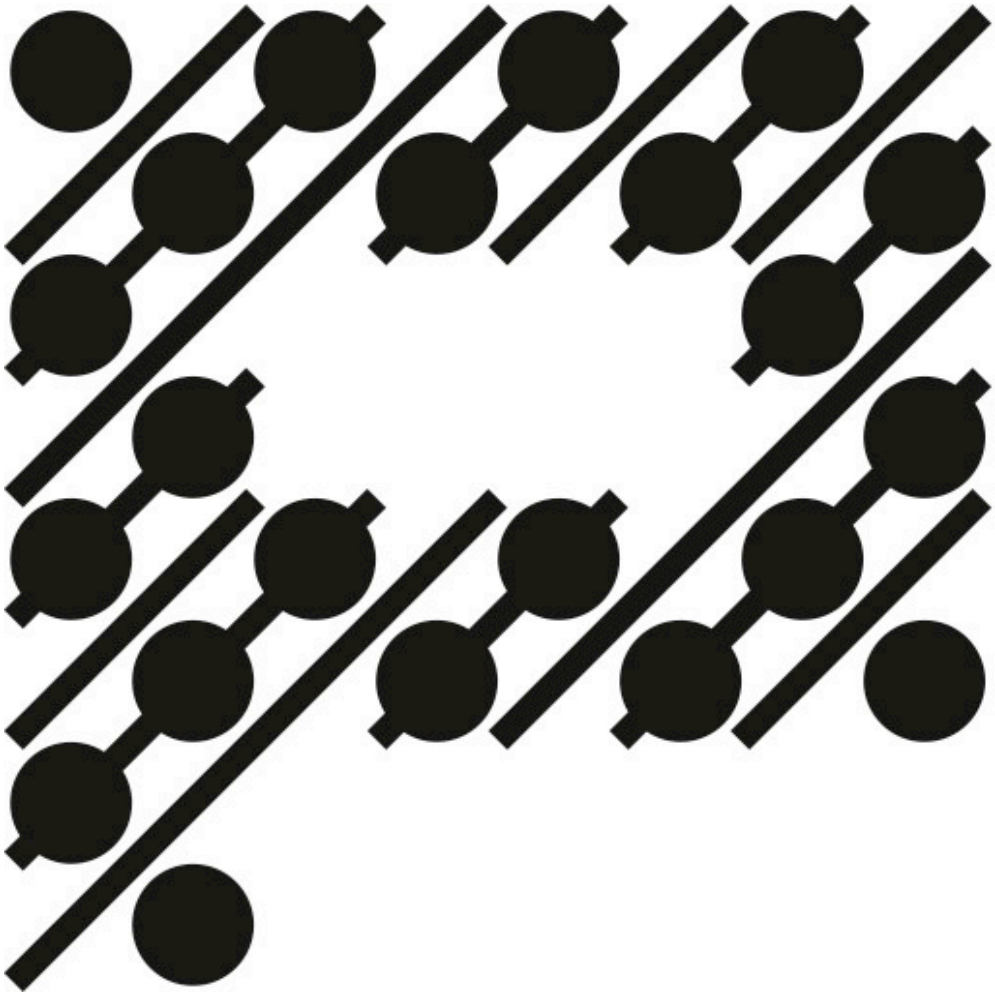

Elderly people health in a warmer Stockholm

GREEN BACKYARD NETWORK

Nr.1

Denna rapport är en översikt av arbetet med utmaningen på OpenLab, ”Äldre människors hälsa i ett varmare Stockholm”, som tillhandahölls av Länsstyrelsen i Stockholm. Ett varmare klimat i Stockholm ökar risken för mer återkommande värmeböljor. Äldre människor är mer sårbara och känsliga för värme vilket gör att det finns ett behov av att hitta lösningar för hur samhället kan hantera detta på ett bra sätt.

Rapporten förklarar de olika faserna i metoden Design Thinking, samt det arbete som teamet har gjort i varje fas. Design Thinking är en användarcentrerad metod där olika behov identifieras hos användaren. Med utgångspunkt i dessa utvecklas sedan lösningar som även testas. Den första delen av rapporten omfattar den första cykeln i Design Thinking där teamet tagit fram förslag på ett antal olika koncept: Green Backyard Network, Helping Green Hands och Automatic Warningssystem.

Den andra delen beskriver valet och vidareutvecklingen av konceptet Green Backyard Network som presenterades offentligt 2 juni 2016 på Openlab av Carina Jacob och Anna Hesselgren.

Vi vill varmt tacka Hanna Sundqvist, Länsstyrelsen Stockholm, för möjligheten till denna intressanta och viktiga utmaning samt för hjälpsamhet och goda råd under arbetet. Ett stort tack också till Susanne Ringström och Maria Udén Stockhaus på Openlab för värdefulla vägledande råd under kursens gång.

Vi vill också tacka alla äldre och vårdgivare för att vi har kunnat komma och ställa frågor samt även testa vårt koncept både på äldreboendet Väderkvarnen och Riddarsporren/Vasaträffen. Ett speciellt tack till Väderkvarnens enhetschef Anneli Lagerberg, de boende Roland Norrby, Margit Halldén, personalen Mats Lindholm, Stine, mfl.

Tack också till:
Anna Petterson, Institutionen för Botanik, ekologi och miljö, Stockholms Universitet
Gunnar Kempe och Susanne Ekman, Micasa
Mare Löhmus, Centrum för miljömedicin, KI
Lena Alksten, Äldreförvaltningen, Stockholm Stad
My Peensalu, Park-och Miljöförvaltningen, Stockholm Stad
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Jessica Ritzén, Dagens Nyheter
Arkdes, biblioteket

Carina Jacob och Anna Hesselgren, Stockholm i juni 2016

Content

1. Background

The global climate change is playing a major role in increasing the intensity, frequency and duration of heat waves. Climate calculations indicate that it will be warmer in the Stockholm county. (SMHI) With the densification of Stockholm a large number of temperature lowering green areas risk to disappear, leading to a stronger urban heat island effect (SvD, 2009). The densification also leads to more noise, air pollution, pollen and ozone close to people. In other words, densification in combination with increased temperature, is a risk to human health. (Boverket, 2010) In addition, there is a low awareness about the negative health effects heat can bring to the people. Therefore it is needed to understand the effects of heat waves on the elderly people, both in healthcare but also in urban planning.

1.1 Heat wave

To investigate what a heat wave is, we must first and foremost define it. The National Encyclopedia defines a heat wave as follows:

"Heat wave is a period of exceptionally warm weather" (ne.se, 2016)

The temperature degree that identifies a heatwave is different from one place to another. Hence, it is important to understand the nature of communities affected. For example, in Stockholm it is a period in summer when the mean temperature goes above 20 degrees for 3 days or more consecutive days. Oudin Åström et al (2013) research shows that the mortality due to heat waves in Stockholm has significantly increased in the past 30 years and 1,500 people died as a result from it.The mortality in Stockholm will increase by 10 % if temperature reaches 27 degrees and again increase 10 % if temperature reaches 30 degrees for 3 days (Oudin Åström, 2013).

The heat waves have affected various parts of Europe in 2003 with the temperatures reaching a record high. More than 70,000 people died and the main affected country was France with around 15,000 deaths in that period with temperatures reaching 40 degree. Towards the end of the century, the scenarios show that the average annual temperature can be as much as 3-5 ° C higher and heat waves will occur more frequently and are more prolonged. (SMHI, 2016)

The factors that contributes to the heat waves are global warming and the increase in population.The increase in the population results in a need to remove green areas to create more living spaces. The buildings in Stockholm are designed forthe ideal temperature of 11 degrees and to store heat in the cold climate. Without hardly any cooling evaporation in the night the buildings become very hot (SMHI, 2016). A growing population and urbanization might increase the chances of heat waves in Stockholm in the near future. And the fact that Stockholm is the fastest growing city in Europe, with an expected growth of 11 % until 2020 (Stockholm Chamber of Commerce, 2015) makes it even more urgent to understand and take precautions of the consequences of heat waves.

1.1.1 Affecting the elderly

Heat and heat waves are a threat to health of the vulnerable groups, particularly people over the age of 65. The temperature control in the body of the elderly is less effective than the body of young people. Sick and bedridden people have difficulties to recognize the body's signals and also do not have the opportunity to travel from the city to escape the high temperatures. The population of Stockholm County is projected to increase by 430,000 people in 2025 and the age structure of the population expected according to the forecast will change slightly during the period. More children and young people aged up to twenty years of age is assumed to come (Mossberg Sonnek et al, 2015, p.23). Forty baby boom generation reaches seventies and making the number of elderly is expected to increase considerably, eg as forecasted, the expected increase of the group over 65 of age is estimated to 23%(about 30.000 individuals) until

2025 (Stockholm stad, 2015).

There are a number of important social functions in the sector of health and elderly care. In the summary, the main impact of heat waves in this sector is the increasing need to take care of people who fall ill or die from the heat. It can mean as an increase in the inflow of patients to health centers and hospitals, but also a need for extra efforts in areas such as municipal home care and elderly homes. Even health professionals can be negatively affected in a heat wave, which may affect their judgment and perception. Solutions often include additional cooling of rooms, which can be accomplished in several different ways. The solutions also often require more staffing as well as interaction between municipalities and county councils (Ibid, p.23).

The average temperature when mortality is the lowest vary between different geographical regions. In Sweden it is between 12 and 14 ° C. Every degree increase above the optimal temperature increases the relative risk of deaths by more than one percent. Studies show that persistent high temperatures increases mortality more per day as the heat continues. Air pollution in combination with the heat wave increases health risks because, high humidity combines with the heat and hence, the evaporation and cooling effect of the body is reduced. If the nights are cool the body has the chance to recover (Ibid, p.23).

The main risk groups in the heat wave are the elderly and those suffering from cardiovascular diseases, lung diseases, kidney dysfunction, mental illness and diabetes.Taking certain medications such as diuretics also increases vulnerability. The greatest increased risk of dying of heat are people with lung diseases, and that is irrespective of age (Ibid, p.23).

Older people suffer greatly because of the physiological changes of the aging that occurs, that affect the temperature regulation and fluid imbalance. During heat waves more deaths occur than normal relatively quickly, often before the patient seeks treatment or go to a hospital. When the heat wave occurs is important for mortality, as it will be lower if the heat wave occurs in late summer compared with the beginning. Since the municipalities today often do not have air conditioning in their nursing and care homes, the indoor temperature can quickly become unhealthy and cause illness (Ibid, p.23).

In the heat wave in Europe in 2007 fewer older people died in the city neighborhoods with many trees than in those areas of the cities with fewer trees. This was because the elderly could seek shady cooler places outdoors with trees close to home, while in the areas with fewer trees, they remained in their warm apartments with fatal consequences. (Boverket, 2010, p.30) The vegetation also reduces the need for cooling devices by providing shade for buildings, and this helps society's efforts to improve energy efficiency. A study finds that the use of electricity could be 11.4 percent lower if a house has 17.5 percent of shadowing greenery. The study was made on buildings without shadowing trees. (Ibid,p. 28) This shows that to get a cooler indoor climate in a longer perspective one has to plant trees outside large windows. Trees are particularly effective to regulate the climate and a large tree has a evaporation of about 400 liters per day. (Ibid,p. 29)

1.2 Challenge

The challenge is given by Stockholm County Administrative Board/Länsstyrelsen in Stockholm which is working continuously on an action plan for climate adaptation for the Stockholm region (Länsstyrelsen, 2014). The challenge givers want the team to develop solutions for elderly people to live happily and feel good in a neighborhood with an expected warmer climate and increased risk of heat waves in future. We seek answers to two different questions: how to get a solution to the heat issue in the urban planning of the city and how to make life easier for an individual when a heat wave occurs.

How can the various stakeholders in society, such as health care providers, municipalities, county councils, property owners and individuals themselves increase their preparedness for periods of heat waves in the future? How can the City of Stockholm's elderly care be developed to help older people to cope up better with a heat wave? How to modify the existing built environment, both internally and externally, with innovative cooling systems?

2. Design thinking process

The aim of the first part was to understand the user and who the user is. Through the phases Empathize, Define, Ideate, Prototype and Testing will the following questions be answered:

Who are we solving for? What are their needs? How do we satisfy the user needs? Showing is better than telling. Why does our work matter?

2.1 Empathize

The process of design thinking starts with understanding the people or the users, for whom we are designing in order to find the best possible solutions. One of the methods our group adopted for the empathize phase was researching about the topic of heat waves. From the research study we came to know about what heat waves are and places around the world where heat wave have struck before. The research showed us that the heat waves have affected various parts of Europe in 2003 with the temperatures reaching a record high. We analysed how these countries coped to the heat wave and the steps they took during and after the period of heat waves. Simultaneously, we started to interview elderly in order to know more about their needs. As the users for our challenge were the elderly people living in Stockholm, we decided to interview them to get a clue to understand how they live in the summer and deal with the hottest periods. We met at several occasions elderly at the meeting point Vasaträffen in an elderly care home at Odenplan. A focus group was held with 3 caregivers at the elderly care home Väderkvarnen. Analysis of the results of the interviews were conducted by creating an empathy map.

2.1.1 Green area

In the present public discussions in Sweden there is a daily ongoing debate about the huge lack of housing and how it's necessary to densify the built environment but there is almost no discussion that this will occur at the cost of diminished green areas. More hard surfaces in the city will also create problems when the heat waves occur. Amanda Burden (2014) says in her Ted Talk on New York City "How public spaces makes cities work" on how public environments generally are designed without green social space. She points at that they have "that stylish Spartan look that we often associate with modern architecture. There's nothing to water, nothing to maintain, and no undesirable people to worry about".

The importance of how to design the urban environments is crucial not to make it boring or uncomfortable (Jacob, 2015).The research by Tara Zupancic (2015) in "The impact of green space on heat and air pollution in urban communities: A meta-narrative systematic review" shows that the reintroduction of green areas into cities reduces the urban heat island effect. In warm temperate dry summer climates air temperatures in parks are 2 degrees cooler and up to 3 degrees cooler at peak summer temperature with surface temperatures from 6 to 8 degrees cooler. Cities are cooler and quieter through shading, evaporative transpiration, and the absorption of sound by green walls. Green space can help to reduce heat and combat air pollution in urban setting (Zupancic, 2015, p.17).

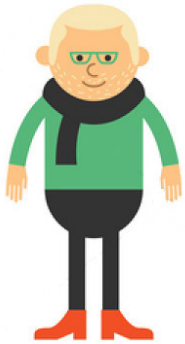
2.2 Define

In the previous phase "Empathize", the team understood how the users see a heat wave and their living conditions in the summer. In the empathy map based on the interviews, insights of the users' needs were identified. Then the elderly were categorized into two groups: Those who are living on their own with none or some assistance, and the ones who are living in an elderly care home and receiving some or more daily help from

caregivers. The insights of the both identified groups were that the needs during hot summer periods are to be safe, socialize and stay outdoors in a cool, green shady place near their homes. From these insights of the needs of the users four personas were developed:

Living home, no help
Lily is 85 and lives on her own with her cat. She has problem with a little bit of back pain. She likes cooking, but not drink as much water anymore. Likes to go to the park and sit there on a bench, or meet up with her friend John 87, or to go shopping. She goes to the gym and like swimming.

Living home, some assistance
Tomas is 75 and lives with his partner. He needs help with preparing his food and the cleaning home. He needs this assistance due to pain in the body. He likes to go for short walks, and he and his wife often go to the park together with their dog. He also likes to go to the elderly home for a coffee and talk to friends. He takes some medication for diabetes and blood pressure.



Elderly home, little assistance
Sara is 85 and lives with her partner. She likes to go for long walks and to meet up with friends. She also likes to go to the park and sit there and observe people. Every morning she has her fika. She is tired of cooking and therefore likes to eat at the elderly home (lunch). Every tuesday afternoon she plays bridge at the elderly home.

Elderly home, full assistance
Ingvar is 80 years old and most of time he lies in bed. He is a widower since 4 years back. He has Parkinson (chronic disease), and because of that he needs help to go to the bathroom and with preparing food. The caregivers are very important for him. As he spends a lot of time in bed the ventilation is important for him.

Then the most extreme users,the one most in need and the one with least need of assistance, were chosen as Point-of-Views for the preparation for the next phase in Design Thinking : Ideate. The two Point-of-Views developed were:

Ingvar, 80 years old, lives in an elderly home and needs assistance for his everyday life in order to feel safe and secure as he has several chronic diseases.

Lily, 75 years old and lives on her own, has back pain and needs space for social and active daily life.

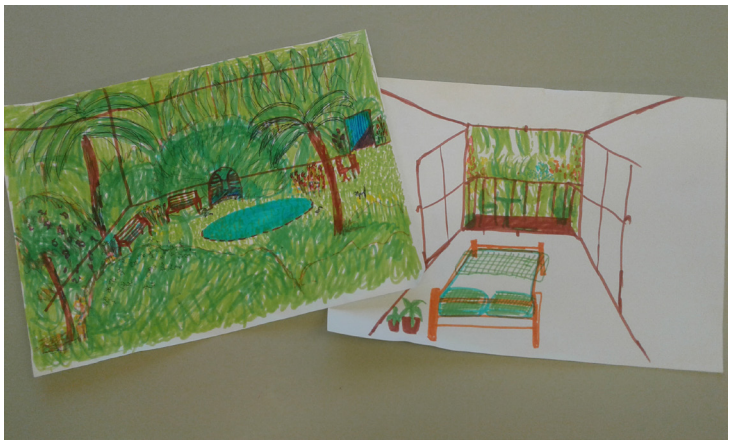
2.3 Ideate

After formulating the definition of the challenge, ideation was done after analysing the needs of POV's developed. The major needs identified were; a green space for the elderly for social interaction, providing them a life to be safe and secure, and a platform for an active daily life. Everyone in the team were given individual time for brainstorming ideas and generating maximum number of ideas to meet the requirements of the personas developed. All our ideas were grouped and clustered. Selection was carried out by giving each person the chance to vote for the ideas which he/she felt for. The ideas that did not receive any votes were discharged.
Then we tried to condensate the ideas that got 3 or more votes. We finally came up with three ideas which we wanted to prototype:

1.The warning and awareness, in what way should the information be spread?
2. Green areas / backyard / balcony / pool
3. The organizations, socialising and help with things like watering plants (no health care tasks).

2.4 Prototype

The aim of prototyping the ideas is to create something visual. By visualising the idea it can be easier to discuss and talk about it and ensure that both parties understand the idea on hand . In the first part of the challenge we chose to draw our ideas and build small models in 3D. At this point we had three ideas that we prototyped on cardboards. We prototyped a drawing of a green jungle-like backyard and balcony, one for the organization of youngsters to help the elderly and in cardboard devices for alarm like a radio, an sms alarm device, an alarm loudspeaker to put above the door.



Prototyping

2.5 Test

The aim of the testing phase is to verify the concepts and ideas with the user, to ensure they are fulfilling their need/needs. We first went to an elderly home where we showed and explained all the three prototyped concepts.

One insight from testing was that awareness of heat waves was lacking, hence there is a need to establish that. People tend to think that an alarm system was exaggeration and that heat waves were not a real problem. Some people whom we interviewed, rather emphasized that they love the summer and warm weather.

Another insight was the need for a cooler environment with shade and greenery and that it should be closeby to where they live. We described the situation with storytelling, placing the elderly in a scenario of extreme summer heat. Some in the elderly home said that they often suffered from heat and seeked a cooler place. They would also appreciate to be checked by the staff. Having extra people, like the association taking care of the plants and backyards, keeping an extra eye on them in case of sudden illness, they all liked. Many also enjoy spending time in their backyards during summertime, watching others or socializing. Some said they enjoy sitting on their balconies looking down at a beautiful green backyard with flowers, trees and people.

However, we felt that was not enough testing so after the concept delivery we went out to for a second test run. This was done to gain more information before making a SWOT analysis as a tool for choosing concept. We divided the group and half went to the elderly home again and the other half went and talked to middle aged and elderly people on the street to gain more knowledge.

However, while talking to the elderly in various stages of testing, there was a lack of experience, knowledge and awareness about summer heat waves. The elderly's focus was on how they love the summer and appreciated to be able to go out and enjoy it. This indicates that there were two insights of needs that were important, one to create awareness, and the other was to create a safe and cooler nearby environment where elderly can socialize during warm summers.

Testing situation at Väderkvarnen

3. Conceptual ideas

The aim of the halfway was to understand the importance of how the concepts satisfy the user needs. Some other concepts were also discussed but these ideas were never further developed in the halfway process. A SWOT analysis with a voting system was applied to find an understanding of the different concepts.

3.1 Green Backyard Network

The need of having a cooler space with natural shadow where the elderly can socialize placed not far from the elderly home made us come up with the concept of an eco-urban network that consists of many self-managed backyards where people create a jungle-like garden of their backyards (both in elderly homes and ordinary housings) and maintain them during the summer months. There will be a lot of plants, fruits and flowers. The walls will be covered with green panels and waterfalls.There will be movable chairs, benches and tables. A “green igloo” placed in the backyard will provide a cooler place for sitting. A mud pot with sand in the middle of the igloo with water. The backyards will be opened daytime for anyone in the city to visit.

3.2 Helping Green Hands

The need of having people taking care of the backyards and checking on the elderly. It can be for young people working in the summer.

It is an association of people from different backgrounds with an aim to socialize with the elderly and helping them to take care of green spaces indoor and outdoor. This could be organized so some are volunteers and some are paid. The volunteers will not handle any medical tasks, instead they would be a company to the elderly while maintaining the vegetation.

In a case of a heatwave, the association will provide various tips and assist the elderly, such as checking on them and urge them to drink water and how to deal with the heatwave.

3.3 Automatic Warning System

The concept of “Automatic Warning System” is divided into two main needs: First, the need to have a warning system that can reach the end user effectively and smoothly. SMHI has a system in place that issue different kind of weather warnings to different cities. SMHI sends the warnings through SOS which sends it to MSB or to Tibs in County Administrative Board. Then depending on that, they will act according to that information manually.

At the time the system is not fully working, and the information about the heat is not going through to the health care due to not fully electronic. By automating the process and make it work in real-time with a two-way feedback confirmation it would be more efficient. The human involvement will be only for monitoring. This will guarantee that information will reach the intended users (the elderly) in real-time.

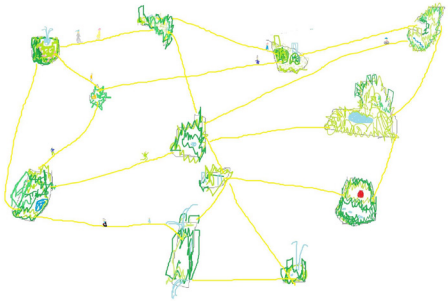
To guarantee this will work, we need to categorize elderly according to health conditions. There will be different approaches to different needs. The communication will be conducted through various devices: TV, Radio, SMS, phone call, local emergency speakers.

3.4 Other concepts

There were other ideas that the team formulated in the ideation phase that did not get qualified for the final rounds of concept delivery. We decided to investigate and try to see the possibilities of using these ideas if possible. We could not develop these four ideas com-


ALARM


ALARM



pletely but shared them with the challenge givers. Some of these ideas were :

- Methods to improve ventilation.
- Interactive clothes like sunvest, sun hat and sun slippers that can read the body temperature and then the material adapts to the climate and cools.
- Evacuation plans during a heat waves by using existing war shelters.
- Use of refractive building materials which refracts back sun radiation and keep cool inside building.

3.5 Selection

The Strength Weaknesses Opportunities and Threats (SWOT) analysis method was used in the concept selection phase, that was done to gain a deeper and objective understanding of each concept before voting. This was initially done individually and then put together in the group. In addition to that, before voting, we conducted a Failure Mode Effective Analysis (FMEA) to identify the different risks within the different concepts. FMEA is more detailed on a need level in finding ”severity of risks” while SWOT is more general. The information gained was then added to the SWOT as these data were identified as either weaknesses or threats. Once our SWOT board was prepared we voted. Everyone in the team had six votes each. Each vote to be used on the most important bullet points in the SWOT board. In order to eliminate any bias towards one of the concepts, we hid the titles of each group of concepts , e.g. the voting was only based on what we defined as important without linked to the concept. The voting result was very close for both the two concepts Green Backyard Network and Automatic Warning System. From here on we decided to continue developing both the concepts in two subgroups.

Part 2

This second part describes the development of the concept Green Backyard Network conducted by Carina Jacob (Civil Engineer in Architecture and Urban Planning) och Anna Hesselgren, (Visual artist, researcher).

4. Design thinking process

To satisfy the users needs the concepts Green Backyard Network and Helping Green Hands were chosen to be developed further. The aim of the first part was to understand the user and who the user is. Through this second cycle of the phases of the Design Thinking method Empathize, Define, Ideate, Prototype and Testing the following questions will be answered again to refine and develop further the now chosen concept . We saw how the concepts could be connected and chose to call the whole concept Green Backyard Network.

Who are we solving for? What are their needs? How do we satisfy the user needs? Showing is better than telling. Why does our work matter?

4.1 Empathize

We have in this second phase of Design Thinking continued with more interviews and also deepened our text research to make the concept Green Backyard Network stronger and identify possible threats.

Our main target group in this challenge is the end users the elderly but in order to further understand the needs of the context of elderly when creating the concept other stakeholders in society, responsible for the space in which the elderly live during summer heat, have to be identified.

Literature research

There is a lack of knowledge in society of the crucial significance of urban green areas for the urban heat system and rainwater system. The hard surfaces increase the water runoffs and cause floods (Wingren et al, 2015, p.115) whereas greenery absorbs the water and prevents floods. Wingren points on that In England the regulation is very strong against permitting hard made surfaces and means that this needs to be considered in Sweden too (Ibid,p. 147).

In the densification trend of today's development of sustainable cities greenery diminishes and people grow in numbers. However, could there be a new way of defining densification and sustainable urban development so that is not only about buildings but rather about people, activities, sound, smells, experiences and use of green areas? (Ibid, p.18). GYF (Green Area Factor) defines the demand on the microclimate, living environment, vegetation, water supplies and is used in Västra Hamnen in Malmö and Norra Djurgårdstan in Stockholm.(Ibid, p. 61-63) Green areas closer than 50m are stress reducing and green islands contributes to the mental health proven in research studies by Adevi in 2007-2014 (Ibid, p.71).

Wingren holds that there is a need to develop strategies for how models for describing how the greenery should be integrated where the citizen's experiences are integrated in the planning processes along with the care for the greenery that otherwise would lose its positive value. The green areas weave the city together like a morphological construction perceived like a whole when you move in it (Ibid, p.72).

Barcelona network of social urban farming

In Barcelona City similar ideas to the Green Backyard Network concept, about social urban green structures and elderly, has been implemented since two decades as a network of urban gardens in a participation programme of organic urban farming for citizens 65+. Part of this is also a coexistence between generations in teaching schoolchildren about urban farming. (Barcelona, 2016)

The red-blue-green structures in the urban setting

To fully benefit of the urban ecosystem services the green and blue structures must be intertwined more in the urban landscape today but Gustafsson means that also another color structure has to be added, the activity based red. It is in the mix of colors that makes enriched

interactivity zones occur between human beings in the city and the urban nature. The RGB(red-blue-green) agents constitute a multifunctional surface program and performative form elements which create the cluster of different kind of lives in urban environments (Gustafsson, 2015, p.33).

Vectors and allergies - threats to be aware of
In order to understand why greener backyards haven't been implemented more already we searched and found a research on vectors as a possible threat to making green areas. In the article "Making green infrastructure healthier infrastructure" the researchers Mare Löhmus at Karolinska Institutet/Department of Environmental Medicine, Stockholm points at the importance to consider that rats and ticks as vectors of serious diseases is a problem when cities want to build more green space. Awareness of these pests must be taken when increasing biodiversity so that no serious health problems arise. It is possible and desirable to increase the greenery but knowledge of these issues must be included in the design of green areas in order to reach the full potential of the greenery as a health promoter. Concerning pollen allergies that may increase they consider finding plants that are pollinated by insects and not by the wind (Löhmus and Balbus, 2015).

Interviews
We interviewed Anna Pettersson, head gardener at The Department of Ecology, Environment and Plant Sciences /Stockholms University who didn't see any problem with creating green backyards. Planting trees and other vegetation is possible with the existing planting techniques - what is needed is just a root protection and soil of 50 cm for trees. She doesn't think rats in the city can be avoided by having backyards without greenery. Responsible property owners work constantly on this issue. But not having cafes and fruit trees is the best way to prevent rats, designing the backyard as an unpleasant space for them to thrive. Björn Embrén at Traffic Office/ Stockholm Stad, expert on trees, says they use makadam combined with layers of biocarbon to stop rats from digging themselves through. And concerning pollen allergies they avoid the most known plants to trigger allergies but for tics they take no measures.

The property owner's lack of knowledge of the technical possibilities for vegetation in backyards and the opinion on the cost of implementation and maintenance seem to be the major reasons why so few backyards are made


Anna Pettersson

greener in Stockholm. As both Gunnar Kempe, manager at Micasa elderly homes and My Pensaluu Park and Environmental Department/ Stockholm Stad say there are no general municipal guidelines for making the cities greener, only recommendations in the comprehensive plan. It is entirely up to the property owner to decide whether to make greener yards or not.

The City's Park department's task is only to maintain and strengthen the existing ecosystems in the public green spaces, not to create new ones and within that work on climate adaptation.They hire subcontractors to do the maintenance and also convey summer jobs for youngsters for shorter periods and minor tasks to these private companies.

Gunnar Kempe thinks however that it would be important to implement more natural shadow from trees and that it should be included and made mandatory in the detail plan. He points on the fact that buildings in Sweden don't have a standard for a cooling system which unfortunately can make it hot indoor during warm summers. He thinks we don't yet see the sun as harmful in Sweden and our electricity net is not designed for room cooling systems. Whenever there has been a big problem in warm summers with elderly that cannot be moved their tenants have used room cooling devices, opened the windows for air draft and urging the elderly to drink.

The yards at the elderly homes are meant to be the outdoor space of the residents where they can spend time. During the years he says they have worked on improving the standard of the backyards which is especially obvious at the elderly home Riddarsporren with a rather well designed greenery on the ground but not on the walls.

But what is astonishing is the installed artificial plastic grass both here and on the terrace at Väderkvarnen which shows that there is little knowledge of the many possibilities to make a natural grass ground, f.i. with a grid of paving that gives a flat surface for wheelchairs and still a feeling of a green lawn (Veg Tech, 2016).

There seems to be a general lack of enough knowledge or interest of the radical improvements, as mentioned above referring to research in the article of Zupancic, that the greenery can bring to the urban setting regarding ecosystem services like better air with the evaporation through the photosynthesis, absorption of rainwater thus limiting the damage of climate change floods, a better kind of shade instead of shadow from buildings and an overall cooler urban environment.The urban heat island effect also diminishes with green areas.

Further interviews with elderly and caregivers at Väderkvarnen
Interviews were also made with the elderly, and this time choosing the most extreme persons in need of full assistance and their close caregiver.

Roland Hans Norrby, 63 years old, physically disabled in a wheelchair. He said every day is the same and would like that more young people came because the staff does not have time to socialize as they are too busy writing the reports. He is a very curious and social person.

Margit Walldén, 99 years old in a wheelchair. She has hard to remember but after a while she remembers. She likes to be social, misses her family life and describes that one of her ward neighbour's husband comes to visit his wife everyday telling about the growing garden at their home. She enjoys to watch social activities from a from green balcony and cultivate friendship with people caring for the plants indoor and outdoor.

"Odla lite trevlig vänskap" - Margit

Mats Lindholm, working as nurse since 2008. He feels the house is like a fortress and the courtyard like a well with no sunlight, the only spot with sunlight is occupied by the restaurant. He also points out that the building from the 80's is not well built, a lot of cheating in the materials can now be seen, like bad water pipes and many other construction flaws. The large outdoor terrace for the residents is not easy accessible. If it would be designed better they would use it more. The balconies have no light. It's very close to everything in the city but they cannot get anywhere because of the hill, the top of the Brunkebergsåsen. The building is hot in the summer and cold in the winter. To cope with the summer heat they use indoor fans, but he says also that during the summer the most vulnerable elderly die of the heat.

Bo.Nu.Då. (2016)

At the opening of the exhibition at Arkdes Bo.Nu.Då. (Bo.Now.Then) on housing in Sweden during 99 years, we talked to the curator Dan Hallemar, also the director of the magazine ARKITEKTUR. He finds the concept on the green backyards interesting and suggests writing about it in their next issue. The show asks among other issues questions on how we can build for the ageing population concerning safety and social life: "How can the green values, ecosystems services and meeting places be integrated into the living environment? Participation and safety are keys to freedom and independence of older people - how to integrate this into the design of future care homes?" (Bo.Nu.Då., 2016)

4.2 Define

We analysed the old Empathy Map again and realise it was never completed properly and that the needs of socializing and green space are dominating the mapping from the interviews. This implied that the Point-Of-Views (POV) were not correctly formulated. It was discovered that the method for creating POV:s had not been applied properly so we refined and made them better from the insights of the needs of the personas. According to BootlegBootcamp "a Point-of- View (POV) is your reframing of a design challenge into an actionable problem statement that will launch you into generative ideation". The POVs should capture, discover and articulate the meaningful challenge. The three elements of a POV are: user, need and insight (Bootleg Bootcamp, 2016, p.21). New empathy maps for the newer interviews were also

made. From that we came up with the refined POVs:

Lily, living on her own with no assistance, needs to have a nearby green and cooler space where she can socialise with other people in the summer heat because she wants to feel independent and safe.

Ingvar, living in an elderly ward home with daily assistance, needs to have a social space to sit with natural shadow close to his apartment because he needs to feel safe and taken extra care of in the summer as the mortality in this group of elderly is high during heat waves.

4.3 Ideate

To satisfy the users' needs a brainstorm was made with the help of some HMW-questions based on the insights from the empathy map.

HMW decrease the temperature in the summer heat waves for the elderly?
HMW redesign the backyards to be more attractive for the elderly?
HMW make the elderly feel independent during the summer heat wave?
HMW create a safe and social living space for elderly in the summer heat wave?
HMW make the backyards possible to implement ? And the maintenance?

The development of the concept Green Backyard Network

Directives

There should be strong municipal guidelines for implementing green backyards of elderly homes in the detail plan when the densification of Stockholm is proceeding, both for existing areas and for new housing areas. When planning and building elderly homes there should be municipal and government subsidies for implementing green backyards, green balconies for every flat and green belts connecting the backyards.

The design of the backyards

Redesign the existing backyards to facilitate easy access for the elderly with physical disabilities. Take away the level between the different areas of the backyards. Green walls will be implemented in the backyards on a system of wires with big leave vegetation. Trees, plants, bushes and flowers will be installed to create a massive green backyard. Vegetation will be chosen to avoid the existence of vectors and pollen allergies.

Changing the ground surface from hard cement into a grid of grass reinforcement. Waterfall walls and water fountains and ponds with fish should be implemented in the backyards. A green igloo in the backyard should be made with a cooling system as a calmer and cooler place to sit for extra shade and intimate talks.

Green belts

Green belts with trees and vegetation between the backyards that are care free, only for pedestrians and bikes. Only those who live there are permitted to come in with a car for loading off/on. The green belts will also have free drinking water taps placed out.

Social activities

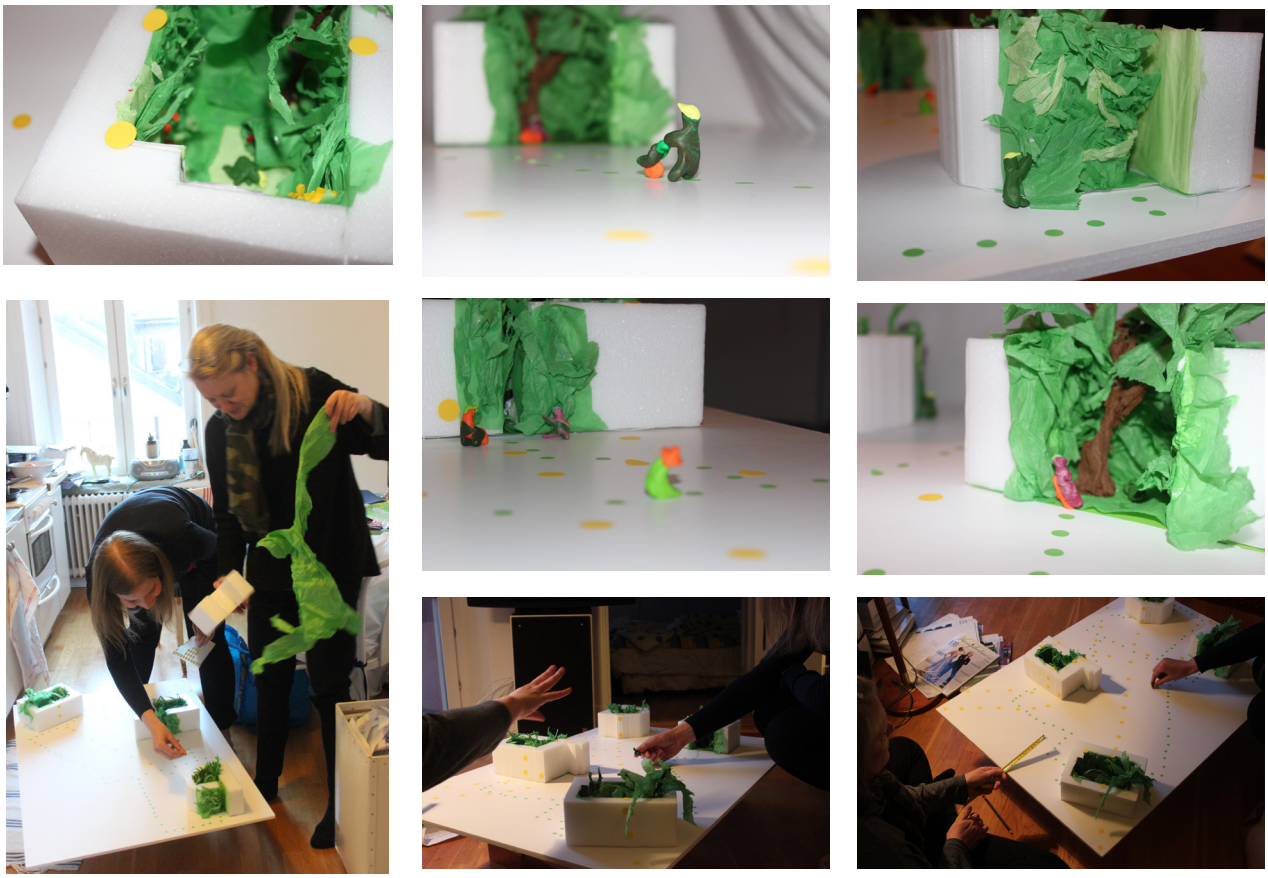
Workshops will be held to activate with those elderly that would like to work with caring for the plants in the backyard.Make space in the larger backyards for outdoor games like boule, krocket, kubb etc. No commercial activities would be allowed like cafes etc.

Indoor

In the shared living space in the wards there should be green walls and waterfall walls.

Map

A map for Green Backyard Network where every backyard of the property owner MICASA in the inner city is marked is to be distributed to every elderly above 65 of age in Stockholm. There will be information on every unique backyard, when they are open to the public, how to get there using the green belts. There will also be information on the activities offered along with advices on how to be prepared and behave in the very hot summer days. There will be a phone number to a contact person at Helping Green Hands.



Prototyping

Helping Green Hands

The organization Helping Green Hands is a part of the concept Green Backyard Network. This organisation is occupied with maintaining the green backyards, socializing with and helping the elderly. The organisation should have an administration that is responsible for finding new persons, planning and organising the work in the backyards. Helping Green Hands should be research based to create a bank of knowledge for the development of the concept, led by a head gardener like Anna Pettersson at The Department of Ecology, Environment and Plant Sciences/Stockholms University with employed gardeners, volunteers and summer job for youngsters. The work will develop a research platform on how to create green social backyards in elderly homes as a long-term commitment in helping municipalities with the knowledge about the possibilities. The work is implemented and followed up with directives from Länsstyrelsen in Stockholm. A network will be established with researchers in Geriatric Medicine and Environmental Medicine, but also the City Planning Committee and Office and other stakeholders concerned with the health of the elderly.

Feasibility

The feasibility of the concept Green Backyard Network is made through collaboration with a property owner like Micasa with many elderly homes in Stockholm inner city. Also the fact that Micasa is a company run by the municipality of Stockholm will give the project implementation a larger impact and publicity as a role model for other property owners and other cities in the region.

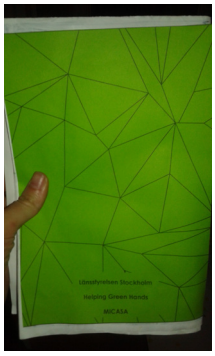
Part of the funding for the concept will be applied for from a research fundation f.i. Vinnova that develops Sweden's innovation capacity for sustainable growth and benefiting society. Like BOODLA , an organisation that has received funding from Vinnova for a long-term ecological greenhouse project with residents combining urban farming with social growth (BOODLA, 2016). Other potential fund givers would f.i . be the Swedish Research Council and Riksbankens Jubileumsfond, an independent foundation supporting research in the Humanities and Social Sciences.

We also made two different blueprints for how the concept Green Backyard Network during a normal day could look like for Lily and Ingvar. This gave us more understanding for what is going on different levels for the implementation of the concept something that we did not think about before.

4.4 Prototype

The first intention was to make small models of backyards on a map of Stockholm printed from a DWG-file given by Hans Hauska at KTH. After trying to print out the models of the blocks of the backyards using the 3D printer it was decided instead to cut them by hand in foam and fill them with paper. The insight was that we wouldn't get enough feedback from the testing if we made it too professional so the prototype was made more in a free way.

Four backyard modules were made with greenery, balconies, waterfall walls and green igloo, then glued on a Kapa board. Green belts were visualized with green dots connecting the backyards. Yellow dots visualized the heating effect of the sun. The testing was planned as a performance: two workers (us) from Helping Green Hands dressed in green shirts pulling a wheelbarrow with the cardboard model walking through the city.




Map

A map for Green Backyard Network was made using an ordinary free tourist map of Stockholm on which every backyard of the property owner MICASA in the inner city was marked. Instead of the printed adverts information on every unique backyard, their opening hours and their particular stories were added along with recommendations on how to cope and behave in the very hot summer days. We also made a sound with waterfall and birds singing to bring when testing to people to listen to in headphones.

4.5 Testing

Gunnar Kempe (Micasa), Anna Pettersson (Stockholm University), Mare Löhmus (KI), Hanna Sundkvist (Länsstyrelsen), three pensioners not living in the elderly home but on their own were invited. Roland an elderly and caregivers at the elderly home Väderkvarnen that we met before were asked to come down and meet us in the backyard for the testing. Due to bad weather (it was +6 degrees C) only Hanna, Roland and the caregivers Stine and Mats turn up. The performance and the model were tested with these people.



On our way to Väderkvarnen we walked through the city and our appearance was met with curiosity as we were talking about heat wave in the cold weather that day.

"Prata sig varm" - Elderly living on his own.

Roland, resident at the elderly ward, physical disabled in a wheelchair,

Roland was happy with some distraction from the daily routines that he finds so monotonous. He enjoyed the nice company and so did we, as we get to know each other more every time we come back. Roland thinks the backyard is nice as it is and likes the warm summers. He has asked to be transferred to an elderly care house in Gotland where he grew up. He finds the air pollution from cars is the worst and understands that green areas help cleaning the air.

Mats

He asked about references from other places with green belts and backyards and mentions Berlin, he thinks the concept is complex when we ask what he thinks.
Mats says that we could have a "bartender" serving lemonade to the elderly. About elderly living on their own that can come to join them in backyard during daytime he finds positive as it makes everyday different and more social.

Hanna

She likes that we are involving the property owner that is needed to implement the concept. She listens to the

waterfall and birds which she likes. She enjoys the Helping Green Hands trying to explain to Roland and Mats the concept with the map. She explains to the group that towards the end of the century we will have over 30 days of heat waves and that's why we need to think about how to deal with the environment. Green areas are important.

Man in the ward
Comments on the green plastic bags we had in our pockets that they were not good for the environment

Man in the street
We met a man 60+ in the street who stopped and looked at the model asking if we really would make the greenery covering the windows too. An interesting insight that "flaws" in the prototyping involves people to think and add comments to the design.

Insights from this testing are that we, as acting people from Helping Green Hands, really were needed helping Roland down and out on the backyard ast the caregivers didn't have much time. Roland and the caregivers trusted us completely. We realized that the access to the backyard is really hard for a person in wheelchair as even though the doorstep is tiny it is large enough to make Roland hurt his feet and the doorway is almost too narrow for a wheelchair. This makes it impossible for Roland to roll out on his own. We feel we are needed also on a social plan and we also become happy of all these encounters. The head of the ward and the caregivers also appreciate our presence and interest in their situation and they so easily let us come for interviews and testing. It was hard to talk about the heat when everyone was freezing in the cold weather.

In the following testing we met the manager from property owner of the two elderly homes. She thinks that it's nice with caring for the elderly as she also is getting older herself. She is surprised to hear about the article on the concept in Dagens Nyheter the same day. She didn't know that the ground can be prepared with a grass grid instead of artificial grass that they now use in the backyards. But then she compares this to how it is made easier for fire vans to pass on grass when there is installed a strong grid of cement on the grass. She says they at Micasa really do care how the environment is for the elderly. The backyards have to be locked as they are today not to attract people that shouldn't be there. They don't want to have burglaries and other people that shouldn't be there. Green belts she wonders what that means, is it bushes and trees? She didn't know that artificial grass might be toxic: "I will have to talk to my ground maker". She says it sounds like very expensive to create and maintain the backyards.

Daughter
"Mummy you must listen to this!" She tried to convince her mother and with a smile on her lips she continued to listen to the waterfall and the birds in the headphones. She smiles "It's wonderful!" The calmness she feels is unbeatable.

Cafe employee
She lives in the forest (Haninge) now because she was not feeling well in town, her skin gets better, she says. As she listens to the sound, she mentions that it is exactly how it sounds, where she lives. She has a creek that runs by the house and she really means that she lives in the countryside. At first she thought this would be the sound of the backyards but after we explained that it is possible to create a real waterfall and a green oasis to be in she was totally excited and continued to ask and said that she would like to have it. She also mentions that it is such a poor air quality in the city and this would help. She also mentions that there is a difference of 3 degrees between where she lives and the town. She does not like the terrible heat.

Testing at Väderkvarnen

Testing at Riddarsporren/Vasaträffen

Walking to Väderkvarnen through the city

5. Final concept

To satisfy the user's needs the concept Green Backyard Network was the final concept as its satisfy the needs of the users to have a safe, social green and cooler place closeby during summer heat waves.

Why are the ideas needed? How will Länsstyrelsen support the idea?

5.1 Our concept

The concept Green Backyard Network consists of lush green oasis with green balconies in the many existing and also future elderly care homes in the inner city of Stockholm. The backyards are interconnected with green belts in a network.

Green walls, big leave trees, plants and flowers will be installed to create a massive green backyard. The ground surface from hard cement into a grid of grass reinforcement. Waterfall walls and water fountains and ponds with fish should be implemented in the backyards. A green igloo in the backyard should be made with a cooling system as a calmer and cooler place to sit for extra shade and intimate talks.

The organisation Helping Green Hands will maintain the vegetation daily in the backyards, have gardening workshops for those interested among the elderly and keep an extra surveillance eye on the elderly in the backyards during the heat waves. The organisation should have an administration that is responsible for finding new persons, planning and organising the work in the backyards.

A map where every backyard in the inner city is marked will be distributed to every elderly above 65 of age in Stockholm. In the map there is information on every unique backyard and their stories, when they are open to the public, how to get there using the green belts. Their you also find information about the offered activity programs (workshops, games etc) along with advices on how to be prepared and behave in the very hot summer days. There will be a phone number to contact persons at Helping Green Hands.

No commercial activities would be allowed like cafes in the backyards but drinking water taps will be installed.

5.2 Why are the ideas needed?

The green backyards in a network satisfy the elderly's needs for a cooler and safe place nearby during summer heat waves. It also meets needs for easy access to socializing with friends but also to cultivate new relations over the generation borders with the mix of youngsters, volunteers and employed people from Helping Green Hands. The socializing is also part of the safety during hot summers as if an elderly would suddenly become ill in the heat, he/she would feel safe that someone will see their need of help. The map will facilitate for those elderly living on their own to find a social green backyard closeby where they can spend time in a safe and cooler environment during the hot summer.

The concept's emphasize on abundant greenery is needed to provide an overall cooler environment in Stockholm city for the most vulnerable. It also meets the needs of the long term climate adaptation programme, Vision 2030, that the City of Stockholm is working on (Stockholm Stad, 2013).

5.3 How will Länsstyrelsen support the ideas?

There will be a project group which on a long-term basis assumes the responsibility to coordinate and ensure the implementation, continuity and funding for the con-

cept.

Directives
There should be mandatory directives from Länsstyrelsen on the municipalities to create strong guidelines for specifically implementing green backyards of elderly homes in the detail plan when the densification of Stockholm is proceeding, both for existing areas and for new housing areas. When planning and building elderly homes there should be government subsidies for implementing green backyards, green balconies for every flat and green belts connecting the backyards.

Research platform
The organisation Helping Green Hands should be research based to create a bank of knowledge for the development of green backyards, led by a head gardener like Anna Pettersson at The Department of Ecology, Environment and Plant Sciences/ Stockholm University with employed professional gardeners, apprentices, volunteers and summer job for youngsters.

The work will be developed as a research platform on how to create green social backyards in elderly homes as a long-term commitment in helping municipalities with the knowledge about the possibilities and needs for the elderly.

Feasibility
The feasibility of the concept Green Backyard Network is made through collaboration with a property owner like Micasa with many elderly homes in Stockholm inner city. Also the fact that Micasa, the elderly care housing company run by the municipality of Stockholm, will give the project implementation a larger impact and publicity as a role model for other property owners and other cities. In order to ensure that the knowledge of the development is documented and evaluated, part of the funding for the concept will be applied for from a research fundation f.i. Vinnova that develops Sweden's innovation capacity for sustainable growth and benefiting society. Other potential fund givers would f.i. be Swedish Research Council and Riksbankens Jubileumsfond, an independent foundation supporting research in the Humanities and Social Sciences.

A network, coordinated by Länsstyrelsen and the project group, will be established with researchers in Geriatric Medicine and Environmental Medicine, but also the City Planning Committee and Office and other stakeholders concerned with the health of the elderly and the growing city.

5.4 Reflections

Working with this challenge through the design thinking method has been an exciting journey with an interdisciplinary group like ours with many strong personalities as well as different backgrounds. One limitation has been time, more time would have gained more insights through both text research and interviews with different stakeholders and users. But still our outcome of the work shows that a lot of work, insights and ideas can be generated for the development of a new design solution on an urgent and huge challenge in quite a short time.

Green Backyard Network, additional testing is needed, for instance, in full scale in a backyard as we first planned. Working with the challenge through design thinking has resulted in a concept that is innovative in its combination of elements where the focus is on the need to care for elderly, creating a new kind of social and safe space in the summer heat that will be as useful in the present summer as in the future heat waves. We will continue developing the concept and make a pilot project involving some backyards in the inner city of Stockholm.

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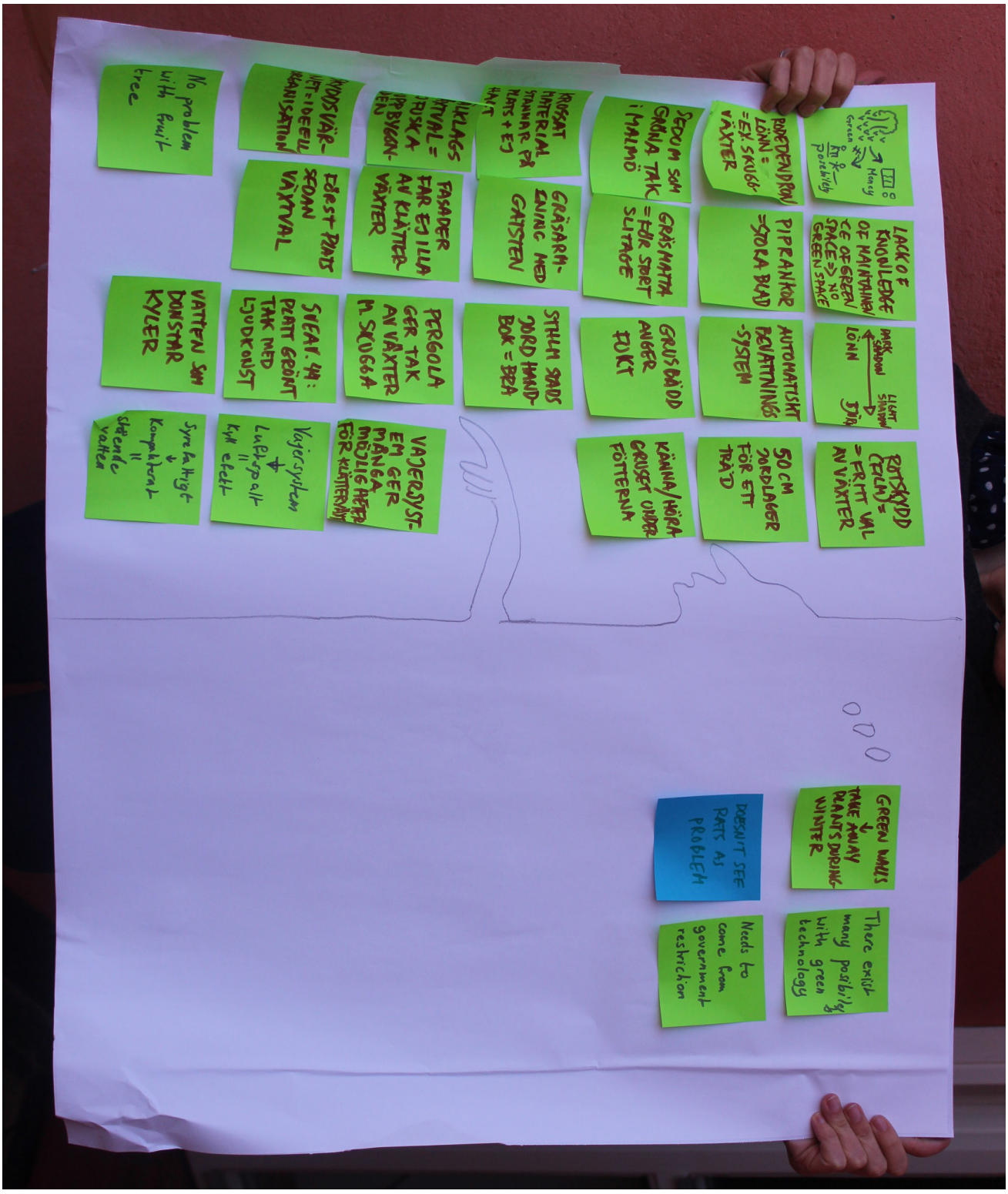
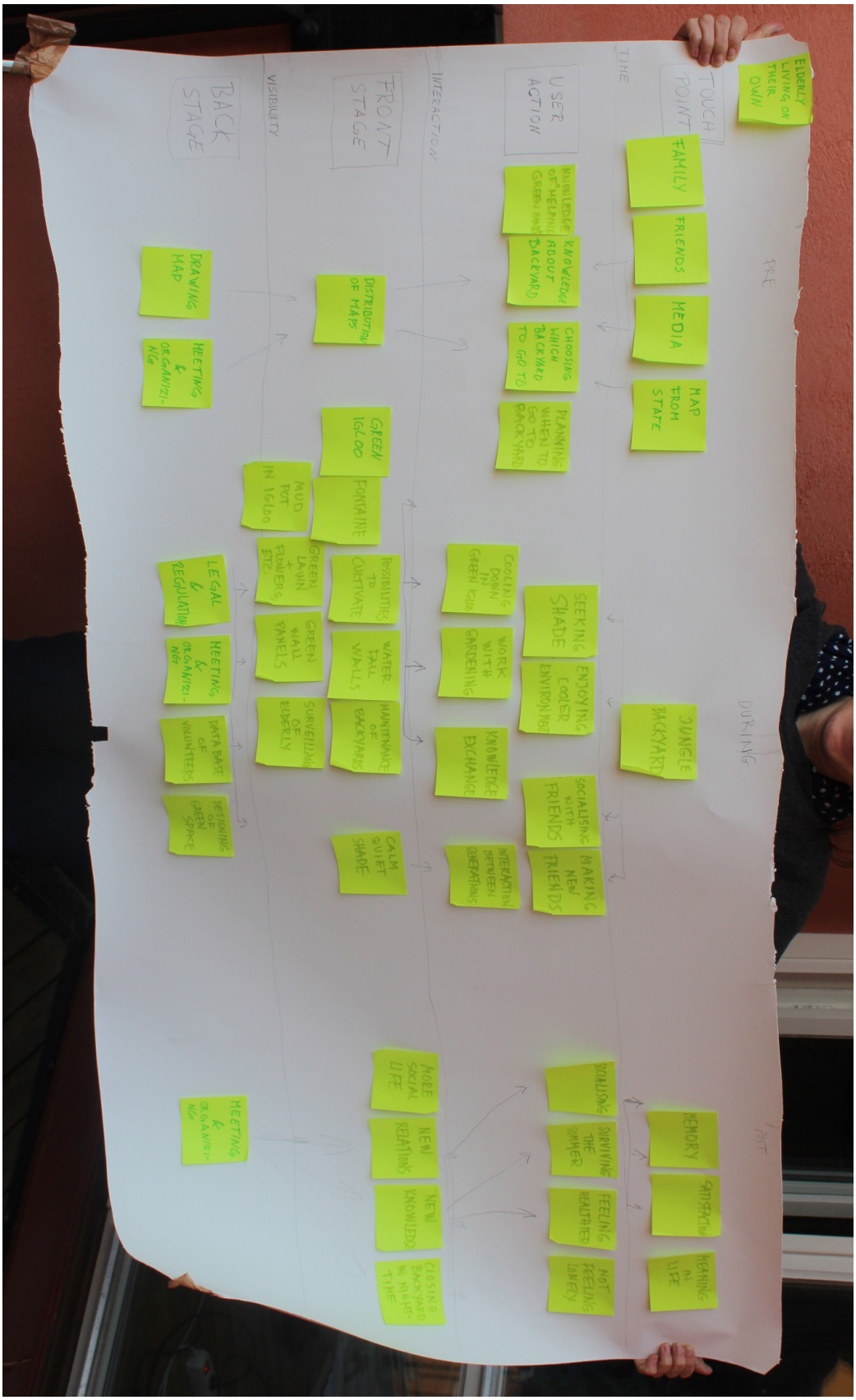
7. Appendix

7.1 Empathize map for Anna Petersson gardener



7.2 Empathize map

7.3 Blueprint - Elderly living on their own



7.4 Blueprint - Elderly living in care home