Project Report

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BAX Course

Graduation Project in Collaboration with Konstfack University College

Spring 2012
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1 What?

With the turn of the millennium we have heard, read and spoken so much about sustainability, eco-friendliness and carbon footprints, but what have we really learnt? What do we really know about the topic? Sometimes companies seem to drape their products and services in a pseudo green veil, without really taking the time to explain to the customers what is so eco-friendly about this offer compared to any other. Most of the time this is just a clever marketing scam to attract more customers. But how can we distinguish these faux green products from the genuine ones?

I ask myself how businesses accept or even contemplate the idea of planned obsolescence, how consumerism has completely changed the way things are designed, produced and disposed of. How is it that we give greater value to economic growth, rather than human and environmental well-being?

We have reached a critical point in history, where finally the consequences of our past actions are starting to materialize in front of us: high concentrations of toxins and harmful chemicals are accumulating in the water that we drink, temperature levels around the globe are rising exponentially, natural resources are disappearing at a shocking rate and we are consuming more than we can produce.

The industrial revolution certainly brought with it many benefits for mankind, such as modern medicine, the invention of automated machinery and an immense range of new materials, but it has also lead us to the current environmental crisis that each day torments world leaders and global campaigning organizations alike. Is it possible for us to become truly aware of these issues and change the course of our actions before the option is no longer available?

The purpose of this project is to raise awareness on the topic of Sustainability and Urban Farming, in order to actively involve people and encourage them to be more environmentally-conscious. The aim of my project is to stimulate the curiosity of the users and educate them in a non invasive manner, while respecting the surrounding space and public privacy. The goal is to establish regenerative ecosystems on water, food, materials, energy and economy.

I have looked into existing technologies such as Vertical Gardening, Living Machines and Rain Water Harvesting as a source of inspiration for the final concept.

The optimistic goal was to find a way to bring city dwellers closer to nature and at the same time protect the natural environment that surrounds urban settlements. The main notion that I wanted to convey is that being less bad is not good enough.

1.1 Why?

The whole purpose of this project is to create a better standard of urban life through the establishment of more green areas dedicated to harvesting healthy food that requires minimum transport. The creation of leisure gardens in the city would reduce the urban heat island effect, absorb excess CO2 emissions, reduce noise levels, restore habitat to the suburbs, manage storm water, provide educational and recreational public activities, reclaim forgotten real estate. By growing its own greens the city would go from being a parasitic consumption machine, to a self-
sustaining ecosystem. The creation of these green oases would offer jobs to the increasing amount of unemployed farmers migrating from the countryside to the city, a relaxing getaway from the stresses of a long working day, a possibility for disabled citizens to take part in social activities and the elderly to feel useful and interact with people that share the same interests.

1.2 How?

I used techniques such as user camera studies and personal interviews to gain greater insight into peoples conscious and subconscious needs and desires. At the same time I identified areas of interest and brainstormed opportunities for possible concepts. Primary and secondary research helped in gathering useful information concerning these areas of interest. I experimented with techniques such as bodystorming and shadowing to further help me in the concept development phase. The final step was to select a concept and solve technical issues such as material choice, dimensions and manufacturing processes.

1.3 Questions

How can local food production be encouraged?
What solutions can be found to reduce “food miles”?
How can the users be involved and educated in a non-invasive way?
How can the city become greener and reduce its dependance on traditional agriculture?
How can this be done by providing new employment opportunities through urban farming?
How can waste be managed in a more efficient manner?
What types of fruits, herbs and vegetables can be grow in the urban environment?
What unused spaces can be utilized?
Who is this product/system targeted at?
Can you build it yourself or buy parts?
Is maintenance an issue?

2 Research

I began the early phases of my research by reading and writing about the topic of Sustainability and focusing on different aspects of this vast field. This gave me a general picture from which I would then chose the direction of my bachelor’s project. After reading Dr. Dickson Despommier’s The Vertical Farm I decided to work with the growing movement of urban agriculture, for the same reasons that were stated above. The topic fascinated me, but I felt like I knew little or nothing about it. I began doing case studies on existing examples of vertical gardens, automated farming, hydro-, aero-, and aquaponics, Living Machines, Window Farming, Guerilla Gardening, and all sorts of other new movements and trends. At

this point I knew more or less what interested me and I started looking for unused or hidden spaces within the city that could be repurposed and transformed into recreational areas for the green-thumbed urban farmers.

Since I was living and studying in Stockholm, I though it would be helpful to understand more about the urban agriculture movement through its real life examples and speak to the people that were passionate about promoting it. Swedes have a particularly intimate and loving relationship to their treasured nature\(^2\) and they have worked hard over the course of history to make the outdoors accessible to all people. The Right of Public Access is the result of this hard work between Swedish citizens and authority and it enables everyone to enjoy the pleasures of nature virtually anywhere in the country, as long as this is done in a respectful and responsible manner.

2.1 Koloniträdgårdsförbundet

Allotment gardens have been a part of Swedish tradition for over 100 years and were first seen when farmers started migrating towards the city in search for new jobs. This form of gardening has always been seen as a positive public activity, especially after the wars when food was scarce and families would grow crops in every free space of land in the city (including the small patches of grass next to the side walk)\(^3\). Koloniträdgårdsförbundet literally means The Allotment Association, and it is a non-political association of gardeners that promote the use of allotment gardens, leisure parks and various other allotment areas\(^4\). Koloniträdgårdsförbundet is part of a larger organization called FOR which is responsible for promoting recreational growers through counseling, consumer alerts, events at garden fairs and contacts with research, government agencies and other organizations\(^5\).

I visited two allotment gardens in the Hammarby area\(^6\) and spoke to the few passionate farmers who were already setting up their compost boxes and preparing the land for the first spring crops. They were all eager to explain how the allotment system works, as they excitedly described their passion for gardening to me. I learned that the garden spaces are leased to the citizens for a period of 10 to 25 years and that due to the lack of cultivatable land there is a very high waiting list for newcomers. The waiting times depend on how close the land is to the center of the city, but they can reach up to 20 years for a decent allotment. “Gardening is a way of relaxing after a hard day of work and freeing the mind of busy thoughts. People like to be in control of what they eat and how it is grown, that’s why we wait in queue so many years to have this precious piece of land”\(^7\).

2.2 100Hus Miljö

100Hus is a program in association with the city of Stockholm that aims at improving Hornsbruksgatan by building on the existing Subway station and restructuring the 60 apartment buildings near Högalid Park\(^8\). Miljö (which in Swedish means Eco) is a unique environmental technology project that will be completed in the Spring of 2012 on the rooftop terrace at Högalid Park\(^9\). 100Hus will use the arc-shaped building as an exhibition and conference hall and on weekends will transform into one of Sweden’s

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2 Visit Sweden - Sweden’s official website for tourism and travel information.
3 Testimony of an inhabitant of Hammarby Sjöstad
4 Koloniträdgårdsförbundet - http://kolonitradgardsforbundet.se/
5 FOR Fritidsodlingens Riksorganisation - http://www.for.se/
7 Allotment farmer at Hammarbyhöjdens fritidsträdgårdar
8 Program for Hornsbruksgatan - /http://www.hornsbruksgatan.se
9 100Hus - http://www.100hus.com/
Many people enjoy gardening, but just don’t have the space or the time for it.
most energy efficient and environmentally-friendly restaurants, growing its own fresh fruit, herbs and vegetables on the south-facing terrace. The building is designed in collaboration with thirty Swedish environmental technology companies, all in need of a central and public demonstration environment for their products. The exhibition will run for 23 months and is expected to attract up to 100 000 visitors.

## 2.3 Tantolunden’s Kolonilotter

Tantolunden is a large park near Årstaviken on the island of Södermalm. Its located in the lively area of Hornstull, Mariatorget and SoFo. The park is a popular meeting place for young people, with its restaurants and bars, docks for swimming and open space for picnics in the summer. A hill in the center of the park host more than 100 allotment gardens and typical Swedish wooden cottages. These so called kolonilotter have been present since 1915 and provide the urban-dwelling citizens of Stockholm with a space to come in contact with nature and dedicate themselves to some healthy gardening. One farmer tells me he grows his own carrots, potatoes, cabbage, spinach, raspberries, apples and lingonberries, just to name a few. He describes his strong connection and love for the land as he points to the monumental moss-covered rocks that make up the hill overlooking Tantolunden. As I admired the beauty of this natural landscape I begin to realize how important it is to protect these fragile ecosystems and integrate them with the structure of the city, instead of pushing ourselves farther and farther away from them.

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2.4 SITE Architects

My research continued with case studies of relevant examples in which urban spaces had been repurposed or used in a more practical manner. I examined the work of a group of architects from the late 60s who focused on sustainability through projects involving green design and interaction with the public. SITE architects base their work on communication systems, the natural sciences and energy conservation in order to create a new architectural language that connects with the user in a deeper way. Architecture according to SITE “is more about the questions than the answers, because it’s the questions that make life interesting.” I was interested in the notion of stimulating the interest of the user, in the same way that SITE’s aim was to make people think about the meaning of a certain architectural choice or element. The goal is to not go unnoticed and this was achieved by bring conceptual architecture into the suburban areas. Although the aesthetics are questionable, I admire the attitude and intention of buildings like the Rainforest Showroom in Hialeah Florida, in which nature is the central theme. The building is seen as an intricate part of the landscape and therefore must give back a part of what was taken away.

Although just a concept, one of SITE’s most interesting proposal was the experimental High-Rise Housing, which consisted of a structure of about twenty stories that would be located in the densely populated city center. The building would include stores, parking spaces and housing for mixed income residents. These houses would be grouped in a neighborhood like manner on the various floors, which in turn would be supported by a matrix of steel beams and concrete. A central elevator provides access to the individual houses, gardens, and interior streets. The purpose of the experimental High-Rise Housing was to question the tradition of monotonous and faceless multi-story buildings, which characterized the rationalistic architecture of the Twentieth Century, causing the city’s inhabitants to hide behind bland and expressionless facades. “As an alternative, the High-rise of Homes offers residents a unique opportunity to achieve an individual statement of identity. The purpose is to shift the premises for aesthetic evaluation in high-rise buildings away from orthodox design continuity, in favor of the artistic merits of collage architecture, based on indeterminacy, idiosyncrasy and cultural diversity.”

I wanted to build on this notion through the design of a space where city-

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11 SITE Architects - http://sitewnyork.com/
12 SITE BEST STORIES Documentary
dwellers could dedicate themselves to a socially fulfilling activity, such as urban agriculture.

2.5 MVRDV

Another interesting group of architects is MVRDV, a Dutch firm founded in Rotterdam in 1993. The grand variety of projects from this studio includes projects such as the Dutch Pavilion for the World EXPO 2000 in Hannover, the VPRO offices in Hilversum, and the Wozoco housing in Amsterdam. MVRDV provide architectural solutions worldwide by using an interdisciplinary approach, involving experts from all fields in the design process. The studio gives great importance to methodical research and elaborates large amounts of data and user studies to back up the design decisions. “Reactions to the first designs are processed quickly, creating a high degree of support for the design and encouraging the sort of new insights that can lead to specific innovative solutions”\(^{13}\). This approach does not necessarily lead to an architectural solution, and can sometimes result in a publication, an installation or even the development of a new software program.

MVRDV developed the Silodam housing unit for Amsterdam from 1995 to 2002. This huge building is very much in line with SITE’s High-Rise Housing concept, in the sense that it focuses on intersocial relationships, stratification and mixed functions. The result is a complex composed of 157 apartments and about 600 square meters of commercial space that mirrors Amsterdam’s political and economical context.

The Rotterdam-based architects feel strongly about environmental issues and this often adds high value to their projects. Thanks to their ideals

MVRDV recently won the Gwanggyo City Centre Competition with a design for an entirely new city, planned to be built just south of Seoul. The new urban center will be a totally self-sufficient home for up to 77,000 inhabitants and will take on an extremely naturalistic look, resembling a hilly green landscape from a distance.

Another interesting idea is The Why Factory, an independent think tank and research institute that MVRDV runs in collaboration with Delft University of Technology. The Why Factory (T?F) is a project focused on giving argumentation back to the architectural world by brainstorming on contemporary scenarios, in order to produce models and visualizations for future cities.

\(^{13}\) MVRDV Design Statement - http://www.mvrdv.nl/
2.6 Feeding 8 Billion People

With the continuous exponential growth of world population and the subsequent decrease in arable land comes an imminent and inevitable problem: How will we feed all of these people in a sustainable way, without using up the earth’s resources?

Experts believe we will reach a world population of over 9 billion before the year 2050\(^\text{14}\). If we were to rely on traditional agriculture, that would require adding cropland the size of Brazil to the existing farmland, which summed up is already the size of the entire continent of South America.

We are losing 1 percent of our topsoil per year, due to traditional agriculture methods. These methods are unsustainable because they focus on extracting as much as possible from the land, without giving back the precious nutrients that the soil requires in order to support crop growth. Another disadvantage of traditional agriculture is the fact that it requires vast amounts of space, water and natural sunlight. This, along with the increase in demand, forces farmers to resort to petrochemical fertilizers, which contribute even more to the destruction of farmlands. Eliminating crop diversity in favor of monoculture crops drastically reduces the amount of beneficial insects, therefore increasing crop vulnerability to pests and requiring the use of pesticides. A large amount of the sprayed pesticide runs off into the groundwater and ends up polluting water sources. The yield to energy input ratio of such a process is extremely low and inefficient, making agriculture one of the major contributors to global warming.

Many organizations, scientists and private companies are working to find sustainable solutions to these problems. Thanks to them we now have advanced technologies such as hydroponics which produces much higher yields than traditional agriculture, using up to 99 percent less water without the need for soil and making use of space in a three-dimensional way\(^\text{15}\). Because the nutrients are provided directly through the water, which stays in the system and can be reused, no pollution is released into the environment. Another advantage is that crops can be grown indoors, thereby providing year-round cycles that are not dependent on seasonal weather patterns.

2.7 PlantLab

PlantLab\(^\text{16}\) is just one of the companies that is proving how modern agriculture can be both economically and environmentally sustainable. They understand that humanity cannot continue with the emphasis on traditional crop growing methods and have developed a unique Plant Production Unit based on the research done by Dickson Despommier on indoor farming at Columbia University. The Dutch company applies mathematical models to hydroponic agriculture, creating unique recipes of light color and intensity, root and plant temperature, humidity, CO\(_2\), air flow, water and nutrients for each type of crop. By using only red and blue spectrum LED lamps they have greatly improved the already superior yields of indoor farming. Their urban farms produce locally, thereby reducing cost, time and emissions due to transportation. This means that all the vegetables, fruits and herbs are picked at their ripest stage, improving taste and nutrition.

\(^{14}\) Estimate of increase in world population according to the UN - http://www.un.org

\(^{15}\) The Vertical Farm - Dickson Despommier (Chapter: The Vertical Farm: Advantages)

\(^{16}\) PlantLab - http://plantlab.nl/
The crops are grown on floors using the DWC (deep water culture) technique, which is highly space efficient. PlantLab has developed the concept of Plant Paradise: the ideal conditions for best possible plant growth. They apply this idea to a cultivation area of 1 hectare, consisting of 10 modules of 1000m² which are stacked on top of each other. With this new idea of urban agriculture PlantLab has managed to optimize crop potential.

Red and blue spectrum LED lighting used by PlantLab to grow salad indoors

2.8 Food Miles

“Almost 250,000 tons of global warming gases released were attributable to imports of food products - the equivalent amount of pollution produced by more than 40,000 vehicles on the road or nearly two power plants. More than 6,000 tons of smog-forming nitrogen oxides were released into the air - the equivalent of almost 1.5 million vehicles or 263 power plants. 300 tons of sooty particulate matter were released into the air - the equivalent of more than 1.2 million cars or 53 power plants.”

So how far does our food travel before reaching us? Food miles are the total distance that food must travel from where it is produced to where it is sold. This means that food that is out of season or that isn’t locally produced usually has the highest food miles. In developed nations food is sometimes imported from halfway across the world, due to the fact that that the international food trade business is developing much faster than the food production sector itself. In the last 30 years world food production grew by 84 percent and the world population by 91 percent, while food trade increased 184 percent. A consequence of this is that the food we prepare every day contains, on average, ingredients from at least five foreign countries!

3 Process

After the initial research, I began interviewing various actors that were involved in the food production and distribution chain. I visited various supermarkets such as Coop, ICA, Hemkop, Willy’s, Lidl, Goodstore. I spoke to the employees working in the Fruit and Vegetable section and asked the various questions: Where does the produce come from? How long does it take to get here? What kind of transportation is involved? How much storage space is required? Where are the warehouses in which you store the food? How many times a week are deliveries made? How

17 Natural Resources Defense Council - www.nrdc.org/policy
often do you replace the fruit and vegetables on display? What do you
do with the ones that aren’t sold on time? Do people ask where the food
comes from? What kind of waste material is left over from transportation?

From my first series of interviews I realized that food retail was a very
hectic business based on speed and money. Unfortunately, this meant that
quality and environmental awareness were not the main focus. I asked
myself it it would be possible to educate the public through a new way
of producing and selling food: The crops would be grown directly at the
store and the customers would be able to pick the fresh fruit and vegeta-
bles on the spot. This would be possible by making use of spaces like the
store’s perimeter walls and rooftop and by using techniques such as ver-
tical farming and hydroponics.

I began speaking to customer’s at the supermarket to ask their opinion
on the concept. The feedback was excellent and the customers seemed
to appreciate the idea, but at the same time I started asking myself if this
was truly the most effective way of raising awareness on the issues that
I had spent so much time reading about. I brainstormed on other ways of
involving the users more directly.

During a trip to one of the gardening shops in Stockholm I came across
an object that stuck my curiosity: A bowl with a small metallic disk that
created a fine mist above the surface of the water. After some research I
discovered that the object that I had seen was an ultrasonic fogger. This
electronic device contains a metallic disk that vibrates at very high fre-
quencies, causing the water above it to vaporise into a fine mist. I was
surprised at how such a small component could generate such a fascinat-
ing phenomenon and decided that I would try to integrate the ultrasonic
fogger into my final concept. I purchased one of the foggers from a local
pet shop and began experimenting with it.

I was now ready to define the brief
and target group: I would design a
new generation window farm that
triggers the user’s curiosity and
teaches them about the methods
of urban agriculture. This product
would be targeted at apartment
dwellers with little knowledge
about gardening, but at the same
time could be appreciated by the
more green-thumbed users.
I spoke to users at the supermarket about their experiences.

1. Why do you choose fresh herbs over dried?
   5/6 for the **taste**

2. How long does one pot usually last you?
   3/6 **one use**, 2/6 a couple of weeks

3. Have you ever tried planting the herbs at home?
   3/6 **yes**, 2/6 sometimes, 1/6 never

4. How do you dispose of the pot once it’s finished?
   5/6 **mixed trash**, 1/6 separates plastic and compost

5. Would you choose locally grown herbs over imported ones? Even if the cost is higher?
   3/6 buys **local**, 2/6 buy according to **price**

“**I’m annoyed by the amount of useless packaging**”

“I’d prefer buying better **quality plants** from a greenhouse if I were to bring them home”

“**Maybe the supermarket could give you a kit to grow it at home**”

“I really just use the herbs **once** and then **throw all the rest** in the trash”
At this point I thought it would be a good idea to work with a more specific area such as the herb industry. This would allow me to focus on details and go deeper into the design process. I chose to work with herbs, because they are fast growing and don’t require excessive effort to take care of, especially if the final product was to be used in an indoor environment like an apartment.

I wanted to share the knowledge I had gained from the many books I had read as research for my project. Therefore, along with educating people on the methods of urban agriculture, I also wanted to incorporate the principals of upcycling. I started searching for materials from products that had reached the end of their life cycles and would otherwise be sent to landfills or downcycled. One of the most largely diffused materials that is currently used for hydro and aeroponics is PVC, a polymer that contains dioxins and harmful chemicals like phthalates, responsible for causing cancer and reproductive disorders in the long run. I chose to replace this material with glass derived from old bottles, thereby substituting the unsafe polymer with a cleaner and more esthetically pleasing alternative.

I began sketching on forms and collecting glass bottles of different shapes and sizes with which to experiment. Since the main goal was to educate and raise awareness on the methods of urban agriculture, the amount of herbs that would be grown was less important than the aesthetic value of the final product. For the concept to appeal to the final user, the product would have to be compact, attractive and inspiring. I realized that I would need a bigger bottle as a base and water reservoir. It was also necessary that the base bottle had flat sides, in order to balance and support itself.
Ideating forms for the final concept
I started by sketching generic shapes that vaguely resembled vases. They were composed of two parts: a base and one or more holders for the herbs.
I began by experimenting with standard tube shapes. The original idea was to design a “living display stand” for fresh herbs in supermarket. This idea was abandoned for a more compact, DIY version that could be used at home.
The last sketches incorporate two different kinds of glass bottles: one larger bottle, used as a water/nutrient reservoir, and three smaller bottles, which support the herbs during their growth. In my final concept I decided to use a flat base, in order to give the product greater stability.
I decided to use three smaller bottles that would be connected to the resevoire and contain the herbs. Many bottles suited the final look I was hoping to achieve, but ideally I chose to use olive oil and vinegar bottles to create a subtle reference to the use of herbs in cooking.

While brainstorming and sketching on forms I was also experimenting with the growth of herbs in different mediums. I had three different types of seeds (basil, parsley and mint) which I planted in soil, clay, cotton, cellulose and organic fibers. The fastest growth came from soil and a material called Rockwool. This practical test was a confirmation that I could grow the herbs in a soil-free environment, without losing the efficiency and yield of traditional geoponics (the process of growing plants thanks to an aggregate medium).18

I wanted the final concept to transmit a sense of naturalness, so I visited the material library in search of inspiration. I found various materials that expressed the values I was looking for. I chose to use cork, because it is often used together with olive oil and vinegar bottles and it expressed the desired values. I would use this material as a stopper and a support for the growth medium that would start the seeds.

For the values and ideals to be transmitted to the final user the product would have to be accepted and therefore remain modest. I experimented with various colours and finishes, but ultimately opted for a matte white base. This neutral base would allow the product to blend in with its surrounding environment without being invasive.

4 The Controversy of Electricity

18 http://dictionary.reference.com/browse/geoponics

A contentious point of my bachelor project was the power supply. Aeroponics requires a small but constant source of electrical power to run and often times there is a negative association between electricity and water. The means I used to overcome this problem was the choice of the power chord. I chose a textile chord that would create a subconscious reference to common household appliances. An example is the iron, which contains a small water resevoire, but nonetheless has become a well-established architype.

In the final stages of my project I brainstormed on alternative ways of supplying power to the ultrasonic fogger. How could the power source be made more functional, environmentally friendly and attractive, while at the same time maintaining its ease of use?
Various phases in the making of the final model: from planting to painting.
One possible solution would be to integrate a small solar panel, that would be placed on the back of the reservoir and charge a battery version of the fogger. This would allow the user to easily move the product without being constrained to the location of nearby power sockets. At the same time the product would have to be placed near a constant light source.

An alternative solution would be to supply the base cork with a power input that would allow for easy charging of an internal battery. This would eliminate the need for a constant power supply, but at the same time would require the product to contain a visual reference to the battery’s power level.

5 The Outcome

The final project proposal was a result of the demystification of data I had gathered through user interviews and the integration of theoretical knowledge with core values that would define the perceived image of the product.

By speaking with amateur farmers at the allotment gardens in Stockholm I learnt that many people are passionate about the subject of food and are keen on knowing how their food is grown and where it comes from. Initially my intent was to use pre-grown herbs from the supermarket and transfer these herbs to the aeroponic window garden, in order to continue the growing from an already started process. But the insight gathered from Tantolunden and Koloniträdgård encouraged me to find a way for people to be able to grow their herbs from seed to full grown plant, so as to be a part of the entire process.

What I worked on was to create an expression of the antithesis of the familiar and the unknown. The user would associate with things such as the material and the form and at the same time be provoked by the process and interaction with the product. The contrast between technology and tradition was a key element that characterized the outcome of the final concept.

What users at the supermarket were looking for when buying herbs was essentially quality and freshness. Oftentimes you can find neither of these at your local store. The satisfaction of eating food you have grown is much greater, because there is no doubt about how much fertilizers, herbicides and pesticides have been used, whether the food is genetically modified or where in the world it has been shipped from. The idea was to
put the users in charge of the process, without intimidating them. The final product is therefore a manifesto of the simplicity of urban agriculture and encourages people to dedicate more time to learning about what they are putting into their bodies when they eat.

Food miles are cut down to zero when you produce locally and the ultimate revolution of food production would be if every family could sustain itself with home grown produce. This is an ideal scenario, but at the same time my project shows how it is possible for someone with little time and knowledge of gardening to grow indoors and with a limited amount of space at their disposal. By growing food in our cities we are essentially restoring habitat to land that is currently used for agriculture, while at the same time reducing the heat island effect that is created by the concentration of greenhouse gases.

Trends like guerilla gardening and window farming are already starting to appear, but it is up to each of us to be aware of how unsustainable the current way of growing and transporting food really is. By having an aero-ponic herb garden in your home you show consciousness and sensibility towards problems that many people do not even know the existence of.

Supherb requires little to no maintenance, just the planting of the seeds and an occasional refill of the reservoir every couple weeks. The ease of use should appeal to users that have an interest in gardening but do not want to invest too much time and effort. One ultrasonic fogger will accompany the product throughout its lifecycle and the small metallic plaque, which is responsible for the mist, can be easily replaced if damaged or worn out.

The product can easily be manufactured with simple machinery since it only requires the cutting and drilling of glass, along with glueing and finally powder coating. The kit comes with base, fogger, corks, starter capsules, growing medium and a choice of three different seeds for first-time users. Once the seeds are planted in the rockwool they must be thermally insulated. This is done by using the transparent capsules that fit snugly over the cork plugs. Once the seedlings grow to a height of about 5 centimeters it is possible to remove the capsules and allow the herbs to grow freely. The process is now automated and requires only that a pH-neutral nutrient solution be added to the base reservoir, in order to sustain the plant growth. The discovery of this fun new way of gardening will appeal to both adults and children, making it a great bonding activity.

6 Scenarios

In order to give the project more depth I decided to define three hypothetical user scenarios. Given the scale of the product it would have to be marketed towards the private sector, unless the intended use were to be purely educational. The first scenario is the most general one and defines a vaster target group. The second and third scenarios deal with smaller target groups and focus on users with more specific needs.
User Scenario 1

**Name:** Tyler  
**Sex:** Male  
**Age:** 7  
**Occupation:** Student

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### About the user

Tyler just started elementary school and is excited about his new friends and teachers. He loves playing outdoors and collecting insects. His favorite TV channel is Animal Planet and the subject he likes most at school is science.

### Why would he like it?

Tyler is curious about everything that has to do with nature. He likes finding out how things work and showing off what he has learnt to his parents. Supherb would trigger his curiosity and bring something he loves into the classroom. Supherb would allow Tyler and his friends to take part in an activity that is usually reserved for grown-ups.

### How would he use it?

Tyler’s teacher will tell him about plants and explain how they grow and how to take care of them. Tyler will be able to study all the fundamental elements of the plant and learn about urban agriculture in a fun way thanks to a stimulating real-life example. He and his classmates will be able to follow all stages of the plant growth cycle and compare them through pictures and video.
The product can be used in schools to teach students how our food will be grown in the future.
User Scenario 2

Name: Monica

Sex: Female

Age: 27

Occupation: Journalist

About the user

Monica is a young career-oriented woman. She likes going out with friends and enjoys playing tennis and jogging in the weekend. She cares about her home and likes to give a good impression to visitors. She has a refined taste and carefully selects the products she decides to purchase.

Why would she like it?

Because of her busy lifestyle, Monica doesn’t spend much time at home. She dedicates the little free time she has to sports and seeing her friends and family. Supherb would allow her to grow fresh herbs at home with minimum effort. This would allow her to show her friends and family that she cares for her own health as well as that of the environment.

How would she use it?

Being a first time user, Monica can log on to the Supherb website to get useful information on planting and taking care of her herbs, as well as exchange ideas and opinions with other users just like her. Once the herbs are fully grown she can use them as condiments to make her dishes more tasty and appealing.
The windowsill is a perfect place for the herbs to flourish thanks to the abundance of natural light.
User Scenario 1

**Name:** Alessio

**Sex:** Male

**Age:** 35

**Occupation:** Restaurant Owner / Maître

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**About the user**

Alessio owns an Italian restaurant where he also works as a maître. He has a passion for good food and wine and when he’s not working at the restaurant you will find him at home trying out new recipes. He enjoys traveling and meeting new people.

**Why would he like it?**

Alessio is a perfectionist with a high attention for details and he likes to know where the ingredients he uses come from. With Supherb he can be in control of the whole growth process, from seed to full grown plant. The product would provide a functional and beautiful centerpiece in Alessio’s home.

**How would he use it?**

Since Supherb requires little maintenance the product can be left on while Alessio is at work. He can count on a constant supply of fresh herbs, which can be used in dishes he prepares for himself and his friends. Supherb can also be used as a centerpiece that will enhance the dining experience with its subtle aroma. Once the herbs have been consumed they can be replaced with new startlings in continuous cycles.

The plant growth can be further sped up if the herbs are placed under a red and blue spectrum LED light.
The product can be placed directly in the kitchen for easy use while cooking.
Infographic Introduction

In order to explain the premise of my bachelor project I animated a short introductory video describing how food is currently produced through traditional agriculture and how urban agriculture will revolutionize the way food is produced in the future. I decided to use simple graphics and easy-to-grasp information, so as to hold the viewer’s attention.

https://vimeo.com/40391798
7 Conclusions

Overall I am pleased with the outcome of my project, but in hindsight there are a few things I would have done differently.

Firstly, I would have liked to have the support of a good collaborating company or design firm to assist me in the more problematic aspects of the project. It was very hard trying to find a collaborator once the project was underway and I was occupied with the design process. So for future design projects I will sort these issues out at an earlier phase or even before the project starts.

Another thing I would have done better would be to keep a more detailed log book describing the development of the design process. Keeping a summary of the various phases as the project progressed would have made the task of writing the report much easier and given me a clearer view of the entire process.

Due to the complexity of the subject it would have been useful to work together with a student coming from a more technical background. This would have helped me solve some of the more scientific details involved with making the final prototype. Working together with an engineering or science student would broaden my knowledge, as well as allow me to work in an interdisciplinary team.

The most significant lesson I took away from this bachelor project was the importance for a designer to be aware of his or her decisions throughout the whole design process and the effect that these decisions have on the development and outcome of the project. As designers many of the choices we make come to us instinctively, but if we are conscious of those choices and understand how and why we make them, then it is easier to learn from our mistakes. It is much more beneficial for a designer to understand the success of a project if he or she is conscious of the decisions that lead to the final solution.

The freedom that was given to me throughout this project was initially misleading, but it taught me how to organise the time I had to work on the various phases of the project by keeping a clear schedule. I spent the first couple of weeks doing research and trying to narrow down the brief without much success. Finally I realized how important it was to continuously keep demystifying and keep track of the data I had collected through close analysis. Once I started breaking down and simplifying the information I had gathered it became easier to chose a target group and ultimately the final brief for my project.

I decided to push myself outside of my comfort zone by using a presentation technique that I had no previous knowledge of. By learning how to animate in After Effect I was able to create a short introductory video that explained the premise of my bachelor project. This allowed me to gather my thoughts and explain the background research much more clearly, thus giving me greater confidence during my final presentation.

During the design process I experimented with different sizes and shapes, varying from one to three top ducts. Since the product was meant for commercial use one or two ducts were not enough. The current size of the final product satisfies the need of a few individuals, but it would be interesting to raise the productivity so that Supherb provides a more varied and larger quantity of produce. One way to do this would be to take advantage of the entire windowsill surface, in order to increase the size of the product horizontally. It would be possible to create a modular system
based on the standard European Window Frame Sizes\textsuperscript{19}, thereby allowing users to choose from a variety of sizes that fit their needs. A larger scale window farm would allow the product to be used by a broader slice of the market, but at the same time increasing the volume would require more electricity to counterbalance the extra plants and water.

Urban agriculture is still a relatively young field and there are many possibilities to develop and build on the Supherb project. Given the short amount of time I had to complete the project, I am looking forward to making use of the feedback I received from my tutors to improve and strengthen my final concept. I look forward to finding a possible collaborator that will assist me in developing a product that can be marketed and launched on the market.

\textsuperscript{19} \url{http://www.simplifydiy.com/windows-and-doors/windows/window-sizes}