UNINHIBITED HABITATION

ADAPTABILITY! TOWARDS A SUSTAINABLE HOUSING STOCK



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CHALMERS SCHOOL OF ARCHITECTURE

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Due to climate change, we are facing a future where the building industry will need to change and start striving for environmental sustainability. There are many ways we as architects can design buildings for the future. However, in the context of climate change, one way is to rethink the way we design buildings that are convenient only for one particular use, ignoring the future's changed spatial needs.

Housing today is based on a norm with the nuclear family in mind, resulting in homogeneous and stereotyped apartments, excluding other household constellations from the market. Our life patterns get more diverse, which is a big challenge for the future that increases the need for adaptable dwelling space. If we are to obtain a sustainable housing stock, one solution can be to incorporate design strategies of adaptability in residential architecture. The thesis applies a norm critical perspective on current housing design, focusing on adaptable housing as a relevant alternative to today's design practice. The notion of adaptability in this thesis refers to three concepts: polyvalence, multifunctionality and elasticity.

This thesis comprises the design for a new multi-family residential building on a plot in Majorna, an urban district of Gothenburg. The dwellings should be able to adapt to future dwelling needs and housing a wide range of household configurations. Thus, aiming for long term usability. The design proposal will be based on design strategies found in literature about polyvalence and multifunctionality in dwelling design. The objective is to incorporate uncertainty in the design process, deal with it through adaptability and contribute to a sustainable dwelling stock.

The research questions are:

1. In what way can design strategies of polyvalent space and multi-purpose rooms contribute to dwellings that can meet the needs for diverse household types and ways of residing?

2. How can design strategies of polyvalent space and multi-purpose rooms support future living patterns and change?

The method employed is research by design, and the process also involves theoretical studies and figurative analysis of apartment floor plans.

KEYWORDS

POLYVALENCE • LONGEVITY • USABILITY • SUSTAINABILITY • TIME HOUSING STOCK • ADAPTABILITY • DWELLING • MULTIFUNCTIONALITY

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ABSTRACT

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The basement
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Managing Design Projects	7.5
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PERSONAL REASONS FOR DISCOURSE

I feel grateful for growing up in a family where sustainability and equality have always been of paramount importance and I've been raised to make somewhat sustainable decisions. The debate about climate change has been present for as long as I can remember. However, during my time as a student at Chalmers University, demographic transformations and climate change have turned urgent. I want to contribute and take action as an architect, without hesitation.

Trying to solve all problems in one project is undoubtedly ambitious. During different master studios and projects, questions about social sustainability have been prominent in my work. I wanted to continue working with this in my master thesis. Moreover, I've always been fascinated by different types of homes and cultures. The housing direction came to be a choice where I could investigate the home and at the same time, work with social sustainability.

I feel humble about whether my thesis could affect how we build and design homes in Sweden. However, I hope it starts discussions, questions, curiosity and I hope my thesis will inspire you as a reader.

Happy reading! Moa



CHAPTER ONE

INTRODUCTION

PREA CHAP

This chapter aims to present the foundation of this thesis and in what way it is relevant within the field of residential architecture. It explains how the thesis has been conducted and presents the design framework for the thesis.

PREAMBLE

CHAPTER ONE

JUSTIFICATION

The government policy for the housing market has seen dramatic changes during the last twenty years. The policy today is oriented towards deregulation and privatization. Since the early 1990s, housing costs have increased tremendously. The increasing land prices driven by high demands for housing in urban areas is one reason. However, another reason is the increased profits claimed by private developers. Needless to say, the private developers want to assure profits and therefore, their focus is mainly on constructing exclusive forms of housing for privileged groups with few investments in affordable rentals. (Grundström & Molina, 2016) There has been a shift away from the ambition to provide housing for all, and this affects vulnerable groups.

This trend is resulting in a homogenous and unsustainable housing stock. The current development of residential buildings is built upon a conventional attitude, a commercialized lifestyle and ignores the question of long-term resilience. (Braide Eriksson, 2019)

The future demographic conditions are almost impossible to predict. According to Schneider and Till, they can be seen as unknown. However, we can predict that changes will occur and other needs will appear, different from the ones we see today. (Schneider & Till, 2007)

Most of the housing stock today consists of conventional apartments that are suitable for traditional households. This makes it hard for certain households to find their place in the housing market.

In an age focusing on sustainability and primarily the short term carbon reduction, it is essential that we preserve an understanding of the broader aspects which make places sustainable over the longevity of time. Adaptability incorporates different spatial and structural design strategies. We are continually placing architecture in a context where it is impressionable to a temporary reality. Therefore, it is crucial to work with time as a parameter in design to help the building prevent its biggest threat - change.



Due to climate change, we are facing a future where the building industry will need to change and start striving for environmental sustainability. There are many ways we as architects can design buildings for the future. However, in the context of climate change, one way is to rethink the way we design buildings that are convenient only for one particular use, ignoring the future's changed spatial needs.

How and where we live has changed a lot during the last 100 years. A well designed and built project aims to last for perhaps at least 100 years. In residential architecture, it is therefore crucial to think about the fact that we do not know how we live 100 years from now. To incorporate this uncertainty and deal with it through adaptability is a substantial part of this thesis.

With this said, the challenge is not only to meet the first dweller's requirements. The apartments we design today need to be able to adapt to future lifestyle patterns and upcoming dwellers. As architects, we need to strive for designing buildings that can host a diversity of households in the future. Buildings with long term usability that can adapt to future challenges and household needs.

This thesis comprises the design for a new multi-family residential building on a plot in Majorna, an urban district of Gothenburg. The aim is to design a building that can adapt to future challenges and unpredictability with dwellings that can adapt to future dwelling needs, housing a wide range of household configurations and function for long term usability. The design proposal will be based on design strategies found in literature about polyvalence and multifunctionality in dwelling design.

In what way can design strategies of polyvalent space and multi-purpose rooms contribute to dwellings that can meet the needs for diverse household types and ways of residing?

How can design strategies of polyvalent space and multi-purpose rooms support future living patterns and change?

The geographical context for this thesis is Gothenburg, thus this thesis is based on the Swedish context using Swedish regulations, guidelines, and statistics. Further on, the thesis is not dealing with adaptability connected to site or structure, such as the building being movable, scalable or demountable.

OBJECTIVE

AIM

RESEARCH QUESTIONS

DELIMITATIONS

METHODOLOGY

The process involves three phases employing theoretical studies, figurative analysis and research by design, respectively. It has been an iterative process moving back and forth between the different phases.

PHASE 1

THEORETICAL STUDIES

The first phase is about collecting material. It aims to gain knowledge about the notion of adaptability and design theories connected to it. Previous work done within flexibility and spatial concepts such as adaptability and polyvalence in residential architecture are being studied.

PHASE 2

FIGURATIVE ANALYSIS

The second phase is about analysis of figurative diagrams, floor plans, combined with sketch work and explorations.

PHASE 3

RESEARCH BY DESIGN

The third and last phase is using the results from the two previous phases to develop adaptable apartments in a multi-family residential building.



Figure 2. Iterative research method

NOTIONS

EXPRESSIONS THAT REQUIRE FURTHER EXPLAINATION

DWELLING A house, flat, or other place of residence.

LONGEVITY

The ability to last for a long time. In this thesis referring to selecting materials that require less maintenance, repair and replacement and implementing an adaptable system that makes it possible for the building to adapt to future needs.

DIVISIBILITY The potential to divide a larger unit.

ELASTICITY

The apartment can be enlarged by taking rooms from the neighboring apartment, or the apartment can be reduced in size by giving rooms to the neighboring apartment.

MULTI-FUNCTIONALITY

The possibility of using space, construction or installation components for several functions. The room function can be changed without changes to the room dimension.

GENERALITY

A room without label that does not have a specific use and thus can take on diverse uses.

POLYVALENCE

A building that can be used in different ways without adjustments to its physical structure. A concept and a system that deals with changeability and unpredictability. In the dwelling, polyvalence relates to the interchangeability of activities between rooms and the possibility for activities to take place at the same time.

READING INSTRUCTIONS

This booklet is divided into four main parts. The next chapter is presenting the background to the thesis. The chapter aims to give a deeper understanding of the chosen topic, the current situation today and references that are relevant to this thesis. The second chapter is about the urban context where the chosen site, its history and surroundings are presented. The third chapter describes the design process where investigations, research, and conclusions for further development are presented. The fourth and last chapter presents the final design proposal.

DESIGN FRAMEWORK

Three parameters forms the design framework for this thesis. The first one is the chosen households that together form the target group. The second is adaptability and time, where this thesis is focusing on two perspectives. The third parameter is defined design strategies for adaptable space. The three parameters are presented below.

1. THE HOUSEHOLDS AND THEIR APARTMENTS

LARGE FAMILIES AND COLLECTIVE HOUSEHOLDS

Based on household- and apartment statistics from the area, the decision was made to focus on two different types of apartments as a starting point. In Majorna, where the site is located, there are many one and two-bedroom apartments, but few larger apartments.

Thus, the first type of apartment is an extra large apartment, about 4-5 rooms and a kitchen. This apartment is suitable for a large family, who still prefer to live in an apartment and not a townhouse or villa. Today, the supply is very limited for this group of people, especially in the area where the site is located. The apartment will also work for collective households.

What the needs for adaptations are over a 50-year sequence of time is unknown. If the needs will be different from today, perhaps the apartment could transform into a small office.

SINGLE PARENTS HOUSEHOLD

The second type of apartment that this thesis will deal with is slightly smaller than the first. About 3-4 rooms and kitchen. This apartment has a broad user spectrum. However, this work focuses on a group of people growing steadily, the single-parent household. This household can take many different shapes, and that is what makes it extra interesting for a thesis focusing on adaptability. The apartment needs to be able to adapt to different situations of change, both long-term and short-term.

2. ADAPTABILITY AND TIME

Longevity is an essential part of building sustainably. However, there are many ways to achieve this. All are aiming for the building to live for a long time. In this thesis, two perspectives on time are used for the design of adaptable dwellings.

One perspective is the adaptability for the household in the living situation. This is achieved through the rooms being general enough to house different activities. The dweller can decide which room to use for what activity and by that the rooms are interchangeable.

The other perspective is the long-term use of the building and its ability to address different spatial needs. For example, how small apartments can become large when there is a shift in need, and how apartments can become office spaces when the market situation changes and requests for dwelling space decreases.

3. WHAT KIND OF ADAPTABILITY?

Housing adaptability is a very complex topic. Different perspectives on flexibility, polyvalence, and generality have been discussed during the last decades by researchers within the residential usability field. However, flexibility is seldom used compared to adaptability, which is a more manageable approach (Braide Eriksson, 2016). Movable walls and flexible elements as foldable furniture are approaches tested in several projects around the world. However, this way of using adaptability has turned out to be less executed. Based on this, the thesis is focusing on a more fundamental approach.

Polyvalence and multi-purpose rooms are both concepts describing a building that can be used in different ways. Compared to flexibility, the concepts are about multiple uses without structural interventions. When it comes to residential design, the concepts are about the interchangeability of activities, room configurations, room proportions and size (Leupen, 2006).

The thesis is focusing on three sub-categories within adaptability as design strategies. POLYVALENCE

The capacity to generate appropriate solutions for each new situation as it arises. A polyvalent room is an inviting room. Space should support the possibility for interchangeability of activities.

MULTI-PURPOSE ROOMS

Proportions and measurements are essential parts of making a room multifunctional. A multi-purpose room enables different activities and creates broader usability.

INTRODUCTION

ELASTICITY

Elasticity in this thesis means the apartment's ability to be enlarged by taking space from the neighboring apartments or being reduced in size by giving away space to the neighboring apartment. This design is not conventional in current design practice. It enables for changing the sizes of apartments in the multi-family residential building and thus contributes to the buildings resilience.



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CHAPTER TWO

BACKGROUND

PREA CHAP

This chapter starts with explaining the Swedish context, demographic transformations and the notion of a home. Furthermore it presents the notion of adaptability and how this thesis relates to it. Five different design theories are presented and the chapter ends with a summary and conclusion.

PREAMBLE

CHAPTER TWO

THE SWEDISH CONTEXT

DEMOGRAPHIC TRANSFORMATIONS AND OUR HOMES

FUTURE CHALLENGES

The only way for the housing stock to be long-term sustainable is if it is adaptable enough to accommodate new demands such as future demographic conditions, aging users and changing living patterns (Schneider & Till, 2007). Dwellings that are built today, meeting current needs and demands, might be inappropriate in a short period of time.

Even if it is hard to predict the future, we do have some trends and prognoses that we can trust will continue to evolve. The population is growing and by the year 2051, we will be approximately 12 million people living in Sweden (SCB, 2018). This is partly due to an aging population and immigration (Braide Eriksson, 2016). Increased immigration is also leading to larger families and new lifestyle patterns. The demographic transformations within Sweden also continue to lead to urbanization (Ibid, 2016).

However, future demographic conditions need to be assumed to be unknown since they are too hard to predict. One thing we do know regarding the future is that housing needs at the end of the twenty-first century will be different from the needs and wishes of today (Schneider & Till, 2007).

BACKGROUND E SWEDISH CONTEXT

HOUSEHOLD DEVELOPMENTS

There are some significant trends regarding ongoing household developments in Europe. In 2016 the single-person household accounted for almost one third, 32.5 %, of the private households. Further on, the two-person household accounted for 31.9 %. In Sweden, however, in 2016 the single household accounted for more than 50 % of all households (Eurostat, 2017). The household size in Sweden has diminished over time from 3.2 persons in 1945, down to 2.1 persons in 1990. One important explanation is the aging population and increased individualism (Boverket, 2017).

When it comes to family types, the nuclear family accounted for 72.2 % in Sweden 2014. Furthermore, the second most common family type 2014, was the single-parent household that accounted for 19,4 % (single-mother households are covering 15,3% of these). The remaining 8,4 % are other kinds of family constellations. (SCB, 2017)

With this said, it is vital that housing is adaptable enough to deal with two situations. The first is to adapt to the changing needs and demands of individuals as they grow older. The second, related to household developments, is the ability to respond to the changing structure of a family (Schneider & Till, 2007).



Figure 4. Distribution of households in Sweden.

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BACKGROUND HE SWEDISH CONTEX

HOW MUCH SPACE DO WE NEED?

The average dwelling size in is Sweden 68 sqm (SCB, 2017b). Multi-family housing is more common in larger cities than in rural areas. Thus, the living space is noticeably smaller compared to single-family homes (SCB, 2016a). The two-room and kitchen apartment is the most common type in Sweden, 36,3 %, followed by the three-room and kitchen, 31,5 % (SCB, 2018b). The most common dwelling size in Gothenburg is the two-room and kitchen of 57 sqm (SCB, 2016)

In a report from SCB, figures show that one- and two-room apartments are smaller today than they have been in over 50 years. The one-room dwelling is in Sweden today, approximately 39 sqm. In the 1980s, it was about 47 sqm. However, in the larger cities, the one-room apartment is even smaller, with an average of 36 sqm. (SCB, 2016) The more urban you live, the smaller the dwelling becomes due to limited space in central areas. In central Gothenburg, 60 % of the housing consists of these small dwellings. (Ibid, 2016)

The question of how much space we need is widely discussed and is highly relevant in a time where we consume and own more than ever. In the RIBA report from 2011, England is analyzed as a country where insufficient space for furniture, possession and socializing has been reported in private homes. Shrinking room sizes is also reported as a problem. (RIBA, 2011)

ACTIVITIES IN THE HOME

If we want to grasp and implement the concept of polyvalence in housing, we need to know the activities that a dwelling generally needs to accommodate. These are also the activities that need to be able to change places for the home to be polyvalent. After all, the polyvalence of the home depends on its spatial configuration. (Leupen, 2006b)

Tarpio (2015) talks about some universal activities that can be addressed within the home. He divides them into three groups; gathering, private and services.

The Swedish standard regulations for building works (BBR) lists eight functions that a dwelling should provide, these are personal hygiene, get together, sleeping, cooking, eating, storage, laundry, entrance storage for outdoor clothes (BBR, 2011)

Leupen (2006b) is also listing six basic activities for the home. He is not mentioning storage or laundry. Instead, he is stresses work as an essential parameter. The modern and post-industrial society shows that home and work overlaps, and they will do even more in the future. Working from home is getting more common. Concepts of hybrid solutions combining housing and working are increasing. (Tarpio, 2015) Working as an activity should, therefore, be implemented in this thesis. (see Figure 2)

Our climate in Sweden creates a need for more storage. Four seasons with varying temperatures and different activities during the seasons requires space. This storage space could to some extent be outside the dwelling, however, it needs to be considered.



The concept of home has for sure an underlying emotional meaning. It is connected to personal identity and safety. At the same time, it emphasizes consumption, being a symbol of status and lifestyle. This commercial narrative is visible when looking in interior magazines or real estate marketing material. It is trying to tell us that with the right furniture and atmosphere we can buy a sense of home.

The question of why people need to describe a physical space with an emotional title is however unclear. Moreover, when does a house become a home? Our homes are expected to allow for both rest and activity. They are supposed to be a safe place and at the same time offer space for gathering and showing status. The concept of home often has some correlation to family. What happens in case the household configuration change? Can the physical space adapt to these changes?

WHAT IS A HOME?

BACKGROUND

ADAPTABILITY

THE NOTION AND DESIGN THEORIES

THE NEED FOR ADAPTABILITY

Residential usability refers to the capacity the space in a home has to adapt to the houscholds changing spatial needs (Braide Eriksson, 2016). Moreover referred to as general spaces that through floor plan configurations can adapt to a variety of living situations and make it possible for the dwellers to determine the usage of space, in comparison to dwellings with predefined rooms (Leupen, 2006a). The degree of residential usability is determined by the flexibility and adaptability of the rooms and room configurations.

We spend a different amount of time in our home and there is a wide range of activities that can take place. Both flexibility and adaptability are parameters that emphasize the necessity of adaptability in dwelling design. Estaji (2017) stresses that any changes in the users of the home, for example, family size or structure, affect the space requirements. Since we cannot predict or control these kinds of changes, adaptability in residential design is crucial. An adaptable system can respond to both a predictable and unpredictable future. By not only serving present purposes but being prepared to meet future requirements, a lot of energy and materials can be saved. Moreover, adaptability increases the longevity of a building and creates spaces that are used more efficiently (Estaji, 2017).

HISTORY OF FLEXIBILITY AND ADAPTABILITY

Braide (2016) writes about the history of flexible housing, dividing it into three key drivers. In the 1920s, the idea of a minimum dwelling developed flexibility in housing by aiming for the most efficient use of space. This came as a response to the need for mass housing. (Braide Eriksson, 2016)

The second key driver started in the 1930s and was a belief that prefabrication and technical solutions were the answer to mass housing production (Ibid, 2016). Solutions were characterized by sliding doors, foldable furniture and movable walls.

The third key driver came in the 1960s and was the idea of user involvement. The user participation movement was focusing on residential needs and aspirations. It embraced a social perspective on housing (Schneider & Till, 2007). In Sweden, both the second and the third key drivers can be found and seen still today on the housing stock (Braide Eriksson, 2016). Experimenthuset in Järnbrott by William-Olsson architects (1953), Däckhuset in Kallebäck by Erik Friberger (1960) and Västra Orminge by Curman Architects (1970) are projects widely mentioned in literature within the field.

Leupen, however, examines the permanent instead of the changeable. Further on, he claims that the long-lasting component of the building provides a frame for changes (Le-upen, 2006a). Flexible space using technical solutions and transformability is seldom used compared to adaptability, which is a more effortless strategy. However, both concepts are used to reach residential usability (Braide Eriksson, 2016).



Figure 6. Diagoon experimental housing (Kroko, 2008) CC BY-NC-SA 2.0.

SALLE POLYVALENTE

The term polyvalence has a long history in the context of multi-purpose hall "Salle polyvalente". The Salle Polyvalente is a building found in the French villages or small towns, used for different public activities. (Leupen, 2006b) A similar typology in the Swedish context would be Folkets hus or Bygdegård. They are also built for public activities, yet not commercial.

POLYVALENCE

In 1967 Hertzberger introduced polyvalence to the architectural discussion through his Diagoon House. The users are given large freedom and are encouraged to define the functions of space themselves (Leupen, 2006b).

Based on the analysis of different polyvalent housing projects, Leupen lists five basic principles that are important to accomplish a polyvalent dwelling (2006b).

- 1. The size of the rooms
- 2. The number of large rooms
- 3. The underlying spatial structure of the dwelling
- 4. The relationship to rooms with fixed activities (bathroom and kitchen)
- 5. The relationship between the rooms

Further on, he argues that a room larger than 16 sqm has the potential to accommodate different activities. The number of large rooms also provides freedom for the user to divide the different functions as preferred. Rooms that only have one access to another room and no other alternative connections have a decreased ability to accommodate basic activities.

Before the 1920s rooms were not defined by their functions, allowing the inhabitants to define the rooms according to their preferences (Ibid, 2006b).

ing es (bathroom and kitchen) **BACKGROUND**

SHEARING LAYERS

The concept, shearing layers, was first mentioned by architect Frank Duffy and later elaborated by Steward Brand in his book from 1994 How buildings learn: what happens after their built. The concept refers to the building as composed of layers of change. The concept of shearing layers leads to an architectural design principle, known as pace-layering, which arranges the layers to allow for maximum adaptability.

The layers from Brands book are (see Figure 4 and 5):

SITE The geographical setting, urban location

STRUCTURE The foundation and load-bearing elements

SKIN Exterior surfaces, facade

SERVICES The technical system, wiring, HVAC, plumping etc.

SPACE PLAN Interior layout

STUFF Furniture etc.

In this thesis, there is no time to investigate number 2 - structure or 4 - services. The project aims to focus on other parts. Another theory, inspired by Shearing layers, is presented on the next spread.

and reuse, you have only an illusion of sustainability...."



Figure 7. Illustration by author based in Brands Shearing layers

STRATEGIES	TYPE OF CHANGE	DECISION-LEVEL	SCALE	TIME	BRAND'S LAYERS STUFF SPACE SERVICES SKIN STRUCTURE SITE					
ADJUSTABLE	change of task	user	components	daily/monthly	0					
FLEXIBLE	change of space	user	components	daily/monthly	0	0				
REFITABLE	change of performance	user/owner	components	7 years		0	0	0		
CONVERTIBLE	change of function	user/owner	building	15 years		0	0	0		
SCALABLE	change of size	owner	building	15 years		0	0	0	0	
MOVABLE	change of location	owner	building	30 years					0	0

Figure 8. Summary of strategies illustrated by author based on Schmidt, Eguchi, Austin, & Gibb, 2010.



(CROXTON, 2003)

BACKGROUND ADAPTABILITY

TYPOLOGICAL FLEXIBILITY

The concepts of typological flexibility and polyvalence are related. Both of them are based on the need for multi-usability of space. Both concepts can be designed in various ways and approached from different perspectives of design. Typology and type are present in all design work, especially in the beginning when the architect is defining different ideas for the building and its overall context of a particular environment (Krokfors, 2017). There are several sub-concepts to typological flexibility stressed by Krokfors (2017). They are as she sees it, interlinked and could be seen as "box within a box" approach. Due to resilient development, the "box within a box" is significant in spatial terms and in understanding hierarchies working within the concept of typological flexibility. The sub-concepts to typological flexibility, defined by Krokfors (2017) are presented on the next page.



Figure 9. Typological flexibility (Krokfors, 2017) Reprinted with permission.

TYPE

Type refers to the spatial configuration of the building and architecture as a meaningful whole. Krokfors (2017) mentions examples of old preserved buildings that are still inhabited. A common quality observed is its spatial configuration that enables multi-usability.

SPATIAL CONFIGURATION

The spatial configuration refers to how the circulation within the building and into the building is organized. If this is done with care, the emerging spaces can become multi-usable, with the capacity for uses other than housing as well. The spatial configuration is a significant part of the design by which unpredictable use can be accommodated during the life span of the building.

SPACE PART

The space part is defining the largest functioning areas in the building and the maximum free space bounded by the fixed structures that are not supposed to change.

SPACE UNIT

The space unit refers to spatial boundaries (within the space part) that allow for multi-usability and for resilience in building and city. Large dwellings are usually a composition of several space units while smaller dwellings could be made by only one space unit. The importance of how space units relate to each other is to be considered. The spatial configuration of the space units should be such that each component can interact with the neighboring component. The space within the building should be divided into passage space and space units. The more potential there is to interact with neighboring space units, the more alteration can take place, and the more flexible the building is.

From the point of view of resilient spatial development, the production of space that springs from space unit thinking is a significant improvement. It promotes energy efficiency, social sustainability and effective use of space. If space is not effective used, reflecting the people's needs at the building and city level, it usually means producing space somewhere else or even replacing existing space and so increasing the use of energy and natural resources. Space unit-based spatial configuration not only serves individual people through its self-conditional character, but it also significantly affects the way the urban areas are profiled in general, and so has an impact on the long-term social sustainability of cities.

ROOM SPACE

When the space units are defined, the question of room division remains. Rooms can now be defined within the space units. Depending on the spatial configuration, a space unit can be divided into several room spaces or it can work as one single room. BACKGROUND ADAPTABILITY

LOGICS AND SPATIAL ORGANISATION

Tarpio (2016) describes logics with other words. He claims that there are two principles within adaptability, multifunctionality and transformability. From these principles four spatial approaches can be found. Furtheron there are seven spatial logics within the spatial approaches. The two principles used in this theory, multifunctionality and transformability, are also mentioned by Krokfors (2017).

The spatial approach that Tarpio calls "series of rooms" might be the one most connected to polyvalence. However, "volume" and "preform", are also in some way related to the polyvalent approach. From the seven spatial logics mentioned by Tarpio, there are four that are interesting to investigate further in this thesis (see figure 10). The logics connected to multifunctionality are closest to this thesis. However, transformability and switchable rooms might be relevant when it comes to long term actions.

1. OPEN PLAN LOGIC 2. THE LOGIC OF ACCESS THROUGH A HALL 3. THE LOGIC OF ROUTE VARIATION 4. THE LOGIC OF SWITCHABLE ROOMS

Leupen (2006b p.30) points out five different models for spatial organization (see Figure 11).

1. THE CHAIN MODEL

The room leading to the next room leading to the next room etc. In terms of privacy, the least polyvalent organization.

2. THE STAR MODEL

From the entrance one can reach all the rooms. No connections between the rooms.

3. THE STAR WITH CENTRAL ROOM

This model is based on a central room from which one can access the other rooms. This is similar to what Tarpio refers to as "The logic of access through a hall"

4. THE CIRCLE MODEL

Loop of rooms with no other connections between rooms.

5. THE GRID MODEL

The rooms can be accessed in more than one way. The grid model provides many possibilities since almost every room can accommodate different activities because of its independent relationship with other rooms.

30



Illustration made by author based on Tarpios logics.



Figure 11. Five models for spatial organisation stressed by Leupen. Illustration made by author based on Leupens theory.

Figure 10. Diagram showing logics from Tarpio that are relevant for this thesis

BACKGROUND ADAPTABILITY

FLOOR PLAN MODELS

Heckmann, Schneider and Zapel (2017) describe and categorizes nine different floor plan ideas/logics. In this thesis, four of them are studied more carefully since they seem more relevant to this work. These models are listed below.



NEUTRAL-FUNCTION / AMBIGUOUS FLOOR PLAN

The use of the space is not determined by the size, form or configuration of rooms. The dwelling is polyvalent since no physical interventions are necessarily needed in order to meet new demands. This logic promotes the creative dweller, mentioned by Krokfors. The users can reflect their identity and way of living through the dwelling. Individuals needs can be realized in the dwelling by arranging the interior.



Visually, the apartment reads like a large, open space with dividing elements (installations, stairs, walls..). The space is dominated by the large area rather than the dividing elements. Therefore the units appear spacious, generous and open. The central core (dividing element, usually bathroom and kitchen) is often arranged so that one approaches it along with one of its edges.

CONTINUOUS FLOOR PLAN

Reduces room boundaries to a few walls, which are placed with great care in order to create dynamic space and divide it into specific areas. The rooms are rarely separated from the traffic area and hardly at all from one another. The apartments appear much larger and more open. The individual room always remains related to the whole.

The logic can be investigated both through horizontal and vertical interaction. For example, in the horizontal approach different activities melt together by corridors, and in the vertical approach varying heights and relationships between rooms adds a new layer to the movement.



CENTRAL LIVING ROOM

The apartment is structured with rooms surrounding a central living room or hall. The central room is a highly connected room that leads to all the other rooms.

SUMMARY AND REFLECTIONS

As the larger cities in Sweden are growing continuously, there is a need for more housing as well as dwellings that are able to adapt to different households needs. In Sweden, people are more likely to live alone due to increased individualism. At the same time, families are becoming more untraditional and constellations are occasionally including a group of friends, generations living together or a family shifting in size from week to week. In one way, planning for more diverse households counteracts increased loneliness. Likewise, dwellings should be adaptable enough to be able to respond to changing needs. We need to reflect on multi-usable space.

One guideline and challenge for polyvalence in dwellings is that it demands enough space. The concept is not based on a custom-made approach resulting in dwellings for a specific use or specific household. Instead dwellings should be more general in order to be adaptable for changes. Here equal room sizes, proportions and connections between rooms are of great importance. For example, increasing the living space with three sqm can have large impacts on the usability of space and affect the unmeasurable aspects in a dwelling. An increase of three sqm can make a bigger difference than we may think, if it is used the right way. Thus, the floor plans in this thesis (presented in chapter five) have been designed to achieve a balance between proportions, sizes, opening and closings, connections, sightlines and circulation.

Many of the design theories presented in this chapter are further analyzed using specific reference projects in the figurative analysis (see chapter 4 and appendix). This was used as a way of testing the theories and learn what qualities to incorporate in the design proposal.

CHALLENGES

 UNPREDICTABILITY POPULATION CHANGES HOUSEHOLD DEVELOPMENTS • DWELLING SIZE • LIVING SPACE

Figure 12. Challenges and strategies

BACKGROUND

BACKGROUND Adaptability

STRATEGIES

 VARIATION for diverse households

• MULTI-PURPOSE SPACE usability and creative dweller

• GENERAL DESIGN unmeasurable values

• POLYVALENCE varying arrangements or combinations of activities

3

CHAPTER THREE

URBAN CONTEXT

PREA CHAPT

This chapter is presenting the chosen site located in district 103 Majorna, Gothenburg. It aims to explain the geographical, historical, social as well as architectural context of the urban area.

PREAMBLE

CHAPTER THREE

MAJORNA

THE CONTEXT

THE SITE LOCATION OF DISTRICT 103 AND THE PLOT

The plot is located in Majorna, a neighborhood in the western part of Sweden's second-largest city, Gothenburg (see Figure 13). The city was founded in 1621 by Gustaf II Adol, thus approaching its 400th anniversary in 2021. Due to the anniversary, many parts of the city are under development and the goal was that 7000 new homes were to be built until 2021 (BoStad2021, 2019). The project is called BoStad 2021. According to the forecast in September 2019, 5200 of these homes will be finished in time. In Majorna, there are two projects part of BoStad 2021, Fixfabriken and Godhemsberget (Ibid, 2019).

When it comes to Majorna, the area is described as follows by the estate agency Stadshem; "There is something certain about Majorna. Here is a pleasant and relaxed atmosphere, and the pace is just so much calmer than inside the city. Majorna is one of Gothenburg's oldest districts.... Here settled sailors, carpenters, boat builders and others who were involved in the port and shipyard operations...." (Stadshem, 2019)

Majorna is the small shops district. Along Karl Johansgatan and Bangatan you will find plenty of second-hand shops, cozy cafés, music and book shops and more. In southeast Majorna borders Slottsskogen, an appreciated recreation area with a small zoo, walking paths and plenty of room for picnic and sport activities. Moreover, Majorna is located close to the river, Göta älv, where restaurants and Röda sten art museum are located.

To the chosen site it is a 47 minute walk from the central station, a 15 minute bike ride or a 11 minute tram tour. There is a short walk to the two different tram stops, Kaptensgatan and Chapmans torg, who both are run by several tram lines. The stop also connects the area to the sea in less than half an hour.



Figure 13. Location of site in district 103 Majorna. ©Lantmäteriet

MAJORNA

MAPPING



1. SCHOOL

- 2. GROCERY STORE
- 3. GYM 4. LIBRARY
- 6. CAR POOL 7. PARK

5. PHARMACY

- 8. PLAYGROUND
- EXISTING BUILDING ON SITE
- PUBLIC TRANSPORT

The district Majorna-Linne contains several smaller districts. One of them, where the plot is located within, is number 103:Majorna, surrounded by 104:Stigberget and 101:Kungsladugård.

Within district 103: Majorna lives approximately 10 800 people. 1820 of these are children below 20 years old. Due to that most housing in the area consists of small apartments, the number of young as well as old residents are high. The levels of income are below the average Gothenburg but education levels are higher. (Statistikdatabas Göteborg n.d.)

The average person in Majorna walk, bike and use public transport. Thus drive less car than the Gothenburg average. The district has a thriving cultural life and works as a complement to the more established institutions in Gothenburg. Characteristic for Majorna is the socioeconomic differences of people living side by side. The district holds many associations, cooperatives and an active citizenship but also problems with drugs, seclusion and unemployment.

APARTMENT TYPES IN 103: MAJORNA 1 ROOM AND PENTRY 1 ROOM AND KITCHEN

2 ROOM AND PENTRY
2 ROOM AND KITCHEN
3 ROOM AND KITCHEN
4 ROOM AND KITCHEN
5 ROOM AND KITCHEN

Figure 14. Distribution of apartment types in Majorna (numbers from Statistikdatabas Göteborg)



Figure 15. Distribution of households in Majorna (*numbers from Statistikdatabas Göteborg*)

DISTRICT 103:MAJORNA

IN NUMBERS



FINDING INSPIRATION IN THE AREA

CREATING DESIGN GUIDELINES

CLOSEBY ICONS AT KARL JOHANSTORGET



KVARTERET STANDARET Arvid Fuhre | 1922



KARL JOHANSSKOLAN Gunnar Asplund | 1925



KV. VAGNBORGEN O.G Westerberg | 1917

CREATING DESIGN GUIDELINES

DETAILS





Gable painted Falu red at Olsonska gården

LANDSHÖVDINGEHUS



Corner entrance at Amiralitetsgatan Balconies towards the street

FACADE COMBINATIONS



Cropped corners at Amiralitetsgatan



Bay windows over entrance



Smooth facade with wood panel all the way down



Traditional combination - Wood and brick



"Heavy" bottom here in plaster with brick details around the windows. Passage to the yard.





Horizontal orientation on windows

reliefs and ornaments

CONTEMPORARY EXAMPLES INSPIRED BY LANDSHÖVDINGEHUS



BRF QVILLESTADEN Bornstein Lyckefors | 2019



Sweco architects | 2017

FINDING INSPIRATION IN THE AREA

Combination of vertical and horisontal panels

Unusual combination, still "heavy" bottom



Entrance with small courtyard in front of building and balconies towards the street

MAJSTÅNGSGATAN Okidoki | 2017

TELLGRENSGATAN 7

EXISTING TEMPORARY KINDERGARTEN

The site chosen for this thesis is today occupied by a temporary building that was put up by a modular system in 2012. The building is housing a kindergarten and located on the edge to a small public park. The children are 1-6 years old and divided into four departments. The kindergarten has room for 72 children. The temporary building permission expires in 2026 (Göteborgs stad, 2020). The design proposal presented in chapter five is based on the scenario where the temporary building is dismantled and a new multi-family residential building is built on the same plot, together with a new kindergarten located in the western part of the park (see figure 18 and chapter five).



Figure 16. The temporary kindergarten seen from the park



Figure 17. The temporary kindergarten seen from Tellgrensgatan

TELLGRENSGATAN 7



EXISTING TEMPORARY KINDERGARTEN

OLSONSKA GÅRDEN

SURROUNDING BUILDINGS ON SITE

Olsonska gården is located north of the site. The building is facing Mariebergsgatan with one storey. Towards Tellgrensgatan and Allmänna vägen the building is two storeys high. Small forecourts are placed between the streets and the building. The block is the last preserved large marketplace, common in Majorna during the 18th and 19th centuries.

Olsonska gården is today considered a cultural heritage. The great value is due to its typology with the courtyard typical for its time and rarely seen nowadays. The buildings are also well-preserved. The oldest part of the block is from the 18th century and was moved to the site in 1792 and transformed dwellings. The exterior of the building is basically unchanged. It has a yellow lid panel and a base covered in grey plaster. Windows and doors are painted in red and the roof is covered with red roof tiles (Göteborgs hembygdsförbund, 2019).

TELLGRENSGATAN AND AMIRALITETSGATAN

The other two buildings bordering the plot are traditional Landshövdingehus typical for the area. The buildings are three levels high with the first storey in brick or plaster and the upper two in wood.









1:200



 SURROUNDING BUILDINGS ON SITE



THE HISTORY OF THE PLOT

WHAT IT USED TO LOOK LIKE BEFORE THE DEMOLITION

The area between Amiralitetsgatan and Oscarsgatan was expanded with landshövdingehus 1880-1910. It was earlier dominated by smaller irregular settlements (see figure 20). The next development was established in 1910-35 and comprised the area south of Amiralitetsgatan. This development was based on the ideas of Albert Liljenberg. Landshövdingehus were built during this time as well. Gråberget, south of the plot, was at this time only used for water reservoir and pavillions but expanded with a residential development during 1950-58. Large parts of the older settlements were demolished after the 1950s. However, many landshövdingehus were preserved. Figure 19 and 20 are showing the old irregular settlements (Kv. Lyran) on the plot that was demolished in the 1970s. (Lönnroth, G. n.d. pp. 265, 280)



Figure 19. Kv. Lyran 1942 (Göteborgs Stadsbyggnadskontor)

URBAN CONTEXT



Figure 20. Historical photographs from the plot (Petersson, B. n.d.)







Figure 21. Sketches

SKETCHES

FINDING INSPIRATION IN THE HISTORICAL CONTEXT





4

CHAPTER FOUR

DESIGN PROCESS

PREA CHAP

This chapter starts with explaining how the figurative analysis was conducted together with a summary and conclusion of the analysis. Further information about the figurative analysis is found in the appendix at the end. Selected parts of the design process are presented. Site analysis, volume studies, strategies, facade and room investigations can be found in this chapter.

PREAMBLE

CHAPTER FOUR

FIGURATIVE ANALYSIS

NINE REFERENCE PROJECTS

In order to build knowledge on the design strategies of adaptability, generality and polyvalence, nine projects were selected and studied. The projects were found during the theoretical studies. They were selected because they all seemed to have characteristics relevant to the thesis. The floor plans have been analyzed based on a checklist. The checklist was set up based on critical parameters stressed from literature within the field.

THE CHECKLIST

1. SIZE

What is the size of the apartment? (number of rooms + square meters) How deep is the apartment?

2. EBY

Calculate EBY and evaluate (see appendix for reading instructions)

3. RELATIONSHIP TO KITCHEN AND BATHROOM How do the rooms in the floor plan relate to the kitchen and bathroom?

4. PROPORTIONS AND NUMBER OF LARGE ROOMS How many large rooms do the apartment have? What are the proportions and measurements of the rooms?

5. CONNECTIVITY GRAPH

Make a connectivity graph of the floor plan (see appendix for reading instructions) Which space organization model is identified?

6. PUBLIC AND PRIVATE

Which rooms are more private in their character? Why? (see appendix for reading instructions)

7. FURNISHING OPTIONS

Are there multiple ways to furnish the rooms? How multifunctional are the rooms?

SUMMARY AND REFLECTIONS

Analyzing floor plans turned out to be a great way of starting my own design process. From the analysis conclusions could be made regarding how to achieve an adaptable dwelling working with polyvalence, elasticity and multi-purpose rooms. The projects were compared and by that reasonable measurements and proportions for multi-purpose rooms could be identified. Moreover, I was able to distinguish how rooms can relate to each other and how many rooms the dwelling needs in order to be polyvalent. Recurrent parameters found in the projects where for instance room in sequences, a central hall room or living room and a central core. Furthermore, all of the apartments were between 80-100 sqm.



Figure 22. Sketch from one of my site visit.

WOODEN RELIEF ELEMENTS Playing with light and shadows in the facade.

WOOD AS MAIN MATERIAL Using a limited material palette and connecting to context.

MAINTENANCE AND LONGEVITY Wood treated with original Falu red, easy to maintain and a beautiful matte finish.

POLYVALENT FLOOR PLAN Dwellings that are adaptable without having to interfere with large structural transformations.

DESIGN PROCESS

DESIGN STRATEGIES

SYMMETRY AND REPETITIVENESS In plan and facade

VOLUME STUDIES

ITERATION ONE (BEFORE MIDTERM)





Framing the park

ITERATION TWO (AFTER MIDTERM)

Public spaces towards the street Framing the park

URBAN STRATEGIES

The chosen volume is located approximately at the same plot as the existing temporary kindergarten was, which is now disassembled. By placing the new building where the old one was located, old trees and other vegetation in the park can be saved. Moreover, the ground is already partly prepared. The volume has an angle making the building facing Tellgrensgatan like building X is facing Amiralitetsgatan (see figure 23 and site plan below). Half of the building is parallel to the street and the northern gable is aligned with Olsonska gården. Two gables are facing the park and together framing both the park and the residential yard. The ground floor has a passage in the middle of the building connecting Tellgrensgatan to the residential yard and the park. The new kindergarten is located in the western part of the park and parallel to Amiralitetsgatan in order to define the urban space along the street.







Figure 24. Building lowered from street level

DESIGN PROCESS

EARLY IDEAS





Figure 25. Pitched roof and falu red painted wooden facade, connecting to the context

Figure 26. Rythm in the facade, contrasts between horisontal and vertical elements

FACADE INVESTIGATIONS

The facade investigations were an iterative work and a search to find an expression suitable for the context, yet contemporary. By working with sketches and looking at reference projects, an evaluation was made regarding what elements to incorporate from the context into the project. The iterations are showing different ways of combining elements into contemporary residential architecture in wood. The relief effect on the facades where investigated by trying out different rhythms, elaborating with horizontal and vertical facade elements. Figure 20 a-d are showing iterations of a building entirely in wood, while e-h are versions where the first storey is made in concrete.



Figure 27. Outdoor anteroom and seating niche



Figure 28. Arcade towards the yard

Figure 30. Glulam bars in final facade expression, 1:200

THE POLYVALENT ROOM

The polyvalent room was investigated by three prototypes. All of them are based on the idea of a room that measures "one and a half room" since this kind of room is able to deal with overlapping activities and gives larger freedom to the dweller. The first one and a half room measures 3400 x 5200, and is based on a regular 12 m² room, a room often mentioned as an average bedroom in the Swedish context. The second room measures 3900 x 5400 and is by that slightly larger than the first one. Lastly the third room measures 4400 x 4900 and has a more squared shape compared to the other rectangular rooms. Both the second and the third "one and a half rooms" are based on a 14 m² room. On the following pages, the three different rooms are tested to see how adaptable they are.



Room number one and two are more rectangular and turn out to work better when it comes to combining activities and dividing the room. However, the squared room allows for greater symmetric proportions and is more harmonic and restful to be in. After making further iterations, the final proposal concludes three different rooms with the measurements 3700 x 4500, 4500 x 4500 and 3700 x 3900. Thus, they are slightly smaller and have somewhat other proportions than the rooms presented here.



0

Д







TESTING SPACE

POLYVALENT ROOM 1

(3400 x 5200)

1:200









SPACE PROGRAM

(3900 x 5400)

1:200









1:200



Ø



DESIGN PROCESS











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n

 \square

NUMBER OF APARTMENTS: TOTAL AREA APARTMENTS: LAUNDRY: STORAGES (apartment storages & comm **BICYCLE STORAGE:** FACILITIES / OFFICE SPACE **RECYCLING:** OTHER SHARED SPACES FOI **TECHNIQUE:** CAR PARKING:



Figure 31. Space program

	39-60
:	$3428 m^2$
	95 m ²
non storage) :	350 m^2
	$138 m^2$
2:	$395 m^2$
	30 m^2
R RESIDENTS:	230 m^2
	$56 m^2$
	10 spots



Entering the site from South or East (From Amiralitetsgatan/Karl Johanstoget)

5

CHAPTER FIVE

DESIGN PROPOSAL

In this chapter I transform the theoretical reasoning into a design proposal for a site in Gothenburg, taking departure from the historical layers previously presented in chapter three.



SITE PLAN

The building is partially aligned with the street and partly angled in the same way as the building diagonally located in the crossing of Tellgrensgatan and Amiralitetsgatan. The angle allows for a public space connected to a facility on the ground floor suitable for a shop or cafe. The public outdoor space is turned towards south-east with sun from the morning until the afternoon.

The building is placed with a distance from the street in order to add greenery and more light to the street. Two gables are helping to frame the park and to create a residential yard in between facing west. The new kindergarten is placed in the western part of the park, aligned with Amiralitetsgatan in order to close the urban space of the street. It is placed close to the other kindergarten and their outdoor areas are gathered in the part of the park.



The ground floor is housing public and residential functions. There are two office facilities and one shop that are based on the same layouts as the apartments. Additionally, there is a smaller office space shared by the residents in the building, providing a possibility to work or study from home yet not in the dwelling. There are one small guest apartment and a guest room shared by the residents. In the northern part of the ground floor three apartments are located. Since the plot is sloping the northern part of the ground floor is one storey higher from the street level, but at the same level as the yard.



GROUND FLOOR

This means that the apartments on the ground floor are protected from observation from the street. Nevertheless, they have private outdoor space towards the yard. To conclude, the ground floor is a divided volume and has a passage in the middle connecting the street with the yard and the park. The building has three staircases. One of them is reached through the passage. The other two get light from two directions and can be reached from the street as well as from the yard. The entrances are highlighted from the street, with anterooms providing seating niches, blurring the boundary between inside and outside.

) 1:400

GROUND FLOOR





0 5m

) 1:200

DESIGN PROPOSAL

Ground floor | Plan 0

GROUND FLOOR





DESIGN PROPOSAL



VIEW SHOWING THE OUTDOOR ANTEROOM AND SEATING NICHE



VIEW SHOWING THE ARCADE AND RESIDENTIAL YARD

THE BUILDING

GENERAL FLOOR PLAN

The general floor plan contains 10 apartments in its original construction, but can provide 16 apartments if implementing divisibility. There are three apartments connected to the right and left staircases, respectively. These three apartments are presented more closely further on and referred to as apartments A, B, C and D. The central staircase is connected to two apartments that are not presented further in this thesis. However, one of them has many similarities with apartment C.



APARTMENT DISTRIBUTION

The apartments are based on a couple of concepts. The rooms are mainly multi-purpose rooms without labels and are reached through a neutral transitional space, a central hall room, or from the kitchen. Storage and wardrobes are widely placed outside the rooms. Hence the rooms become more general. The sanitary functions are located in a central core and separated from each other. This is making the dwelling more appropriate for more than just the nuclear family. The spatial organization is providing circulation at several occasions and the relationships between rooms and central neutral spaces (such as kitchen and hall room) makes it possible to rent out some of the rooms, to share the dwellings as a collective or for the property owners to divide the large apartment into two smaller units.





CONCEPTS

- Enfilades
- Central core with storage
- Reaching rooms from neutral space
- Multi-purpose rooms
- Rooms without labels
- Balconies reached from two directions

DESIGN PROPOSAL

THE BASEMENT AND ROOF FLOOR







WHY WOOD?

Wood was chosen early in the project to connect to the context and as a sustainable construction material. It is a preferable material since it is a renewable resource and helps to control climate change by binding carbon dioxide.



The basement & Roof floor

6. TECHNICAL EQUIPMENT

11. ROOF TERRACE



FACADE TELLGRENSGATAN

FALU RÖDFÄRG

The wooden facade is painted with original Falu Rödfärg, based on linseed oil. The result is a matte finish that will age beautifully. This specific recipe leaves an open surface that allows the wood to breathe and reduces the risk of rot (Falu rödfärg, 2011).

FACADE TELLGRENSGATAN





A MONOCHROME PIECE OF ARCHITECTURE

The expression of the facades is a result of the facade iterations presented more thoroughly in chapter 4. The ground floor has a horizontal orientation of the panel to imitate the "heavy bottoms" of the adjacent Landshövdingehus. The top floor has a narrower width on the panel for a lighter expression. The building has a red corrugated metal roof for monochrome completeness.





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1:400 | 1:200

FACADE AMIRALITETSGATAN

YELLOW CONTRASTS

The outdoor anterooms, seating niches and the passageway are left untreated, adding a contrast to the otherwise monochrome building. Thus the entrances are highlighted and the wood will be kept yellow since its protected from the sun. The surrounding buildings inspire the hipped roof. However, it has a flat top for a contemporary look and to provide the residents with a roof terrace.



FACADE TOWARDS THE YARD

SECTION THROUGH STREET AND YARD

The section is showing the relationship between the building, street, residential yard and the park. To the right is a trace of the new kindergarten with the same expression as the multi-family residential building. Due to the building being lowered from the street level, the building does not appear much taller than the surrounding buildings, even though it has an extra floor. The section is showing the entrance space on the ground floor with built-in seating niches, apartment C and the shared facility on the roof floor where someone is having a birthday party.

76

0 5m

APARTMENT TYPE A | 142 SQM

ARCHITECTURAL QUALITIES

Apartment A is based on five multi-purpose rooms measuring 3700 x 4500 located around a central core providing sanitary, the kitchen, communication space and a central hall room. The apartment is 142 sqm, working as a 5 - 8 1/2 room and kitchen, depending on the household and how the rooms are being used. It allows for divisability, by merely adding another entrance and kitchen, the apartment can transform into two apartments (48 and 97 sqm).

All rooms are large enough to fit a double bed or to work as a living room and they are reached through a neutral transitional space, the central hall or through the kitchen. Moreover, they can be reached in more than one way. Right next to the entrance is a small room that could be used as a walk-in closet, as a small workspace for as an extension to the adjacent room. Three rooms in a sequence is a recurrent quality found in four situations. The central hall room is provided with corrugated and frosted glass to let in light, making the room an extra space for working, dining, playing, gatherings or perhaps even as a small living room.

R

R

R

E2 = Hall room

R = Room

В

-

Κ

E

E

B = Balcony

ROOM CONFIGURATION

E1 = Entrance hall K = Kitchen

R

R

= Passage, small room, wc

This floor plan is showing a situation where a family of eight are living in the apartment. The central hall room is used as an extension to the kitchen, providing the dining space. Two of the multi-purpose rooms are divided and used as smaller rooms for the children.

Floor plan | Apartment A | 142 sqm

78

THE LARGE FAMILY

TWO ADULTS & SIX CHILDREN

The youngest child is having the bedroom closest to the parent. The living room is chosen due to its close connection to the dining area and the southern balcony.

THE COLLECTIVE HOUSEHOLD

SIX ADULTS

This floor plan is showing a situation where collective household of six are living in the apartment. The central hall room is used as an extra space for studying and gathering. One of the multi-purpose rooms is divided and used as smaller bedrooms. Two couples are living in the larger bedrooms. The social spaces are gathered around the kitchen, giving all the residents access to the western balcony.

APARTMENT TYPE B | 110 SQM

ARCHITECTURAL QUALITIES

Apartment B is based on three multi-purpose rooms measuring 4500 x 4500 located around a central core providing sanitary, the kitchen and communication space. The apartment is 110 sqm, which in a Swedish context would be seen as a 5 room and kitchen dwelling. It allows for divisability, by merely adding another entrance and kitchen the apartment can transform into two apartments (35 sqm and 74 sqm). All rooms are large enough to fit a double bed or to work as a living room and they are reached through a neutral transitional space or through the kitchen. Moreover, they can be reached in more than one way. Additionally, there is a smaller room located in between two of the larger rooms, a room that can be used as a walk-in closet for the adjacent rooms or simply as a smaller bedroom or home office. Furthermore, by removing one of the walls, it could be merged with one of the larger rooms to create a larger living room.

CORE AND ROOM SIZES

80

DESIGN PROPOSAI

CIRCULATION

DIVISABILITY

SINGLE PARENT WITH TENANTS

THREE-FOUR ADULTS & TWO CHILDREN

This floor plan is showing a situation where a family of 5-6 persons are living in the apartment. The living room is chosen due to its connection to the southern balcony and to have the more public part of the apartment close to the entrance. In the other room connected to the kitchen the parent is living together with the youngest child.

The smaller room is working as a bedroom for the second child. The third room is rented out to a couple who get their own bathroom and can reach their room directly from the entrance.

ONE-TWO ADULTS & FOUR CHILDREN

This floor plan is showing a situation where a family of 5-6 persons are living in the apartment. The living room is chosen due to its connection to the southern balcony and the kitchen. The room next to the entrance is divided into two smaller rooms, one working as a home office and one as a child bedroom.

Floor plan | Apartment type B | 110 sqm

SINGLE PARENT WITH HOME OFFICE

The smaller room is working as a bedroom for the parent and the third large room as a bedroom for three children.

APARTMENT TYPE C & D | 108 + 32 SQM

ARCHITECTURAL QUALITIES

Apartment C is based on three multi-purpose rooms measuring 3700 x 3900 located around a central core providing sanitary, the kitchen, a central hall room and communication space. The apartment is 108 sqm, which in a Swedish context would be seen as a 5 room and kitchen dwelling. Next to apartment C a small studio unit is located, apartment D 32 sqm. The two apartments can be arranged in another way and transform into two apartments (64 and 85 sqm). All rooms are large enough to fit a double bed or to work as a living room and they are reached through a neutral transitional space, through the kitchen or through the central hall room. Moreover they can be reached in more than one way.

ROOM CONFIGURATION APARTMENT C

DESIGN PROPOSAL

APARTMENT C ど D

SIGHTLINES

CIRCULATION

This floor plan is showing a situation where a collective household of four people are sharing apartment C and a single household is living in apartment D. The single household is using the walk-in closet as a sleeping alcove for more privacy.

COLLECTIVE AND SINGLE HOUSEHOLD

FIVE ADULTS

The collective household is using the largest room as a living room connected to the central hall room used as a social space. The two couples get equal large rooms both connected to the balcony.

NUCLEAR FAMILY AND COUPLE HOUSEHOLD

FOUR ADULTS & THREE CHILDREN

This floor plan is showing a situation where a family of five people are living in the apartment. The largest room towards the yard is divided into two rooms used as bedrooms. The room closest to the entrance is divided and used as two smaller bedrooms when the kids grow older and need more privacy.

The third room is extended to the central hall room creating a larger living room connected to the kitchen. The small unit is used by a couple. The living room is large enough for a double bed and a small sofa.

86

Floor plan | Apartment type $C \ \mathfrak{S} D$ | $108 + 32 \ sqm$

Scale 1:100

Floor plans | Apartments | Living situations over time

LIVING SITUATIONS OVER TIME

APARTMENTS

2027

The couple is moving out and the family gets an addition to their apartment. The kids are still young so they don't need the extra space yet. They decide to rent out one room and keep the extra entrance for the tenant.

2045

The family have been living in the apartment for 25 years. Both children have now moved out. The grandmother who just became a widow is moving in next to the entrance. She gets her own kitchenette and access to the living room.

2050

87

Both children have now moved out and the parents are renting out the upper floor to a student. A kitchen is installed and the private entrance is opened once again. The parents are working from home a lot, having their own company, and have made a large office space. If the buisiness is expanding they are planning to use the upper floor as an office in the future.

2025

— The couples have finished their studies and one couple is moving out. The other couple is now having two children and are staying in the apartment.

THE CENTRAL HALL ROOM

VIEW IN APARTMENT A

The central hall room or central living room was recurrent found in the reference projects during the figurative analysis. Once the hall used to be perhaps the most important room in the home used for gatherings and social events.

The central hall room is a general room that could be used for various activities. It has the potential of becoming a room that never gets a label, hosting new activities each day. The room encourages to a more creative dweller giving endless possibilities. The wall between the hall and the kitchen has corrugated frosted double doors and windows to let light in but still providing some privacy. Moreover, high windows are placed around the room for even more light.

Rooms in sequences was another recurrent feature in the reference projects and has been used in grand European architecture since the 17th century.

Sequences of rooms provided with double doors in corrugated frosted glass, can be found in all three larger apartments. It gives the dwellers the possibility to open up for a more continuous and airy space. Moreover, it creates beautiful views and long sightlines.

All apartments are cladded with a brushed wooden panel (borstad slätspont) that has an obvious wood texture and a soft transition between the panels. The wood is treated with a white pigmented oil to keep it light with a contemporary and neutral expression. The walls have a high base in wood that is stained blue together with the doors.

ENFILADE

VIEW IN APARTMENT A

REFLECTIONS

During this semester, I've only managed to scratch on the surface of the thesis topic, adaptability. Moreover, the thesis includes additional layers such as living situations, sustainability, time and identity within residential architecture. All adding complexity to the thesis. The overall conclusion is that these parameters are far from always incorporated in today's design practice. Which is still particularly designing based on a commercialized lifestyle, traditional households and by demands from the building industry. As future architects, we need to keep challenging our profession and the developers to improve the development of Swedish homes is essential.

The notion of adaptability is nothing new, not even in Sweden. Nevertheless, the approaches seen in Swedish projects are often about transformability, movable walls and foldable furniture. However, adaptability could likely become a more common reality in residential architecture in Sweden, and there are many different approaches. With the prominent housing shortage and increasing diversity in society, it is essential to lift the subject once again.

In this thesis, more fundamental approaches have been studied. Such as ways for the dwelling to be adaptable mainly through multifunctionality and polyvalence. Moreover, in this approach, the building frame defines the architecture for an extended period of time and the space within which change can occur. Even though the building is inherently static, the space inside the frame is generic, polyvalent and undefined in such a way that it is adaptable for various living situations, interpretations and activities.

All people are influenced daily, consciously or unconsciously, by architecture. A home is a space that mirrors one's identity. Moreover, it is a shelter and a safe place in a continually changing modern society. With the starting point from a critical perspective of the normative housing development, the design proposal explores architectural strategies that strengthen identity to the home and widen the possibility for different ways of residing. The adaptable approach taken in this thesis is one way to ensure long-term inclusion and homes that through their spatial composition, can respond to changing desires, needs and challenges. The thesis has given me insights on how to investigate housing from a specific perspective where unpredictability and time have been guiding parameters.

My thesis began with a hypothetical theory of using adaptability as a strategy to prevent demolition, hence support change. The research questions where formulated as questions on how to do this, rather than asking if it is exclusively the correct answer.

One question was, "In what way can design strategies of polyvalent space and multi-purpose rooms contribute to dwellings that can meet the needs for diverse household types and ways of residing?"

The design proposal showcases one way this could be incorporated today. However, I'm sure it is not the only answer. The dimensions and proportions of the multi-purpose rooms have been carefully investigated, and thus they are inviting for various activities, situations, interpretations and dreams. Moreover, the spatial configurations have been developed through iterations, searching for a polyvalent home. This is connected to how rooms are reached and how they are interacting with each other. The result is dwellings with a high degree of polyvalence suitable for various ways of residing.

Another guiding question was, "How can design strategies of polyvalent space and multi-purpose rooms support future living patterns and change?" Which is a question that deals more with the long-term and resilient perspective. The design strategies of transformability and elasticity are prominent in this answer since they deal with more long-term solutions.

The thesis has two distinct parts to it, where the first one is the research; understanding, investigating and analyzing adaptability tools and strategies. This was mainly done on a space unit and room space level. However, the next step could be to go back and look at other aspects of it, gather more information and possibly take the concept further and deeper. This would emphasize the structure and the frame of the building. Moreover, working with adaptability in this part of the building is a whole thesis in itself.

When it comes to the design process, the same reflection has been made. The building frame is developed from a 1200 grid with windows and glulam bars aligned within this system. However, the load-bearing structure on the next level, referred to as the space part by Krokfors, could be developed for further adaptability within the building structure.

Building and running this kind of housing would be a very different story than the one presented in this project. The first question would be what kind of tenure the building would have. Do you own your apartment, is it a rentals or perhaps a combination of both? Location of the proposal is also crucial for how it would work in reality. The chosen location in Majorna, has an underlying aspect that the district's residents are often open to news, trends, ideals and ways of living and residing.

What this thesis has proven, with a first attempt, is that by implementing adaptability strategies from an early stage in the design process, the result will generate apartments suitable for more diverse living situations than they otherwise would. Waiting for the society to change before we take action is an unsustainable approach. Instead, we have to design for future scenarios, even though it's not clear what we are aiming for. From the beginning of this thesis, I have had a perception that architecture can have an impact on social issues and the prospect that adaptability strategies in housing development, will benefit everyone in the long run. After this semester, I still today believe in this idea and I hope to continue evolving these strategies in my future practice.

CONCLUSIONS

BIBLIOGRAPHY

LITERATURE

Braide Eriksson, A. (2016). Residential usability and social sustainability: towards a paradigm shift within housing design? Gothenburg: Chalmers University of Technology

Braide, A. (2019). *Dwelling in Time: Studies on life course spatial adaptability.* Gothenburg: Chalmers University of Technology

Bjur, H. (2018) *Liljenbergs stad: Göteborg 1900–1930* Stockholm: Balkong

Brand, S. (1994). How buildings learn: what happens after they're built (1997). London: Phoenix

Heckman, O., Schneider, F., & Zapel, E. (2017). *Floor plan manual housing*. Basel: Birkhäuser.

Krokfors, K. (2017). Time for space. Typologically flexible and resilient buildings and the emergence of the creative dweller. Alto University School of Arts, Helsinki, Finland.

Lönnroth, G. (n.d.). Kulturbistoriskt värdefull bebyggelse i Göteborg: Ett program för bevarande, Del 1. (pp. 265, 280) Stadsmuseet, Göteborg.

Leupen, B. (2006a). *Frame and Generic Space*. Rotterdam: 010 Publishers.

Schneider, T., & Till, J. (2007). *Flexible housing*. (pp. 15, 37-38, 41) London; New York: Architectural Press, an imprint of Routledge.

REPORTS

SCB. (2018). Sveriges framtida befolkning 2018–2070. (Demografiska rapporter 2018:1). Retrieved from https://www.scb.se/ contentassets/b3973c6465b446a690aec868d8b67473/be0401_2018i70_br_be51br1801.pdf p.9

SCB (2017) Befolknings- och välfärdsstatistik: Bakgrundsfakta. 2017. Retrieved from https://www.scb.se/contentassets/ddfcaaff5e2f4f7ba4fb7c09a4655808/le0102_2015i16_br_be96br1701.pdf

WEBSITES

Eurostat. (2017). People in the EU: statistics on household and family structures. Retrieved 2020-02-13 from https://ec.europa.eu/eurostat/statistics-explained/index.php/People_in_the_EU_-_statistics_on_household_and_family_structures#Single-person_households

Boverket. (2017). *Hushållen idag*. Retrieved 2020-02-15 from https://www.boverket.se/sv/kommunernas-bostadsforsorjning/underlag-for-bostads-forsorjningen/hushallen-i-dag/

SCB. (2018b). Drygt 4,8 miljoner bostäder i Sverige. Retrieved 2020-02-15 from https://www.scb.se/hitta-statistik/statistik-efter-amne/boen-de-byggande-och-bebyggande-och-ombyggnad/bostadsbestand/pong/statistiknyhet/bostadsbestandet-2017-12-31/

SCB. (2017b). *Knappt 4,8 miljoner bostäder i landet*. Retrieved 2020-02-20 from https://www.scb.se/hitta-statistik/statistik-efter-amne/boen-de-byggande-och-bebyggelse/bostadsbyggande-och-ombyggnad/bostadsbestand/pong/statistiknyhet/bostadsbestandet-2016-12-31/

SCB. (2016) Vanligast med 2 rum och kök på 57 kvadratmeter. Retrieved 2020-02-20 from https://www.scb.se/hitta-statistik/artiklar/2016/Vanli-gast-med-2-rum-och-kok-pa-57-kvadratmeter/

Göteborgs hembygdsförbund. (2019) Veckans artikel: Olsonska Gården. Retrieved 2020-05-06 from https://goteborgshembygdsforbund. se/2019/09/08/veckans-artikel-olsonska-garden/

Statistikdatabas Göteborgs Stad (n.d.) *Antal hushåll efter hushållsstyp 2014–2018*. Retrieved from http://statistikdatabas.goteborg.se/pxweb/ sv/1.%20Göteborg%20och%20dess%20delområden/1.%20Göteborg%20och%20dess%20delområden__Primärområden__Befolkning__Hushåll/20_Hushallstyp_PRI.px/table/tableViewLayout1/?loadedQueryId=4f068ae9-97b4-4eab-a657-62f19ca4811b&timeType=item

Falu Rödfärg (2011). Produktinformation Original Falu Rödfärg. Retrieved 2020-05-08 from https://falurodfarg.com/falu-rodfarg-original/

Göteborgs stad. (2020). Tellgrensgatan 7 Förskola. Retrieved 2020-03-15 from https://goteborg.se/wps/portal/enhetssida/tellgrensgatan-7-forsko-la

ARTICLES

BBR. (2011). Boverkets byggregler: föreskrifter och allmänna råd, BBR. Retrieved from https://www.boverket.se/sv/lag--ratt/forfattningssamling/gallande/bbr---bfs-20116/

Beisi, J. (1995). Adaptable housing or adaptable people: Experience in Switzerland gives a new answer to the question of housing adaptability. Architecture and Behaviour Journal, Volume 11, No 2. pp. 139-162. Retrieved from https://www.epfl.ch/labs/lasur/wp-content/uploads/2018/05/BEISI.pdf

Croxton, Architectural Record, August 2003, pp. 147 (cited by Knecht, Designing for Disassembly and Deconstruction, Architectural Record, October 2004).

Estaji, H. (2017). A review of flexibility and adaptability in housing design. pp. 37-47. International Journal of Contemporary Architecture "The New ARCH" Vol. 4, No. 2 (2017) Retrieved from https://www.researchgate.net/publication/319059598_A_Review_of_Flexibility_and_Adaptability_in_Housing_Design

Grundström, K., & Molina, I. (2016). From Folkhem to lifestyle housing in Sweden: segregation and urban form, 1930s-2010s. International Journal of Housing Policy, 16 (3), pp. 316-336. Retrieved from https://doi.org/10.1080/14616718.2015.1122695

Leupen, B. (2006b). *Polyvalence, a concept for the sustainable dwelling: Nordic journal of architectural research.* Volume 19, No 3. pp. 23-31. Retrieved from http://arkitekturforskning.net/na/article/download/156/120

Manum, B. (2009). The advantage of generality: Dwellings' potential for housing different ways of living. Stockholm: KTH. Retrieved from http://www.sss7.org/Proceedings/04%20Building%20Morphology%20and%20Emergent%20Performativity/069_Manum.pdf

RIBA. (2011). The Case for Space: the size of England's new homes. Royal Institute of British Architects. Retrieved from https://www.architecture.com/-/media/gathercontent/space-standards-for-homes/additional-documents/ribacaseforspace2011pdf.pdf

Schmidt, R., Eguchi, T., Austin, S., & Gibb, A. (2010). What is the meaning of adaptability in the building industry? . 16th International Conference on Open and Sustainable Buildings, (pp. 227-236). Bilbao. Retrieved from http://adaptablefutures.com/wp-content/uplo-ads/2011/11/Schmidt-et-al.-2010b.pdf

Tarpio, J. (2016). *Spatial principles and logics of dwelling flexibility*. Arkkitehti: Finnish architectural review, 2016(4), pp. 12-21. Retrieved from https://tutcris.tut.fi/portal/fi/publications/monenlaista-joustavuutta(9e351c23-91bb-4ab1-be78-bd646043f49c).html

FIGURES

Figure 6. p. 23 Kroko. (2008). Experimental houses Diagoon type, Delft, Netherlands, 1967-70 [Electronic image]. CC BY-NC-SA 2.0. Retrieved from https://www.flickr.com/photos/krokorr/5474451006 (2020-02-20)

Figure 9. p.26 Krokfors, K. (2017) *Time for space. Typological flexibility.* [Electronic image] Reprinted with permission.

Figure 13. p.35 © Lantmäteriet Retrieved from https://geodata.chalmers.se (2020-02-03)

Figure 19. p. 44 © Göteborg Stadsbyggnadskontoret

Figure 20. p. 44 Petersson, B. (n.d.) Föreningen gamla Majgrabbar [Electronic images] Retrieved from http://www.majgrabbar.se/majgator.htm (2020-05-09)

All other figures are taken or produced by the author.

APPENDIX

FIGURATIVE ANALYSIS

APPENDIX

The appendix contains a more detailed description of the figurative analysis made after the theoretical studies, as part of the design process. Nine different projects within the field of adaptability in residential architecture where chosen. The floor plans where analysed using a self-made checklist.

PREAMBLE

THE CHECKLIST

What is the size of the apartment? (number of rooms + square meters)

How does the rooms in the floor plan relate to kitchen and bathroom?

|--|

2. EBY

How deep is the apartment?

Calculate EBY and evaluate

3. RELATIONSHIP TO KITCHEN AND BATHROOM

EBY

EBY is a keyfigure mentioned and used by CBA (Centrum för boendets arkitektur) It's used to measure space efficiency. This is done by taking the efficiently usable living space/ entire floorplan area.

Evaluation criteria for EBY < 0.7 bad 0.7 – 0.8 pretty bad 0.8 – 0.9 pretty good > 0.9 good

CONNECTIVITY GRAPH

Connectivity graphs are a way to look at rooms relationship to each other, their space organisation. How the rooms can be used is highly connected to the space organisation.

- E = ENTRANCE
- R = ROOM
- K = KITCHEN
- = BATHROOM OR OTHER SMALL ROOM

PUBLIC AND PRIVATE

MORE PRIVATE PART OF APARTMENT

4. PROPORTIONS AND NUMBER OF LARGE ROOMS How many large rooms do the apartment have? What are the proportions and measurments of the rooms?	
5. CONNECTIVITY GRAPH Make a connectivity graph of the floor plan Which space organisation model is identified?	
6. PUBLIC AND PRIVATE Which rooms are more private in their character? Why?	

7. FURNISHING OPTIONS

Are there multiple ways to furnish the rooms? How multifunctional are the rooms?

READING INSTRUCTIONS

APPENDIX

STUMHOLMEN

KJELL FORSHED

SIZE: 3 room and kitchen | 82.5 m²

EBY: 0.82 | pretty good

FLOOR PLAN MODEL: Neutral function floor plan

HOUSE TYPE: Lamella

NOTES: With another structure the kitchen could be located in any of the four rooms, which would provide even more adaptability. The bathroom is located next to the entrance and can only be reached from the there. The diagonal wall in the entrance strengthens the diagonal axis through the apartment.

PROPORTIONS - NUMBER OF LARGE ROOMS

The apartment has 4 almost identical rooms with similar propor-

tions. They measure approximately 3.7 x 3.6 meters.

The apartment could be seen as having the space organisation called the circle model. The layout has a circulation flow

COURTYARD HOUSE

DIENER & DIENER

SIZE: 3 room and kitchen | 103 m²

EBY: 0.9 | very good

FLOOR PLAN MODEL: Central living room

HOUSE TYPE: Courtyard house

NOTES: The bathrooms are located next to the entrance and can only be reached from there. The kitchen is not big enough for a table but highly connected to the central room that probably provides the activity eating.

PROPORTIONS - NUMBER OF LARGE ROOMS

The apartment has 2 identical rooms and one room located inbetween which is slightly smaller and connected to the loggia and the kitchen. The larger rooms measure approximately 7.1 x 4.1 meters.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation called the star model with central room.

PUBLIC AND PRIVATE

From the entrance the more public rooms of the apartment are located to your right. The kitchen and the central room with the loggia works as the get together space. The larger rooms, located on each side of the central room, are a bit more private in their character.

PUBLIC AND PRIVATE

between the four large rooms.

CONNECTIVITY GRAPH

The public and private parts of the apartment are rather hard to identify since it's not obvious which rooms that are used as bedrooms. However the most private parts of the apartment are probably as the dotted parts in the figures. One can see that the larger room that works as a passage room is not maked as private and will probably not be used as a bedroom. This room is less multifunctional than the other three.

The rooms are large enough to house any basic activities such as sleeping, eating and get together. However, the small window seen in some floor plans in the inner two rooms, makes it hard to fit a double bed and by that the room is less multifunctional. The passage room is harder to furnish since it has many openings. There are no built in wardrobes, but the windows and openings are well placed in order to be able to use these kind of furnitures. Care is taken to not let openings get too big. This improves the feeling of enclosenedness and increases the way furniture can be arranged.

FURNISHING OPTIONS - MULTIUSABILITY

All rooms are big enough to house any basic activities such as sleeping, eating and get together. The central room is less private than the other two rooms and also works as a passage room. This means that this room is less suitable as bedroom. The larger rooms are perhaps uneccessarily large as bedrooms and could be divided into two rooms and still be big enough for a double bed. Even as a living room it is spacious.

ROSENGATAN

NILS OLSSON

SIZE: 5 room and kitchen | 100 m2

EBY: 0.9 | very good

FLOOR PLAN MODEL: Central living room / Access through hall

HOUSE TYPE: Block

NOTES: This apartment is from 1928. With todays standards the kitchen would probably be merged with the boardering small room, becoming an apartment with 4 room and kitchen instead. The 2nd entrance room can hardly be used as a room in itself since it doesn't have any windows. Meaning that the apartment would today be called a 3.5 room and kitchen.

PROPORTIONS - NUMBER OF LARGE ROOMS

All rooms are big enough for a double bed. The largest rooms measure approximetely 4.6 x 4 and 4.8 x 4.3 meters. They have proportions and openings that make them easy to furnish.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation called the grid model. The 2nd entrance room is highly connected to the other rooms.

PUBLIC AND PRIVATE

The dotted parts show the more private space in the apartment. Due to its strong connection to other rooms, the 2nd entrance room is more public than the others. However it is not neccessatily a passage room. By simly adding a door between the entrance and this room it could be used as more private space, but then the smaller room on the left when entering becomes a passage room in order to reach the largest room in the apartment. It's important to notice that the 2nd entrance room is located in the dark core of the apartment and is preferably used as an extension to the largest room.

FURNISHING OPTIONS - MULTIUSABILITY

All rooms are big enough to house a double bed and it is easy to place additional wardrobes. The small kitchen could become a bigger one with space for a table if merging with the smallest bedroom.

BRF VIVA

MALMSTRÖM EDSTRÖM ARKITEKTER

SIZE: 3-4 room and kitchen | 97 m2

EBY: 0.85 | pretty good

FLOOR PLAN MODEL: Dividing elements

HOUSE TYPE: Lamella

NOTES: The apartment has two bathrooms, the smaller one is located in the more private part of the apartment. The kitchen is big enough for a table, but there might be a conflict between eating and passing through the kitchen. The kitchen has a good connection to the largest room and to the balconies.

PROPORTIONS - NUMBER OF LARGE ROOMS

The apartment has only one large room that measures approximately 5.8 x 3.5 meters, it even could be extented to a larger room if desired. The second largest room can also fit a double bed but it's only 12 m² and not big enough to fit the activity get together. The third largest room is slightly too small to fit a double bed, which is a pity because it would provide a higher level of multiusability in the apartment.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation called the grid model. The central core working as a dividing element is a nice feature providing circulation but on the other hand it creates some corridor space.

PUBLIC AND PRIVATE

The entrance guides you to the kitchen on your right and through the kitchen to the largest room in the apartment. These are the more public spaces in the apartment. Left of the entrance the more private spaces are located. The entrance balcony is another layer of space where the households interact with eachother.

FURNISHING OPTIONS - MULTIUSABILITY

The rooms themselves are not very multifunctional. Only the largest room can be used for any kind of activity. However, the structure of the apartment is adaptable and allow the room boundaries to change. In this case study the EBY has been kindly measured only removing the entrance space. More space could be added as non-furnishable space such as communication spaces. Then the EBY would be "not good".

BLACKEBERG KOLLEKTIVHUS

ARCHITECT: KLEMMING AND THELAUS

SIZE: 1-2 room and kitchenette | 25-38 m²

EBY: 0.8-0.9 | pretty good-good

FLOOR PLAN MODEL: Zoning

HOUSE TYPE: Tower block in 7 floors

NOTES: This case study is intresting because it is made for single households and an early idea about sharing space. In relation to this thesis it is interesting to see if there is a possibility for these kind of apartments to merge without loosing qualities, or perhaps gaining new ones?

PROPORTIONS - NUMBER OF LARGE ROOMS

All rooms are big enough for a double bed. The largest room measure approximetely 4.2 x 3.7 and is the room in the one room apartment. The two room apartment could be used as one larger room.

CONNECTIVITY GRAPH

Looking at the small apartments one and one they seem to have the space organisation called the chain model. By looking at them merged together as a larger apartment, the space organisation changes into a star model.

PUBLIC AND PRIVATE

In the sketch where the apartments are merged, the private part of the apartment is located to your left when entering. In the small apartments it's hard to identify public and private space since there is only one room, all activities have to take place in the same room.

FURNISHING OPTIONS - MULTIUSABILITY

The floor plans to the right are showing two sketches of how three small apartments could be merged into a 4 room and kitchen apartment, 90 m². The first version has only one bathroom and a smaller entrance area compared to version two. Instead it gets a larger living room.

NYA BRUKET, SANDVIKEN

ALMQVIST, LISINKI AND SIMONSSON

SIZE: 3-5 room and kitchen | 75(+35) = 110 m²

EBY: 0.8 | pretty good

FLOOR PLAN MODEL: Neutral function

HOUSE TYPE: Lamella in two storeys, working class dwellings

NOTES: The apartment feels light and spacious. Many possibilities to divide or merge apartments and many opportunities for the creative dweller.

PROPORTIONS - NUMBER OF LARGE ROOMS

All rooms are equal in size and proportions. They measure approximately 4.6 x 3.2 meters.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation model called the grid model. If there was a connection between the iner two rooms, the model would be different.

PUBLIC AND PRIVATE

Looking at the first floor (3 room and kitchen, 75 m²) the public part of the apartment is located in the front and the private further in. The public part gets light from two sides and the private rooms have only one door. If the first floor apartment is connected with the smaller one (35 m^2) upstairs the upper part becomes the most private.

FURNISHING OPTIONS - MULTIUSABILITY

The rooms are large, general and multifunctional. They can be furnished in many different ways and used for various activities. The windows are placed in the middle of the wall, making it easier to furnish.

SECOND FLOOR, SCALE 1:200

RUDDAMMSPARKEN

ANNA HIDEMARK

SIZE: 4 room and kitchen | 100 m²

EBY: 0.85 | pretty good

FLOOR PLAN MODEL: Circuit/internal path

HOUSE TYPE: no information

NOTES: The "bedrooms" are spread out in the corners of the apartment. The EBY is pretty good but I'm sure the floor plan and square meters could be used even more efficient.

HELLMUTSTRASSE

ADP ARCHITECTS

SIZE: 1-4 room and kitchen

EBY: 0.9 | excellent

FLOOR PLAN MODEL: Central living room

HOUSE TYPE: Slab block

NOTES: The plan is divided into three zones, locating fixed openings in load-bearing walls. The floor plan is showing the primary structure.

PROPORTIONS - NUMBER OF LARGE ROOMS

Dimensions of rooms are either 4 or 4.5 meters which are anticipated to adapt to different ways of furnishing. The rooms could be combined and turned into apartments in various ways (see figure).

PROPORTIONS - NUMBER OF LARGE ROOMS

All rooms are large enough to fit a double bed. The two smaller bedrooms are similar in size. The rooms are rather squared than rectangular in their proportion and the largest two rooms measure 4.4 x 4.2 and 3.9 x 3.3 meters.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation called the circle model. This also relates to the floor plan model called internal path. The circulation is provided around the dark core that in this case is not a free standing dividing element as in Brf Viva. Instead the core is integrated and connected to the other rooms.

PUBLIC AND PRIVATE

The post private part of the apartment is located fartherst away from the entrane. The rooms are the smallest in the apartment and they have their own shared bathroom. Their size and design make them suitable as bedrooms. The third bedroom is located next to the entrance, and by that not as private as the other two.

FURNISHING OPTIONS - MULTIUSABILITY

The rooms are large enough to fit many different activities. In that way they are multifunctional. The living room is by far the largest room and a passage room that makes it hard to use this room for other purposes. The larger room next to the living room is multifunctional in its size, character and proportions. This room could be used for many different activities.

The apartment could be seen as having the space organisation

CONNECTIVITY GRAPH

model called the star model with central room.

PUBLIC AND PRIVATE

The largest room is connected to the kitchen and entrance and by that more public than the other two.

FURNISHING OPTIONS - MULTIUSABILITY

The rooms are large and perhaps in some way hard to furnish. The apartment is one sided which makes the iner part of the large rooms a bit dark.

RESIDENTIAL DEVELOPMENT BOCKLER

()

HAERLE HUBACHER

SIZE: 5-6 room and kitchen | $105 m^2$

EBY: 0.96 | excellent

FLOOR PLAN MODEL: Access through a hall

HOUSE TYPE: no information

NOTES: This project is a contemporary example apartments with multi-functional rooms and the logic of accessing through a hall. The hall itself works as a versatile heart of the apartment. The dwellings are affordable rental apartments for different family constellations.

PROPORTIONS - NUMBER OF LARGE ROOMS

All rooms are large enough to fit a double bed. The largest room measure 4.2 x 3.4 meters.

CONNECTIVITY GRAPH

The apartment could be seen as having the space organisation called the star model with central room. The connectivity graph looks similar to the previous case study even though the floor plans look very different. Not much connection between rooms means that many of the rooms have a private character.

R Κ R R

PUBLIC AND PRIVATE

Most of the rooms have a private character due to few openings and connections. The rooms located closest to the entrance feel more public. They have a close relationship to each other and to the central room.

FURNISHING OPTIONS - MULTIUSABILITY

The apartment has many possibilities and alternative ways for furnishing. Considering the number of square meters the apartment feels well structured. There are many rooms and the rooms fit most activities without being too large or too small.

A

SKETCHES FROM CASE STUDIES

6

9

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