

STUDENT LAB  
experimental sustainable living  
A M a s t e r T h e s i s b y  
Eva Pirri & Galini Afentoulidou







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For any mistakes that may be in this project the responsibility is entirely ours.



# ABSTRACT

Student Lab is a master thesis research and design project that investigates how to increase socialization and decrease energy consumption in a student house. The outcome is to find innovative design solutions that can help the transition towards sustainability and apply them to the design of a student house. Student Lab is applied to the ongoing Living Lab project at Chalmers to be able to follow a real time project that connects sustainable living technologies and behavioural change techniques.

The structure of this master thesis is divided in three parts.

Firstly, an investigation part that studies student housing evolution, energy efficient architecture, sustainability as a life changing motif and interactive research as ethnographic interviews, study visit and shared living experience.

Secondly, a transition part that gathers information from the investigation and meeting with actors of the Living Lab project and subsequently transforms them into design criteria to apply to the design of the student house.

Lastly, a design part with site analysis, design concepts, drawings, visualizations and an energy performance comparison. The design proposal shows a solution for experimental sustainable living in a student house exploring the concept of sharing.

This project has been carried out on half time basis along with the Halo Team Sweden project for the Solar Decathlon China 2013.





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*“Earth provides enough to satisfy every man’s needs,  
but not every man’s greed.”*

- Mahatma Gandhi

(Goodreads, 2008)



(Gospodinov, 2013)

# 1.INTRODUCTION

Today people are becoming more and more isolated. We have passed from a time where families lived together sharing activities, life and knowledge to an age where people live alone by choice and have stopped sharing routines with others. Moreover with globalisation in the 21st century, where countries opened their borders to facilitate exchange and commerce, there is a feeling that people have become even more isolated. The rise of social networks made human contact evolve into virtual communication and the primal human pull of socialization might be turning into “de-socialization”. As Aristotle said, *“Man is by nature a social animal; an individual who is unsocial naturally and not accidentally is either beneath our notice or more than human. Society is something that precedes the individual. Anyone who either cannot lead the common life or is so self-sufficient as not to need to, and therefore does not partake of society, is either a beast or a god.”* (Goodreads, 2009). There is a need to improve socialization and reestablish values that allow people to share more.

At the same time climate change is threatening the Earth. Human behavior promotes consumption, emissions and exploitation of natural resources; the impact this has on the environment is tangible. There is an urgent need to quickly and drastically reduce these factors and for people to be pro-active, starting from their homes, sharing information, knowledge and news.



Individualism. (Individualismo, n.d.)



Polluted Beach, Agios Nikolaos area, Crete, Greece.  
(Tom Szustek, 2011)

## 1.1 Background

This master thesis study focuses on Gothenburg, Sweden. Gothenburg is the second largest city in Sweden and is organized in 20 main areas. The center is where all the historical buildings are together with museums, shops and two of the leading universities in the country: Gothenburg University and Chalmers. Sustainability is considered an important issue and is prominent within the curriculum of both universities. Around 60.000 students from all over the world come to Gothenburg and thus search for a dwelling that can ensure their comfort and productivity during the academic period. Unfortunately, the existing building stock of apartments is not enough to meet the demands of the incoming students. SGS Studentbostäder and Chalmers Studentbostäder are the main student housing companies, providing more than 9500 student apartments of 1, 2, 3 or 4 rooms. Around 4000 new apartments are planned to be built before 2021(Sjögren, 2011).

In the autumn of 2012 local politicians discussed the housing shortage problem in the area and proposed a short-term solution of hosting students in temporary constructions, like caravans and barracks around the city (Genborg, 2012). At the same time, the research program Homes for Tomorrow (H42) together with Johanneberg Science Park and HSB started the Living Lab project at Chalmers (Chalmers, n.d.). The goal of this project

is to build a new student house in Johanneberg campus that helps with the shortage of student apartments and experiments with new architectural solutions and engineering technologies. This student house will give its tenants the opportunity to learn the importance of sustainability both socially and environmentally, enabling them to lead a more sustainable lifestyle.



Position of Gothenburg in Väster Götaland (Map of Sweden, n.d.)



Old Map of Gothenburg(Ludvig Simon, 1888)



Map of Gothenburg (Map of Gothenburg 2006.1, 2006)

But in what way could student housing help the transition toward sustainability? What kind of process is it and what does it entail?

This master thesis investigates how to increase socialization and decrease energy consumption through behavioral change. To design solutions that will help to answer the above raised questions and obtain a strategy that will be possible to apply in the Living Lab project in Gothenburg and that could be taken as example in other situations around the world.



Socialization (Pranzo Amici Estate, n.d.)



Take care of the environment (Seeds Of Children, n.d.)



Care about future generations (Header, n.d.)

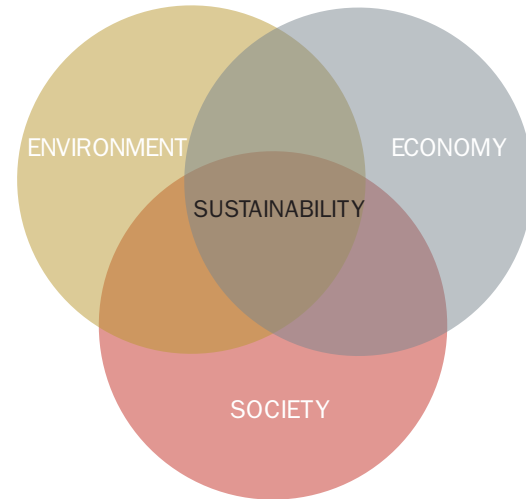
## 1.2 Approaching sustainability

The word sustainability is derived from the Latin *sustinere* (tenere, to hold; sus, up) (Dictionary.com, n.d.). Dictionaries provide more than ten meanings for sustain, the main ones include to “maintain”, “support”, or “endure”. However, since the 1980s the term sustainability has been used more in the sense of human sustainability on planet Earth resulting in the official definition of sustainable development that was published in 1987 by the World Commission on Environment and Development, known as the Brundtland Commission:

*“Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs”* (IISD, n.d.).

How then can sustainable development be implemented in our work as architects and promoted in student housing?

From an architectural perspective sustainability, other than being the confluence of environmental, social, economical factors, provides the opportunity for innovative architectural solutions. With the support of technology, renewable energy and passive strategies people will get inspired to think about environmental issues that affect our society, bringing them together to achieve substantial results for the present and the future.



(Sustainability diagram, n.d.)

So what is our role, as architects, in the process towards sustainability? How do we design for a sustainable future?

First of all, a building is a “structure with roof and walls, such as a house or factory” (Oxford Dictionaries, n.d.). Marco Vitruvio Pollione, also known as simply Vitruvio, says that every work of architecture should satisfy 3 concepts: *utilitas*, *firmitas* and *venustas*. This means that the building, which is a work of architecture, should be useful (*utilitas*), stable (*firmitas*) and beautiful (*venustas*). Leonardo da Vinci draws the Vitruvian Man to state that every work of art, as well as every architectural work, should be built around the human dimensions and therefore should be human centred (Vitruvio, translated by Rowland and Howe, 2011).



To live in a building means to use its functions and enjoy its spaces and beauties everyday.

From our point of view, technically speaking, we perceive a sustainable building as environmentally friendly, made of low-impact and non-toxic materials that have been produced locally. Embodied energy, as well as everyday energy consumption, is low with the contribution of sun, water and wind. Moreover, it is a flexible and durable structure in order to be reused in the future and last as long as possible.

On the other hand, in a social aspect, a sustainable building is designed with a human centred approach. The architecture is based on the concept of the Vitruvian Man of Leonardo da Vinci as mentioned before, bringing people and nature together and strengthening the environmentally friendly ideology. The physical and psychological comfort of the user is satisfied by creating harmonious but small living spaces, which are optimised so that no area is wasted.

Finally, a sustainable design enables and motivates users towards a sustainable lifestyle. The expression ‘sustainable lifestyle’ includes sustainability and people. Combining the sustainable development definition, as pointed out earlier, with the definition of lifestyle “the way in which a person lives” (Oxford Dictionaries, n.d.) we come closer to the meaning of ‘sustainable lifestyle’, the way a person lives today in order to not compromise the needs of future generations.



Use of renewable energies, like solar panels (Akeena Install, n.d.)



Non Toxic Materials (Organic, n.d.)



Social Development (Re-creating society, n.d.)

Another definition of sustainable lifestyle is that, “*Sustainable living is a lifestyle that attempts to reduce an individual’s or society’s use of the Earth’s natural resources and his/her own resources*” (Ainoa, Kaskela, Lahti, Saarikoski, Sivunen, Storgårds and Zhang, 2009).

A lifestyle includes the routine, the every day occasion, the habits, the knowledge, the hobbies, the tastes and the cultural background of a person. To be sustainable a person needs to be aware of environmental issues. Through new technologies and solutions that are consuming the majority of resources, releasing ever more pollutants into the air and accumulating waste around the world, Humanity is having a detrimental effect on the environment, especially if we look at energy use and resulting carbon emissions. Leading a sustainable lifestyle should be an attitude of the people to avoid this environmental degradation by changing their way of living, being aware of what and how much they consume.

There have been many discussions on what the word “sustainable” means, and it cannot be defined in one sentence.

Sustainability pertains to both the environment and the people that inhabit it. Advances in technology, population trends, changing social habits and the effect all have on the surrounding habitat must be considered concurrently. It is very important to find new solutions to sustainability issues that involves people actively from the start. Reuse, recycle and

reduce are all consequences of a lifestyle. Not only reuse, recycle and reduce but also rethink and respect should be included as essential components of environmentally-responsible consumer behavior. Rethink as to reinvent lifestyles, sticking out from conservative ways of designing towards it helping people to change and respect as taking into consideration people and nature’s need. Therefore the R3 concept of the waste hierarchy defined in the past decade should evolve into the R5 concept (Rouse, 2008).

## 1.4 Aim and scope

The aim of this thesis is to find solutions to increase socialization and decrease energy consumption through investigations on social development and environmental preservation and apply these concepts into the design of a student house.

The topic of this thesis is applied to the Living Lab project conceived by Suslab and started at Chalmers by the research program Homes for Tomorrow (H42) in collaboration with HSB and Johanneberg Science Park. Some restrictions were given from the beginning by HSB: the building should be a movable structure of around 400sqm footprint with 3 stories. The site has been decided by Chalmers and is situated on Johanneberg campus. Other than the student rooms, this building will host an exhibition hall that will show the results of experiments made in the laboratory.

Today the shortage of student housing is a significant problem in Gothenburg. Universities keep on attracting people from all over the world but unfortunately the student apartments are too few compared to the number of students per year. Consequently, some students have to choose private accommodation that is not only more expensive but also harder to find, doesn't ensure the possibility to share the university experience with other students and may be faraway from town, school and facilities. It is hard to solve this issue in a quick way but the

result of this thesis will be to design a temporary, flexible student house that could help them for a short period of time.

Living in this Living Lab student house in the Johanneberg campus will help the students to rethink and understand problems about sustainability, getting them used to a sustainable lifestyle and to make an effort to help and respect the planet by reusing, recycling and reducing consumption.



(Chalmers Johanneberg, n.d.)

### 1.3 Living Lab, SusLab

Living Lab is a concept based on a systematic user co-creation approach integrating research and innovation processes, which are integrated through the co-creation, exploration, experimentation and evaluation of innovative ideas, concepts and related technological artefacts in real life cases. Such cases involve user communities, not only as observed subjects but also as a source of creation. Furthermore, this approach allows all involved stakeholders to concurrently consider both the global performance of a product or service and its potential adoption by users. This consideration may be made at the earlier stage of research and development and through all elements of the product life cycle, from design up to recycling. The Living Lab term is also used in user-centered research, where activities are observed and data are collected when the inhabitants live in their residence, to improve everyday life by behavior change or by merging new technologies with design based on several habits (ENoLL, n.d.).

Living Labs that are focused on the daily user's life are organised in Europe by SuslabNWE among others. Suslab is a network of living labs that observes and examines innovation processes through users participation. The European program INTERREG IVB funds it. At the moment different organisations from London, Rotterdam, Delft, Wuppertal and Gothenburg are involved. According to Suslab, users are able to sample and interact with sustainable innovation in their home environment

and therefore share their feedback with other residents and stakeholders (Suslab, n.d.). This means that users are involved in the product services design in order to create practicable and sustainable innovations.



(SusLab Logo Map, n.d.)

Living Lab that will control, register, test and show their daily energy consumption.

## 1.5 Target group: Students

One group of people that is here suggested to be particularly suitable to adaption to a new lifestyle is the youth. From being a teenager and living with parents they pass to live by themselves, become adults and build their own lives; it is a stage of transition. Youngsters are a fundamental part of the society. They are part of the future (*Ladi, 2012*).

They are energetic, they have the will to try new experiences, they are flexible, easy to adjust in new environments, open to participatory methods and eager to rethink existing solution. During this time young people learn habits that they will acquire and continue to use in the future. The more they learn now, the more they will teach forthcoming generations. They are the main actors for spreading ideas and this is why it is their role to take part in revolutions and innovations. The majority of people from 18 to 26 years old are university students (NCES, 2012); as a result this target group is assumed to be relevant for this experimental approach. The way toward sustainability is long, but after learning and experiencing it, students will be able to promote it all over the world, meeting their needs without compromising the ability of future generations to meet their own ones<sup>1</sup>. In this case they will be able to achieve this goal by being actively engaged in the

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1 The United Nation definition of sustainable development released in the Brundtland Report in 1987



Youngsters moving to college (College Move-in Day, n.d.)



College Students working and socializing (College Students, n.d.)

## 1.6 Design a building we would live in

We are two architects from two different countries, Italy and Greece, enrolled in the Master Programme Design For Sustainable Development at Chalmers in Gothenburg. In our previous studies we got the chance to study and learn about student housing. We have been living as students for some years, which gives us practical knowledge and experience on this topic. It is very important for us to design and research something we could directly use. Therefore, we would like this project to be inspired by our lives, that in this case are the same as many other students, while trying to improve future student housing conditions as well as spreading sustainability.

Moving to Sweden provided us with inspiration to explore the possibility of researching and designing student housing. In our home countries we were living in private houses while today we live in student rooms; a fact that makes us able to compare advantages and disadvantages of living alone, with family or living in a student building. Our viewpoint gives us the ability to have broader ideas and knowledge on students lives and needs but most of all we give inspiration to our project while at the same time we get inspired by it.



First Day In The New Room (©The Authors, 2013)



Approaching the design (©The Authors, 2013)



Sketching (©The Authors, 2013)

## 1.7 Solar Decathlon competition

From February 2012 we have been participating with Team Sweden from Chalmers University of Technology in the international competition Solar Decathlon China. Universities from all over the world design solar energy efficient houses, build them on site in a real scale and compete in 10 different criteria<sup>2</sup>. Halo, the proposal of Team Sweden is a student house. We have been involved as architects in the entire design process where we repeatedly discussed student living, sharing and interaction. At the same time, we have been investigating on different concepts, as well as existing student houses. One of the main characteristics of Team Sweden is that we are international students (14 countries around the world). This made us able to get deeper in diverse cultural habits. Moreover, handling a real-time-situation project brought us closer to technical aspects of the building that should be considered from the first steps of the design.

Solar Decathlon motivated us to further develop our existing knowledge on student housing while analysing and promoting sustainable ways of living through interaction.

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<sup>2</sup> Architecture, Market Appeal, Engineering, Communications, Solar Application, Comfort Zone, Hot Water, Appliances, Home Entertainment, Energy Balance.



Solar Decathlon China Site In Datong (Solar Decathlon above, n.d.)



End of Construction Period in Datong (BLOG 9, 2013)

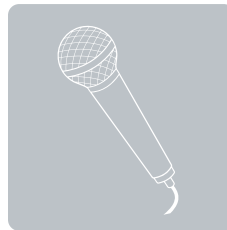
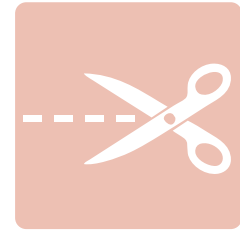
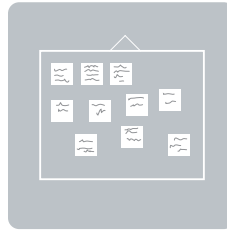
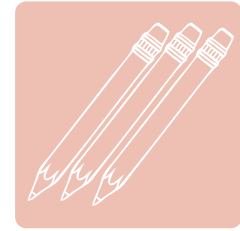


Team Sweden in the Chalmers' tent building Halo. (Building Halo, n.d.)

## 1.8 Methods

This thesis is divided into an investigation and a design part.

The investigation part started with collecting information about the Living Lab project and Suslab. Then, we explored sustainability and tried to narrow down a personal definition of it. We researched the history of student housing, student housing both in Gothenburg and the western world, case studies, student life and behaviour change. We have participated in a workshop with Homes for Tomorrow, made ethnographic studies and visited existing examples of common spaces in HSB housing blocks. Finally, we studied energy efficient solutions and passive strategies. The design part started in parallel to the above with the analysis of the area and the site. The goal is to combine the conclusions of the investigations on social development and environmental preservation into the design proposal in order to find solutions to increase socialization and decrease energy consumption.







*“a life without investigation is not worth living”*

- Plato

(GoodReads, 2008)



(Gospodinov, 2013)

## 2.INVESTIGATION

*“A research is the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions” (Oxford Dictionaries, n.d.).*

This Master Thesis investigates three main topics: student-housing evolution, sustainability as a life changing motive and energy-efficient architecture for sustainability.

By exploring student housing evolution in the western world, it is possible to understand how today’s solutions have emerged and to find new ones that improve the inhabitants comfort. Researches on behavior change help to find ways to increase socialization and improve people’s lifestyles towards sustainability. The analysis of energy-efficient architecture is useful to know how to decrease energy consumption, reduce footprint in order to make a building as environmentally friendly as possible.

However, interactive research is the basis for understanding people whatever the target group. This is used in our work, parallel to the rest of the investigations, to understand people’s needs and habits and try to cater for them in a way which is both sustainable and efficient. These methods much be transparent, tangible and explainable to all involved. A conceptual student house provides the perfect medium for this transaction of ideas.

## 2.1 Student housing evolution

Student housing in the Western context is the result of hundreds years of evolution in Europe and in the USA. Originally, student housing were called residence halls or dormitories<sup>3</sup>.

The first residence halls were founded in Bologna, in Italy around 1300. There, students were living in the Soccii. Later on during 1400, residence halls started to appear in Paris where students were living in Paedagogies.

The Paedagogies were the starting point of the colleges that currently exist. Compared with today, there were some specific requirements for living inside them. The students were accommodated according to their field of study or homeland. It was also considered advantageous for students to live in residence halls so that they would keep contact with others students and share knowledge.

At the same time in Oxford the poorer student attending university were lodged in the ‘domus pauperums’, hostels owned by the university. After 150 years, in 1550 Oxford University obtained the complete control of those hostels and expanded their use to all students.

With the reform of the university of Paris in 1808 the residence hall concept was abandoned. Nevertheless in Oxford and afterward in Cambridge

<sup>3</sup> A residence hall is “a university building containing rooms for students to live in” (Oxford Dictionaries, n.d.). A dormitory is a “large bedroom for a number of people in a school or institution” (Oxford Dictionaries, n.d.).

this model stayed rooted and is the same one that subsequently was applied to the American residence hall type (Blimling and Miltenberger, 1981).

## 2.1.1 English universities today and American residence halls

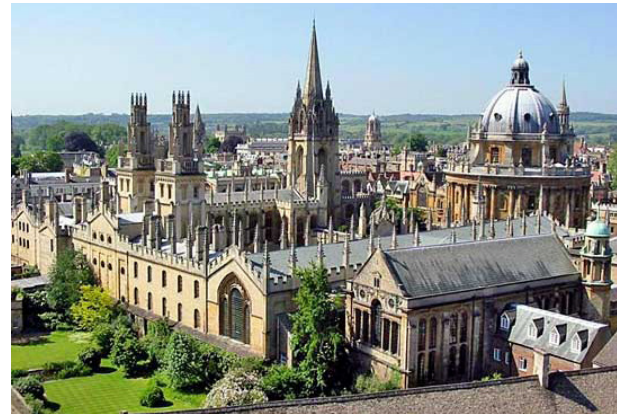
### Oxford University and University of Cambridge

At Oxford University the students belong to different colleges but they are all members of the University. The college is the center of both their academic and social life. They have the possibility to focus on their studies, use the library, attend weekly meetings and tutorings, eat, attend events, participate in sports, join music classes and have an accommodation.

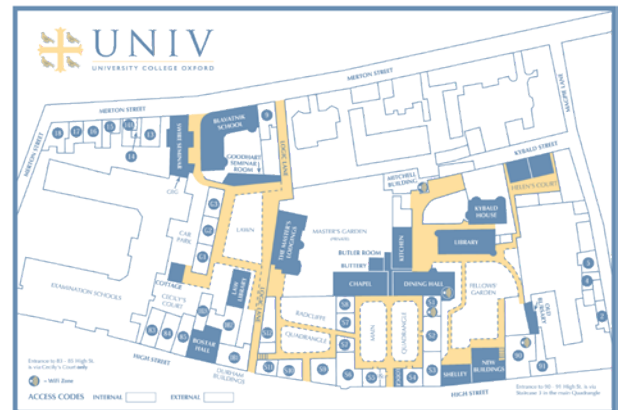
The University College Oxford is one of the oldest ones and it owns study bedrooms of which some are situated on the main site and the rest in the North of Oxford. Different common rooms are also provided as places of leisure, where the students can enjoy hobbies, watch TV or read books and newspapers (University of Oxford, n.d.).

The University of Cambridge embraces the same concept as the Oxford University but the accommodation for students is granted for 3 years and in some of the colleges even for the fourth.

The main focus of this type of college organization is to help the students to concentrate on their studies ensuring their social life by meeting future colleagues while engaging with different kind of activities.



View on Oxford University (University of Oxford, n.d.)



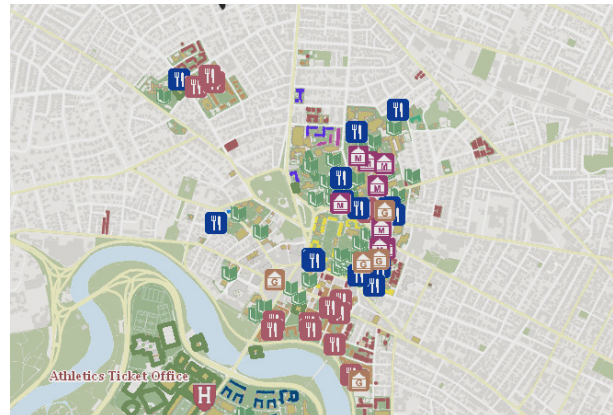
University of Oxford organization (Oxford University, n.d.)

## Harvard University and the typical American student-housing concept

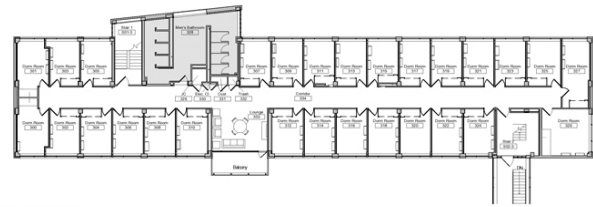
In the USA there is a long tradition of residence halls started in 1720 with the foundation of Harvard University's Massachusetts Hall. The function of this building was to host the future and present students (Susman, 2012). The Massachusetts Hall is the oldest surviving building in Harvard University. Originally it contained chambers and small private studies for students that would live there. Today this building is still partly a residence hall, in the fourth floor. The typical American university campus is organized in way to have facilities next to educational buildings and accommodations. The principle is the same as in the English universities: to help students to concentrate on their studies ensuring their social life.

In the USA, the campus of big universities as Harvard hosts many libraries, different faculties, sport facilities, restaurants, museum, galleries, parking lots and residence halls (Harvard University, n.d.). These residence halls are *"university-managed accommodation, designed and maintained to provide a caring environment that encourages academic success, respect and personal growth"* (Universities in the USA and Canada, n.d.). The design of these dorms follows a traditional concept: long corridors with rooms on each side and community bathroom on each floor. No kitchen and no common room are needed since they are provided in other areas on campus or, in

Harvard, in the houses. The house is the same thing as the college in English Universities; it is a place where the student has the possibility to focus on both their academic and social life, find various facilities and services. Every member of the university is free to use all the services provided on campus. This type of accommodation is granted in every American university for at least the first 2 years of undergraduate program. Basic furniture, Internet, telephone and TV connections are provided in the rooms that can be shared or not.



Harvard University campus (Harvard Campus, n.d.)

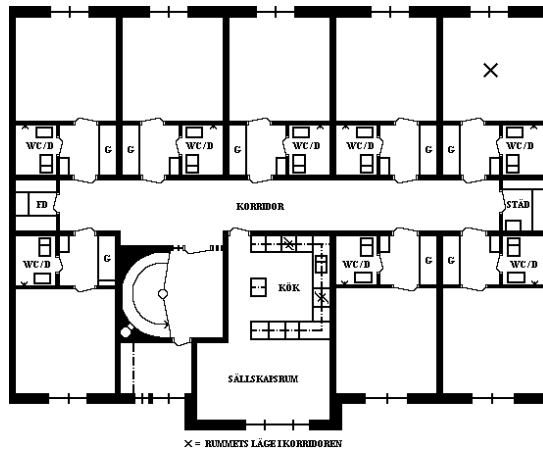


Third Floor Plan - Story Hall  
302' - 11 0"

Traditional concept of dormitories in Harvard: long corridor.

## 2.1.2 Student housing in Gothenburg, Sweden

The history of student housing in Sweden and consequently in Gothenburg has not been very long; however, there were some forerunners from the beginning of 20th century. Gårdabo, founded in 1902, was one of the first buildings in Gothenburg hosting young girls and concentrating several educational activities like seminars, club nights, sunday school, swedish and english courses, etc (Carlsson and Olsson, 2001).



(corridor typology, 2010)

In 1951 the first student house was decided to be built in Johanneberg, today called Viktor Rydberg. However, because of financial reasons the building was not ready until 1954. After that completion, more student houses were planned to be built and the estimated demand until 1965 was around 4200 single rooms. Most of the first student houses had the corridor typology, inspired

by the American Residence Halls: single rooms in a corridor with shared kitchen and sometimes shared bathroom or wc. A state survey among students from Stockholm, Uppsala and Göteborg, published in 1961 (Socialdepartementet, 1961), shows that students were dissatisfied with the 12 sqm rooms. However, regarding the kitchen facilities, students preferred to have one in order to be able to cook and to lower their monthly expenses, they would not mind to share one kitchen in five.

Even if the estimations showed that there was a large need of student rooms, it seems that later on, during the 70's, there were many available student rooms. A fact proving the conditions at that time is that during summer, students used to leave their rooms to save some money since they knew they could find even the exact same place available when they were coming back in September. Under these circumstances it was much harder to rent out the rooms with shared kitchen and the more students had to share it, the more difficult it became. Moreover, students were concerned about cleanliness and tidiness matters (Carlsson and Olsson, 2001).

After 1990, student-housing companies in Gothenburg started to modify the organization of the new constructed buildings. The typical corridor arrangement was not very attractive to the students, so they adopted the apartment system. Living alone became more and more popular in rooms of 20-30 square meters with own kitchen and bathroom and a lot of common activities in the same building or

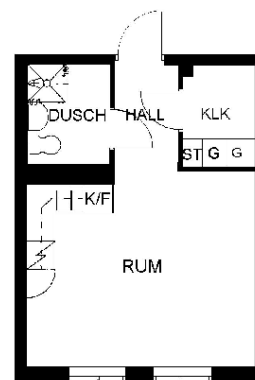
in the surrounding area. Additionally, they started renovating older buildings in central locations, addressing in this way their concept according to the student demands (Jägersand, 1999).

Today SGS and Chalmers Studentbostäder are the two main providers of living spaces for students in Gothenburg. Housing shortage among university students is a major problem not only in the area, but also in the whole country<sup>4</sup> and several solutions are being discussed to face the situation. University of Gothenburg needs to expand its activity and to construct a new building, transforming the older Språkskrapa to student rooms (Vikingsson, 2012). Concurrently SGS is planning to build 38 new one-room apartments for students (18 sqm) with a temporary building permit of 5+5 years in Medicinaregatan, available from next year, 2014 (Tollesson, 2012). Furthermore 700 new student apartments are planned to be ready by 2015 and built by municipal owned housing companies (Kendall, 2013).

As mentioned before, local politicians have been also discussing a temporary solution for hosting students in, for example, caravans and barracks. At the same time, the student unions seem more concerned about this kind of solution that may end up permanent, trying to push for more stable and long-term plans (Genborg, 2012).

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4 It is estimated that Sweden lacks around 20.000 student rooms (Bennewitz, 2012).



Single Room (SGS, 2010)



Vasagatan Student Housing in Gothenburg (Huset Skylt, n.d.)



Chabo Student Housing in Gothenburg (Accommodation, n.d.)



### 2.1.3 Examples of student housing around Europe

The investigation process presented here includes the study of some examples of student housing design around the world. Each one of these subjects has been chosen for a precise reason that inspires the topic of this master thesis.

#### **Cité A Docks, Le Havre, France, Cattani Architects**

Cité A Docks is a housing solution based on the re-purposing of shipping containers. It is interesting how the containers have been positioned, 100 small apartments provide open spaces and transparencies. This layout helps the students interact with each other. the idea of reusing containers to create housing modules makes this architectural design a unique building that attracts people's attention (Dave, 2010).

This project was chosen because it promotes the environmental sustainability through reusing and the social one by creating interactive spaces. It also manages to create architecture by an industrial module.



(Cité A Dock, n.d.)



(Cité A Dock 7, n.d.)



(Cité A Docks Plan, n.d.)

## Spacebox, Utrecht, Netherlands, Mart de Jong



(Nelson, R, 2009)

Spacebox has been designed to solve a student housing shortage similar to the one of Gothenburg. The 234 units that compose Spacebox in Utrecht can be moved to different locations in only 3 weeks and also have low energy costs. In fact, many universities have adopted this typology for student housing as it is cost-efficient and flexible. The flexibility of the construction is particularly interesting because of the possibility to combine the units vertically and horizontally, depending on the needs (Spacebox, n.d.).

This project was chosen because of its movability, flexibility and easiness of assembly. It constitutes a way to solve unexpected and sudden needs.



View on the student housing block (SpaceBox 2, n.d.)



Modularity of the rooms (Space Box Modular Jan 5, n.d.)



Prefabricated units can be moved however needed.(Space Box Prefab Jan 5, n.d.)

## Tietgen Dormitory, Copenhagen, Denmark, Lundgaard and Tranberg Arkitekter



(Sakamoto, 2010)

Community feeling is the aim of Tietgen Dormitory. The circular shape symbolizes equality and communal living, while the units sticking out represent the individual. The designers focused in the interior design to offer a pleasant living to the students. The main idea of the project is to promote shared living and the community but at the same time provides each residence with a unique identity. Each floor contains five apartments that consist of smaller private units organized around a shared kitchen, living room and balcony. (Tietgenkollegiet, 2013)

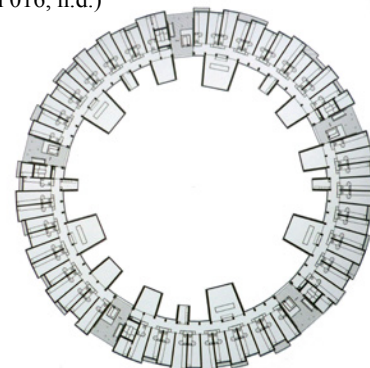
This project was chosen because of its social architecture as priority in the design and the special focus it puts on the interaction between the residents.



Courtyard view (Tietgen Dormitory Ita070708 cjenlindhe 2, n.d.)



The kitchen is used as socialization space (Tietgen Dormitory Copenhagen 016, n.d.)



4th floor plan (Tietgen Dormitory Lundgaard & Tranberg Architects 4th floor plan, n.d.)

## Student Housing Poljane, Ljubljana, Slovenia, Bevk Perović



Poljane Student Housing (Kambic, n.d.)

In Poljane the public and private spaces are divided vertically. The public functions remain on the ground floor, while the private ones are organized on the upper floors. Furthermore, the student units on the upper floors are shared between 3-4 students. It is interesting that this division of shared and private spaces is reflected also in the building facade where big, unobstructed windows are located in the common areas and where aluminum folding panels disguise the windows of the sleeping ones.

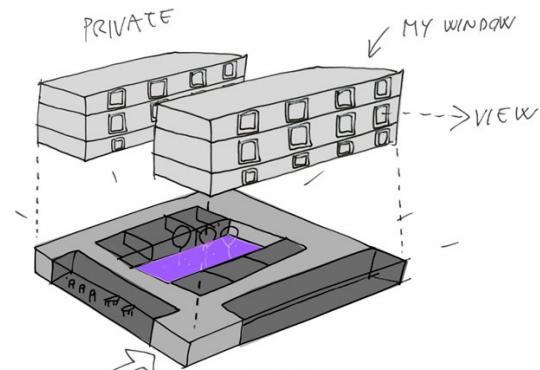
This project was chosen because of its functional organization and how it is indicated on the image of the building.



View on the courtyard: Ground floor public spaces; upper floors student apartments (Student Housing Poljane 2, n.d.)



View on the apartments (Poljane 01, n.d.)



Axonometric View: Private And Shared Spaces(1g, n.d.)

## Halo, Solar Decathlon China 2013, Team Sweden Chalmers University of Technology



Halo on Solar Decathlon China Site in Datong.(©Team Sweden, 2013)

Halo is the result of investigation into student behaviour and energy efficient solutions. The concept is based on Team Sweden's motto "Shared space is double space". Four students live together in 60 sqm where their private space is reduced to the minimum necessary to sleep. In sharing the majority of the floor space they are able to have better facilities, more sophisticated appliances and at the same time live as a family. Sharing space, routines and knowledge. The house provides a new alternative in the push towards sustainable living (Halo Team Sweden, 2012).

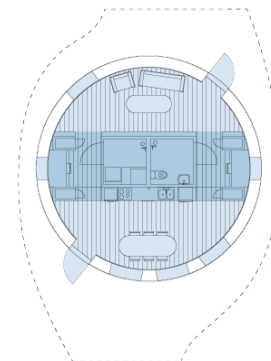
This project was chosen not only because of our special experience, but also because of the special social and environmental focus that comes from both the plan organization and the material selection.



Halo Livingroom: view on the functional wall and on the loft beds(©Team Sweden, 2013)



Halo Kitchen (©Team Sweden, 2013)



SPACE DIVISION  
空间分隔

SHARED SPACE  
共享空间

PRIVATE SPACE  
私人空间

Halo Plan (Shared Space Plan, 2013)

## MySpace - Trondheim, Norway, MEK Architects



(Dezeen MySpace student housing in Trondheim by MEK Architects, n.d.)

The focus of MySpace is the improvement of student socialisation. By taking out space from the single rooms and using it in the common areas the inhabitants have the same amount of square meters but with a different distribution, that creates more meeting places where students can interact, gather for dinner or just spend time in the same space. The designers compare the building with a social network where you share most of your activities and experience. Nevertheless, the most appealing particular of this project is the brilliant idea of MEK to publish details about the building before it was constructed. In this way a debate arose among residents and gave feedback to the architects (Frearson, 2012).

This project was chosen for the way it brings together private and public spaces, how it facilitates students to be private in public.



Kitchen View (Dezeen MySpace student housing in Trondheim by MEK Architects, n.d.).



Corridor Shared Spaces (Dezeen MySpace student housing in Trondheim by MEK Architects, n.d.).



Plan (Dezeen MySpace student housing in Trondheim by MEK Architects, n.d.)

#### 2.1.4 Reflections

As shown previously, student housing or residence halls have the same concept in the United Kingdom and in the USA, while the situation in Sweden seems to be different. The goal of having the accommodation on campus is to make the students able to combine their educational and social activities. In this thesis project the location of the building is also in the Johanneberg campus after a proposal made by HSB, JSP and Chalmers. The idea of having student housing on campus is not only an educational matter, it is also a question of resource consumption. If the student lives on a campus where restaurants, sport facilities, study rooms, library, computer rooms, shops are offered, is there a need to place them in the building as well? Furthermore, as mentioned in *The Story Of Stuff* (2008) in our society we have too much stuff that we don't need. With the term stuff we mean every material device that could be used by a person, so clothes, books, objects, but also kitchen appliances, study rooms facilities, computers, etc. By eliminating this stuff from the building, that could be found on campus anyway, the energy consumption will be decreased together with price and space, while increasing happiness by socialising and helping the environment (*The Story of Stuff Project*, 2008).

Additionally, the standard organization of rooms in the American Residence Halls precludes the thought of 'dynamic' space, giving a feeling of a "prison corridor" but also impeding socialization

within the building since no facilities are provided there. The inhabitants are forced to go out of their dwelling to find meeting spaces or even a kitchen and this block them from feeling like home in their own habitation.

In Sweden, even though the corridor typology has not been completely left behind yet, the organization of student housing turns more toward the apartment type. Keeping students isolated in their own space where each has his own oven, fridge and toilet. This is not a very energy efficient way of living. Student housing companies are trying to find a solution to this isolation by providing an important amount of common activities to the most of the student blocks.

At the same time, a quick look at different student housing around Europe shows that there is a trend towards sustainability and research on different solutions regarding energy saving and student interaction. Transformability, flexibility and mobility are some of the factors being considered in the design of student houses in order to adapt to different occasions and needs.

The evolution of American residence halls leads to the creation of two different concepts in the western world. On the one hand, in the USA everything is shared on campus, while on the other hand, in Sweden every student has its own facilities. Contemporary designers show interest in adjusting their projects to the student housing demands with a particular focus on sustainability.

## 2.2 Energy-efficient architecture for sustainability

*“All houses are solar. The sun shines on almost every home, many days throughout the year. The question is, to what extent are you utilizing the sunlight?” (Kachadorian, 2006, preface)*

People live, work and entertain themselves mainly inside buildings. Therefore their comfort and their consumption depend on what they are surrounded by. History indicates that there has been always a connection between dwelling and nature, since human had to find a way to survive without having the proper technological support.



(House Heating Systems: A brief History, 2010)

After the industrial evolution, when people realized the comfort technology can bring, they started to step away from nature till the moment the environmental impact became visible in every-day life. Architects and designers around the world need to take the initiative and act.

How did sustainability get connected with architecture? What are the main guidelines that

designers could base on their design to achieve an energy efficient house? How does the climate affect the building performance? What are the most used strategies to provide enough comfort to the residents?

In this investigation part, a short introduction to different strategies towards energy efficient solutions are presented that architects could implement in their work in order to embrace sustainability and reduce the environmental damage as much as possible.



## 2.2.1 Origins of energy-efficient architecture

*“Vitruvius, in his Ten Books on Architecture, refers to the architecture and urban design of the Greeks, [...] which plays particular attention to the influence of the sun on the various functions of the city [...]. For both the Romans and Greeks had long been aware of the link between building orientation and building use.”* (Gonzalo and Habermann, 2006, p. 8).

The origins of energy-efficient house principles can be found from archaic years till more contemporary ones. In a broad definition we could call these buildings “sustainable”. Vernacular architecture uses the basic green architectural principles by using materials and resources close to the site. Humans had to build a shelter to protect themselves from weather conditions. Without any architectural knowledge and by the will to survive they managed to build with comfort, sustainably and efficiently; this resulted in self-built dwellings with high regard for craftsmanship and quality, easy to understand, in human scale and ecologically apt (Sundarraja, Radhakrishnan and Priya, 2009). Another characteristic, as Kazimee (2008) states, is the flexibility in vernacular constructions. In this way, they follow the needs and the desires of the residents and last in time.

Through vernacular architecture we can learn how a building can be designed in an effective way and take advantage of the location, regarding materials, climate, ground, etc. It represents the



Blackhouse, an archaic dwelling in Scotland was made by natural material and was organised around a fireplace, that together with the livestock was heating the house (Martincerv74, 2009)

connection between humans and the environment (Edwards, 2011).

Also during modernism<sup>5</sup> F.L. Wright with his long extended roofs kept the sun away from south and west facades during the summer months while Le Corbusier defined his ideal house as the one with the correct air for breathing and foreshadowed the hermetically sealed buildings. In EXPO 1967 in Montreal, Buckminster Fuller actually tried to explore his dream of covering entire cities with a dome, but in a small scale (Gonzalo and Habermann, 2006).

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<sup>5</sup> Modernism emerged in the early twentieth century and characterized by simplicity and purity of form. Le Corbusier, Gropius and van der Rohe managed to spread the “form follows function”(Rower, 2011)



(1967 Montreal Biosphere, n.d.)

However, architecture started to step away from nature using uncontrollably energy resources resulting in serious ecological consequences. What we sometimes call “unsustainable architecture” started mainly after the industrial evolution at the end of the 18th century. Using mechanical systems for heating, cooling, ventilation became a trend and a necessity. This architectural development comes in parallel with the increasing use of fossil fuels and consequently the growth of greenhouse gas emissions (RIBA, 2013).

Several environmental movement started rising during the seventies and kept spreading on along the years. For example, in 1970 during the Earth Day or in 1987 when the Brundtland Report was formed by the World Commission on Environment and Development (WCED) to deal with important environmental issues. This was the first time that sustainability was associated with architecture as sustainable development of cities depend on the building industry (United Nations, 1987).



The first passive house, in Darmstadt (Feist, 2006)

In general, we could assume that sustainability existed as long as architecture if we take into consideration the vernacular architecture, but it formed a specific sector during 20th century in order to face the environmental issues that became more than ever crucial. So then, what was the role of the architect from 20th century and beyond? Which are the main guidelines that architects follow to support the environment?

### 2.2.2 Guidelines towards an energy-efficient architecture

*“A square meter that is never built does not consume energy”* (Gonzalo and Habermann, 2006, p. 100)

Sustainable architecture seems to include a lot of definitions like eco-housing, green development, sustainable design and ways of designing and building. Rocky Mountain Institute in its “Primer on Sustainable Building” (Barnett and Browning, 2007, p. 2) outlines sustainable architecture’s goal as “to produce buildings that take less from the earth and give more to people”.

As mentioned before, during the last decades of the 20th century several architectural methods emerged to guide architects to a more energy-efficient design. A common example is the “passive house” concept that was introduced in 1988 in Sweden during a research project. It was a first step architects took towards sustainability in contemporary years realising the importance of architecture in the environment.

A Passive House is a very well-insulated, virtually air-tight building that is primarily heated by passive solar gain and by internal gains from people, electrical equipment, etc (Passive House Institute, n.d.). The result is a 90% saving of space heating energy. It is actually a building standard, as it demands specific requirements from a building to be characterized as that. Its design is a combination

of several factors such as technology, orientation, climate, etc. An other alternative vision for energy-efficient homes, appeared in 2013, is the Active House, that follows some of the Passive House standards, with the difference that promotes more natural lighting and ventilation (Activehouse, 2013).

What are the guidelines an architect bases his design on in order to save energy and increase user comfort?

There are several methods to fulfill this goal. Despite many differences in the approach there are some basic guidelines applied to all of them.

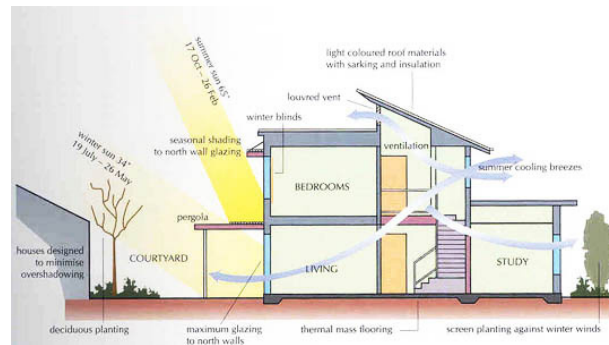
Firstly, the plot area should be examined; the inclination of the ground, the orientation, the existing trees, and elements that can affect the design, such as sunpath and wind flows during different hours and days of the year, depending on the climate of the region (Kachadorian, 2006).

Secondly, the most energy-efficient shape is rectangular in plan, so that thermal bridges are limited. The more compact the building is, the more energy is saved. Compact shapes have lower surface to volume ratio and that is also the reason why a two-story building is always preferred compared to one-story; it has double the living space under one roof and less energy per square meter is spent for the construction (Hickey, 2012, Kachadorian, 2006).

Regarding the orientation, main facades should be orientated towards South, with glazing, where living areas are situated, while openings to

the North, where ancillary spaces are positioned, should be avoided, in order to improve the use of solar energy. Internal access/circulation should be organized in the center. West orientation is preferred for living spaces as well, because of the light that it provides during the occupation time of the inhabitants (Kachadorian, 2006, Gonzalo and Habermann, 2006). It is an efficient way in economic and environmental terms of using windows as solar collectors and heating devices.

Concerning the organisation of the plans, the floor plan is optimized when it is organized in an open way, as it distributes better the sunlight and consequently the heating to the space. The heated areas should be organized in one volume, keeping the unused and unheated rooms outside it (Gonzalo and Habermann, 2006).



(Green building & design, 2011)

### 2.2.3 Reflections

Sustainable architecture is a quite new term for design, but based on traditional principles that have been used for more than 1000 years. The awareness of putting nature in danger created the need of turning to the past and learning from old building methods. “Energy efficiency has been called “the fifth fuel” (after coal, petroleum, nuclear power, and renewables); it is seen as a cost-free tool for accelerating the transition to a green-energy economy” (Owen, 2010).

It seems that environmental and economical crisis brought the designers in front of the problem and by putting together the knowledge and experience from the past with today’s technology, they managed to create a list of guidelines to meet the requirements that several building standards demand or to just reduce the embodied energy as well the living one. Saving energy has become an issue and preoccupies also politicians. President Obama presented it also as an economical solution stating “Making our buildings more energy efficient is one of the fastest, easiest and cheapest ways to combat pollution and create jobs right here in America.” (Locus, 2011).

By advertising the problem we have succeeded to make people change their buying habits. Buying sustainable home, electrical devices, energy saving bulbs, etc is becoming a trend. But what about changing also their behavior? If our machines use

less energy, will we just use them more? Architecture, as a part of social sciences, cannot remain inactive. Architects have to adjust their design according to human behavior and motivate people to adapt a sustainable lifestyle.

## 2.3 Sustainability, a life changing motive

Why do we need a behavior change?

Behaviour is the way in which one acts or conducts oneself, especially towards others. A change is an act or process through which something becomes different (Oxford Dictionaries, n.d.). A behavior change is therefore an alteration of comportment. A social development that, if it becomes stable, could be worthwhile in the strive towards sustainability. We live in a human-centred system where social changes affect the society, thus the environment.

Today, climate change is one of the main threats to the environment. Although this global phenomenon has been a factor since earth's inception, never has the human contribution been so great. It is hard to believe that most of the population does not understand that consumption, emissions and exploitation of natural resources are the catalysts of environmental depression. Humans mostly cause threats to the environment through lifestyle and habits. It is a hard task to change the lifestyles of billions of people all at once (Murtha, 2012). However, there should be a possibility of change. We need to activate ourselves starting from our own home, sharing information, knowledge and innovations. How can we encourage people to change their lifestyles? How can architects contribute with design and what are the challenges they may find?



Human pollution: throwing garbage from the car window (Per Chi Getta Qualcosa Dal Finestrino Dell'Auto Una Sanzione Fino A 1000 euro, n.d.).



Non recyclable waste: a kid in China ends up playing with waste around the town (A Chinese Child Sits Amongst A1, 2009).



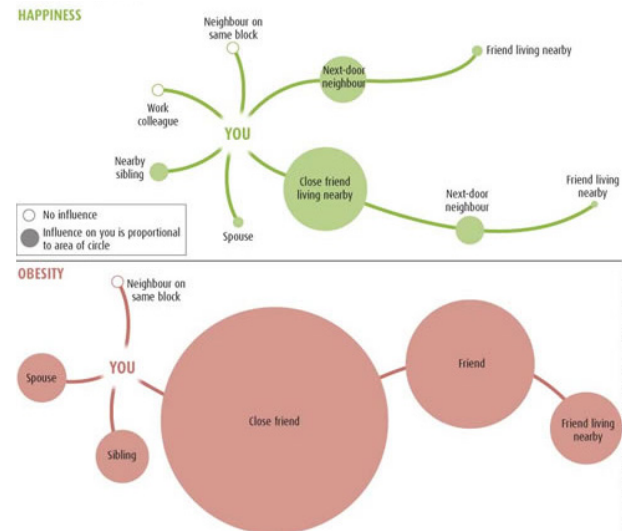
Air pollution: people are forced to use mask to not breathe the polluted air (Air Pollution Linfen Bicycle, 2011).

In order to answer these questions, theories about behaviour change are studied and the connection between behaviour change and architecture is explored.

### 2.3.1 Behavior change theories

There are different theories about behavior change and here they are used to find new solutions on how to modify people's compartments.

Nicholas Christakis is an American physician and social scientist known for his research on social networks and on the socioeconomic and biosocial determinants of behavior, health, and longevity (The Christakis Lab, 2013). His work at Harvard University analyzes the connections among people with a particular regard on the influence they have on each other's health. The example that Christakis takes demonstrates that if you live in a network of obese people, the chances to become obese as well are elevated, and they get higher together with the relationship level between people (friend, sibling, parents), and vice versa (Reuter, n.d.). There is a



Network of influence (Happiness Obesity Influence Friend, 2008).

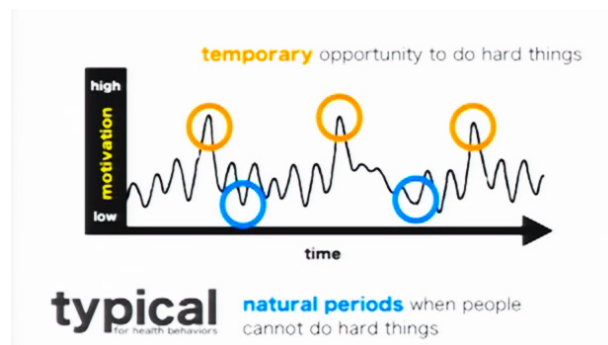
clear connection between someone's behavior and the attitude of their network of people. People are subdued by the milieu in which they live and this leads to the modification of their own behavior, even if they are not aware of it. They subconsciously influence each other.

In addition, behavior and habits are really close concepts in theory as in practice. Behavior, as mentioned previously, is the way in which one acts or conducts oneself. A habit is a settled or regular tendency or practice, especially one that is hard to give up (Oxford Dictionaries, n.d.). These two are tightly linked to each other, so if one is able to change a habit he will also be able to change his behaviour toward the habit he had. Charles Duhigg has studied another theory on behavior change in his book "The Power of Habit" (2012). His main focus is on how habits work. For Duhigg, the ability to change a habit stands on the capability of recognizing it: *"if you can diagnose your habits you can change them however you want"* (Duhigg, n.d.). Duhigg also affirms that a habit is all about the reward, so a person should recognize which reward he is craving in order to change the habit and find a way to obtain the same reward through a different behavior.

This differs to other researchers who think behavior change should be obtained by encouraging motivation. BJ Fogg's<sup>6</sup> interesting argument lie in *"facilitate behavior change instead of motivate it"*

6 Fogg is a social scientist and teacher at Stanford Uni. He works with systems that can change human behaviors.

(Fogg, n.d.). His studies on motivation show that during life people have a mood wave that varies between picks of motivation and non-motivated periods. During the picks of motivation people are temporary able to do hard things, while during the rest of the time they are not. His analysis explains that there are different solutions for each of those cases. In the picks-of-motivation period people should be led to do hard things that structure their future behavior, reduce barriers they have created against a specific action, make the behavior easier and do something hard in order to increase their skills. Once these hard things are learned, they will become easier to do and people will need less motivation to realize them. On the other hand, when the motivation is low, people will still be able to do structured behaviors, compartments that they have already learned during their life, but also tiny habits and baby steps that don't require much effort. Thus, as Fogg says, *"the role of a sociologist should be to help people succeed on the most desirable behavior that matches their current motivation"*. In this way their ability will be exploited to 100% and a



Motivations Waves (Fogg, n.d.).



behavior change will feel less hard to achieve and more natural to pursue (Fogg, n.d.).

As studied by now, there are many theories that could help people change their lifestyles encouraging social development, but the transformation process always has to start from a personal will of change. How can we help people towards behavior change? How is it possible to make them aware of the need of change? How can this change affect their environment? Can architecture facilitate the behavior change process? How can architects design for behavior change?

### 2.3.2. Architecture and behavior change

According to the previously presented theories it is possible to state that there are different ways to help people reach a behavior change. By applying these methods to architecture it could be possible to ameliorate lifestyles by increasing sustainable compartments and decreasing the human impact on the environment. On the one hand, architecture should be able to bring people closer together and facilitate the sharing of everyday life, knowledge and information by the simple use of communal spaces and common activities. For example the meal is an important part of the socialization process, it brings people closer because they are able to have a conversation, to share ideas and everyday life episodes. Thomas Merton describes this act perfectly in his book *The living Bread* (Merton, 1956, p.126): *“The mere act of eating together, quite apart from a banquet or some other festival occasion is by its very nature a sign of friendship and of communion”*.

On the other hand, the living space should enable a sustainable lifestyle. Teaching the importance of environment and how to protect it, using less resources and reducing energy consumption.

If we follow Nicholas Christakis analysis, which states that we are subconsciously influenced by the people we are surrounded by, it is easy to understand that if we are surrounded by people that lead sustainable lifestyles we will try to reach the

same comportment. Tim Brown says “This is a very important insight for design: that the behavior of those around us significantly affects our behavior” (Brown, 2012).

It could be the will to feel a sense of belonging to a specific group, the need to be competitive or even the shame to not be as good as the other. Each case is an important factor in people’s behavior change.

If architects could create new design solutions that enable people to feel a sense of belonging, the competition or the shame toward being unsustainable, it will be possible to change their habits. For instance, if the goal is to decrease water consumption in a building and some inhabitants are very careful in water use, the others may notice it. They may try to behave in the same way because they will want to belong to the group of people that save water, or because they will feel the need to be at least as good as the water-saver, or also because they will feel ashamed to waste water if other people are trying to save it.

According to what Charles Duhigg says, we have to understand our own habits in order to change them. (Duhigg, n.d.) The same concept could be applied to help people modify their behavior. Find out what their basic needs are, what is the reward they are looking for and find a different way to solve it that saves more energy and doesn’t change the final reward that they are looking for.

For example, in winter, a person living in an apartment with an autonomous heating system often puts the temperature higher than the comfort one<sup>7</sup>, and wears just one thin clothing layer. In that situation it could be enough to turn few degrees down on the heating system and put on just one more layer. The need of high indoor temperature is more psychological than real. Thus, if the apartment was designed with centralized heating system that keep the temperature fixed on 20°C, energy would be saved and the person would have obtained the same reward as in the opposite case, that is to feel warm at home.

Taking into account the studies made by Fogg, the behavior change should be facilitated by making things easier, enjoyable and funny to do for everybody (Fogg, n.d.).

For instance, a waste-recycling system is something that has to be done accurately and requires patience. Usually people would prefer to throw their waste in the same bag and in the same case. If the waste-recycling system instead of complicating things facilitated them, or had some peculiar characteristics that make it fun, would not be hard to use. The Fun Theory Project designed an example of a fun waste system. The “Garbage Jukebox” (Vestia, 2009) is a solution invented for Portugal and Spain where people party in the streets

<sup>7</sup> Thermal comfort for a person at rest or under light activity (e.g. office work) is best at air temperature of  $T=22\pm 2$  °C, relative humidity of  $f=50\pm 20\%$ , air speed  $<0.2$  m/s, and mild radiation exchange, but depends on clothing habits (Martinez, 1995-2013).

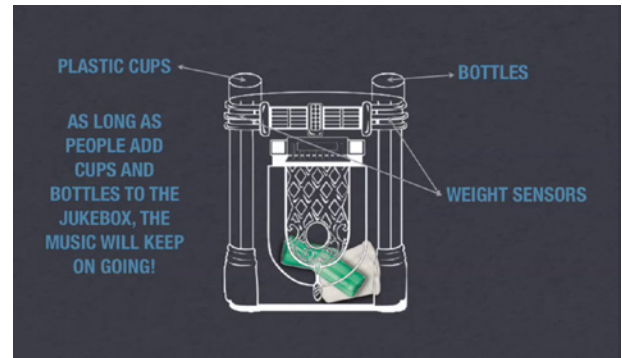
and leave leftovers. With the “Garbage Jukebox” every cup or bottle you throw in keeps the music on for 30 seconds or 1 minute so people are stimulated to put more and more leftovers in the garbage, and keep the place clean.

Lidman and Renström (2011), two masters students at Chalmers University of Technology, studied behavior change strategies and came up with a division of five categories that define the level of control the user or the designer has towards behavior change. The first one is to ‘enlighten’ which means to motivate the user through information. The second one is to ‘spur’, to encourage and tempt the user to perform the desired behaviour by means apart from the behaviour. The third one is to ‘steer’ where the user should be guided towards the desired behavior. The fourth is to ‘force’, which restrains the undesired behavior and the last one is to ‘match’ where a designer adapts the product to fit with already existing behaviour of the user.

On the other side Christopher Alexander (practicing architect, builder, and Emeritus Professor of Architecture at the University of California) came up with the idea that people should design houses, streets, and communities for themselves. From his researches it emerges that most of the beautiful places of the world were not made by architects but by the people that lived in it and more than only the beautiful places, the places that are better organized for the people (Project For Public Spaces, n.d.). In his book A Pattern Language Alexander



Design Solution for Behavior Change: People are more attracted by taking the stairs because they make noise than taking the escalator (Piano Stair Nudge, 2012).



Design Solution for Behavior Change: People are more attracted by throwing bottles and cups in the bin than on the street because the bin makes music (Garbage JukeBox, 2009).



Most people enter a building without cleaning their shoes, often resulting in dirt all over the floor, the Scratch Mat plays music if you clean your feet on and it makes the activity more attractive (Scratch Mat, 2009).

describes patterns that defines problems and then find solutions. In this way he allows everybody, not only professionals, to work with their neighbors to improve a town or neighborhood, design a house for themselves or work with colleagues to design a public building such as an office or a student house (Patternlanguage.com, 2012). In every chapter he gives very specific guidelines on how things should be structured. For instance information on how to organize the entrance of a building: “The entrance should be a welcoming space that directs the people towards it.” (Alexander, Ishikawa, Silverstein, Jacobson, Fiksdahl-King and Angel, 1977) or also about outdoor spaces: “The area immediately outside the building, to the south- that angle between its walls and the earth where the sun falls- must be developed and made into a place which lets people bask in it” (Alexander, Ishikawa, Silverstein, Jacobson, Fiksdahl-King and Angel, 1977, p. 758).

### 2.3.3. Solutions to be taken

Behavior change is as crucial process in life as in design. Humans are the center of society; the environment is affected by their behavior. Therefore, they should be able to recognize their mistakes, change their habits and improve their lifestyles in order to achieve a higher level of sustainability. As Tim Brown says: “by rethinking the design of our spaces we can send new messages” (IDEO, 2012).

The role of architects in this process should be to design buildings that help people modify their habits towards more sustainable ones. To increase socialization is a crucial aspect in this process. By designing smart solutions people could be enabled to meet in their daily life activities, exchange ideas and influence behaviours. An efficient way seems to be the comparison of personal waste production or the use of heating or light per person; in any case people will affect each other by living in the same space.

However, the first step should be to inform people about the current situation where there is a need of change towards sustainability. Unfortunately some people are still uninformed on sustainability and often this is the reason why they do not modify their comportments. In other cases people know about the current situation and they don’t want to give up comfort. This is the challenge architects should go through: change people’s minds, show them the other side of sustainability, take away some of their comfort and give them back a reason to accept it. Architects should create sustainable

buildings that stimulate the inhabitants with new innovative design solutions, enabling them to lead more sustainable lifestyles, helping each other keep pace with sustainable development.



Instead of raising the heating we can put on some more clothes layers and the result will be the same, but we will not consume as much energy (7 Ways to Lower Your Heating Bill, 2012).



Facilitate material recycling, lower the impact of our consumption and keep the planet clean (Kid Recycling Superstar, n.d.).



It is an easy task to remember to close the water while we brush our teeth and it can drastically lower water consumption (BigStock Little Girl Brushing Teeth, n.d.).

## 2.4 Interactive research

This Master Thesis uses a part of the investigation to analyze and understand students' needs and habits through different interactive approaches. This interactive research includes a workshop with Homes for Tomorrow (H42) at Chalmers and several interviews with students who currently live in student apartments in Gothenburg.

### 2.4.1 Workshop with H42

Students from the architecture faculty at Chalmers were invited by the research program Homes For Tomorrow to participate in co-creation workshop and survey about student housing. Our role in this workshop was to participate as students.

The invitation email explained that students had to define activities, functions and priorities associated with student living. They had to note down the activities they engaged in during two days in a short diary, that was followed by a workshop involving all the participants. During the workshop they were asked to categorize their activities. They decided to do it according to privacy level and space: from 'more private' to 'less private' and from things you do at home to things you cannot do at home. Pernilla Hagbert and Olga Bannova analysed the results of the workshop in their paper 'Mapping Human Factors for Sustainable Design and Living'. They state that *“even though students belonged*

*to same age groups and had relatively similar disciplinary background, their demand for privacy diverged, based on cultural and social specifics and beliefs.”*

The result was quite surprising: students appear to be more open to sharing than expected. While they need their privacy, they seemed to understand that they can do lot of their activities on campus, staying in their room just for their basic needs. For example, recreational activities like reading a book or listening to a podcast could be done in a public space by sharing resources, but they can not share the room for sleeping. Also, it appeared that they are not likely at all to study alone but rather in a common space and they would prefer not to share private hygiene. This gives the option to the designer to decrease private space and replace it with common spaces.



H42 workshop (©The Authors, 2013).

## 2.4.2 Ethnographic interviews

“Ethnographic interviewing is a type of qualitative research that combines immersive observation and directed one-on-one interviews. Ethnographic interviewers apply this technique on a micro level to understand the behaviors and rituals of people interacting with individual products” (Mai and Amann, 2009).

In this Master Thesis contextual inquiry is used as ethnographic interviewing technique in order to gather qualitative data about users and their goals. The interviews took place in user’s natural setting to bring important details of the behaviors to light. To have a better understanding of what they miss from the student housing they live in, what they prefer and what they look for when they search for student housing in Gothenburg.

In total we have interviewed 13 people, 23 to 31 years old, from 9 different student-houses in Gothenburg. Specifically 7 people live alone, 3 people share the room/apartment with 1 more person, 1 shares with 2 more, 1 with 3 more and 1 with 6 more persons. Each person has a different social situation, habits and background, and each student house possesses differing spaces, facilities and functions. The questions that were posed were about the type of room or apartment they live, the shared activities, the price, the level of socialisation and how the house promotes the above. What matters more when choosing a place to stay, etc.



Lisa’s place, Olofshöjd student house, Gothenburg (©The Authors, 2013).



Mike’s place, Ostkupan, Gothenburg (©The Authors, 2013).



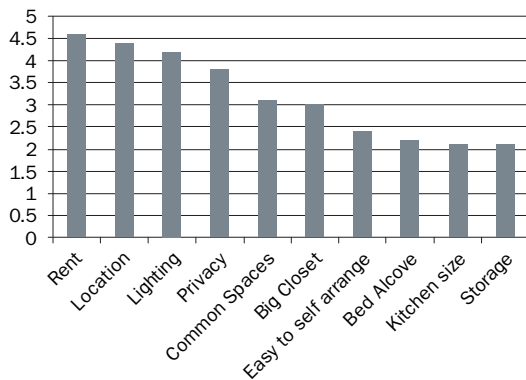
Kostas’s place, Chabo, Gotheburg (©The Authors, 2013).

Students were also asked to describe how they use their apartments, how satisfied they are, what they like and what they miss.

From these interviews it appeared that students would rather live alone or with someone they know due to tidiness; they seem to need a space of their own where they can have privacy; they mostly know their neighbors. However, these are only the people that have a shared space, like a kitchen, that they are obliged to use which consequently helps in socialising. The students that have their own kitchen and bathroom don't know their neighbors at all and don't interact socially in their building; most of them prefer furnished space to live and as expected the price and the location are the most important factors on choosing a room. An average of 4100kr/month is the maximum rent that they would be able to pay for an apartment that covers their needs.

*“Sharing is about going around in your room with your underwear, not in the corridor though, please.”* Mike, 25 years old

(See appendix for detailed interviews)



Graph showing importance of spaces according to student's preferences during ethnographics interviews. (©The Authors, 2013)



Lisa's place, Olofshöjd, Gothenburg (©The Authors, 2013).



Sofia & Paschalis's place, Högsbogatan, Gothenburg (©The Authors, 2013).



Kosta's place, Chabo, Gothenburg (©The Authors, 2013)



### 2.4.3 Sharing in Datong

During the Solar Decathlon competition in summer 2013 in Datong, China, we got the chance to experience a communal living for one month. Each team participating in the Solar Decathlon got assigned one floor in the Solar Palace to share with another team. Each floor had two shower blocks and 4 toilet blocks. The laundry was positioned at the entrance of each shower block. The showers were shared by gender, the toilets were shared by gender and by team and the laundry was shared by team. The rooms were positioned on both sides of a 100 meters-long corridor. Each room was around 25sqm and contained three bunk beds, one long desk to share in three and one small closet with three cabinets. The furniture was basic but the room was very bright because it opened to the outside with a 12sqm window that gave the feeling of being in a very spacious room. The material used in the whole building was marble and white paint. On the ground floor we could find almost everything we needed: a canteen where we ate every day (breakfast, lunch and dinner), a small supermarket, a doctor, a printing room and also a hairdresser.

The general feeling of the building was cold, especially for the long, white and poorly sound insulated corridor. Although the fact of sharing it with a group of people to whom we were particularly close and many others students that were going through the same experience as us, made it warm. At the end some of us were calling the Solar Palace



The Solar Palace in Datong, China (©Josua Smedberg, 2013).



Room in the Solar Palace (©The Authors, 2013).



Solar Palace long, empty corridor (©The Authors, 2013).

home. At the same time it was hard to deal with noise when the sound insulation was poor.

We were able to keep showers and toilets clean but the laundry space was always messy since we didn't have a place to hang our clothes. To share the meal with other people was great and of great importance as it helped to keep the group feeling alive.

It was easy to organize ourselves since everything was prepared, however it would have been better if we were able to go out from the building more often to shop or eat. Solar Palace was situated quite outside the city in a new area where there were not enough facilities. To be in the same place working and living was frustrating because we were not able to escape from work and felt quite isolated from the real world.

However, if someone were to ask the two of us how to define the community living experience in the solar palace the two words that come to mind are 'family' and 'fun'. More than the environment, it is the people that make the difference and if the environment is good it could only bring people closer and help them establish unique relationships, learning from each other different values and leaving a footprint in their life that will last forever.

During the two weeks of the Solar Decathlon China exhibition, after the prizes were assigned and the contests were over, all teams organized gatherings in the house they built to experience life there.



Laundry room in the Solar Palace: we were used to hang out in there to catch wifi (©The Authors, 2013).



Meditation room: one room was left empty and we decided to use it as room for meditation, relax, sport or to have some privacy (©The Authors, 2013).



Lunch in the canteen with the whole team (©The Authors, 2013).

Our team was always using the house as if we were actually living in it during daytime, enjoying the patios, having naps in the loft beds, using computer and listening to music. However to have the possibility to cook and sleep in Halo completed the experience. The house is designed for 4 students, but we cooked a dinner for more than 25 people and we all fit in the house comfortably, hanging out, dancing and singing. The kitchen was the place for chatting while the living room was transformed into a dance floor. The meal was also a way to share culture and knowledge since it was cooked by an Italian for many international people with ingredients and drinks from China.

After the party we slept in Halo: two in each bed and one on the sofa. The design of the beds with mattresses integrated in the loft and 40cm barriers around them, allowed a privacy feeling in an open space since students were not able to see each other while laying in bed. Even the noise was lower thanks to these barriers. After that night we discussed the experience and the whole group agreed that we managed to design a house where surprisingly shared space is actually double space.

After this experience both of us were still thinking of how to improve the sharing experience, making it more realistic and liveable and that it is what we are trying to do here in the Student Lab.



Party in Halo: having dinner and chatting in the kitchen (©The Authors, 2013).



Party in Halo: dance floor in the living room (©The Authors, 2013).



Hanging out in the patio: reading, napping and watching a movie (©The Authors, 2013).

*“He who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast.”*

- Leonardo Da Vinci  
(Goodreads, 2008)



(Gospodinov, 2013)

### 3. FROM THEORY TO PRACTICE

A theory is “*a set of principles on which the practice of an activity is based*” and a practice is “*the actual application or use of an idea, belief, or method, as opposed to theories relating to it*” (Oxford Dictionaries, n.d.). These two concepts are closely linked together. An architecture Master Thesis needs also theory to base the practice on in order to make the project more valuable and solidify the arguments. But what is the connection between theory and practice?

In this Master Thesis, first step was to collect and write down the design criteria of the contributors to this work, HSB, H42 and the thesis investigations. They were then divided into categories explaining step by step the specific criteria and at the end, grouped into one category, the Master Thesis design criteria, to be used as an inspiration for the design of the Living Lab project in Johanneberg campus. By listing this information it is possible to make clear what to keep for the project and highlight what it should focus on.

#### 3.1 Design criteria HSB

With 554 000 members all over Sweden, HSB is one of biggest housing organizations of the country where members have influence and can take part in the decision-making process (HSB, n.d.). Every year new buildings and housing projects are carried on to fulfill the members’ needs. Among the strategies used in HSB projects, a big attention is given to the conservation of energy and to the use of renewable energy sources, but also to help people co-operate to achieve more social and sustainable lifestyles. This is why HSB decided to collaborate with H42 and JSP in the Living Lab Project. A visit through some HSB buildings during spring 2013 showed that the newer the building is, the greater the importance credited to the creation of better common spaces and to improve the function of common activities, such as laundry rooms (see pictures in the appendix).

HSB has specific guidelines on how to develop the Living Lab project in Goteborg and Anna Olofsson, project manager and responsible for new construction of HSB, has been interviewed to specify and list them to help through this master thesis’s design process. Anna Olofsson explains that for HSB:

- The building has to be movable because it has a temporary building permit of 10 years maximum.

- The building footprint should be of around 400sqm.
- The building should be made of 3 stories.
- In the ground floor there should be: an exhibition hall, JSP office, a meeting room and every space should be closed in between walls.
- The function of the building is student housing.
- It is important to experiment and test new technologies that they will be able to transfer into other buildings later on.
- The costs of the construction has to be low.
- There is no necessity of having an elevator, to facilitate the movable building construction.
- It is important to help people to live more sustainably.
- Interior design flexibility is a priority.
- Movable walls inside to enhance the flexibility is a proper solution.
- The building should hosts 20 to 30 students.
- The kitchens should be common.
- The bathrooms should be private or shared maximum in 2.
- Each person should have maximum 20/25sqm.
- Each person should live in 1 private room.
- The average price per room should be about 4000SEK, not cheaper then the other student rooms in Gothenburg.

## 3.2 Design criteria Homes for Tomorrow (H42)

Homes for tomorrow (H42) is a research program from Chalmers in the area of built environment with a focus on buildings and homes, which supports and studies future homes in the global era with a particular attention on saving energies and reducing resources.

Moreover, H42 is an interdisciplinary research environment with a focus on active multifunctional building envelopes, concrete composites with energy storage potential, indoor water systems and perceptions of homes light and structures. The Living Lab Project is introduced in their agenda with the goal of researching on alternatives about these topics that can be used in the future in other buildings and in other situations (Homes for Tomorrow, 2013).

For H42 the Living Lab project needs innovative architectural and engineering solutions to enable people to lead more sustainable lifestyles. In this master thesis Pernilla Hagbert, Phd Student at Chalmers University of Technology and member of H42 and Greg Morrison, project leader and professor of Civil and Environmental Engineering, Water Environment Technology, have been interviewed to explain H42's strategy and list their criteria for the Living Lab project. Their aims are:

- To increase the laundry room use. This room should be on the ground floor and connected with

other activities. It should include: Resource sharing, teaching people how to wash clothes and use water correctly, increase interaction among people, the sharing of machines, the space for an area where people can take care of their clothes (sewing, amending, ironing, etc) and the space for a clothes library.

- To ameliorate the waste system by improving waste separation, converting human waste into compost, minimizing consumption, creating a space for recycling and allowing a space for a workshop to modify, fix and transform the things re-cycle.

- To register and study consumption of the inhabitants by keeping track of everything that enters and leaves the house with a system that scans barcodes. This system should be in at the entrance of every room.

- To use the 3 floors criteria decided by HSB in a different way: the ground floor should have the same concept, but the first floor should have an experimental organization that uses the extreme concept of shared space. This floor would be used by Chalmers as a reality studio where the students study specific concepts which they will personally experiment on with a design-build process.

### 3.3 Investigation design criteria

This Master Thesis has studied the history of student housing, behavior change theories and passive house guidelines that have been carried out in order to have a better understanding on how to decrease energy consumption and increase socialization in a student house. Now the aim is to use this knowledge as inspiration and guidance in the design of the Living Lab. Solutions from the investigation chapter have been listed here to clarify their role in the research and how to design the Living Lab in the best way.

English and American campus organization avoids putting facilities that are already on campus in the student housing if the latter is on campus as well.

American residence halls organize the student rooms in long corridors

Halo Team Sweden uses an extreme concept of pairing a decrease in private space with an increase in shared space.

Behavior change strategies say:

- We should facilitate behavior change, understand peoples needs in order to change them and that the network of people in which one lives directly influences behavior.
- The building should have a compact shape in order to reduce the surface to volume ratio (see 2.3.2).
- The building should have energy efficient

windows. (see 2.3.1).

- The inhabitants should be proud of their building and often the student house aspect doesn't fulfill this function, so we should find a way to make this happen (see 2.4.2).
- The students should be able to feel at home in their room even if it is a student house (see 2.4.2).
- The shared spaces should be increased (see 2.4.2).
- There should be some kind of modularity inside the building (see 2.1.3).
- The shape of the building should be combined using modules to allow the creation of different shapes (see 2.1.3).
- The living spaces should be concentrated in the south, east and west, while unused and ancillary rooms should be placed towards north (see 2.3.2).
- The ground floor should follow an open organization in order to exploit sunlight and distribute heating easier (see 2.4.2).



### 3.4 Thesis design criteria

The aim of this chapter is to define the design criteria of this Master Thesis by gathering information collected from HSB, H42 and from the investigations about student housing history, behavior change theories and passive house guidelines. Some points overlap between categories, some are partly used for reasons of space, case and functional organization, and some others are completely adopted in the design.

The design criteria of HSB and H4T is considered because the proposal is interesting and reasonable, but also follows the real time project of the Living Lab.

#### **The points used from HSB are:**

- The building has to be movable because it has a temporary building permit of 10 years maximum.
- The building should be 3 stories.
- In the ground floor there should be: an exhibition hall, JSP office, a meeting room and every space should be partitioned. The room criteria is kept with the more flexible idea of movable walls to change the function of the ground floor according to demand.
- The function of the building is student housing.
- They want to help people to live more sustainably.
- They want interior design flexibility.

- They plan to have movable walls inside to enhance the flexibility.
- The building should hosts 20 to 30 students, or more.
- The kitchens should be common.
- The bathrooms should be private or shared by a maximum of 2, just in the second floor.
- The laundry room should be on the ground floor.

#### **The points used from H42 are:**

- Increase the laundry room use. This room should be on the ground floor and connected with other activities. It should increase interaction among people. We are not going into depth regarding the research of this criterion.
- Ameliorate the waste system, but we are not going into depth regarding the research of this criterion.
- Register and study consumptions of the inhabitants of the building, keeping track of everything that enters and leaves the house with a system that scans barcodes to see how much food you consume. This system should be in every room at the entrance.
- Use the 3 floors criteria decided by HSB in a different way: ground floor with the same concept, but the first floor should have an experimental organization that uses the extreme concept of shared space. We are not considering the educational criteria used from Chalmers.

### **The points used from the Investigation are:**

- English and American campus organization avoids putting facilities that are already on campus in the student housing if the latter is on campus as well.
- Extreme concept of sharing from Halo Team Sweden that decreases private space and increases shared space.
- Behavior change strategies say that we should: facilitate behavior change; understand people needs in order to change them; the network of people in which one lives directly influences his behavior.
- Christopher Alexander's book A Pattern Language gives guidelines on how to build the perfect building for its function, in this case for a collective house.
- Passive house strategies (orientation, high efficient windows, insulation, shape factor) "The area immediately outside the building, to the south- that angle between its walls and the earth where the sun falls-must be developed and made into a place which lets people bask in it" (Alexander, Ishikawa, Silverstein, Jacobson, Fiksdahl-King and Angel, 1977, p. 758).
- The inhabitants should be proud of their building and often the student house aspect doesn't fulfill this function (see 2.4.2).
- The student should be able to feel like home in their room even if it is a student house (see 2.4.2).
- The shared spaces should be increased (see 2.4.2).
- Modules inside the building (see 2.1.3).

- Combine modules to create different shapes (see 2.1.3).

### 3.5 Reflections


*“Design is directed toward human beings. To design is to solve human problems by identifying them and executing the best solution.”* Ivan Chermayeff. (Quotes On Design, n.d.)

To design means to “do or plan something with a specific purpose or intention in mind” (Oxford Dictionaries, n.d.). It is a difficult task to approach the design of the Living Lab project for this Master Thesis since it should combine the design criteria, therefore the intention or the purpose, of three different actors: HSB, Homes for Tomorrow and the thesis investigations. Trying to combine these factors resulted in many ideas which overlapped, especially between HSB and H42. The thesis investigation brings much interesting information on how to ameliorate the social and environmental approach to building design..

First of all, as mentioned in the introduction, the building should follow the specific concept of sustainability defined in this Master Thesis. It should be human centered, made of low-impact and non toxic materials produced locally, in this case in Sweden, the structure should be flexible and durable to be reused in the future, the areas of the building should be harmonic and comfortable and there should be no wasted space, and most of all it should motivate users towards a sustainable lifestyle. Moreover, the design solutions used in the building should facilitate behavior change enabling

people to meet by enhancing socialization areas and also allowing them to decrease energy use. The inhabitants should be proud of their house where smart and innovative solutions are used.

This project will try to use these characteristics to make the Living Lab a new typology of student house that will help the shortage of student accommodation in Gothenburg, teach the students to live sustainable lifestyles, test new solutions of how to share a space and make the inhabitants feel like home in their temporary dwelling.



*“Design can be art. Design can be aesthetics. Design is so simple,  
that’s why it is so complicated.”*

- Paul Rand  
(Goodreads, 2008)

(Zaveri, 2013)

## 4. DESIGN PROPOSAL

After having finalized the theoretical part of this Master Thesis it is now time to approach the design proposal. This chapter studies the background of the Johanneberg campus, analyze the area that surrounds the site of the project and illustrates the design process of the Living Lab through sketches, plans, sections, elevations, technical details, renderings and energy performance comparisons.

### 4.1 Historical background

The site is located in Johanneberg neighborhood in the Centrum of Gothenburg. Johanneberg has 7416 inhabitants in 2011 (Göteborgs Stad, 2013), 3470 jobs (2003) and an area of 75 hectares (Göteborgs Stadskontor, 1982, p. 36). Johanneberg got its name January 30, 1920 - from Johannebergs landeri - when Gothenburg made his first division into districts (Göteborgs stads statistiska kontor, 1923). The city plan for Johanneberg was started in 1901 when the City Council of Gothenburg launched an international urban planning competition for the development of the southern part of the city. The winning entry was inspired by urban design concepts studied by Camillo Sitte in his book *Der Städtebau nach seinen Künstlerischen Grundsätzen*, and developed by two important swedish architects Per Hallman, director of Stockholm city planning, and Fredrik Sundbärg. (Riboldazzi, 2011). The next city plan was designed in the 1910s by the city engineer of that moment, Albert Lilienberg.

Johannebergs southern part was built during the 1920s comprising mostly of villas. Between 1930 and 1950 they were supplemented with stone house on three floors. A number of the houses that were built in the lower Johanneberg during the 1930s were characterized by functionalism, and when the expansion at the middle of the decade reached the upper part of Johanneberg the new style had fully penetrated the urban assessment of the city and Uno Åhrén,

swedish architect and urban designer (Sapere.it, 2012), took over as city planning director. The city plan was designed in 1937 and started with the expansion of upper Johanneberg with detached slab blocks and large spaces between the buildings. The distances between the houses was 45 meters, 13 meters of house width, heights of 20-25 meters. Furthermore, the houses were built in stone with bright colors. This is why the Upper Johanneberg got such a unitary character, although many property owners, builders and architects were involved in the construction.

In the same year 1937 Chalmers University (founded in 1829 by William Chalmers) was moved from its previous site to the upper Johanneberg area close to Gibraltargatan. (Stadshem Fastighetsmäkleri, n.d.) Today the area is considered to be extremely interesting historically, the most pronounced “functional area” and also an important student area, surrounded by student housing and facilities, eg. SGS, Chalmers Studentbostäder.



Johanneberg in 1962(Johanneberg, Göteborg Flygfoto, 1962 ).



View of Gibraltargatan in 1927 (Då, Gibraltargatan, 1927).



Historical view on Gibraltargatan (Då Och Nu: Övre Johanneberg, n.d.).

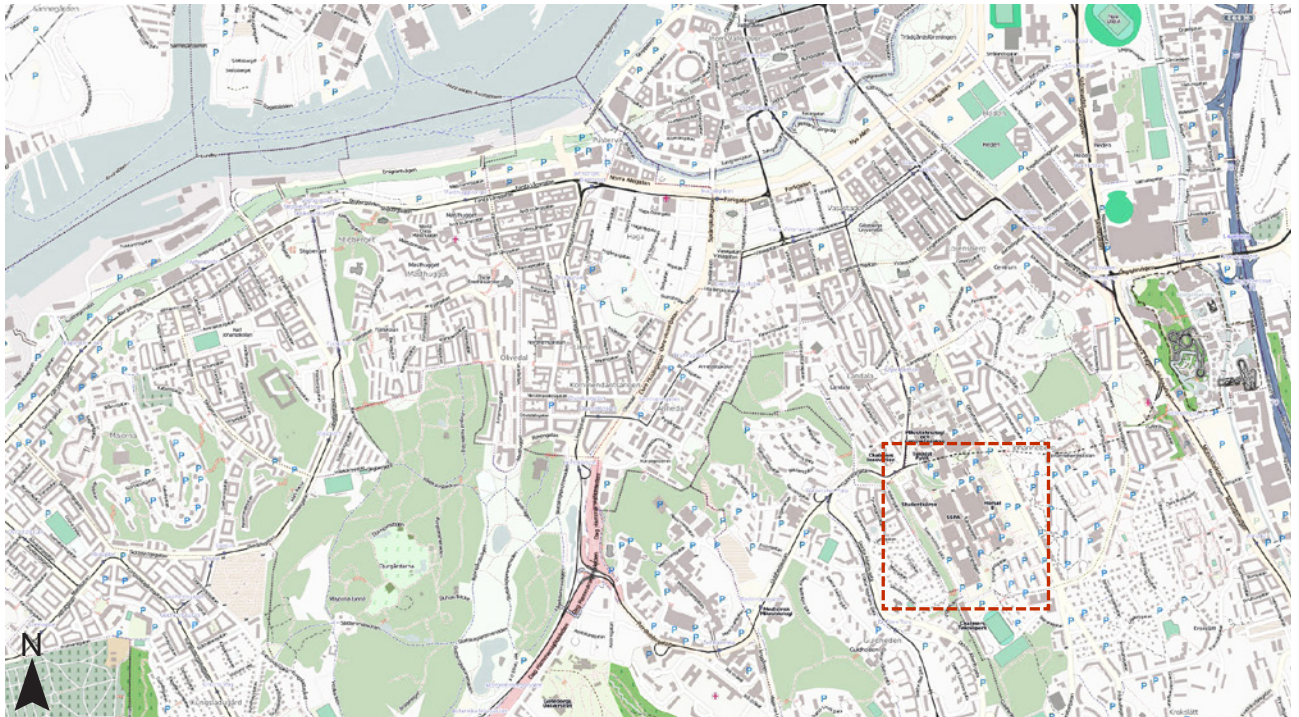
## 4.2 Analysis

Approaching the design of the Living Lab it was necessary to study the urban organization of the area to have a better understanding of it. The area is illustrated through maps that show the position in the city, the land use, the density of the area, the building heights and the road organization. With this analysis it is possible to arrange the Living Lab organically with its surroundings, connecting the building with facilities around it and making it easily accessible by cars, bikes and pedestrians.

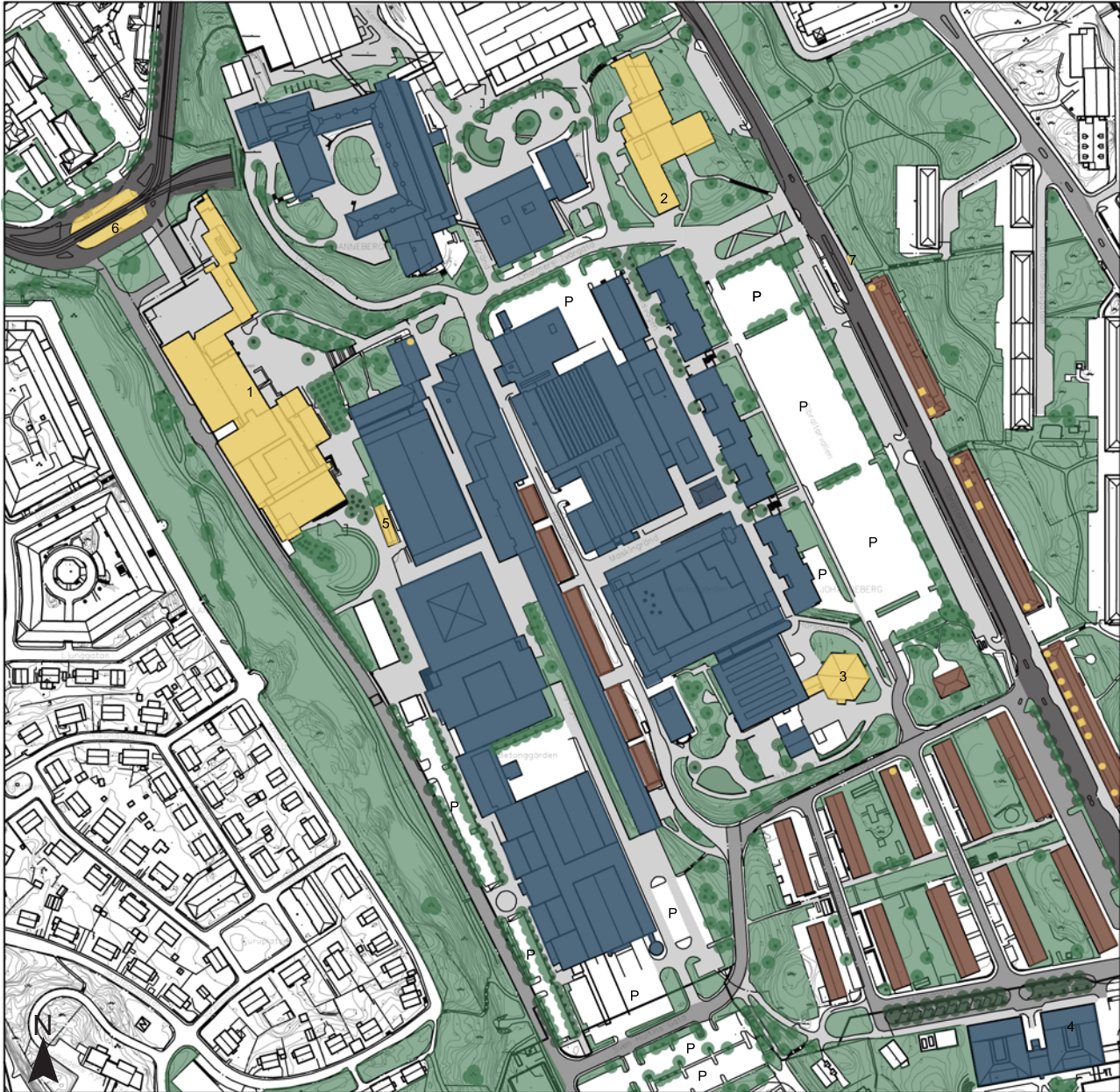
### 4.2.1 The area

#### **Position in the city**

The area of interest is in Johanneberg campus, at Chalmers. The Johanneberg campus is located in the area of Johanneberg. Among Chalmers campuses, Johanneberg is the biggest and oldest. (Chalmers, n.d.) Most of the faculties are located here as well as the Student Union, training fields and a big part of the research programs.



# Land use map 1:4000









The Johanneberg campus is surrounded by green areas with both educational and residential buildings. The lower part of the campus, towards Southwest, includes green areas and educational buildings. On Gibraltargatan, the upper part of the campus towards Northeast, it is possible to find more facilities as supermarket, restaurants, hairdresser, dentists and residential buildings. Besides, in the area there are also Fysiken (the gym), Chalmers library, the Student Union and Chalmers Offices for Human Resources.

Many facilities that the inhabitants of the Living Lab would need can be found in the area surrounding the site, therefore it is unnecessary to

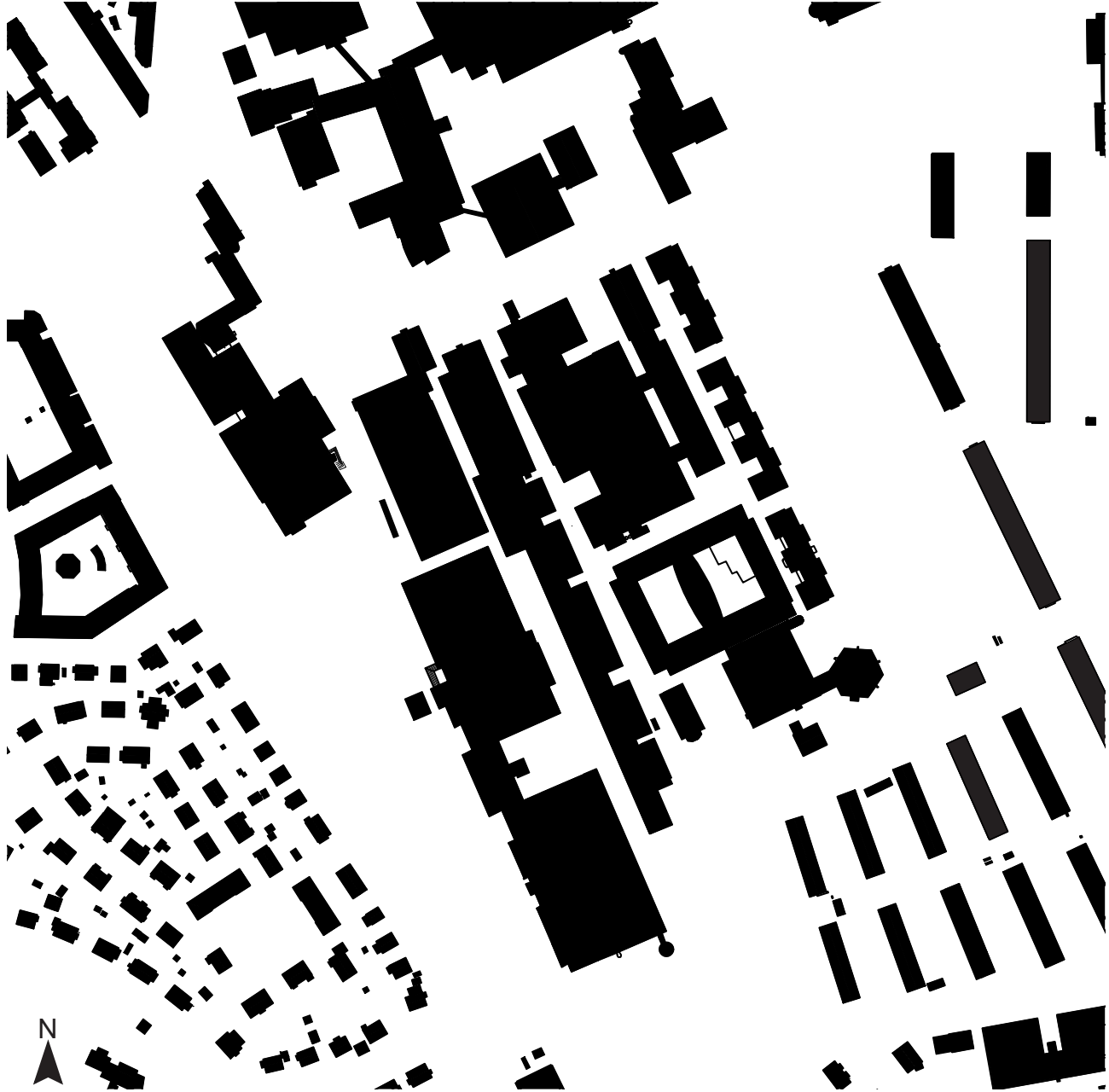
design them as part of the building since they would take space from someother facilities that are more needed. For example, almost every student owns a computer and at the same time at Chalmers in every faculty there are many computer rooms available with every program a student may need, so it is unnecessary to design a computer room in the Living Lab. The same argument can stand for the library. At Chalmers there is a big Library where every kind of book can be found so it is inappropriate to put a library in the Living Lab since the students are able to use the one they have on campus.

## Legend

	Educational buildings
	Residential buildings
	Services
	Green areas
	Restaurants
	Commercial

P	Parkings
1	Student Union building
2	Library
3	Fysiken
4	Chalmers offices for human resources
5	The train
6	Tram stop
7	Bus stop

# Density map 1:4000



The density map presents the percentage of the area that is built. In our area of interest the built environment occupies the 26,3% of the land, a fact that proves that the area is sparse, as most in Sweden, and our intervention will not affect the existing ambience.

### **Legend**

 Built

Information

Total area: 408938,95 sqm

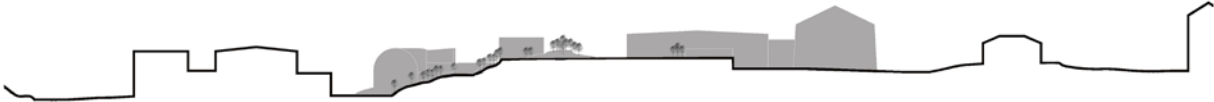
Built area: 107655,25 sqm

Density: 26,3%







# Building heights map 1:4000



# Site cross section



## Legend

-  6 floors
-  5 floors
-  4 floors
-  3 floors
-  2.5 floors
-  2 floors
-  1 floors




This study is made to understand the territory assessment in the area of interests. After an interactive analysis of the site where the heights of the buildings have been measured by floors the results are that the territory assessment of Johanneberg campus is heterogeneous; buildings goes from 1 to 6 floors heights and the hilly shape of the ground makes it hard to understand the differences on building heights. However the decision to keep only 3 floors for the Living Lab has been taken not only to stick to the design criteria of HSB and H4T, but also to design a building that fits with its surrounding environment (the buildings next to it are 2, 4 and 5 floors).

# Road organisation and transportation map 1:4000



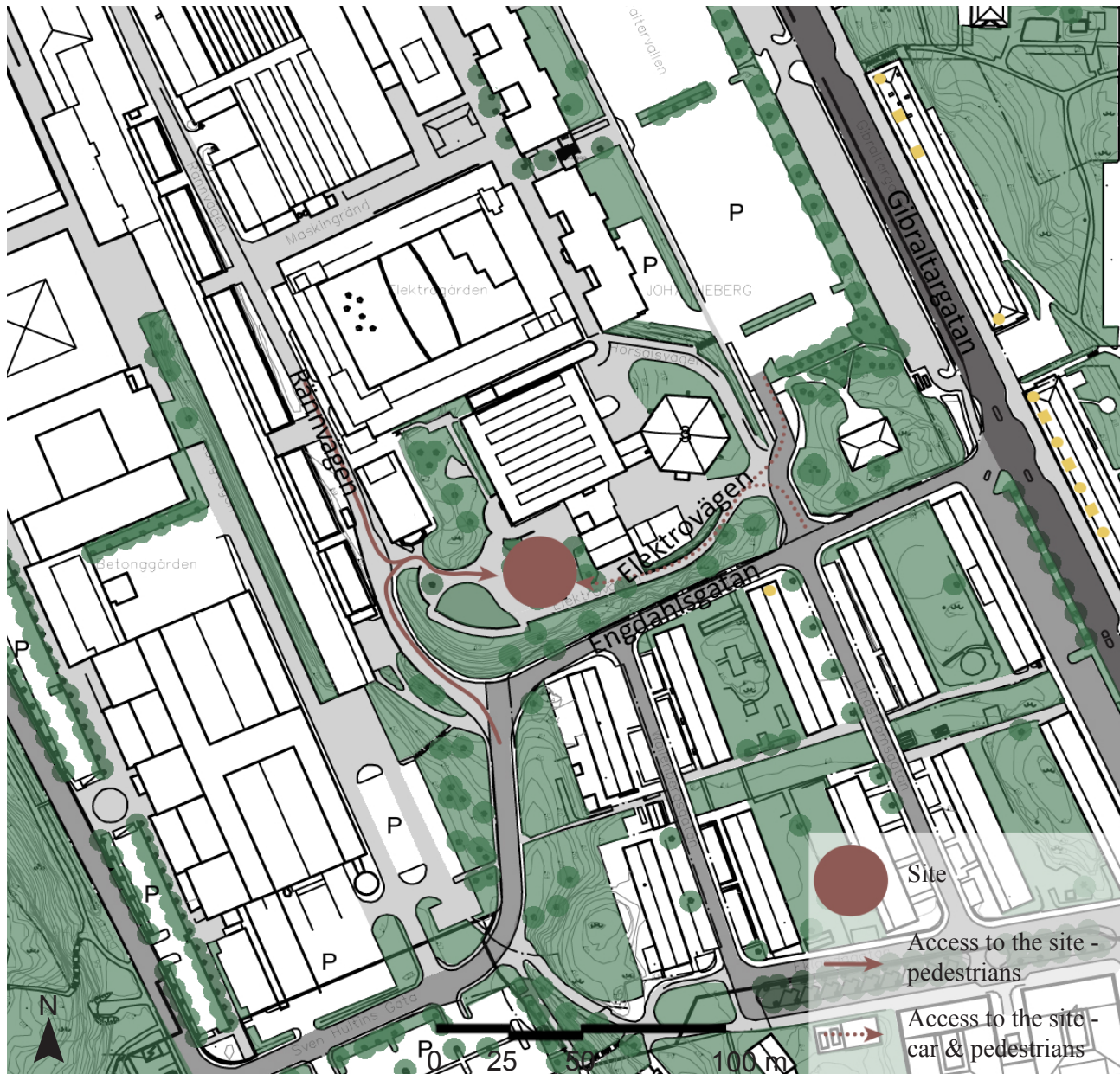
It is very important to understand how it is possible to access the Living Lab. Around the area of interests there are 3 kinds of roads: pedestrian roads, inside Chalmers campus; low speed roads, accessible by car but not in high speed like Sven Hultins Gata, Viktor Rydbergsgatan and Engdahls gatan. The area is also accessible by public transportation on Chalmersplatsen and Gibraltargatan.

### **Legend**

-  Pedestrian roads
-  Low speed roads
-  High speed roads

## 4.2.2 The Site

### Accessibility map





The location of the site is on the southern part of the Chalmers campus, in between Elektrovägen and Rännvägen, on the hill right next to the Fysiken's climbing lab.

For pedestrians it is possible to access the site from east and west while for cars it is only possible from east.

## Pictures of the site



1.



2.



3.



4.



5.



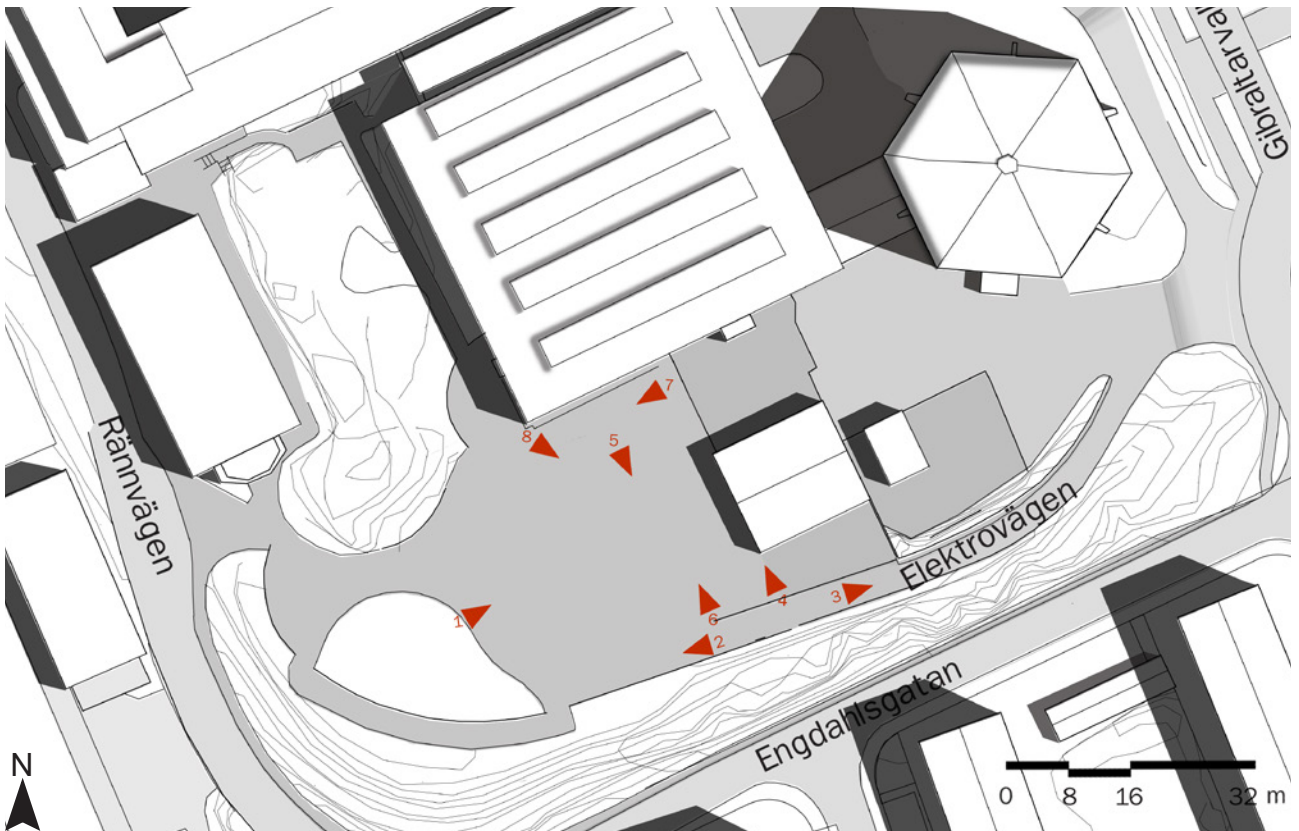
6.



7.



8.

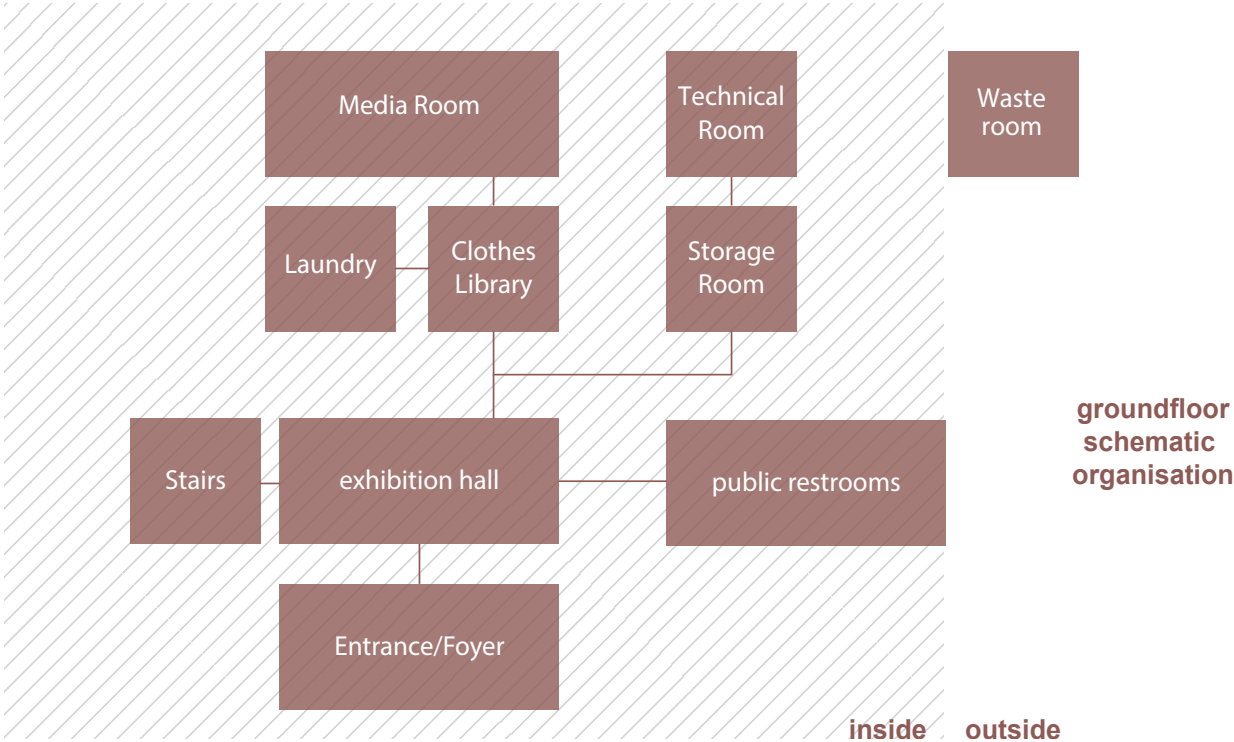


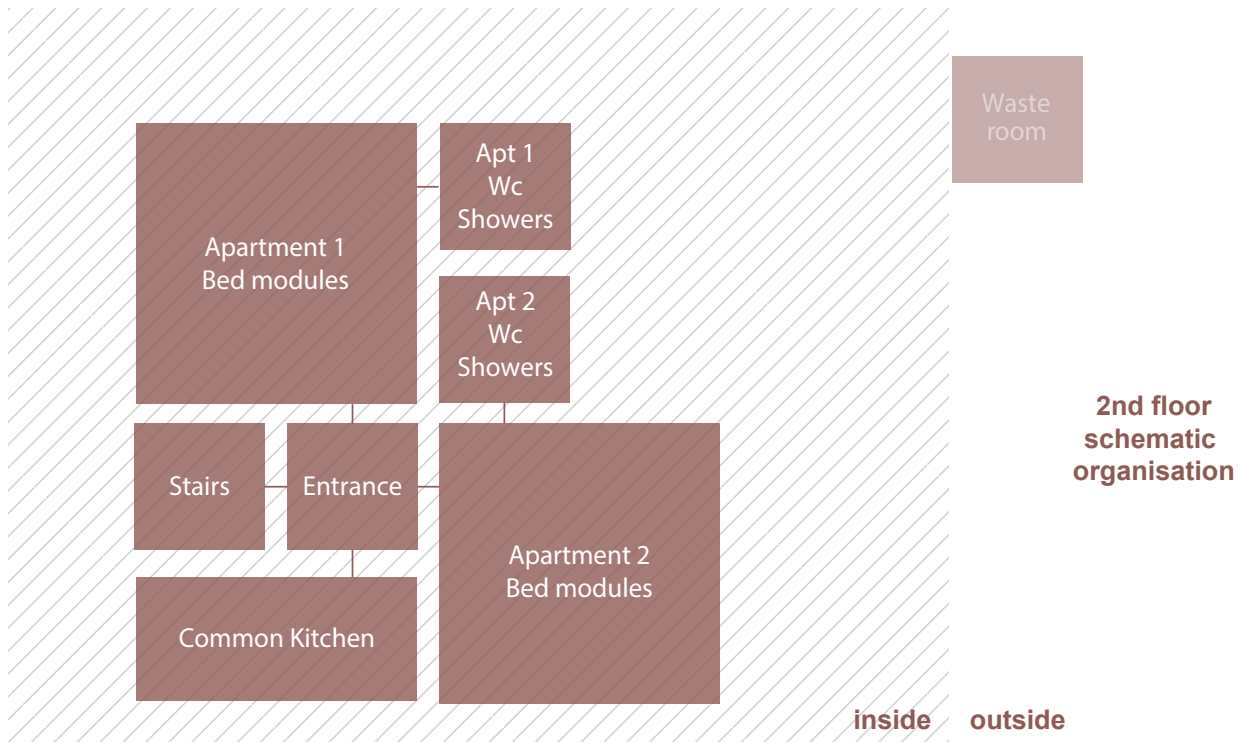
## 4.3 Student lab design proposal

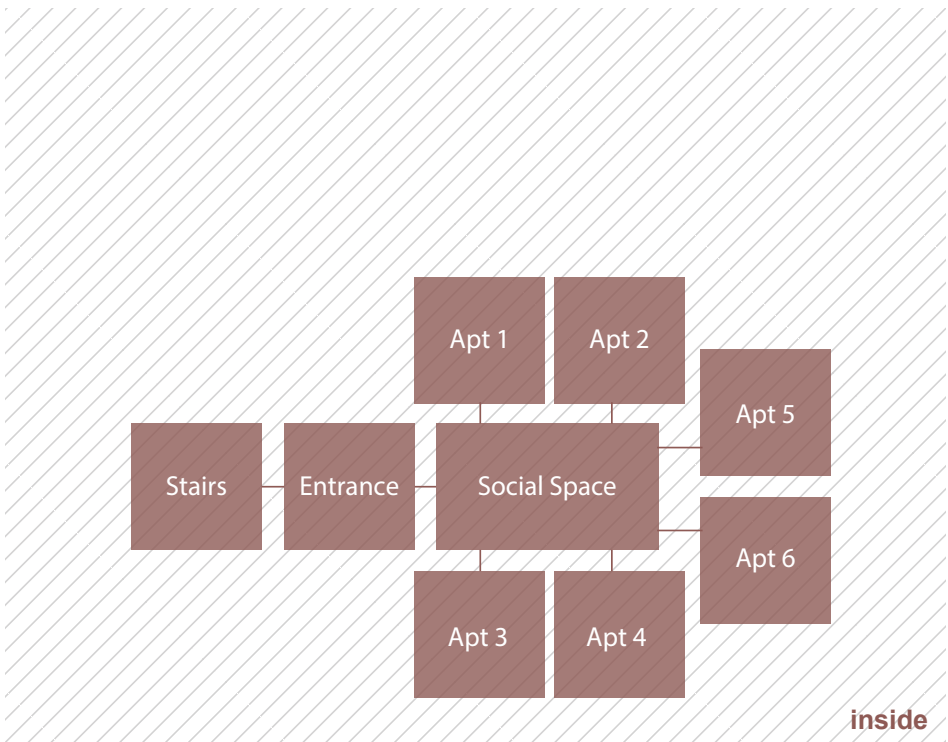
### 4.3.1 Schematic Organisation

A Schematic organisation of the building plans is needed to start with the design proposal, exploring connections and sizes of the different rooms and spaces.

# Schemes







Waste room

**3rd floor  
schematic  
organisation**

inside outside

## Flexibility

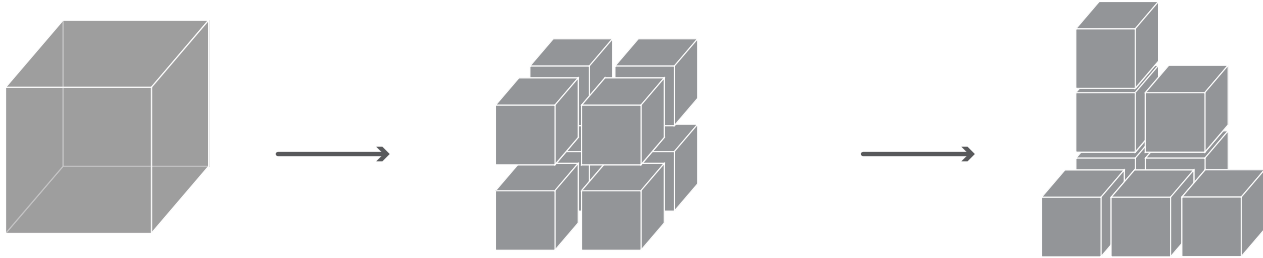
Flexibility is an important concept in this project. The Oxford Dictionaries define flexibility as “the quality of bending easily without breaking, the ability to be easily modified, willingness to change or compromise” (Oxford Dictionary, n.d.).

The structure of the building is designed to be movable, therefore the construction has to be easy to assemble and disassemble as well as it has to be

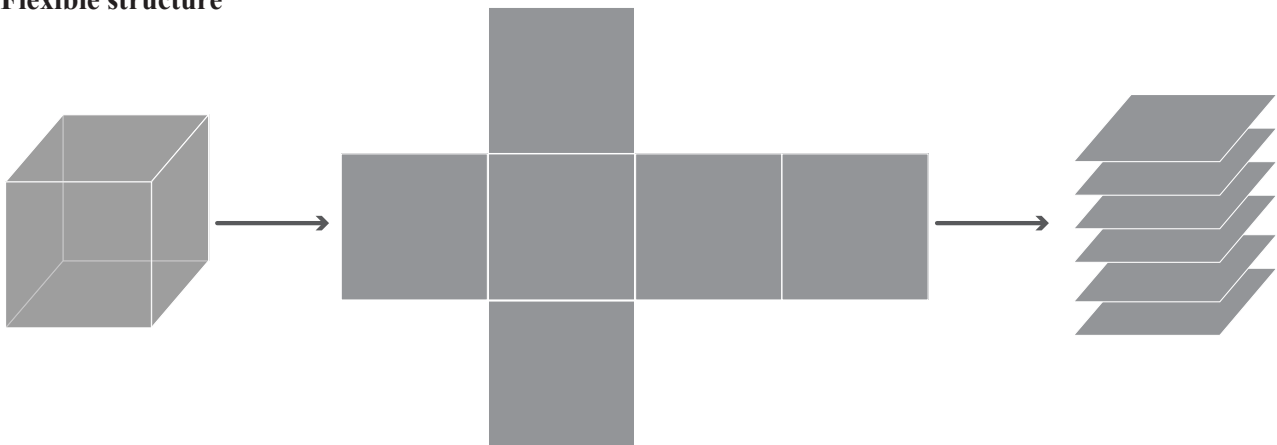
possible to compose it according to needs and tastes.

The use of a modular structure makes it easy to build, assemble, disassemble and modify the shape of the building. Each module can contain a facility and can be differently moved. For example, the staircase can be positioned according to the entrance, and the location of the entrance can be chosen according to the position of the site and can be changed when and if the building is moved.

## Flexible functions



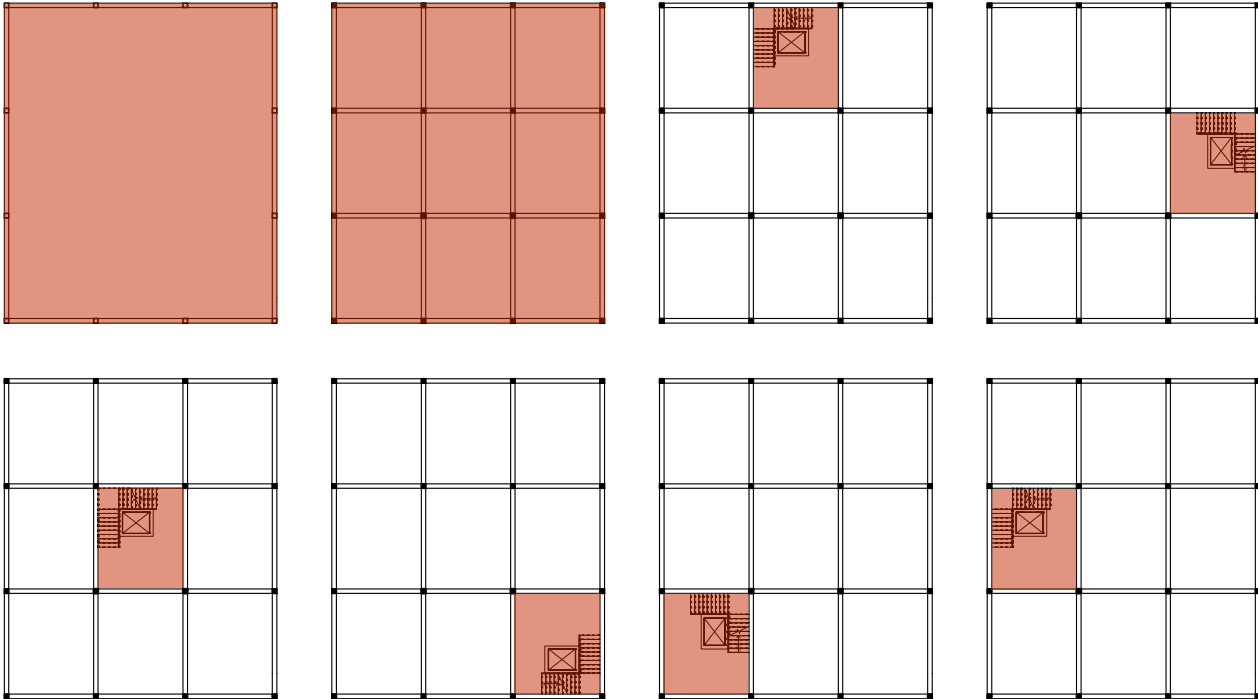
## Flexible structure



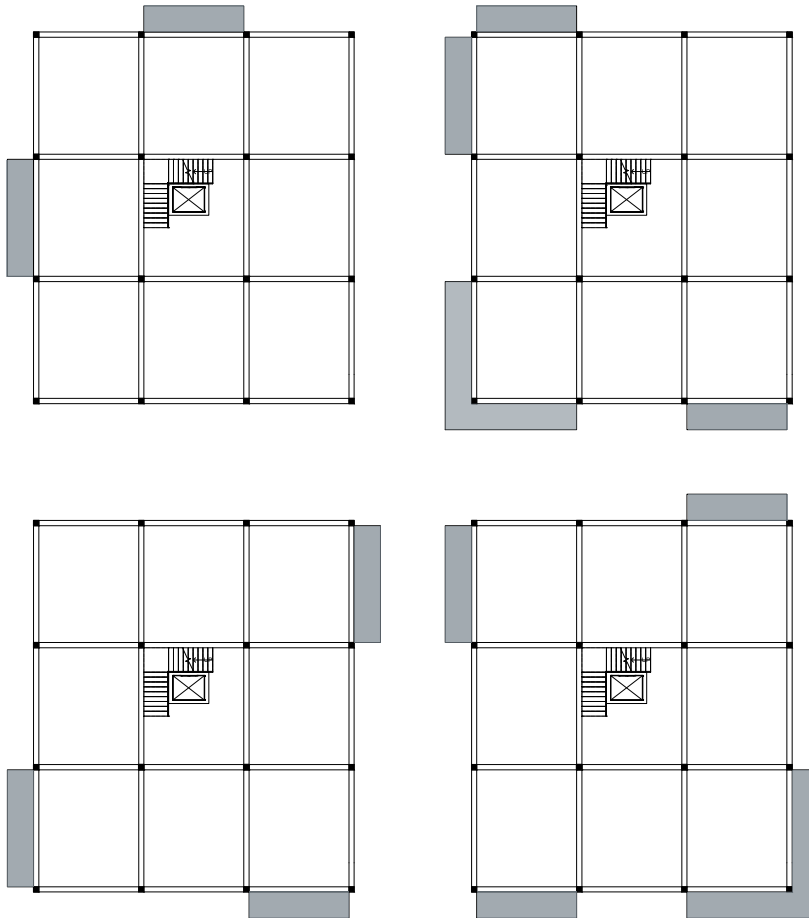


The use of modules also allows having different shapes that can be sustained by the modular structure. Plus, these shapes can be rotated according to the facade or to the sun side. In this specific case, the project keeps the basic geometry of a rectangle. Additional unheated modular spaces can be attached to the facade to alternate the overall shape. The modules are positioned according to the functions, in order to make visible the experimental space.

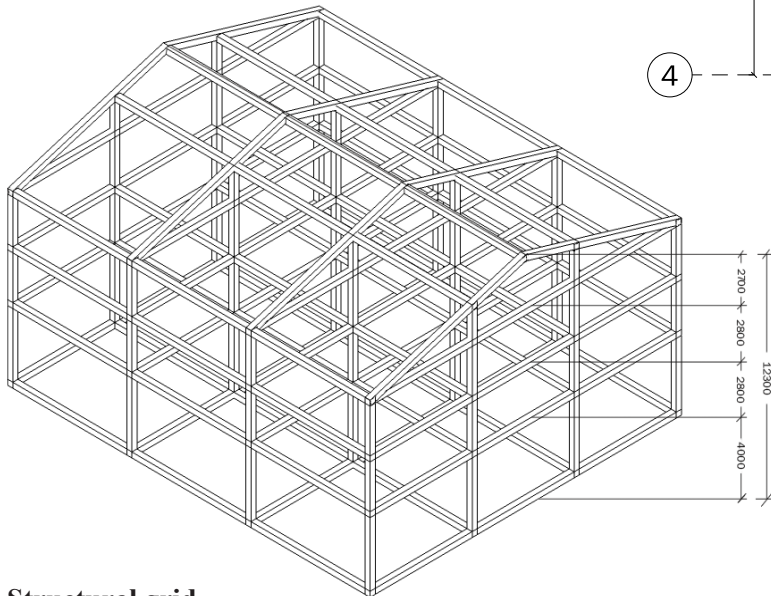
**Flexibility: modular structure of the design**



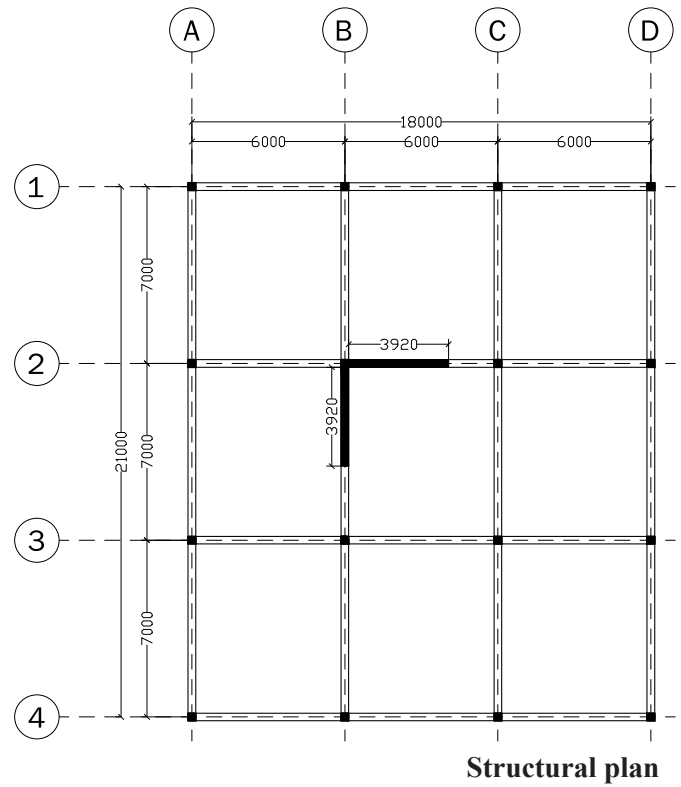
**Flexibility: modular structure permit to have different shapes in the design**



The simplicity of the assembly and disassembly is given by the morphology and material of the structural grid. In this case the material conceived for the skeleton is steel.

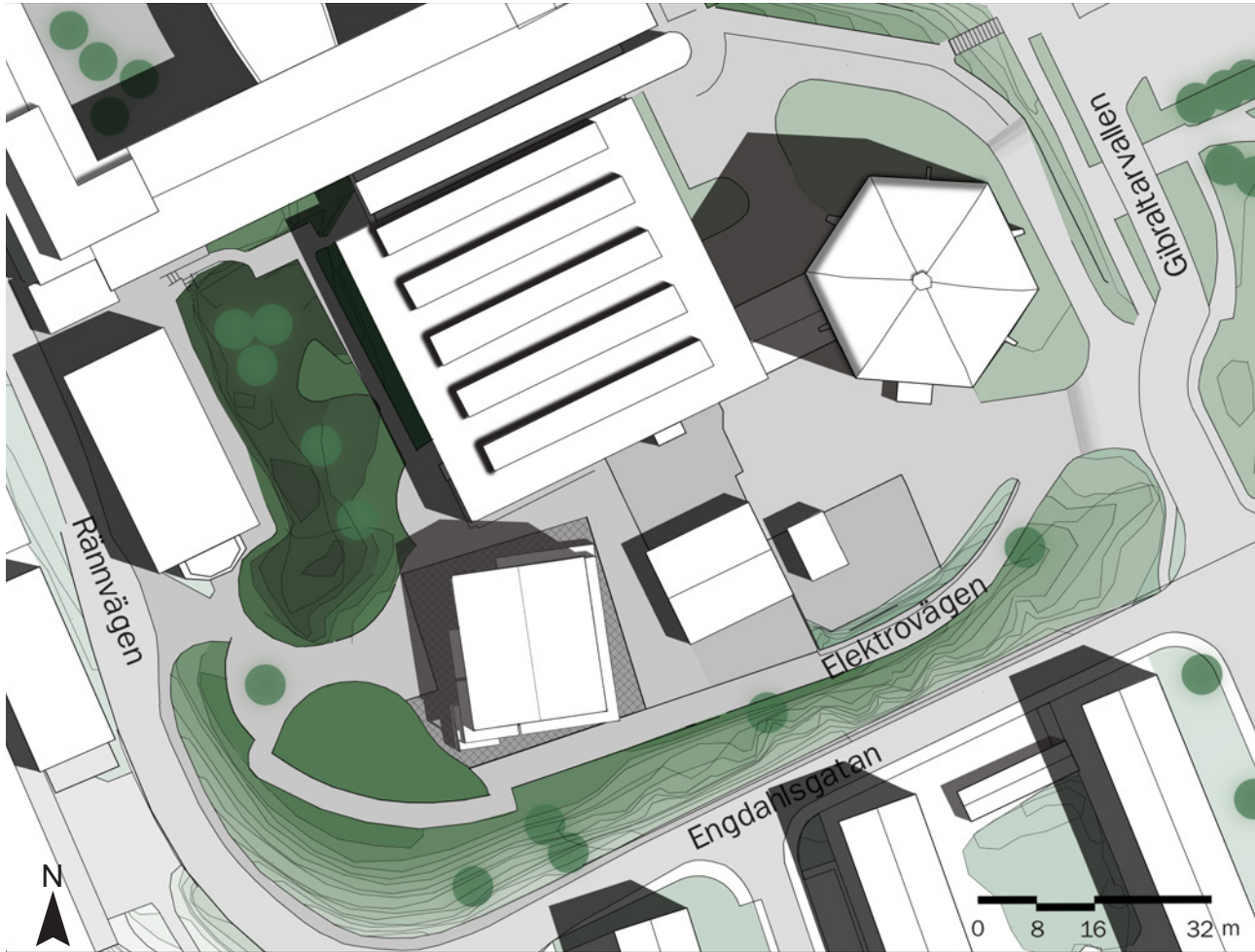


**Structural grid**



## 4.3.2 Plans

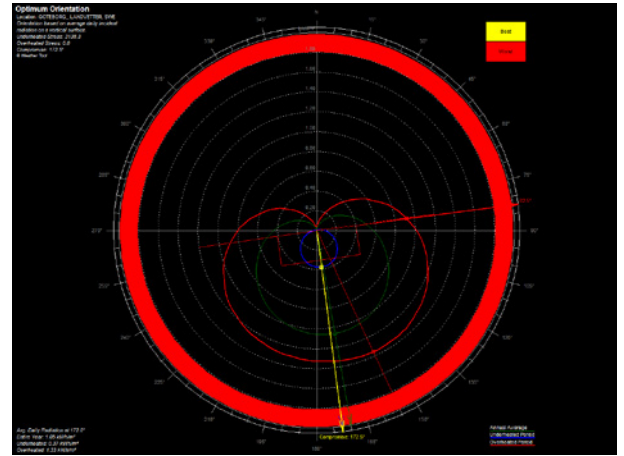
### Site plan



The site stands on top of the hill behind Fysiken. It is surrounded by green areas and on the southwest there is a view point on the campus. People are used to hang out there during sunny days enjoying lunch, fika, doing some exercise or just having a chat with friends.

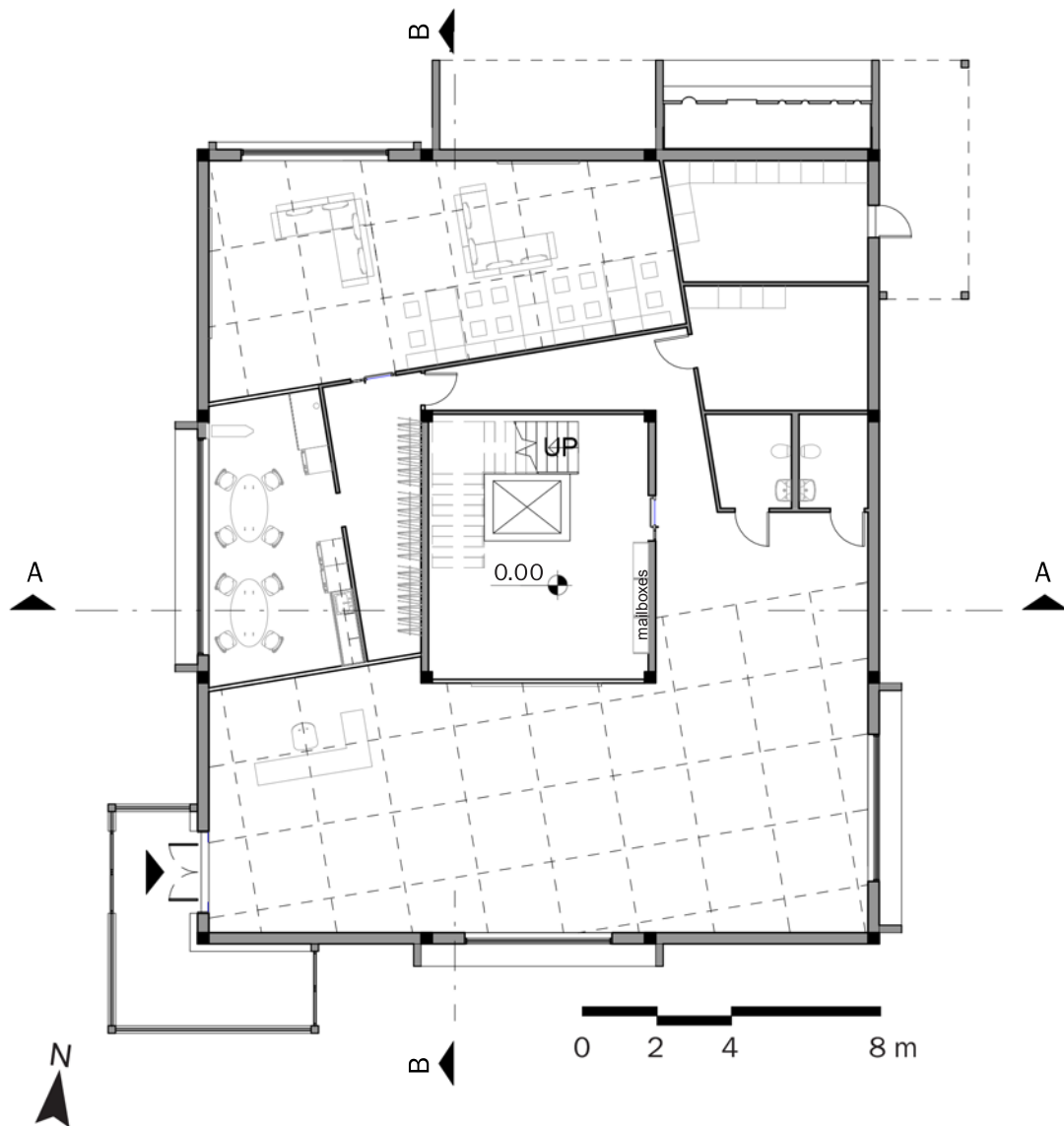
The maximum solar orientation of the building is on  $172.5^\circ$  from the North to receive as much solar radiation as possible in winter, when heating is required, whilst rejecting as much as possible in summer when it is not as much necessary.

The Ecotect software was used here to define the path of the sun and the optimal orientation of the building in Gothenburg.



Optimum orientation graph for Gothenburg

# Ground floor plan 1:200



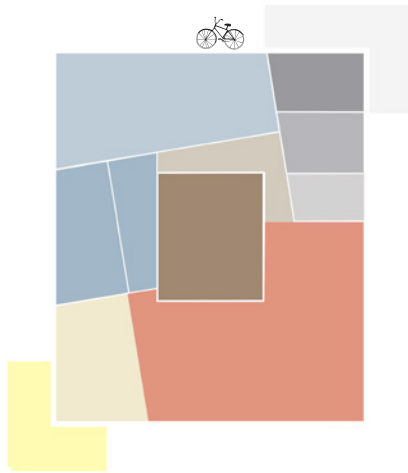
The first floor is made of both public space for exhibition hall about the Living Lab project and public areas that are accessible only from the inhabitants of the building.













The entrance of the Living Lab is positioned in southwest corner to orientate people coming from both ways. The public areas only accessible for inhabitants are the common laundry room with clothes library and “repairing spot” and, right next to it, the media room where it is possible to watch movies on big screens with projectors and have parties. These two rooms are connected so that the inhabitants can decide to use the laundry room and then watch a movie or just hang out in the media room while waiting for their laundry to be done. It is also a way to socialize and meet other inhabitants. The staircase is positioned in the middle of the floor to allow a geometrical organization of the space and the entrance to the student house is positioned on the east side of the stair case to make the inhabitants pass all the way through the exhibition hall to go home. The media room and the exhibition hall are organized with a grid of movable walls that can be positioned in many different ways to create different spaces according to the needs. For example, if someone wants to organize a conference in the Living Lab it is possible to create a room for that. The movable walls stand on railings attached to both the floor and the ceiling. When not used, these movable walls can be stored in the storage room

next to the technical room.

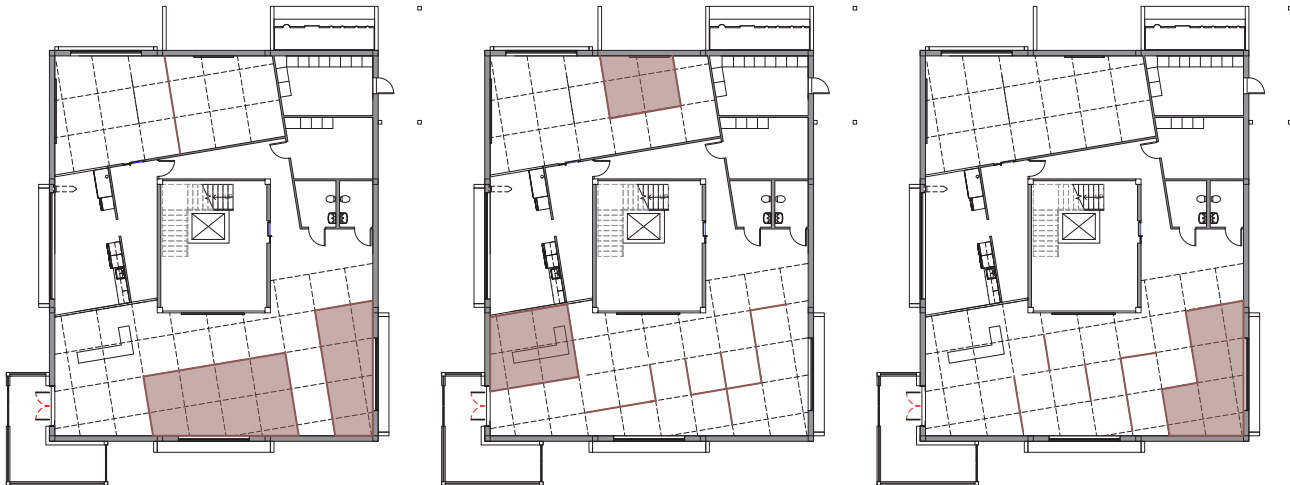
The outdoor area towards the southwest is used as a social space: the frame of the window is pulled out of the facade to create a bench where to sit and socialize, and at the same time interact with the laundry room. Besides, on the northeast part of the building a waste room is attached to the building and is accessible from the outside. Students need to learn waste recycling techniques and how important it is to separate the waste for sustainability.



## Functional plan



- |   |                 |  |                           |
|---|-----------------|--|---------------------------|
|  | Entrance        |  | Media Room                |
|  | Reception       |  | Public Restroom           |
|  | Exhibition Hall |  | Storage Space             |
|  | Staircase       |  | Technical Room            |
|  | Corridor        |  | Recycling Station         |
|  | Bike parking    |  | Laundry & Clothes Library |

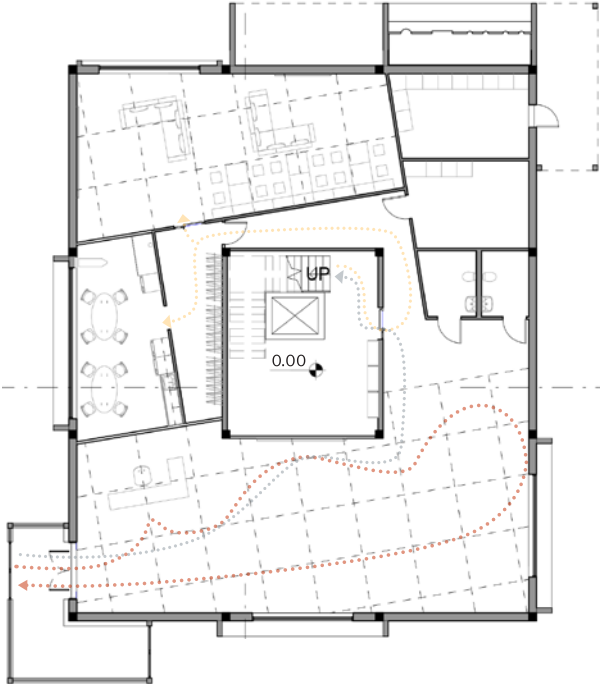
## Alternative interior organisation



- |   |                |
|---|----------------|
|  | panel position |
|  | space created  |

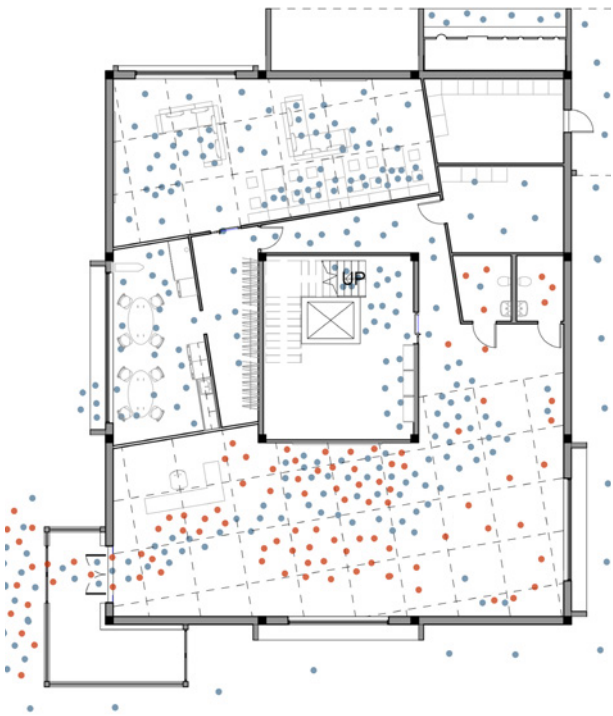


### Flow plan



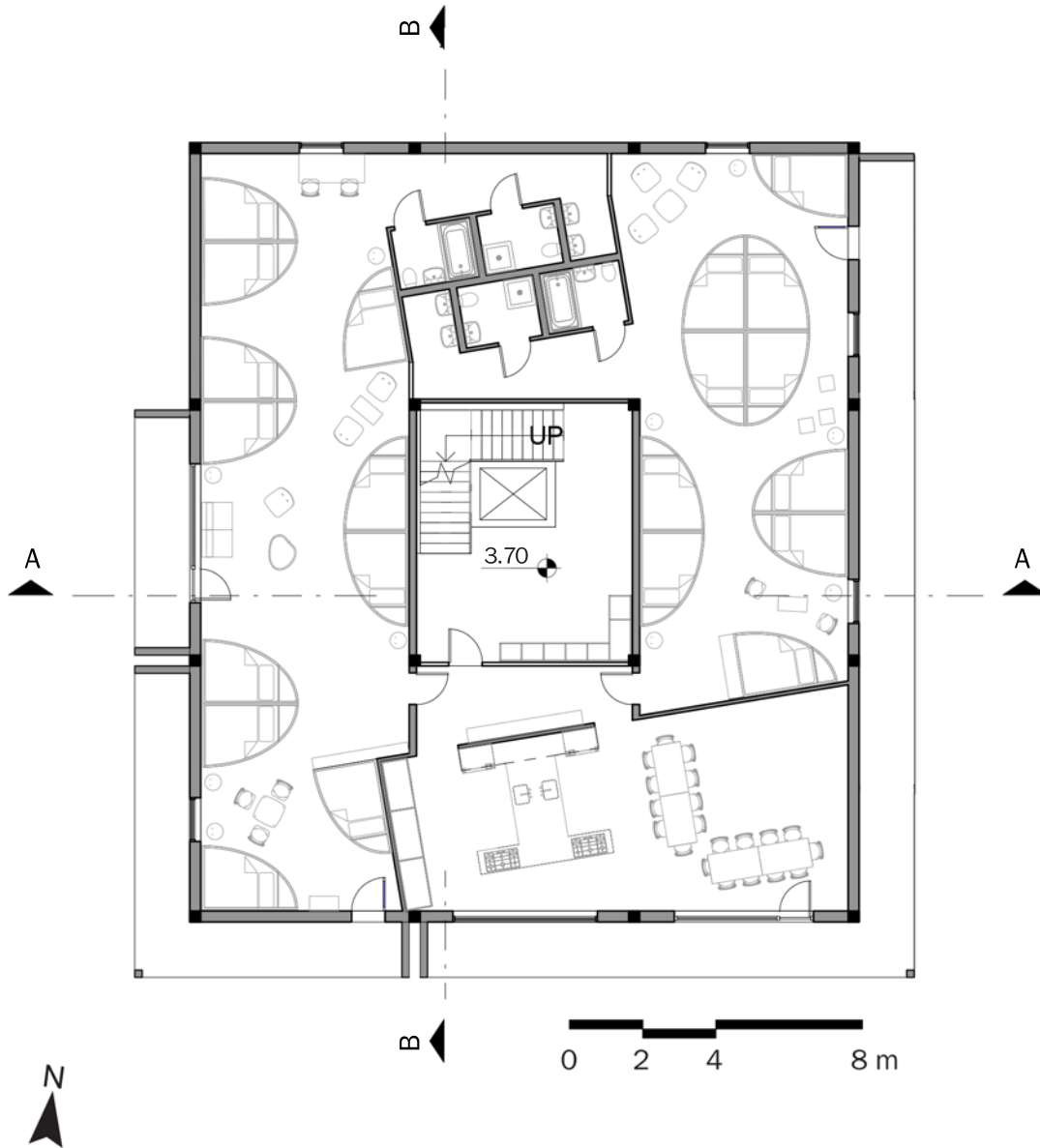
- Public flow
- Private flow - residential
- Private flow - common activities

### Density plan



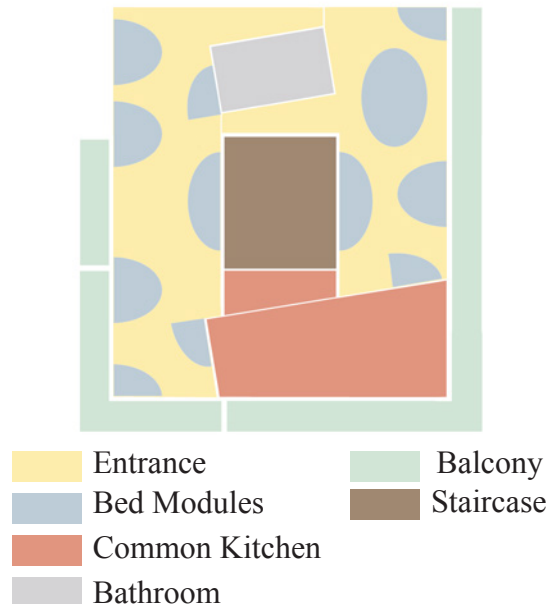
- Public
- Residents

# 2nd floor plan 1:200



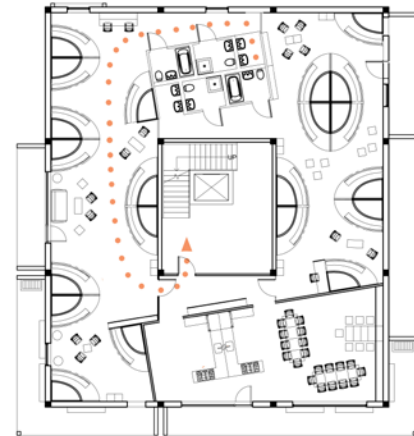
The second floor is accessible from the ground through stairs and elevator. An entrance gives access to two different apartments and a shared kitchen. 21 students live in 2 apartments of around 130 and 100sqm. The apartments are not divided in rooms but defined by bed modules (bed modules are illustrated and explained later on in the text). The space created in between bed modules is shared and can be furnished according to the occupant needs. Toilet and shower blocks are positioned on the North side of the apartments to collect the pipes together and not use the sunny space on the South side. Each apartment has 1 big or 2 balconies that are also used as shared space to enjoy barbecues, summer nights, or just to take some fresh air.

### Function plan



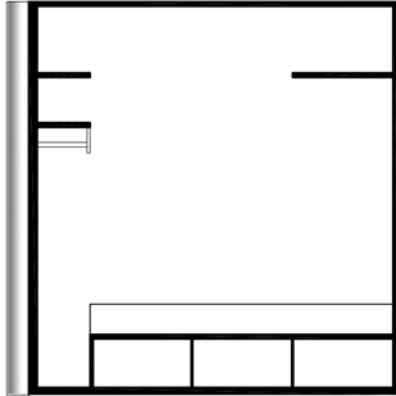
The general concept of the floor is to experiment with communal living sharing spaces, appliances and facilities in order to increase socialization and decrease energy consumption. The kitchen is central in the floor organization: it is positioned in the entrance, so that everybody has to pass through it, and it is shared between the two apartments to be able to meet everyone from the experimental floor. As mentioned by Thomas Merton in his book “The living Bread”, the meal is an important part of the socialization process and if the kitchen is where people have meals it is also the place where they are able to share activities as eating, cooking, cleaning, partying or only sharing the table to read a book, stay on the computer or having a chat,(Merton, 1956), becoming friends.

### Egress plan

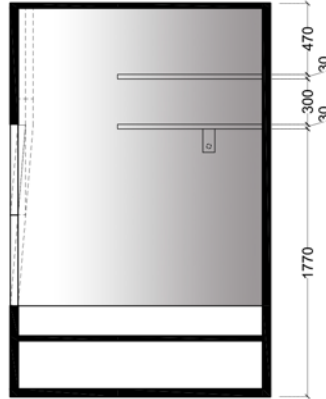


Maximum distance to exit - 26m

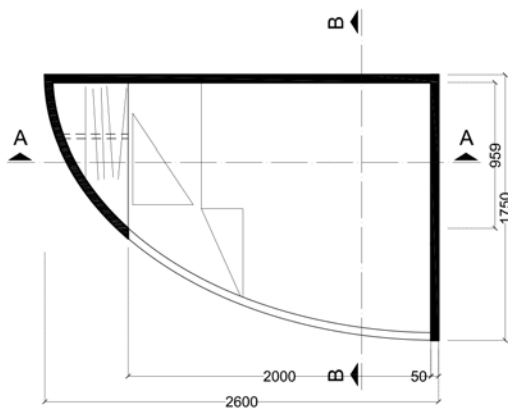
# Bed module 1:50



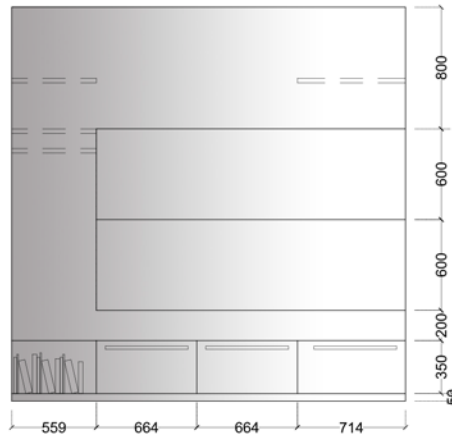
Section A-A'



Section B-B'



Plan



Elevation

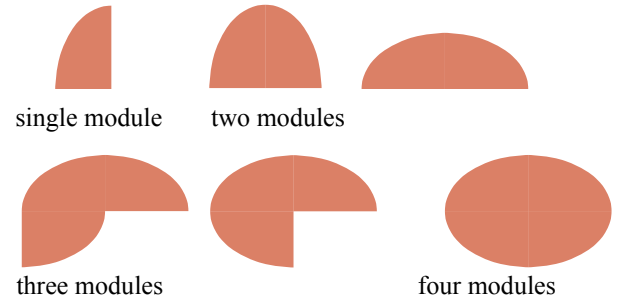


The bed module is a movable living unit that has an area of around 3,6 sqm. Its shape gives the possibility to be combined in different ways in order to create different spaces. It can also be personalized by changing colors or attach personal items on the walls.

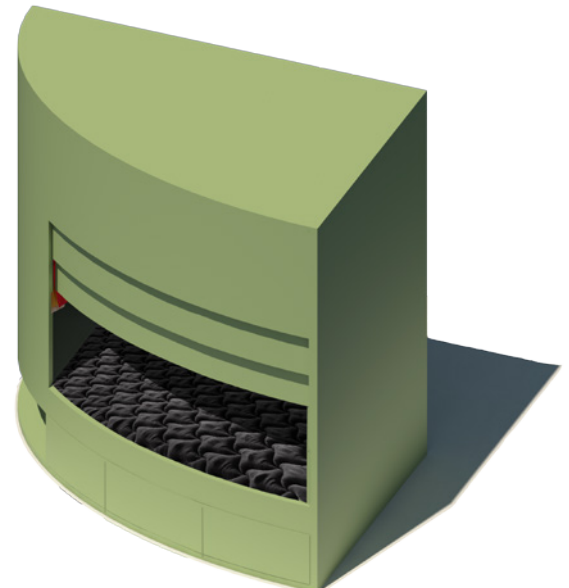
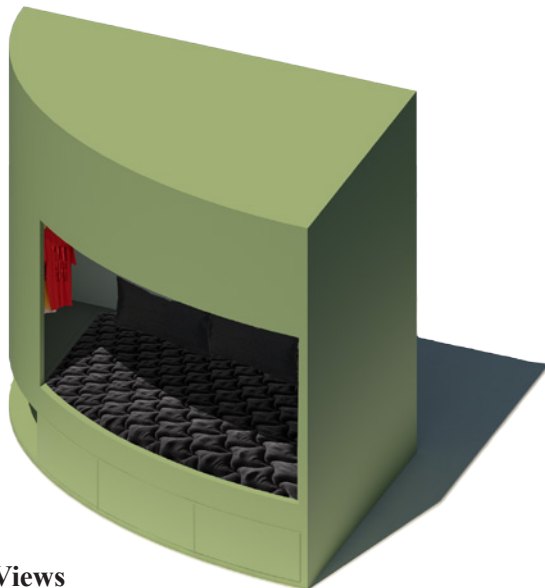
It includes a mattress with a gradually increased width from 900 mm to 1750 mm that gives the possibility to host a friend. Three large drawers under the bed, one big shelf above the bed and one hanging rod with three shelves (two above and one below) for storage spaces.

The module can provide privacy to the inhabitant thanks to two sliding doors. On the other hand, while open it can be used as a sofa and together with other modules to form a social neighborhood to interact with each other.

Alternative module combinations

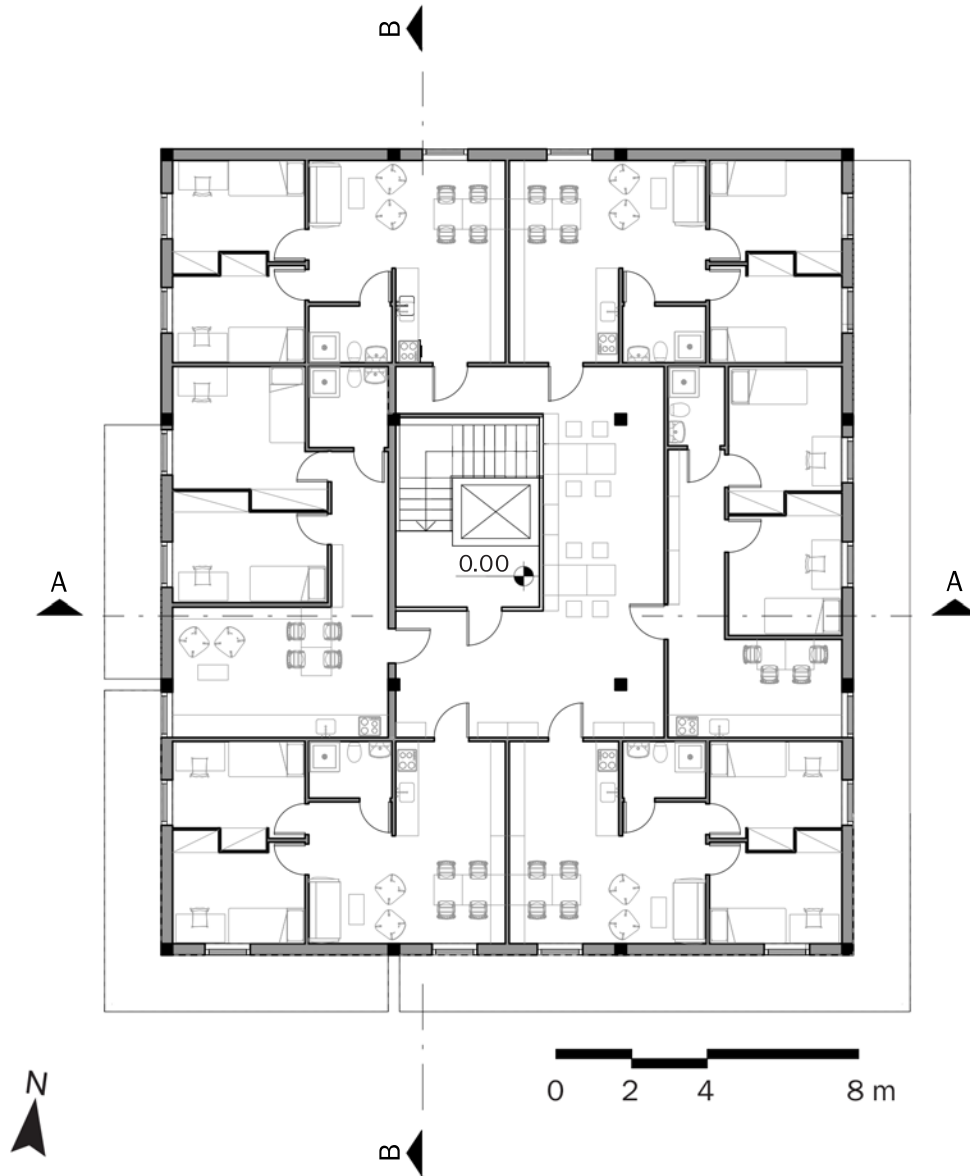


This unit includes also electricity features that can be connected to the floor according to where it is positioned. This gives the possibility to each module to have its own lighting and for each student to plug his own devices in his private space.



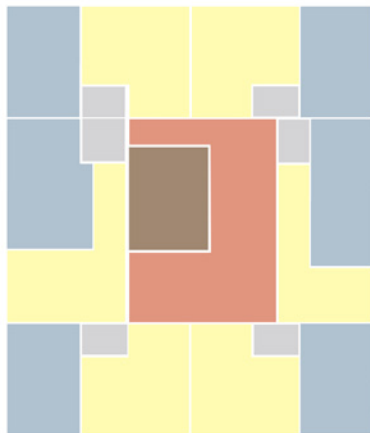
3D Views

# 3rd floor plan 1:200



The third floor is also accessed from the central stair that leads to an open social space and divides the students to their own apartments. This space is organised to concentrate leisure activities and bring the inhabitants together to meet each other. It is a transformable and flexible space that can be personalised with inhabitants' furnitures according to their taste. The students can meet there to play games, read, eat or party. The natural light coming from the high ceiling makes the space more attractive. We could say that this space has the role of the square in small villages; people meet, socialise, play, eat, drink and discuss, creating a community feeling.

### Function plan



- Living Space
- Sleeping Space
- Social Space
- Bathroom
- Staircase

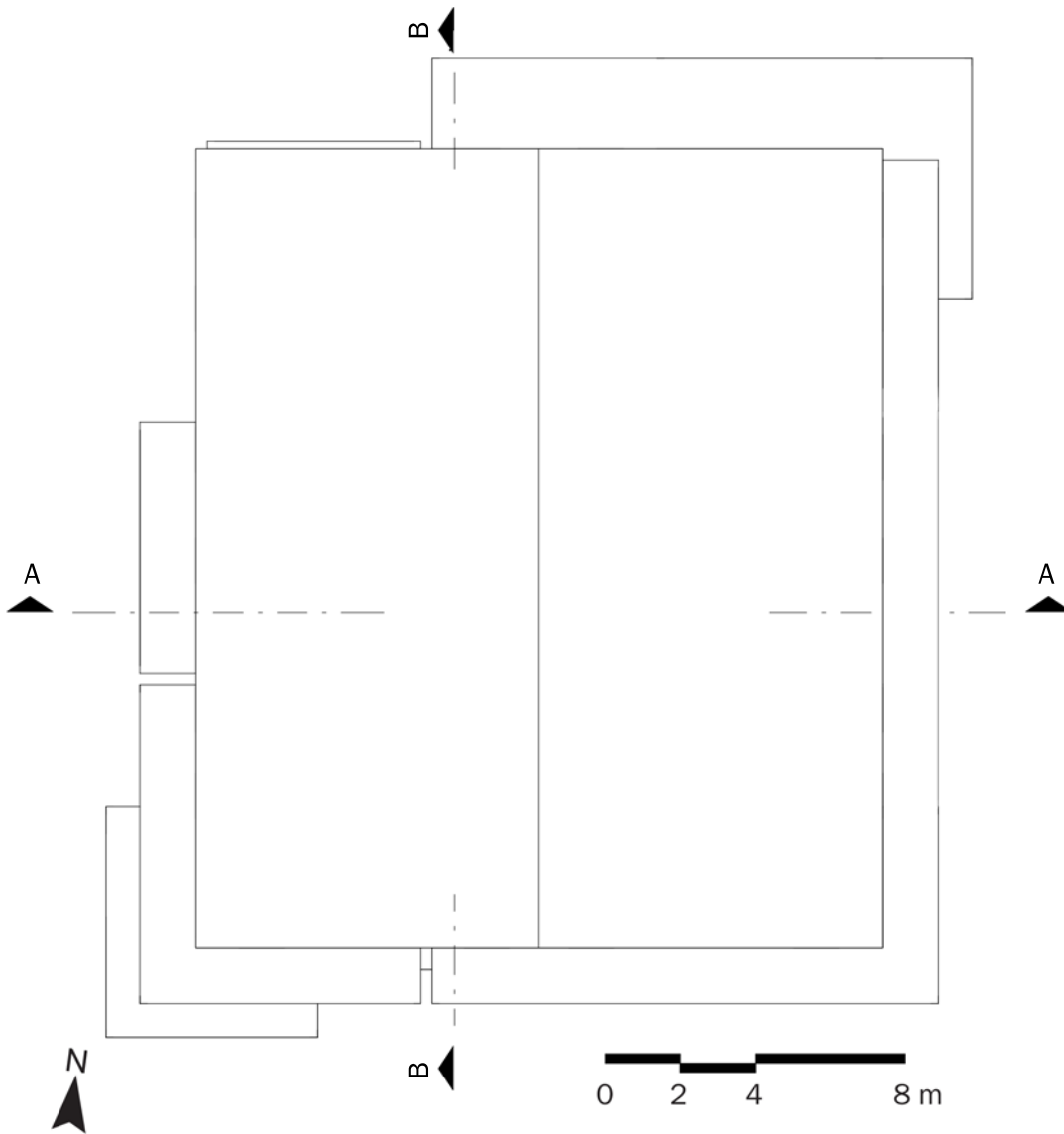
This floor hosts six 2-bedroom conventional apartments; four identical ones of 47 sqm, one of 56 sqm and one of 45 sqm. Kitchens and bathrooms are organised close to each other to facilitate the pipe connections. Each apartment consists of two separate bedrooms with their own built-in closet, one bathroom and one common kitchen.

### Egress plan



Maximum distance to exit - 25m

# Roof plan 1:200

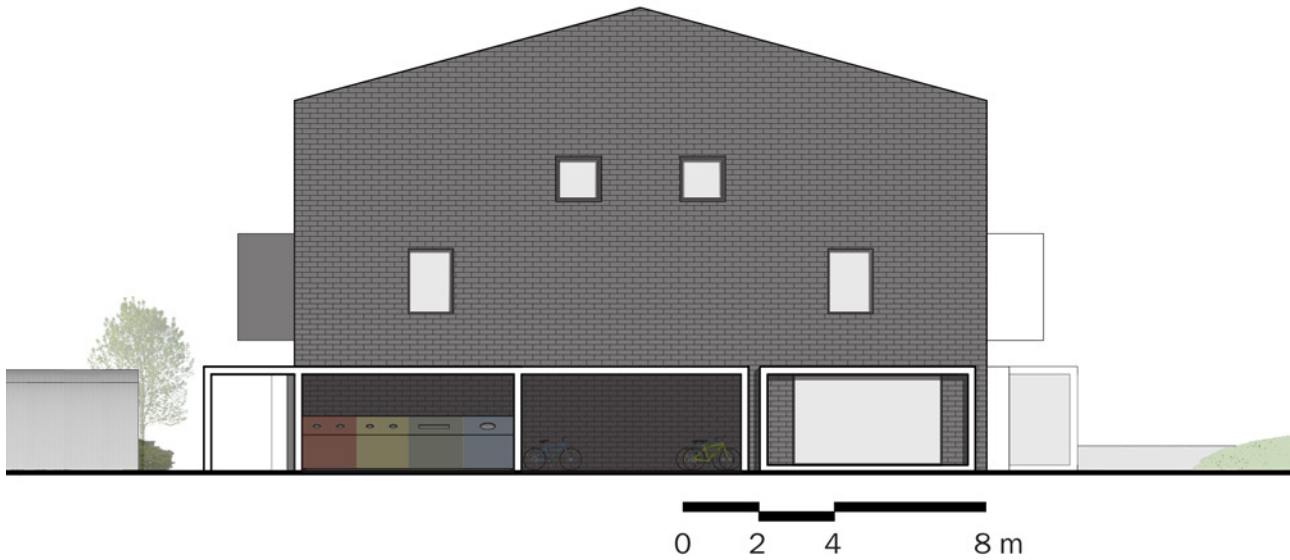




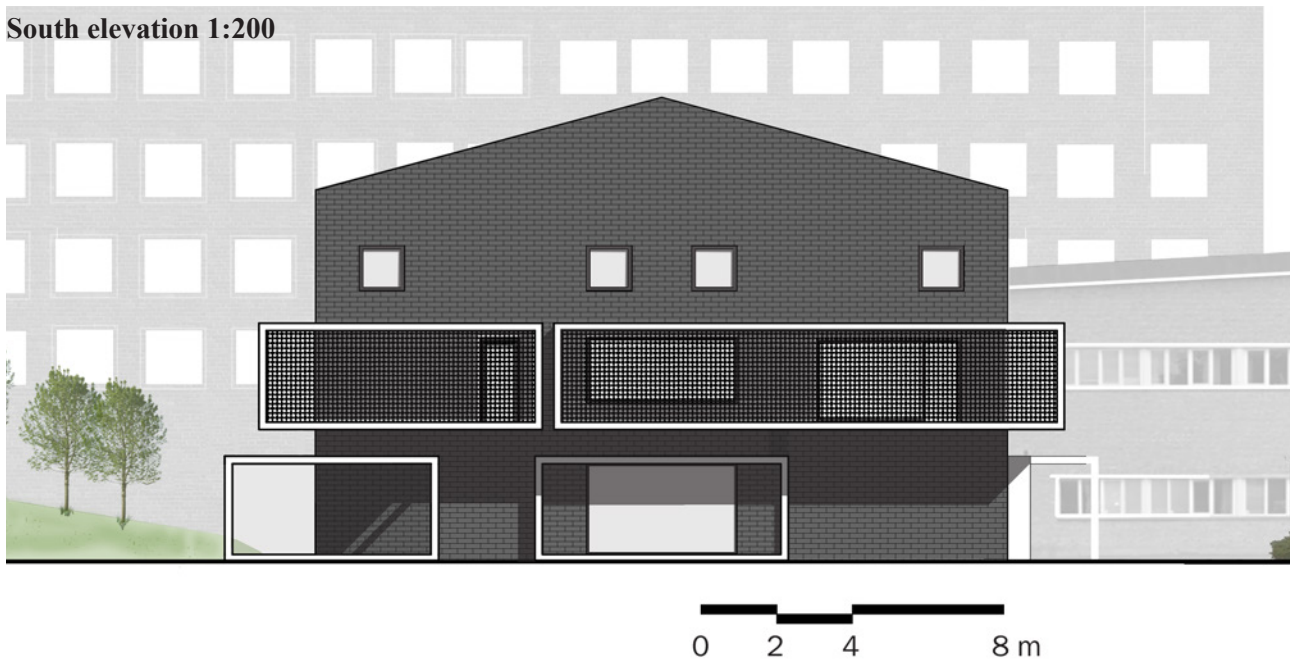


### 4.3.3 Elevations

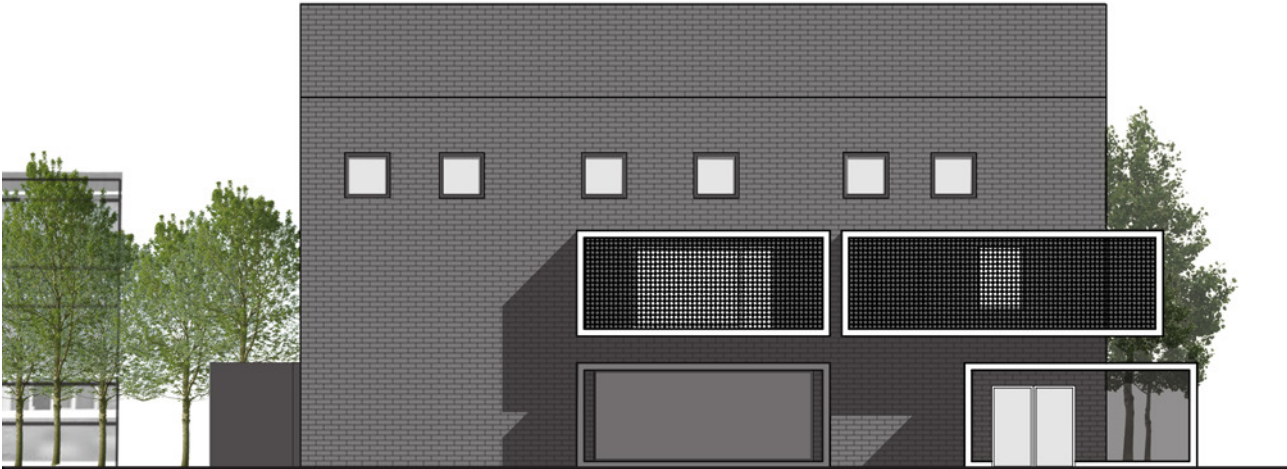
#### North elevation 1:200



#### South elevation 1:200

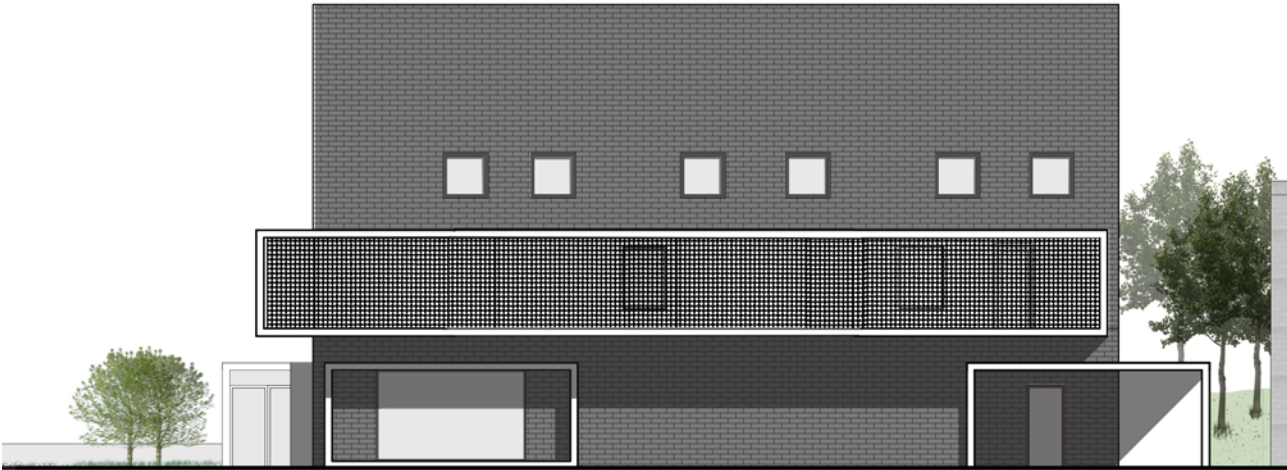


West elevation 1:200



0 2 4 8 m

East elevation 1:200



0 2 4 8 m

#### 4.3.4 Sections

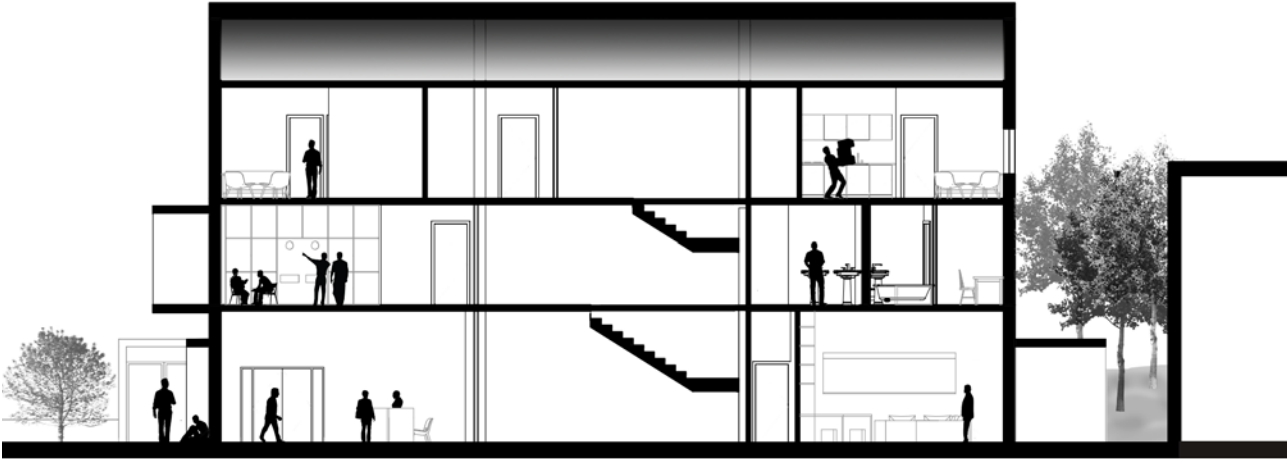
### Cross section of the building with surroundings



### Section A-A 1:200



Section B-B 1:200



## 4.3.5 Renderings

### Exterior





# Interior

## Experimental floor



## Laundry





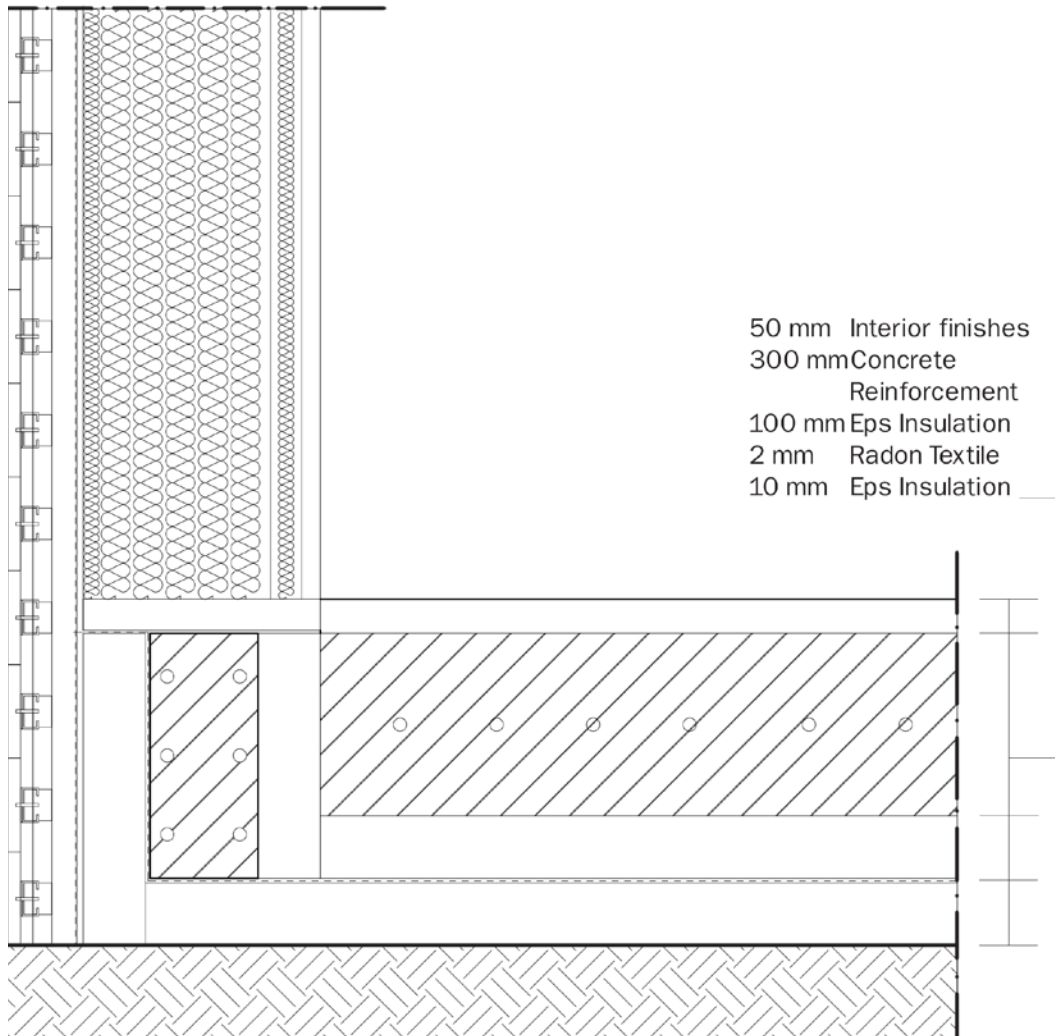
Common kitchen



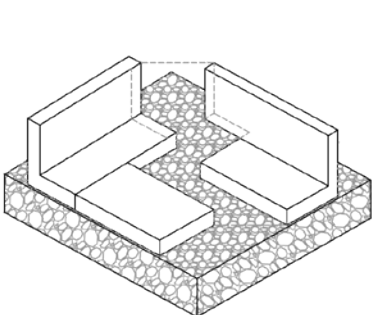
### 4.3.6 Structural details

The structural details illustrated here are examples of possible solutions for foundations, walls and facade.

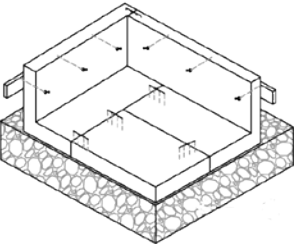
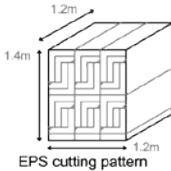
#### Floor detail section 1:10



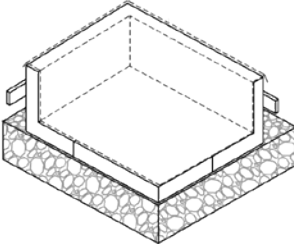
# Passive house foundation type: assembly



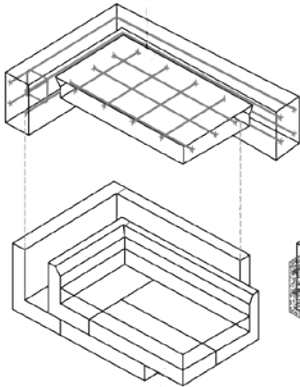
Step 1. Outer 'L' Assembly



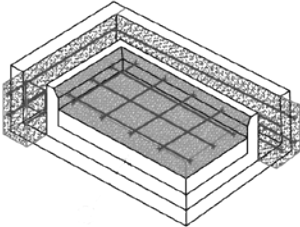
Step 2. FIXING



Step 3. RADON LAYER

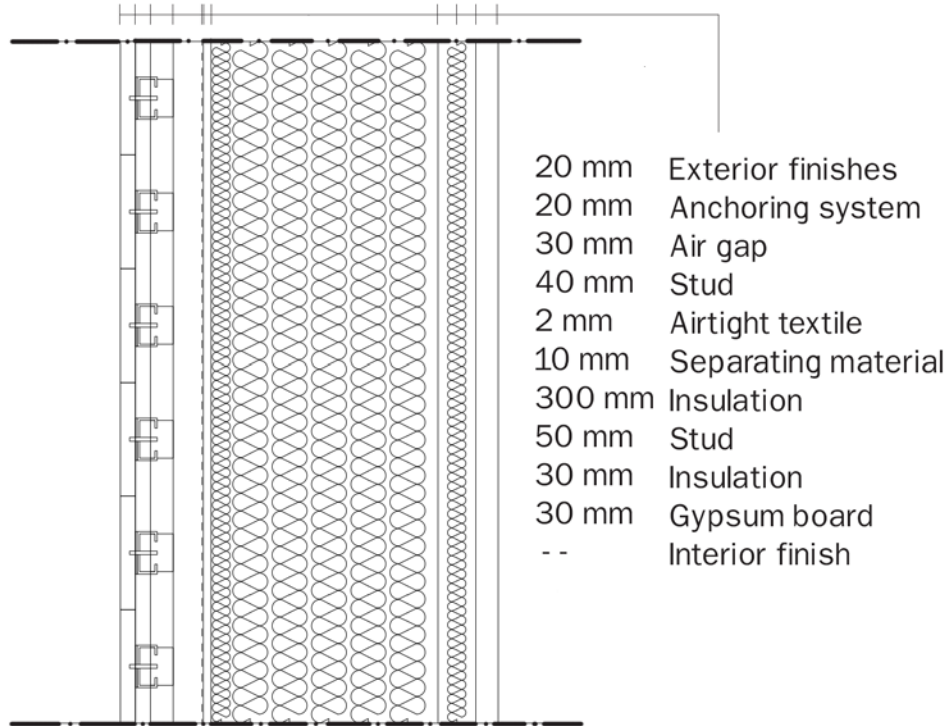


Step 4. Inner 'L' Assembly

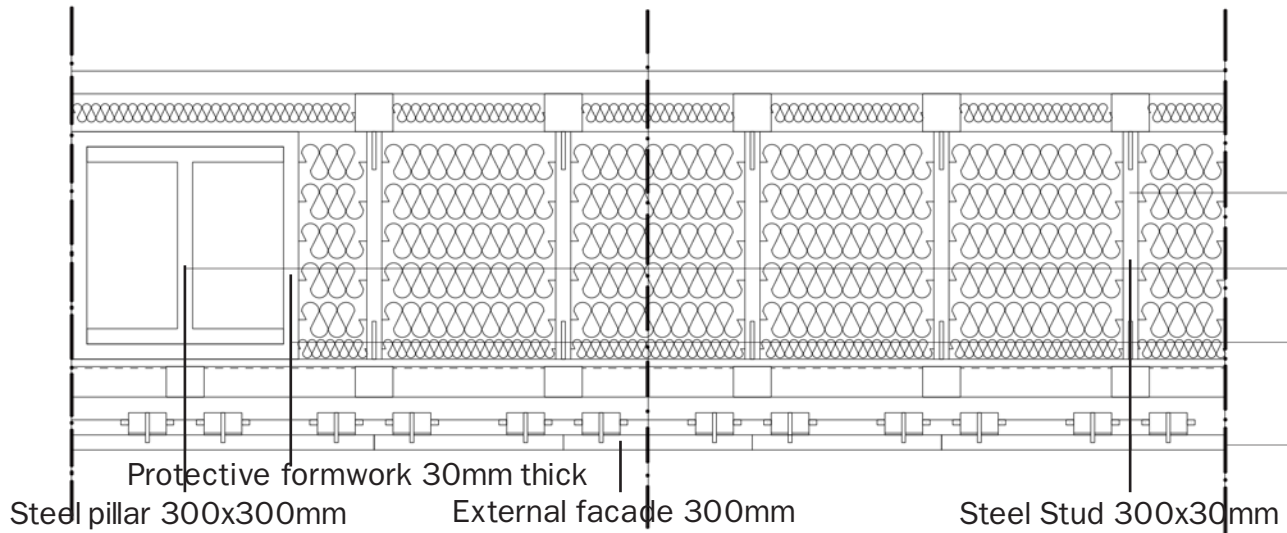


Step 5. reinforcing and pour concrete

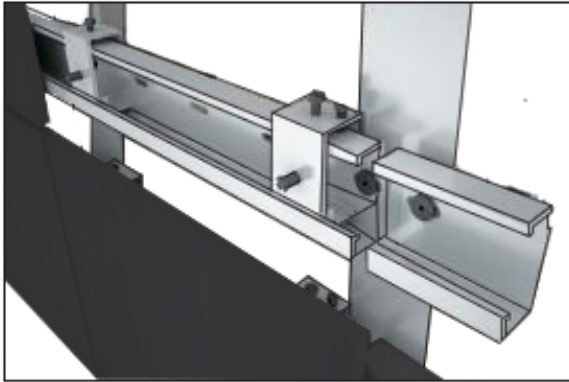
### Wall detail section 1:10



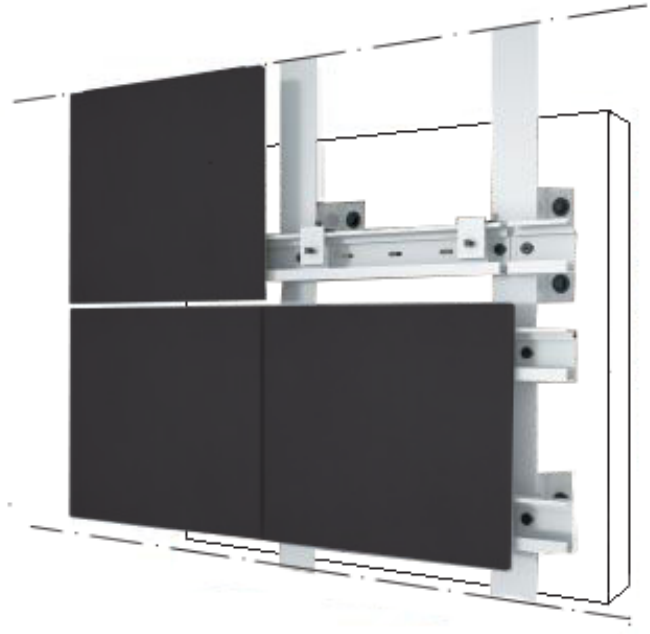
### Wall detail plan 1:10



## Facade detail: structure of anchored bricks



Details on anchor points



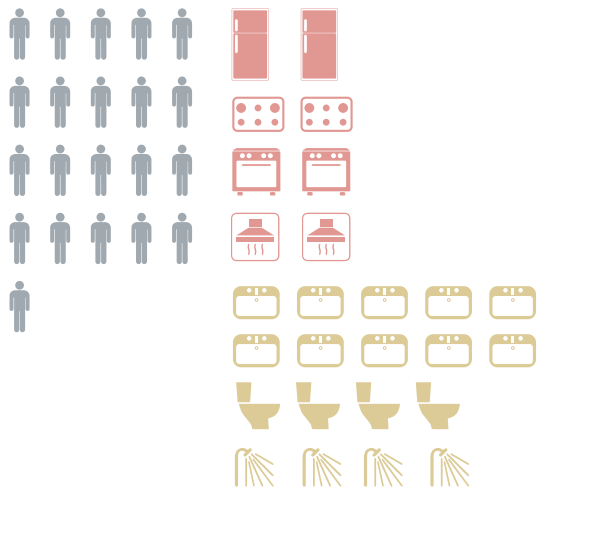
### 4.3.8 Energy performance

In this part energy calculations were made to compare the performance of each floor, the experimental and the conventional. The aim is to observe the energy consumption per person. The reason we chose to analyse the consumption per person is because it gives a more objective result compared to the one per square meter when we know that the place is going to be occupied and operated by inhabitants. To be more precise, imagine a house of 100 sq.m. where one person lives alone and place it next to one with same area where 4 people live together. Regularly the energy spent per square meter will be much lower in the first example, as one person can not be assumed to spend the same amount of energy and resources as four, but this

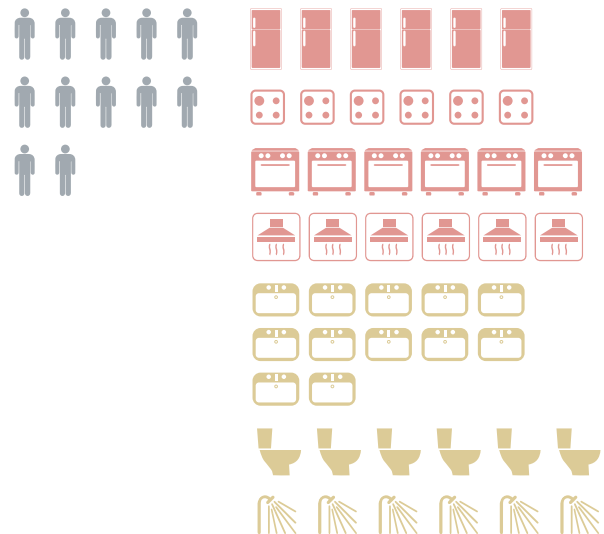
definitely does not make it a more sustainable living; specially if we consider all heating, cooling, appliances and the embodied energy.

The software that is used in our case is IDA - Indoor Climate and Energy, a leading building performance simulation tool. The data that are imported in the two floors separately following the plan organisation are: kitchen electrical appliances, amount of people for internal heat gain, natural lighting and electronic personal devices. Thermal bridges and solar radiation of the windows were taken also into consideration. Solar shadings are not calculated. The ventilation system and the supply air is constant in 18° C.

2nd floor - Experimental



3rd floor - Conventional



Occupancy, kitchen appliances and personal electrical devices schedules are added to the software for each floor in relation to the type of space (see the following graphs). These schedules are assumptions based on ASHRAE (American Society of Heating, Refrigeration, and Air-Conditioning Engineers) standards. For each one, the following tables provide hourly values for a 24-hour period, starting at midnight (0 to 24 on the x-axis). These values (0 to 1 on the y-axis) are fractional multipliers.

For example, if an occupancy density is 100 people in a building, then:

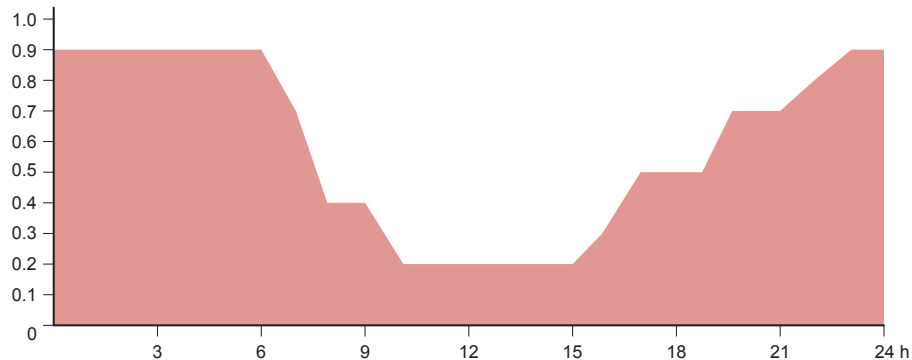
a schedule value of 1 means that 100 people are assumed to be in the building during that hour.

a schedule value of 0 means that no people are assumed to be in the building during that hour.

a value of 0.1 means that  $100 * 0.1 = 10$  people are assumed to be in the building during that hour (Vasari, 2013).

In our case the occupancy density is 21 for the experimental floor and 12 for the conventional one. As both floors host students and are used as residential spaces the occupancy schedule is identical.

Student occupancy daily schedule\*

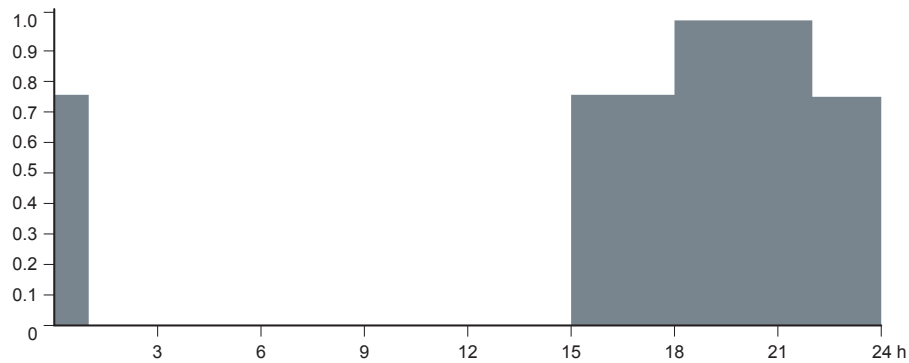


\*Based on occupancy-residential schedules of Autodesk Vasari

By electrical devices we estimated one personal equipment per student (ex. personal computer) that consumes 50W/hour. So each floor has the same amount of devices with its number of occupants.

This graph actually shows that during sleeping and school hours the devices are not in function. The peak time here is when students are back from school and have already eaten their dinner.

Electrical personal devices daily schedule

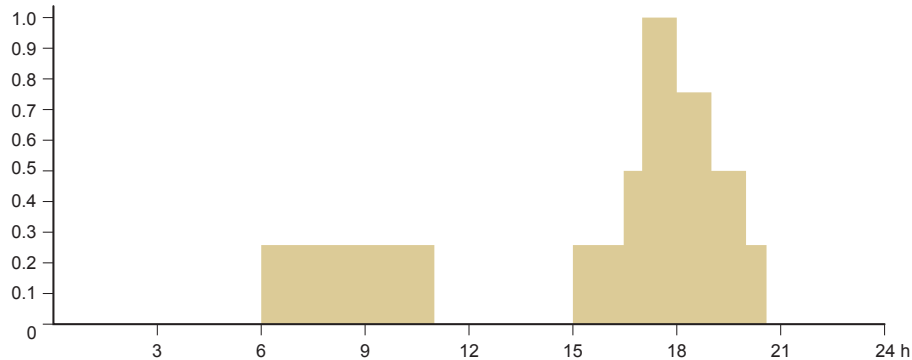




In kitchen appliances the fridge and the kitchen stove are considered. In the big kitchen of the experimental floor there are two big fridges that consume 200W/hour each and two kitchen stoves that consume 2000W/hour each. In each apartment of the 3rd floor there is one fridge consuming 50W/hour and one kitchen stove consuming 1500W/hour.

The following schedule regards only the kitchen stoves as the fridge works continuously 24 hours/day. According to the schedule the kitchen stove is mostly used during morning when students prepare their breakfast and after school when they are all back at home for dinner and preparing next day's lunch as well. This time is the peak of the day.

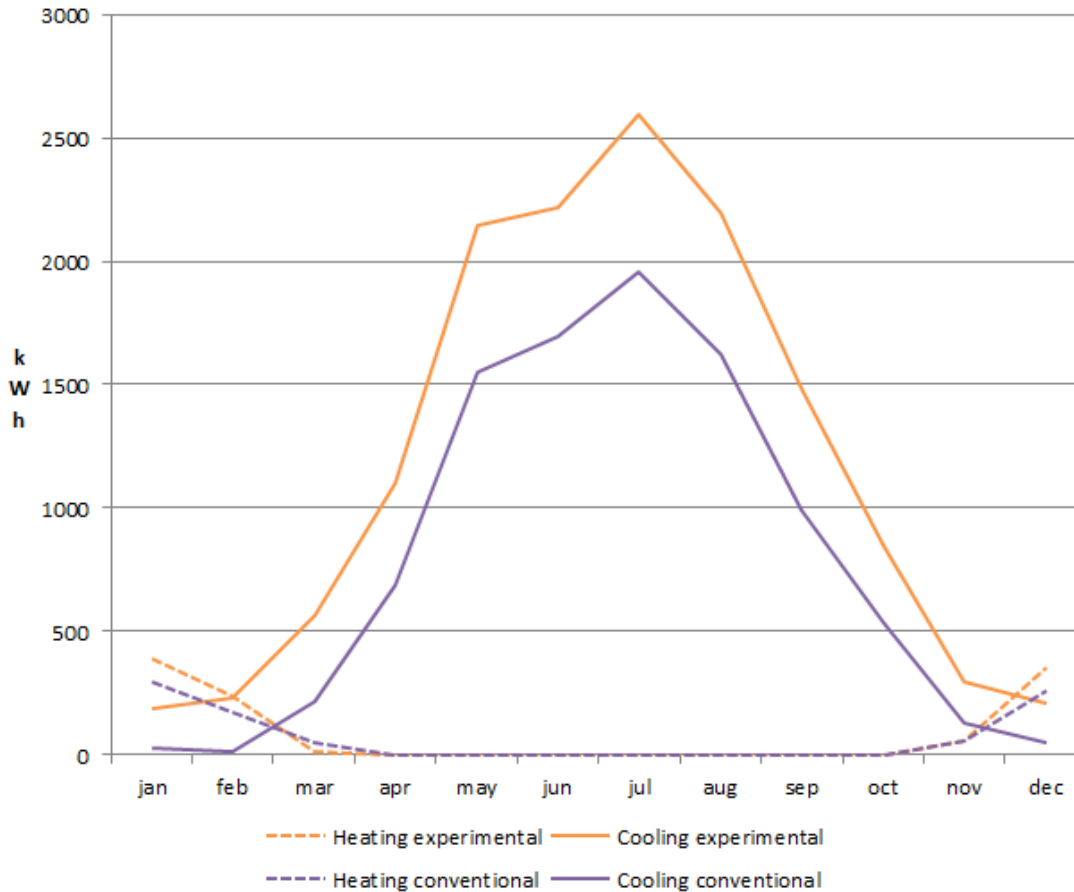
Kitchen appliances daily schedule



So after all the data and schedules mentioned above were imported, the simulation ran in order to calculate the yearly energy needed to keep the comfort in each floor providing heat or cool according to the seasons. Consequently, by having the total energy consumption and divided it by the amount of inhabitants we had the energy consumption per person on each floor during one year.

The results as numbers are not precise, because the model doesn't include many details such as material properties, etc. However by simplifying the model and handle both floors in the same way we were able to have comparable results that can give us a conclusion regarding the difference in energy spent per person in each floor.

## Yearly Energy for Heating and Cooling

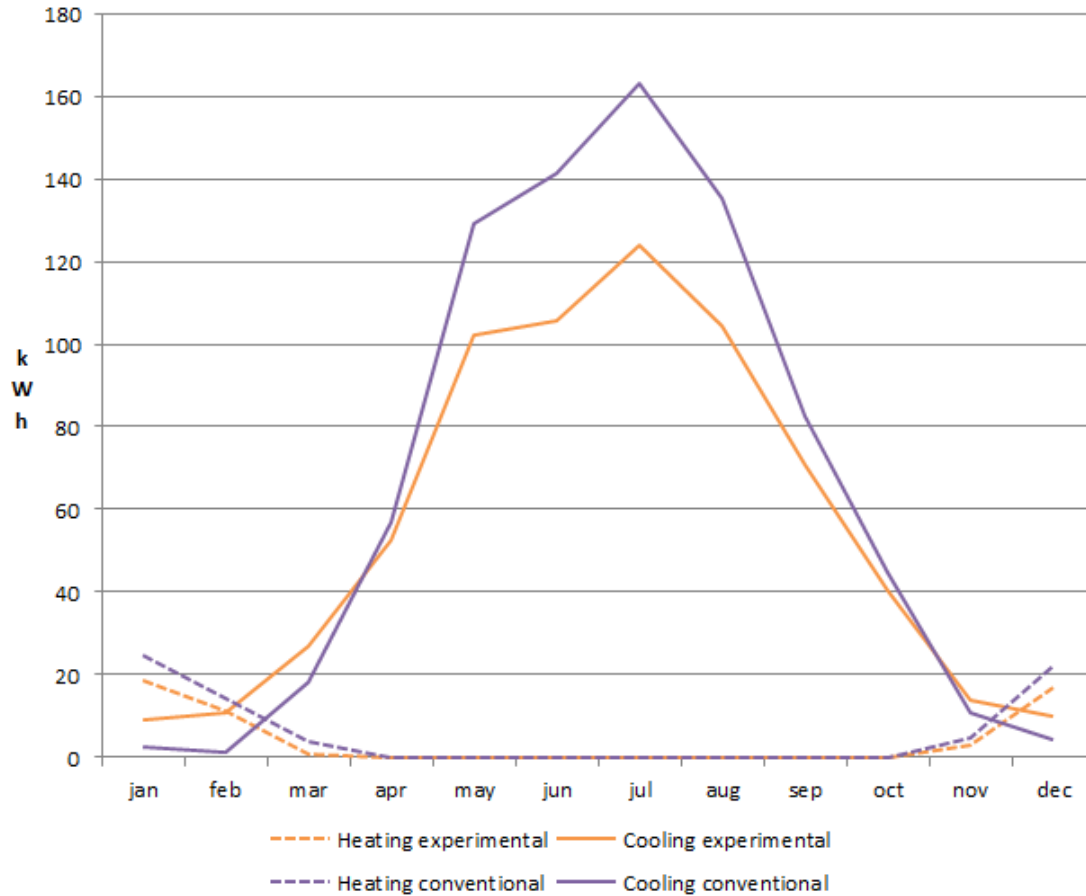


This graph provides the energy used in kWh (y axis) for one year starting from January (x axis). It is divided in cooling and heating for each floor that represents one colour.

It indicates that there is more energy needed to cool and heat in the experimental floor than in the conventional one. This result was expected as there are 21 people living in the 2nd floor compared to 12

in the 3rd floor. Although the amount of people are doubled, the difference is not relatively big.

## Yearly Energy for Heating and Cooling per Person



The next graph presents us the same results but per person. The total energy is divided with the amount of person living in each floor as mentioned above. Here the results are reversed and students living in the experimental floor spent less energy individually comparing to the ones living in the conventional one.

Summarizing, by sharing appliances and resources it is possible to reduce and save the energy spent while at the same time students have the opportunity to take advantage of the social qualities of the social space.



*“Understanding your behaviour inside the home is  
the most important first step to reducing energy use”*  
(Green Gurus, 2012)

(Cuba Gallery, 2011)

## 5. CONCLUSION

This dissertation has investigated student housing evolution, energy efficient architecture and sustainability as a life changing motif and presented a design proposal based on them. The purpose of the current study was to propose solutions to increase socialization and decrease energy consumption.

The Student Lab is an experiment on sustainable living where the inhabitants are helped by the design of their living space to change their behaviour and learn a way to lead a more sustainable lifestyle. By sharing daily activities the inhabitants are influenced by each others to decrease energy consumption, helped by new technologies and passive house strategies. Its design is a result of the several research of the investigation part of this Master Thesis.

Situated on campus, it concentrates activities that students cannot find in the close proximity. During the H42 workshop students seemed to be available to stay in their room just for their basic needs and visit the campus for the rest. Energy-efficient architecture strategies, like compact shape, open plans and orientation to maximize solar gains are followed. On the other hand the modular structural organisation means simpler and faster construction in order to respond to the lack of student housing in Sweden. The interior organisation promotes community feeling and shared living (see Tietgen Dormitory, MySpace, Halo) while the autonomous

bed modules in the experimental first floor gives flexibility to students to apply personal identity to their private space.

Nowadays technology has made big steps in the building sector and most countries of the western world have already started incorporating sustainable techniques and materials that lead to energy saving in their building code. But in order to decrease energy consumption it is not only necessary to have more efficient buildings. People need to become more aware also of their energy consumption and change their lifestyles, including their behavior to adapt to new energy efficient technologies and reduce their overall energy demand.

Researchers that analyse human behavior as Tim Brown and Nicholas Christakis found out that there is a clear connection between our behavior and the behavior of people who surround us. Their research point out that people will affect each others by living in the same space. So if we actually increase socialization, we also increase the number of people influencing each others. Here comes our role as architects: we need to create spaces for people to share easily and comfortably.

The two floors offer different spatial organisation and each of them can host different amount of people; the experimental floor is organised in two open spaces for 21 students in total with a large common kitchen, while the conventional floor keeps the common 2-bedroom apartment organisation. The fact that both floors have the same area gives

the possibility to have comparable results in energy consumption both per floor and per person. The comparison was carried out with IDA (Indoor Climate and Energy simulation) software. This study has shown that even though more people live in the experimental floor (21 students in the experimental against 12 students in the traditional) the total energy consumption divided in two apartments with a shared kitchen appears only slightly higher than the one with a traditional division in 6 small apartments for two students each. For example, 2 fridges consume less energy than 6, and the same is applicable to the number of sink, showers, etc. The fact of limiting the number of facilities in the house is also a way to decrease waste. For instance 2 fridges for 21 people might affect the amount of food to store per person, but the amount of waste per day would be decreased and the inhabitants will also be able to share grocery shopping and prepare meals for a larger amount of people rather than only for oneself, which allows energy saving.

It was also shown that in terms of socialisation, the shared kitchen enables students to cook and have meals together as well as other recreational activities. The overall floor organisation promotes constant meetings among the flatmates and brings a family life feeling in the student house. Inhabitants can share cultures, values and knowledge and learn how to change their behaviour towards a more sustainable one by influencing each other, but also by being informed from the relative graphs on the groundfloor about their daily consumption (waste,

water, energy, etc). At the same time a minimum of private space is guaranteed in the bed module, according to the main privacy needs of students (see workshop with H42). In this way it will also be possible to be private in public, whenever privacy is needed. On the contrary, the traditional spatial organisation of a student house, as on the conventional floor of Student Lab, prevents people from ‘accidentally’ meeting. By entering in their apartments, they find themselves more isolated while living in an open space allows more easily to meet and socialize.

Students, after having lived in such an experimental environment, will be able to carry with them and spread the habits and knowledge acquired here. The Student Lab can also be inspiring for the people not living in it; by visiting the exhibition space or friends who already live there, they will get encouraged to follow the same lifestyle, starting to be actively sustainable.

However the future behaviour of people is certainly unknown. Students and generally people in modern days have become less flexible and have less will to share, so there is always a risk that they will find a collective living like this not suitable for themselves. The ethnographic interviews showed also that students now prefer to live by themselves or with someone they already know. Considerably more work will need to be done to determine the students who are going to live together, their background and their connection.

Nevertheless, this is an experimental project, which gives the opportunity to a certain group of people to investigate a completely different way of living. Even though they may decide not to follow it later on, they would have still participated and earned important knowledge in a process that aims for a more sustainable lifestyle, which is necessary in our society today.

Finally, a number of important limitations need to be considered. Firstly, the social behavior is not a quantitative term and consequently we cannot measure it and be certain for the future behavior of the users. However this is a risk that experiments have. Secondly, the calculations made by IDA are subject also to certain limitations. For instance, specific material properties of the building elements (walls, roof, floors) were not imported in the simulation. Both floors had the same properties though; a fact that made them comparable.

This research has thrown up many questions in need of further investigation. Further research might investigate alternative flexible interior organisation of the ground and 1st floor, further development of the bed module and use it in other functions such as small green houses, recycling stations, etc., technical details regarding material use, mobility and flexibility of the main structure.



(Vlček, 2012)



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## Images

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(Parabold, 2012)

# 7. APPENDIX

## 7.1 Ethnographic Interviews

### ETHNOGRAPHIC INTERVIEW 1

Name: Eva

Age: 24

Field of Study: Architecture

#### LIVING

Where do you live (name student housing): Högsbogatan

Area: Marklandsgatan

Number of people: 1

Type of apartment: furnished room with kitchen and toilet plus shared kitchen and laundry on each floor.

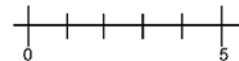
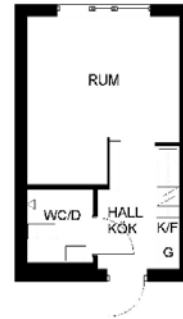
Size of apartment in square meters: 25

What are the existing common activities in your building? None

What is shared and what is private? Almost everything is private, except the floor kitchen and laundry. But the kitchen has to be booked in order to use it and the laundry is too small to stay there and it is just allowed to use it one person at the time.

How do you access the shared space? They are locked and on the same floor as the room. I feel the laundry as a part of my house, not the kitchen.

Do you know your neighbors? Not really, I met some using the laundry but I cannot say I know them. I know other people from the building on other floors. I would like to have a spontaneous way to know them more.



Rent per month: Includes everything, 5121 sek/month

How much satisfied are you: Satisfied

What is more important when you choose a room? (put grade 1-5)

Location 4

Rent 4

Kitchen size 1

Easy to self arrange the room or not 3

Big closet 2

Storage 1

Common spaces 5

Bed alcove 3

Good lighting 5

Privacy 4 (doesn't mean I need to live alone, I want a place for my own)

Other...

What do you prefer: basic furnitures

How much money would you give per rent per month? Max the rent I give now.

Where is the laundry? Same floor as the apartment

How often do you use it? Once every 2 weeks

Would you stay in the laundry if it was a pleasant place to be? Yes

Why did you choose this apartment? For the possibility to meet new people, be close enough to the centre and to have a small space of my own. If I would have find a room in a bigger apartment I would have taken it.

Would you like to share a bigger space with other people for a short amount of time? Yes, with clean, respectful people or friends.

For how long? Depends how do I find myself with the people. If good the whole academical period.

Show us how you use the apartment

I enter, put the code to open the door. If I have bags, as today, I get mad because i have to put them down or do some circus trics to push the bottons with the bags in my hands. Would be nice to have a voice locker!

Then I enter, I check into the mail box if I have any, I go up the stairs for one floor and open another door. If I have bags I get mad again, even more because this door is even harder to open since the handle is small. I check on the laundry board when I have it and if I put it then open the door of my apartment. (get mad again if I have bags).

Once I enter I take out my shoes being careful to not put soil everywhere even if this never works, put down my bag(s) and go back to the entrance to hang my coat. When I am finally home, I relax.

Comments:

I would like to have a bike sharing in the apartement that let you take the bike the day you want for a small amount of money.

I would also like to meet my neighbors more often and get to know them better.

More facilities around the student house as for example a café, taylor, etc

## ETHNOGRAPHIC INTERVIEW 2

Name: Galini

Age: 27

Field of Study: Architecture

LIVING

Where do you live (name student housing): Emilsborg

Area: Close to Chalmers

Number of people: 1 - alone

Type of apartment: 1 room with kitchenette, bathroom, furnished

Size of apartment in square meters: 18 sq.m.

What are the existing common activities in your building? In the same student housing block, but not in my building, there are a swimming pool, sauna, room for parties, pool room and music room. In my building there is just the laundry in the basement.

What is shared and what is private? Everything is private.

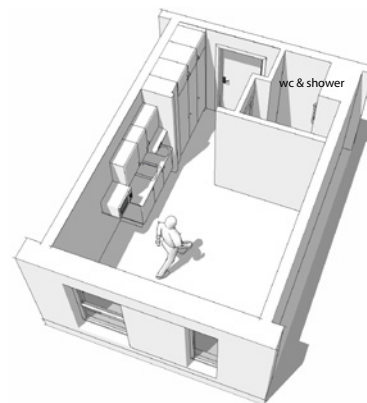
How do you access the shared space? same floor? locked? different floor? Do you feel them as a part of your "house"? I use actually only the laundry. I access with magnetic key and I don't feel it as a part of my house a lot, because it is a space not connected with anything else and where I meet people that I've never seen before.

Do you know your neighbors? No, but I would like to

Rent per month: 2900

It includes: Electricity, Internet, TV, other – everything

How much satisfied are you: Satisfied



Flat example:  
1 room & kitchenette, 18m<sup>2</sup>



What is more important when you choose a room? (put grade 1-5)

Location 5

Rent 5

Kitchen size 1

Easy to self arrange the room or not 2

Big closet 4

Storage 3

Common spaces 2

Bed alcove 4

Good lighting 4

Privacy 2

Other...

What do you prefer: Furnished

How much money would you give per rent per month? 3500

Where is the laundry? In the basement

How often do you use it? Every 10 days

Would you stay in the laundry if it was a pleasant place to be? Alone I don't think so, but maybe with others..

Why did you choose this apartment? It was the first available that I found and satisfied me in position and price.

Would you like to share a bigger space with other people for a short amount of time? Yes, probably with people that I already know, or meet them before so that I can decide if I want to or not. I guess that if no real problem occurs, I could stay for my whole study period.

Show us how you use the apartment

I put the magnetic key in the entrance door that it is already in the designed air-lock. This allows me to take out my key when I am under a weather-protected space!

Then I take the elevator to my room (I live in the 7th floor). Sometimes it takes time for the elevator to arrive, but I don't really mind. I mind more when the elevators are both broken and I have to go up and down 7 floors.

When I arrive to my floor I first check my mailbox, then I switch on the lights of the corridor (that it is always too dark) and walk towards my door. When I enter I step directly on my doormat so that I don't get my floor fully muddy and put my gloves to the shelf next to the entrance. I take off my shoes and get into the

room. Take out my coat, hanging it, switch on computer and go to the toilet to wash hands.  
Directly after I usually relax in front of my computer before doing anything I have to.  
In the mornings I open my window as long as I am in the bathroom, so that I don't feel the cold and refresh the air.

### ETHNOGRAPHIC INTERVIEW 3

Name: Isabelle

Age: 23

Field of Study: Architecture

LIVING

Where do you live (name student housing): Olof

Area: Johanneberg

Number of people: 1

Type of apartment: One furnished room with bathroom and shared kitchen in 4 people

Size of apartment in square meters: 18.5

What are the existing common activities in your building? Laundry, sauna, motion hall, volleyball, table tennis, little supermarket, 2 bars, super market, byke parking, parking lots(for rent), chill out areas, storage room, waste room.

What is shared and what is private? All shared except room and bathroom.

How do you access the shared space? Normal key, you have to lock it.  
Sometimes i forget.

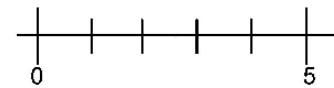
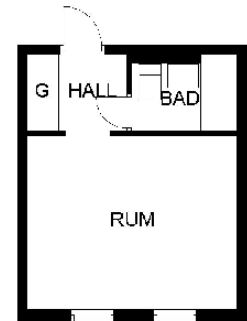
Same floor? Yes

Different floor? Kithcen on the same floor.

Do you feel them as a part of your “house”? Not realy the kitchen. There is just one stove and there is no space to do things together, at the same time

Do you know your neighbors? Yes thanks to the kitchen.

Rent per month: 3600 aproximately and it includes: Electricity, Internet, TV,



How much satisfied are you: Very satisfied, except from the kitchen. The room is good, never had something as good as this.

What is more important when you choose a room? (put grade 1-5)

Location 4

Rent 5

Kitchen size 0

Easy to self arrange the room or not 1

Big closet 0

Storage 0

Common spaces 1

Bed alcove 5

Good lighting 5

Privacy 5

Other: Separate room from her bed. Even if it's very small. I want clean. If somebody can guarantee the cleanliness i could share it.

What do you prefer: Furnished or unfurnished – basic furniture: desk chair, double bed.

How much money would you give per rent per month? 4000

Where is the laundry? Outside the building

How often do you use it? Once/10 days, week

Would you stay in the laundry if it was a pleasant place to be? Maybe, if i like it then i would do too many laundries, and this is not sustainable. Maybe I would wash my clothes with somebody else

Why did you choose this apartment? It was the only option at that moment

Would you like to share a bigger space with other people for a short amount of time? Only if i know them

And for how long? If it's nice, I could stay like that

Would you share the room? No.

Show us how you use the apartment

Take off back pack, then scarf, then jacket, then shoes, put on sleepers, then toilet. Plug in pc, put music, take

water, open skype, i find interesting people, i cook, i eat always in my room, NO ONE EVER EAT IN THE KITCHEN EXCEPT IF THEY HAVE FRIENDS. The pb with the kitchen is no internet.

Comments:

I could have a bathroom without a sink – if I have a sink in the room

It is better if you have more shared spaces because it feels more that you know each other. Then you become more responsible on cleaning etc. Also to be on the same floor. If you have more opportunities to meet each other you can come closer.

Less than 3 people, you feel that you know each other and who creates a mess or not.

## ETHNOGRAPHIC INTERVIEW 4

Name: Lisa

Age: 24

Field of Study: Architecture

LIVING

Where do you live (name student housing): Olofshöjd

Area: Johanneberg

Number of people: 2 Shared with friend

Type of apartment: Apartment with 2 rooms – kitchen and bathroom.

Size of apartment in square meters: 45

What are the existing common activities in your building? Gym – barbecue – laundry – bar – playground – sauna – volleyball

What is shared and what is private? The apartment is private for 2 people, but there, the kitchen and the bathroom are shared in 2

How do you access the shared space? Magnetic lock – book in internet – she doesn't use the sauna a lot because it's old, she uses the laundry – the barbecue sometimes in summer

Do you feel them as a part of your "house"? No

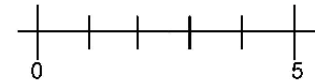
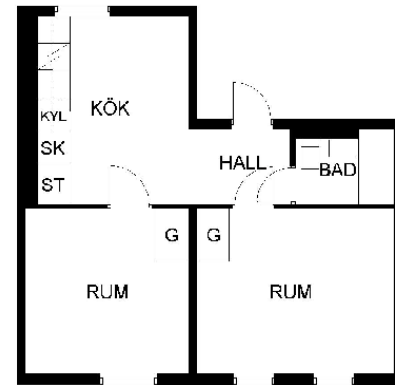
Do you know your neighbors? No

Rent per month: 4500 sek – includes everything

How much satisfied are you: Satisfied

What is more important when you choose a room? (put grade 1-5)

Location 4



Rent 5  
Kitchen size 2  
Easy to self arrange the room or not 2  
Big closet 2  
Storage 3  
Common spaces 3  
Bed alcove 3  
Good lighting 4  
Privacy 5  
Other: Long contract that last the whole study period

What do you prefer: Unfurnished

How much money would you give per rent per month? 4000

Where is the laundry? Ground floor outside with daylight – look nice from outside

How often do you use it? Once every 5 or 6 week

Would you stay in the laundry if it was a pleasant place to be? Yes

Why did you choose this apartment? Evacuation

Would you like to share a bigger space with other people for a short amount of time? Yes

With whom? Prefer friends, but also stranger is ok.

And for how long? 2 years max – if it's good i could stay for the whole time.

Show us how you use the apartment

I open the door. Put shoes and coat off, trough gloves over the “thing”. Put my backpack on the floor and spread everything around. Turn on radio. Move to the kitchen, put grocery in the kitchen, wash breakfast dishes. Walk staidly between room and kitchen. When I am not alone I am more in the kitchen. When I am alone I am in my room.

## ETHNOGRAPHIC INTERVIEW 5

Name: Marcus

Age: 26

Field of Study: Architecture

LIVING

Where do you live (name student housing): Ränvagen

Area: Johanneberg

Number of people: 1

Type of apartment: 1 room with kitchenette, bathroom, not furnished

Size of apartment in square meters: 28

What are the existing common activities in your building? Laundry, bbq area

What is shared and what is private?

How do you access the shared space? same floor? locked? different floor?

Do you feel them as a part of your “house”? Yes

Do you know your neighbors? No

Rent per month: 4300

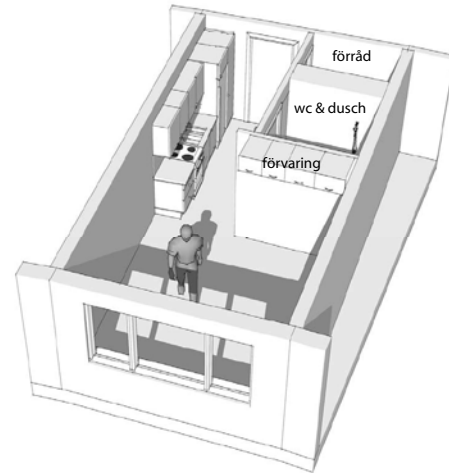
It includes: Electricity, Internet, TV, ALL.

How much satisfied are you: Satisfied

What is more important when you choose a room? (put grade 1-5)

Location 5

Rent 3





Kitchen size 3  
Easy to self arrange the room or not 3  
Big closet 3  
Storage 2  
Common spaces 2  
Bed alcove 3  
Good lighting 4  
Privacy 3  
Other...

What do you prefer: Unfurnished

How much money would you give per rent per month? 4500

Where is the laundry? Outside, downstairs

How often do you use it? 2 times/month

Would you stay in the laundry if it was a pleasant place to be? No

Why did you choose this apartment? Because it's close to school

Would you like to share a bigger space with other people for a short amount of time? If yes, with whom? and for how long? Yes, with friends

Extra comments:

Laundry: 3 machines to wash, 1 closet to dry, 1 machine to dry. Not enough time because you can book it just for 2 hours. So people book it 2 times in a row just to dry the clothes.

They use the exterior "entrance" corridor for barbecue in summer even if it is kind of illegal for fire safety reasons. But it is nice because it has a west orientation and you can get some sun. The balcony is in east and is cold. Good to have access to two different orientations. But on the other hand it wouldn't be nice to sit and look just towards Chalmers.

The storage is next to the garage in Chalmers! Around 3 sq.m.

Show us how you use the apartment

Open the door, remove shoes, turn on computer, put down jacket & bag, go to the bathroom.

## ETHNOGRAPHIC INTERVIEW 6

Name: Mike

Age: 25

Field of Study: Construction Management

LIVING

Where do you live (name student housing): Ostkupan

Area: Mölndalsvägen

Number of people: 3 (normally 4)

Type of apartment: Room in corridor with shared kitchen and 2 shared bathrooms

Size of room in square meters: 16sqm

What are the existing common activities in your building? Pool room/sauna/gym/pub/tv room/barbecue outside in the terrace/laundry room/bike parking/storage/  
What is shared and what is private? Only room private.

How do you access the shared space? Kitchen and bathroom are not locked, but the corridors are locked.

Do you feel them as a part of your "house"? Yes, but not so much.

Do you know your neighbors? Yes, we discuss issues in the kitchen

Rent per month: 2882

How much satisfied are you: Less satisfied

What is more important when you choose a room? (put grade 1-5)

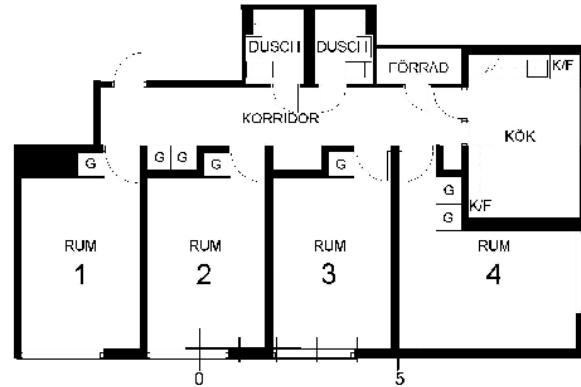
Location 5

Rent 5

Kitchen size 4

Easy to self arrange the room or not 3

Big closet 3



Storage 3

Common spaces 4

Bed alcove 3

Good lighting 4

Privacy 5

Other: The flatmates (in ostkupan you can meet your flatmates before choosing the room), the people are the most important, with the money

What do you prefer furnishe/unfrunished? Furnished

How much money would you give per rent per month? 3200

Where is the laundry? In the entrace in the ground floor, next to the mailboxes. There are windows, to the backyards, normal heights/the windows are up and it is very cold

How often do you use it? 1-week

Would you stay in the laundry if it was a pleasant place to be? No

Why did you choose this apartment? Price

Would you like to share a bigger space with other people for a short amount of time? Yes. No corridor like hospital!!!! The cat made it feel more cosy (they had a cat), in my previous apartment with whom? Yes if the people are clean and respectfull and for how long? Indefinite, in the future I would like to live alone

Show us how you use the apartment

I enter to corridor, I walk to my room, I open the door with the key, I leave my bag, my coat and I go to the kitchen. I instinctively check the fridge to see what's happening (ahahah). After I go to my room, I change clothes, in the mean time I take off my lap top and put some music, tearn on the heater (the electrical one is not enough!!!!) then I go to the toilet, I go to eat again, sit with my laptop. If my neighbors show up in the corridor I talk with them. The chinese girl invited me for dinner once.

Comments: Somebody introduces the house in ostkupan! I once found a girl in my flat waiting for me!

Changes to make:

Warmer room please, it's too cold. More respect form flatmates.

Comments:

“Sharing is about going around in your room with your underwear, not in the corridor though please.”

Mike doesn't have a radio in the kitchen, he would like to.

## ETHNOGRAPHIC INTERVIEW 7

Name: Shea

Age: 31

Field of Study: Architecture

LIVING

Where do you live (name student housing): Rotary

Area: Johanneberg

Number of people: 1

Type of apartment: 1 room with shared kitchen, bathroom, furnished)

Size of apartment in square meters: 19

What are the existing common activities in your building? Pub, pool, sauna, basketball court, bbq, laundry

What is shared and what is private? Shared kitchen, private room+bathroom

How do you access the shared space? same floor? locked? different floor?

Do you feel them as a part of your “house”? With magnetic key. Not as part of the house.

Do you know your neighbors? All except the one who doesn't use the kitchen.

Rent per month: 4049, it includes: Electricity, Internet, TV, Everything

How much satisfied are you: Satisfied to very satisfied

What is more important when you choose a room? (put grade 1-5)

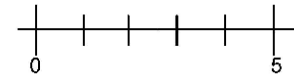
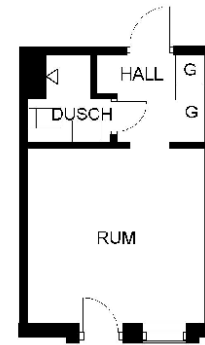
Location 5

Rent 5

Kitchen size 3

Easy to self arrange the room or not 3

Big closet 3



Storage 2  
Common spaces 4  
Bed alcove 1  
Good lighting 3  
Privacy 3  
Other...

What do you prefer: Furnished

How much money would you give per rent per month? 5000

Where is the laundry? Outside, but you can have access from inside as well, but it takes more time.

How often do you use it? Once per week or every other week.

Would you stay in the laundry if it was a pleasant place to be? Yes, it would be nice to have couches, desks to sit & work there as I wait.

Why did you choose this apartment  
It was the only one available.

Would you like to share a bigger space with other people for a short amount of time? If yes, with whom? and for how long?

It's fine to share, but there is always the risk with people who suck. With friends is also a risk to destroy your relationship. It's fun to move with random people.

Would you share the room? Yes.

Extra comments:

Find a way to open the door automatically. Maybe by pressing with the foot, or magnetic card that can be read even if it inside the clothes.

I wish I could go out of my room. To have a balcony. I have a door & it's nice to stand out.

The corridor sucks! Make the corridor useful. It feels like a hospital. Nice to create spaces out & you can feel more your neighbors.

Maybe if you know personally the receptionist/caretaker you respect him more and you don't feel well of getting the place dirty or destroyed.

Show us how you use the apartment

Take shoes off, hang coat, unpack bag, take computer out, bathroom, kitchen eating, playing the guitar.

## ETHNOGRAPHIC INTERVIEW 8

Name: Sofia/Paschalis

Age: 25/26

Field of Study: Software Engineering

LIVING

Where do you live (name student housing): Högsbogatan

Area: Marklandsgatan

Number of people: 2 (couple)

Type of apartment: Furnished- one room with bathroom and kitchenette

Size of apartment in square meters: 25

What are the existing common activities in your building? None

What is shared and what is private? Almost everything is private, except the floor kitchen and laundry. But the kitchen has to be booked in order to use it and the laundry is too small to stay there and it is just allowed to use it one person at the time.

How do you access the shared space? They are locked and on the same floor as the room. I feel the laundry as a part of my house, not the kitchen.

Do you know your neighbors? Some yes

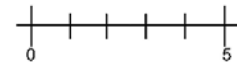
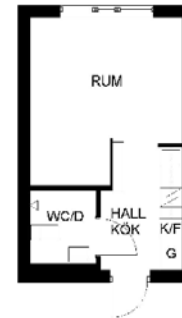
Rent per month: 5121

It includes: Electricity, Internet, TV, other

How much satisfied are you: very satisfied

What is more important when you choose a room? (put grade 1-5)

Location 5/5



Rent 5/4

Kitchen size 3/3

Easy to self arrange the room or not 4/2

Big closet 5/5

Storage 2/1

Common spaces 3/3

Bed alcove 1/1

Good lighting 4/4

Privacy 5/5

Others: Water and electricity included in the price of the rent – number of floor in the apartment – elevator – transportation

What do you prefer: Furnished

How much money would you give per rent per month? 4000 , total 8000

Where is the laundry? On the same floor

How often do you use it? Once / week

Would you stay in the laundry if it was a pleasant place to be? Yes - No

Why did you choose this apartment: No other option, the only student housing that had space for 2

Would you like to share a bigger space with other people for a short amount of time? Yes, people I know, 2 months max – No

Would you share the room? No - no

Show us how you use the apartment

Paschalis:

take out shoes and coat, unpack, take out stuff, see what to cook for dinner, sit in the office area.

Sofia: take out shoes and coat, leave my bag, wear pygiama, open laptop, toilet, cook, sit on pc, skype, go to bed.

Comments:

Common spaces needed

Balconies in the front side

Bad smell when they clean

Cleaner laundry

## ETHNOGRAPHIC INTERVIEW 9

Name: Subi

Age: 25

Field of Study: Structural Engineering & Building Technology

### LIVING

Where do you live (name student housing): Frölunda

Area: Västra Frölunda

Number of people: 7 (6 guys + 1 girl)

Type of apartment: apartment in a not student building with 7 rooms, with shared kitchen 2 shared bathrooms, furnished, living room, terrace.

Size of apartment in square meters: 15sqm the room

What are the existing common activities in your building? living room, kitchen, bathroom, terrace, laundry common for 2 buildings. yard with playground.

What is shared and what is private? Just the room is private.

How do you access the shared space? same floor? locked? different floor? Do you feel them as a part of your "house"? Everything is open. Same floor, inside the apartment. Also a storage room inside the apartment, around 5-6 sq.m.

Do you know your neighbors? (Yes, No and I don't want to, No, but I would like to) Yes and we have dinner every night together.

Rent per month: 3589, it includes: Electricity, Internet, TV, other

How much satisfied are you: very satisfied

What is more important when you choose a room? (put grade 1-5)

Location 3

Rent 4-5



Kitchen size 0  
Easy to self arrange the room or not 0  
Big closet 2  
Storage 1  
Common spaces 4  
Bed alcove 1  
Good lighting 4  
Privacy 3  
Other... transport connections 5

What do you prefer: furnished

How much money would you give per rent per month? 3800

Where is the laundry? It is in the groundfloor, it has big windows, you can watch outside and a lot of light

How often do you use it? Once in 8-9 days

Would you stay in the laundry if it was a pleasant place to be? We could make laundry parties, of course I would stay. It is a nice place to meet people if it is a student house.

Why did you choose this apartment Because my old one sucked. I lived in Ostkupan. I knew the people who lived there. So I wanted to share the house with them. I could do it even with people that I don't know.

Would you like to share a bigger space with other people for a short amount of time? If yes, with whom? and for how long? (he shares already)

Would you share the room? Yes, but with friends. I would share a room even if there are not other common spaces.

Show us how you use the apartment

take off the shoes, the coat, leaving the stuff in the room, go to the kitchen to see if sb is there, talk with them. see what to eat, eat, go back to room, computer, dinner all together to the dining room. One cooks, the rest wash the dishes. Different one every day. Schedule for cleaning. It is working fine and nobody complains.

Comments

We want a laundry machine in the apartment, because the other is never available. It's nice not to need to book it. I don't want to go down just to book the laundry.

There is no bad thing living with these 6 people.

In Ostkupan we had problem with cleaning. People were not social at all. We were living in 4. Not clean, not talk.

It would be nice the first one in the flat to be able to choose who is coming with interviews.

It would be nice to have common sport activities to do with other people in the building. A party room, in Ostkupan we had one.

## ETHNOGRAPHIC INTERVIEW 10

Name: Delia

Age: 29

Field of Study: Industrial Ecology

### LIVING

Where do you live (name student housing): Chalmers Studentbostader. Landala, Kapellgången

Area: Landala

Number of people: 1

If you share it, with who (boyfriend/girlfriend, friends, random people, family)?

Type of apartment: room with shared kitchen, private bathroom, furnished with kitchenette that is disconnected for fire safety - the fire alarm is sensitive)

Size of apartment in square meters: 32 sq.m.

What are the existing common activities in your building? Shared kitchen with 15 people in total. We can use Emilsborgs activities. We don't have anything else. My building is temporary, they are going to renovate it in summer. It was a nursing home, I don't have internet.

What is shared and what is private? Only the room is private

How do you access the shared space? same floor? locked? different floor? Do you feel them as a part of your "house"? Same floor, open everything.

Do you know your neighbors? I do, but only because I make an effort.

Rent per month: 3300

It includes: Electricity, not Internet, no TV, heating

How much satisfied are you: satisfied

What is more important when you choose a room? (put grade 1-5)

location 4

rent 5

kitchen size 3

easy to self arrange the room or not 3

big closet 4

storage 5

common spaces 4

bed alcove 1

good lighting 5

privacy 2

other... housemates, in my country we always live with others, so it is important to see with who you are going to live

transport 4

I wouldn't like to live with a landlord, I am social person and I like to have parties, so it wouldn't be appropriate.

What do you prefer:

furnished or unfurnished

How much money would you give per rent per month? 4000

Where is the laundry? on the same floor. It has a window. 2 washing machines and 2 dryers. I don't stay there, I go to my room, because it's on the same floor.

How often do you use it? once a month, once every 4-5 weeks

Would you stay in the laundry if it was a pleasant place to be? I guess so. In my current situation, I don't need to.

Why did you choose this apartment? Cause it's really close to Chalmers with pretty good price. And I have my own privacy because it's a studio.

Would you like to share a bigger space with other people for a short amount of time? Yes the apartment. If I know the person I would share the room as well. If the kitchen and living room are big enough to accommodate more people, I would share even with 10 people.

If yes, with whom? and for how long? I don't mind with who. For the whole master

Would you share the room?

Show us how you use the apartment

Unlock the door, take off the shoes, coat, put the keys in the coat, put down my bag, turn on the computer to listen music, go toilet or get sth to eat. I usually leave the window open, so I close it after. Make tea. I don't lock my door. I have a private fridge and there is one more in the kitchen.

2 Fridges, 1 Freezer, 2 ovens.

My address is kapellgången 6, **but I have to enter in kapellgången 2. There is still a nursing home there, so we have to use the other entrance.**

After summer it is going to be more expensive with internet I guess.

It would be nice to have bicycle storage. We don't have. When I lived in Ostkupan we did have bicycle storage. In Ostkupan it was more intimate, I was sharing the facilities, it was nicer to share with 4 people the kitchen. Now almost all of the people are in their rooms, so we don't see each other. In Ostkupan we were "forced" to see each other.

I prefer a shared kitchen because I like to interact with other people. I wouldn't like to cook in the same place where I sleep.

I moved from Ostkupan because my contract ended. Otherwise I would have continued.

I could live in Halo for a year, or for 2 years!

I live in the 8th floor, but there is a 9th as well.

## ETHNOGRAPHIC INTERVIEW 11

Name: Kostas

Age: 26

Field of Study: Civil Engineering

### LIVING

Where do you live (name student housing): Chabo

Area: Johanneberg

Number of people: 1

Type of apartment: room with kitchen, bathroom, furnished

Size of apartment in square meters: 28

What are the existing common activities in your building? laundry, terrace, nothing else.

What is shared and what is private? everything is private

Do you know your neighbors? No. I say hi to one person

Rent per month: 4700

It includes: Electricity, Internet, TV, other

How much satisfied are you: very satisfied

What is more important when you choose a room? (put grade 1-5)

location 4

rent 4

kitchen size 2

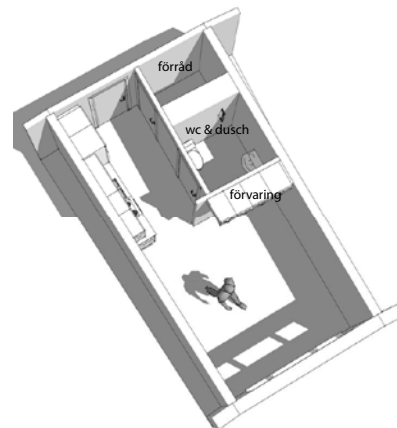
easy to self arrange the room or not 2

big closet (4) 3

storage 3

common spaces 2

bed alcove 1



good lighting 3  
privacy 3  
other: private bathroom

What do you prefer: furnished

How much money would you give per rent per month? 4700

Where is the laundry? on the same floor

How often do you use it? once a week, I don-t stay there. I book the time and I go. I share the laundry with 16 other rooms. One person per time can use it.  
no window

Would you stay in the laundry if it was a pleasant place to be? If it had a playstation yes. I would like it then!

Why did you choose this apartment? No other options

Would you like to share a bigger space with other people for a short amount of time? NO. I prefer alone.

If yes, with whom? and for how long? No way.

Would you share the room? In this room ,with another person, no way. I would share the kitchen. the bath-room as well, with a friend.

Show us how you use the apartment

I open the door, I change my self, put comfortable clothes, I come to the living room, I use the toilet. I don-t cook, I don-t eat. I sit here, in front of the computer and have a good evening. I talk on skype, I study, I go to the gym (one close to Chabo). In the weekends I go out, from prison.

Comments: Nothing disturbs me here, the insulation is bad, I hear music from my neighbor. I don't like this floor. I miss Greece in this student house. I miss interaction with others; I don't want to know them, because they don't want to know me. I would prefer to know m neighbors, but I don't like these ones especially. I don't have wi-fi, I want to!

## ETHNOGRAPHIC INTERVIEW 12

Name: Carlos

Age: 31

Field of Study: Sustainable Energies

LIVING

Where do you live (name student housing): Ostkupan

Area: Mölndalsvägen

Number of people: 4

Type of apartment: Room in corridor with shared kitchen and 2 shared bathrooms

Size of room in square meters: 16sqm

What are the existing common activities in your building? Pool room/sauna/gym/pub/tv room/barbecue outside in the terrace/laundry room/bike parking/storage/  
What is shared and what is private? Only room private.

How do you access the shared space? Kitchen and bathroom are not locked, but the corridor is locked. It is like an apartment.

Do you feel them as a part of your “house”? yes, but we don’t stay in the kitchen, never

Do you know your neighbors? Yes!!! We drink together, chat in the kitchen

Rent per month: 2909

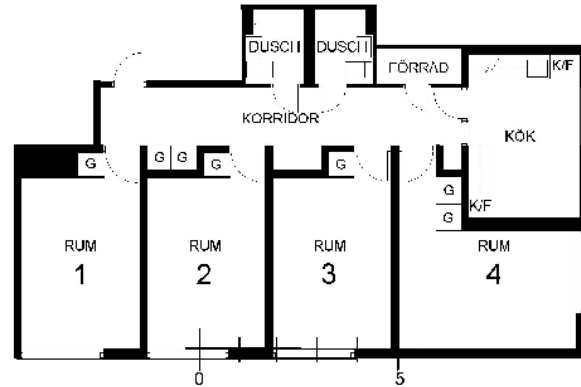
How much satisfied are you: satisfied-it really depends on the people you live with, my neighbours are very clean

What is more important when you choose a room? (put grade 1-5)

Location 4

Rent 5

Kitchen size 3





Easy to self arrange the room or not 3

Big closet 3

Storage 2

Common spaces 3

Bed alcove 2

Good lighting 5

Privacy 4

Other: The flatmates (in ostkupan you can meet your flatmates before choosing the room), the people are the most important, with the money

What do you prefer furnishe/unfrunished? furnished, also with pillow and covers

How much money would you give per rent per month? 3500

Where is the laundry? In the entrace in the ground floor, next to the mailboxes. There are windows, to the bakcyards, normal heights/the windows are up and it is very cold

How often do you use it? 1,2-week

Would you stay in the laundry if it was a pleasant place to be? No.. but maybe yes.

Why did you choose this apartment? Price

Would you like to share a bigger space with other people for a short amount of time? I would love to live in frolunda!

with whom? whoever i get along with all people

and for how long? Indefinite, until I get more money to have a nicer one where I can live alone

I would still like to continue sharing if I was still a student, If I worked, I would like to have more privacy, I wouldn't like to share the apartement with a 21 years old kid that party all night and I have to go to work. I cannot live here if I work!!!

Show us how you use the apartment

I enter to corridor, I walk to my room, I open the door with the key, I leave my bag, my coat, I Put my sleepers. I go to the kitchen. I often meet my neighbors (especially my Swedish neighbor) whith which I chat in Swedish and have dinner with. For me this is a common space (the kitchen) I put salsa music.

Comments: I like the place, of course the money was my priority, but the people you live with make the experience good. It depends very much on that.

Changes to make:

Carlos: I would share the room with somebody if it was very big. But it is hard.

Comments:

Carlos knows he puts the music too loud.

Carlos was living in Copenhagen, in a container with 9 different students from all over the world. In Copenhagen is different, sometimes you have to do a motivational letter and an application to be accepted in the student housing.

Maybe it makes it more attractive???! If you have to get selected, it means it's something for elite, and if it's for elite, more people will want to go there, to be part of the elite.

Total amount of people interviewed: 13

## 7.2 Workshop H42

### Template supplied by H42 organization for the workshop

#### 1 DAY STUDENT ACTIVITY DIARY

MON  TUE  WED  THUR  FRI  SAT  SUN

Please fill in the activities you engage in during the course of one day (a 24 h period), and indicate what day of the week it regards. For each activity, we ask you to approximate the time spent on the activity (e.g. *Sleeping* took up about  $\frac{7}{8}$  h of the 24 h period accounted for). In addition, we would like you to please write down what stuff (e.g. what spaces, tools, gadgets, equipment) or other prerequisites

(knowledge, routine, conditions) you need to perform your activity. Please also reflect on what could possibly be improved, what you lack or what could be optimized in terms of any of the parameters (time, stuff, skills). Finally, indicate if you feel this is an activity that can be done collectively with shared facilities, individually yet with shared facilities or completely private, not sharing facilities? Thank you!

ACTIVITY (e.g. sleeping, yoga)	TIME (min or h)	STUFF (e.g. yoga mat, computer...)	ROUTINE/SKILLS (e.g. silence, cooking skills...)	TO IMPROVE (what could be optimized?)	SHARED/PRIVATE (e.g. cooking individually - sharing kitchen)
					<input type="checkbox"/> COLLECTIVE /SHARED <input type="checkbox"/> INDIVIDUAL /SHARED <input type="checkbox"/> PRIVATE/ NOT SHARED
					<input type="checkbox"/> COLLECTIVE /SHARED <input type="checkbox"/> INDIVIDUAL /SHARED <input type="checkbox"/> PRIVATE/ NOT SHARED
					<input type="checkbox"/> COLLECTIVE /SHARED <input type="checkbox"/> INDIVIDUAL /SHARED <input type="checkbox"/> PRIVATE/ NOT SHARED
					<input type="checkbox"/> COLLECTIVE /SHARED <input type="checkbox"/> INDIVIDUAL /SHARED <input type="checkbox"/> PRIVATE/ NOT SHARED
					<input type="checkbox"/> COLLECTIVE /SHARED <input type="checkbox"/> INDIVIDUAL /SHARED <input type="checkbox"/> PRIVATE/ NOT SHARED



### 7.3 Study Visit - Common spaces in HSB residential buildings





