take care of.

KAS: Do you know anything more about those centres for families? Like how that was organized?

HAY: Yeah, yeah. Those are like very much taken care of from the Red Cross. So there's a red cross centre in each one of them and they have like, they have a lot of activities. I didn't know that, they have for example, a bazar every week. They have like activities every week, different activities, football and so on. I mean, the one has a very good reputation. But there is, for example, refugee camps centres like where, they were hospitals for people who are like psychologically sick, mental hospitals, and those ones are very bad to be in. I stayed in one of them for like a week and the minute you walk in into one of those, it's very like overwhelming. It's like it's was supposed to be a hospital for people who are mentally sick. So all the windows had like bars and so on, the smell and the feeling it's all white tiles and the light is very specific. It's very yeah, very, very uninviting. It's not like, it's not relaxing, it's very stressing and I think those camps need to be, **all the temporary ones need to be changed**. They need a lot of work, they're like hospitals, and not good ones. That ones that are prepared or designed as a refugee camp, they're good. There's the deportation camps which are the worst they, I've never been to one, I am gonna go to one trying to volunteer in one to see it, but those ones are just awful. Because they are meant to make people understand that they have to go. People are not allowed to cook. They take 70 DKK a week. The food in the canteen is rotten. In the Danish, like Denmark has been called twice or three times for, it's like a refugee camp, deportation camp, that is talked about in the global news of how bad it is.



PAT: Just to make you leave.

HAY: Exactly. It's called a deportation camp. If you don't get it from the name, then you get it from the space. So, people stay there for years and they, this is the worst because, you know, in my case, there's I know that I will get out at some point because I got accepted. But in their case, they always get rejected and they go back and get rejected again, again and again, and they have to stay in that deportation camp the whole time and don't know where they were taking their, the residency from Somalians or Syrians, or so on. And they wanted to deport them home. Then they would take their CPR number and then when you don't have a CPR number, you cannot rent an apartment. So they send you to the deportation camp until, like for three months or something and then people are shocked because they are losing their world again. Really, why do you want to do this topic?

KAT: Because our life is so great otherwise. So, we just need a topic to like, bring us down again.

HAY: Yeah, I see.

KAS: Yeah I mean we have now quite a lot of academic also materials where people and very proper academic words are saying exactly what you're saying, trashing Denmark left and right because the deterrence, the temporaryness the whole immigration policies that are aimed at discouraging people more or less directly. And then the integrated, super strict integration program for the chosen ones.

HAY: And so funny thing is, people are still integrating despite all of that and they still

KAS: Yeah but that's all, that's almost. I mean they're making it really impossible and then they're claiming like no, the fault is put on people who don't integrate, even though it's literally designed

HAY: Integration centre, or the integration process is meant for people not to integrate. That is, by far, is agreed upon from Danish people. There is a huge movement now in the Danish society from Danish people, they call them refugee hell Denmark. Telling people from Ukraine, not to seek asylum in Denmark.

KAS: Yeah, I've seen some of, like people telling that you should consider it wisely if you want to apply here instead of elsewhere in European Union.

HAY: Ukrainians can stay in Denmark for three months without applying for asylum. Part of, people

saying that part of why Denmark wants Ukrainians is because they need workforce and that's why they gave them work permits. They didn't give them the right to study. And that is not good. That is not good. That's it. It's not good. It's not human. A refugee is a refugee and refugees are humans if they want to study, they should study. If they want to work, they should work.

KAS: This country is so sketchy in so many ways.

HAY: But they are so smart, they are around all the rules, all the rules, all the small wholes

KAT: For the outside people, they're still like, really good country, right? Just if you are in the country and actually deal with those things you're like, but for the rest of the European Union, there will still be like

KAS: It's so cynical

HAY: I have tried to tell a Dane that their country is not as beautiful or like as innocent. No they're protecting us and we should, I talk to so many Danes and it's like of course we shouldn't let all the people in. Like yes of course, because you know all the people wanted to be in Denmark, everyone is so happy to be in Denmark and everyone was so happy that the war was in their country and everyone is so delighted that their life's got disrupted by Russia. They were waiting for their chance.

KAS: Just like this mythical threat. That some people come and destroy your danishness, whatever that is.

HAY: Danishness, I don't know.

KAS: I don't think Danes know either, probably like white, right? Blond.

HAY: Yeah, white, blond.

KAS: Yeah, I feel like that's where it's starting..

HAY: Maybe she's a spy from the Danish government.

KAT: So, should I get offended? Because you thought that I'm a Dane.

HAY: No actually, I mean, I'm not looking. The thing is, the government is bad. The people are good. The people need a lot of awareness, and then everything would be good. I believe, still in, I believe in awareness, not in humanity because I believe that humans are logical and emotional. But if you speak

to their logic part and be like and Danish or Danes are very much into statistics and you can be like, so this is the information you need to know. This is the research that I made. This is the numbers, your country is shit. What do you think?

PAT: Haya you're so ungrateful.

HAY: Oh I know, but the numbers say I am

KAS: But I love this thing. I have so many papers now I can just like send it to people and be like this is a legitimate package. And this is mostly actually researchers from your country. Like, university of Copenhagen or other university, so it's like, that data is proven by your own people. I mean hold them traitors, I don't know

HAY: But that's the thing. That's why there is like this. It's so funny a friend of mine we always like we agree on some stuff about the asylum and refugees and stuff like that but then we disagree on other stuff and he was like on a date or we were in a group of people but it was for him to meet another girl and then that other girl was from Venezuela. So she's not a refugee, but she's here by a work permit and she needs to apply for a new work permit every couple of years to, depends on her salary and stuff like that, and then she was explaining to him how hard it is. And then he was showing so much empathy with her and he's one of my best friends. So and then we walked in and he was telling her, yeah with this Ukrainian refugees as well, oh my god, how can we treat people so differently and la la la la. And I could hear what he's saying and of course I don't want to put him down in front of the girl but still he walked and I was just like, it's very nice to see you actually like you know getting back to senses and he's like, what do you mean? Just like, you know, seeing you speaking that passionately about refugees and he's like, yeah, you know my stand of that but you are, you like, we disagree on some things. And then he starts to explain that blah, blah, blah. I'm just like it's fine, it's fine. But if it's gonna take a girl to make you actually speak senses then, I will set you up with a lot of girls. So yes, it's either information or love. That's what you need to convince Danes. See, emotional or logical.

PAT: Yeah, it's funny.

HAY: Where are you staying tonight?

....

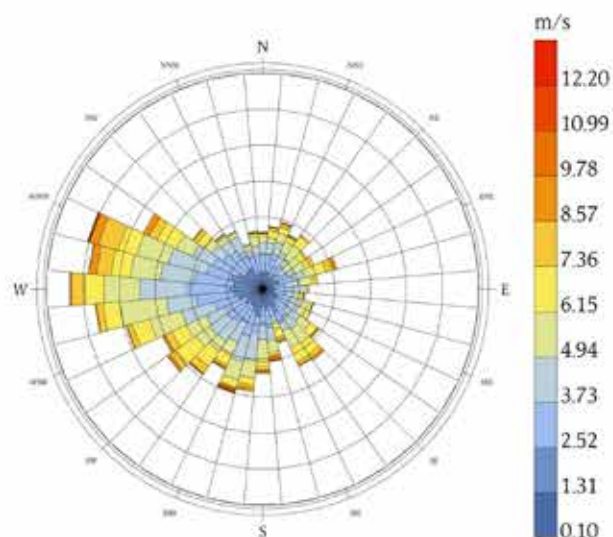


## Appendix 2. Microclimatic Considerations

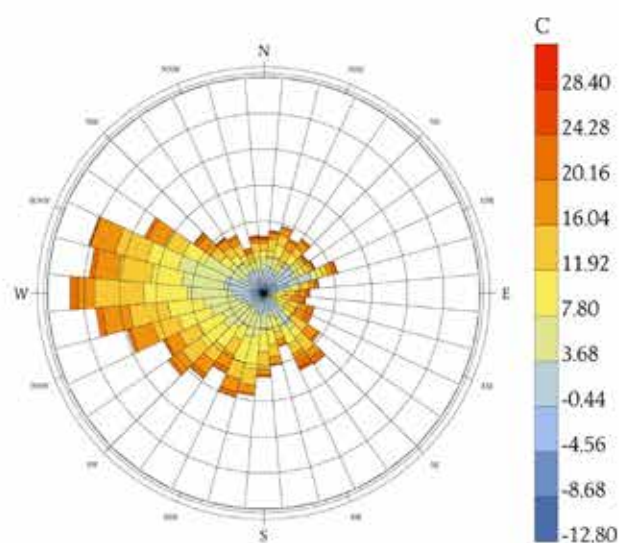
### Wind Conditions

The wind rose demonstrates that the strongest and usually coldest winds come from the west. The analysis was carried out for Aarhus V and covers a period of one year (01.01.2021 - 31.12.2021).

The site is slightly sloping and bordered on one side by the buildings of Gellerupparken, which can serve as wind breakers. However, the distances to the project site are a little too great to feel a noticeable difference.



| Ill. 1. Wind speed (m/s)



| Ill. 2. Wind Temperature (°C)

**City:** Aarhus V

**Country:** Denmark

**Location:** 56°09'39.0"N 10°08'32.4"E

**Weather file source:** Shiny Weather Data (Nearest Grid)

**Period:** 1.01.2021 to 31.12.2021

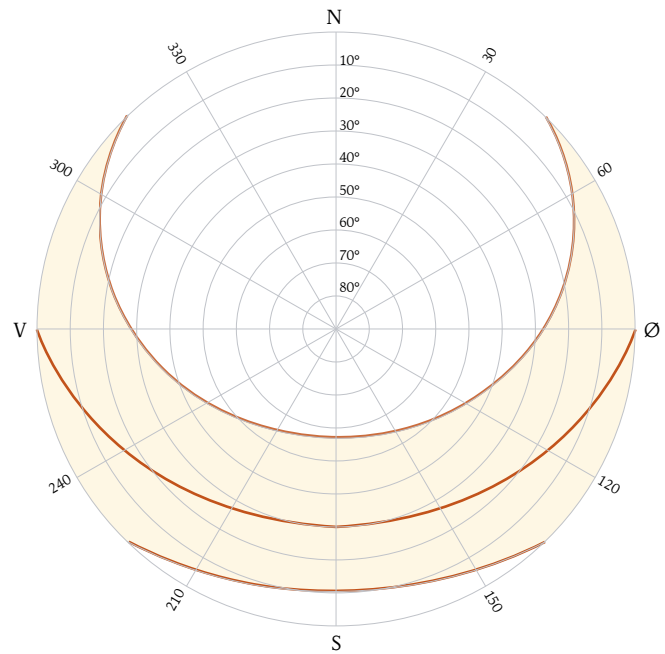
*Calm for 0.01% of the time = 1 hours.*

*Each closed polyline shows frequency of 1.1% = 100 hours.*

## Sun Conditions

Sufficient sun hours are important in terms of daylight and regarding solar radiation and energy production. Solar radiation can be the source of passive heat gains in winter but should be carefully implemented given the risk of overheating in summer. Moreover, it can be implemented as an active strategy by generating electricity or heat through photovoltaics or solar thermal collectors.

The sun analysis demonstrates that the sun path in summer rather long and the sun reaches its zenith at midday with an altitude angle close to 60 degrees. In winter the sun angle is at its minimum of 11 degree, which leads to long shadows casted by the buildings. However, the lower angle provides the possibility for the sunlight to reach far into the building and therefore allowing solar heat gains in the colder months.



| III. 3. Sun conditions

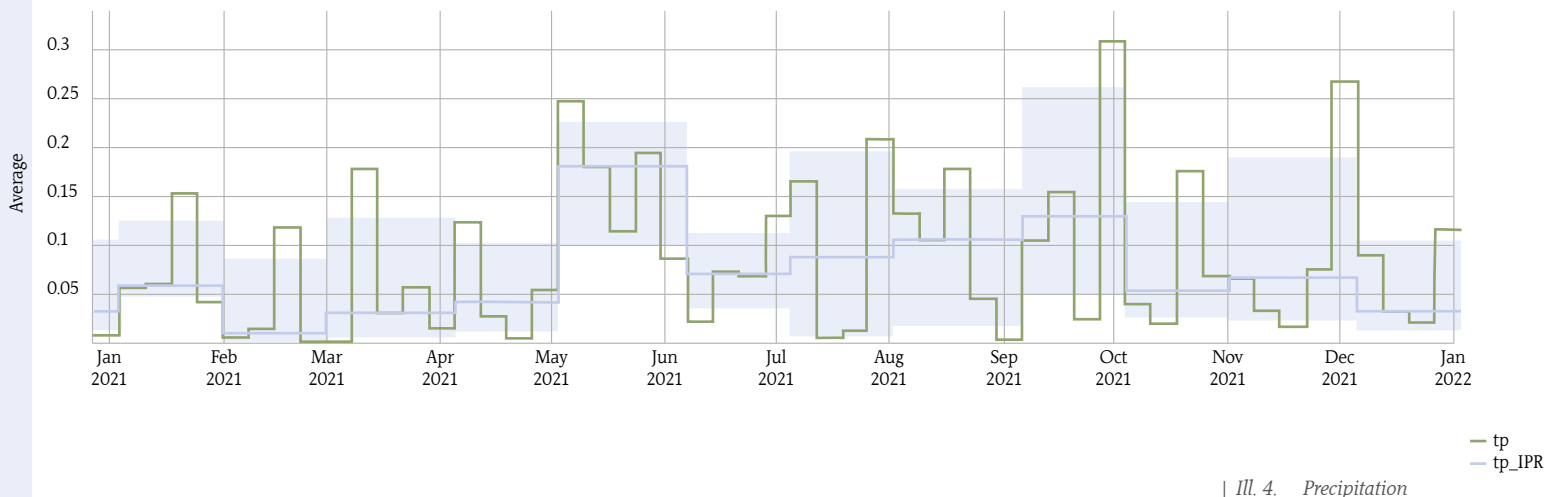


## Precipitation

The bluespot analyses reveals that minor runoff clots of rainwater occur throughout the site. Larger puddles occur mainly in the southern area of the building site, near the already existing buildings. No construction should occur in this area and if so, only with special consideration for these circumstances. Smaller accumulations of stormwater also occur to the northwest and northeast of the site.

The rainiest months are October and May. In December there is also a lot of precipitation, but only for a limited period of time, the average of this month is nevertheless lower than in May. From January to April there are tendencies of less rainfall.

This analysis showcases for the need of LAR systems, especially in the southern parts of the building plot. In the 2019 local plan for this area, consideration has already been given to these issues. In the southern part, the one most affected according to the bluespot analysis, a playground will be built which serves as a LAR system. ("Lokalplan nr. 1103," 2019)



| Ill. 4. Precipitation

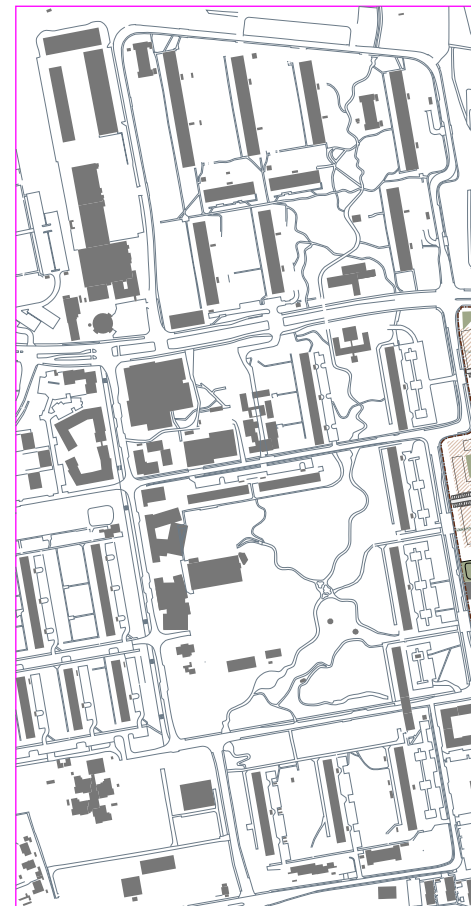


## Initial site considerations

These iterations illustrate initial considerations for a masterplan layout. The bluespot analysis as well as analyses of access points and noise were taken into account.

In the east of the plot there is a high traffic road, therefore taller office buildings were planned in this area, while residential units have been envisioned to the west. The proposals include space for green areas and the center of the site is to remain largely car-free.

After initial iterations, however, the local plan proposed by the municipality was used to narrow down the project's scope.







| III. 6. Initial site considerations // 1:10000

## Appendix 3. Daylight Studies

The comfort in a room depends on various factors. In terms of daylight, there is daylight, view, glare and illuminance. Illuminance and glare are parameters for express visual comfort.

The requirements for daylight according to EN 17037 are for a minimum level of recommendation for vertical daylight openings an ET: 300 lux for 50% fraction of the relevant area and ETM: 100 lux for 95% fraction of the relevant area. (CEN-CENELEC Management Centre, 2018)

An alternative value to evaluate the daylight conditions in a room is the daylight factor. This establishes a relationship between the illuminance in the room and outside and is given as a percentage. (Daylight Factors, no date)

A guideline value for the daylight factor is that it should be at least 2% to assure a medium illuminance ratio. (VELUX Group, no date)

The initial daylight studies were based on a dormitory typology room that only had access to daylight from one side.

In order to adapt the type of daylight studies to the concept of the project, analyses were then made for universal application to the individual rooms. The weakest starting position was analysed, in which rooms that are 1.5 grid lengths deep only have access to daylight on one side, orientated towards north.

Furthermore, a room with a depth of one grid was also simulated.

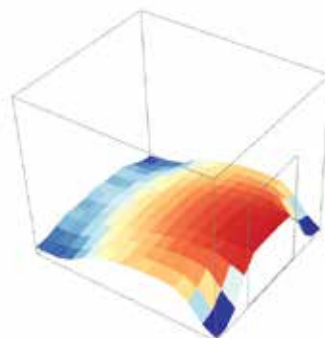
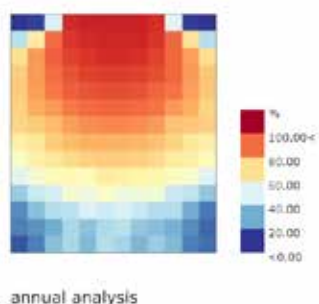
These analyses are displayed on the next pages.

The simulation shows how many percent of the time throughout an entire year, the individual calculated points receive over 300 lux of daylight.

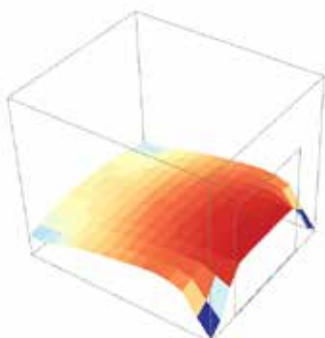
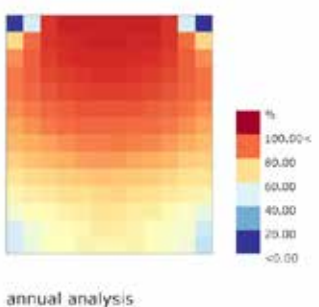
### 1 grid deep

window height is 2,1m // facing north

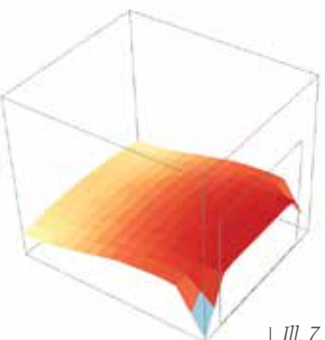
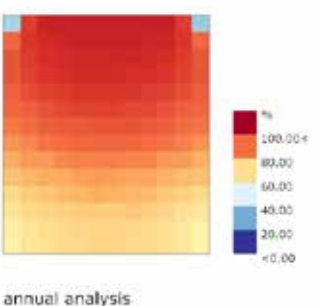
30% of facade area is glass



40% of facade area is glass



50% of facade area is glass

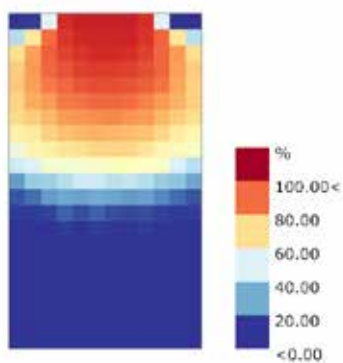


| Ill. 7. Daylight analysis // 1 grid deep

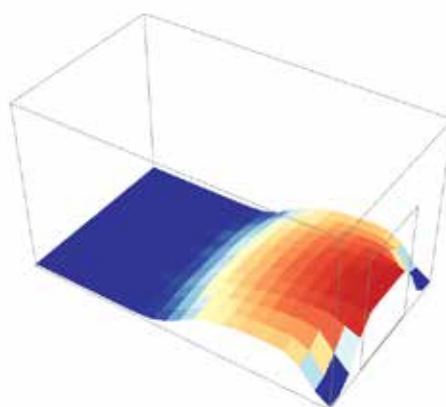


1,5 grid deep  
window height is 2,1m // facing north

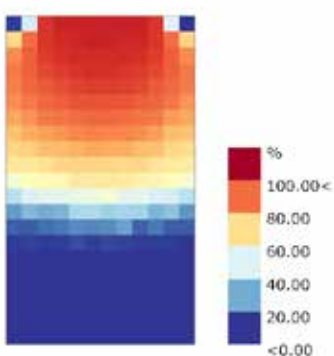
30% of facade  
area is glass



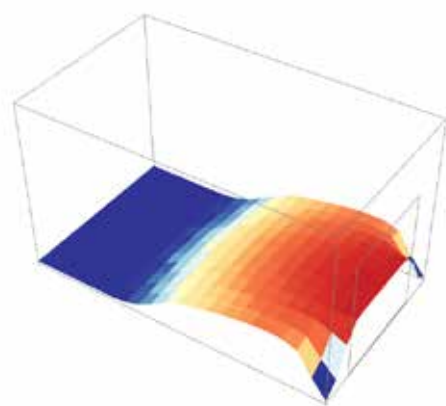
annual analysis



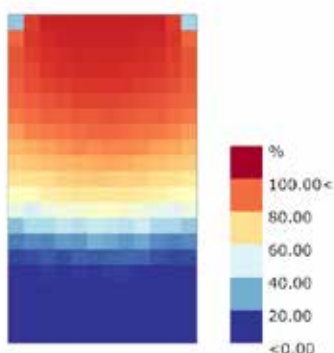
40% of facade  
area is glass



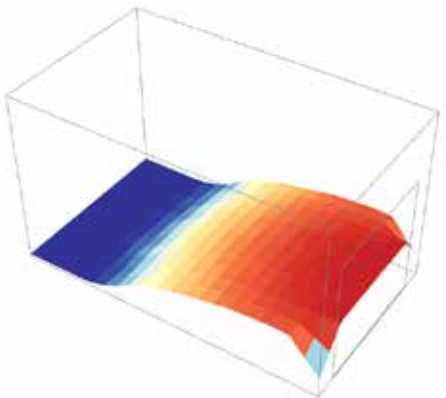
annual analysis



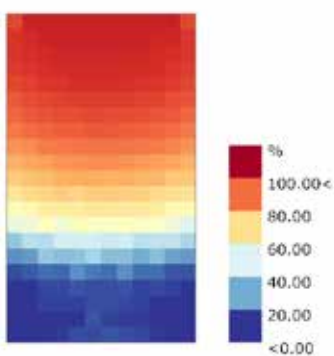
50% of facade  
area is glass



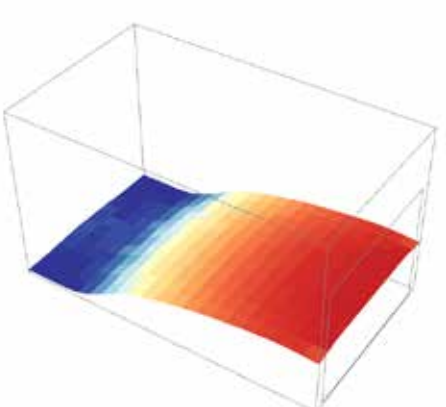
annual analysis



60% of facade  
area is glass



annual analysis

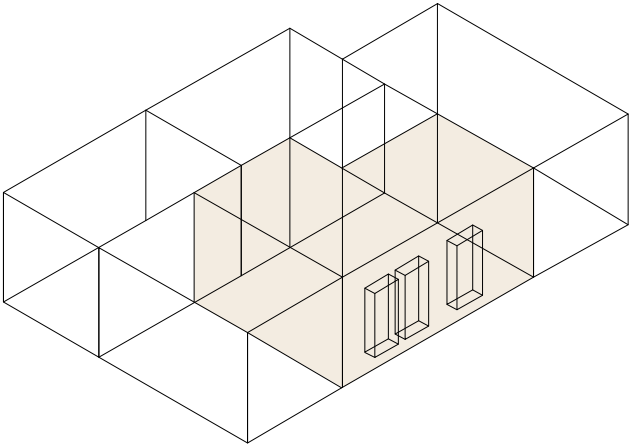


The considerations of the façade studies were examined with regard to daylight. The calculated spaces are the same as those simulated for thermal performance in BSim.

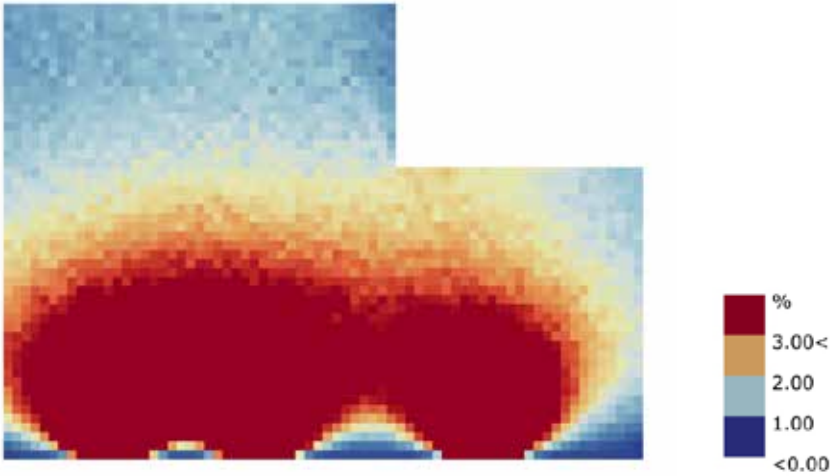
The daylight factor was calculated, as well as an annual illuminance for each orientation of the windows.

The average daylight factor for the common room is 2.8%, well within the range. However, the analyses of the illuminance demonstrate that it is too low, expectedly especially for the northern orientation. It could be considered whether more than 3 façade panels with windows are necessary in these areas. However, this case does not occur in the proposed plan layout. In most cases, the common rooms are oriented towards south, or in a few cases towards west. In order to investigate this case in more detail, additional simulations were made for one of the equinox days (21.09) for 09:00 and 15:00 // window orientation: west.

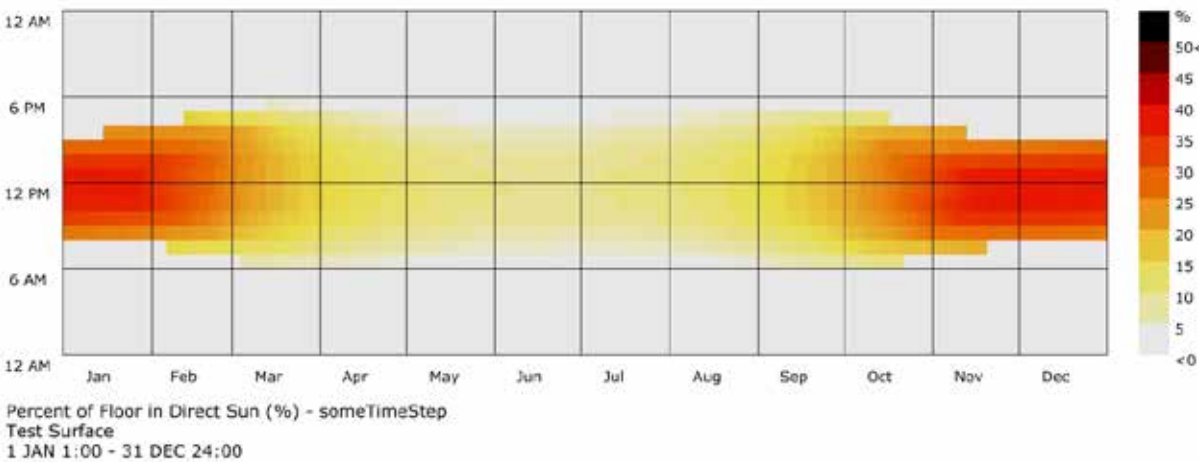
A glare study was conducted to see when glare can become a problem in terms of visual comfort.



| Ill. 9. Dormitory common room

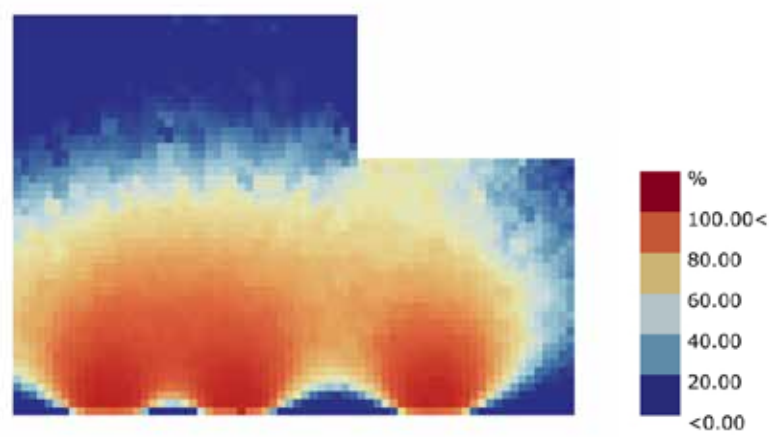


| Ill. 10. Daylight factor // common room

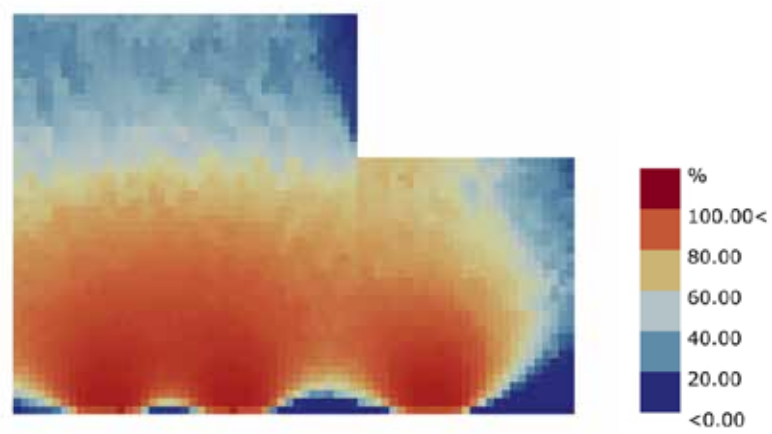


| Ill. 11. Glare study at desk height (800 mm) // common room

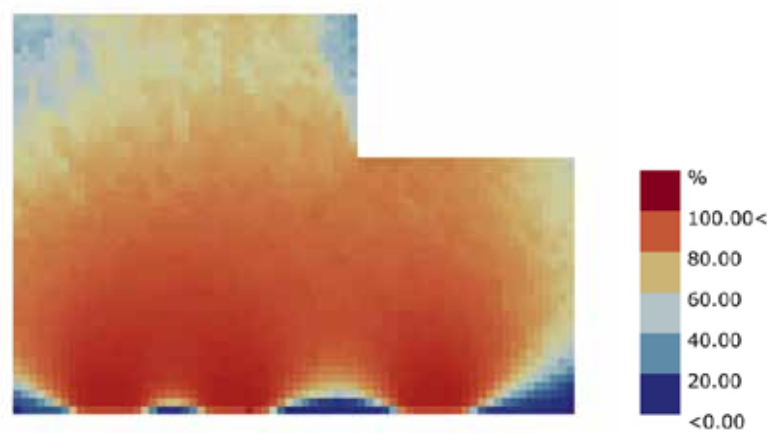
window orientation: north



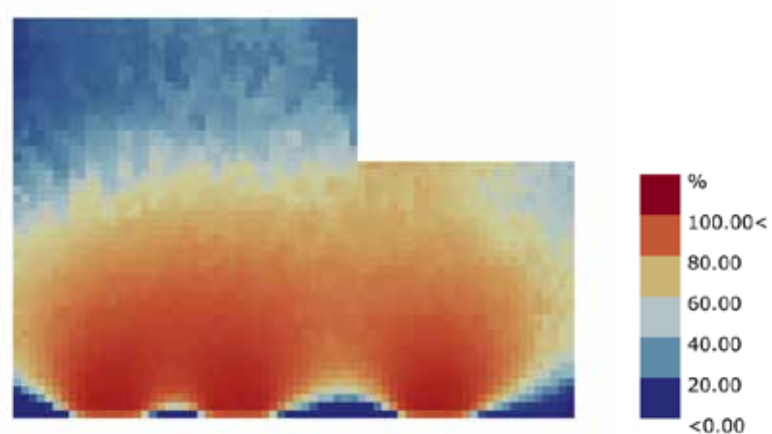
window orientation: east



window orientation: south



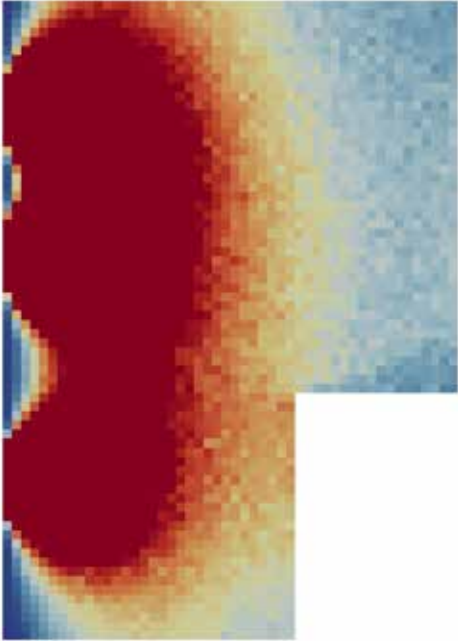
window orientation: west



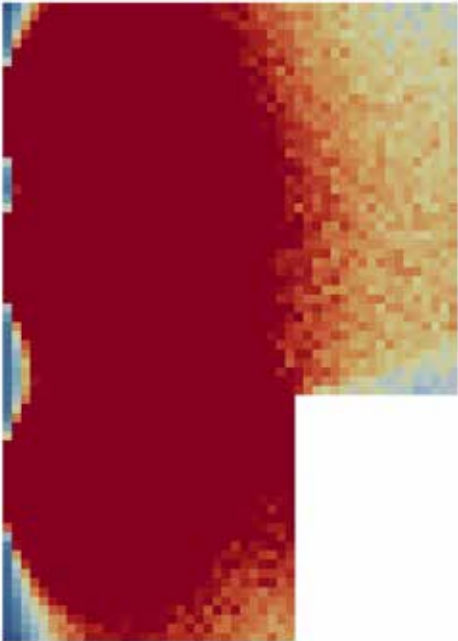
This analysis shows that sufficient illuminance can be expected in the neutral months. In the summer months it is expected to be better, whereas in the winter months it tends to be worse.

The residents have the possibility to use larger community rooms on the second floor. These have access to daylight from at least 2 - 3 sides and therefore provide a more diverse spectrum of daylight.

09:00  
window orientation: west



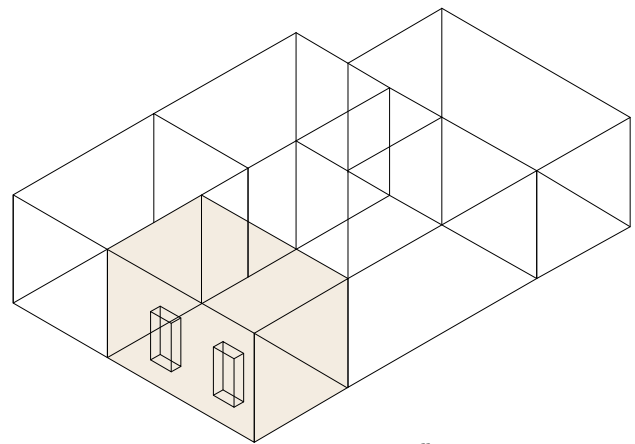
09:00  
window orientation: west



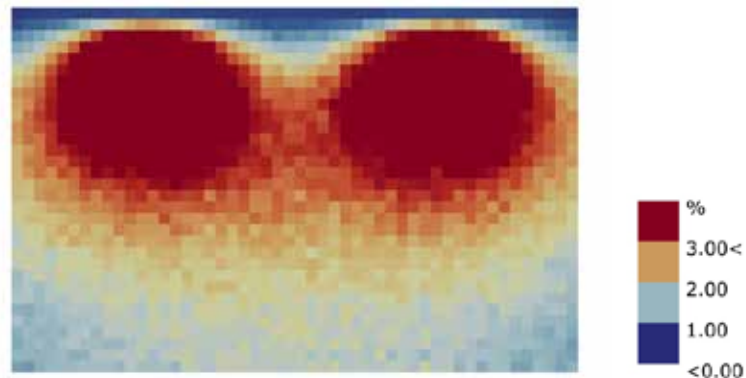
The idea that the windows should reflect a gradient of privacy on the façade resulted in the use of window sizes 0.8 x 1.2 m and 0.8 x 1.6 m for the private rooms.

The simulations resulted in a daylight factor of 1.5% for a room of the respected size with 2 windows of 1.2 m each, which is insufficient. A combination of one window with 1.2 m and one with 1.6 m results in a DF of 2% and is thereby considered to be just on the border. Two windows of type 0.8 x 1.6 m provide a daylight factor of 2.2%.

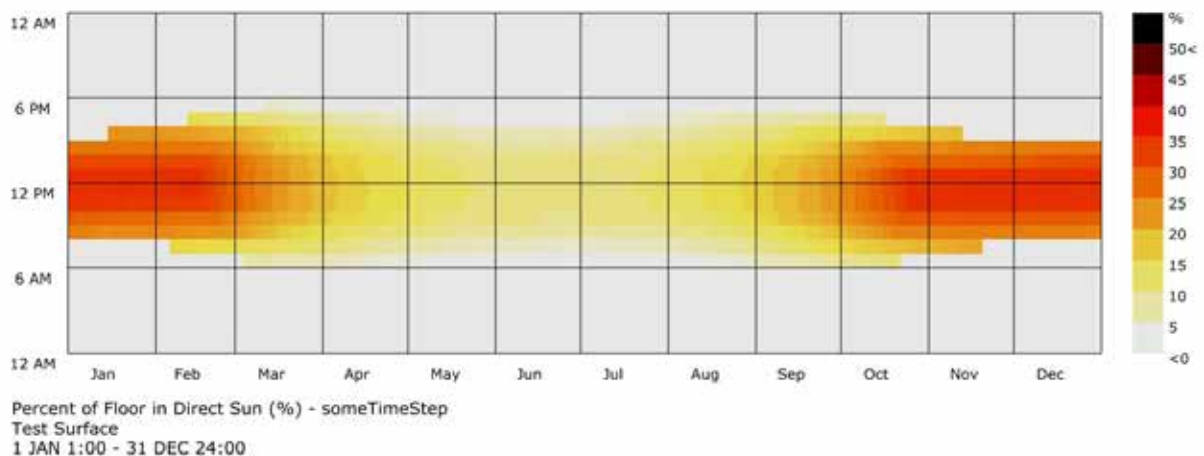
Simulations of the annual illuminance were also performed in this case, with similar results to those for the common room. Therefore, a simulation for 21.09, which is the equinox, was additionally carried out.



| Ill. 14. Dorm room



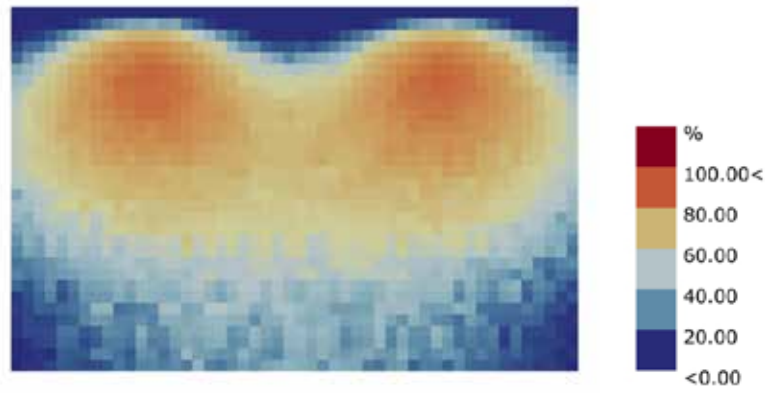
| Ill. 15. Daylight factor // Dorm room



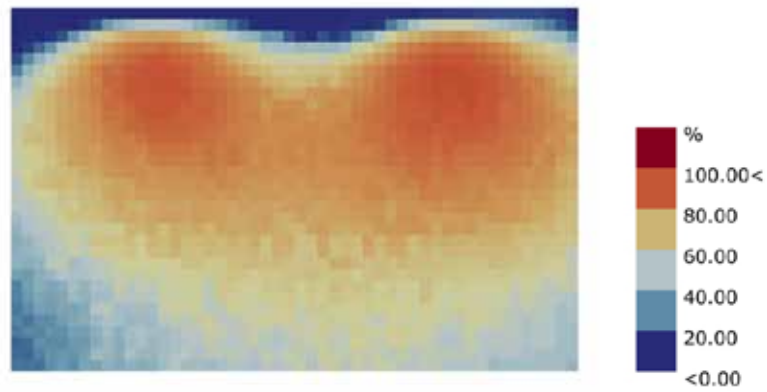
| Ill. 16. Glare study at desk height (800 mm) // Dorm room



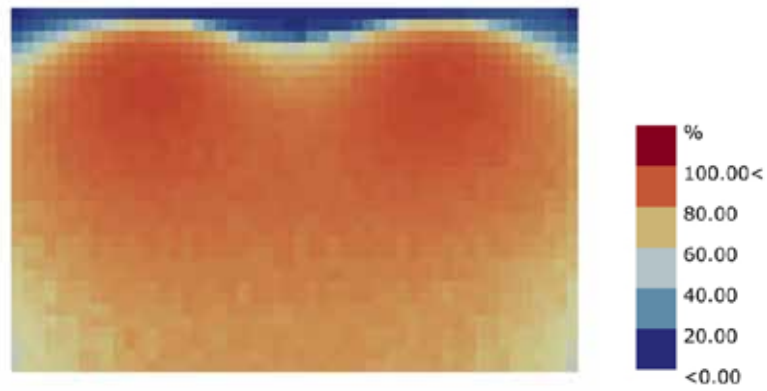
window orientation: north



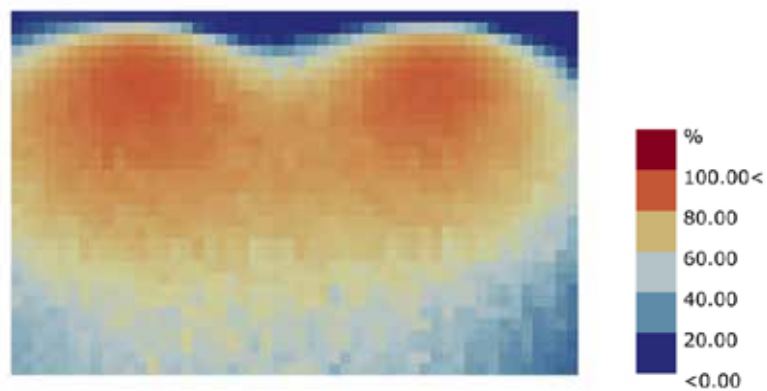
window orientation: east



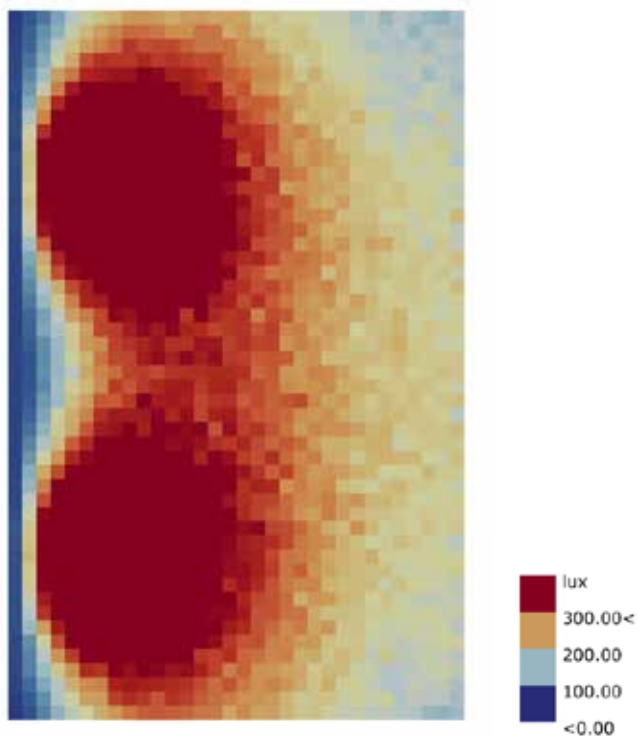
window orientation: south



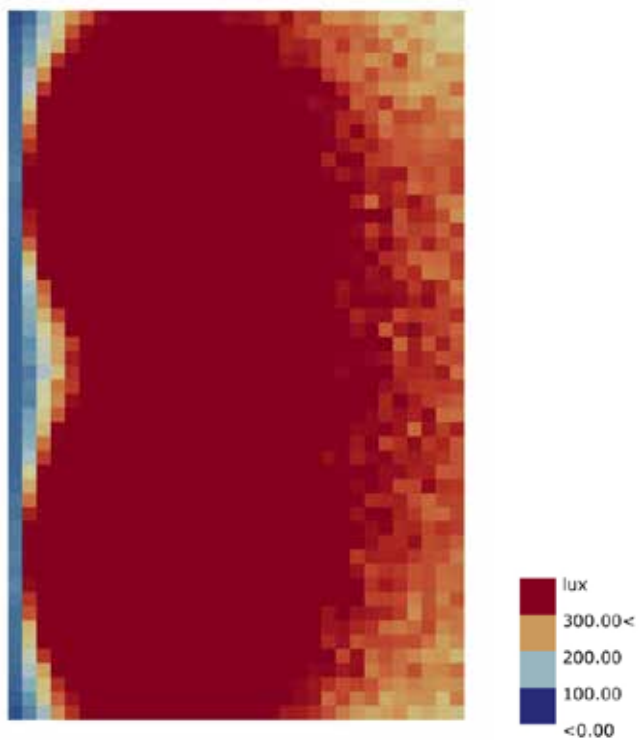
window orientation: west



09:00  
window orientation: west



09:00  
window orientation: west





## CLT Wall

Exterior wall  
created on 29.4.2022

### Thermal protection

$U = 0,14 \text{ W/(m}^2\text{K)}$

EnEV Bestand\*:  $U < 0,24 \text{ W/(m}^2\text{K)}$



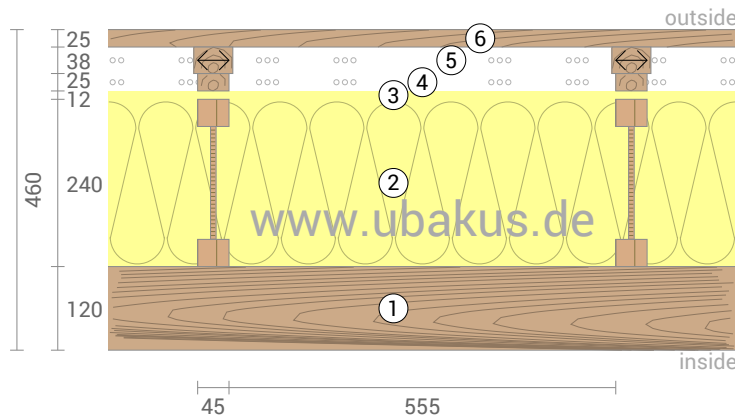
### Moisture proofing

No condensate



### Heat protection

Temperature amplitude damping:  $>100$   
phase shift: non relevant  
Thermal capacity inside:  $97 \text{ kJ/m}^2\text{K}$

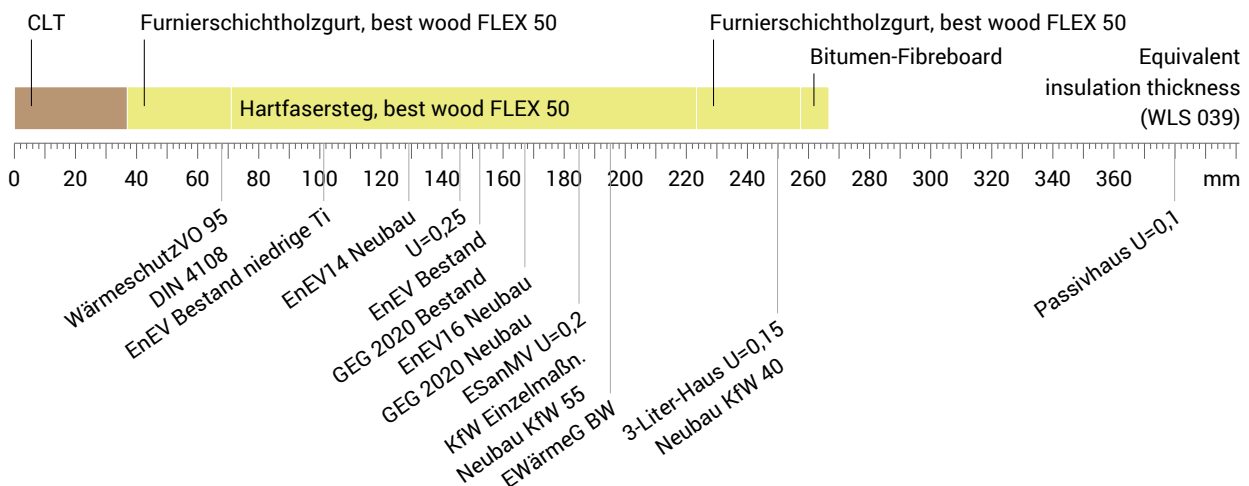


- ① CLT (120 mm)
- ② best wood FLEX 50 (240 mm)
- ③ Bitumen-Fibreboard (12 mm)
- ④ Rear ventilated level (25 mm)
- ⑤ Rear ventilated level (38 mm)
- ⑥ Profilholz (25 mm)

<-> Layers marked by arrows are perpendicular to the main axis.

## Impact of each layer and comparison to reference values

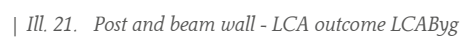
For the following figure, the thermal resistances of the individual layers were converted in millimeters insulation. The scale refers to an insulation of thermal conductivity  $0,039 \text{ W/mK}$ .



Inside air :  $20,0^\circ\text{C} / 50\%$   
Outside air:  $-5,0^\circ\text{C} / 80\%$   
Surface temperature.:  $19,0^\circ\text{C} / -4,9^\circ\text{C}$

sd-value: 3,5 m

Thickness: 46,0 cm  
Weight:  $89 \text{ kg/m}^2$   
Heat capacity:  $125 \text{ kJ/m}^2\text{K}$





## Post and Beam

Exterior wall  
created on 10.5.2022

### Thermal protection

$U = 0,16 \text{ W/(m}^2\text{K)}$

GEG 2020 Bestand\*:  $U < 0,24 \text{ W/(m}^2\text{K)}$



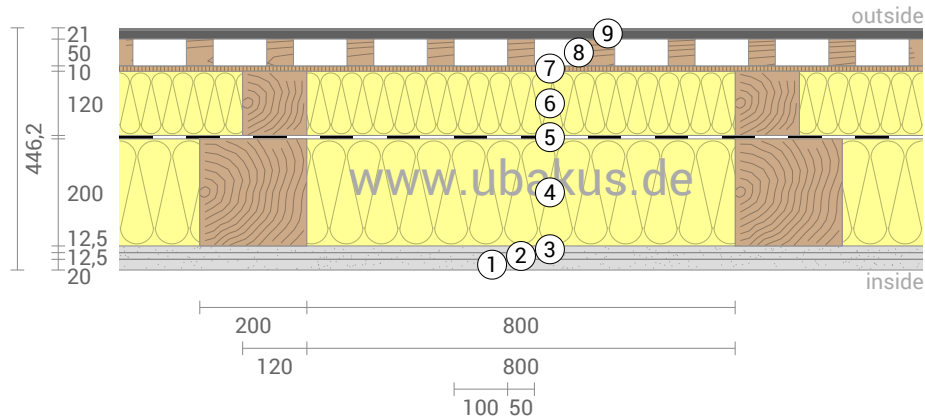
### Moisture proofing

Dries 46 days  
Condensate:  $378 \text{ g/m}^2$   
Wood moisture:  $+0,0\%$



### Heat protection

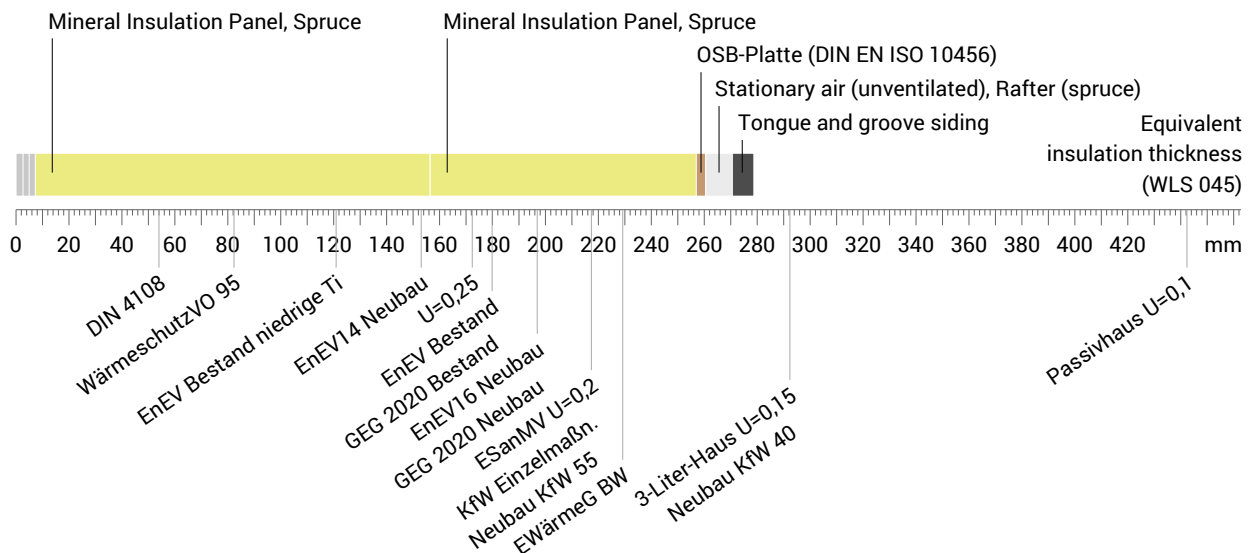
Temperature amplitude damping:  $>100$   
phase shift: non relevant  
Thermal capacity inside:  $83 \text{ kJ/m}^2\text{K}$



- |                          |                                     |                                    |
|--------------------------|-------------------------------------|------------------------------------|
| ① Gypsum plaster (20 mm) | ④ Mineral Insulation Panel (200 mm) | ⑦ OSB-Platte (10 mm)               |
| ② Gypsum board (12,5 mm) | ⑤ Foil, PE                          | ⑧ Rafter (50 mm)                   |
| ③ Gypsum board (12,5 mm) | ⑥ Mineral Insulation Panel (120 mm) | ⑨ Tongue and groove siding (21 mm) |

### Impact of each layer and comparison to reference values

For the following figure, the thermal resistances of the individual layers were converted in millimeters insulation. The scale refers to an insulation of thermal conductivity  $0,045 \text{ W/mK}$ .



Inside air :  $20,0^\circ\text{C} / 50\%$   
Outside air:  $-5,0^\circ\text{C} / 80\%$   
Surface temperature.:  $18,5^\circ\text{C} / -4,8^\circ\text{C}$

sd-value:  $24,2 \text{ m}$

Thickness:  $44,6 \text{ cm}$   
Weight:  $113 \text{ kg/m}^2$   
Heat capacity:  $152 \text{ kJ/m}^2\text{K}$

\*Vergleich mit dem Höchstwert gemäß GEG 2020 für erstmaligen Einbau, Ersatz oder Erneuerung von Außenwänden (Anlage 7, Zeile 1a,1b).

## CLT wall with wooden cladding:



All statements without guarantee

### CLT Wall

Exterior wall  
created on 4.5.2022

#### Thermal protection

$U = 0,14 \text{ W/(m}^2\text{K)}$

EnEV Bestand\*:  $U < 0,24 \text{ W/(m}^2\text{K)}$



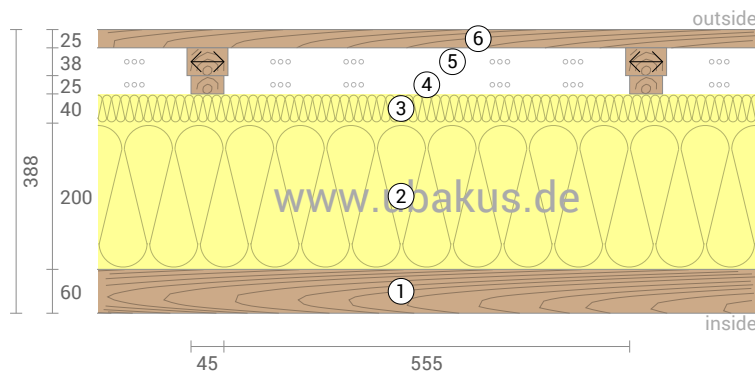
#### Moisture proofing

No condensate



#### Heat protection

Temperature amplitude damping:  $>100$   
phase shift: non relevant  
Thermal capacity inside:  $69 \text{ kJ/m}^2\text{K}$

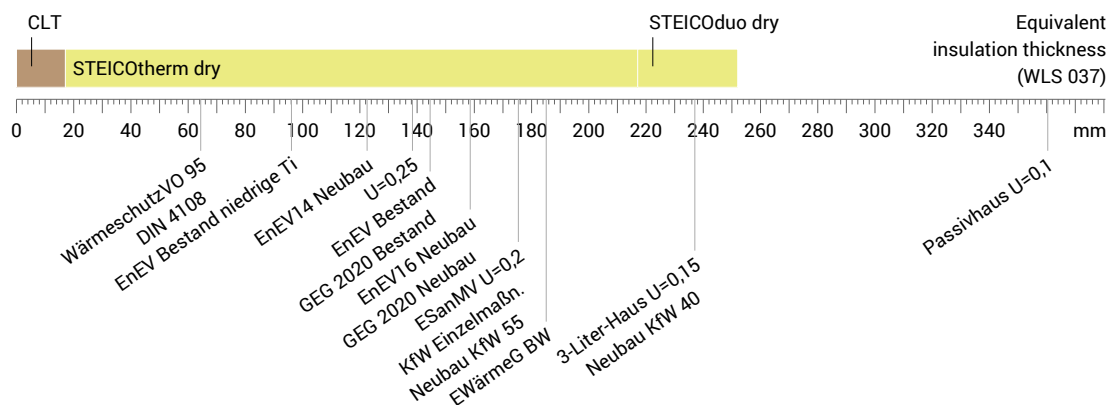


- ① CLT (60 mm)
- ② STEICOtherm dry (200 mm)
- ③ STEICOdüo dry (40 mm)
- ④ Rear ventilated level (25 mm)
- ⑤ Rear ventilated level (38 mm)
- ⑥ Profilholz (25 mm)

<-> Layers marked by arrows are perpendicular to the main axis.

### Impact of each layer and comparison to reference values

For the following figure, the thermal resistances of the individual layers were converted in millimeters insulation. The scale refers to an insulation of thermal conductivity  $0,037 \text{ W/mK}$ .



Inside air :  $20,0^\circ\text{C} / 50\%$   
Outside air:  $-5,0^\circ\text{C} / 80\%$   
Surface temperature.:  $19,1^\circ\text{C} / -4,9^\circ\text{C}$

sd-value: 2,2 m

Thickness: 38,8 cm  
Weight:  $72 \text{ kg/m}^2$   
Heat capacity:  $107 \text{ kJ/m}^2\text{K}$

\*Vergleich mit dem Höchstwert gemäß EnEV 2014/2016 für erstmaligen Einbau, Ersatz oder Erneuerung von Außenwänden (Anlage 3, Tabelle 1, Zeile 1).



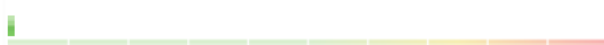
**Heat loss: 11 kWh per m<sup>2</sup> and heating season**



**Primary energy (non renewable): >103 kWh/m<sup>2</sup>**



**Green house gas potential: -49 (?) kg CO<sub>2</sub> Äqv./m<sup>2</sup>**

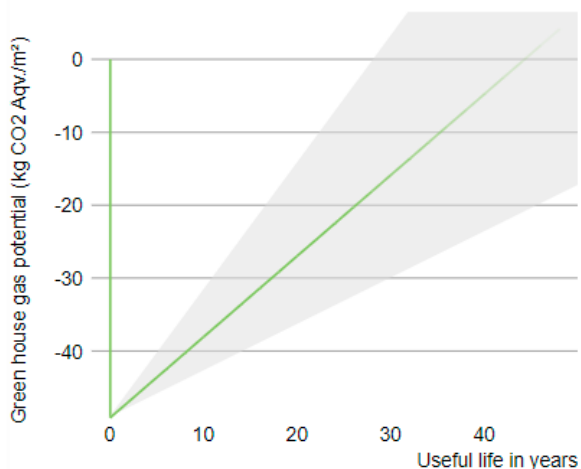


Amount of heat that escapes through one square meter of this component during the heating period. Please note: Due to internal and solar gains, the heating demand is lower than the heat loss.

Non-renewable primary energy (= energy from fossil fuels and nuclear energy) that was used to produce the new building materials ("cradle to gate").

For the production of the building materials used, more greenhouse gases were withdrawn from the atmosphere than emitted.

#### Green house gas potential



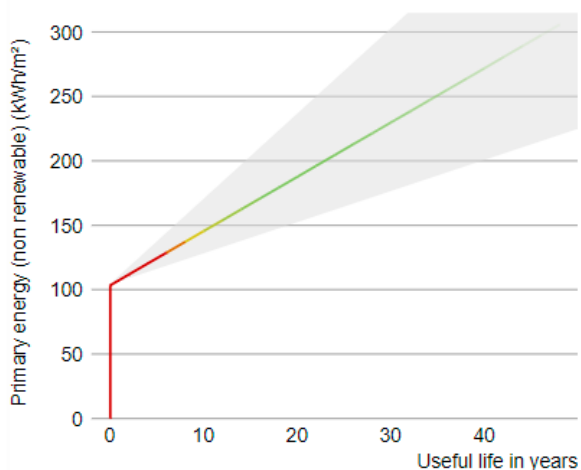
The **left figure** shows the global warming potential of the production of the component in the vertical part of the curve. Greenhouse gas emissions (through heating) arising during use of the building are indicated by the upward curve.

The **figure at the bottom left** shows the non-renewable primary energy expenditure for the production of the component in the vertical part of the curve. The primary energy required during use of the building (through heating) is represented by the upward curve.

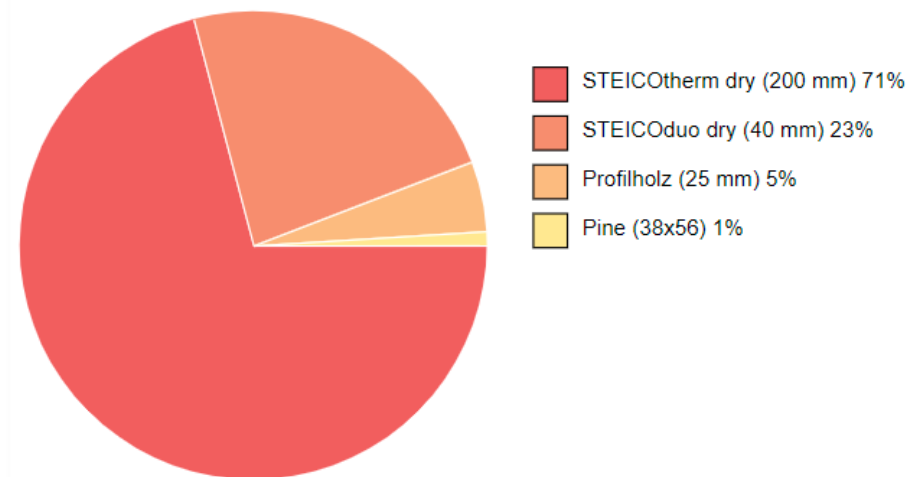
The longer the component is used unchanged, the more environmentally friendly it is, because the production costs contribute less to the total emissions (indicated by the color of the curve).

Due to unknown solar and internal gains, the heating demand can only be estimated. Accordingly, primary energy consumption and global warming potential during the use phase are only vaguely known. For the estimation it was assumed that solar and internal profits contribute with 4 kWh/a/m<sup>2</sup> component area. The light gray area indicates the area in which the curve is located with great certainty. For heat generation, a primary energy input of 0,60 kWh per kWh of heat and a global warming potential of 0,16 kg CO<sub>2</sub> eqv/m<sup>2</sup> per kWh of heat was used. Heat source: Heat pump (air-water).

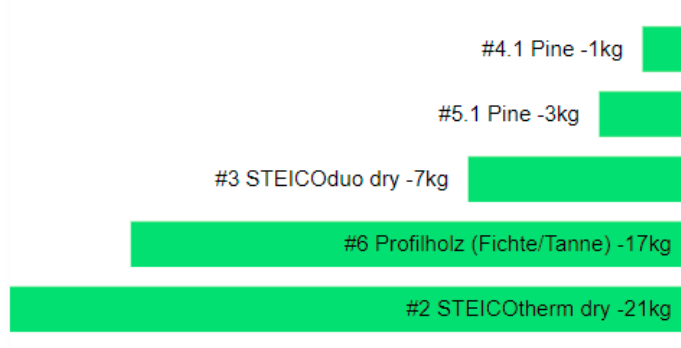
#### Primary energy consumption



#### Composition of non-renewable primary energy input for manufacturing



#### Composition of the global warming potential of production in kg CO<sub>2</sub> eq/m<sup>2</sup>



A negative global warming potential (green bars to the left) means that more greenhouse gases have been extracted from the atmosphere than produced, usually through the growth of renewable raw materials.

#### Other environmental product data for the manufacture of this component:

Summer smog (POCP): 0,0067 kg Ethen-Äqv./kg  
 Acidification potential (AP): 0,044 kg SO<sub>2</sub>-Äqv./kg  
 Eutrophication potential (EP): 0,0077 kg Phosphat-Äqv./kg  
 Ozone depletion potential (ODP): 0,00000000015 kg R11-Äqv./kg

Attention: At least one shift could not be considered because its environmental product data is unknown. See table on the tab 'Renovation'.

#### Hints

The calculation is based on monthly average temperatures. Source: DIN V 18599-10:2007-02

Note the difference between heat loss and heat demand: Because of solar and internal heat gains, the heat demand is less than the heat loss. Use the [heat demand calculator](#) to calculate the **heat demand** of a room or building. The heat demand calculator also takes into account ventilation losses as well as internal and solar gains.

Ideally, the LCA should also include the disposal of building materials after their end of life. With lifetimes of 30, 40 or more years, however, it is not foreseeable today what kind of damage or benefit the disposal will pose. For this reason, the disposal is not considered here.

The financial and environmental impact of a **refurbishment**, a tabulation of environmental data and uncertainty information can be found on the [next page](#).

You will find many more information on life cycle assessment in the article [So bauen Sie mit gutem Gewissen – trotz Klimawandel](#). Explanations on environmental product data can be found in the article [Umwelt-Produktdeklarationen verstehen und verwenden](#).

## CLT Wall

Exterior wall  
created on 4.5.2022

## Thermal protection

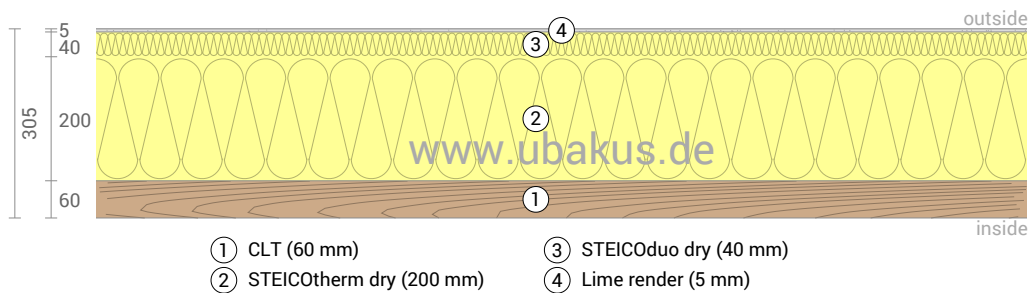
 $U = 0,14 \text{ W}/(\text{m}^2\text{K})$ EnEV Bestand\*:  $U < 0,24 \text{ W}/(\text{m}^2\text{K})$ 

## Moisture proofing

No condensate

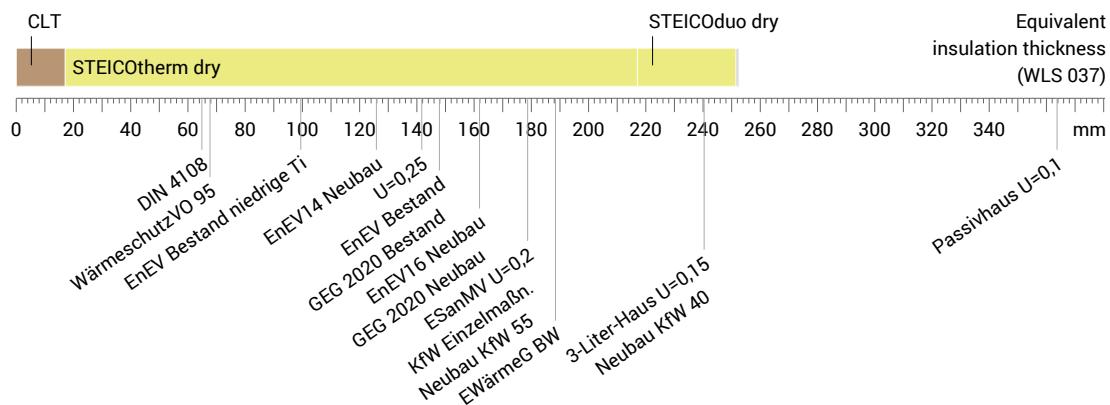


## Heat protection

Temperature amplitude damping:  $>100$   
phase shift: non relevant  
Thermal capacity inside:  $69 \text{ kJ}/\text{m}^2\text{K}$ 

## Impact of each layer and comparison to reference values

For the following figure, the thermal resistances of the individual layers were converted in millimeters insulation. The scale refers to an insulation of thermal conductivity  $0,037 \text{ W}/\text{mK}$ .



Inside air:  $20,0^\circ\text{C} / 50\%$   
Outside air:  $-5,0^\circ\text{C} / 80\%$   
Surface temperature:  $19,1^\circ\text{C} / -4,9^\circ\text{C}$

sd-value: 2,3 m

Thickness: 30,5 cm  
Weight:  $64 \text{ kg}/\text{m}^2$   
Heat capacity:  $114 \text{ kJ}/\text{m}^2\text{K}$

\*Vergleich mit dem Höchstwert gemäß EnEV 2014/2016 für erstmaligen Einbau, Ersatz oder Erneuerung von Außenwänden (Anlage 3, Tabelle 1, Zeile 1).





New building

Refurbishment

Heat loss: 11 kWh per m<sup>2</sup> and heating season



Primary energy (non renewable): >99 kWh/m<sup>2</sup>



Green house gas potential: -26 (?) kg CO<sub>2</sub> Äqv./m<sup>2</sup>

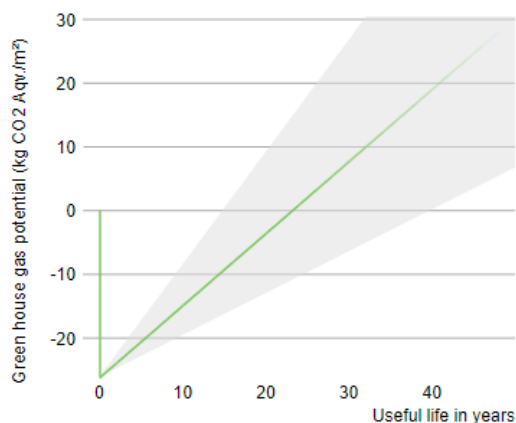


Amount of heat that escapes through one square meter of this component during the heating period. Please note: Due to internal and solar gains, the heating demand is lower than the heat loss.

Non-renewable primary energy (= energy from fossil fuels and nuclear energy) that was used to produce the new building materials ("cradle to gate").

For the production of the building materials used, more greenhouse gases were withdrawn from the atmosphere than emitted.

Green house gas potential



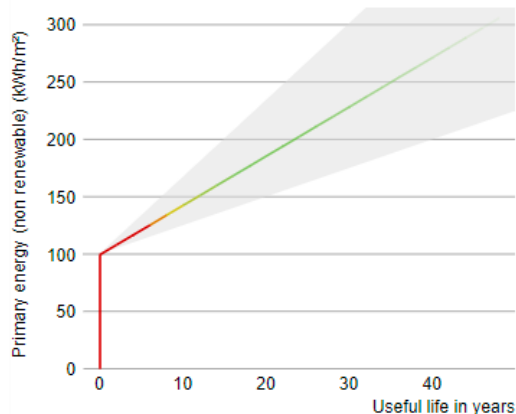
The left figure shows the global warming potential of the production of the component in the vertical part of the curve. Greenhouse gas emissions (through heating) arising during use of the building are indicated by the upward curve.

The figure at the bottom left shows the non-renewable primary energy expenditure for the production of the component in the vertical part of the curve. The primary energy required during use of the building (through heating) is represented by the upward curve.

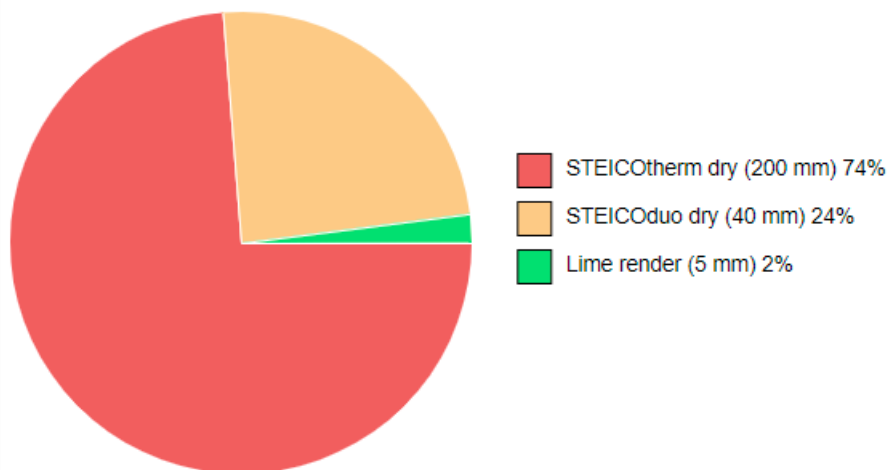
The longer the component is used unchanged, the more environmentally friendly it is, because the production costs contribute less to the total emissions (indicated by the color of the curve).

Due to unknown solar and internal gains, the heating demand can only be estimated. Accordingly, primary energy consumption and global warming potential during the use phase are only vaguely known. For the estimation it was assumed that solar and internal profits contribute with 4 kWh/a/m<sup>2</sup> component area. The light gray area indicates the area in which the curve is located with great certainty. For heat generation, a primary energy input of 0,60 kWh per kWh of heat and a global warming potential of 0,16 kg CO<sub>2</sub> eqv./m<sup>2</sup> per kWh of heat was used. Heat source: Heat pump (air-water).

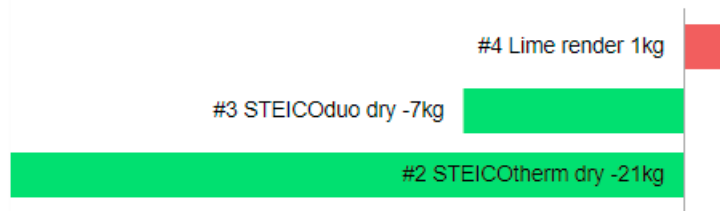
Primary energy consumption



#### Composition of non-renewable primary energy input for manufacturing



#### Composition of the global warming potential of production in kg CO<sub>2</sub> eq/m<sup>2</sup>



A negative global warming potential (green bars to the left) means that more greenhouse gases have been extracted from the atmosphere than produced, usually through the growth of renewable raw materials.

#### Other environmental product data for the manufacture of this component:

Summer smog (POCP): 0,0047 kg Ethen-Äqv./kg  
 Acidification potential (AP): 0,034 kg SO<sub>2</sub>-Äqv./kg  
 Eutrophication potential (EP): 0,0056 kg Phosphat-Äqv./kg  
 Ozone depletion potential (ODP): 0,0000000015 kg R11-Äqv./kg

Attention: At least one shift could not be considered because its environmental product data is unknown. See table on the tab 'Renovation'.

#### Hints

The calculation is based on monthly average temperatures. Source: DIN V 18599-10:2007-02

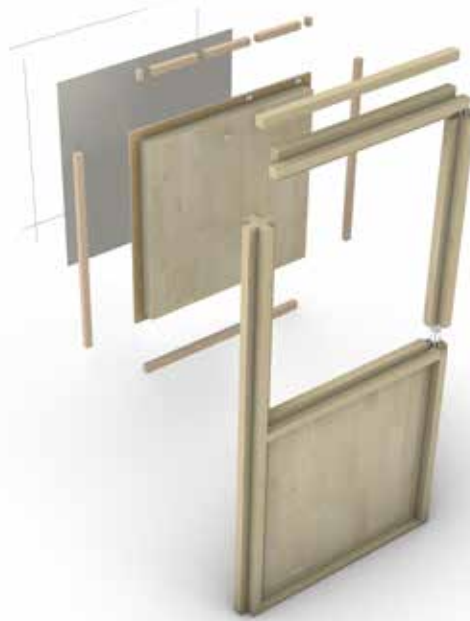
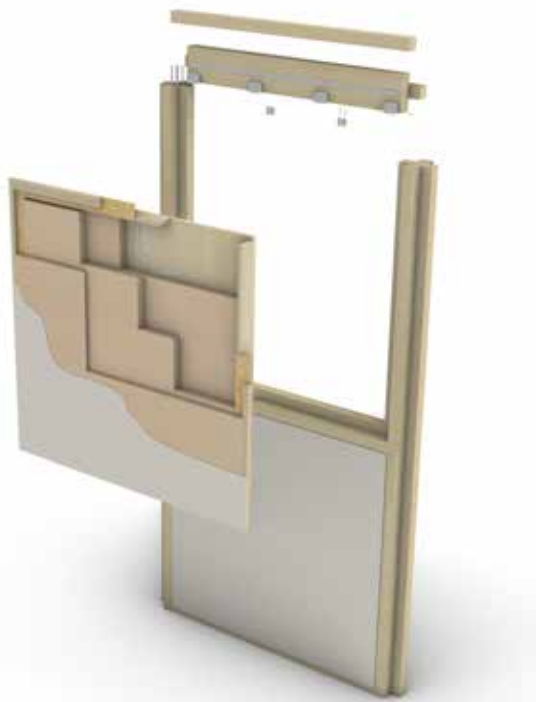
Note the difference between heat loss and heat demand: Because of solar and internal heat gains, the heat demand is less than the heat loss. Use the [heat demand calculator](#) to calculate the **heat demand** of a room or building. The heat demand calculator also takes into account ventilation losses as well as internal and solar gains.

Ideally, the LCA should also include the disposal of building materials after their end of life. With lifetimes of 30, 40 or more years, however, it is not foreseeable today what kind of damage or benefit the disposal will pose. For this reason, the disposal is not considered here.

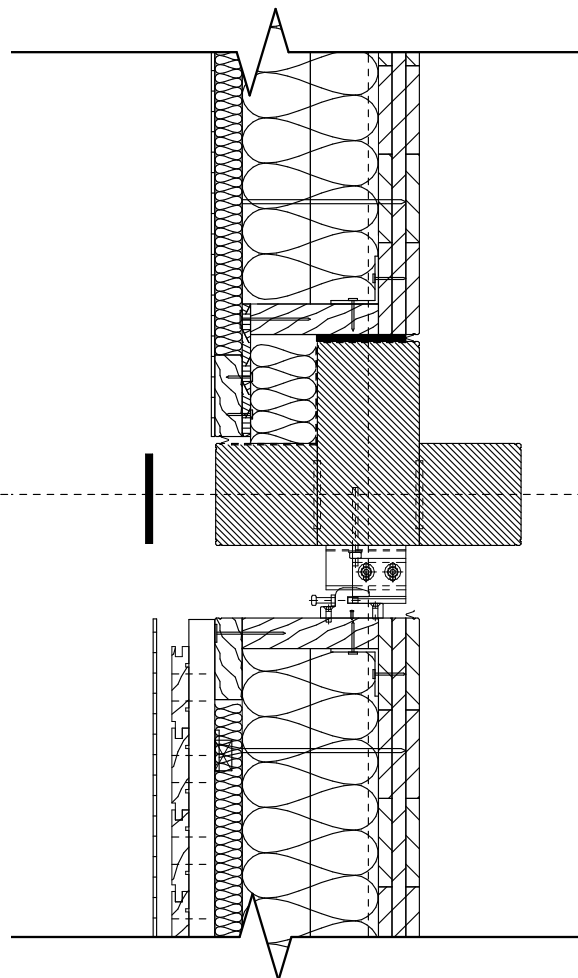
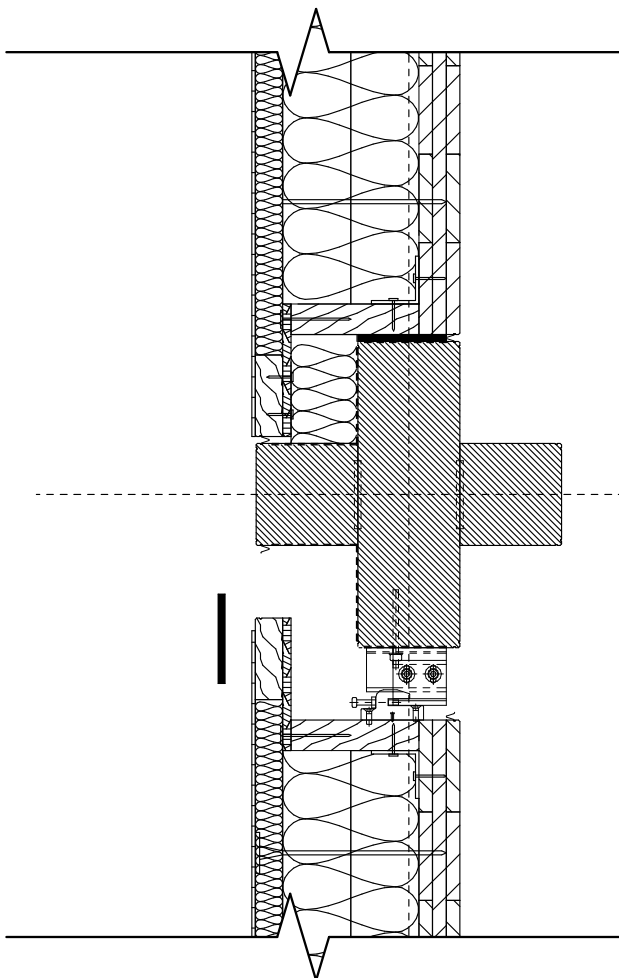
The financial and environmental impact of a **refurbishment**, a tabulation of environmental data and uncertainty information can be found on the [next page](#).

You will find many more information on life cycle assessment in the article [So bauen Sie mit gutem Gewissen – trotz Klimawandel](#). Explanations on environmental product data can be found in the article [Umwelt-Produktdeklarationen verstehen und verwenden](#).

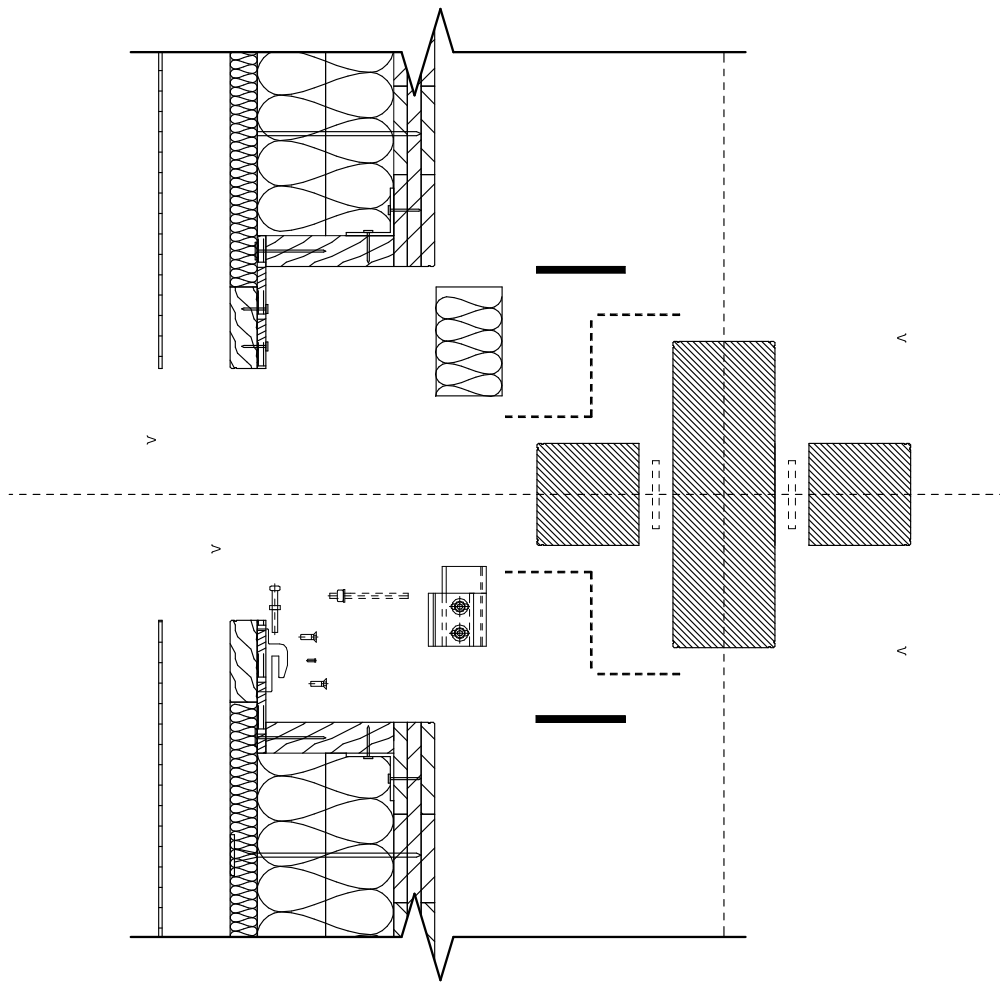
## Mounting details wall panels:



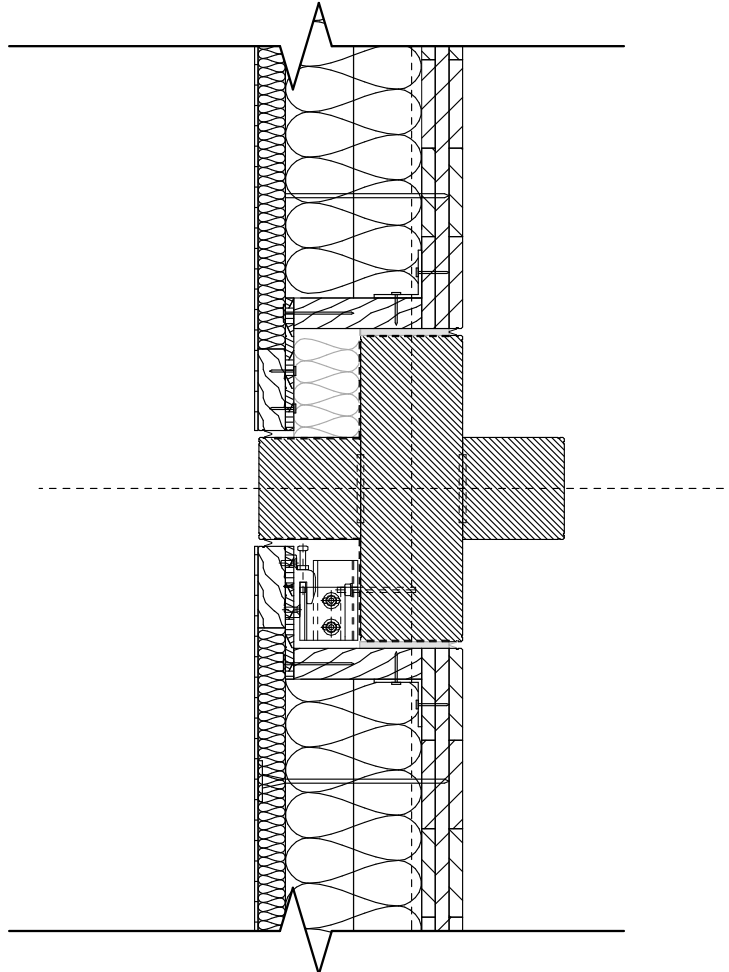
| Ill. 26. Exploded view of the prefabricated wall panels



| Ill. 27. Mounting the pre-fabricated wall panel to the beam // section detail 01 & 02



| Ill. 29. Mounting the pre-fabricated wall panel to the beam // section detail 03, exploded view



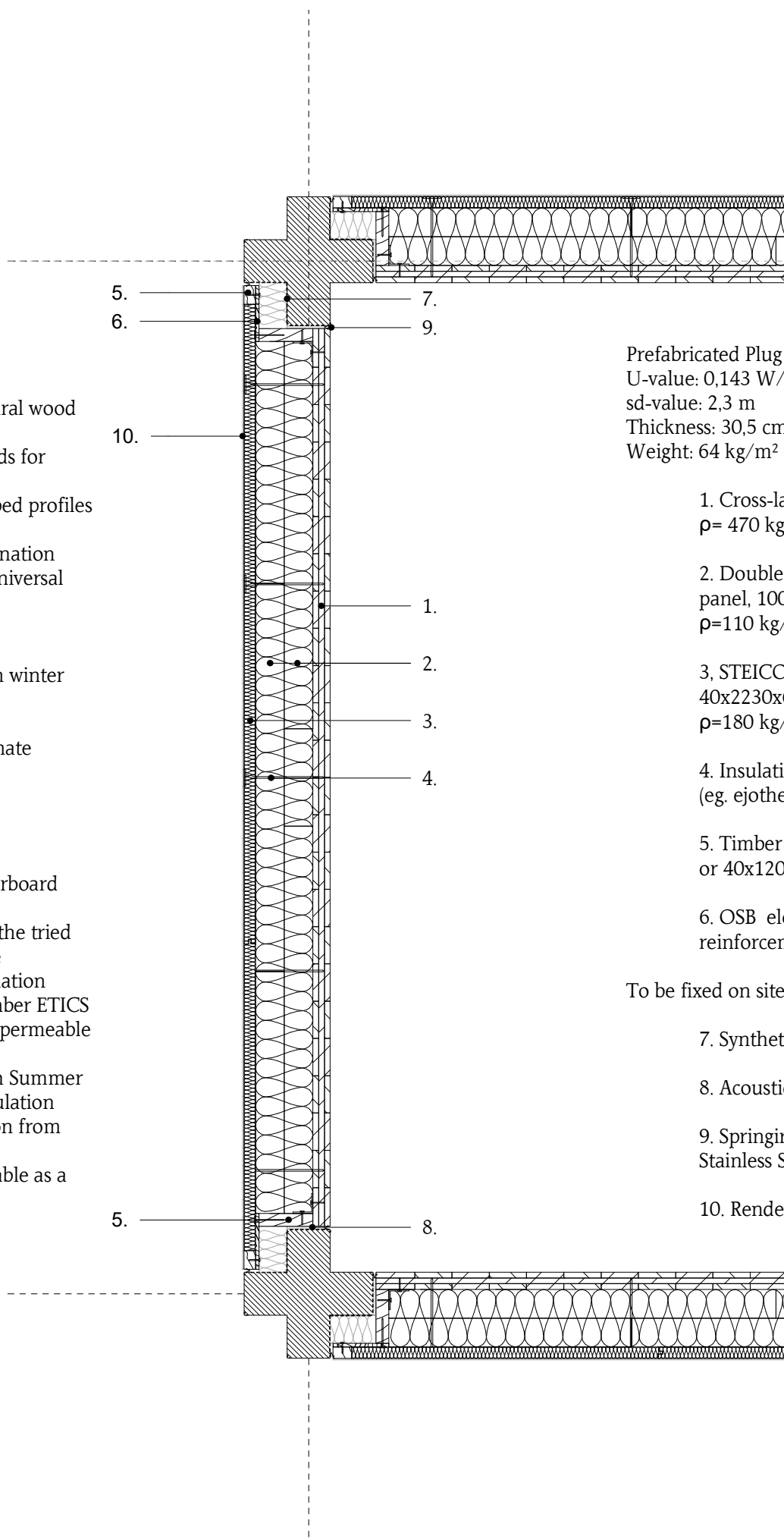
| Ill. 28. Mounting the pre-fabricated wall panel to the beam // section detail 03

## 2. STEICOtherm dry

- Rigid insulation made from natural wood fibres
- Multifunctional wood fibre boards for various applications
- Available in T & G profiles, stepped profiles and square edged
- Above rafter insulation in combination with other boards (e.g. STEICOuniversal dry)
- Manufactured in dry process
- Exceptionally light and robust
- Excellent insulation properties in winter and summer
- Water vapour open
- Helps to regulate the indoor climate

## 3. STEICOduo dry

- Combined sheathing- and renderboard made from natural wood fibres
- Instant weather protection with the tried and tested STEICO T & G profile
- Render carrying wood fibre insulation board for the STEICOsecure Timber ETICS
- Both Water repellent and vapor permeable for robust constructions
- Excellent insulation properties in Summer and Winter and good sound insulation
- Suitable for air-injected insulation from 40mm thick
- Sarking board type: UDP-A, suitable as a temporary cover



Prefabricated Plug  
U-value: 0,143 W/  
sd-value: 2,3 m  
Thickness: 30,5 cm  
Weight: 64 kg/m²

1. Cross-lam  
ρ= 470 kg

2. Double  
panel, 100  
ρ=110 kg

3. STEICO  
40x2230x  
ρ=180 kg

4. Insulation  
(eg. ejotherm)

5. Timber  
or 40x120

6. OSB element  
reinforcement

To be fixed on site

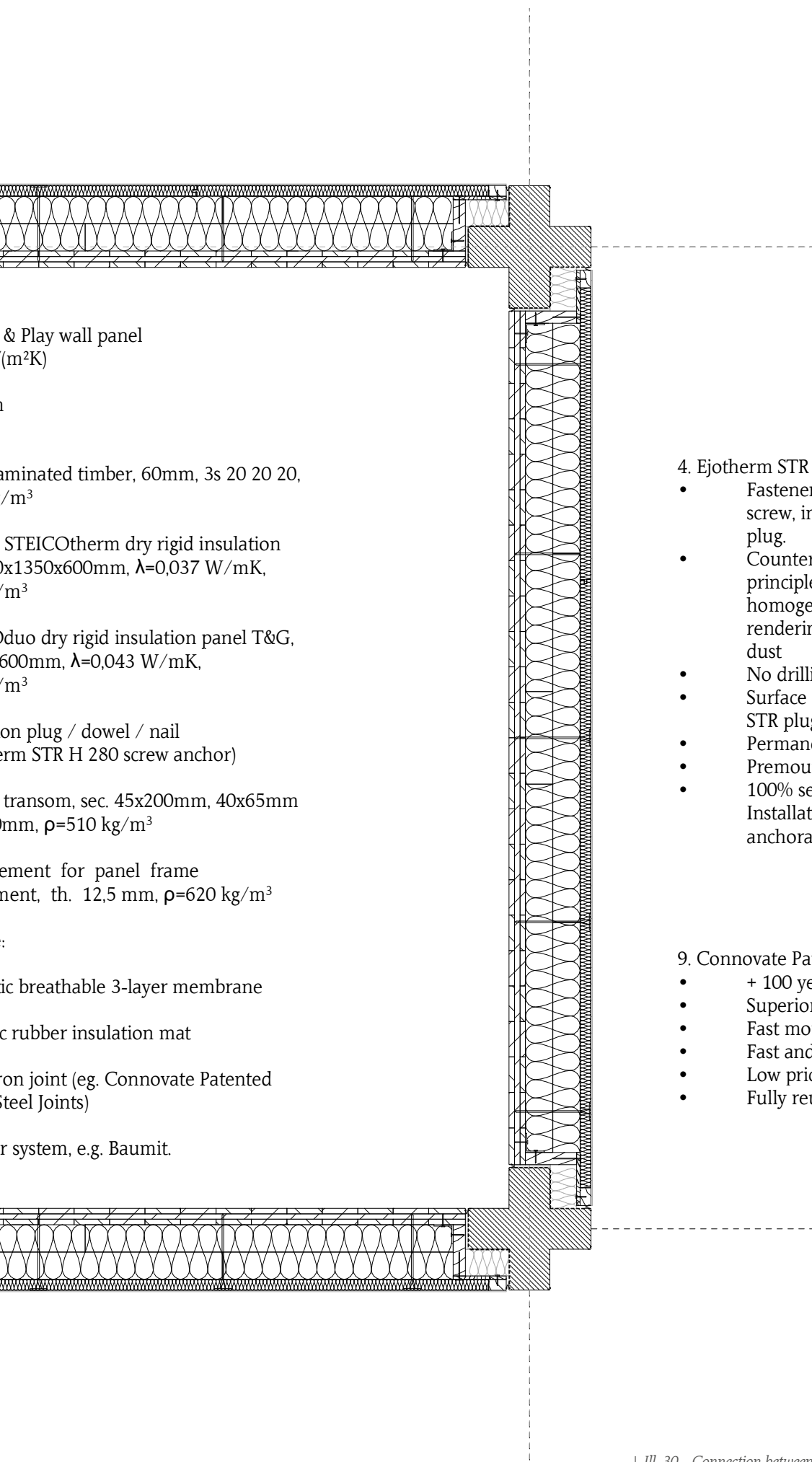
7. Synthetic

8. Acoustic

9. Springing  
Stainless S

10. Render



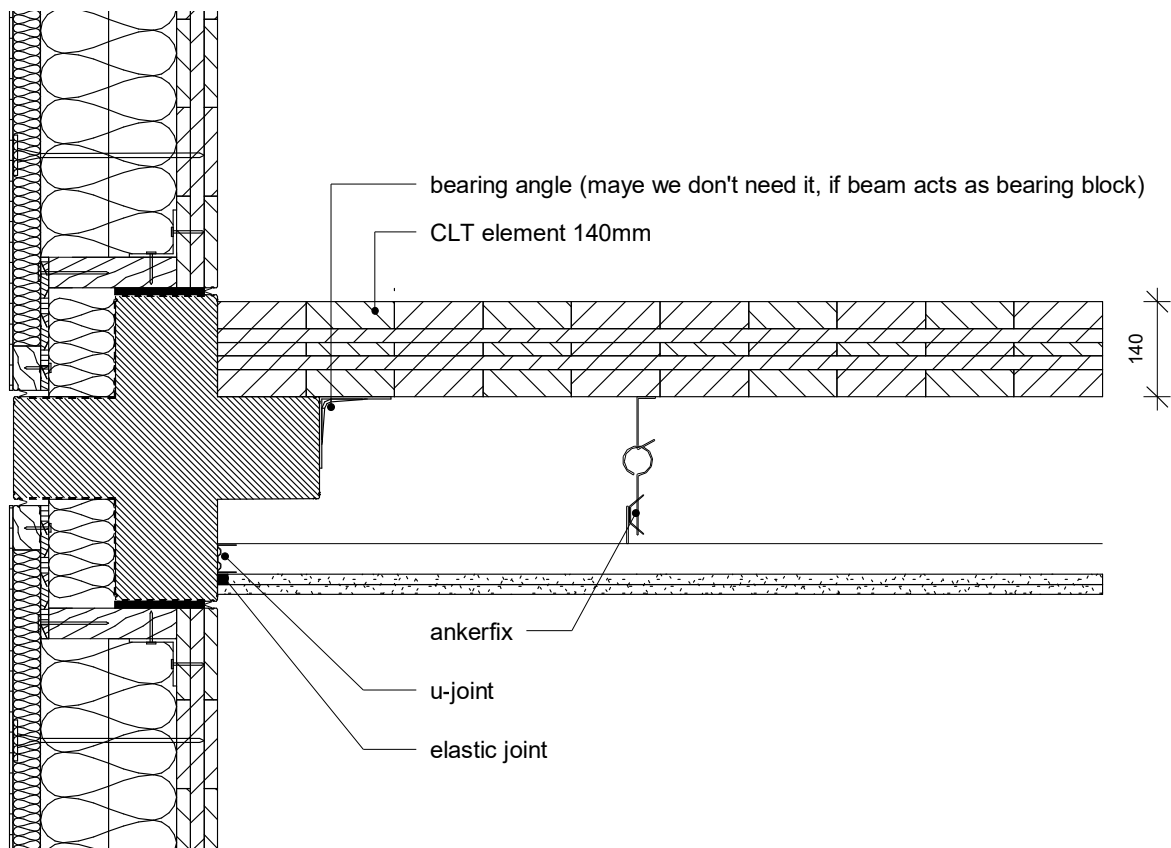


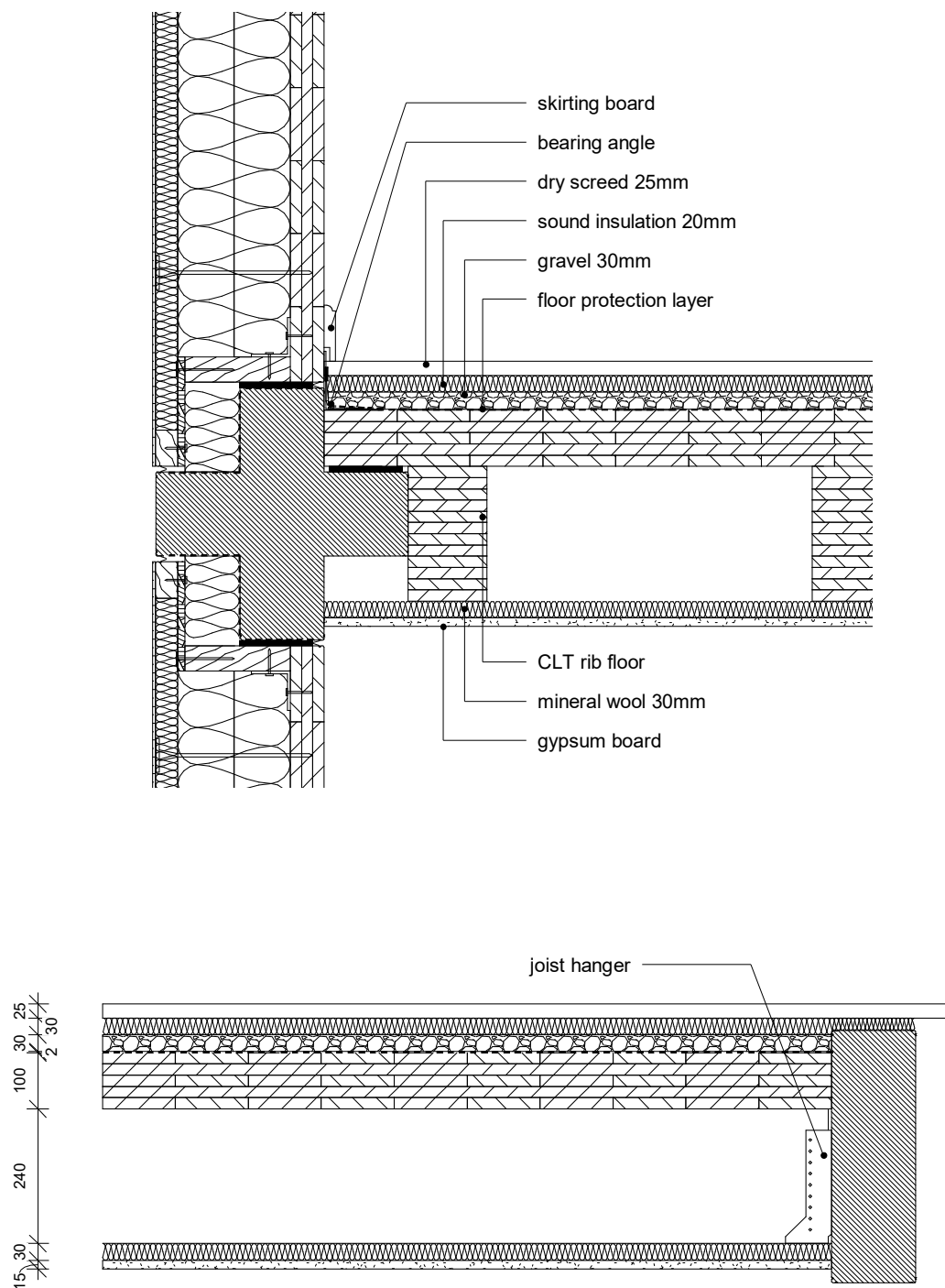
#### 4. Ejothrm STR H 280 screw anchor

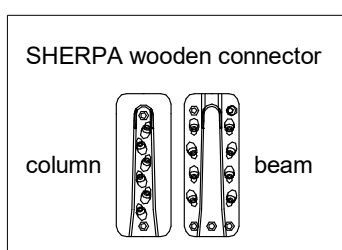
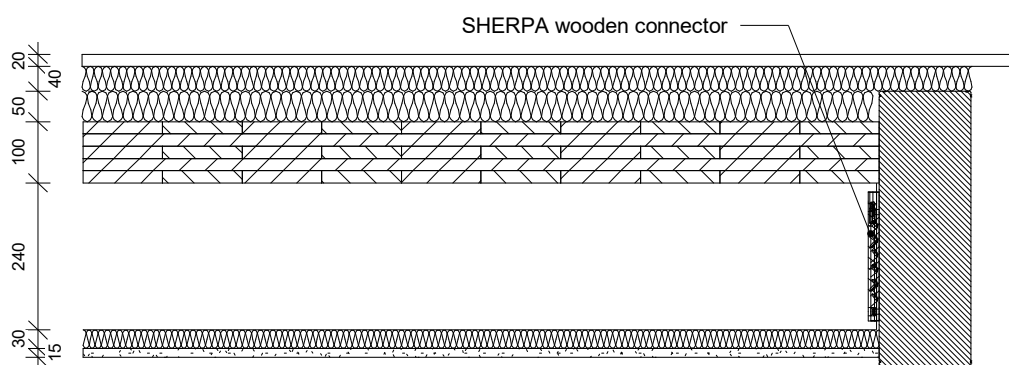
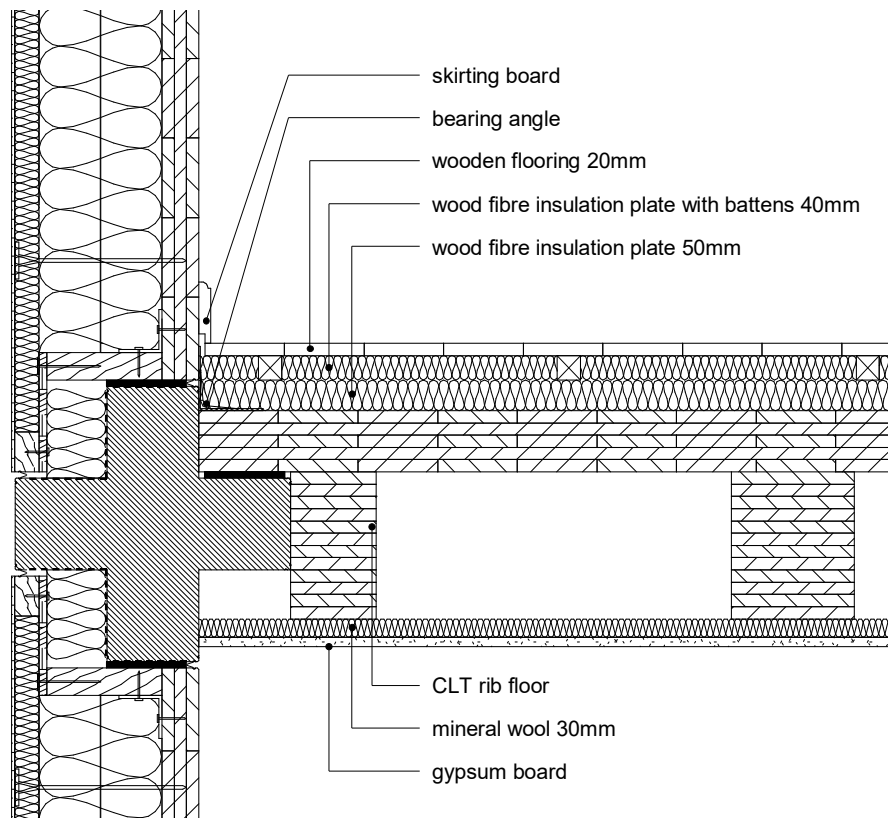
- Fastener, consistent of a galvanized steel screw, included washer and EPS sealing plug.
- Countersunk Installation - EJOOT STR principle with ejothrm STR cap for homogeneous surfaces and even rendering - quick and easy without milling dust
- No drilling necessary
- Surface fixed Installation using ejothrm STR plug
- Permanent contact pressure
- Premounted screw for quick installation
- 100% setting control: the countersunk Installation of the washer indicates safe anchorage

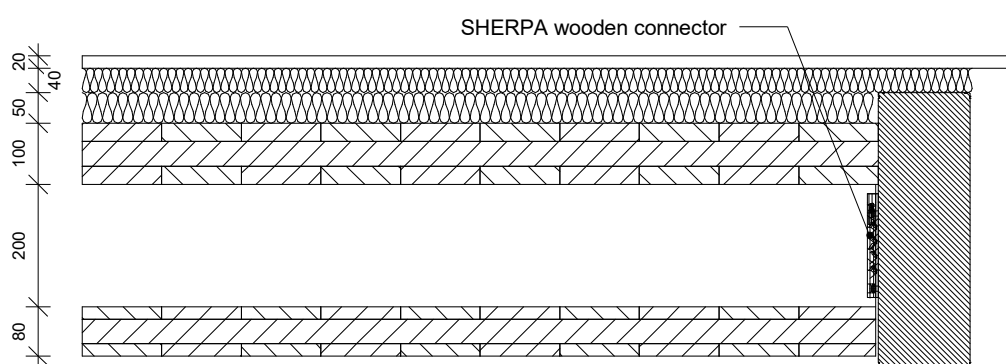
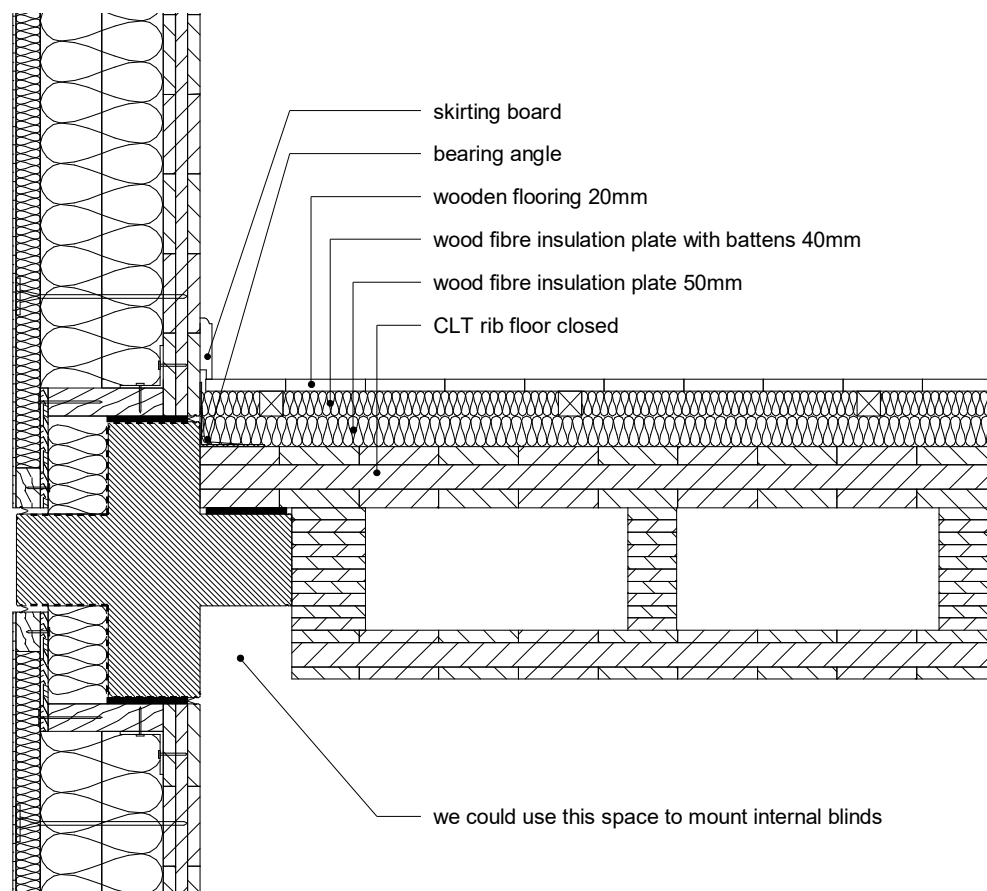
#### 9. Connovate Patented Stainless Steel Joints

- + 100 years durability
- Superior life cycle properties
- Fast mounting
- Fast and weather independant assembly
- Low price compared to elastic joints
- Fully reusable







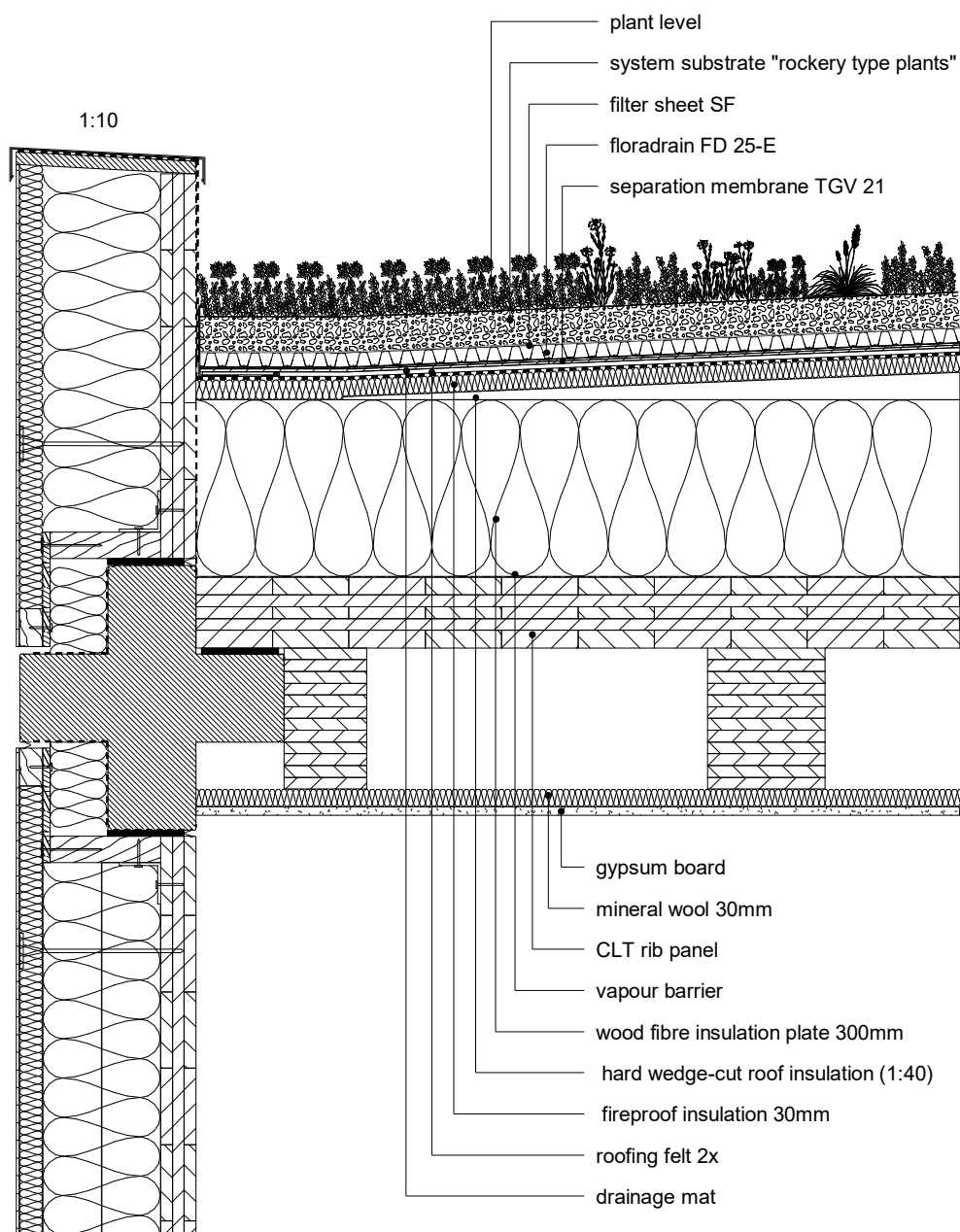




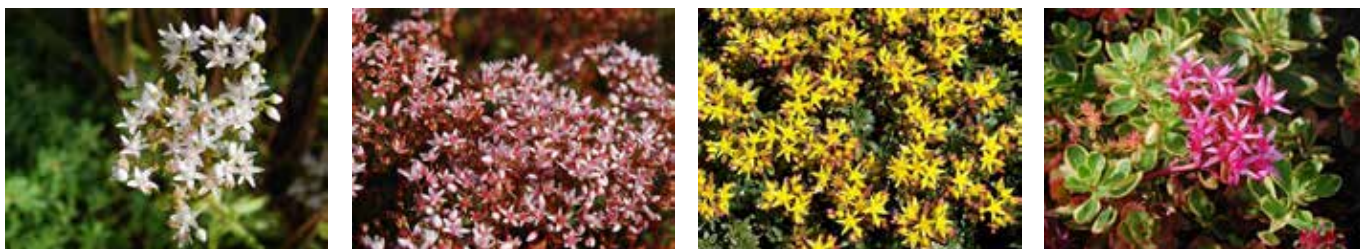


(ZinCo, no date a)

| Ill. 35. Selection of greenery that would grow

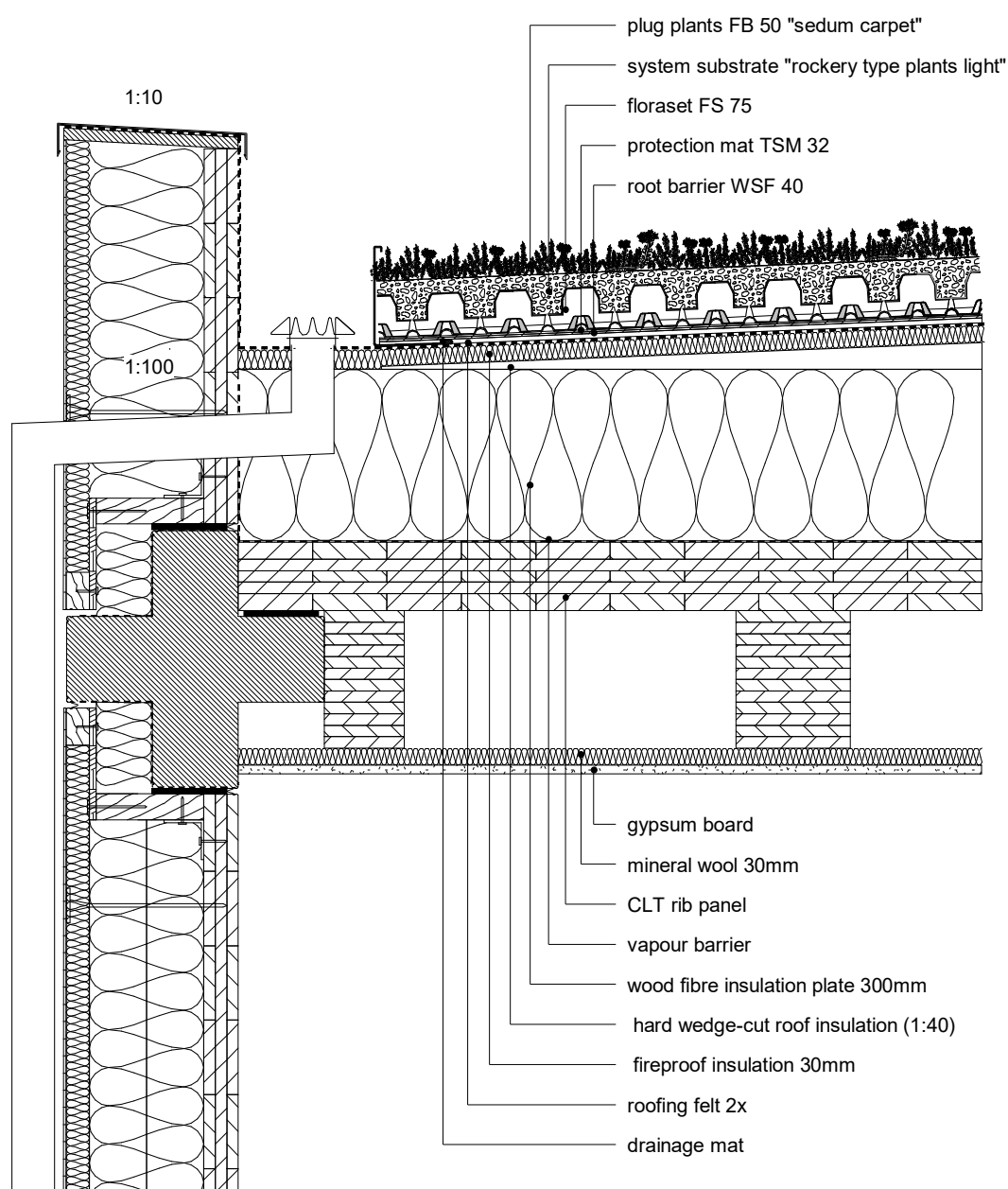


| Ill. 36. Extensive green roof "rockery type plants" // weight saturated: 110 kg/m<sup>2</sup>

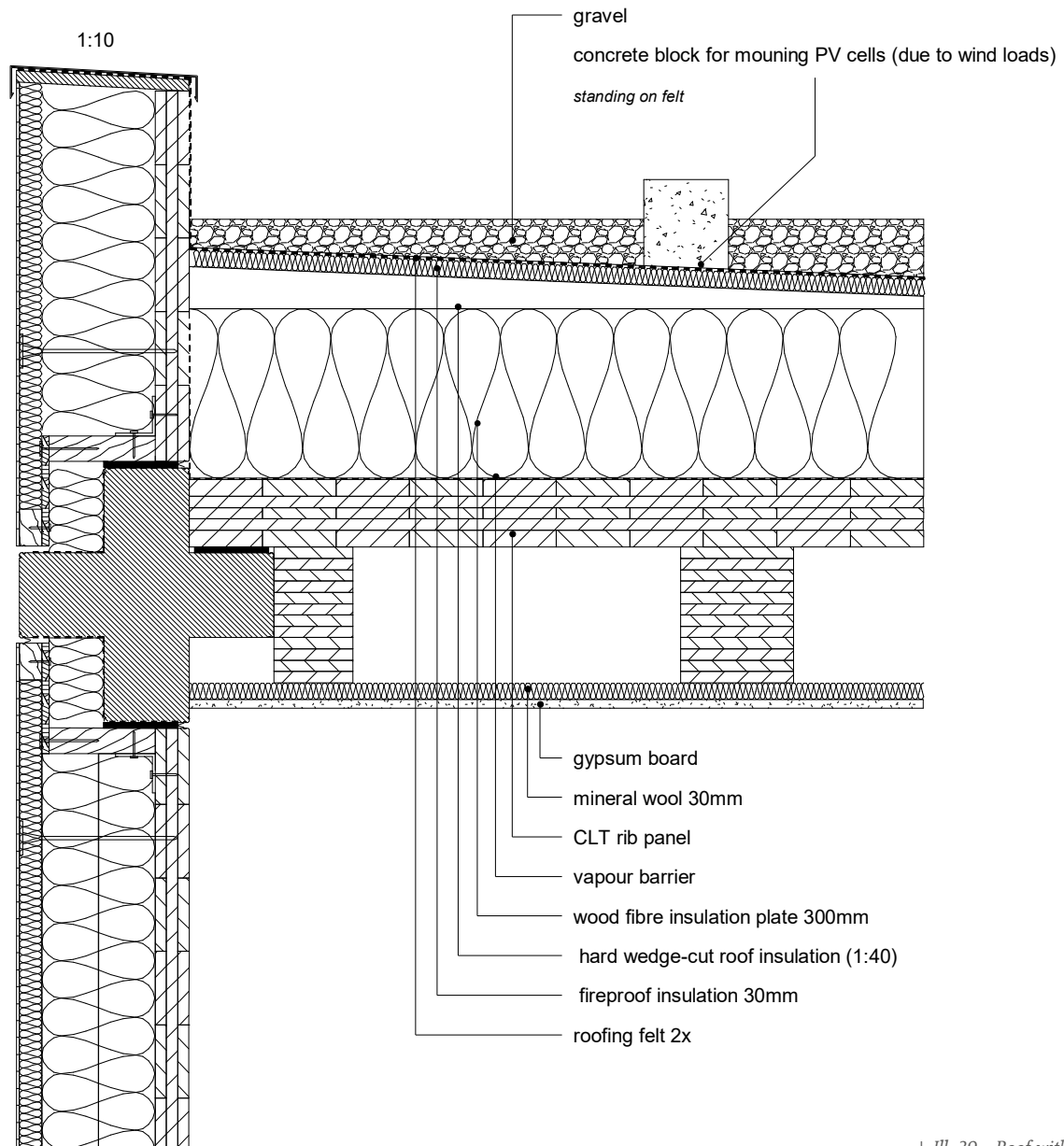


(ZinCo, no date b)

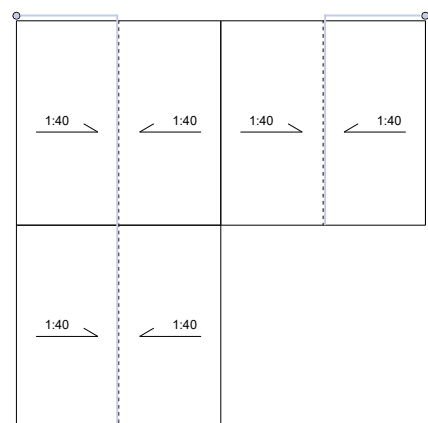
| Ill. 37. Selection of greenery that would grow



| Ill. 38. Extensive green roof "sedum carpet" // weight saturated: 60 kg/m<sup>2</sup>



| Ill. 39. Roof with solar cells



| Ill. 40. Drainage system on the roof



# Appendix 5. Indoor environment & Energy

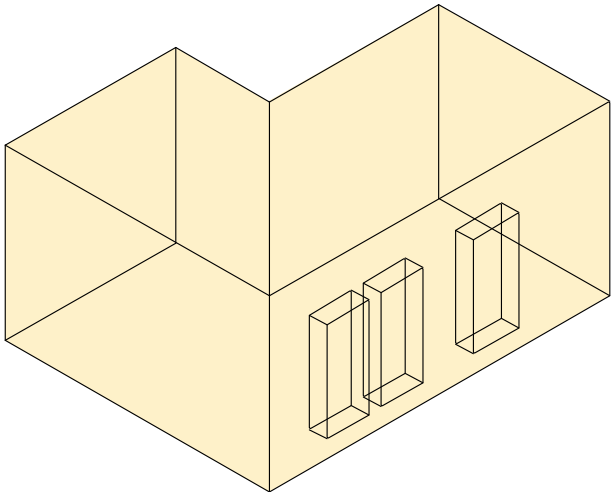
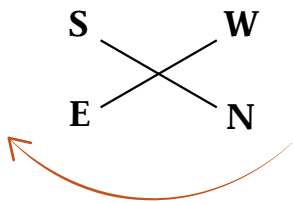
## 24-hour average // common room

These calculations have been conducted for the dormitory common room. The investigations should demonstrate the influence of the orientation of the windows (north, south, west and east) in the months between July and September, as the BSim simulation showed that these months are the most critical.

The internal loads are calculated the same as in the BSim calculation. Lighting is part of the calculation only in September.

The calculations display that the orientation towards the north leads to lower temperatures. However, this orientation is unsuitable with regards to daylight.

Most importantly, the temperatures never exceed a critical value. The higher temperatures in September can be explained by the additional internal loads due to lighting.



| Ill. 41. Common room

### July

north

Chooosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,6 °C	
Temperature variation	Δti =	1,5 °C	
Max. Temperature	timax =	23,4 °C	

east

Chooosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,1 °C	
Temperature variation	Δti =	2,4 °C	
Max. Temperature	timax =	24,3 °C	

south

Chooosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,4 °C	
Temperature variation	Δti =	2,6 °C	
Max. Temperature	timax =	24,7 °C	

west

Chooosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,1 °C	
Temperature variation	Δti =	2,4 °C	
Max. Temperature	timax =	24,3 °C	

| Ill. 42. 24-hour average July



## August

north

Chosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,6 °C	
Temperature variation	$\Delta t_i =$	1,5 °C	
Max. Temperature	t <sub>imax</sub> =	23,4 °C	

east

Chosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,1 °C	
Temperature variation	$\Delta t_i =$	2,4 °C	
Max. Temperature	t <sub>imax</sub> =	24,3 °C	

south

Chosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,4 °C	
Temperature variation	$\Delta t_i =$	2,6 °C	
Max. Temperature	t <sub>imax</sub> =	24,7 °C	

west

Chosen month:	August	tu =	20,5 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	23,1 °C	
Temperature variation	$\Delta t_i =$	2,4 °C	
Max. Temperature	t <sub>imax</sub> =	24,3 °C	

| Ill. 44. 24-hour average August

## September

north

Chosen month:	September	tu =	16,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	24,1 °C	
Temperature variation	$\Delta t_i =$	2,5 °C	
Max. Temperature	t <sub>imax</sub> =	25,4 °C	

east

Chosen month:	September	tu =	16,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	24,5 °C	
Temperature variation	$\Delta t_i =$	3,3 °C	
Max. Temperature	t <sub>imax</sub> =	26,2 °C	

south

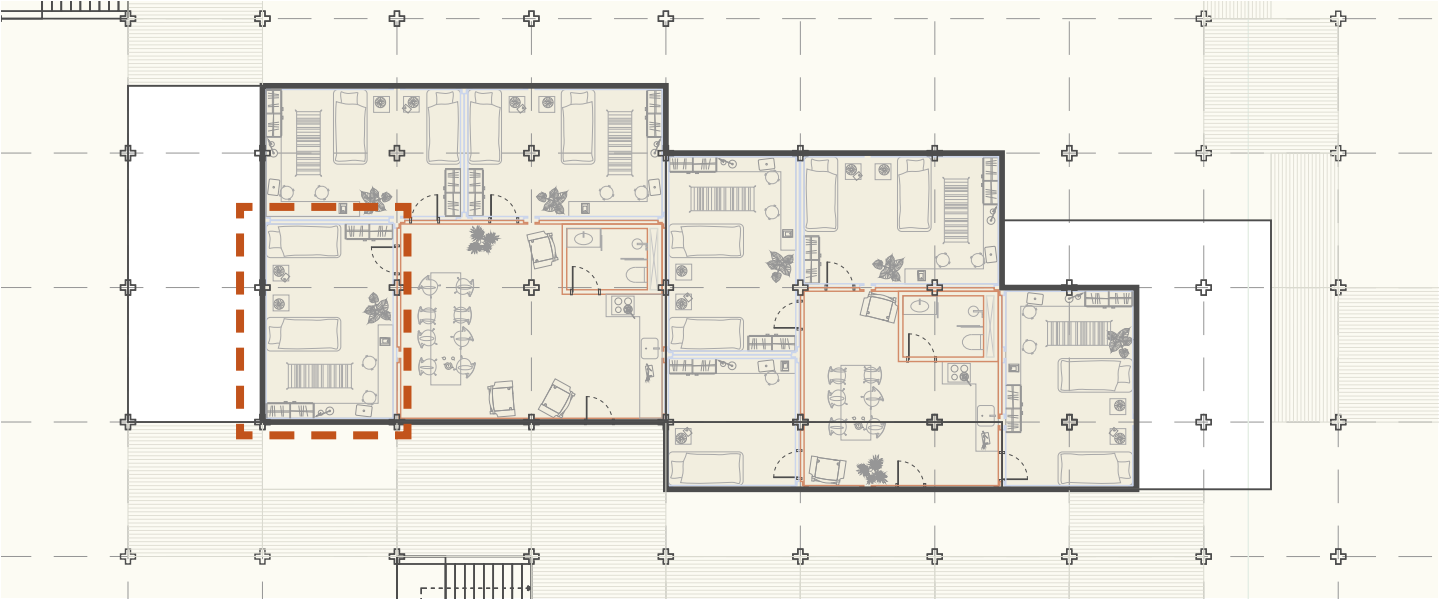
Chosen month:	September	tu =	16,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	24,8 °C	
Temperature variation	$\Delta t_i =$	3,4 °C	
Max. Temperature	t <sub>imax</sub> =	26,5 °C	

west

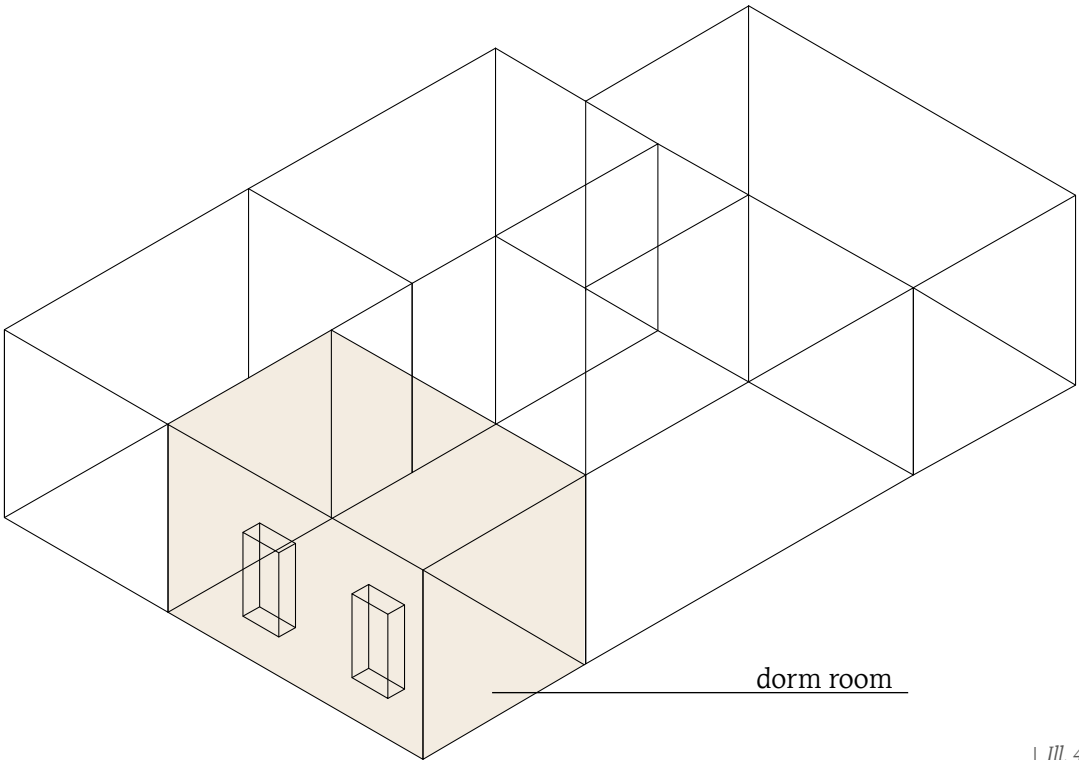
Chosen month:	September	tu =	16,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	24,5 °C	
Temperature variation	$\Delta t_i =$	3,3 °C	
Max. Temperature	t <sub>imax</sub> =	26,1 °C	

| Ill. 43. 24-hour average September

To ensure that the thermal comfort in the bedrooms is also adequate, a simulation was carried out with BSim. The settings for systems and time schedules are the same that were used in the common room after adjustments. Only lightning, people load and equipment were altered according to the use.

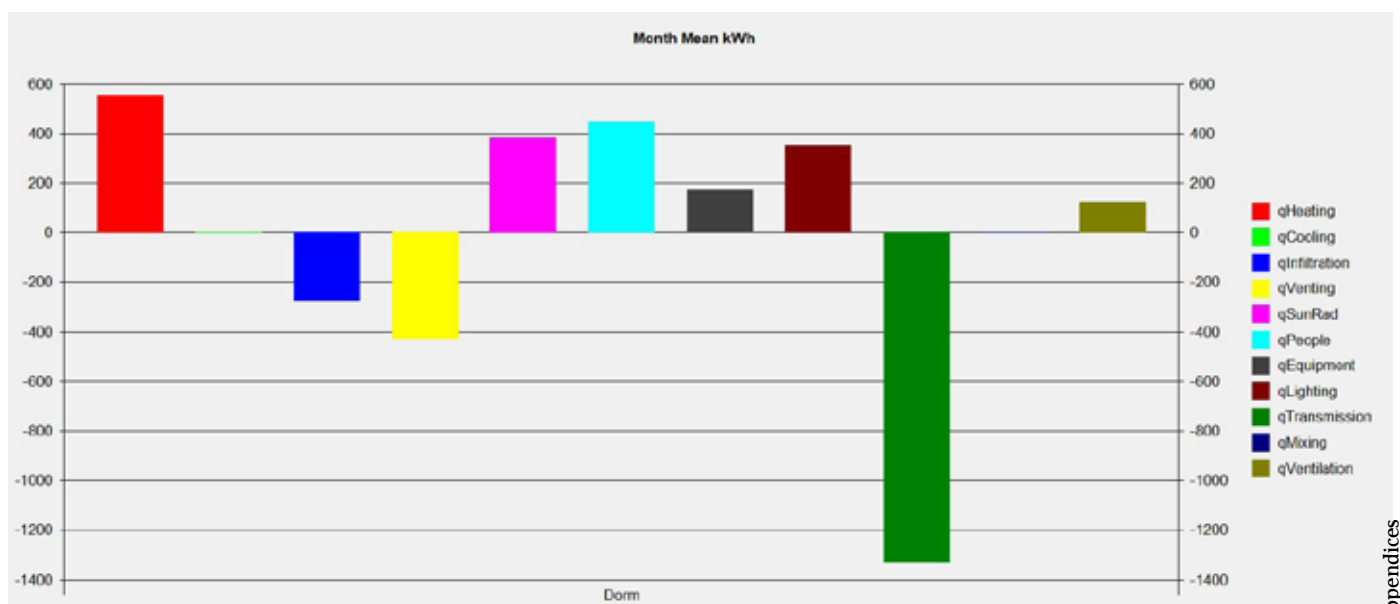


| Ill. 45. Dorm room in the first floor



| Ill. 46. BSim Model

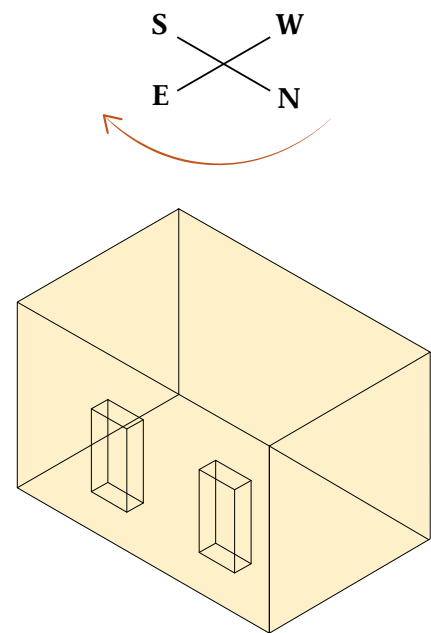
2019	Month	Hours	Dorm											
Dorm	Sum/Mean	1 (31 days)	2 (28 days)	3 (31 days)	4 (30 days)	5 (31 days)	6 (30 days)	7 (31 days)	8 (31 days)	9 (30 days)	10 (31 days)	11 (30 days)	12 (31 days)	
qHeating	549.79	108.13	98.93	116.32	21.69	0.00	0.00	0.00	0.00	1.85	5.60	89.21	108.05	
qCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
qInfiltration	-273.98	-36.15	-32.86	-38.23	-24.16	-16.90	-12.38	-7.55	-7.33	-11.89	-20.35	-30.24	-35.94	
qVenting	-427.49	0.00	0.00	0.00	0.00	-115.70	-89.02	-69.25	-80.64	-72.88	0.00	0.00	0.00	
qSunRad	381.46	4.93	11.78	30.29	46.86	60.46	59.20	60.66	46.68	32.27	17.78	6.78	3.77	
qPeople	446.76	37.94	34.27	37.94	36.72	37.94	36.72	37.94	37.94	36.72	37.94	36.72	37.94	
qEquipment	175.20	14.88	13.44	14.88	14.40	14.88	14.40	14.88	14.88	14.40	14.88	14.40	14.88	
qLighting	353.00	46.50	41.57	44.33	41.35	0.00	0.00	0.00	0.00	42.28	45.53	44.95	46.50	
qTransmiss	-1329.32	-206.13	-178.99	-194.03	-107.16	-59.40	-36.17	-5.96	-11.54	-48.76	-103.45	-170.04	-207.69	
qMixing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
qVentilation	124.59	29.89	11.84	-11.51	-29.69	78.72	27.24	-30.72	0.00	6.02	2.08	8.22	32.48	
Sum	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	
tOutdoor me	8.1	0.7	0.4	-0.7	7.1	11.5	14.2	17.8	17.9	14.5	9.8	3.4	0.7	
tOp mean(°C)	22.0	21.8	21.9	21.9	22.0	21.7	22.1	22.7	22.6	22.1	21.9	21.9	21.8	
AirChange(/h)	3.6	3.6	3.6	3.6	3.6	4.5	4.6	2.3	1.9	5.1	3.6	3.6	3.6	
Rel. Moisture (%)	39.3	25.0	25.2	23.0	32.6	42.0	52.6	60.0	58.3	51.8	44.1	30.8	26.4	
Co2(ppm)	529.0	536.9	536.5	536.3	537.5	509.5	503.4	531.4	552.5	496.8	535.9	535.1	535.9	
PAQ(-)	0.4	0.6	0.6	0.6	0.5	0.4	0.2	0.1	0.1	0.2	0.3	0.5	0.6	
Hours > 21	8096	709	661	743	706	564	628	621	632	712	712	705	703	
Hours > 27	14	0	0	0	0	0	0	14	0	0	0	0	0	
Hours > 28	3	0	0	0	0	0	0	3	0	0	0	0	0	
Hours < 20	0	0	0	0	0	0	0	0	0	0	0	0	0	
FanPow	355.99	36.06	32.57	36.06	34.90	33.33	32.07	4.65	0.00	39.35	36.06	34.89	36.06	
HtRec	5908.73	844.37	768.21	876.57	525.17	353.17	229.94	0.00	0.00	285.24	473.52	707.91	844.62	
ClRec	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HtCoil	700.81	108.68	82.11	68.38	30.04	102.91	55.19	0.00	0.00	39.14	35.78	67.26	111.32	
ClCoil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Humidif	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FloorHeat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FloorCool	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CentHeatPl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CentHeatPl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CentCooling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	



As for the calculations for the common room, the different window orientations were similarly tested for the dorm room.

According to the BSim simulation, the most critical month in terms of overheating was July. Therefore, this month was selected for the 24-hour average calculations to illustrate the temperature differences at a closer level.

Since the internal loads are much lower in the dorm room than in the common room, January and December were included in the 24-hour average, as these are the coldest months. This is to ensure that the temperatures do not drop too low.



| Ill. 48. Dorm room

July

north

Chooosen month:	July	tu =	21 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,3 °C	
Temperature variation	Δti =	1,3 °C	
Max. Temperature	timax =	22,9 °C	

east

Chooosen month:	July	tu =	21 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,8 °C	
Temperature variation	Δti =	2,2 °C	
Max. Temperature	timax =	24,0 °C	

south

Chooosen month:	July	tu =	21 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,8 °C	
Temperature variation	Δti =	1,9 °C	
Max. Temperature	timax =	23,7 °C	

west

Chooosen month:	July	tu =	21 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,9 °C	
Temperature variation	Δti =	2,3 °C	
Max. Temperature	timax =	24,0 °C	

| Ill. 49. 24-hour average July

## January

north

Chosen month:	January	tu =	3,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,4 °C	
Temperature variation	Δti =	2,0 °C	
Max. Temperature	t <sub>imax</sub> =	22,4 °C	

east

Chosen month:	January	tu =	3,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,6 °C	
Temperature variation	Δti =	2,6 °C	
Max. Temperature	t <sub>imax</sub> =	22,9 °C	

south

Chosen month:	January	tu =	3,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,3 °C	
Temperature variation	Δti =	3,4 °C	
Max. Temperature	t <sub>imax</sub> =	24,0 °C	

west

Chosen month:	January	tu =	3,9 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,6 °C	
Temperature variation	Δti =	2,5 °C	
Max. Temperature	t <sub>imax</sub> =	22,8 °C	

| Ill. 50. 24-hour average January

## December

north

Chosen month:	December	tu =	6 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,6 °C	
Temperature variation	Δti =	1,9 °C	
Max. Temperature	t <sub>imax</sub> =	22,6 °C	

east

Chosen month:	December	tu =	6 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,7 °C	
Temperature variation	Δti =	2,3 °C	
Max. Temperature	t <sub>imax</sub> =	22,8 °C	

south

Chosen month:	December	tu =	6 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	22,2 °C	
Temperature variation	Δti =	3,2 °C	
Max. Temperature	t <sub>imax</sub> =	23,8 °C	

west

Chosen month:	December	tu =	6 °C
If the ventilation air has same temperature as outdoor air			
24-hour average	ti =	21,7 °C	
Temperature variation	Δti =	2,3 °C	
Max. Temperature	t <sub>imax</sub> =	22,8 °C	

| Ill. 51. 24-hour average December



To get an overview of the total energy consumption, one building block was audited in Be18.

The type of unit is a „multi-story“ building with several residential units and a public space on the ground floor. The built-up area is 246.22 m<sup>2</sup> and the heated floor amounts to 425.06 m<sup>2</sup>. The assumed heat capacity is 80 Wh/Km<sup>2</sup> and the building is permanently in use.

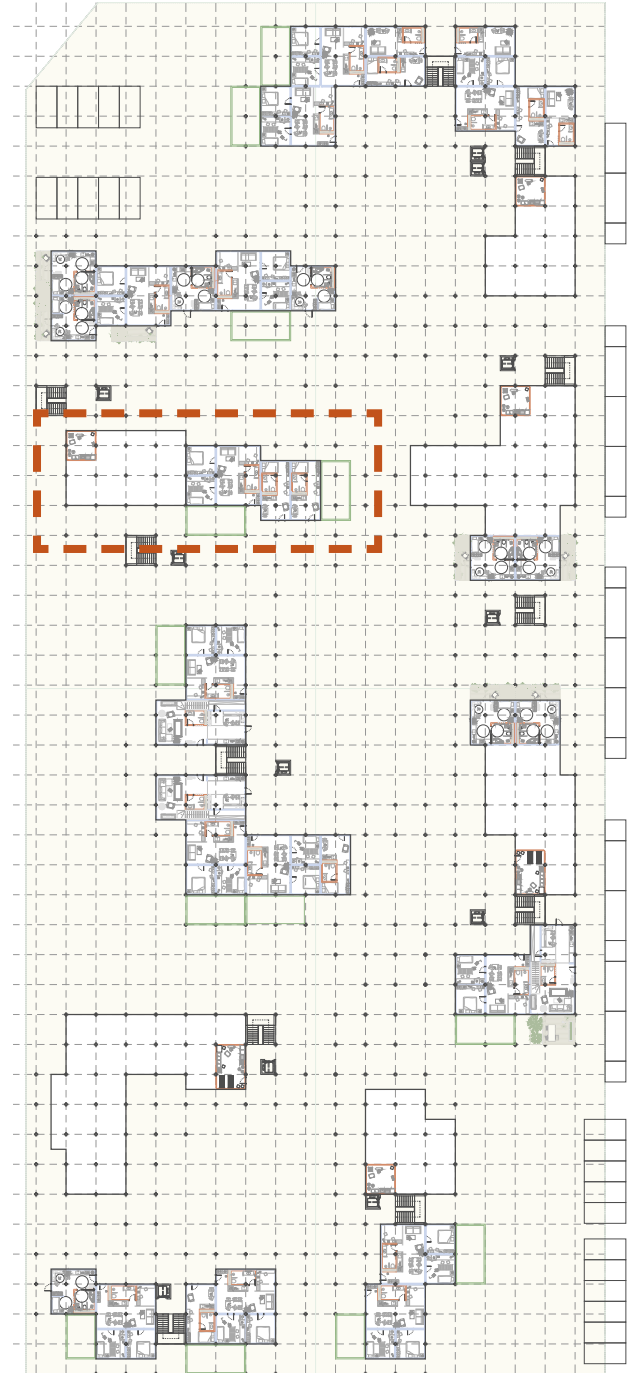
Supplements to the energy frame for special conditions is not applicable since the intended usage is residential.

The U-values were calculated with Ubakus and for the windows values from Rational wooden frame windows were used. Additional line losses as a result of change in construction are also taken into account.

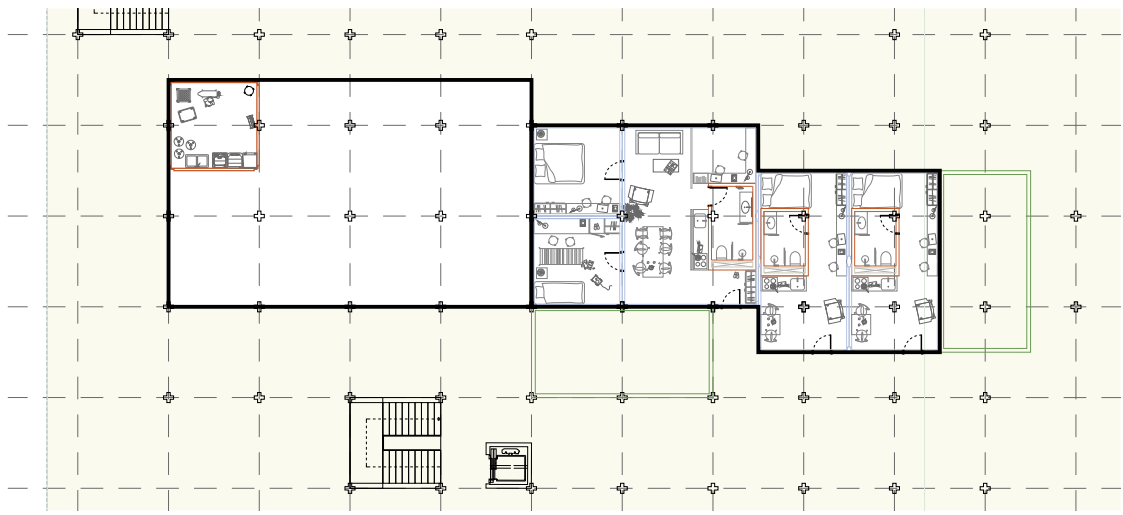
The next pages contain the entries in Be18, followed by the key numbers. The inputs are calculated according to SBi-213, edition 6.

For ventilation and lightning, the building was divided into zones. A flat constitutes one zone. The public zone on the ground floor was assessed as a separate zone, as in some cases there are other requirements.

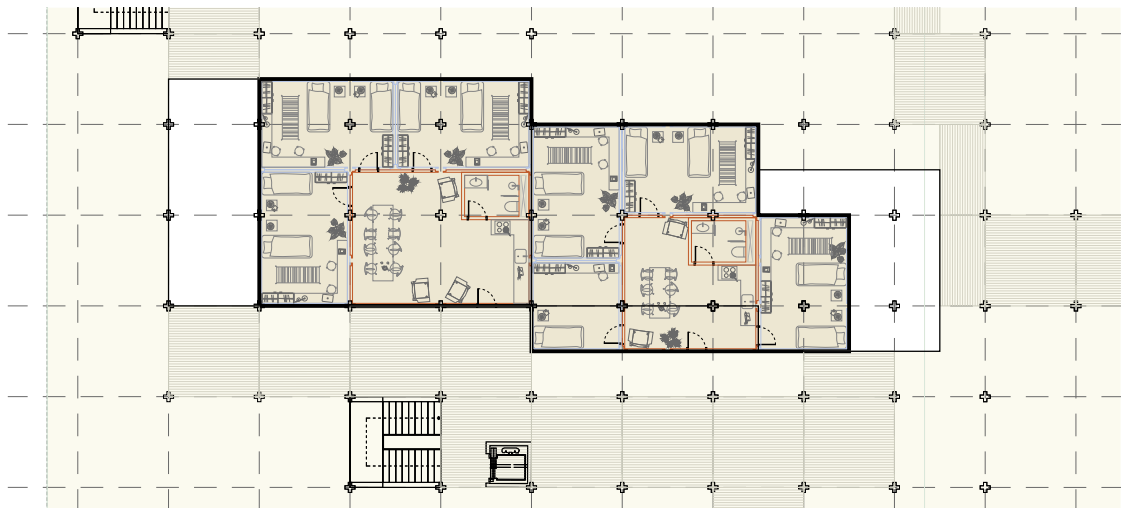
Solar cells were installed on the roof of the top floor. These roof areas are the least shaded and the solar cells can be optimally positioned on the flat roof. Areas were left free for maintenance work and inspections.



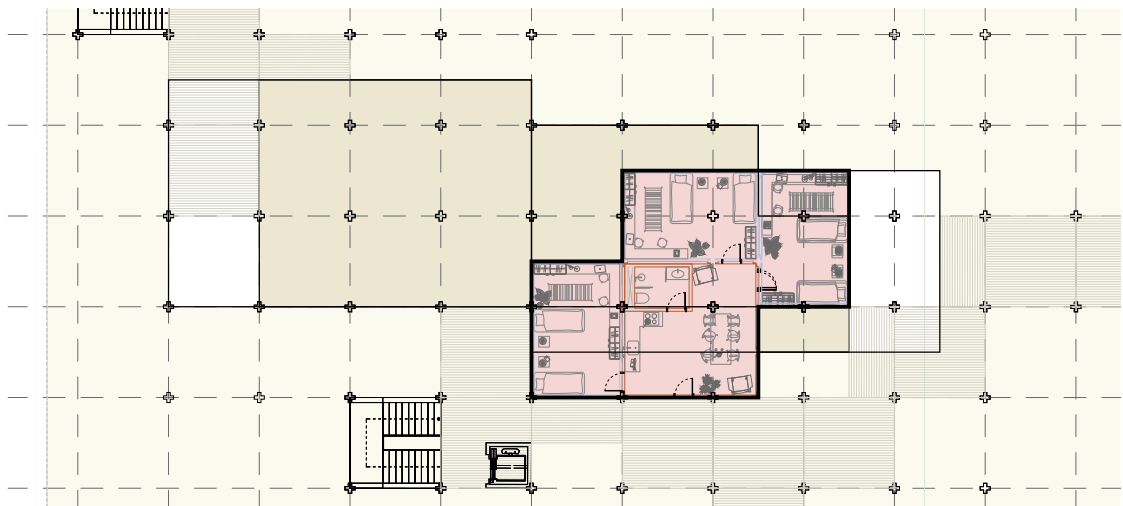
| Ill. 52. Site overview



| Ill. 53. Groundfloor



| Ill. 54. First floor



| Ill. 55. Top floor

General building information

Building

Name

Refugee Community Village

Multi-sto

▼

Detached house (detached single-family house)  
Semi-detached and nondetached houses  
Multi-storey house, Store etc or Other (non-residential)

1

Number of residential units

0

Rotation, deg.

425,06

Heated floor area, m²

425,06

Gross area, m²

0

Heated basement, m²

0

Other, m²

246,22

Developed area, m²

80

Heat capacity, Wh/K m²

Start at

End at (time)

168

Normal usage time, hours/week

0

24

Heat supply

District h

▼

Basis: Boiler, District heating, Block heating or Electricity

☐

Heat distribution plant (if electric heating)

Contribution from (in order of priority)

☐ 1. Electric panels

☐ 2. Wood stoves, gas radiators etc.

☐ 3. Solar heat

☒ 4. Heat pump

☒ 5. Solar cells

☐ 6. Wind mills

Total heat loss

Transmission loss 7,9 kW 18,5 W/m²  
Ventilation loss without HRV 8,7 kW 20,4 W/m² (in winter)  
Total 16,6 kW 38,9 W/m²  
Ventilation loss with HRV 4,7 kW 11,1 W/m² (in winter)  
Total 12,6 kW 29,6 W/m²

Calculation rules

BR: Actual co

▼

See calculation guide

Supplement to energy frame for special conditions, kWh/m² year

0

Only possible for other than residential buildings and calculation rules: BR: Actual conditions.

Warning: New reference for lightning in BR15: 300 lux.

Mechanical cooling

0

Share of floor area, -

Description

Comments

Transmission loss frame

Normal 16,2 W/m²  
Low energy 15,2 W/m²

| Ill. 56. General building information

## Key numbers // Outcome

Key numbers, kWh/m <sup>2</sup> year			
Renovation class 2			
Without supplement	Supplement for special conditions	Total energy frame	
75,2	0,0	75,2	
Total energy requirement		17,0	
Renovation class 1			
Without supplement	Supplement for special conditions	Total energy frame	
56,4	0,0	56,4	
Total energy requirement		17,0	
Energy frame BR 2018			
Without supplement	Supplement for special conditions	Total energy frame	
32,4	0,0	32,4	
Total energy requirement		17,0	
Energy frame low energy			
Without supplement	Supplement for special conditions	Total energy frame	
27,0	0,0	27,0	
Total energy requirement		17,0	
Contribution to energy requirement		Net requirement	
Heat	0,1	Room heating	34,6
El. for operation of bulding	0,3	Domestic hot water	13,1
Excessive in rooms	16,3	Cooling	0,0
Selected electricity requirements		Heat loss from installations	
Lighting	28,4	Room heating	0,0
Heating of rooms	0,0	Domestic hot water	0,0
Heating of DHW	0,0	Output from special sources	
Heat pump	10,7	Solar heat	0,0
Ventilators	2,6	Heat pump	34,5
Pumps	0,0	Solar cells	30,1
Cooling	0,0	Wind mills	0,0
Total el. consumption	44,1		

| Ill. 57. Key numbers - Be18 outcome

Building envelope

	External walls, roofs and floors	Area (m²)	U (W/m²K)	b	Ht (W/K)	Dim. Inside (C)	Dim. Outside (C)	Loss (W)
		1116,71		CtrlClick	132,106			4230,26
1	Wall GF South	81,8	0,14	1,00	11,452			366,464
2	Wall GF North	89,23	0,14	1,00	12,4922			399,75
3	Wall GF West	29,52	0,14	1,00	4,1326			132,25
4	Wall GF East	35,68	0,14	1,00	4,9952			159,846
5	Wall 1 South	70,22	0,14	1,00	9,8306			314,586
6	Wall 1 North	73,68	0,14	1,00	10,3152			330,086
7	Wall 1 West	35,36	0,14	1,00	4,9504			158,413
8	Wall 1 East	37,6	0,14	1,00	5,264			168,448
9	Wall 2 South	36,59	0,14	1,00	5,1226			163,923
10	Wall 2 North	40,88	0,14	1,00	5,7232			183,142
11	Wall 2 West	30,16	0,14	1,00	4,2224			135,117
12	Wall 2 East	31,12	0,14	1,00	4,3568			139,418
13	Floor	246,22	0,09	1,00	22,1568			709,114
14	Roof	262,45	0,098	1,00	25,7201			823,043
15	+ Floor to outer	16,2	0,09	1,00	1,458			46,656
+16								
17								
18								
19								
20								

| Ill. 58. Building envelope

Line losses

	Foundations and joints at windows	l (m)	Loss (W/mK)	b	Ht (W/K)	Dim. Inside (C)	Dim. Outside (C)	Loss (W)
		586,8		CtrlClick	21,6			691,2
1	Foundation Line Loss	82,8	0,2	1,00	16,56			529,92
2	Doors Line Loss	48	0,01	1,00	0,48			15,36
3	Windows Line Loss	342,6	0,01	1,00	3,426			109,632
4	Roof Line Loss	113,4	0,01	1,00	1,134			36,288
+5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

| Ill. 59. Line losses

Windows

	Windows and outer doors	Number	Orient	Inclination	Area (m²)	U (W/m²K)	b	Ht (W/K)	PF (-)	g (-)	Shading	Pc (-)	Dim. Inside	Dim. Outside	Loss (W)	Ext
		77			198		CtrlClick	92,448			CtrlClick				2958,34	6/1
1	Type A North	6	0	90	1,68	0,8	1,00	8,064	0,8	0,48	1				258,048	0
2	Type A South	14	180	90	1,68	0,8	1,00	18,816	0,8	0,48	1				602,112	0
3	Type A West	5	270	90	1,68	0,8	1,00	6,72	0,8	0,48	1				215,04	0
4	Type A East	0	90	90	1,68	0,8	1,00	0	0,8	0,48	1				0	0
5	Type B North	12	0	90	1,28	0,8	1,00	12,288	0,8	0,48	1				393,216	0
6	Type B South	9	180	90	1,28	0,8	1,00	9,216	0,8	0,48	1				294,912	0
7	Type B West	3	270	90	1,28	0,8	1,00	3,672	0,8	0,48	1				98,304	0
8	Type B East	3	90	90	1,28	0,8	1,00	3,672	0,8	0,48	1				98,304	0
9	Type C North	9	0	90	0,96	0,8	1,00	6,912	0,8	0,48	1				221,184	0
10	Type C South	3	180	90	0,96	0,8	1,00	2,304	0,8	0,48	1				73,728	0
11	Type C West	3	270	90	0,96	0,8	1,00	2,304	0,8	0,48	1				73,728	0
12	Type C East	2	90	90	0,96	0,8	1,00	1,536	0,8	0,48	1				49,152	0
13	Door North	1	0	90	1,89	1,2	1,00	2,268	0,8	0,48	1				72,576	0
14	Door South	7	180	90	1,89	1,2	1,00	15,876	0,8	0,48	1				508,032	0
15	Door West	0	270	90	1,89	1,2	1,00	0	0,8	0,48	1				0	0
16	Door East	0	90	90	1,89	1,2	1,00	0	0,8	0,48	1				0	0
+17																
18																
19																
20																

| Ill. 60. Windows



Ventilation

Ventilation	Area (m²)	Fo, -	qm (l/s m²)	n vgr (-)	t (°C)	EI-HC	qn (l/s m²)	qun (l/s m²)	SEL (kJ/m²)	qms (l/s m²)	qms (l/s m²)	qms (l/s m²)	qms (l/s m²)
Zone	425.08		Winter			0/1	Winter	Winter		Summer	Summer	Night	Night
1 Groundfloor Public Space	103.68	1	0.3	0.8	18	0	0	0	1	0.3	0	0	0
2 Groundfloor Unit C1	51.77	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
3 Groundfloor Unit B2	20.74	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
4 Groundfloor Unit B2	20.74	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
5 First Floor Dormitory 1	77.76	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
6 First Floor Dormitory 2	80.3	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
7 Second Floor Dormitory 3	70.09	1	0.3	0.8	18	0	0.3	0	1	0.3	0	0	0
+8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

| Ill. 61. Ventilation

Lighting

Lighting	Area (m²)	General (W/m²)	General (W/m²)	Lighting (lux)	DF (%)	Control (U, M, A)	Fo (-)	Work (W/m²)	Other (W/m²)	Stand-by (W/m²)	Night (W/m²)
Lighting zone	425.08	Min.	Inst.			U,M,A,K					
1 Groundfloor Public Space	103.68	3	2	500	3	A	1	1	0	0	0
2 Groundfloor Unit C1	51.77	3	2	300	2	M	0.8	0	0	0	0
3 Groundfloor Unit B2	20.74	3	2	300	2	M	0.6	0	0	0	0
4 Groundfloor Unit B2	20.74	3	2	300	2	M	0.6	0	0	0	0
5 First Floor Dormitory 1	77.76	3	2	300	2	M	0.8	0	0	0	0
6 First Floor Dormitory 2	80.3	3	2	300	2	M	0.8	0	0	0	0
7 First Floor Dormitory 3	70.09	3	2	300	2	M	0.8	0	0	0	0
+8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

| Ill. 62. Lighting

Internal heat supply

Internal heat supply	Area (m²)	Persons (W/m²)	App. (W/m²)	App. night (W/m²)
Zone	425.1	637.6 W	1487.7 W	0.0 W
1 Ground Floor	195.98	1.5	3.5	0
2 First Floor	158.09	1.5	3.5	0
3 Second Floor	69.99	1.5	3.5	0
+4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

| Ill. 63. Internal heat supply

Heat pump

Description

New heat pump

Heat pump Function

Share of floor area, -

Combined

1

Hot-water tank

Volume 0 litres

Room heating

DHW

12

0,8

4,5

3,2

0,9

0

Nominal effect, kW

Nominal COP, -, Incl. of pumps, ventilators and automatics

Rel. COP at 50% load, -

Test temperatures, °C

0

0

42

36

Cold side

Warm side

Earth hose

Heating pla

55

55

6

0

Cold side: Earth hose, Vent, Outdoor air or Other source

Warm side: Room air, Air supply or Heating plant

Special auxiliary tool, W, not included in nominal COP

Automatics, stand-by, W, (constant service)

Heat pumps connected with ventilation

0

0

0

0

Temp. Efficiency for HRV before heat pump, -

Dim. air supply temperature, °C

Air flow, m³/s

Data for other source

| Ill. 64. Heat pump

Solar cells

Description

New solar cells

Solar cells

65

Panel area, m²

0,45

Peak Power (RS), kW/m²

0,35

System efficiency (Rp), -

Orientation and shadows

180

Orientation, S, SE, E, ...

35

Slope, °, 0, 10, 20, 30, ...

0

Horizon cutoff, °

0

Left shadow, °

0

Right shadow, °

| Ill. 65. Solar cells

## Heating requirement

MWh	January	February	March	April	May	June	July	August	September	October	November	December	Total
Heating requirement													
1 Trans- and vent. loss	5.66	5.18	6.08	3.66	2.49	1.64	0.65	0.62	1.55	2.99	4.71	5.66	40.89
2 Vent. VF (total)	0.21	0.20	0.25	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.15	0.21	1.09
3 Vent. VQV down reg.	0.00	0.00	0.00	0.00	-0.03	-0.09	-0.18	-0.18	-0.10	0.00	0.00	0.00	-0.59
4 Heat loss	5.45	4.98	5.83	3.59	2.52	1.73	0.83	0.80	1.65	2.99	4.56	5.45	40.39
5 Incident solar radiation	0.64	1.14	2.19	2.65	2.85	2.62	2.81	2.79	2.49	1.83	0.81	0.51	23.34
6 Internal supply	1.58	1.43	1.58	1.53	1.58	1.53	1.58	1.58	1.53	1.58	1.53	1.58	18.62
7 From pipe and VVB const.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8 Total supplement	2.22	2.57	3.77	4.18	4.43	4.15	4.39	4.38	4.02	3.41	2.34	2.09	41.96
9 Rel. supplement -	0.41	0.52	0.65	1.16	1.78	2.40	5.30	5.46	2.44	1.14	0.51	0.38	
10 Part of room heating	1.00	1.00	1.00	0.47	0.00	0.00	0.00	0.00	0.00	0.50	1.00	1.00	
11 Variable heat supplement	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12 Total supplement	2.22	2.57	3.77	4.18	4.43	4.15	4.39	4.38	4.02	3.41	2.34	2.09	41.96
13 Rel. supplement -	0.41	0.52	0.65	1.16	1.78	2.40	5.30	5.46	2.44	1.14	0.51	0.38	
14 Utilization factor	1.00	0.99	0.98	0.80	0.56	0.42	0.19	0.18	0.41	0.81	0.99	1.00	
15 Heat requirement	3.23	2.42	2.13	0.12	0.00	0.00	0.00	0.00	0.00	0.12	2.24	3.36	13.62
16 Vent. VF (central heating)	0.21	0.20	0.25	0.06	0.00	0.00	0.00	0.00	0.00	0.01	0.15	0.21	1.09
17 Total	3.45	2.62	2.38	0.19	0.00	0.00	0.00	0.00	0.00	0.12	2.39	3.57	14.71

| Ill. 66. Heating requirement