



A healthy log housing concept for senior citizens

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Suuret ikäluokat Suomessa, kuten muissakin läntisissä maissa ovat seniori-ikäisiä ja jäämässä pikkuhiljaa eläkkeelle. Vanhen-
evia ihmisiä on enemmän kuin koskaan aikaisemmin ja tämän takia uusia konsepteja tarvitaan heistä huolta pitämään. Seniorit
toivovat loppuelämältään terveellistä kotia, korkeaa rakentamisen laatua, esteettömiä ratkaisuja, turvallisuuden tunnetta sekä akti-
ivista elämää, vanhenemisesta huolimatta. Kysymys kuuluukin, kuinka nämä asiat voitaisiin arkkitehtuurin keinoin tuoda seniorien
elämään.

Tiedetään, että puumateriaalilla on useita positiivisia ominaisuuksia ja tämän vuoksi hirsien käyttäminen rakennusmateriaalina
parantaa asuin ympäristön terveellisyyttä. Tämän diplomityön tavoitteena on kehittää terveellinen hirsitalokonsepti senioriasumis-
een. Asuin ympäristö, jossa seniorit kokevat olevansa virkeitä sekä terveitä ja mikä tärkeintä, tuntevat olevansa kuin kotonaan. Työ
on tutkielma- ja suunnitelmapainoiteisen työn yhdistelmä. Työssä suunniteltu konsepti käsittää hirsitalomoduulien esittelyn, sekä
niiden variaation. Lopullinen ratkaisu muotoutuu aina rakennusympäristön antamisen rajojen puitteissa.

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The post-war generation in Finland, as in many Western countries, has reached senior age and is currently in retirement. We have more ageing people than ever and we thus need new concepts for caring for them. Senior citizens dream of a healthy home to live in, high quality and accessibility, a feeling of comfort and safety and staying active despite ageing. The question is how architecture could bring these contents into their lives.

Wood as a construction material has several known positive properties and using logs as material for senior houses create a healthy environment. The aim of this thesis is to develop a healthy wooden log housing concept for senior citizens. A living environment where senior citizens feel alive and healthy and most importantly feel at home. This thesis begins with a literature review, followed by a section introducing design solutions. The concept itself consists of a log house modules theme with variations to the modules. The final solution takes shape depending on the habitants and surroundings.

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INTRODUCTION

Ageing means giving up many things. But we often forget that ageing also means the beginning of something new. An old saying goes: "When one door closes, another opens". The purpose of my thesis is to open new doors concerning the housing of senior citizens.

The post-war generation in Finland, as in many Western countries, has reached senior age and is currently in retirement. We have more ageing people than ever and we thus need new concepts for caring for them. We are not the only ones, though. For example the one-child policy in China has led to the traditional elderly care model not working anymore. Long-term housing solutions for senior citizens are therefore needed. How could architecture bring new contents into the life of senior citizens? How to approach this subject matter?

To begin with we have to ask what needs senior citizens have concerning their housing. Based on the literature (Sorri 2006, Dahlström & Minkinen 2009; Revet 2000) they dream of a healthy home to live in, high quality and accessibility, a feeling of comfort and safety and staying active despite ageing. The senior housing market needs new concepts and brands for fulfilling seniors' housing needs (Tyvimaa 2010). A 'design for all'-strategy does not fulfil the needs of all seniors anymore.

Wood as a construction material has several known positive properties, e.g. antibacterially, moisture buffering, psychological effects and authenticity, which all positively influence people living in wooden houses. Words often used to describe wood include warm, comfortable and relaxing (Rametsteiner 2007).

Based on this, an idea of a concept combining senior citizen housing and building with logs began to form. Wood as a natural and healthy material sits well with the needs of senior housing. The aim of this thesis is to develop a healthy wooden log housing concept for senior citizens. A living environment where senior citizens feel alive and healthy, and most importantly feel at home. This thesis begins with a literature review, followed by a section introducing design solutions. The concept itself consists of a log house modules theme with variations to the modules. The final solution takes shape depending on the habitants and surroundings.

WHY BUILD WITH WOOD

Psychological effects of wood

People tend to prefer environments that spark their interest but do not demand too much of their attention. This includes construction materials such as wood and stone (Nyruud & Bringslimark 2012). Wood as a material is known to have a positive impact on people's emotional states and psychological health. Rice et al. (2006) and Rametsteiner (2007) state that people often consider interior wood natural, warm, comfortable, relaxing, healthy, good-looking, easy to use and an environmentally friendly choice. People simply feel well when surrounded by wood and they have an innate understanding that wood creates healthful environments (Rice et al. 2006).

Anttila et al. (2012) state in their research that persons living in log houses were more satisfied with their apartments than people living in other wooden houses or stone houses. They particularly felt that indoor air quality was better and on average their health was better compared to other respondents.

Wood also has a calming effect on people. Morikawa et al. (1998) write that contact with wood has a decreasing effect on blood pressure. Grote et al. (2012) and Kelz et al. (2011) noted that the use of solid wood in classrooms can reduce pupils' stress levels. They found that the heart rate of examined pupils significantly decreased in solid wood classrooms.

Nyruud et al. (2013) has studied wood utilisation in interiors. In their study, respondents in a hospital were shown pictures of patient rooms with different amounts of wood in the interior design. The respondents tended to prefer patient rooms with intermediate levels of wood. Broman (2001) has shown that it is important to avoid creating disharmony when composing a wooden surface. For example not too many knots should occur in the wooden surfaces used in interiors. However, knots are not only a negative thing according to Nakamura & Kondo (2007). They state that knots are the remains of branches in a tree trunk and thus evidence that the wood came from a living tree, which is seen as a positive phenomenon.



Photo: Katja Vahtikari

Moisture buffering of wood

Indoor air humidity influences several factors affecting human health, e.g. the growth of bacteria, viruses, fungi and mites that can harm the everyday living of people (Kokko 2004). The relative humidity in a good indoor air climate remains between 25–45% in Finland during winter and should stay below 60% during summer (Koponen et al. 2004). Most of the organisms negatively affecting health do not live in this optimum zone.

Wood is a hygroscopic material with the ability to moderate indoor air moisture variations. Skaar (1988) states that wood moisture content always tries to be in equilibrium with the atmospheric moisture of its immediate environment. This moisture buffering can be used indoors to minimise the daily peak variations of the relative humidity of the air (Svennberg et al. 2004).

Several things affect the indoor moisture buffering capacity: furnishing, furniture, coatings and different materials (Koponen 2004). The efficiency of moisture buffering properties depends on the material combinations and coating of the wooden material, and of course on surface area and material thickness. Koponen (2004) has classified materials based on their ability to moderate the daily variation of indoor air humidity, and uncoated pine solid wood had the best result in his study. Some painted wooden surfaces had an equally good moisture buffering capacity as uncoated surfaces. Hameury (2007) has shown that treatment with waterborne alkali silicate paint applied to Scots pine actually increases the moisture buffering value.

VOCs and the antibacterial properties of wood

All building materials emit something, including wood. Volatile organic compounds (VOCs) include both human-made and naturally occurring chemical compounds, meaning particles/compounds emitted from the material itself, and not e.g. dust (Fig.1). These VOCs are called emissions (Ohlmayer 2009). Wood consists of organic compounds called extractives. The amount and composition of extractive organic compounds in wood depend on tree species, time of year, tree genetics and age, and vary within individual plants (Granström 2005). Wood extractives are used e.g. in many medical products and by the perfume industry (Roffael 2006). They also influence the indoor air we breathe. Järnström (2011) writes that people feel that the indoor air quality is better in wooden houses than in other housing types. Higher terpene concentrations have been measured in these very buildings and it is known that terpenes and aldehydes are the most common emissions from Nordic wood species.

Wood, and especially pine heartwood, has been shown to have antibacterial properties. Pine is found to be very suitable in situations where there is a risk of contamination from food (Boursillon & Riethmüller 2007). This phenomenon is not well known, but one of the most important factors behind the antibacteriability of pine is the presence of wood extractives. (Milling et al. 2005; Sipponen et al. 2007; Vainio-Kaila et al. 2011).

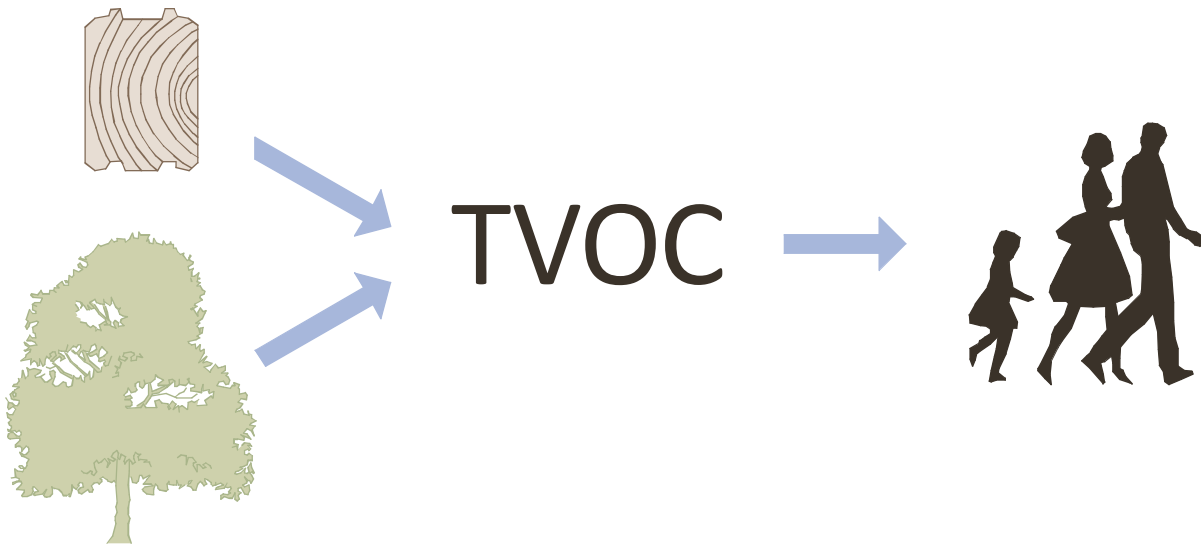


Figure 1. Trees and wood as material emit volatile organic compounds (VOCs) and contributes our well-being. Wood is known to have a positive influence on people.

BUILDING WITH LOGS

Finland

Traditional Finnish wood construction is based on the use of logs. Though the dominant position of log construction in Finland ended in the first decades of the 20th century, when the timber frame structure was imported, Finnish log construction experienced a new coming in the 1950s when log cabins began to be manufactured industrially according to Heikkilä (2004). Log houses have been used especially as leisure-time houses and it has been difficult for the log house industry to spread into towns (Heikkilä 2002). One reason is that logs are considered a dull material in Finland. According to Tuuva-Hongisto (2010), the only exception to this is leisure-time housing and building with wood is often connected to nature and considered a counterbalance for living in the city.

The settling of logs has been one of the specialities of the log material, but it has also limited log architecture. The Finnish manufacturer Honkarakenne has introduced a massive wood wall structure that does not live or settle. The non-settling log is made of pine and is manufactured from six sections that are laminated in a crosswise manner. Gluing the parts minimises log twisting and cracking. One of the advantages of this product is that other materials, such as stone, steel and glass, can be combined with the wood frame (Honkarakenne 2014).

China

Log constructions have spread across large areas in China, but logs have never attained a comparable level of the technical elaboration found elsewhere in the world (Zwenger 2012). Two fundamental prerequisites influenced the development of log construction: first and foremost, the abundance of dense coniferous woodland and secondly a comparatively dry climate. Log constructions developed in regions where it was necessary to shelter against very cold climates because they encase warmth. Zwenger has researched building with wood in China and notes that only a minute part of the literature related to Chinese wood constructions concerns log construction.



Photo: Katja Vahtikari

SENIOR CITIZENS

Ageing is not only a population phenomenon but also an individual reality and experience (Fernández-Ballesteros et al. 2013). While 25% of an individual's age is accounted for by genetics, an estimated 75% is due to environmental conditions. A person's age alone does not determine how they will continue to age. Ageing is a unique characteristic for every generation and also depends largely on the time and environment we live in (Karisto 2004). Ageing usually means retiring, when the rhythms of everyday (working) life easily disappear, as also do the opportunities for social contact while physical mobility concurrently decreases (Feddersen & Lüdthe 2009; Özer-Kemppainen 2005). In other words, ageing means giving up many things, and the living environment of senior citizens should therefore offer a platform for communication and recreation.

What kind of environment can then be said to support good life. Dahlström and Minkkinen (2009) write that it is an environment that appreciates the life experiences of its inhabitants, takes into account their needs and resources, supports their independent initiative and offers social support but also enough privacy. It has to be remembered that a senior inhabitant is a considering subject that has important knowledge concerning their own living environment (Keiski 1998). The ability to adjust quickly to a new environment slows down during ageing, as does the ability of reading information from your surroundings (Verma 2088).

A senior citizen is a person that has retired and is at least 65 years old, but still lives independently (Tuppurainen 2006). Feddersen and Lüdthe (2009) state that rather than waiting until they became dependent on help senior citizens nowadays look ahead, actively seeking ways of living that are more appropriate to their needs as they grow older. Seniors are individuals and want to be treated individually (Sorri 2006). However, senior citizens also have some uniform wishes for their future living, as presented in Fig.2.

Senior housing usually means a private owner-occupied or rented living conventional apartment house that has been allocated to a person with a certain age. The idea is that the ageing individual moves into a senior apartment while still living independently. Because senior houses have been designed taking accessibility into consideration, the apartments can later be changed to meet the needs of the ageing inhabitant (Özer-Kemppainen 2005; Tuppurainen 2006).



Figure 2. Things that are important for senior citizens.

Senior citizens in Finland

The Finnish post-war generation born during 1946–1950 has now reached the senior age, and this means that the Finnish population is ageing rapidly (Fig.3) (Tyvimaa 2010). Tikka (1991) states that Finland, as many other Western countries, is facing a situation where old people are no longer old in the traditional meaning of the word. As a group, Finnish seniors are healthier than ever before and each generation since the 1980s has been so. Seniors are also used to a high standard of living and many of them additionally want to enjoy their lives and also have money to spend (Kekäläinen & Kotilainen 1987; Tikka 1991; Özer-Kemppainen 2005).

Tyvimaa (2010) notes that currently the most popular housing type and living mode for Finnish seniors is a single-family house and living in a household of two persons, respectively. Single seniors usually live in apartments in multi-family buildings. Accessibility problems in these apartments, such as the lack of lifts in confined rooms in the apartments, are issues that make living normal lives difficult for seniors. This is why the demand for purpose-built apartments for senior citizens will increase in the next twenty years.

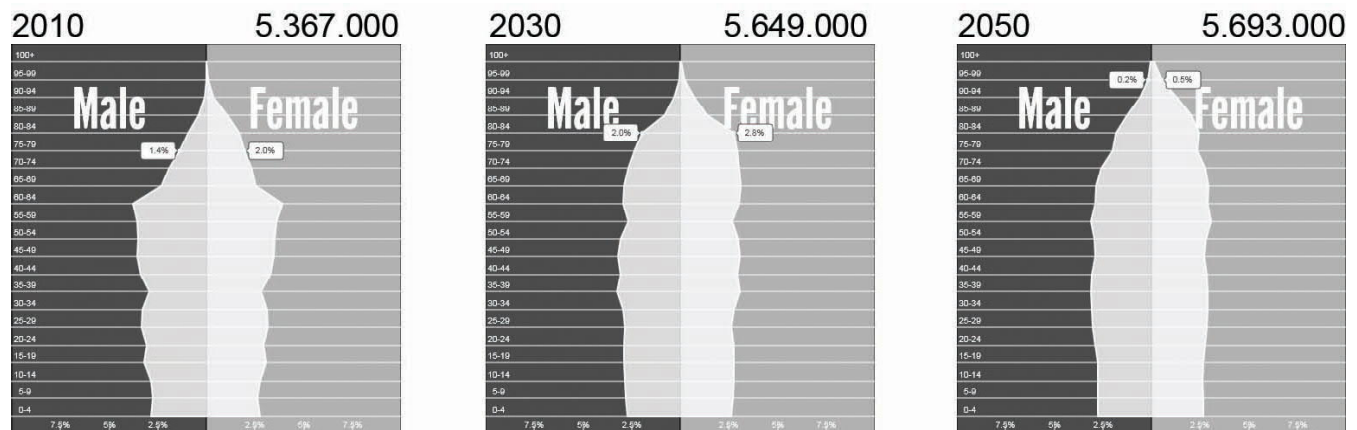


Figure 3. Population pyramids of Finland 2010 - 2050 (De Wulf 2012).

Senior citizens in China

Old age is not a separate phase of life in China, marked for example by the ending of an individual's working life as it is in Europe. The elderly switch back and forth between family and earning a living, often placing their own interests in the background (Feddersen & Lüdthe 2009). Chinese family structures traditionally cluster around relatives who assist one another economically. Elderly parents usually live with the eldest son. The oldest son and his spouse traditionally have the responsibility of taking up most duties related to caring for elderly parents. (Zhang & Goza 2006; Li & Tracy 1999).

China's population will age dramatically during the next decades as a result of the one-child policy (Fig.4). This will lead to serious problems in the provisioning of care for the elderly (Feddersen & Lüdthe 2009; Flaherty et al. 2007). Li and Tracy (1999) show that with a rapidly ageing population, elderly care can no longer be solely a family matter; it is also a social issue.

More and more parents will not have a daughter-in-law to care for them. Millions of Chinese senior citizens live in homes not designed for older residents, but because of tradition would feel disgraced to relocate and spend their final years in a nursing home (Zhang & Goza 2006). Many of the younger generation are more career-focused, and it is becoming increasingly difficult to combine a career and look after your parents without third-party elderly care services. On the plus side, their wealth is increasing with rising salaries.

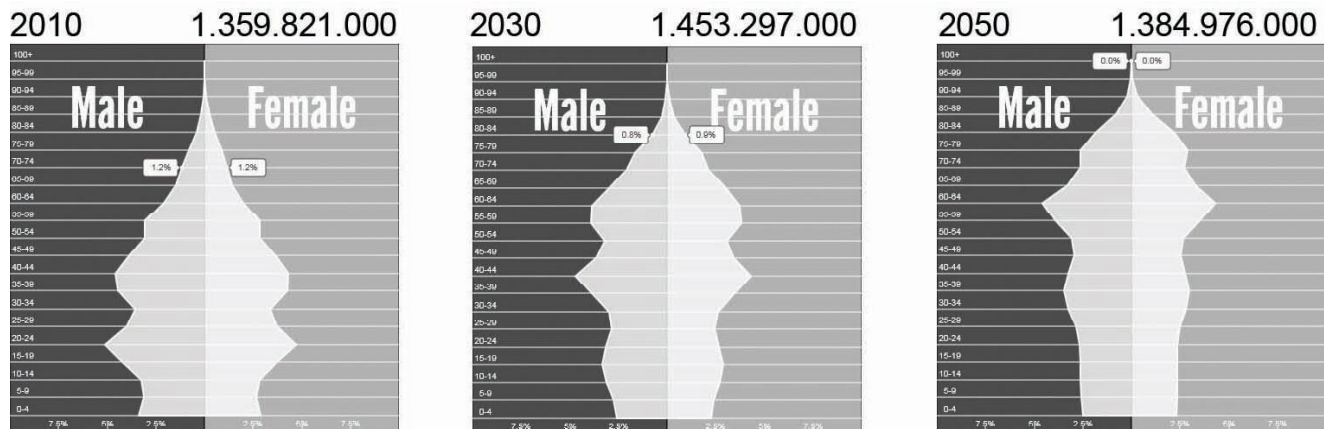


Figure 4. Population pyramids of China+ 2010 - 2050 (De Wulf 2012).

SENIOR HOUSING

Senior housing in Finland

Before the early 1900s low-income elderly people lived in poorhouses. The idea of retirement homes for the elderly did not form until the 1900s. These retirement homes were located in rural environments and were often the old main buildings of farms, e.g. the Kuru municipal home (in retirement home use since 1918) or the mansion of the Sippola municipal home (in retirement home use since 1920). Such solutions remained in place until the 1950s. Rapid urbanisation then created the need for institutional buildings as well as for increased unit sizes. However, despite their institutional character, the solutions of this time were considered cosy and carefully designed. For example the Kustaankartano elderly home (Fig.5), built in 1953, with its large park-like yard is a good example of this (Kekäläinen & Kotilainen 1987).



Figure 5. Kustaankartano elderly home in Helsinki consists of several buildings and a park with walking paths and activities for the elderly .

During the 1960s homes for the elderly were built outside the city centres and their architecture was closer to hospitals. Many of the units built in the 1950s were collected into large groups of buildings, e.g. the Riistavuori elderly home. Soft values arose again in the 1970s, and units became smaller (Kekäläinen & Kotilainen 1987). In the 1980s the competition for the building of Hausjärvi Elderly People's Home and Health Care Centre was settled, and at the time it was discussed (Arkkitehtuurikilpailuja 2/1987) that using spatial planning could encourage discourse between the elderly e.g. by using corridors as a stimulating inner street with lounges (Fig.6). The aim at the time was to achieve a home-like environment using a small scale and increasing the scopes of activity by greenrooms and winter gardens as in Fig.6.

This trend continued also in the 1990s when the housing service centre Wilhelmiina (1995) was designed (Fig.7). The centre brought together different types of housing and care arrangements, e.g. home clusters with shared atrium gardens that encourage the encounters of people (ARK 2/3 1996). A pioneering senior housing project Färdknäppen was concurrently launched in Sweden. The idea was that after the age of 40 one was permitted to move into the house, and each resident fulfils their own share in the everyday life according to their individual capabilities. They have their own apartments, but also large common facilities (William-Olsson 1994).

Senior houses as independent living facilities are a quite new business idea in Finland. Assisted living facilities and institutional care are the usual solutions when seniors are incapable of living on their own any longer. Finnish municipalities can provide these services alone or in co-operation with other municipalities, or services can be purchased e.g. from private service operations or non-profit organizations (Tyvimaa 2010).

A pioneering senior housing project in Finland has been the "Loppukiri" house in Helsinki. The entire project has been atypical because the contractors of the house are the seniors themselves. Loppukiri uses the Swedish Färdknäppen as its model. Loppukiri is a resident community for ageing people, a "self-service house" where all services are produced by the inhabitants themselves. The house consists of common facilities (kitchen, library, gym etc.) and modern apartments of 36–80 square meters. The seniors describe that the key words for their living in Loppukiri is joy and enthusiasm. (Dahlström & Minkkinen 2009).

Senior housing in China

Senior housing as a product type is still very new in China, and thus relatively unknown in most regions of the country. Currently there are three major types of senior housing in China: government welfare-type senior housing, non-profit non-government senior housing and for-profit senior housing. The living types of all these can be independent living, assisted living facilities and nursing care (Wang 2007). In their study Brekelmans and Chen (2011) asked elderly Chinese which service items were most wanted by them. The three most popular answers were medical/nursing services, entertainment and food services.

Senior housing is arriving in China through small steps. Wang (2007) introduces a pioneering senior community "Beijing Sun City", launched in 1988. It provides a broad range of services including medical care and nursing, entertainment, food services and sport facilities. It has apartments for purchase and rent and most of the seniors are able to live independently. However, the Beijing Sun City concept is adapted from the USA and although wealthy seniors consider the option of living in a modern senior living facility or community, the challenge for a western developer is to understand what Chinese seniors care about.



Figure 6. The ground floor plan of Hausjärvi Elderly People's Home and Health Care Centre, a competition first prize by Kaira-Lahdelma-Mahlamäki.

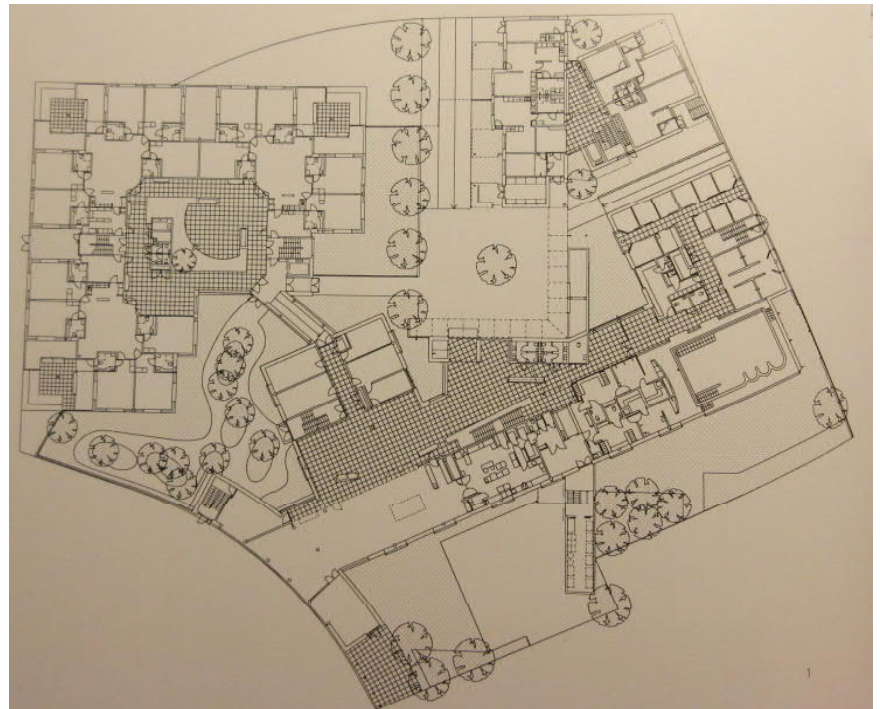


Figure 7. The ground floor plan of Housing Service Center Wilhelmiina located in Helsinki and designed by Helin & Siitonen.

LOCATION OF SENIOR HOUSING

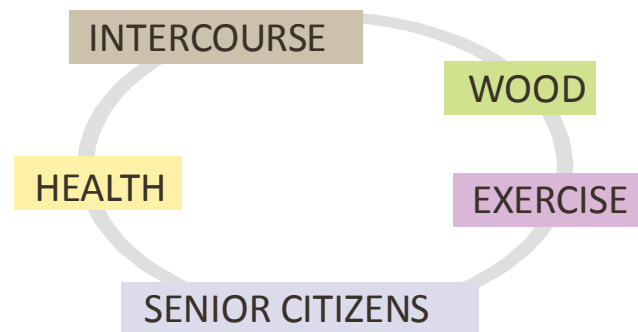
The architectural responsibility for designing for an elderly person is the same as when designing an environment for anyone else. The environment of the elderly should therefore differ as little as possible from a normal environment. The limitation problems brought by ageing have to naturally be taken into account in the design (Kekäläinen & Kotilainen 1987).

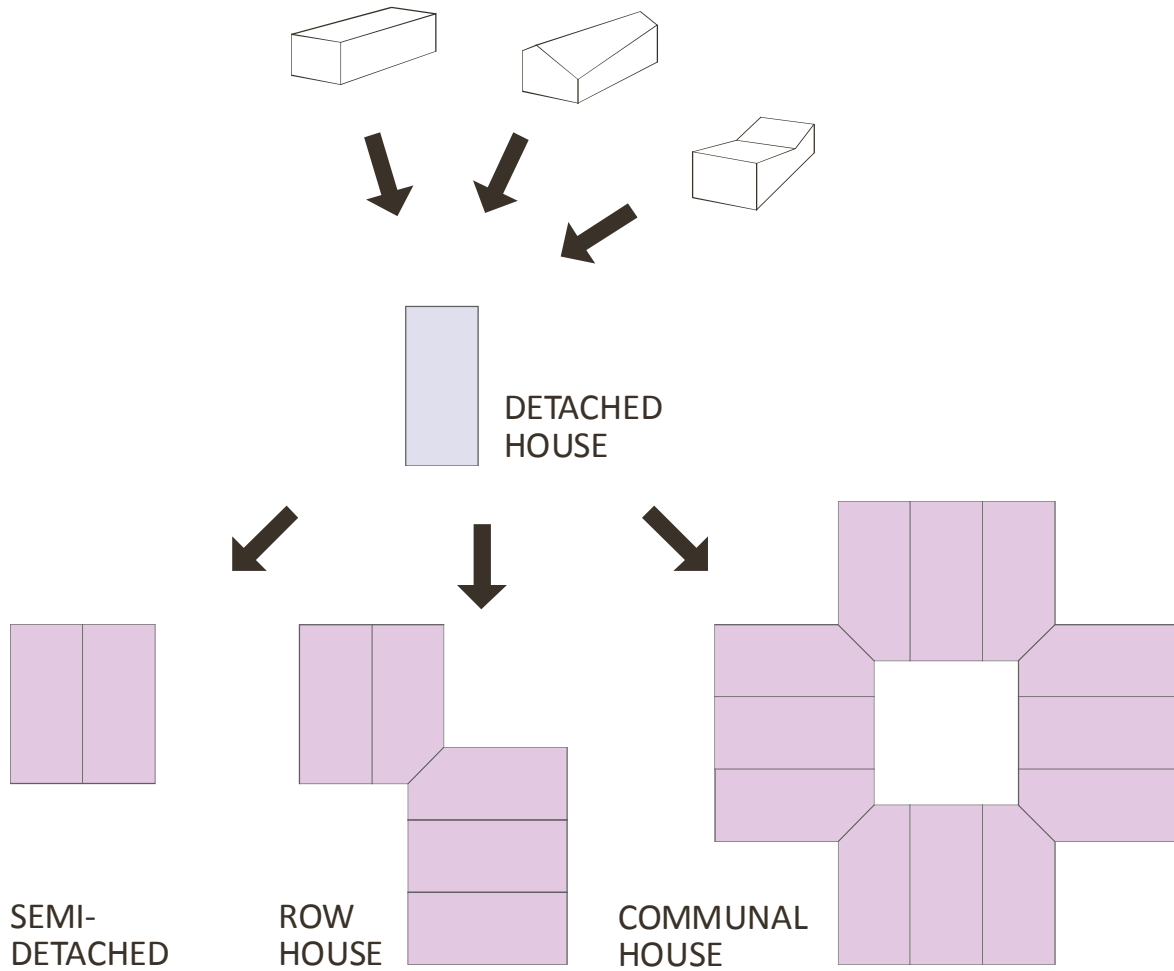
The surrounding environment is emphasised when mobility is restricted. The degree of accessibility of the residential area, distances to services as well as the transport arrangements define the opportunities of independent living. Taking care of their own everyday happenings at home and outside is very important because most elderly get their exercise through these chores (Verma 2008). Events, stimulation, chores and things to follow occur in a good environment (Kukkonen & Mirja 1986; Routio 1989; Özer-Kemppainen 2005). Such an environment is also appropriate for different kinds of groups of people (Åkerblom & Kahri 1988).

THE CONCEPT

Senior housing is changing, as housing on the whole has become a way for expressing and creating the own identity (Raappana & Tiitta 2008). Facilities and services need to focus and specialize on certain types of residents or habitants. Segmentation should be based on senior residents' needs, not only age.

When going through literature a vision of the senior house concept started to form. What was needed is a flexible concept that can be modified depending on the amount of habitants, their interest and the location of the building. A concept that takes into account all things seniors need in their everyday life.





The concept is based on one piece which can be connected differently depending on the desired area and housing type.

The detached house functions as a basic block.

Safety and comfort is emphasized in the homes of elderly. They start often to build up a “control center” in their homes, a spot where all the important things such as food, drugs, rest and small items are near (Keiski 1998).

The apartments have been designed according to this principle. In the one-bedroom apartment a bed can also be placed in the living room if needed.

HALL

Space for moving and sitting while dressing.

LIVING ROOM

Spending more and more time here taking naps, listening to radio, watching tv, using computer... Connections to the bathroom and kitchen are very important, not to forget the views outside.

KITCHEN

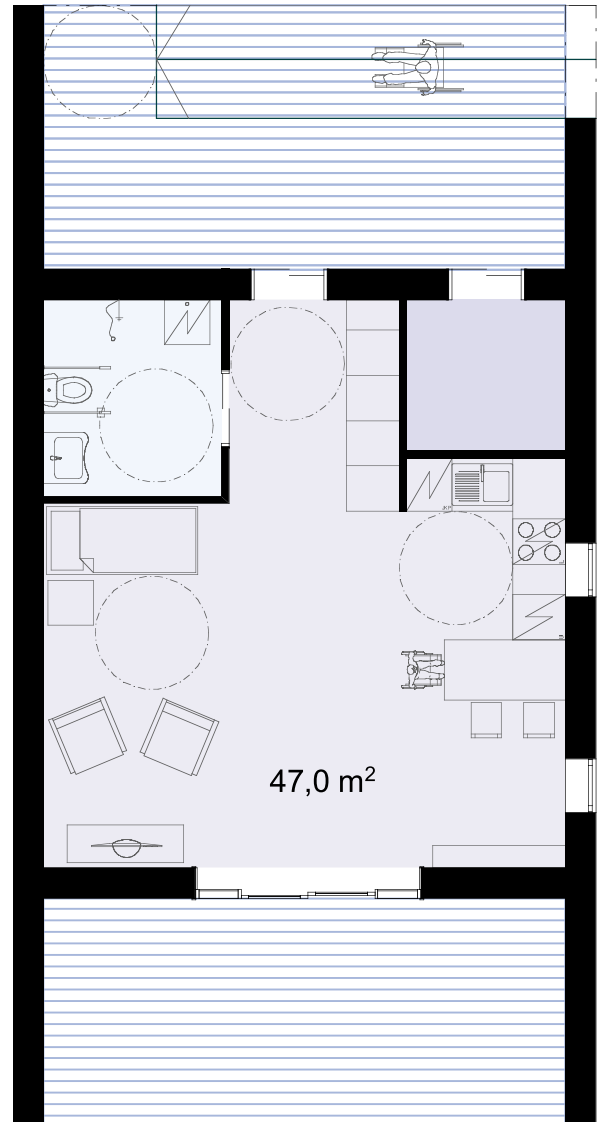
Accessibility supports independent living. It is easy to slide the plate from the kitchenette to the dinner table.

BALCONY

Fresh air and own garden increase liveliness.

BATHROOM

Good place for doing morning exercise. Supporting hand grips and accessibility planning make everyday life easier.



1:100

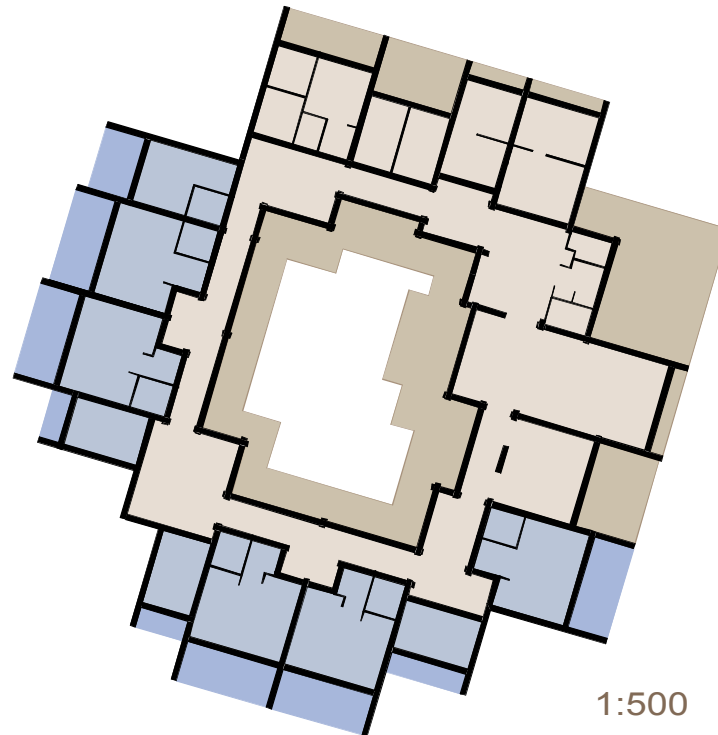
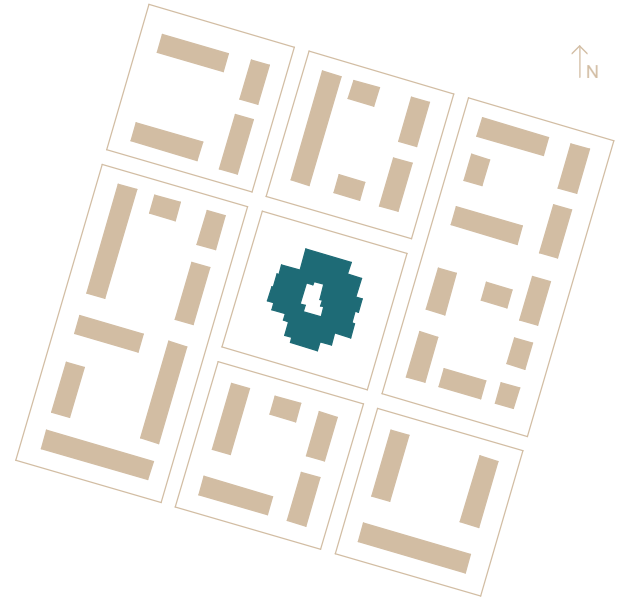


COMMUNAL HOUSE

1:4000

When combining the apartments, a model of communal housing can be created. In this model, the habitants have their own private apartments with balcony but also common areas and courtyard.

Because senior citizens spend a lot of time at home, plenty of time is also spent in common areas (Aalto et al 2010). Therefore common areas are located in both pass-through and peaceful spaces. The right-angled co-ordinates support navigation in the building.



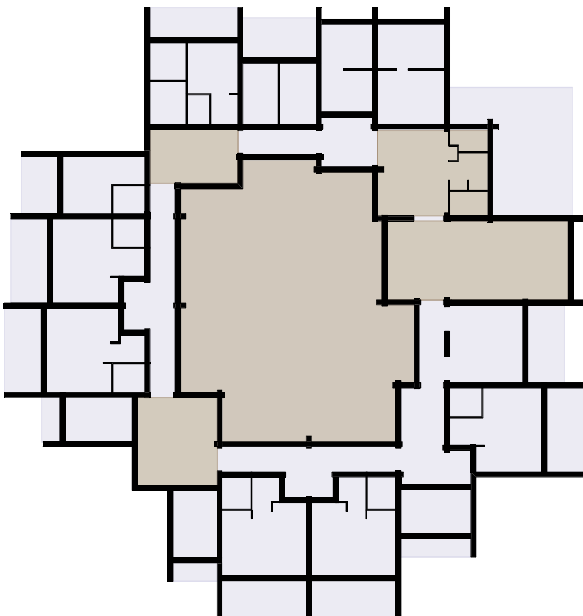
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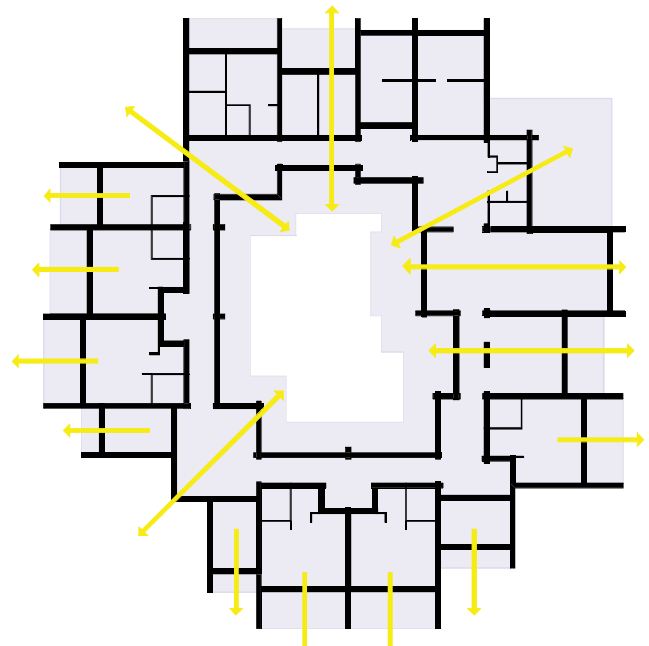
FUNCTIONS

Elderly feel refreshed when they are able to follow what is happening in their surroundings and that is why attention has been paid to the views and openness. They also prefer sitting in places where they can control the surroundings as wide as possible (Verma 2008).

MEETING POINTS

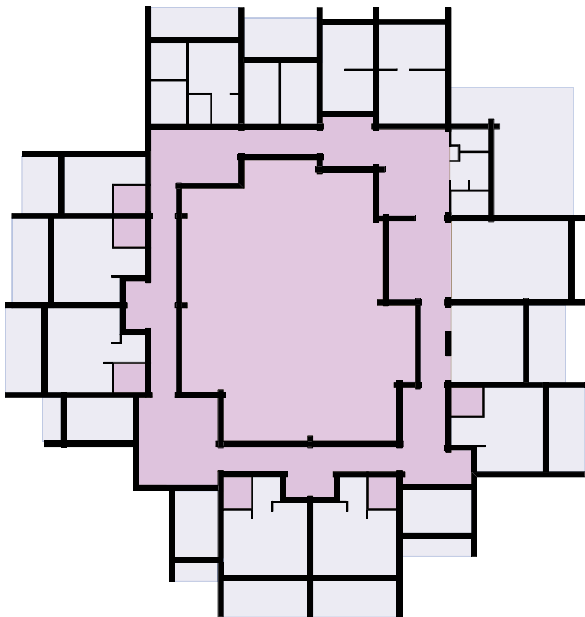


VIEWS

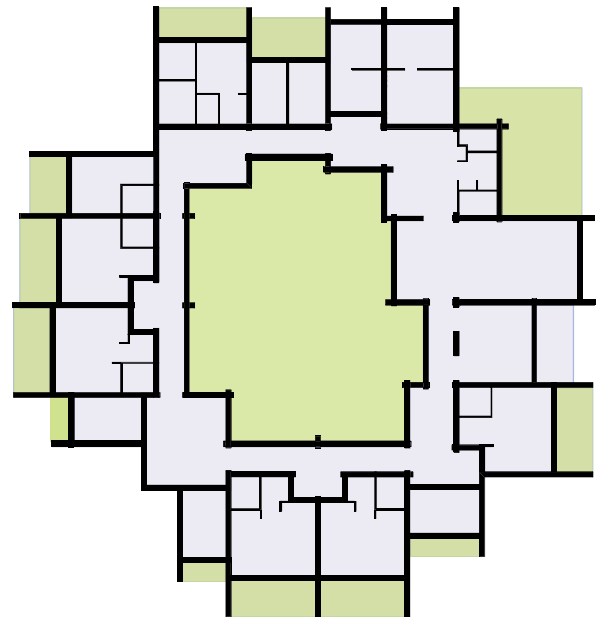


The courtyard enables exercise and stimulation. One can circle it both outside and inside the house and going to the courtyard has been made effortless. Stairs, walking paths and nature activate the inhabitants and the courtyard also enables people to meet each other.

EXERCISE



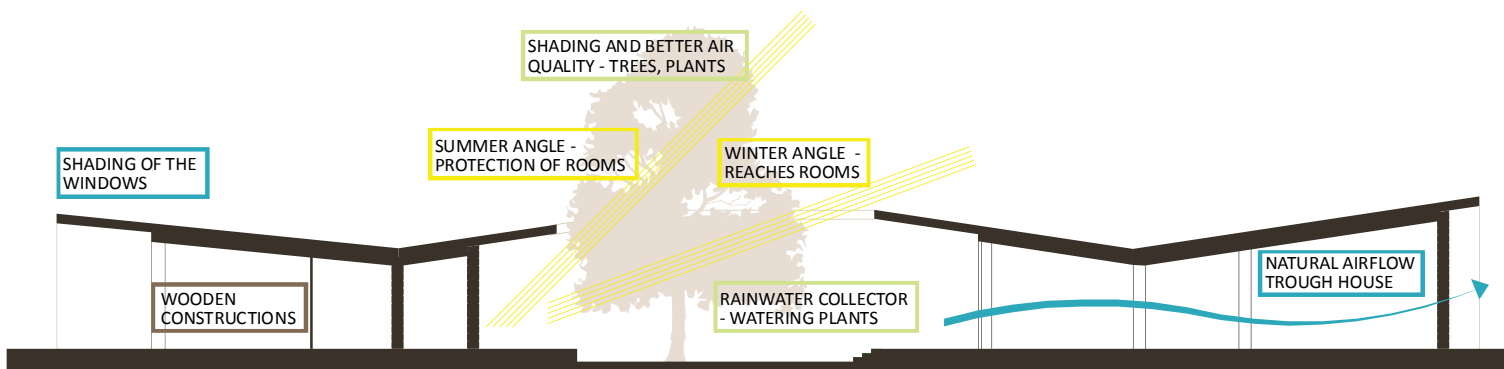
NATURE AND FRESH AIR





GARDEN

Planning rehabilitative environments is useful for special groups because they have positive influence on people with dementia for example (Översti 2013). The following things are important ... scents of the garden, colors, plants, walking paths, lighting, ... plants that create sounds when it is windy, protect against the wind, binds dust, ... garden for senses that bring back old memories.



FLOOR PLAN - COMMUNAL HOUSE

The architecture is based on functionality, home-like atmosphere and the idiom that log as a material creates.

The common areas can be remodelled depending on the interests of the habitants. Some might want a gym, others a sound-proof room for playing music. The plan can also be remodelled based on the needs of different cultures.

Sheltered courtyard in the middle, where it is easy and quick access from one's front door. The closed courtyard is also safe for demented.

The corridor circulating the yard can also be considered as a part of the yard. The corridor enables exercise in a park like environment even in bad weather.

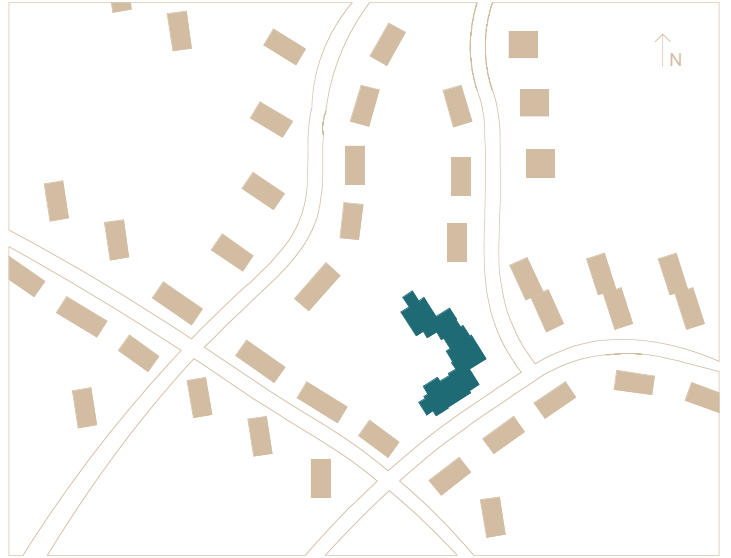
Spacious common areas provide good opportunities for monitoring the environment.



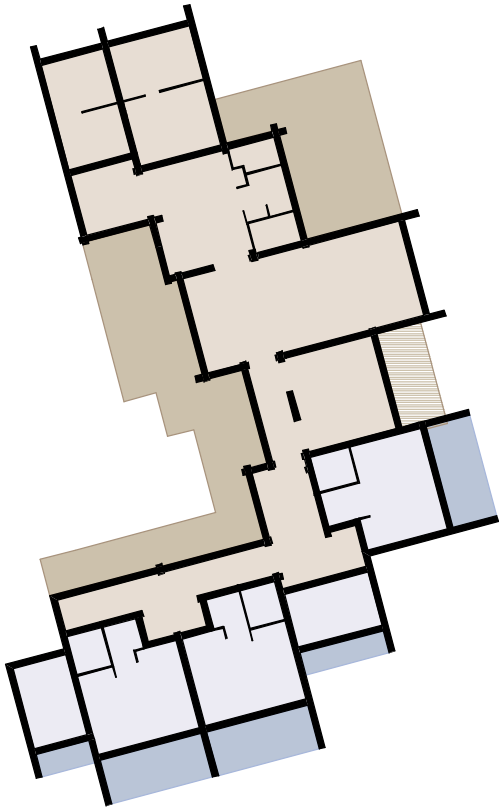


VARIATIONS

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The concept can also be used to compact the existing building stock and the layouts take shapes depending on the form of plots and cardinal points.



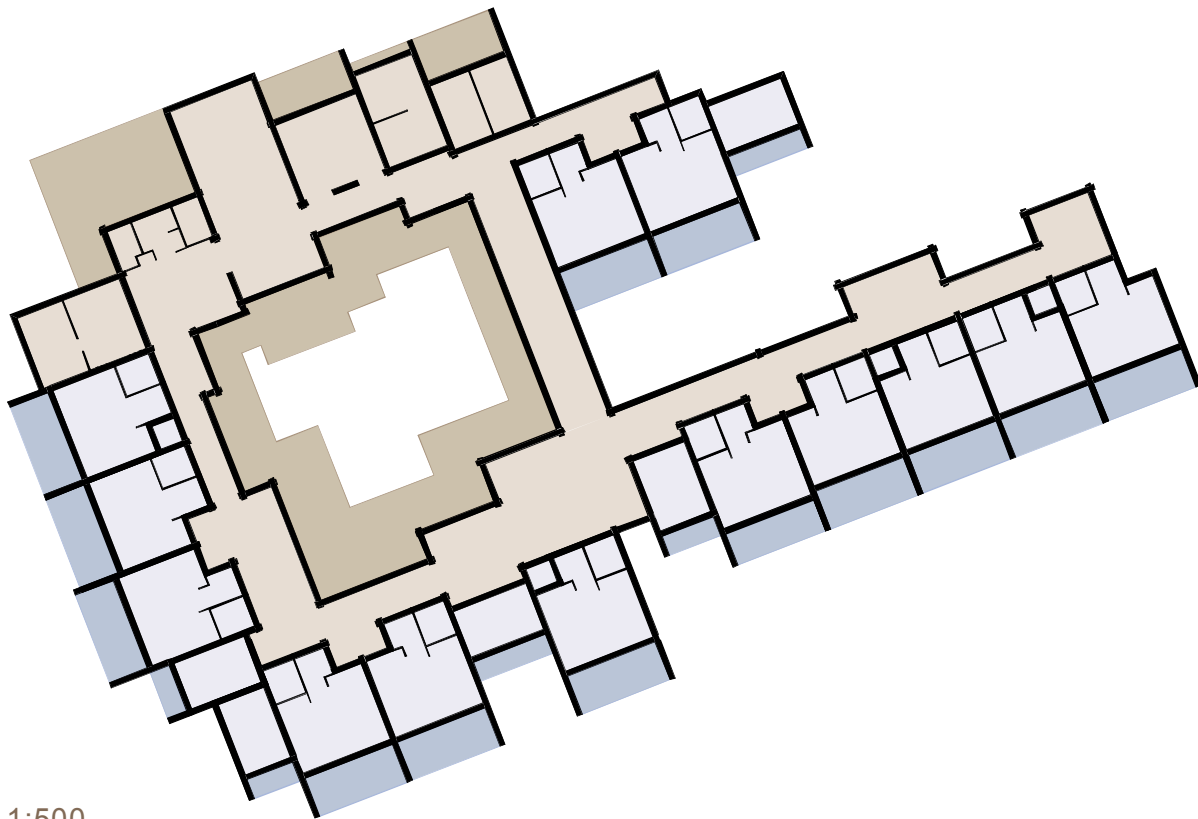
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VARIATIONS

1:4000



All the services are located in the central building but the inhabitants of the “satellite houses” are free to use them also.



1:500

VARIATIONS

1:4000



Even though the shapes of the buildings and plots vary, the main idea of common rooms as the heart of the building remains. Different shapes of the blocks can be used to adapt the building better to the surroundings.



1:500

VARIATIONS - CHINA

Chinese courtyard houses

Courtyard houses are the most prevalent residential mode of Chinese folk houses. For example, the quadrangle courtyard in Beijing is a compound formed by connecting houses on four sides. The courtyard is a square with a proportional size and a veranda is typically used to connect the houses. The outer walls are more closed to provide privacy (Qijun 2011). Traditionally several families can share the courtyard (Jiang 2014).

Traditional Chinese neighbourhoods historically accommodated a relatively diverse mix of residents of different levels of wealth and influence. The traditional courtyard typology itself was largely responsible for this, as it allowed dwellings of varying quality (Abramson 2001).

The concept in China

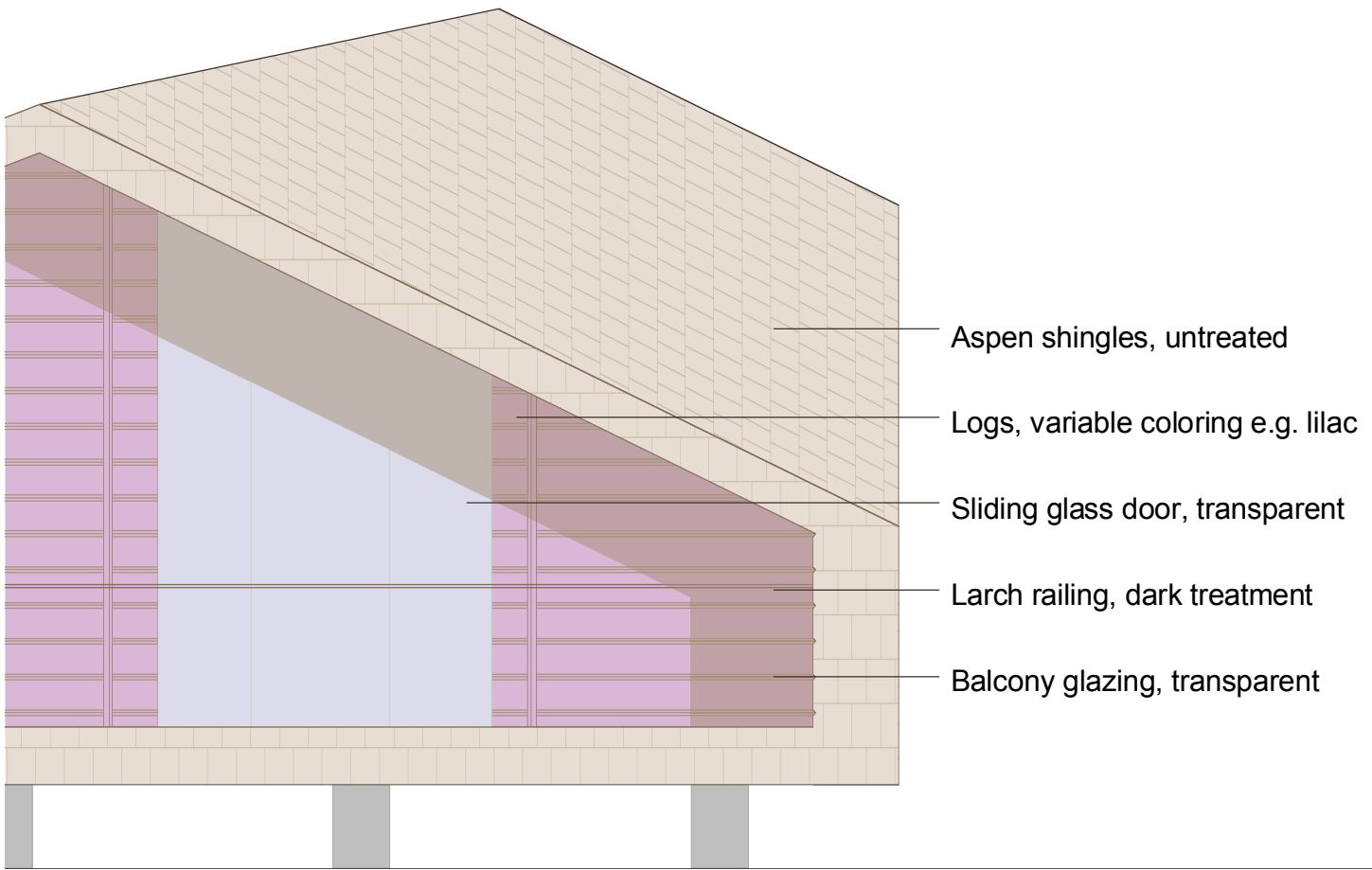
The basic concept fits well in the Chinese building tradition with the closed courtyards. Some minor changes must be done, though. In China the balcony area is included in the net floor area (Jiang 2014). Because this and the fact that the Chinese are not as used to balconies as Finnish people, the balconies are excluded. The garden remains, but with a Chinese design.

Chinese people have used fenshui methods for thousands of years to bring safety and well-being into their lives. Fenshui in architecture is often equal to using common sense. Clear access routes, as well as peaceful corners, taking into account colors and light do not differ much from the Finnish accessibility planning.

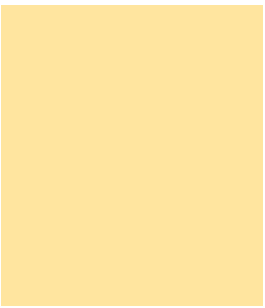
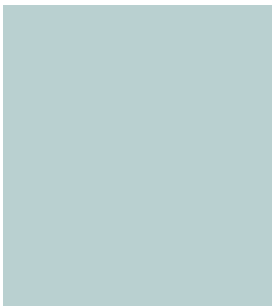
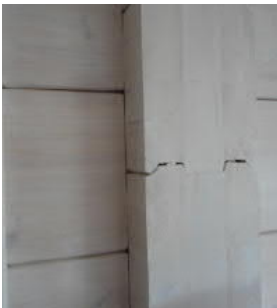
Photo: www.pixabay.com



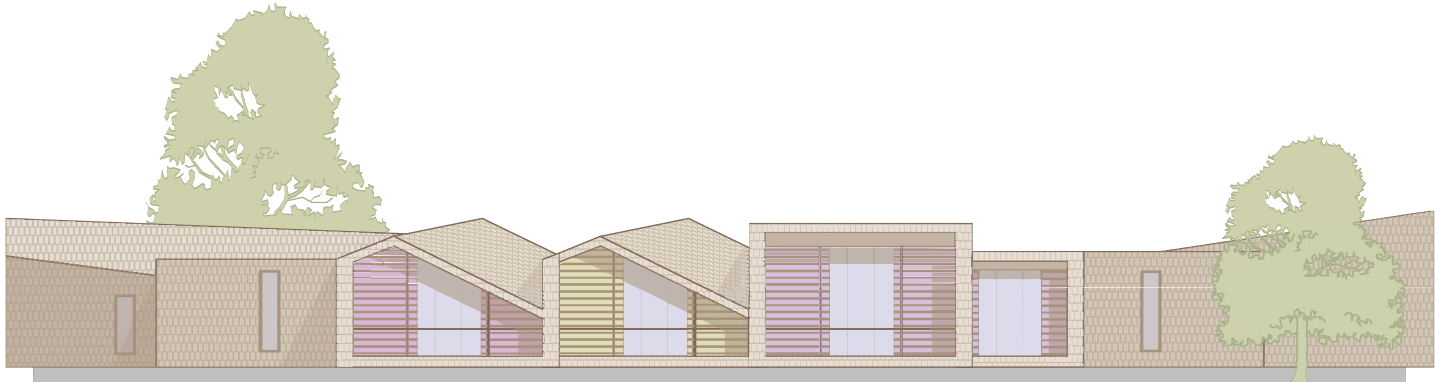
FACADE DETAIL 1:50



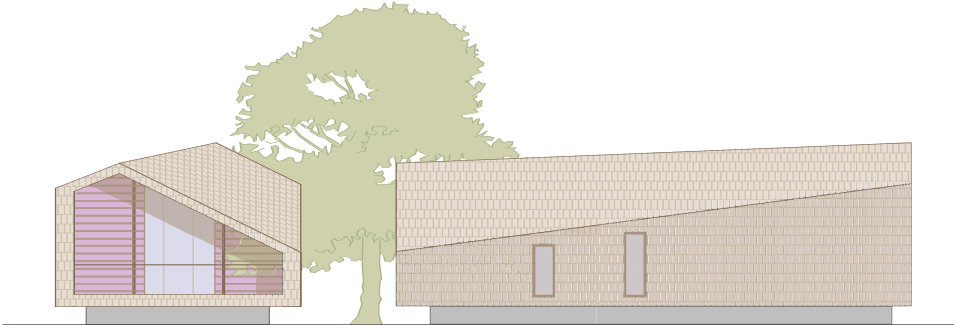
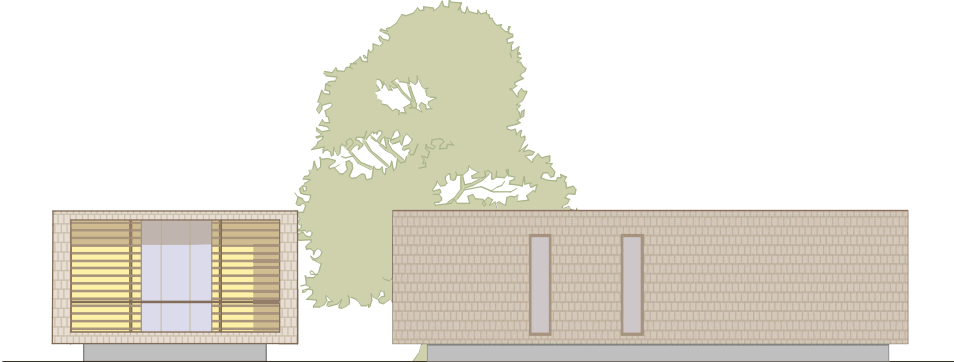
MATERIAL AND COLOR PALETTE



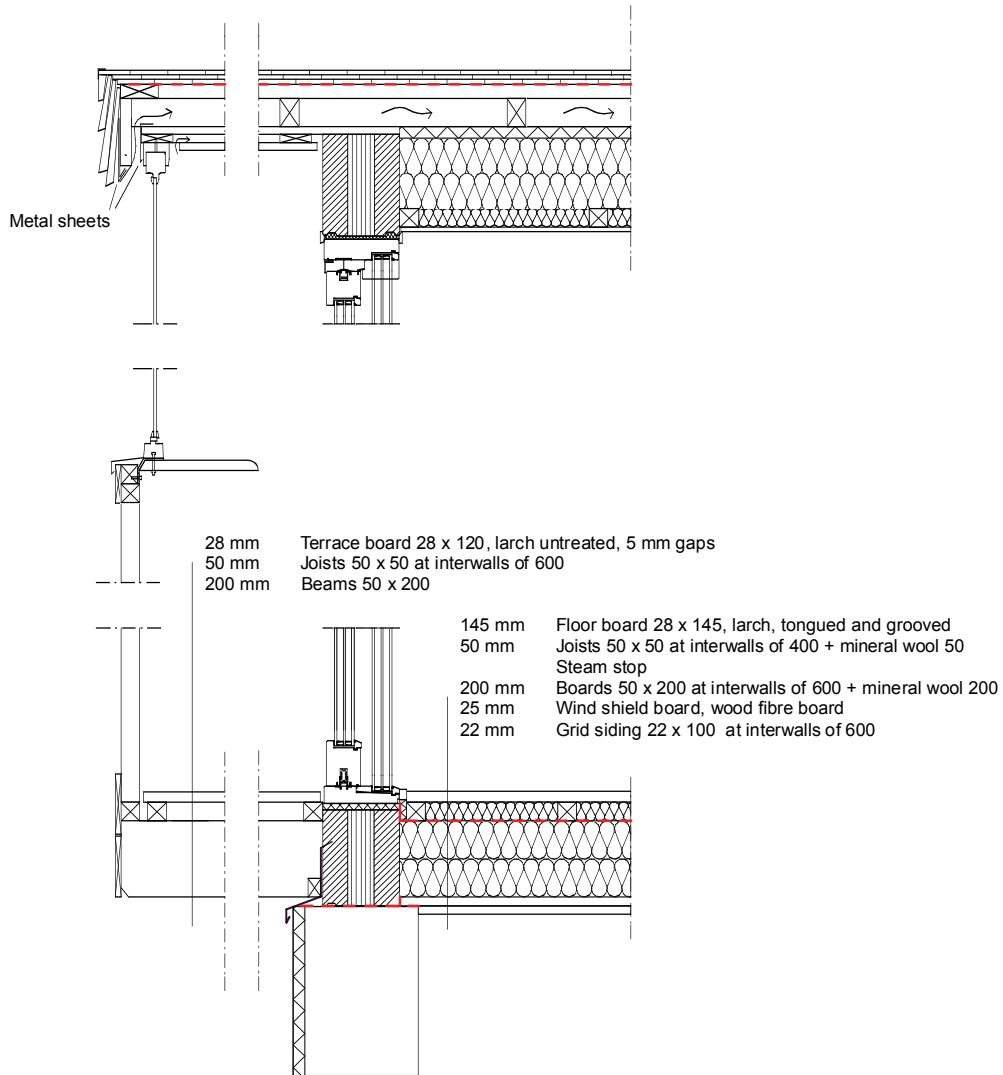
FACADE OF COMMUNAL HOUSE 1:275



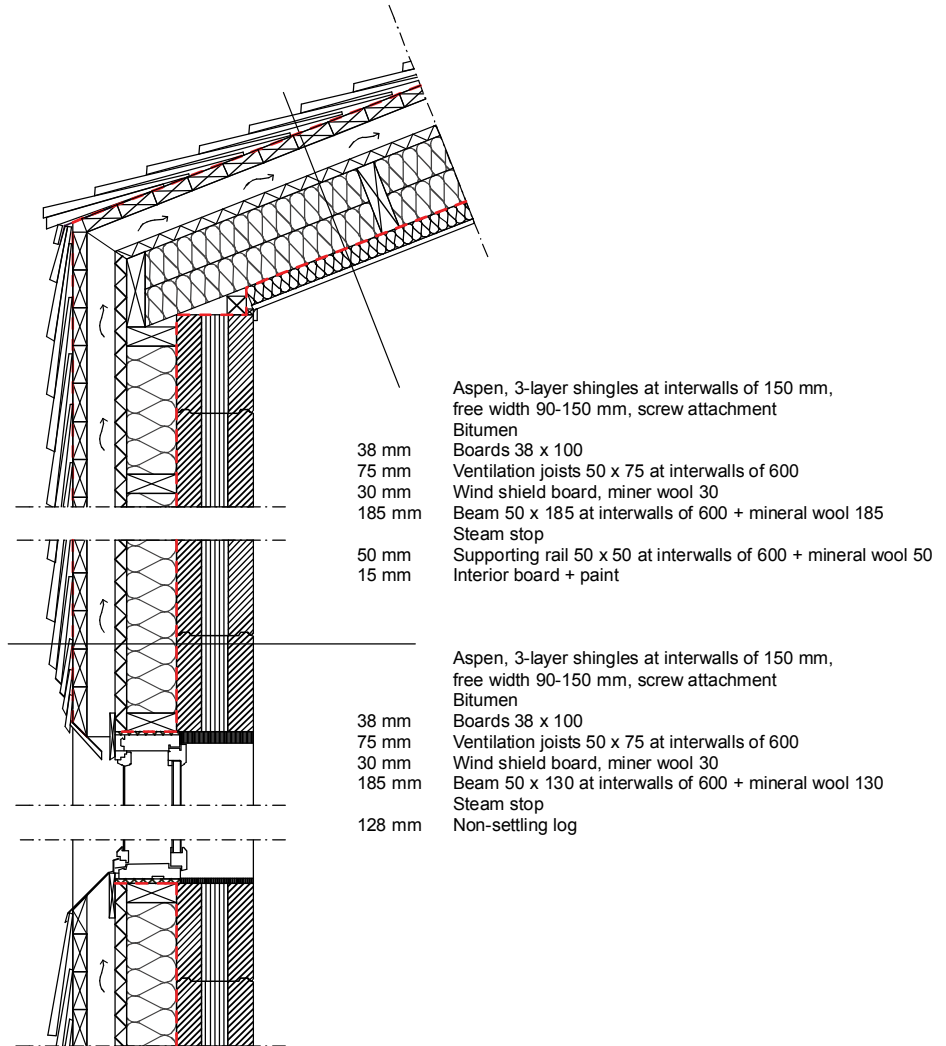
FACADES 1:250



VERTICAL SECTION, BALCONY 1:20



VERTICAL SECTION, WALL 1:20



EPILOGUE

The aim of this thesis was to develop a healthy living environment where senior citizens feel at home. Although housing has been observed only from the senior citizen point of view, this kind of concept could be applied to all forms of supported housing. Senior housing concepts develop all the time. A currently popular new idea is family care, where the elderly persons live as a “family” together and have their own nurse look after them. The concept presented in this thesis could also easily be adapted to this kind of housing.

In addition to that wood feels warm, natural and pleasant, living in a wooden house is a bit like living surrounded by nature. Using wood in buildings is always a small adventure beginning from the designing process, but so is living too. Wood is a honest material. It lives and ages like people do. I believe that is why log structures and seniors match so well.

Making this kind of interdisciplinary study has been both rewarding and educational but also challenging. It is sometimes very hard to put yourself in someone else's place, especially when the life of seniors differs from my own in many ways. Still I think we could all age peacefully when the ideas presented in these theses are taken into account. When I showed the ground plan to a senior aged friend of mine, he immediately told me where he would place his Pelargonium. I think it proves that this concept could work also in reality.

Finally, I want to thank my supervisor professor Jouni Koiso-Kanttila for all his valuable comments and support during this process, I have learned a great deal. This diploma thesis would also not be the same without discussions with Sara, thank you for them. I also want to thank my student friends and teachers who have taught me more and more during all these years. I would also like to thank Tanja Rytönen-Romppanen for collaboration with Honkarakenne. And thank you all that have commented or helped me with my thesis.

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