Universidad de Valladolid

UNIVERSIDAD DE VALLADOLID

ESCUELA DE INGENIERIAS INDUSTRIALES

Grado en Ingeniería de Diseño Industrial y Desarrollo del Producto

Diseño de Mobiliario Modular para Jardinería

Autor:

Sanz González, Laura

Eusebio de la Fuente López

OsloMet - Storbyuniversitetet

Valladolid, Julio 2020.

TFG REALIZADO EN PROGRAMA DE INTERCAMBIO

TÍTULO:	**Gardening Modular Furniture Design**
ALUMNO:	**Laura Sanz González**
FECHA:	**01/04/2020**
CENTRO:	**OsloMet – Campus i Kjeller**
UNIVERSIDAD:	**OsloMet - Storbyuniversitetet**
TUTOR:	**Vibeke Sjøvoll**

Resumen y palabras clave

El presente TFG consiste en un proceso de investigación de las necesidades del grupo cultural *aficionados a la jardinería en entornos urbanos,* seguido de un proceso de diseño con este grupo como destinatario. Se aplican técnicas de investigación como entrevistas en persona al igual que por correo electrónico a empresas y expertos, cuestionarios online para aficionados y publicaciones en grupos en redes sociales. Durante este proceso se detecta la necesidad de nuevas formas de incorporar en el hogar un espacio para la jardinería, especialmente en Noruega donde practicar esta actividad al aire libre es imposible durante gran parte del año. El resultado es un diseño de mobiliario modular que permite personalizar el espacio dedicado a la jardinería o a otras cosas (libros, televisión, …) mediante un sistema de baldas y bandejas. El diseño es sostenible y fácilmente modificable a lo largo del tiempo, adaptándose a las necesidades cambiantes del usuario.

Palabras clave: modular, mobiliario, jardinería, diseño, producto.

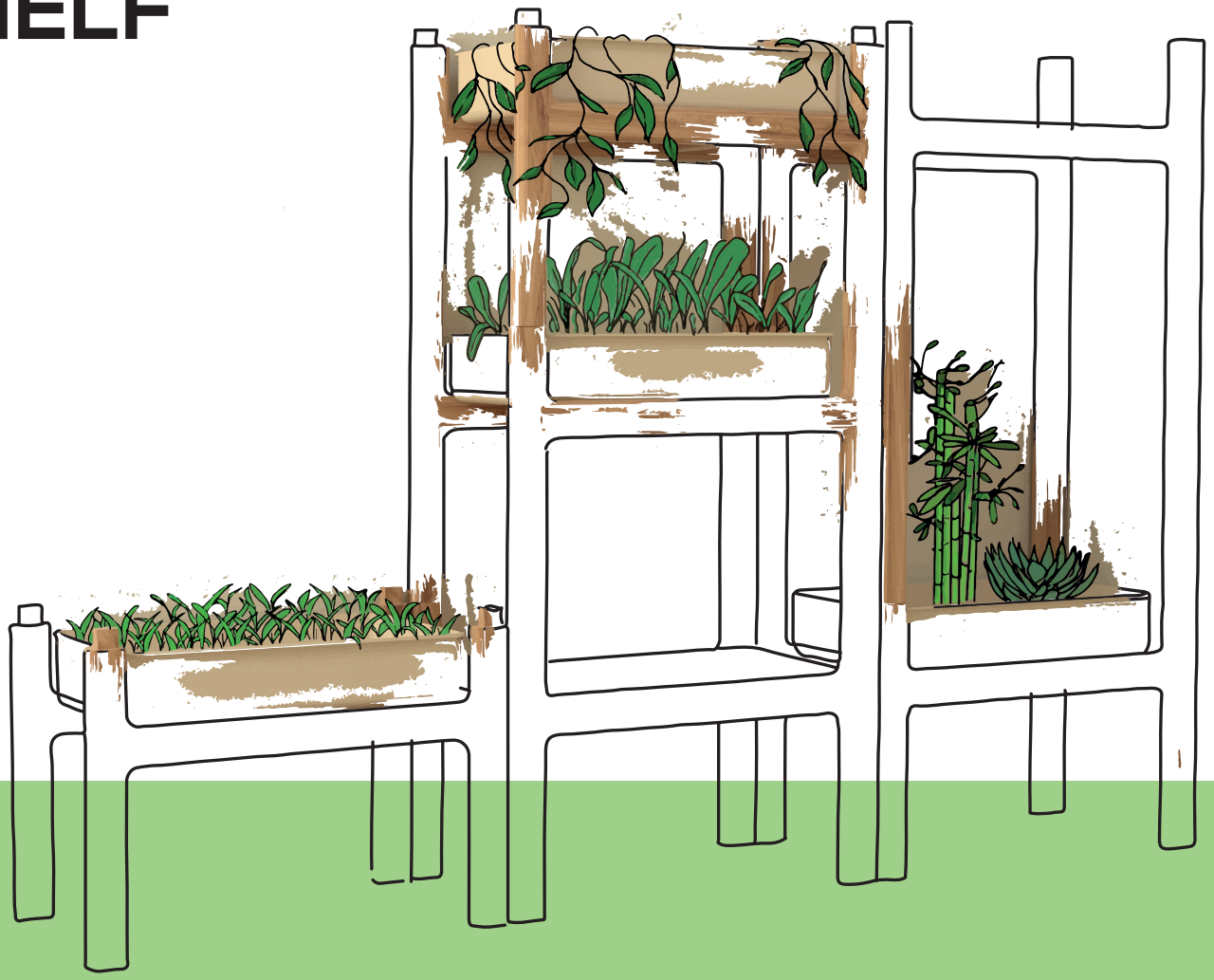
Abstract and keywords

This TFG consists of a research process about the needs of the cultural group *gardening amateurs in urban environments,* followed by a design process with this group as the target. Research methods vary from in-person and email interviews with companies and experts, online forms for amateurs and posts on social media. In this process, the need of new ways to introduce gardening in the home is detected, more so in Norway, where outdoor gardening is not possible during most of the year. As a result, a modular furniture system is designed. The shelves and trays system allows the user to customize and decide the space he dedicates to gardening or to other things such as books, TV, etc. The design is sustainable and easily modifiable throughout time, changing according to the user's needs.

Keywords: modular, furniture, gardening, design, product.

BAPD2210

GARDENING SHELF SYSTEM



January - March 2020

Group 3
Eine, Jørgen, Emil, Laura

INDEX

1. ABSTRACT

This project was developed as part of the course Cultural Understanding and Communication in Product Design (BAPD2210). The course aims for the students to achieve a general cultural understanding and look into products as part of cultural contexts. The starting point was choosing a cultural group, followed by a research process carried out with different methods and techniques as well as data gathering and representation, and a design process that communicates the acquired knowledge and resonates with the chosen community. The present project revolves around gardening, including a research process that lead us to a gardening modular furniture design. This report sets forth the whole process as well as the gathered information and our reflections along the way.

2. INTRODUCTION

This project consists on an investigation about gardeners and gardening. Our goal is to understand the activity as well as the community in order to communicate their values through a product design. The process starts with a research phase, which set the basis for reflection and which later allowed us to get to conclusions and make design decisions.

The first condition when selecting the cultural group was not being part of it. When we chose gardening, we were aware that our research had to start from zero. Therefore, this report emphasizes the research process and presents it from beginning to end. Along the way, we have given use to different research techniques and data gathering methods. In this document, we explain why and how we have used them and the conclusions we extracted from them.

As we gained more insights, our research focus and project goals have tilted and shifted, specially when talking to professionals in the field.

“Dare people to be involved in the process [of gardening].” - stated Kristin, from Food Studio.

The final product derives from a design process led by the research conclusions. All the insights and project goals are taken into account in the product, which reflects the community spirit and also aims to spread gardening culture. This process is presented in the last part of this document.

This report includes all the content created as part of this project, as well as the thoughts and knowledge we have gained throughout the process and the final product design.

3. BACKGROUND

The initial phase was crucial because it meant choosing the focus of the whole process. We looked at different cultural communities that met the one condition - we could not belong to them or be familiar with them. Once we had a list with some options that we were interested in, we agreed to use some decision tools in order to be objective and consider the most important aspects regarding this decision.

As a decision method, the SWOT mattresses were very helpful.

SWOT mattresses

This method consists on creating a mattress that gathers strengths (S), weaknesses (W), opportunities (O) and threats (T) of choosing each cultural group. We made our decision balancing these four factors for each of the cultural groups.

We narrowed our options down to four: gardening, yoga, music-production and zero-waste producers. This is what the SWOT mattresses looked like:

A. Choosing gardening as a research topic

Strengths	Weaknesses
Accesible research Popularity Not exclusive or very expensive Hands-on learning Environmentally friendly topic	Weather dependant Light dependant Long wait for results if we try it
Opportunities	**Threats**
Spread a very beneficial hobby Improve gardening tools Spread nature awareness Making it easier for newbies to begin gardening	Difficulty to practice/research during the winter months Need to know the process really well before designing

B. Choosing yoga as a research topic

Strengths	Weaknesses
Accessible research Popularity Possibility to experience it ourselves	Very wide cultural group Expensive to practice
Opportunities	**Threats**
Improve the equipment Improve the experience Spread a good practice	Not finding room for improvement since it is so popular Not being accepted into the community

C. Choosing music production as a research topic

Strengths	Weaknesses
Music is a universal language Very contemporary	Less accessible cultural group Producers mostly use technology
Opportunities	**Threats**
Make it more sociable Improve the experience	Only finding opportunities in software improvement

D. Choosing zero-waste producers as a research group

Strengths	Weaknesses
Contemporary topic Specific research Sparks creativity	Small cultural group Difficult access
Opportunities	**Threats**
Design a sustainable product Increase awareness Enable people to reduce their waste	Not being able to reduce waste in every situation - unrealistic?

3. BACKGROUND

All members of the group wrote and contributed to the SWOT mattresses. In the interpretation process, it became clear that all research groups had some strengths as well as weaknesses, and opportunities as well as threats. That is why, in the decision process, we considered our personal interests together with the mattresses.

The first thing that became clear was that choosing music production had a big risk (threat) - only finding opportunities in software improvement. Moreover, the foreseen difficulty to contact people in the field made us discard this research topic in the first place.

Of the three remaining groups, we decided not to choose yoga for several reasons. In the first place, because it is such a broad cultural group. On top of that, even though it was an unfamiliar activity to us, some of us had practiced it on occasion or had close contact with yoga amateurs.

Finally, we decided on the research group where we thought we would be able to be useful for more people. Zero-waste is such a specific and strict culture. Gardening, on the other hand, is an activity with so many benefits and we were excited about the idea of making it accessible and spreading the culture around. Also, planting makes the gardener be involved in the whole life of the plant and realise where food comes from, maybe sparking an interest for being more environmentally friendly just how zero-waste people are. This is why gardening was our final choice.

Once we decided on gardening, we started the research.

Personal experience in gardening

As said before, gardening felt distant to all members of the group when we started this project. We asked ourselves about our relationship with gardening to look back on it once the project was coming to an end.

These are the small testimonies we gave:

Jørgen –
"I don't have a lot of experience in gardening. I worked at a greenhouse for one week as part of a school project, but nothing more. It was nice being outside in the fresh air in the spring all the time [during that week]."

Emil –
"The plants I've seeded I feel like myself has also grown. Getting insights in such a relevant field has kind of brought me asking why more people aren't doing it. Getting more experience has made me realise how easy it is and has made me wonder why people don't practice it."

Eine –
"I knew that I have little experience and I didn't know how to grow, how to make a plant. I've never been interested in it and I haven't tried it or considered trying it. I have just seen my mom plant some tomatoes and stuff on the kitchen window. The only thing I knew is that you need soil and water. I didn't know how long it takes but that also depends."

Laura –
"I am a very impatient person who likes things to be ready quickly. That is why I found gardening very distant to my interests, and also because I have never done it before. In the process of deciding which focus group to choose, I realised gardening is a hobby with a lot of benefits."

By these short testimonies it is obvious that we had a lot of knowledge to earn during the research process. Therefore, we have come up with ways to experience gardening with our own hands as well as listening to experts in the field. The different experiences and methods that we have used to do so are explained in the next section of the report.

4. RESEARCH PROCESS

The research process is a fundamental part in this project, since it is the phase where we adquire knowledge about the cultural group.

Therefore, in this section of the report we will discuss our goals during the research, as well as the methods we applied and the different people and companies we got in touch with.

The next graphic represents a general timeline for the project, including the research process we will focus on along the next pages.

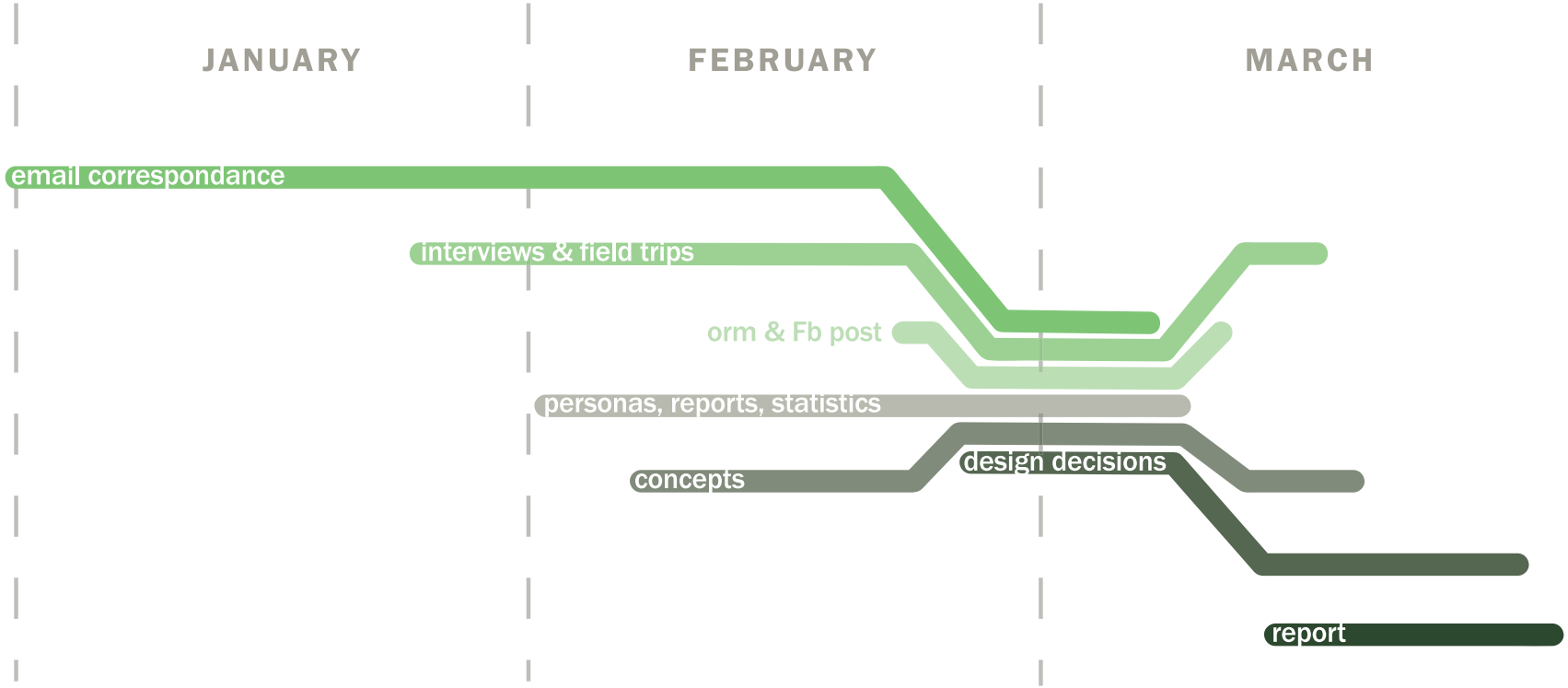


Figure 1. Project process graphic (own graphic).

4. RESEARCH PROCESS

4.1. Goals and research question

Our research question was **"How can we introduce agriculture in urban living?"**, and we based our research on finding out how urban agriculture is done today. By urban agriculture we mean everything from community gardens to growing some herbs on the kitchen counter.

We chose this research question for several reasons. We thought it was an interesting thing to research, as well as the environmental part of it was interesting. We also tried finding ways to improve the current solutions, and other ways of making it easier to start planting yourself. The research question was altered to match our progress in the project.

We wanted to get as many viewpoints as possible to get a broader understanding of our subject. Understanding the culture and finding out what works and what does not work was important for us. In our brief we had 3 goals:

Make agriculture accessible for an everyday person
We wanted to make something that made it easy to start growing at home, and was space-efficient.

Design a product accepted by enthusiasts
We wanted our product to be accepted by those who had done this for a long time as well. So we did not want to make a starter kit, but more something simple that works well for everyone.

Design a sustainable product
Sustainability is an important part of the home-growing community, as many people do it for the environment as well for hobby purposes. That is why making a sustainable product was important to us. This goal was kept unaltered throughout the whole project.

We changed our goals and priorities during the project as we decided what things were more important.

4.2. Research methodology

In order to pursue our goals to understand the community and design something that resonates with them, we applied several research methods. Some of them were email correspondence or phone calls, but we also planted microgreens ourselves to live the experience. The graphic in page 11 summarises the research process.

- Email correspondence

We started reaching out to companies that worked with what we thought we wanted to work on, and some of them gave us some very good feedback. We struggled a bit in the beginning, but after the first milestone presentation we started getting the response we wanted and arranged some phone calls and interviews.

- Phone calls and interviews

We made an "interview template" to guide us through the interviews, so that we could get several viewpoints on our questions. We called the main farmer at Losæter and had a phone interview with him. That made us realise that we wanted to focus on smaller scale agriculture and individual persons rather than corporations and companies. So we made a form which we sent out to different facebook groups - one Norwegian and one Spanish.

Even though we decided to move our focus over to individuals, we still wanted to contact Tåsen microgreens and Food Studio. We got in touch with Tåsen microgreens and visited them since we thought we could get some valuable information on how to grow in small areas. We learned a lot about hydroponics and the importance of different lights. We also learned a lot about the importance of the growing medium and the pH of the water.

4. RESEARCH PROCESS

On our visit to Food Studio, we did not only discuss the planting experience, but the whole picture including planting, harvesting and being aware of where food comes from. Kristin, the founder of Food Studio, told us gardening is a great way for people to have a bigger picture and become conscious. This interview happened rather later in the research process, meaning that we could discuss our design ideas with her too.

- Form and Facebook posts

The form gave us a lot of information from people who do this as a hobby, and it did so in a timesaving manner. We sent it out and worked with other things, and then we got our answers after two days. We designed the questions so that the information would help us find more areas to look after a solution in. To make the information easier to take in and understand we made some charts and diagrams which could visually give us information faster than if we had to read the spreadsheet.

We posted about our project on a gardening-themed Facebook group too, so we could get answers from more people.

- Field trip

As part of the research, we decided to try to visit all the community gardens we found in Oslo (see map on the right). We did this on the 6th of February, and completed a tour with community gardens we pin-pointed on the map. This visit made us realise that these gardens are inactive in winter, so we moved them aside our focus for the research since this project only lasts until the end of March.

- Planting our own microgreens

The first thing we decided to do in this research process was planting some seeds and taking care of them, watering them, etc. to experience gardening ourselves. We thought this was extremely important in order to get to know the cultural group, but also with the purpose of identifying some problems or tools/tasks that could be improved.

The pictures on page 10 show how we set up the planting trays and the LED lights in our working place.

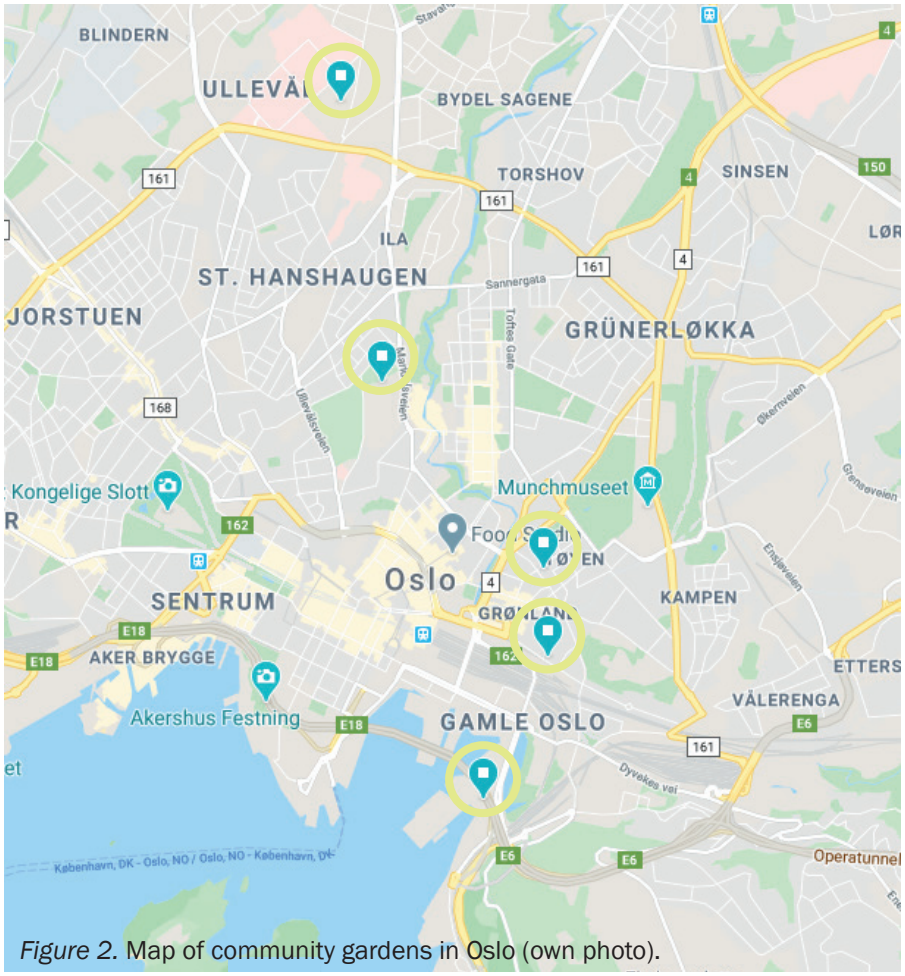
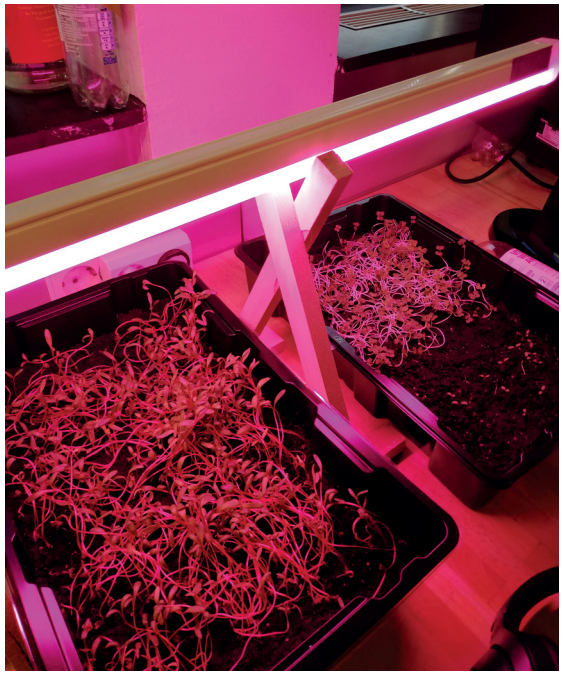


Figure 2. Map of community gardens in Oslo (own photo).

4. RESEARCH PROCESS



Figures 3 and 4. Pictures of our gardening set up (own photos).

We planted some fast-growing seeds so that we could get results rather fast since we did not have that much time. Some of the seeds we planted were Japanese Tatsoi or Rhubarb Chard.

4.3. Data gathering methodology

After each interview, phone call, or after receiving the answers to the form, it was necessary to gather all the information so we could take it into account further into the project. We did so via different kinds of reports and graphics.

Before any interview or direct contact with gardeners or farmers, we created some stereotypical personas that helped us discover our own pre-formed opinion of the cultural group and also that of the other members of the group.

After we had our interviews or phone calls, we wrote down what we found out on an interview report so that we could easily read through and have everything in mind in the future. We also took pictures during the interviews where it was possible to. Then we made some archetypical personas based on the people we interviewed or on the new insights.

For the form, we decided it would be better to make some graphs, as the results were put in a spreadsheet and it was difficult to easily look at it and get to conclusions. We created pie charts, as well as wordclouds and other kinds of visuals so that we could increase the speed in which we could take in the information. The piecharts worked really well for our needs, since it was easy to see which colors dominated the chart.

All the content we generated applying these methods is presented in the next section of this report, as well as in the appendices.

4. RESEARCH PROCESS

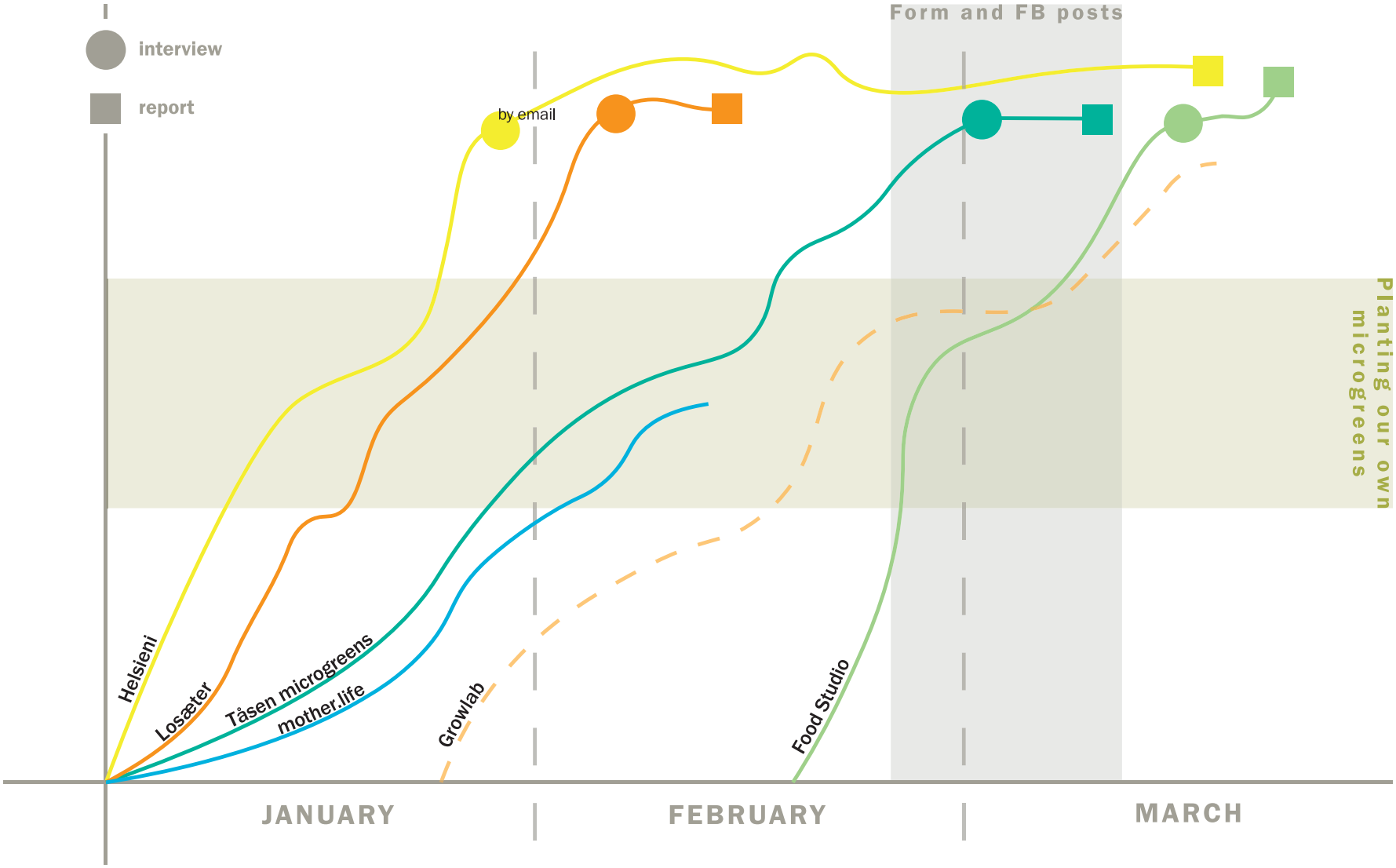


Figure 5. Research process graphic (own graphic).

5. RESEARCH INSIGHTS & DATA VISUALISATION

With every step we took in the research process, we gained insights. Applying the methods described in Data gathering methodology, we turned this new knowledge into useful content for our understanding and for the posterior design process.

In this section, we will present all the insights we acquired during the research and the content that was generated. This is crucial for the next sections, since we based our design decisions and chose a focus group basing ourselves in all this information.

5.1. Content

a. Stereotypical personas

After we sent out the first emails and planted our microgreens, we decided to create some stereotypical personas.

Figure 6. Stereotypical persona (own material).

Figure 7. Stereotypical persona (own material).

Stereotypical: "a set idea that people have about what someone or something is like, especially an idea that is wrong".

We created this personas based on personal opinions and preconceived ideas, with the intention of knowing where we stood. Looking back at these personas later on was eye-opening, since we realised we were wrong about some things and right about others. A few pages ahead, we present the archetypical personas.

To see these personas full-size, read appendix B.

5. RESEARCH INSIGHTS & DATA VISUALISATION

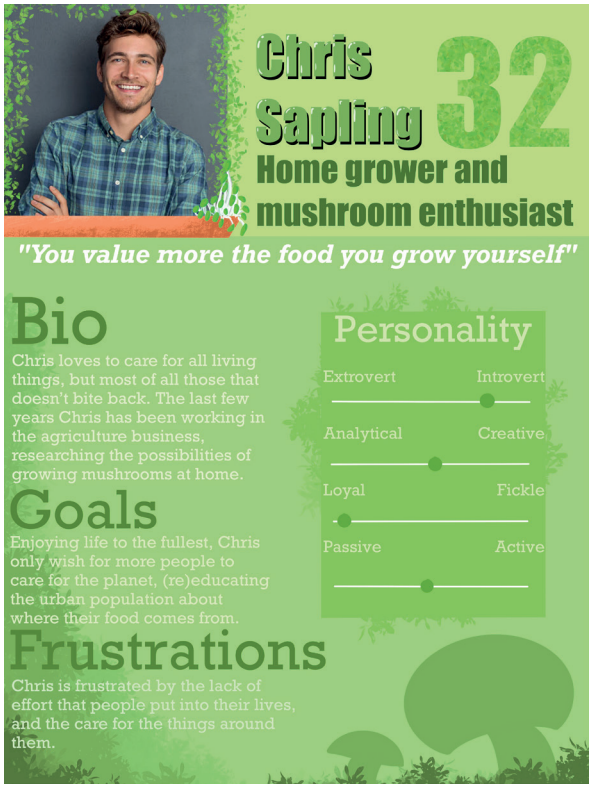


Figure 8. Stereotypical persona (own material).

b. Interview conclusions

As described in the data gathering section - see 4.3 - we created reports for phone calls, in-person interviews and some email conversations (the ones where we got to do an online interview). We tried to write the report as soon as possible after the interview so that we kept the essence of it and as much detail as possible.

We made an interview template beforehand - see appendix C -, just so we could have a guide through the conversation, but the questions changed as the topic or the interviewed person changed too.

The full reports can be found on the appendix C, but in this section we discuss the main conclusions we got from each of them.

The first interview we did happened over email with a Finnish company called Helsieni, which sells mushroom growing kits. We sent them a survey with questions from the interview template and got some really useful answers - interview 1, appendix C -. They pointed out how gardening makes you aware of the whole process food goes through before you buy it. “The role of urban agriculture is about (re)educating the urban population about where their food comes from.”

Figure 9. A Helsieni growkit.

The second interview was a phone call with the main farmer at Losæter, Øystein. Talking to Øystein - interview 2, appendix C - was the second time we realised that farmers and gardeners like being involved in the whole process, from seed to mouth to ground again. “I like to be a part of the whole process, from planting the seed to shitting it out.” - were his literal words. He also expressed his positive opinion about vertical farms, which

we found interesting because it was a concept we had been looking into.

The third interview was with Tåsen microgreens - interview 3, appendix C. The trip to Tåsen microgreens was very interesting, and we learned a lot. They had so much knowledge of how to manipulate the plants with light, and they knew how to grow them as efficiently as possible. They used the space efficiently by growing vertically, and they added nutrition to the water so that the plants would grow as fast as possible. It was very inspiring to visit them, as you can see in our final design.

Figure 10. Visit to Tåsen microgreens (own picture).

Lastly, we interviewed Kristin from Food Studio - interview 4, appendix C-. This interview happened the second week of March, so we already had a semi-defined design concept and we asked her for feedback on it as well as for general insights. Kristin agreed with our previous interviewees that gardening helps being aware of the bigger picture of food production and is always food for thought. We talked about her business too, and how the best way to educate is through experience. She said our mission should be enabling people to easily grow plants or food at their homes, and we totally agreed with her looking back on all the other insights too.

c. Graphs and statistics

The interviews with experts in the field made us take some decisions:

- we want to focus on individuals, not companies;
- our goal is to make gardening easy and available.

Therefore, we needed insights and answers from individuals now. A very efficient way to get them was through an online form, which we shared with Norwegian as well as Spanish gardening amateurs. With the responses we got - see spreadsheet on appendix D - we built some graphs and wordclouds.

5. RESEARCH INSIGHTS & DATA VISUALISATION

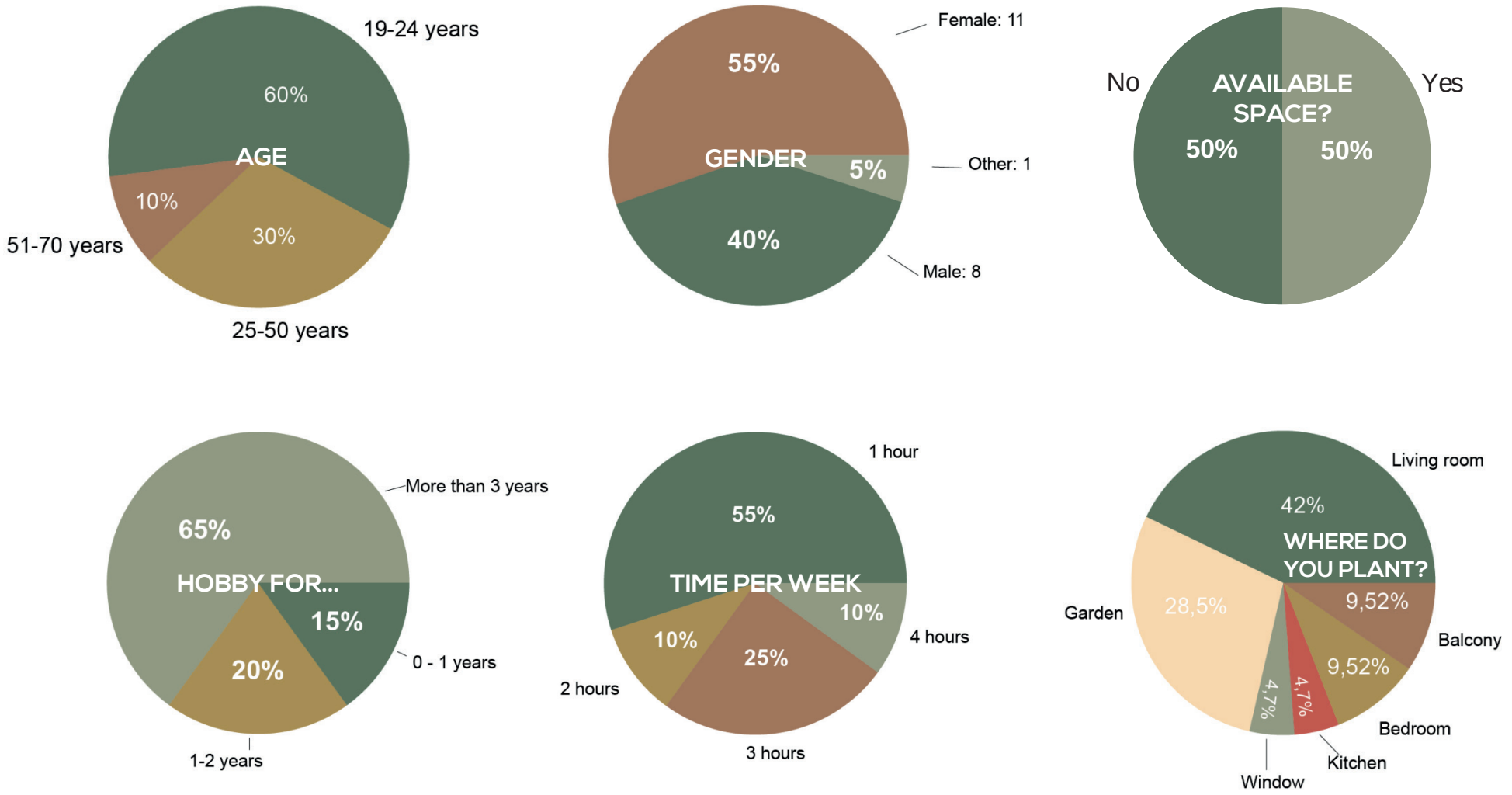
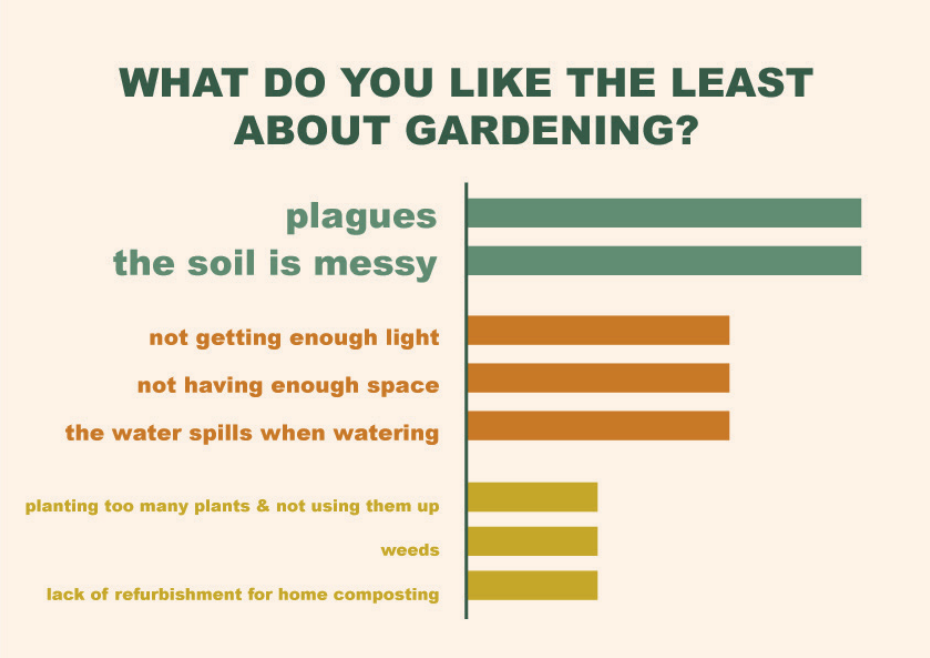


Figure 11. Statistics from research form (own graphics).

5. RESEARCH INSIGHTS & DATA VISUALISATION



Figures 12 and 13. Statistics from research form (own graphics).

5. RESEARCH INSIGHTS & DATA VISUALISATION

Which tools do you use?

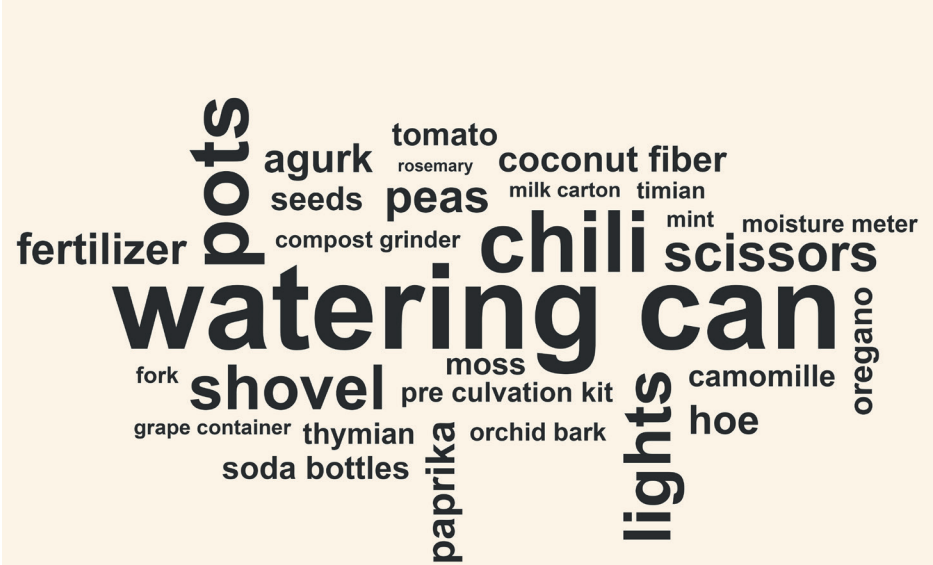


Figure 14, 15 and 16. Statistics from research form (own graphics).

Looking at these results, we took note that a lot of people plant indoors and half of them do not have enough available space, or they do not have as much as they would like to. We also noticed the wide age range and that the quantity of men and women was very similar.

These insights and all the others, we took into consideration when we made decisions further in the process.

5. RESEARCH INSIGHTS & DATA VISUALISATION

To come in contact with, and to get insights from as many people as possible, we joined communities on Facebook and posted about our project. In a group called: *Dyrk selv – sopp, grønnsaker og nyttevekster* (Grow yourself – mushroom, greens and useful plants), one member commented about a closet type of solution that would fit in small apartments. Adding to it, integrated lights and watering system.

A response to that comment added that their vision for the future was that this would be the norm for furniture in the kitchen. A selection of different trays that you plant in and everything sorts itself and notify you when it is ready for harvest.

This was not realistic to deliver, but it gave us an idea for what the market wanted, and we could work towards a more realistic solution with that in mind.

Figure 17. Relevant comments on Facebook (own material).

d. Archetypical personas

After acquiring some new knowledge from the research, we created a few archetypical personas - see in full-size on appendix B.

Archetype: "a typical example of something, or the original model of something from which others are copied".

Therefore, for these personas, we based ourselves on the people we interviewed as well as the people who answered the form. This first one is based on the main farmer at Losæter, Øystein.

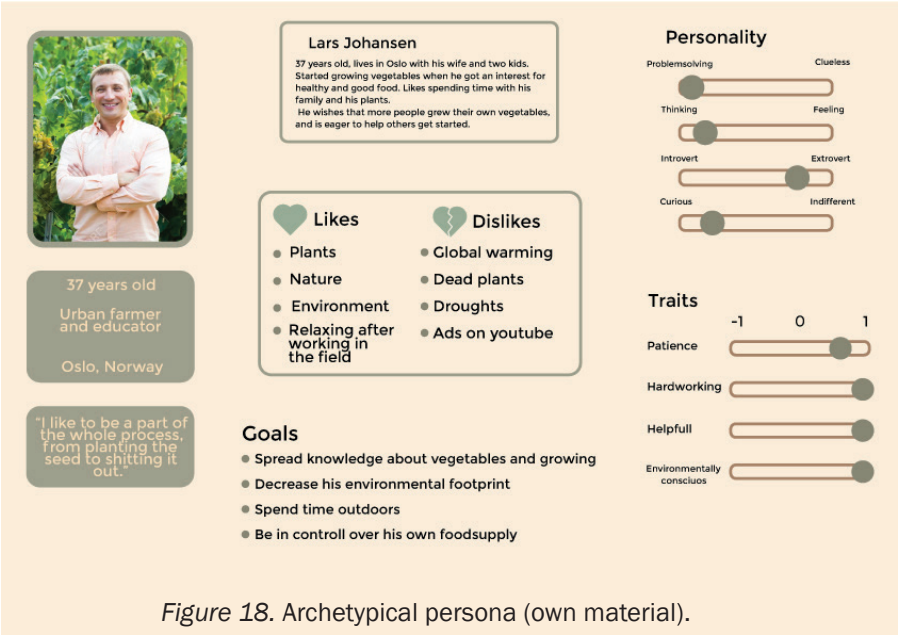


Figure 18. Archetypical persona (own material).

5. RESEARCH INSIGHTS & DATA VISUALISATION

Figures 19 and 20. Archetypical persona (own material).

When comparing these personas with the stereotypical ones, we realised we were right in several things, like the common interest for the environment and for healthy food. Nevertheless, the age range was way too narrow in the stereotypical personas and some personality traits - like being introverted, for example - were not true.

e. Our experience gardening

To gain the most insight possible within this culture, we thought one of the best approaches was to try our hands at it ourselves. Therefore, we went and got our hands on seeds, plastic trays, dirt as well as an indoor growing light. Basically, everything you need to get started.

The experience gave us a lot of insights in the general experience, from planting the seeds to harvesting your yields. We could relate to the answers we got from the surveys and we also discovered potential problems we could work with further. For example, tending to the soil, in an indoor environment you have to be careful not to spill it everywhere. As well as making it more efficient and precise to water the plants.

Also, by getting our hands on, it also made it easier for us to prepare questions for interviews and to communicate from our own experiences.

5. RESEARCH INSIGHTS & DATA VISUALISATION

5.2. General insight and focus

During the research process, our goals did not change so much, but our focus group and our priorities became clear. At first, we focused on urban agriculture, including community gardens and farms but also individuals. At the end of this phase, it was clear that we would focus on individual people and try to make a positive change in their lives in order to make that change in society.

From the answers to the form we came to the conclusion that space was a problem for gardening enthusiasts living in urban spaces, and solving this became one of our priorities. Vertical gardens were a recurrent topic from the beginning to the end of the research phase, and they are a clear example of optimising the use of space.

Other goals, such as making gardening accessible or designing a product accepted by newbies as well as experts, remained intact throughout the whole research. From our interviews with companies, we learnt that making it easy for people to garden was a relevant matter, so we kept it as one of our priorities.

With the direction the environment and the planet are taking, it is hard not to see how important our project could be. The more people tending and caring for plants, the more people would tend and care for the Earth. If we could blend furniture and home growing, we could make plants as accessible as normal furniture, thereby eliminating the problem of space for growing in most small apartments. The more plants and vegetables grown at home, lesser the amount travelled across the planet.

6. DESIGN PROCESS

In this section of the report we will present the design process that followed the research. However, the design phase did not just start when the research finished, it had started way sooner. As we gained insights during the previous stages, several concepts and ideas began to form in our minds. We started this design phase from those ideas that were born during the research process, which we call concepts. Then, through group meetings, we carried out a selection process where we decided which concepts to develop.

We started this design process with all the research insights in our heads, but we revisited them frequently along the way. Same with our goals and priorities, which we reminded ourselves of so that we would not lose focus.

In the next pages we explain the ideation methods we applied in this project, as well as the market research and, lastly, the concepts. The decisions that lead the design process are argued in this section too.

6.1. Methods for ideation and problem solving

To start the ideation phase, we had a no-boundary concept development. Come up with any concept or design that we thought could be of some use, and no idea could be too crazy. This helped us get our thoughts out on paper and made us come up with ideas that could be tweaked to use later.

The further into the project we got, the insights we got would automatically eliminate some concepts, and help us shape others into a better version of themselves.

A method we kept throughout our whole design process is the double diamond method. This method is helpful to make sure you're coming up with new ideas, and to make sure you're refining your options before you move onto the next step of the process. We started generating ideas to later eliminate them until we had only one concept to work on. We would add on and create different versions on it to later refine it into a finished concept.

With insights, our main problem to solve was to fit home growing into small apartments. Our process led us to explore different ways to merge plants and furniture together. With small apartments in mind, our product had to be space efficient and able to be brought into a small room.

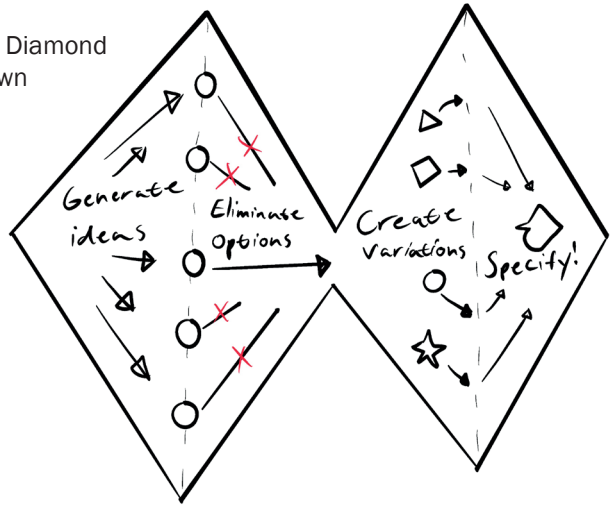


Figure 21. Diamond graphic (own graphic).

6.2. Market research

Looking at the products that already exists on the market, targeted towards our cultural group, there is a lot of variety. The essentials are a tray for holding the soil as well as the plants, and the light for growing it indoors. Most products out there categorize as kits and provides a system for you to grow in, and the more advanced and technological it is, the more expensive it tends to be.

6. DESIGN PROCESS

The market consists on everything between renting small acres of land for growing yourself, to a fully automatic growing station in your home. Our goal was to find not only what this cultural group needed, but also what they would be willing to buy.

Looking at our results, we searched throughout the market for products facilitating for indoor gardening and also being space-efficient. A result from our gathered insights taught us that most home-growers want space for growing.

To conclude the research, the market does not provide many to none modular “storing” units for plants and others. Most of those that do fit the category does not give much possibility for modularity or are oddly specific to the point they restrict the usage of the product itself.

These are the representative products we have discovered during the market research - see links on appendix E.

Figure 22. Vertical garden.

Figure 23. Shelf.

Figure 24. A Helsieni growkit.

Figure 26. Green structure.

Figure 25. Vertical garden.

Figure 27. CNC for seeds.

Figures 28 and 29. Kitchen garden.

6.3. Concepts

Summarizing the results from our survey and interviews, our focus became to merge gardening and furniture together in a functional way. We looked at the possibilities of integrating plants in chairs, in tables and even lamps, where light is already integrated. We realized how buying a piece of furniture with total focus on the plant is a huge commitment, and how a lack of effort in planting would drastically reduce the value of the furniture.

Figure 30. Sketch (own material).

Improvements on already existing tools were a consideration. We looked at a more functional scissor designed to be more accessible to people restricted to one arm usage. Also, ways to improve upon the watering experience, as that was one of the issues our insights shed light on. And from personal testing we considered a solution for spreading seeds easier when planting, as seeds require different spacing apart and doing it with no tools can sometimes prove to be a challenge. A selection of different trays that you plant in and everything sorts itself and notify you when it is ready for harvest was another solution we thought of too.

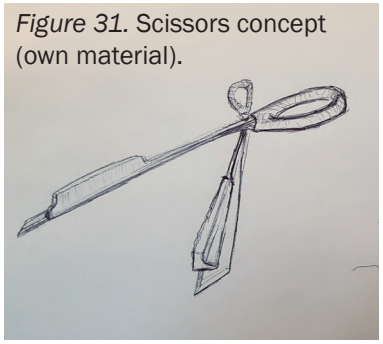


Figure 31. Scissors concept (own material).

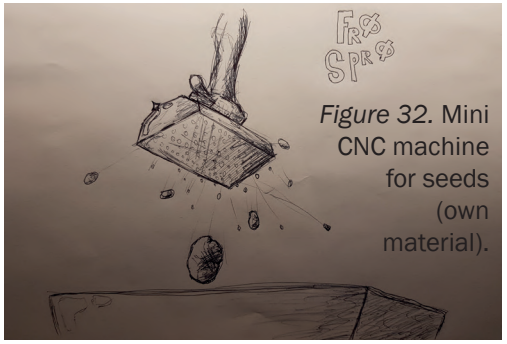


Figure 32. Mini CNC machine for seeds (own material).

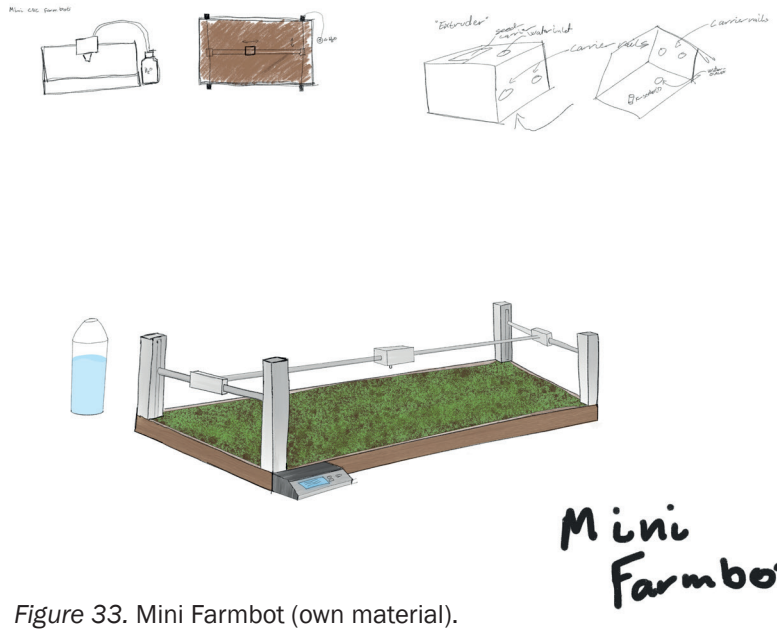
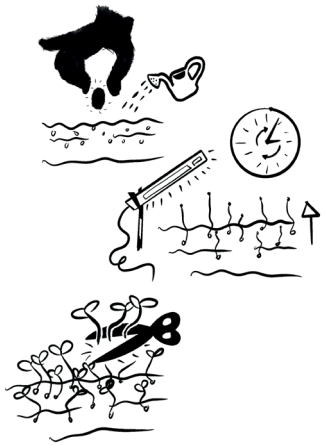
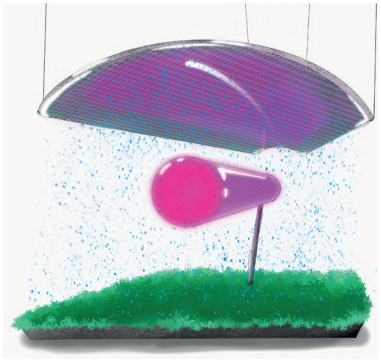
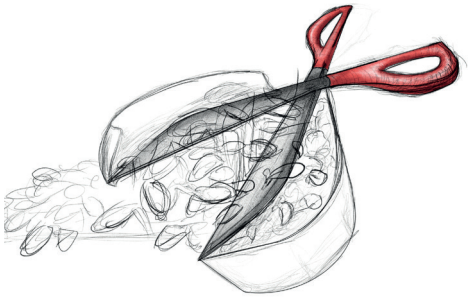


Figure 33. Mini Farmbot (own material).

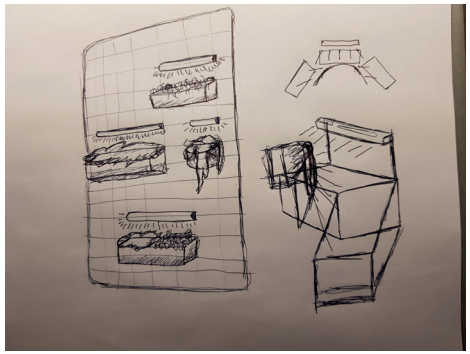
6. DESIGN PROCESS

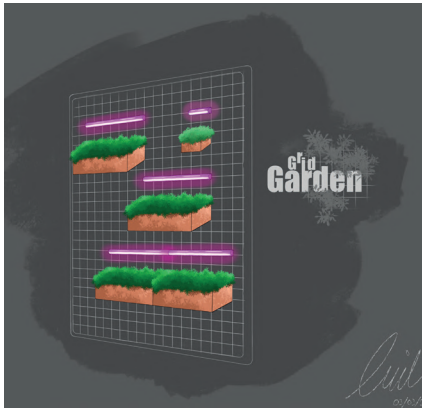


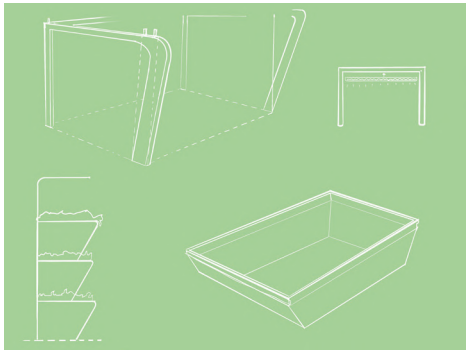


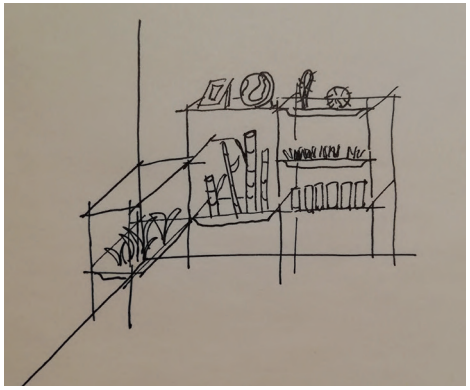


Figures 34-42. Design concepts (own material).



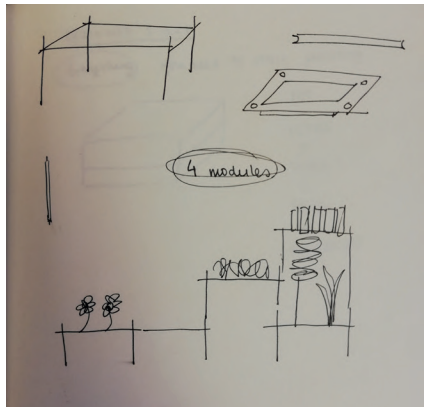


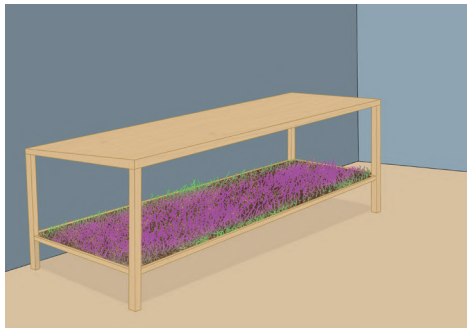


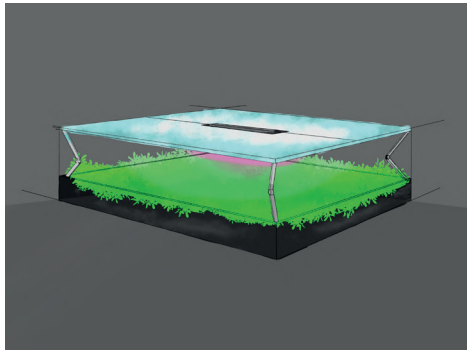


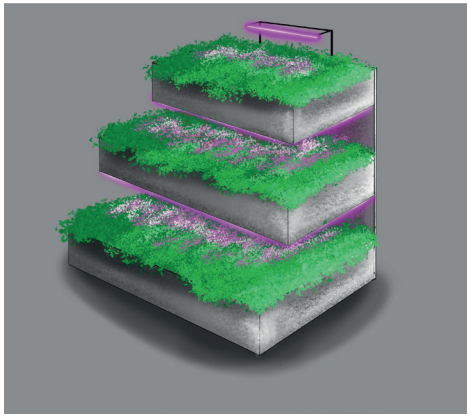
Focus on the value you could get out of the product; one of our top contenders were a combination of a gardening tray and coffee-table that would introduce plants to an area of attention in the living space. The benefits would be that gardening would have a more discreet involvement in daily living, one would not have to go out of their way to tend to them, as they are already in the area of attention. These next sketches represent the concepts we came up with related to gardening and furniture.

6. DESIGN PROCESS



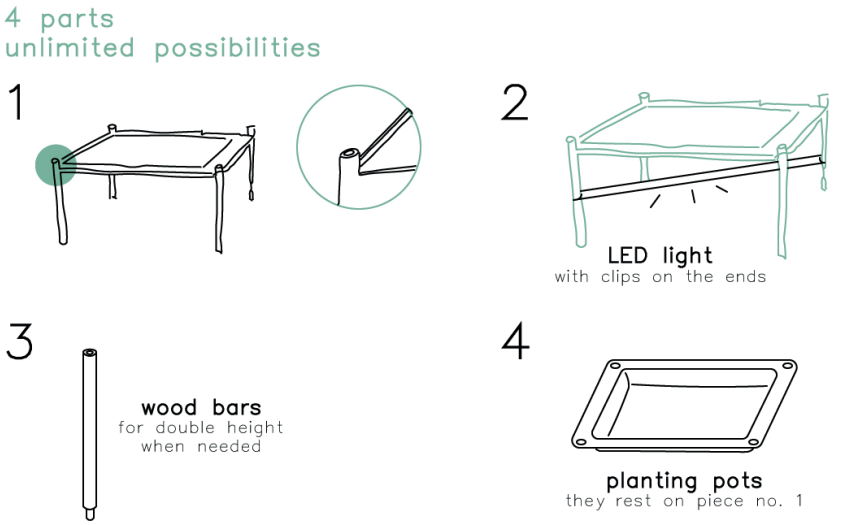






Figures 43-48. Design concepts (own material).

The concept we went for proved to be the best option in regards of modularity, giving the user a free range of options in regards to size and commitment. Available space being the most sought-after solution, we thought out a modular shelf system accessible from all sides, giving full freedom for placement in their available space. The solution being quite simple offers any user the option to use the shelf system as an ordinary shelf, or mixing shelves and trays for an all-in-one planting station. This concept gives the user the most possible options and freedom from as little as possible.



7. RESULT OF DESIGN PROCESS

Once we have set forth the research process and ideation phase, in this section we present the final product design. Firstly, we explain the final decisions regarding the shape and measurements of the design. Secondly, we address functionality as well as focus group, communication, and how the product fulfils the project's goals. Lastly, more technical aspects like materials, technical drawings, sustainability and commersialisation.

7.1. Final decisions

In the final stages of the design process, we were debating whether to focus on a coffee table or a shelving system - both integrating gardening. Finally, we decided that a coffee table had more limitations than a shelving system, specifically compared to the modular concept we had in mind. The modularity made the product personal - since you choose what is best for you - as well as flexible in space and time.

Once we decided to focus on this modular furniture concept, we developed several shapes and discussed during several group meetings which was best and why.

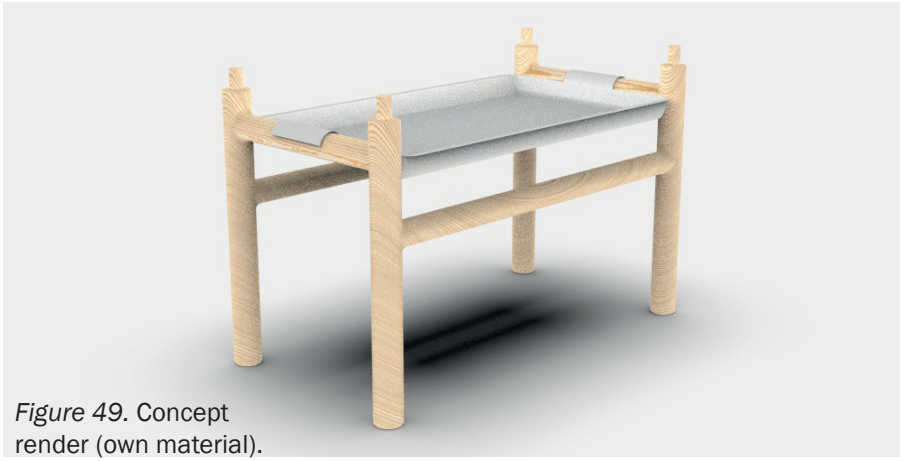


Figure 49. Concept render (own material).

Figure 50. Concept render (own material).

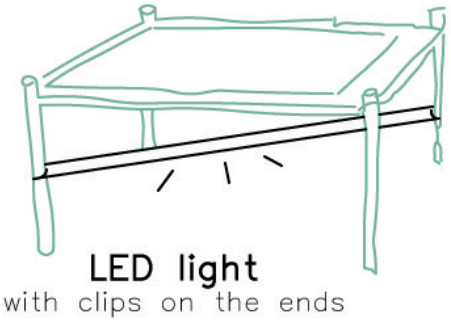
These are the two main shapes we debated about, and ended up with a combined design which took the good aspects of both modules.

The first one has a system where the tray can slide halfway out because the handles for the tray have the same shape as the wooden bars on the sides. In this module, the tray is placed on top instead of on ground level. Both structure are formed by 8 wooden bars, but the placement is different. On the first one, the long horizontal bars are placed there so the tray does not interfere with them when sliding out.

As said before, these modules could be the shelving structure for

gardening trays as well as for shelves, depending on the users' needs. In the first structure, the shelf rests on the horizontal shorter bars and, if a light is needed for the plants, it would be placed clipped to diagonal vertical bars.

Figure 51. Sketch (own material).



In the second design, the tray lays on ground level and can be slided all the way out. It rests on two wooden rectangular bars, so it has bigger support surface. A gardening light could be placed in this rectangular bars, hanging from them, and maximising the space between the light and the tray below. More space means the light can spread out more evenly, which is good for the plant.

If a shelf was to be placed in this second structure, it would rest on top of the two shorter horizontal bars, same as a gardening tray.

Both structures have the stacking method in common. There are some taps on top of the wooden legs, and same-shaped holes at the bottom of each of them, so the modules can be stacked in a safe way.

In the final product, we incorporate the positive aspects from these two shapes:

- the tray is placed on the top so that even in the lowest shelf, the tray is accessible and one does not have to bend down to water it or take a look at it;
- the bars are located similarly to the second structure, and have a rectangular profile which allows more support for the tray or shelf;
- if a gardening light is needed, the space between the light and the tray below is optimised. Standard gardening lights can be placed in this sort of structure.

Our moodboard looked like this:

Figure 52. Moodboard (own material).

7.2. Final product

7. RESULT OF DESIGN PROCESS

Our final product consists of two main parts – the modular frame and the tray. Each frame holds one tray.

The frames can be stacked vertically. Every frame is alike and has holes and plugs which fit into each other at both ends of the vertical bars. This way, the users can define the size of their furniture as well as how much space they dedicate to gardening, since the frame is designed to hold gardening trays as well as shelves.

The trays are ten centimetres deep and have handles on the two longer sides for the user to grab it easily.

Figures 53-57. Product renders (own material).

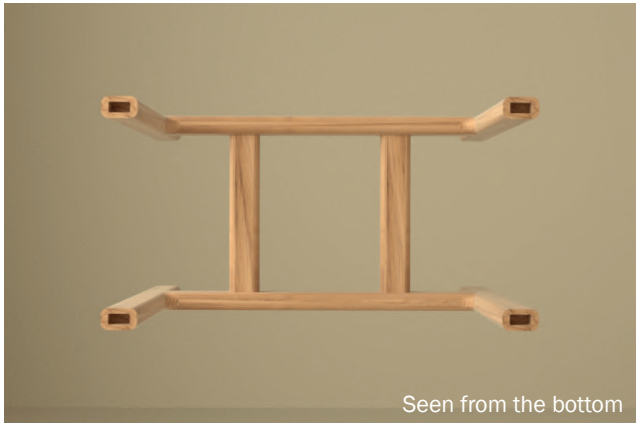
With this modular system, we give freedom to the user, which is able to decide:

- his/her commitment to gardening. It might be the case of someone who is starting to garden and wants to get slowly into it, or a gardening expert who would like to introduce gardening in his/her living areas. They both could decide whether to dedicate a shelf, or a whole set of these frames to gardening.
- how he/she uses the shelves over time. The user can change the system around, move the light frames around his/her home to a different room, divide the system into smaller ones or add more frames and trays to it.

This way, we fulfil our goal of creating a design accepted by new and expert gardeners.

This design revolves around gardening too, which means it is thought out to be used comfortably when watering the plants or tending to them. The tray is light and can be accessed from all sides. It is also possible to take it out of the frame without any interference.

Along with the main pieces - the frame and the tray - there are two supplementary pieces. One consists of wooden legs, so that some shelves can have double height in the user needs it - see next page.



The other piece has an aesthetic function: it covers the plugs on the top shelf. It looks like this:

The target group are people with an interest in growing plants or herbs themselves but have little outdoor opportunities. Our main target are people interested in indoor gardening that live in urban spaces.

See next page for the measurements of the final product.

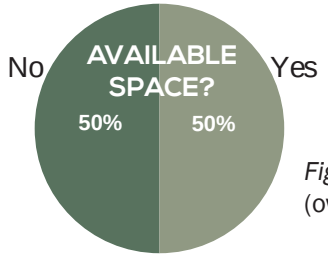
7.3. Communication and analysis of the product

We wanted to communicate and enlighten the idea for people to be more aware of growing their own food. We also wanted to have a focus on eco-friendliness because it's an important aspect. That lead to the idea of simplifying the product as much as possible, having just the essential components and achieving a simple natural appearance. With that in mind, we came up with a modular design that lets the user adapt the product to their needs and liking.

As for utilizing the space in a best possible way, we decided that vertical stacking was the best solution. This is also something we saw from the microgreen-community, where vertical farming is the most practised way of doing it. Many people are young and may live in small spaces, therefore space-utilization was an important aspect for our product to be successful in our target group.

As said before, a core value for the gardening community is eco-friendliness and caring for food and the environment. Therefore, being kind to the planet is something we wanted our final product to represent too. We achieved this by avoiding sharp edges, implementing rounded shapes and natural or recyclable materials.

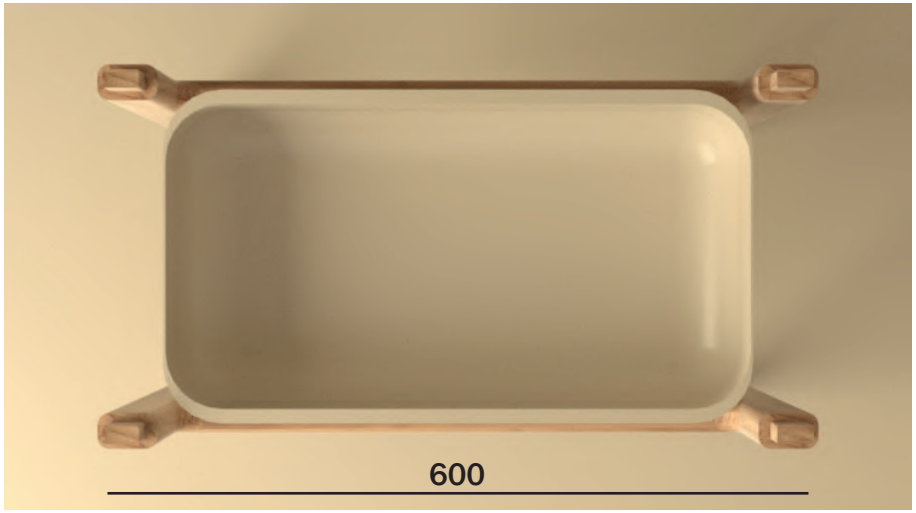
If the product were to be produced, we would seek out local producers to work with.

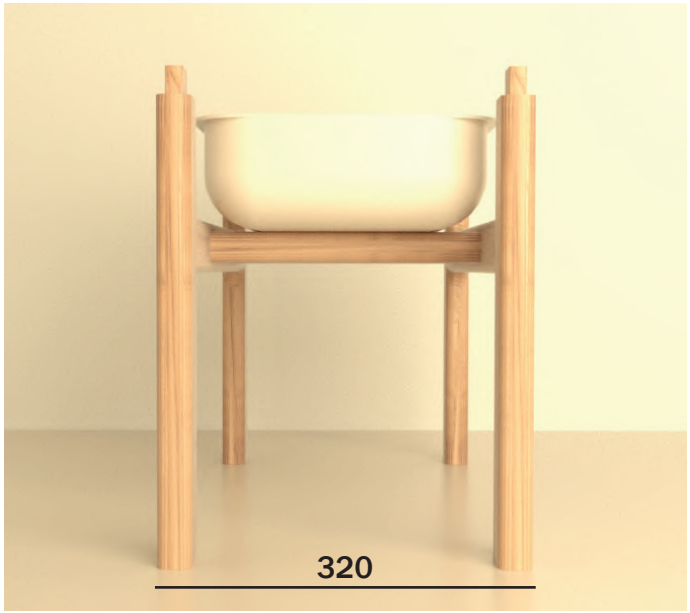


Figures 58. Graphic (own material).

7. RESULT OF DESIGN PROCESS

Figures 59-62. Product renders (own material).





These are the exterior dimensions of the product. We decided the size of the product looking at several reasons. The frames had to be light because they would be moved around and stacked, but not too small because the size of each gardening tray had to be relevant. Also, the frames could not be too tall, so that the stacking system would make sense in a standard room. We looked at the height of coffee tables as guidance.

The final decision was 600x400x320mm.

7.4. Materials

As for materials of the product, we wanted it to be sustainable, long-lasting and to be fit for the purpose.

The decision about the material for the frame was intuitive and direct, since we had in mind the community values as well as the three mentioned conditions we wanted the material to fulfil. We chose wood for the modular frame, since it's an organic and long-lasting material. Wood gives a relaxed expression and feeling, instead of - for example - metal, which is a hard and industrial material. Moreover, wood has a weight-by-density ratio which makes it ideal for this structure, since it is not too light -it stays in place and can be stacked - and not too heavy - can be easily moved. It is also a resistant material which will withstand the weight of the gardening trays. Lastly, wood is easy to obtain and can be locally produced.

As for the tray, the decision was not so direct. The most common materials for planting pots are clay/ceramic, concrete, plastic, cardboard, metal, fiberglass and foam. We researched different materials to find the best fit, which had to fulfil important criteria as aesthetics, purpose and environment-friendliness.

Figure 63.

Clay/ceramic:

Generally, lasts longer than plastic and has a much more subtle CO2 footprint. Clay is a natural as well as affordable material. It looks good and can come in many different finishes to reach a larger audience. It is quite a heavy material, meaning the trays would weigh a lot if they were made of ceramic. They would also need to be a certain thickness - thicker than other materials -, in spite of the support it would have within the structure. Ceramics are not very resistant against shock impacts, which is a big inconvenient, because the trays could crack and need to be replaced.

Figure 64.

Concrete:

It would need to be a thick surface with reinforcements for it to work for our structure, which results in it being too heavy. Concrete is a very heavy material - for the structure as well as for the user - and concrete trays would not be easily moved. This material also has a negative environmental impact. On the positive side, concrete would create an industrial and rustic appearance together with plants, but it is just not the appropriate material for our project.

7. RESULT OF DESIGN PROCESS

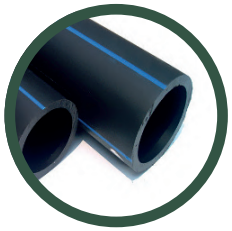


Figure 65.

Plastic:

There is a lot of different types of plastic, and the different types consist of a range of synthetic or semi-synthetic organic compounds. However, there are an array of variants that are made from renewable materials such as polyactic acid from corn or cellulosis from cotton linters.

We looked into HDPE-plastic as an option because it had some interesting properties. It has a really high strength-to-density ratio, while being easy to recycle, even at home. It also provides a good appearance by being opaque, not see-through. It can withstand temperatures up to 120°C, which enables you to sterilize it without damaging the tray. For example, if the trays were going to have another purpose and the user wanted to kill the bacteria and mold. There are also some companies, like Plasticiet, which produce recycled HDPE from discarded pieces of plastic, creating a circular system with the material and making it sustainable.

Figure 66.

Cardboard:

Cardboard is a stiff, strong and light-weight paperbased material. There are many different types, but the most common one is made up of three layers of brown kraft paper. It's not waterproof by itself, and would get soggy fairly quick. It's more more ideal for smaller and less serious projects.

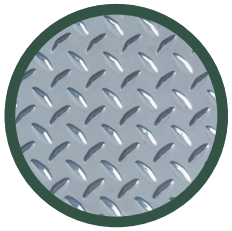
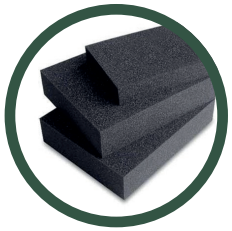


Figure 67.

Metal:

Metals are a really diverse material group. Metals are usually really dense, which makes them heavy. The upside of metals is that many sorts are really stiff, which enables them to keep its shape while still being really thin. Nevertheless, the biggest inconvenient is that metal rusts. If we were to use metal, it would have to be galvanized to prevent corrosion from the moisture in the wet soil.

Figure 68.



Foam:

Foam is a great material for growing plants in. Styrofoam is really lightweight and holds it shape well. Anyways, it can be really fragile and the appearance is not the best.

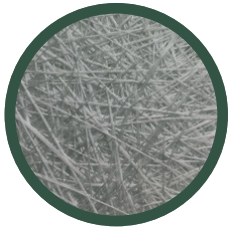


Figure 69.

Fiberglass:

It is a lightweight material which is not altered by UV exposure, so the colour would not change over time. Fiberglass pots are not as cheap as plastic pots, but they are much more durable. The main issue is that the price is out of range for our goals and target group.

7. RESULT OF DESIGN PROCESS

Finally, we chose HDPE-plastic. It is a recyclable plastic which has great resistance properties while being light and having a lot of possibilities for its finish (colour, texture, shininess, ...).
Figure 70. HDPE icon.

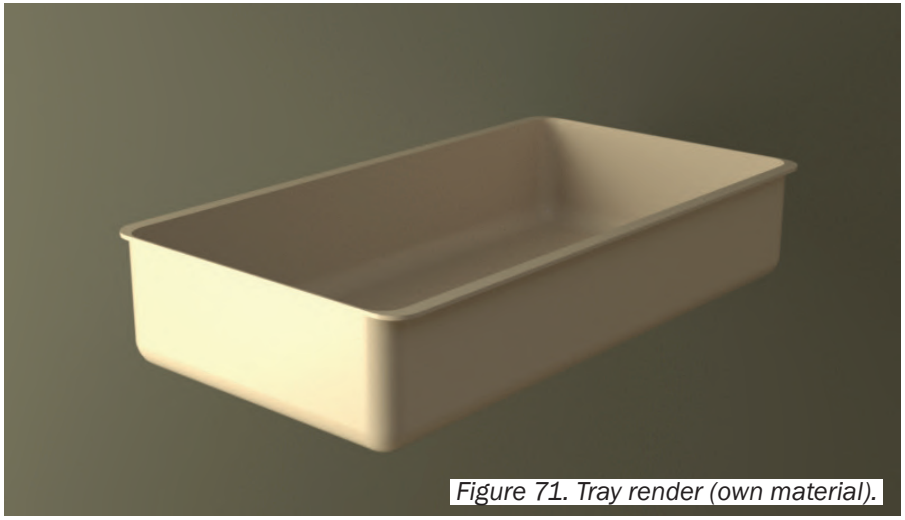


Figure 71. Tray render (own material).

7.5. Sustainability

Sustainability is an important part of our project, since our target group values nature and the environment. We want to make our product with as little waste as possible, and we want the end-user to be able to fix the product if it gets damaged. Our target group values short-travel food, fresh food, and all the benefits on health growing your own food brings.

We want our economy model to be circular, meaning that if something breaks, the end-user can send the broken part back, and get a new one. Let's say the HDPE tray breaks, the end-user sends it back to us, then we send a new tray back to the end-user, and we recycle the old one.

The HDPE plastic we want to use for the tray is an High Density Polyethylene, which is easy to remelt and reform. We imagine this would be the best way to solve the sustainability part when using plastic. HDPE is also a very tough material, and designed the right way it will last for decades.

For the frame itself we want to use locally sourced wood. We want to offer more than one type of wood, so that the end-user can choose what color, grain and tactile surface they want. We want the frame to be a showcase in any room, and we want the user to be emotionally attached to the product. We try to stay away from any "fast fashion" choice, so that our product is not just popular for a year - instead, it just does not go out of fashion.

Oak would be a good option since it is a durable and dense wood often used in furniture, and since it is resistant to rot, it would fit really good in our application. Birch is also used a lot in furniture, but it is not as resistant to rot as oak is. There are different oils and lacker you could use to protect the wood. Pine is also a locally abundant material, and it is used primarily in construction. It is resistant to rot, but the finish of the wood is not as premium as the others.

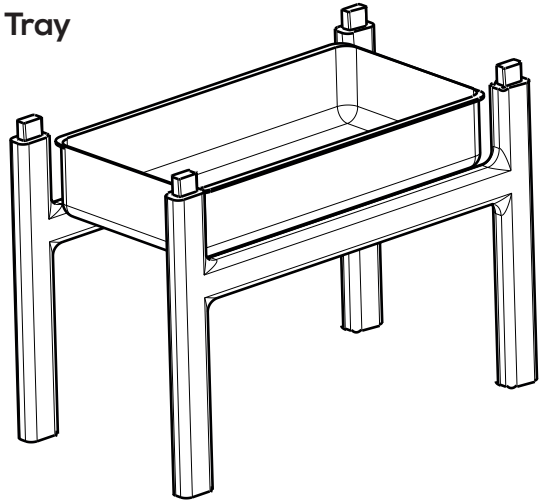
7.6. Technical drawings

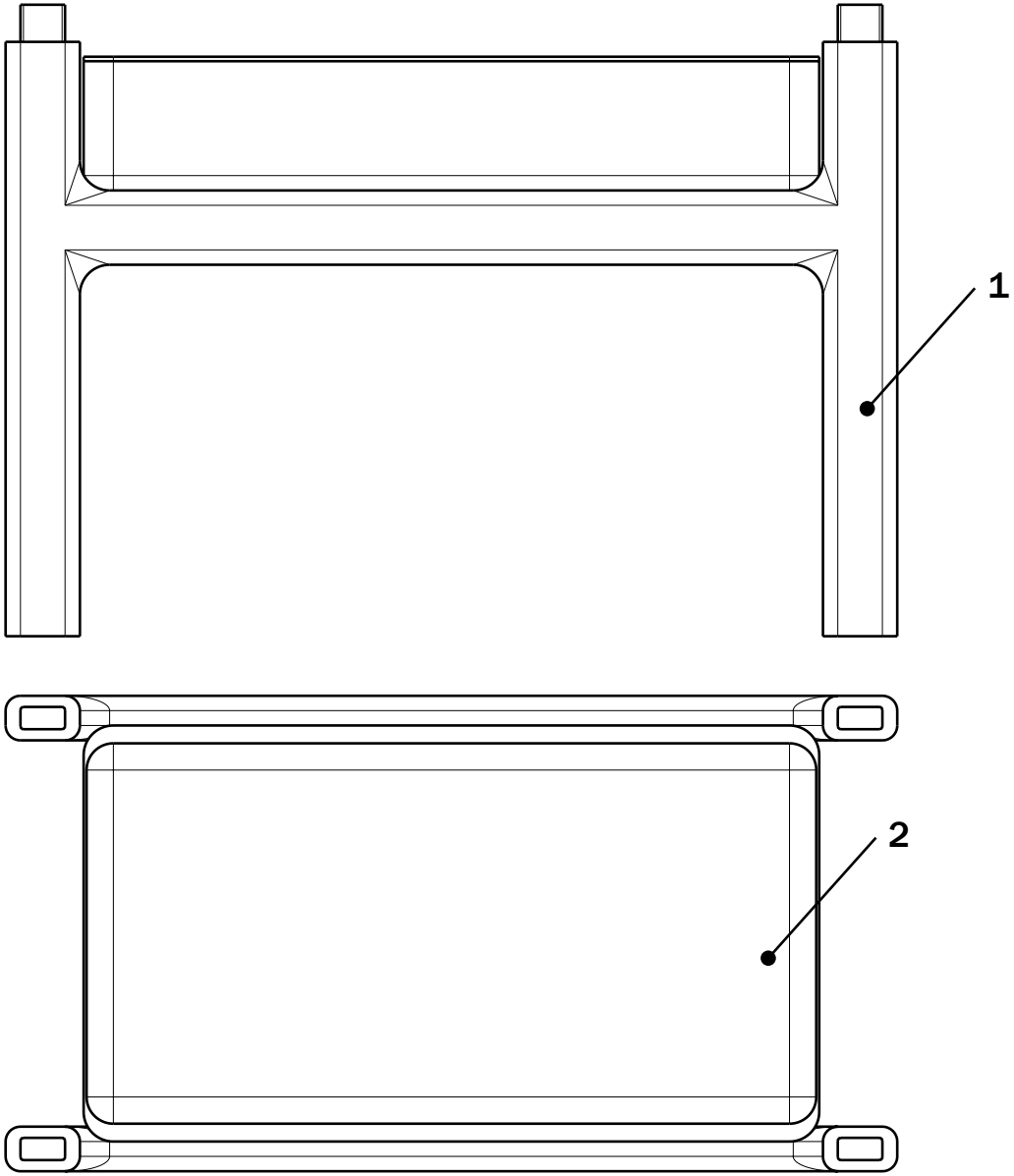
In the next pages of the report we present the technical drawings we have generated for the main as well as the supplementary pieces of the final product.

Check appendix F to see the technical drawings in their technical format and bigger scale.

7. RESULT OF DESIGN PROCESS

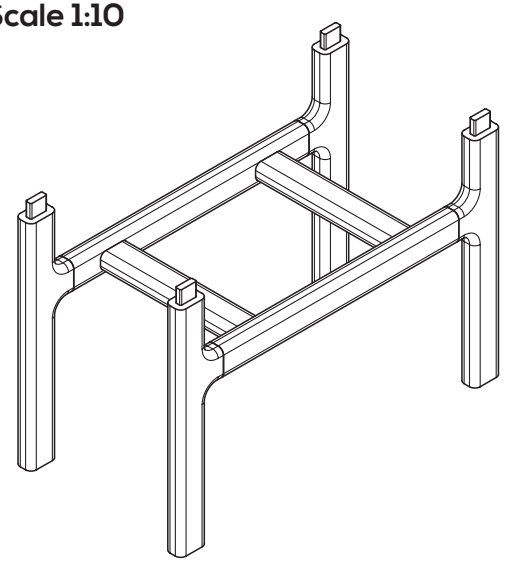
Technical drawing no. 1
Product
Scale 1:5
1 - Structure
2- Tray

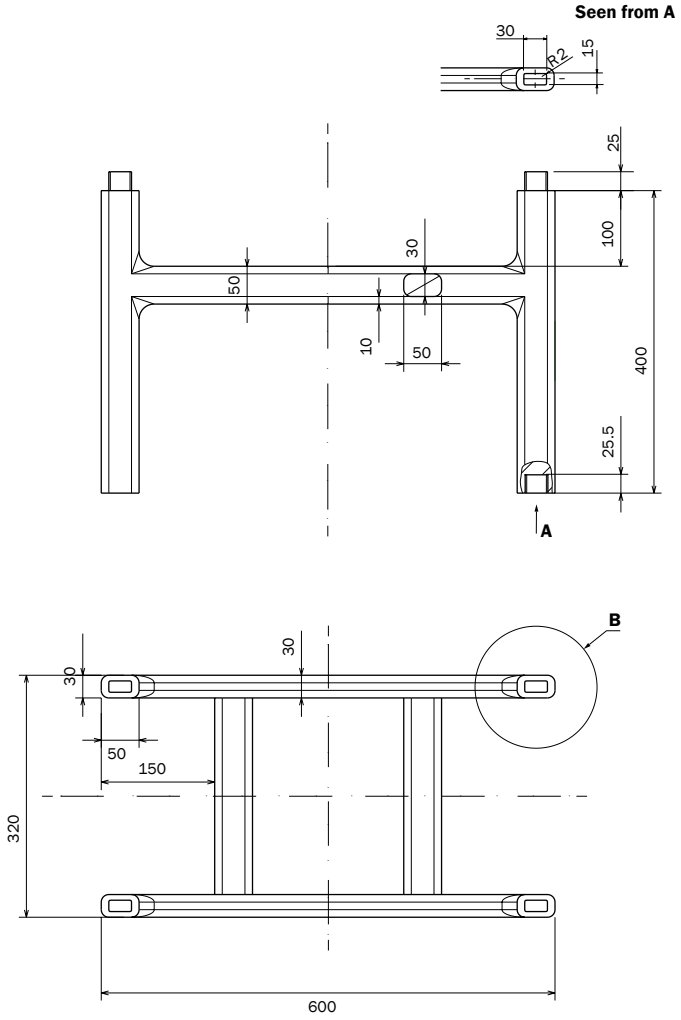




7. RESULT OF DESIGN PROCESS

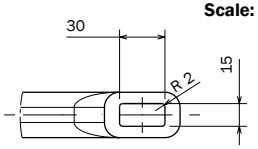
Technical drawing no. 2
Structure
Scale 1:10





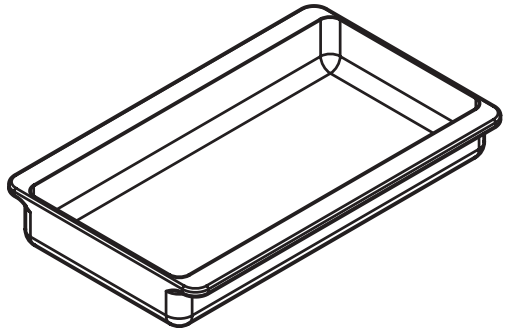
30x50mm structural profile
Fillet radius: 10mm

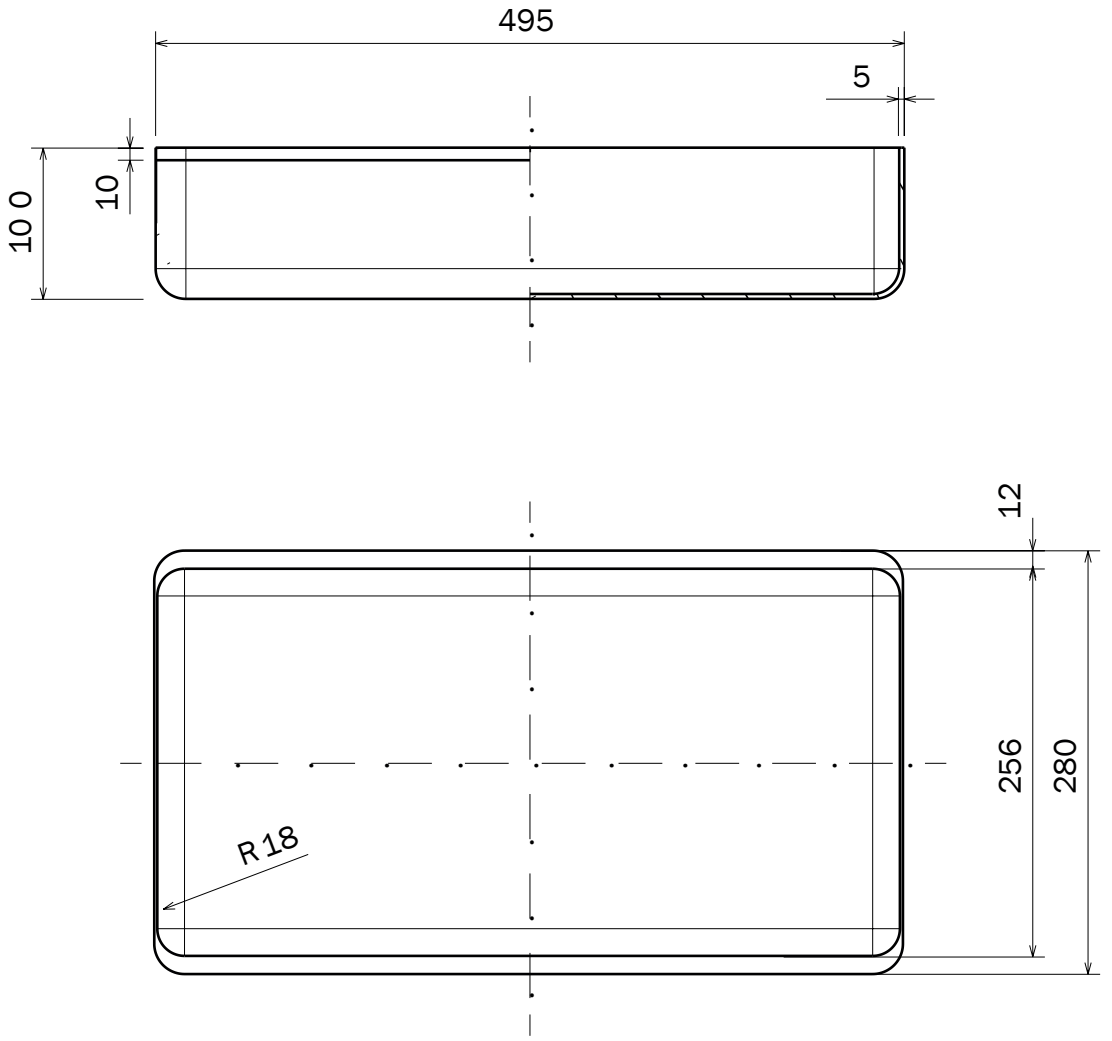
Detail B
Scale: 2:5



7. RESULT OF DESIGN PROCESS

Technical drawing no. 3
Tray
Scale 1:5

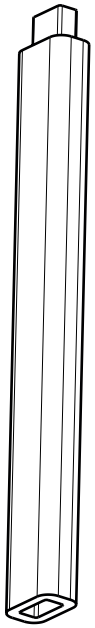


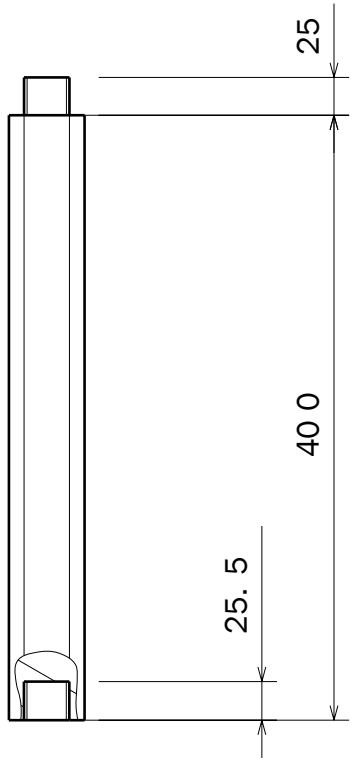


Fillet radius: 20mm

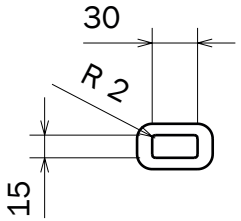
7. RESULT OF DESIGN PROCESS

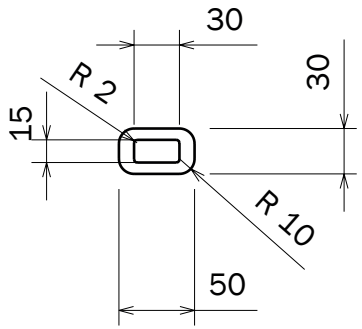
Technical drawing no. 4
Leg
Scale 1:5





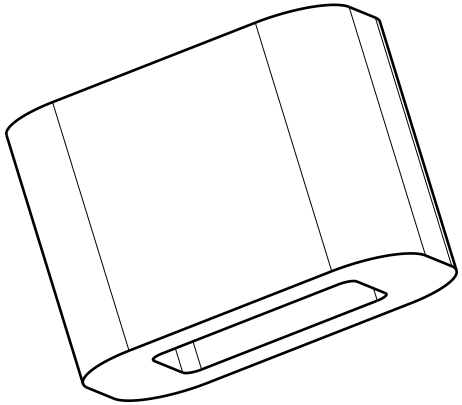
Seen from the bottom:

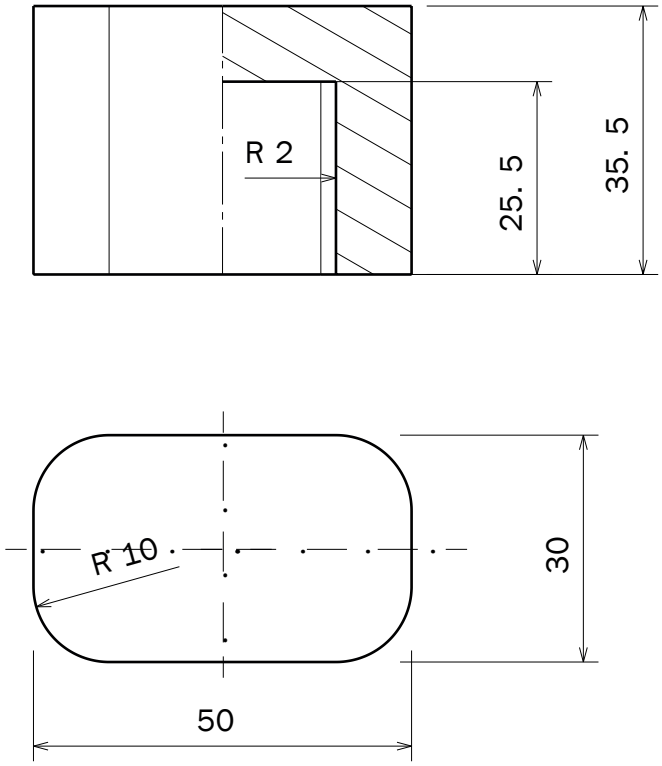




7. RESULT OF DESIGN PROCESS

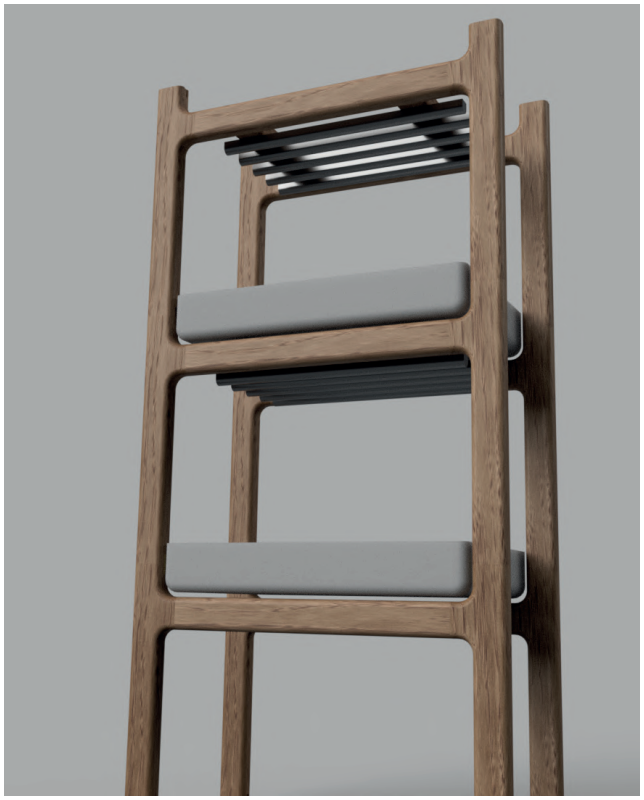
Technical drawing no. 5
Cap
Scale 1:1





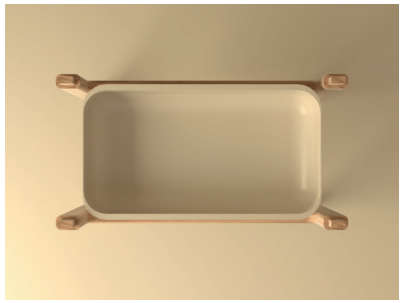
7.7. Renders and visuals

As part of the project, we have experimented with the 3d models and created renders as well as compositions.



Figures 72-88. Product renders and content (own material).

7. RESULT OF DESIGN PROCESS



7. RESULT OF DESIGN PROCESS

In the next pages, we present some possible combinations as well as some renders with integrated drawings.

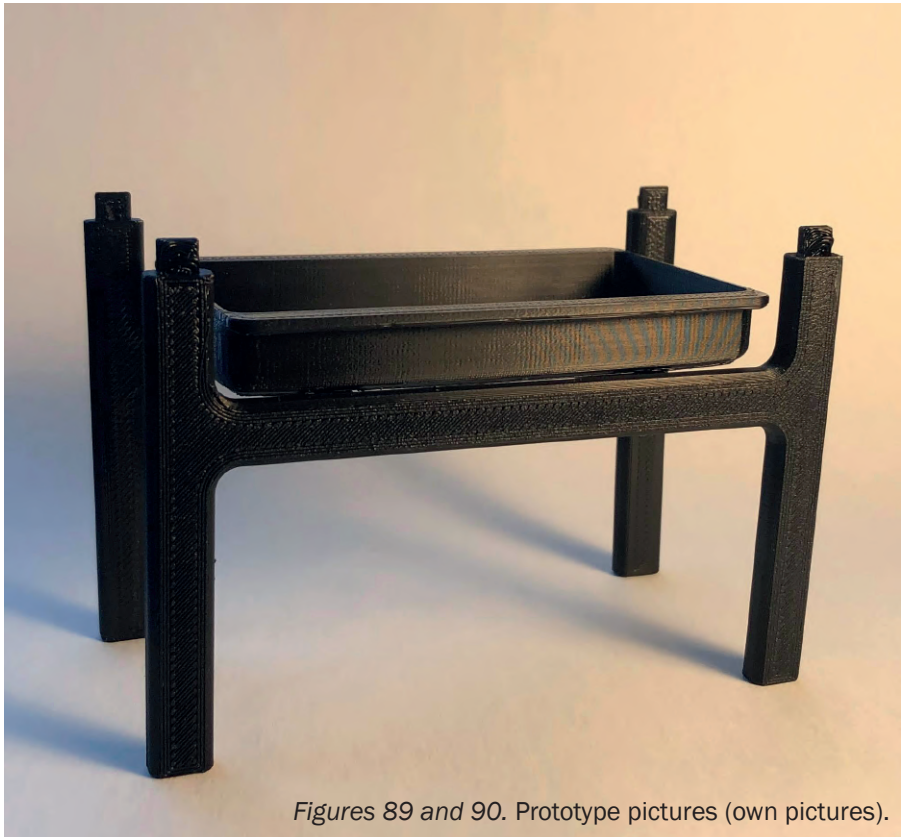
7. RESULT OF DESIGN PROCESS

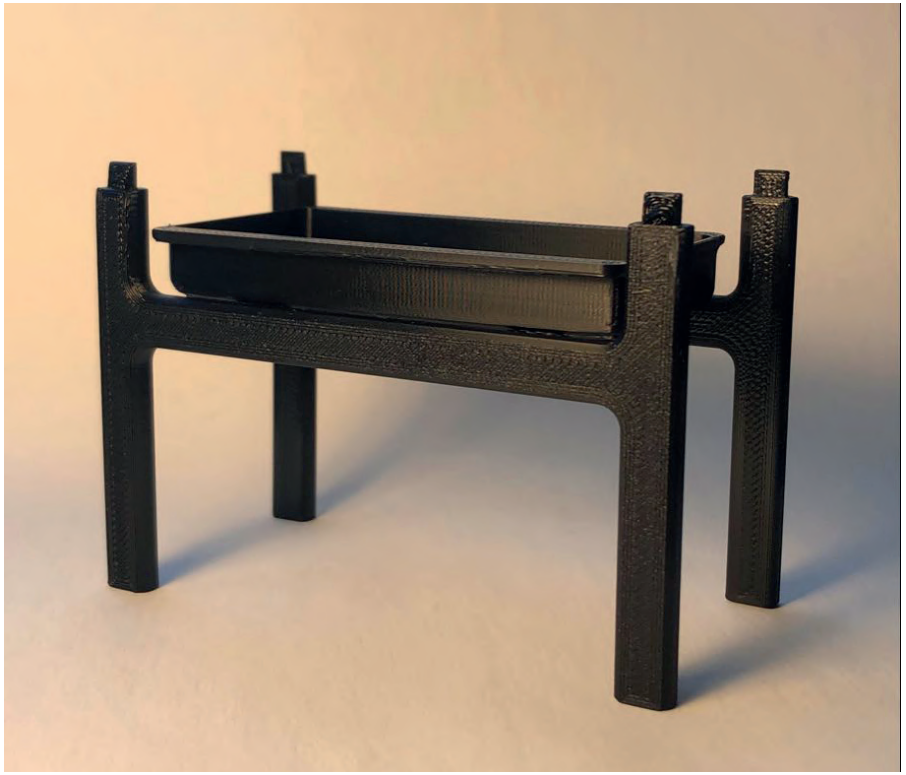
7.8. Commercialisation

One of the main characteristics about the product is the freedom it conveys. That is why, when it comes to selling the pieces, we want this to remain intact. Each piece will therefore be sold individually, so that the user can totally personalize their purchase.

7.9. Prototype

We wanted to create a prototype with the resources we had available, so we 3D-printed a set in 15% size: a frame and a tray. This was the result:





Figures 89 and 90. Prototype pictures (own pictures).

8. CONCLUSION

This project lasted over 3 months. Starting blind, not knowing anything about the home-growing culture, we have learnt a lot about the people and their interest.

Getting insight in this culture taught us that the hardest thing is getting started. Being in contact with the people involved, we saw a whole lot of enthusiasm and passion, not only is this a hobby for some, but it's a lifestyle. For many, the produce they grow is a part of their diet, making home-growing an essential part of their lives. And for us, that was an eye-opener.

In the beginning, it was easy for us to visualize products in the form of tools. But the more insight we got, we learnt that the problems weren't there. Home-growing and gardening itself is already separated into its necessary components, the only thing missing is the space to do it. And that's where we based our product. One of our goals to begin with was to make a product accepted by the enthusiasts in this field, as well as making it more accessible for beginners. We believe that the product we came up with is the perfect solution to both.

To focus on lack of space in small apartments, we wanted to incorporate modularity. Giving the user as much freedom of space as possible, as if one were to plant in their own garden. It was also important for us that our product would be sustainable and to last generations. The plants might not last a lifetime, but the shelf sure will.

The modular shelf system is the perfect product for anyone who wants to grow at home. As it in itself can take either the least amount of space, or can be spread out to fill the room. Where it once was not green will not be no more!

In the end, we feel like we have found a suitable product that can blend nature into any indoor environment and that we've given a lot from a simple product. We only wish that circumstances could be different, so that we could build a prototype to try out properly.

9. REFERENCES

A Helsieni growkit [photography]. (2015). Retrieved from http://www.helsieni.fi/en/home

Vertical Garden [photography]. (2020). Retrieved from https://www.fronda.com/productos/huerto-vertical-de-madera-suelo

Shelf [photography]. Retrieved from https://gardenersyards.com/best-indoor-garden-shelves/

A Helsieni growkit [photography]. (2019). Retrieved from https://www.helsieni.fi/en/helsieni-growkit/

Vertical garden [photography]. (2020). Retrieved from https://www.fronda.com/productos/huerto-vertical-de-madera

Green structure [photography]. (2019). Retrieved from http://www.ecologicstudio.com/v2/projects.php?idsubcat=4

CNC for seeds [photography]. Retrieved from https://farm.bot/pages/genesis

Kitchen garden [renders]. Retrieved from https://www.auk.eco/

Clay/ceramic [photography]. Retrieved from https://www.enasco.com/p/Nasco-White-Earthenware-Clay%2B8300160

Concrete [texture]. Retrieved from https://r2backdrops.com/products/concrete?variant=28577789116468

Plastic [photography]. Retrieved from http://www.irri-altal.com/shop_products_pipes_palad_hdpe

Cardboard [vector image]. Retrieved from https://www.vectorstock.com/royalty-free-vector/cardboard-texture-background-vector-12556694

Metal [texture]. Retrieved from https://www.homedepot.com/p/M-D-Building-Products-1-ft-x-1-ft-Diamond-Tread-Light-Weight-Aluminum-Sheet-57574/301173487

Foam [photography]. Retrieved from https://www.indiamart.com/proddetail/die-cut-hard-foam-21075851191.html

Fiberglass [texture]. Retrieved from https://www.alibaba.com/product-detail/High-quality-Fiberglass-CSM-surfacing-mat_60552086002.html

HDPE icon [icon]. Retrieved from http://reciclario.com.ar/indice/plastico-2/polietileno-de-alta-densidad-o-pead-2/

10. BIBLIOGRAPHY

MaterialDistrict. (5 February 2019). Plasticiet. Retrieved from https://materialdistrict.com/material/plasticiet/?fbclid=IwAR2Mb-5qmoJPGJK-CYdMiGOqr6PRgb7O0SnETfpcS9iG6w7erddul3oZxd5U

BonniePlants. (03.25.2020). What Are Pots Made From? Retrieved from https://bonnieplants.com/gardening/what-are-pots-made-from/

Grant, B. (01.07.2020). Clay Pots vs. Plastic Pots – Should You Use Clay Pots Or Plastic Pots. Retrieved from https://blog.gardeningknowhow.com/gardening-pros-cons/clay-pots-vs-plastic-pots/

Madore, J. D. (2020). Plastic Pots vs Clay Pots For Plants – Pros and Cons. Retrieved from https://greenupside.com/plastic-pots-vs-clay-pots-for-plants-pros-and-cons/

Urbine, C. (September 23, 2016). The Pros and Cons of Fiberglass Planters. Retrieved from https://plantersetcetera.com/2016/09/23/pros-cons-fiberglass-plant-containers/

Gibson, A. (2016). Choosing a Pot Plant Container – The Pros and Cons. Retrieved from https://themicrogardener.com/choosing-a-container-the-pros-and-cons-2/

Mother. (2020). Retrieved from https://www.mother.life/

ecoLogicStudio. Retrieved from http://www.ecologicstudio.com/v2/index.php

farm.bot. Retrieved from https://farm.bot/

Auk. 2020. Retrieved from https://www.auk.eco/

Fronda. (2020). Retrieved from https://www.fronda.com/

Heggdal, Ø. (2017). Myter om urban matproduksjon. Retrieved from https://www.nationen.no/faglig-snakka/myter-om-urban-matproduksjon/

Barbosa, G. L., Gadelha, F. D. A., Kublik, N., Proctor, A., Reichelm, L., Weissinger, E., ... & Halden, R. U. (2015). Comparison of land, water, and energy requirements of lettuce grown using hydroponic vs. conventional agricultural methods. International journal of environmental research and public health, 12(6), 6879-6891.

Gardeners Yards. Best 6 Indoor Garden Shelves – How To Maximize Your Grow Space? Retrieved from https://gardenersyards.com/best-indoor-garden-shelves/

Helsieni. (2020). Retrieved from https://www.helsieni.fi/en/home/

Edible_Schoolyard. (2020). Retrieved from https://edibleschoolyard.org/

Climate ADAPT. (2020). Retrieved from https://climate-adapt.eea.europa.eu/

Publications Office of the European Union. (2020). Retrieved from https://op.europa.eu/en/home

European_Commision. (2020). Sustainable land use (greening). Retrieved from https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/greening

European_Commision. (2020). Future of the common agricultural policy. Retrieved from https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en

10. BIBLIOGRAPHY

Spire.org. (2020). Retrieved from https://www.spireorg.no/

Better Health. (August 2014). Gardening - people with disabilities. Retrieved from https://www.betterhealth.vic.gov.au/health/healthyliving/gardening-people-with-disabilities

VisitOslo. (2020). Comer verde. Retrieved from https://www.visitoslo.com/es/oslo-para-ti/oslo-verde/comer-verde/

Universitetet i Oslo. (2020). The Botanical Garden – a living museum. Retrieved from https://www.nhm.uio.no/english/visiting/botanical-garden/

EcoTrail Oslo. (2020). DISCOVER GREEN OSLO. Retrieved from https://oslo.ecotrail.com/en/discover-green-oslo

Naturvernforbundet. (2020). Nature intro. Retrieved from https://naturvernforbundet.no/nature/category987.html

Losæter. (2020). Retrieved from http://loseter.no/#sosial-media

Tøllefsen, L. E. (June 20. 2012). Herligheten, urban gardening in Oslo. Retrieved from https://ecosistemaurbano.org/english/herligheten-urban-gardening-in-oslo/

Geitmyra. (2020). Geitmyra Culinary Center for Children. Retrieved from https://www.geitmyra.no/english

Nabolagshager. (2020). Tak for maten. Retrieved from https://nabolagshager.no/prosjekter/tak-for-maten/

FutureFarmers. (2020). Retrieved from http://www.futurefarmers.com/
Urtehagen_på_Grønland. (2020). Retrieved from https://www.facebook.com/Urtehagen/

verdecora. (2020). Retrieved from https://verdecora.es/

LeroyMerlin. (2020). Macetas y jardineras de interior. Retrieved from https://www.leroymerlin.es/jardin-terrazas/macetas-jardineras/macetas-interior?sort=default&gt=4-col&offset=1&index=7

Plantasjen. (2020). Innepotter. Retrieved from https://www.plantasjen.no/innepotter/

Foodstudio. (2020). Retrieved from https://foodstudio.no/

Epic Gardening. (16. Des). How to Grow Microgreens from Start to Finish. (COMPLETE GUIDE)
Retrieved from https://www.youtube.com/watch?v=dtvuMNVLISo&t=4s

APPENDIX

Cultural Understanding and Communication
Group 3

APPENDIX A

CULTURAL UNDERSTANDING - GARDENING

DESIGN BRIEF

1 - INTRODUCTION

As we become more aware of the need to care for nature, there have been efforts to introduce plants into urban spaces and into our everyday lives.

Vertical gardens, community gardens, micro-greens and vegetal structures are some examples of these efforts.

We want explore gardening to make our lives greener and promote a hobby that benefits us all.










2 - INFORMATION

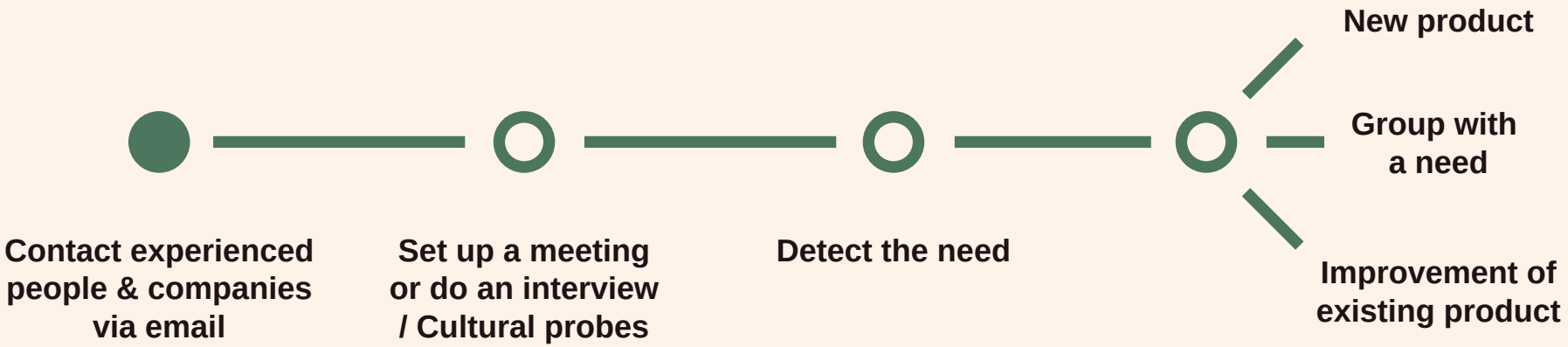
Our main way of contacting people has been by email. During our research, we have got in touch with:

- brands who work in projects sharing agriculture and gardening
- brands who work with microgreens
- urban agricultural communities & community gardens

Personal experiences and perspectives:
We interpret gardening as a calming hobby, where one does not need too much to begin, but there is no boundary on where to end. We are motivated to work on something that we are unfamiliar with. As more and more people bring attention to environmental change, people want to make positive changes to their everyday routines. Just by growing some of your own veggies and greens you can start your path to a zero-waste lifestyle.

3 - RESEARCH

The first step on our research was to garden some plants ourselves. We bought some fast-growing seeds and a LED light to provide light.

4 - RESEARCH QUESTION

How can we introduce agriculture to more people in urban living?

How can we share the culture of gardening?

How do we make this benefitial hobby more popular?

5 - GOALS & CRITERIA

- **Make agriculture accessible for an everyday person**
- **Design a product accepted by enthusiasts**
- **Design a sustainable product**
- **Getting more experience working with new research methods**

APPENDIX B

1. Stereotypical personas

Erik Knutsen

34 years old
Oslo, Norway

Erik was born in the south of Norway, but he moved to Oslo for work. He went vegan in 2008 when he realised his lifestyle was not friends with the environment. He plants vegetables and some other stuff in his little attic balcony and on the kitchen counter.

Personality

Extroverted — Introverted

Active — Lazy

Smart ass — Indifferent

Routine

Frustations

1. The weather in winter
2. Non-vegans
3. Buying vegetables in the supermarket
4. Cactus

Age :	26
Work :	Biologist
Family :	Husband
Location :	Denver, CO
Character :	Nature Enthusiast

HANNA BAKER

«I feel like there`s a smarter way for me to transition into a healthier lifestyle»

Motivations

Personality

Goals

- To cut down on food-related costs
- To live a healthier lifestyle
- To try to live a happy life, and encourage others to do the same

Preferred Channels

Frustrations

- Market being too focused on unhealthy and processed foods
- Not having enough space to farm all the vegetables she wants

Brands

iHerb

patagonia

HERBALIFE

Bio

Hanna is a biologist and nature enthusiast from Denver, Colorado. She has since her teenage years been interested in eating healthy, and supplying her body with the right nutrients. Hanna is a social, outgoing and energetic human being. She is very passionate about her work and loves what she does. Occationally she will have a drink or two, but she is trying to cut down on her alcohol intake.

2. Archetypical personas

Anna Hansen

50 years old
Trondheim
Works fulltime
Has 2 children

gardening

Her main hobby is gardening, and likes that it is easy to get in contact with other people through the parsellhage. Anna has been growing her own vegetables for 2 years now. She prefers buying stuff new instead of making things herself.

Anna likes gardening because...

- easy access to fresh vegetables
- it's fun
- no dangerous chemicals
- sense of achievement
- cooking with food she has grown

37 years old

Urban farmer and educator

Oslo, Norway

"I like to be a part of the whole process, from planting the seed to shitting it out."

Lars Johansen

37 years old, lives in Oslo with his wife and two kids. Started growing vegetables when he got an interest for healthy and good food. Likes spending time with his family and his plants.
He wishes that more people grew their own vegetables, and is eager to help others get started.

Likes

- Plants
- Nature
- Environment
- Relaxing after working in the field

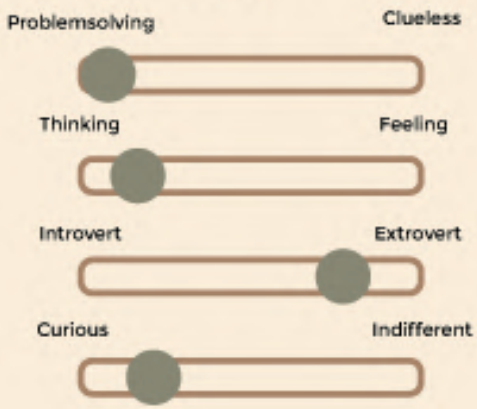
Dislikes

- Global warming
- Dead plants
- Droughts
- Ads on youtube

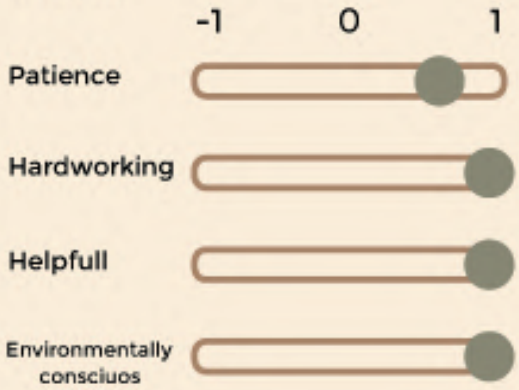
Goals

- Spread knowledge about vegetables and growing
- Decrease his environmental footprint
- Spend time outdoors
- Be in controll over his own foodsupply

Personality



Traits



David

23 years old
Madrid, Spain
Student

David shares a flat in the city centre with two other students. He likes organic food and going to the gym, as weel as hanging out with his friends and going for walks. He gardens vegetables and little plants around his flat.

	hrs/week
GARDENING	3
STUDYING	7
GYM	3
FRIENDS	8

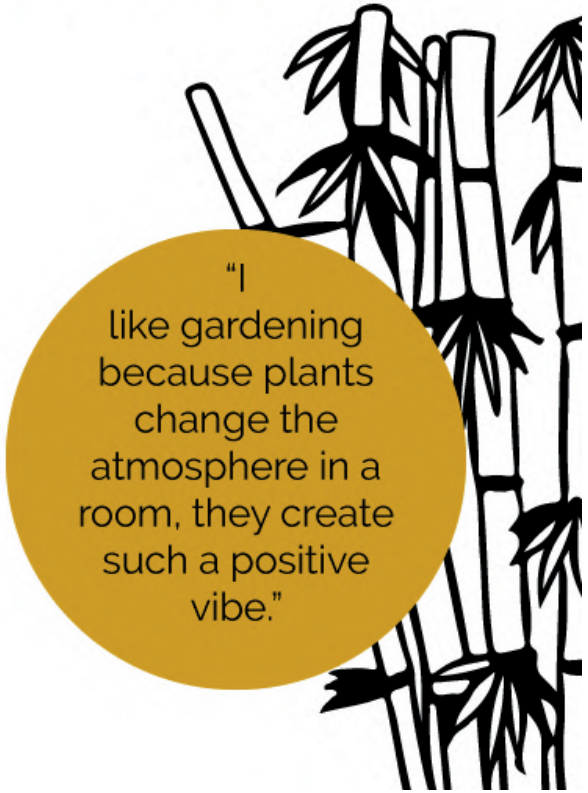
PERSONALITY TRAITS

pro-active
outgoing
sensitive

&

PET-PEEVES

plastic bags
procrastination



"I like gardening because plants change the atmosphere in a room, they create such a positive vibe."

APPENDIX C

New email

To:

Subject: **Email we sent out to gardening-related companies**

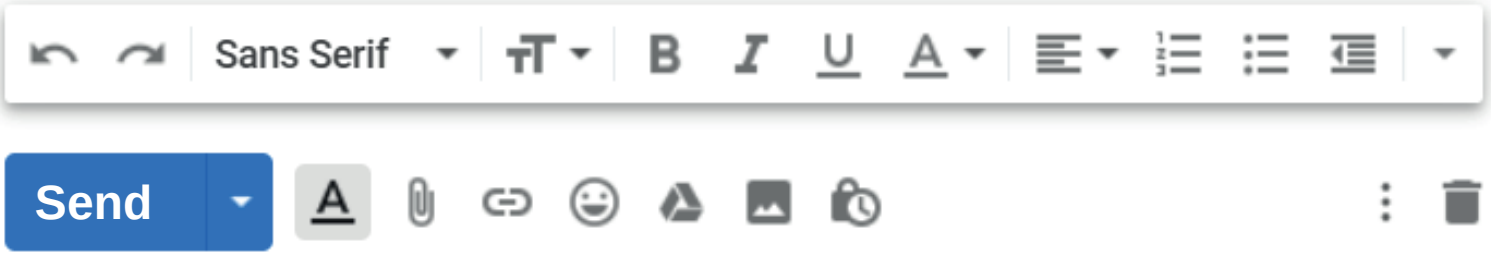
Hello!

We are a group of students studying at OsloMet, in Norway who are currently working on a project revolving around agriculture in urban settings. We are therefore reaching out to get as many insights as possible to develop a clear picture around the subject. The assignment is based on developing a product for a group or culture that we lack knowledge of beforehand.

We are studying Product Design, and our goal with the insights is to use the knowledge we get about the focus area to design a product that will in some way be better than the already existing solutions.

After looking online we found your product and webpage. After reading about it we found it really interesting, and we'd like to ask you some more questions in regards of your product and also your interpretation of agriculture in urban settings. We see homegrowing as place with many product opportunities and would like to explore these possibilities.

Best regards



Interview Questions

This are the interview questions we wrote as a guideline for the interviews. The interviewees changed, and so did the questions and the conversation, but these are some subjects we tried to cover in the interviews.

How did you get into gardening?

Why do you do gardening?

In what context do you practice gardening?

Is there a specific group of people you aim your product towards?

What is your favourite part of gardening? And your least favourite part?

What challenges come with gardening? Or what challenges do you normally face?

When did your enthusiasm for the environment start?

What is the most important thing to be aware of when getting started with agriculture?

What is your opinion/first thing that comes to mind when talking about home growing? And when mentioning urban agriculture?

What is the positive sides of vertical farms/microgreens etc? And the negative sides?

Do you believe that if EVERYONE took more part in agriculture, it would have a positive outcome on the environment? And in people's lives?

How would you implement microgreens in a kitchen?

How would you advice someone with no experience to get started with homegrowing?

List some of the things you find negative with agriculture

How much time do you invest into agriculture each week?

How does the season affect your joy and need for agriculture?

interview no. 1

Helsieni

02/2020

What is the most important thing to be aware of when getting started with agriculture?

The main thing to be aware of is that agriculture is hard work. There is a lot of knowledge out there and trying to learn from people doing it is very important. Before getting started it makes sense to explore the field and find role model farmers that make sense to you. Bringing agriculture forward means to be ready to challenge the status quo, which can be difficult as it is a big industry with lots of different interests.

What is your opinion/first thing that comes to mind when talking about home growing?

Home growing increases appreciation of the food we consume daily. You can get more in tune with the natural world, the seasons, eat higher quality foods and be less reliant on long supply chains and processed foods.

And when mentioning urban agriculture?

The role of urban agriculture is about (re)educating the urban population about where their food comes from. It provides people a meaningful way of participating in the production of their food.

What is your favorite part of gardening? And your least favorite part?

Being outside. Getting fresh and nutritious food without pesticides, etc.
My least favorite part is watering.

What challenges come with gardening? Or what challenges do you normally face?

How to get the most amount of food with the least amount of work.

Do you believe that if EVERYONE took more part in agriculture, it would have a positive outcome on the environment? And in people's lives?

Yes.

How much time do you invest into agriculture each week?

3 working days

How would you advise someone with no experience to get started with home growing?

Just do it. Buy some soil, and put some seeds in it. Or buy our Mushroom Growkit ;-).

List some of the things you find negative with agriculture.

How hard it is for local producers to get their products to consumers.
Subsidies for unsustainable farming practises.

interview no. 2

Losæter

12/02/2020

We started the interview explainging our project, and that we wanted to gain some insight in growing vegetables in an urban environment. We also wanted to know how Øystein got interested in agriculture.

What is your favourite part of gardening, and what is your least favourite part?

A very positive journey.
Hard work, you wear out your body over time (can) by digging, weeding, bending down.

What is the most important thing to be aware of when getting started with agriculture?

It's the soil you cultivate and not the vegetables. Full focus on the soil, if not it will not be vegetables. Earth is a huge, huge living universe. It is believed that only about 1% of life in the earth has been mapped.
The biggest hack is to quickly realize that you have to focus on the earth.

What is the positive sides of vertical farms /microgreens etc? And the negative sides?

A very positive factor in people's lives to cultivate themselves. Obviously a thing that people like. Without food we are nothing. It benefits all people.

Vertical farms are smart because they make better use of space and are suitable for those with little space.

Do you believe that if everyone took more part in agriculture, it would have a positive outcome on the environment? And in people's lives?

The economy plays a role, getting access to good raw materials cheaper than buying them.

Conclusion:

The interview with Øystein was productive since he had experience and knowledge about everything, from how to treat the soil, and the logistics of running a "farm".

interview no. 3

Tåsen Microgreens

06/03/2020

We were met by a friendly guy named Vijal. He started the interview with giving us a brief introduction to what they do and how they do it. We had a good dialogue with him, and he taught us a lot that we didn't know before.

What essentials do you use for growing microgreens?

Vijal told us that instead of soil they use volcanic rocks and vermiculite. The volcanic rocks controls the airflow to the roots, while the vermiculite holds the water inside so the plants don't dry out. They only used water for nutrition, but they controlled it so the waters pH-value were in between 5,5 and 6, instad of 7 which is the pH-value of pure water.

Why do you use different types of light for the plants?

The reason for the different types of light was to control the plants so they were as ideal as possible when they were to be delivered. Pink light helps the plants grow faster and longer. It is more effective they white light. Blue light is used to "freeze" the plant since it makes the pores of the leaves close so the photosynthesis gets heavily reduced. This makes the plants grow outwards and not upwards. It makes them "fatter" and the leaves get wider and thicker. It's used to control the state of growth. For example if a plant is done growing, but they are not delivering it yet, so they use blue light to freeze the process.

What other aspects should you think about when doing microgreens?

Temperature, mold, height, light intensity and watering process. The most ideal temperature is between 19 and 25 degrees celcius, this is because mold grows in temperatures below 19 degrees and above 25 degrees.

The ideal height between each shelf in the vertical farming system is 1,5 meters, because then the light from above gets enough space to spread evenly.

The light intensity also effects the speed of growth. Vijal also told us that normal sunlight is the best source of light.

They watered the plants from the bottom and up to have the vermiculite soak up the water evenly, and to make sure every box of plants got equally as much water.

Conclusion:

The trip to Tåsen microgreens was very interesting, and we learned a lot. They had so much knowledge of how to manipulate the plants with light, and they knew how to grow it as efficient as possible. They used the space efficiently by growing vertically, and they added nutrition to the water so that the plants would grow as fast as possible. It was very inspiring to visit them, and you can see that in our final project.

interview no. 4

Food Studio

09/03/2020

We started talking about the project and our goals. I mentioned the goal to spread gardening culture and to make it easier for people to introduce it in their homes and their everyday lives. Kristin said that in their activities, instead of saying the typical "don't do this, don't do that", they educate through positive feelings and experience. She said that she thinks it is very important to connect some positive feelings to our product. We also talked a lot about the answers we got from the form.

What is the most common feeling you get when you talk to people that come to your trips and activities?

People are not aware of the whole picture. Most people consider food as something you take from your plate and put into your mouth, when actually food has a much longer life and process. In the experiences Food Studio organises, participants generally realise that they don't think about where food comes from. That is the main reaction.

What other aspects do you think we should consider?

There are many things. You should think about aquaponics and hydraponics because these methods are much cleaner and very innovative. Then, another important thing is being sure that you don't put in more resources than you get out of gardening/planting/harvesting. This is so complicated and taking everything into account for this project (such short time) will be impossible.

About the product itself:

She asked whether we were working on a box or kit with everything someone might need to start gardening. We talked about that for a bit, how it could include every little thing and guidance too so that with just the kit you could garden on your own.
But then I mentioned our furniture idea, to blend gardening into homes, and she said she would love that for her house and that she thinks it is a very good idea. She said introducing gardening in furniture would be a strong improvement and it would make gardening very appealing. Kristin said now that plants or vegetables create such a good atmosphere which is something people agreed with in the form.
Here she mentioned microgreens too and I said we had looked into them. She thinks they are a very good way to start gardening something you can then eat and get involved in the process.

Conclusion:

We talked about education and how the best to educate is experience. So, Kristin thought we should encourage/enable people to garden at their homes easily. So we should encourage them to experience it, and then our labor would be done.
"Dare people" she said. To be involved in the process, because just by planting microgreens or something very easy they would also think about food and sustainability.

APPENDIX D

Date	Gender	Age	For how long have you gardened?	Do you have enough space to plant at home?	Where do you plant?	What do you like the most about growing food yourself?
25.02.2020 kl. 12.43.22		20	1-2 years	Yes	Garden	The feeling of growing things yourself, and using less money
25.02.2020 kl. 12.43.31	Woman	22	More than 2 years	No	Window	The progression from seed to plant, and how fast the plants and fruits can change
25.02.2020 kl. 12.49.00	Other	57	More than 2 years	Yes	Living room	The user interface
25.02.2020 kl. 12.52.28	Man	21	A couple months	No	Living room	
25.02.2020 kl. 13.27.19	Woman	25	More than 2 years	No	Living room	What I like the most is to get the plants to grow, I feel a special mastering by using things I have grown myself in my food. I know where it comes from and whats used to grow them.
25.02.2020 kl. 14.20.37	Woman	45	More than 2 years	Yes	Garden	The safety from knowing no herbicides are use etc.
25.02.2020 kl. 15.39.01	Woman	50	More than 2 years	No	Garden	Contact with others in the *parsellhage*.
25.02.2020 kl. 21.52.24	Woman	41	More than 2 years	Yes	Garden	That I know what is on/in it, the taste, the satisfaction of doing it, learning something new all the time, new experiences, variables like the weather makes it unpredictable and exciting, and you can combine it with other things like home-composting. It is a great way of getting to know new people, get new friends, share experiences and share happiness, plants, seeds and sprouts.
26.02.2020 kl. 06.20.49	Woman	31	More than 2 years	Yes	Living room	That you do it yourself.
26.02.2020 kl. 08.38.57	Woman	19	1 year	No	Kitchen	
26.02.2020 kl. 13.44.58	Woman	50	Mer enn 2 år	Ja	Hage	I can go out any time and pick up something fresh.
			more than...			
25.02.2020 kl. 16.07.19	Man	19 to 25	3 years	Balcony	Living room	The environment/vibe it generates.
25.02.2020 kl. 16.08.33	Woman	19 to 25	3 years	Small balcony	Living room	The smell of the plants
25.02.2020 kl. 18.22.26	Woman	19 to 25	1 year	Bedroom	Bedroom	The life or vitality they bring to the spaces
25.02.2020 kl. 18.37.04	Man	19 to 25	6 months	Balcony	Balcony	The skills it requires
25.02.2020 kl. 19.23.57	Man	19 to 25	3 years	Small surface close to the window. There's room for 3 plants	Living room	The satisfaction of watching the plants grow, from the seed till they die.
25.02.2020 kl. 19.48.10	Man	51 to 70	6 months	Balcony	Balcony	Look at the evolution of each plant
25.02.2020 kl. 23.27.39	Man	19 to 25	2 years	Small patio	Garden	I like planting small trees which give fruit or flowers
25.02.2020 kl. 23.29.04	Man	19 to 25	3 years	A square meter	Bedroom and living room	Strawberries and parsley
26.02.2020 kl. 10.31.30	Man	19 to 25	3 years	A shelving system	Living room	Seeing how the plants evolve and grow with time

How much time do you dedicate to gardening each week?	What tools do you use for gardening?	What do you like the least about gardening? Is there something that irritates you or that could be done differently?
Between 30 minutes to an hour	Grows vegetables such as tomatoes, cucumber and peppers for herbs. I use long boxes in the green house and pots. I use empty soda bottles and fill them with water, then i put them upside down in the soil so that the plants wont dry out if I am gone for a few days.	Well, like when the plants are eaten by other small animals!
1.5 hours	Pots, lights, watercan, fertilizer, rosemary, chili, timian oregano, camomille	That I never manage to use up what I grow and that I always plant too many plants
More than 2 hours	Compost grinder and pot	Worm
Between 30 minutes to an hour		
1.5 hours	I use irrigation boards, watering can, moisture meter, some light when I bother (they are not very nice and very difficult to place) and colours, which is nice. For herbs, I use a self watering pot from Eva Solo. When I plant seeds, I only use what I have available. I also mix my own soil for the different plants, then I use peat-free soil perlite, orchid back, sphagnum moss and coconut fiber.	Clearly, small flies that come when the plants are too wet for a long time. It is also difficult to get enough light sometimes, and the lights I have now are not very practical for larger plants
More than 2 hours	pots, plant lights, pre-cultivation kits etc. (in addition to milk cartons etc.)	Nothing
Between 30 minutes to an hour	Pallet collar	Weeds
More than 2 hours	In the question above you asked where I grow and could only tick one answer, but I grow in the kitchen, in the livingroom, in the laundry room and the bathroom, in the garden and in the green house. I use drink boxes, grape cups, pots, trays etc. I have blue / red LED x3 x for winter lights in winter / spring. I use home composting with Bokashi, gold winner and Bokashi for fertilizers, masonry buckets and greenhouse tubs. And right on the ground and in pallets in the garden. I grow fenugreek and yellow peas for indoor shoots, chilli all year, and otherwise a rich seed stock for growing in the garden and greenhouses as well as porch pots.	I don’t have soil to farm in, and I have to save water since it’s expensive. I have installed an extra water meter to be able to water outside with only paying per cubic metre.I think it is bad that we do not get more refurbishment for home composting, and seeds are terribly expensive! New customs rules are extremely annoying and very restrictive.These could advantageously be changed again. There will be some soil inside when I hold on, no good solution to it; but working with a greenhouse tunnel solution; then some of the waste work can also be moved out in winter time. A lot of space goes into this and i have too little space for the plants inside.
Between 30 minutes to an hour	Potter, climbing thread	I want more space in the windowsill
Between 30 minutes to an hour		
Mer enn 2 timer	Inside - chillis in pots Outside - right in the ground; everything from mint, thyme, salvia, oregano, ...	Good potting compost without peat and organic is almost impossible to buy!
1 hour	Watering can	That the water spills when I water the plants
1 hour	Watering can	That the pots need a dish underneath so the water doesn't spill
1 hour	Glass of water and spoon	The soil to spread out and be messy
More than 4 hours	Gardening scissors, brush gloves and little shovel	Cleaning
1 hour	Scissors and a glass bottle for the water	There is no inconvenient. The only thing that would annoy me would be my house not to have direct sunlight.
1 hour	Watering can and a little hoe	Handling the soil or the mulch
4 hours	Scissors, little hoe, little shovel	Plagues or illnesses.The plants lose aesthetic and functionality and require treatments.
3 hours	The basic ones, like gardening scissors and a shovel	I don't have many problems
1 hour	Spoon, fork, rope and sticks	The soil

Do you think it was expensive to start your own kitchen garden? What did you spend the most money on?	Do you think it is easiest to buy new equipment or make it yourself?
Soil and seeds	Make it yourself
Soil	Buy used at a garagesale
The bathtub	Make it yourself
I like to harvest seeds myself from fruits and vegetables, so don't spend that much time on it. I just bought a little and a little, so it does not seem that it has been so expensive. Buy a lot of equipment cheap on eBay	Depends on what kind of equipment they are talking about. If there are sticks then I buy if I can't find anything easy. Otherwise, it's not that much equipment that I can make myself.
vegetable bed of beams	It is cheaper to make it yourself
The housing association received start-up support from the municipality of Trondheim	Buy
Yes. Earth. Garden Tools. Seed. In that order.	Buy new.
Yes, pots are expensive	I want to make it myself, but it is not possible so I have to buy new.
I use most of my money on seeds, then potting compost - if I find something I want	For the flowerbeds, make it mself, tools buy
No	
No	
No	
No	
No	
No	
No	
No	
No	

IDEAS FROM THE COMMUNITY ON FACEBOOK

This form was posted on a Facebook group too. The group was called *Dyrk selv - sopp, grønnsaker og andre nyttevekster*. These are the comments we got apart from the answers:

“What about an integrated light and irrigation system in a size that makes it suitable for small apartments? Have considered building such a self, in order to grow some salad and the like. in winter time. Should fit well with the characters of the time with short-traveled and organic. Possibly a hydroponics cultivation kit for kitchen countertops maybe ... many possibilities, good luck!”

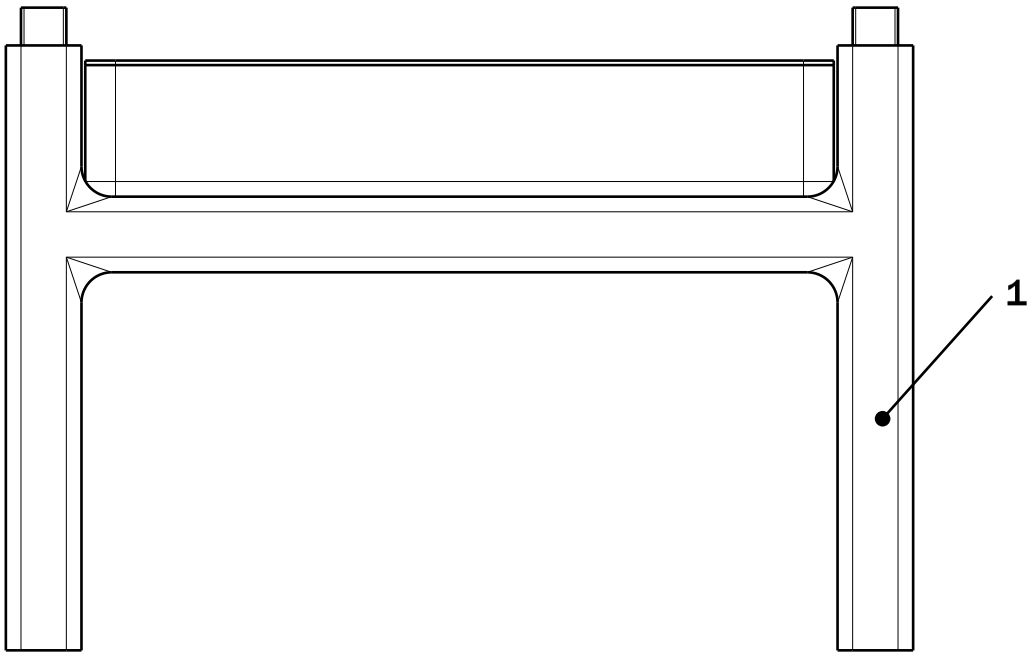
“What about a closet for growing, integrated with lights and irrigation system, in a size that would fit into small apartments? I have considered building one myself, to grow salads and other stuff in the winter season. Should fit into this day and age short traveled food mindset. Maybe a hydroponic growkit for kitchen benches?”

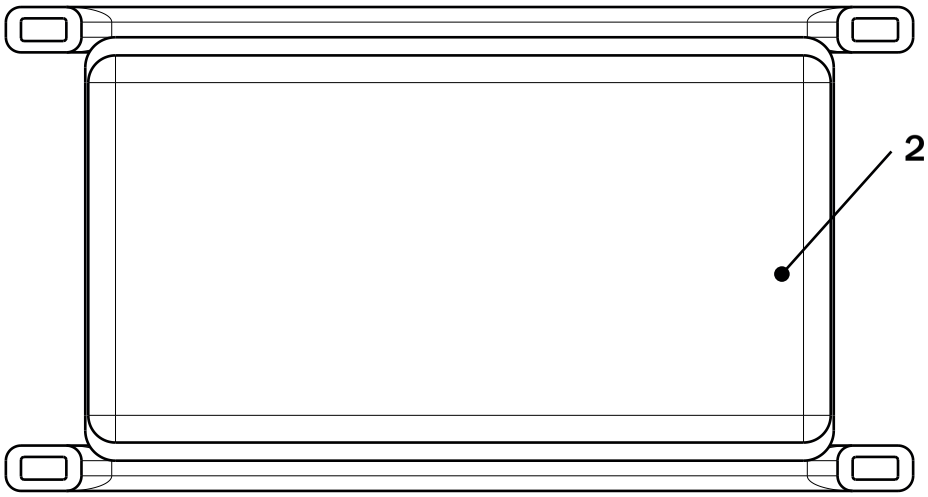
APPENDIX E

MARKET RESEARCH DIRECT LINKS

- Vertical Garden - Fronda
- Best Indoor Garden Shelves
- CNC Machine for Seeds - Farm.bot
- Vertical Garden - Fronda
- Kitchen Gardening System - Auk.eco
- Mushroom Growing Kit - Helsieni
- MicroFarm - Mother
- Gardening & Architecture - Ecologic Studio

APPENDIX F

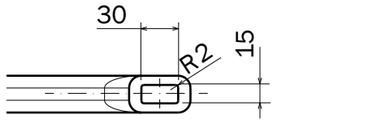


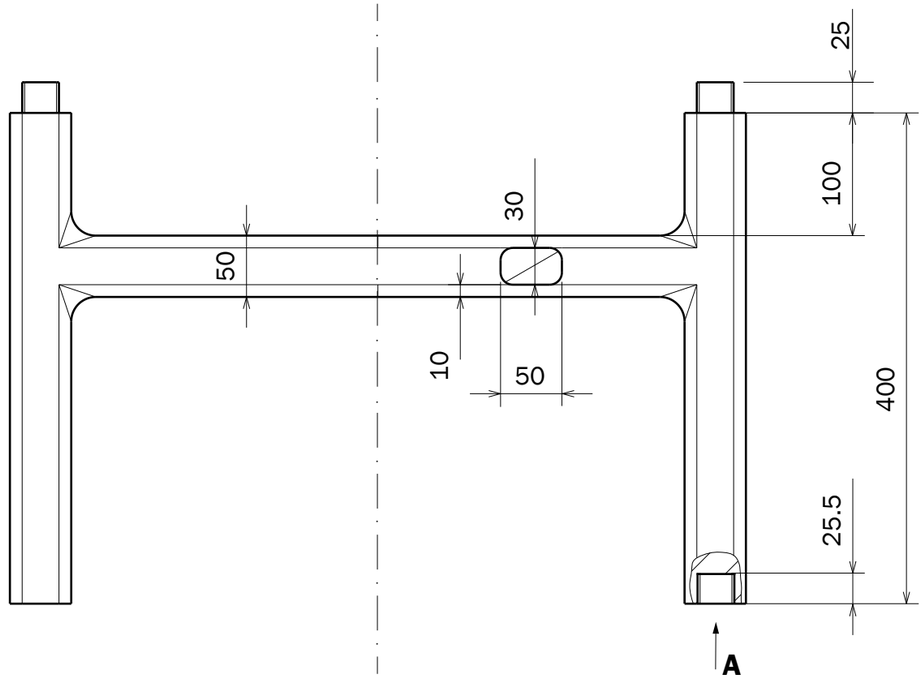


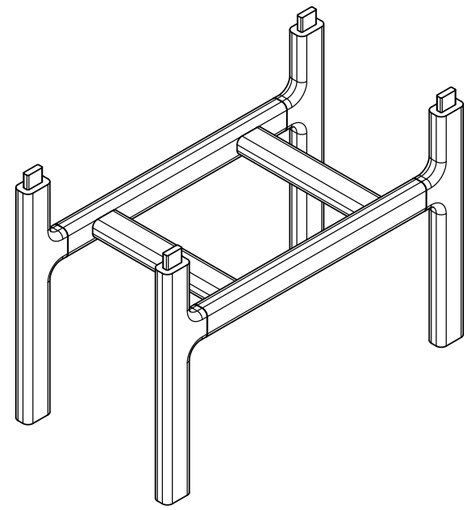
No.	Quantity	Name	Material	Drawing
2	1	Gardening tray	HDPE	3
1	1	Structure	Recycled wood	2

PROJECT TITLE GARDENING MODULAR FURNITURE		PART PRODUCT
DRAWING NO. 1	SCALE 1:5	MATERIAL -
DEGREE OsloMet - Product Design	DATE March - 2020	COURSE Cultural Understanding and Communication

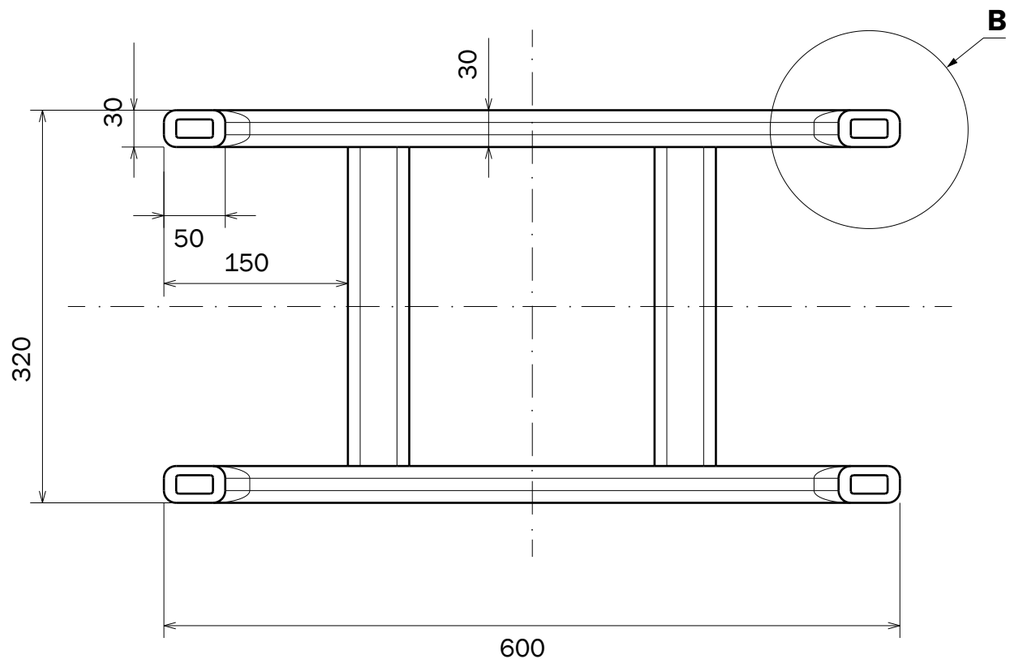
Seen from A



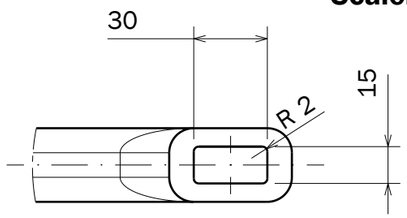




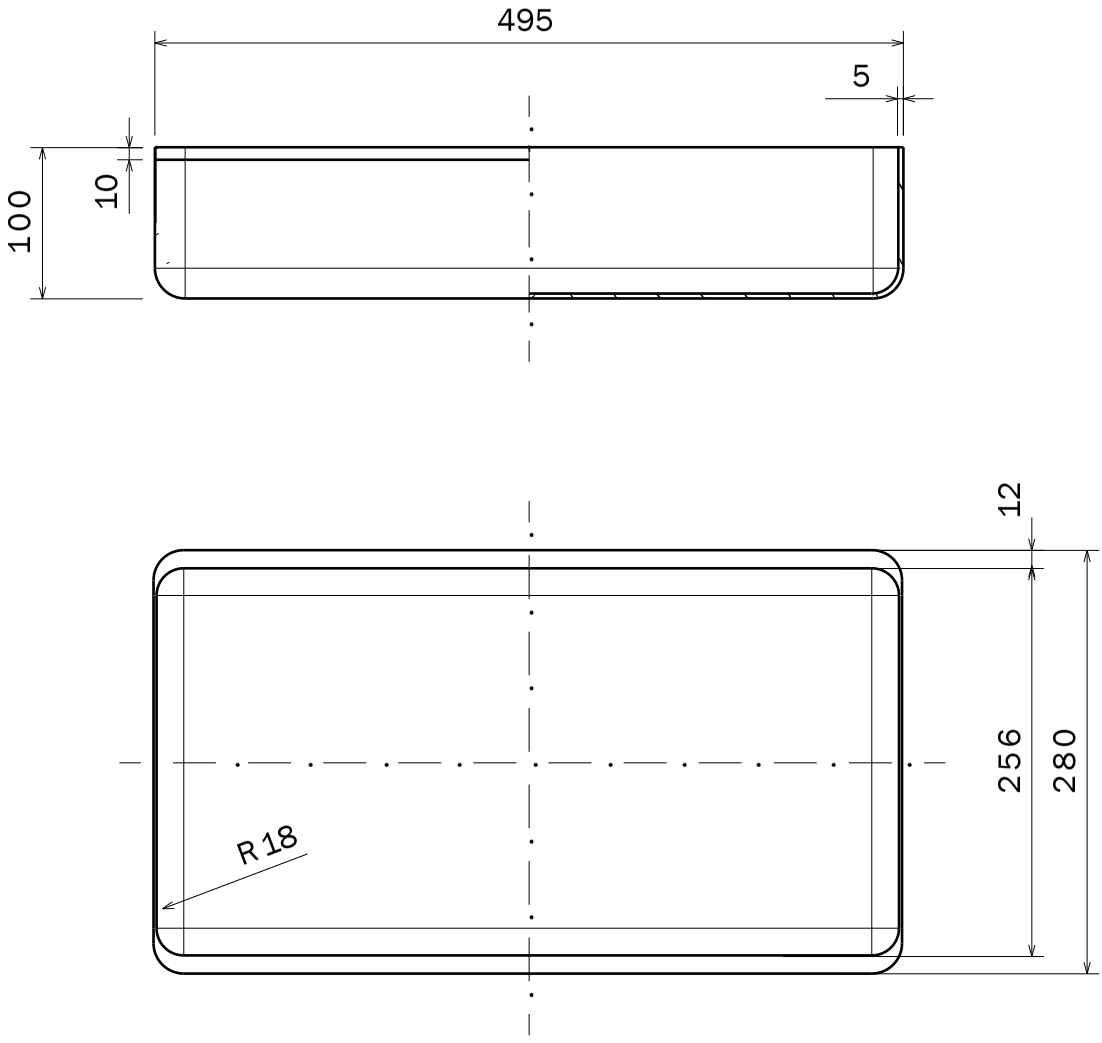
30x50mm structural profile
Fillet radius: 10mm



Detail B
Scale: 2:5

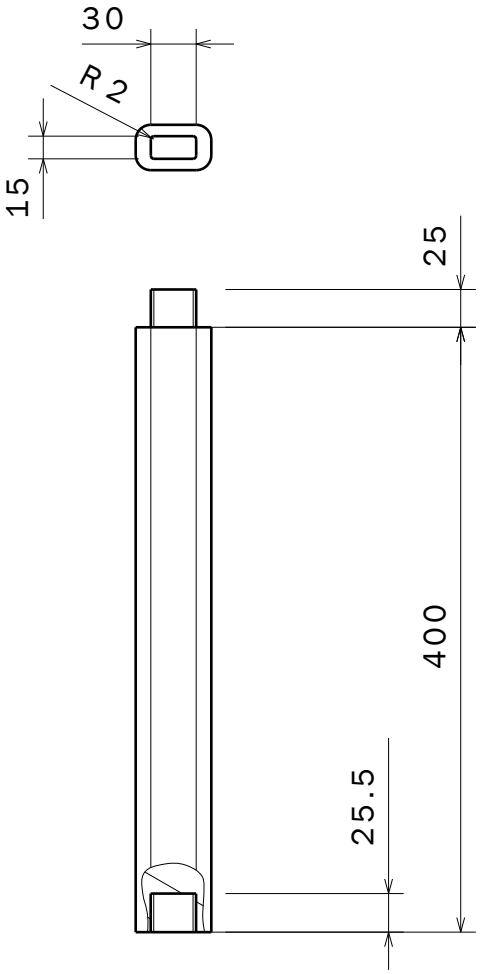


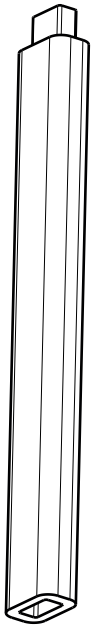
PROJECT TITLE: GARDENING MODULAR FURNITURE		PART: STRUCTURE
DRAWING NO.: 2	SCALE: 1:5	MATERIAL: Wood
DEGREE: OsloMet - Product Design	DATE: March - 2020	COURSE: Cultural Understanding and Communication

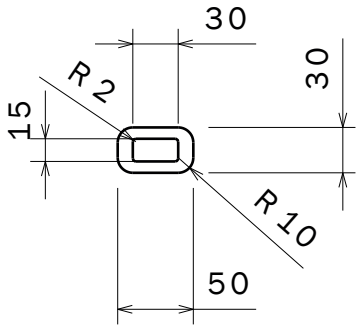


Fillet radius: 20mm

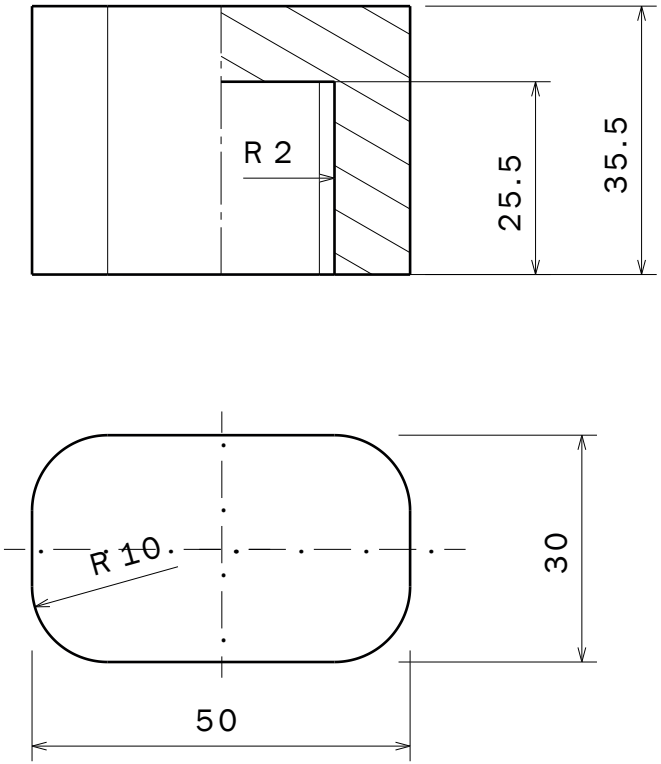
PROJECT TITLE		PART
GARDENING MODULAR FURNITURE		GARDENING TRAY
DRAWING NO. 3	SCALE 1:5	MATERIAL HDPE
DEGREE OsloMet - Product Design	DATE March - 2020	COURSE Cultural Understanding and Communication

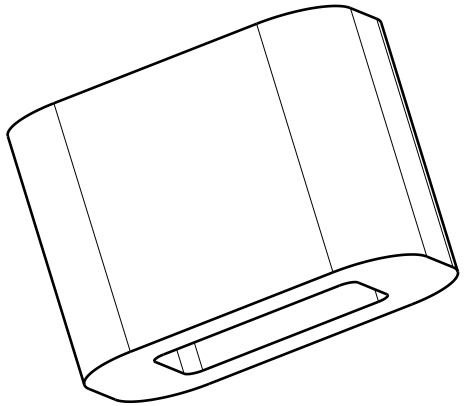






PROJECT TITLE GARDENING MODULAR FURNITURE		PART LEG
DRAWING NO. 4	SCALE 1:5	MATERIAL Recycled wood
DEGREE OsloMet - Product Design	DATE March - 2020	COURSE Cultural Understanding and Communication





PROJECT TITLE		PART
GARDENING MODULAR FURNITURE		CAP
DRAWING NO. 5	SCALE 1:1	MATERIAL Recycled wood
DEGREE OsloMet - Product Design	DATE March - 2020	COURSE Cultural Understanding and Communication