Synopsis

This project concerns the development of an inflatable workstation for public spaces. The product is designed in consideration of people who are using the parks as a place to “work” with their laptops.

The first phase, the Research, deals with basic aspects of the project, such as the definition of the target group, an analysis of the open public spaces, a morphological analysis of the workstations. In order to have more available data for the project, a central park of the municipality of Aalborg is being used as a case study. The first chapter ends with the problem statement.

The second phase, concept development, concerns the problems that a person deals with in a park when using a laptop, the demands and specifications of the users, coming out of interviews and observation. In addition, the values and the vision of the new product are defined and the final concept is selected.

The third phase, product development, introduces the more technical aspects of the project and ends with the final product.
Reading guidance
The thesis is documented in two reports: A process report and product report. The process report contains four phases. Phase 1, 2, 3 and 4 dealing with the research, development and realization of the project.

The product report is a detailed presentation of the product that has been designed.

Harvard style is used for referring to various sources. The list of references and illustrations can be found in the back of the process report. When referring to appendix, illustrations, diagrammes and pictures, the following format will be used.

ill. 1.2.3

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The appendix and the report can be found in the CD on the back of the process report. The CD also contains pictures, sketches and diagrams that have been collected during the design process.

Acknowledgements
This project involves the development of a concept work station for Aalborg’s public park, Kildeparken. In this context I would personal like to thank some people who have assisted with information, feedback, critical comments or even help whenever was needed.

For information, support and input: Aalborg municipality and especially the people from the maintenance department of the municipality.

I would also like to thank Mr. Henrik Harder, professor of the A&D in Aalborg university and his team, for their contribution through the GPS research on Kildeparken.

Also, my supervisor Nicola Morelli for the effective cooperation from the beginning until the end of the project.
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This project is the result of the master thesis. The main theme that the project deals with is open public spaces and more specific the design of an inflatable workstation for parks.

The purpose of this report is to reflect upon the personal ability of the writer to organize and run a wide project, based on the experience of the previous semesters and the general education.

In that context, the attempt was to present a complete research for one concept and not dive into only one point of view of the project.

That means that during the project there was an effort to keep a balance between the theoretical part, introducing the back office and the front office of the project, design the offered service and link the actors of the new system, while at the same time, explore the industrial aspects of the project, such as the form, the construction, the manufacturing techniques and more.
The process is illustrated in the funnel diagram describing the diverging and convergent process of the project.

Primarily, a wide planning in order to set the framework of the project is done. Soon, the focus is gathered in one aspect, which is chosen as a topic for the project and a wide research is carried out in order to approach the theme better. The research phase is not ending at a specific point, but the outcome of the initial research gives the spark for the concept development. Once the concept has achieve a complete level, the development of the product starts. The end point of the process is the final form of the product.

Although the design of the service behind the product is essential part of the process and runs almost parallel with the development of the product, it is not included in the diagram since it is not part of this report. The design of the service can be found in the product report.
In the first phase the main objective is to identify and document the design task. That happens with an investigation in public spaces and workstations.

Another aspect of the phase is to understand and define the target group. This is carried out by observation and interviews in order to identify their needs. Personas are formed to be used later on in use cases.

A case study about a public park, that is going to be used during the project is presented. The research results are summed up and used as a basis for the problem statement.
PHASE ONE RESEARCH
OPEN PUBLIC SPACES
To initiate the project a research of the term open public spaces is performed.

Public Space
According to wikipedia, a public space refers to an area or place that is open and accessible to all citizens, regardless of gender, race, ethnicity, age or socio-economic level. No fees or paid tickets are required for entry, nor are the entrants discriminated based on background.

As public spaces can be mostly described the streets, town squares or parks and some of the government buildings such as public libraries.

This project will mainly focus on open public spaces and more specific to public parks.

Anybody has the right to act as he wants in a public park as long as he is not violate the freedom of the others. That means that the park can be used for a lot and different purposes. Some of the most common uses are:

- Leisure / relax
- Barbecue
- Socialize
- Meeting point
- Sports (Running - Soccer)
- Entertainment

Elements
Besides the geographical characteristics of a landscape, hills, lakes, trees, paths, etc., in a park can be also found some standard elements that are used for the physical and psychological needs of the public, such as statues and memorials, art pieces, fountains, benches, night lights, garbage bins and more. The variety and the number of the extra elements, depends on the size, the use and the position of the park in the city.
Use of the park

Usually the public parks are open 24 hours per day all year long. But the use of them from the crowd is changing according to the temperature and the daily light during the year.

In the diagram above, it can be seen the daylight in the area of Aalborg. The light lasts from 7 hours in the winter time up to almost 19 hours in the summer time. Since the temperature is also suitable for staying outside, the parks of Aalborg are crowded and alive at summer time.
WORKSTATIONS
The objectives of this chapter is to give a brief understanding of what a work station is.

Workstation
A workstation in a manufacturing environment, is an area with equipment for the performance of a specialized task usually by a single individual.

A simple desk and a chair, where somebody can have a piece of paper and a pen, can be consider as a workstation. The workstations have been developed a lot since the period with the desk and the paper. Today, a computer unit and internet are essential parts of a working environment.

A workstation can either be bought as a complete furniture with all the extra features included or it can be built element by element by the user.

A major classification of working spaces refers to open and closed environments, or in other words, to team workstations, where the communication and interaction between the members is essential part of the design of the space or individual workstations, where isolation from the rest of the surroundings is more important. In this project, the focus is on individual spaces but without the restrictions of isolation.

Offices
The tenancy for the modern companies is to provide to their employees pre - designed workstations, that are well ergonomically designed in order to achieve maximum productivity from them. Although this spaces are standard, still give the chance to the user to make small adjustments and customize parts of the space since the feeling of belonging in the working environment is really important (my office).

Future
The tenancy of the design field for workstations is focused in three main cores: the ergonomy provided to the user, isolation from the surroundings and high tech technology. Since the meaning of the workstation and working environment is change drastically according to the technology provided, it is hard to assume how the design of it will look like in some years from now or even describe the parts that a station will consists of.
MORPHOLOGICAL ANALYSIS

The chapter provides the basic information about the components of a workstation.

In order to investigate which are the major components that a workstation usually consist of, the method of morphological analysis is used. The products of the pictures from the chapter “workstations” are used as a reference.

During the process of the project, based on that analysis, different decisions upon the components of the final product are taken in order to form the product architecture.

<table>
<thead>
<tr>
<th>Basic Components</th>
<th>Desk</th>
<th>Chair</th>
<th>Working light</th>
<th>Shelter</th>
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<td>No desk</td>
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<td>No shelter</td>
<td>Closed</td>
<td>Convertible</td>
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<th>Extra Components</th>
<th>Power Supply</th>
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<td>Solar</td>
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<td>No internet</td>
<td>Wirless</td>
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<th>Hardware Components</th>
<th>Screen</th>
<th>PC Unit</th>
<th>Mouse / Keyboard</th>
<th>Microphone / Loudspeakers</th>
<th>Camera</th>
<th>Printer</th>
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<td>CRT</td>
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PROBLEM AREA
This chapter frames the problem area that is gone be further investigated during the project

Starting from the analysis of the workstations and the research about the public spaces, various topics have been examined. The major point of this investigation was to make clear if a public park is used and can be characterized as a working environment and how the existing facilities satisfy the user’s needs.

Interviews
Interviews with people “working” in a park were carried out. The main aspect was to identify the main target group, how much time does somebody spends on a park with his laptop, what are the main problems that somebody deals in a public park and other essential questions for the problem area.

Using the outcome of the interviews, it is found that people have specific needs relating to public spaces. It has become also clear that many of the problems concerning workstations are related to the use and the influence of the surroundings. The problem area therefore covers an investigation of a workstation in a public park.

The outcome of the interviews has been also used later on in the project for documenting the demands of the target group and the specifications of the product.

Working in a park
The phrase “working in a park”, might sound contradictory. That is because people during the years, have connect in their minds, public parks with leisure and relaxing time and not so much with work. The truth is that with the new time perspectives and the available technology, more people in their free time, try to avoid the closed spaces and have some breaks outside in the nature.

During the project, the phrase “work in a park” refers to all kind of tasks performed with a laptop. Those tasks varies from internet browsing and music downloading to professional presentation and pie charts, according to the user.

Hot spots
In the majority of the european cities free wireless internet, known as hot spots, is provided to public spaces such as central squares. According to the danish legislation, it is not allowed to the municipalities to provide free wireless internet to public spaces since undercuts the private business. Based on that limitation, the project investigates solutions to provide the citizens the freedom of working with their laptops to a park.
EXISTING PRODUCTS

This chapter presents products used as workstations in open spaces

Although the indoor workstations have been under the focus of the designers and the furniture industry for many years, where has been achieved great progress on the ergonomics, efficiency but also in the philosophy behind the working environment, the situation with the outdoor workstations has remained almost static. The last years, mainly because of the progress in the field of technology, some new products for outdoor use, came out in the market.

Wireless Technology

The internet wireless technology, gave the ability to use network wherever you want. In that context, a lot of manufacturers gave attention on the shape and the characteristics of their products, in their attempt to make public furniture more appealing to the crowd.

Solar Energy

In the attempt to solve the main problem when working outside, the laptop’s battery life time, a lot of products focus on how to collect solar energy.

Providing the basic components, a surface for the laptop and a sit, they vary from really light and simple constructions (pic. 3.4) to more complete providing a shelter and semi closed spaces (pic. 3.3). These solutions are consider rather expensive than efficient. In addition, solar cells are avoided in crowded public areas for reasons of vandalism. Although, since the technology concern the solar energy becomes more available to the market it is expected that in the near future the cost but also the specifications of these products will be more suitable for that kind of use.

Weather Protection

A big category of outdoor furniture has focus on how to protect the user from uncomfortable weather conditions. Problems of the screen’s brightness because of the sun or unpleasant wind were aspects that tried to be solved by making closed spaces for public parks.

ill. 1.5.1 Existing products
TARGET GROUP
By looking at the initial analysis and the outcome of the interviews, the characteristics of the target group are defined.

Although the public parks by definition are used from everybody, the people who use the parks in order to work with their laptop have some precise characteristics. In order to approach the span of the target group, observation in public parks and some initial interviews were carried out.

Interviews
In that phase the interviews intend more to get an understanding of the people using the parks as “working environment” and not to get a feedback about their needs or comments about the project. In that context the interviews are limited to their age, questions about the equipment they usually use at the parks, technological equipment that would also like to use, the duration of their stay in the park and the reason of visiting.

Target group
The definition of the target group for the specific project it can not be very explicit from the early beginning until the whole life time of the product. That is because the variable of technology, which is a major aspect in the project, according to the age of the users, is changing gradually by the time. Few years ago, technology (computers and gadgets) consider as a privilege of young people since it was easier for them to adapt the new way of interaction. Today, more and more people of older age are becoming familiar with the field.

Based on that fact, the target group is defined through two main parameters. Age and level of technology knowledge. Where as a beginner described a user that can only use simple devices like radio and gradually goes to the advanced user who is an expert user of all kinds. In between can be found, the use of a mobile phone, ipods, laptops and more.

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| Level of technology use | Beginner | Advanced |

ill. 1.6.1 Target group
ill. 1.6.2 Target group photos
PERSONAS
Three different characters are generated to illustrate the span of the target group.

Anders Pedersen
Age: 32
Job: Economist
Civil status: Single
Anders lives alone in an apartment in the city. He works in a bank and spends a lot of time on the internet in order to keep updated for his work. He runs a personal blog in the web about stocks markets and enjoys posting advice for readers of his page.

He is not fun of social gatherings but he enjoys spending time in the park while reading financial newspapers.

Birthe Jacobsen
Age: 29
Job: Assistant in a print office
Civil status: Married
Birthe lives with her husband and their three year’s old daughter in a small apartment in the center of the city. She has a part time job in a print office.

She is an amateur novel writer and she would like one day to publish her stories.

In her spare time, she likes to take her daughter for a walk in the park.

Capser Gerhar
Age: 17
Job: Highschool student
Civil status: Single
Casper lives with his parents in the center of Aalborg. His income is generally coming from the danish government support (SU). He wants to study computer science.

He loves his new iphone and spends a lot of time on facebook and net games with his e-friends.

He usually meet with his friends in the park to share music for his ipod and chat.

Personas
A method of understanding the target group by using fictive characters. Personas are used during the design process in different scenarios within a realistic context. In that way, abstract user data take personal characteristics which related to the design work, evaluating each time according to a “real” person’s point of view.
CASE STUDY KILDEPARKEN

This chapter is a brief introduction of the park that has been chosen to work with as a case study for the project

In order to be able to investigate direct the problem area and have more input for the project, a specific park of the city of Aalborg has been chosen as a case study. The characteristics of the park as well the users are presented here.

Location
Kildeparken is located in the center of the city, bounded by main streets and the railways. Connected direct with the train station through a tunnel, makes the location of the park quite popular not only for the locals but also for people outside the city of Aalborg. The illustration on the right is diagram of the park.

Visitors
The park is estimated to have 1.1 million visitors annually. Depending on the weather, in a normal day of summer time, the park has more than 3000 visitors per day. During the winter time this amount of people is reduced but still remains in a high number since the park is used as a shortcut.

Users
The majority of the people are using the park for recreation. Barbecue, is one of the common uses of the park for Sundays and free days. Kildeparken is also very popular for young people. It is usually used for meeting point after school and there are several events like the celebration of the first day of the school year.

Events
During the year there are several events in the park. Concerts and different kind of shows are held in there with bigger event the carnival of the city.
ill. 1.8.2 Kildeparken map
This research is the outcome of a cooperation between Aalborg Municipality and the research team of Aalborg University, DMB (Det Mangfoldige Byrum). The results and the diagrams of the study, can be found in the appendix.

The study

The study took place in four parks in the area of Aalborg. Here are presented the results for Kildeparken.

The study that carried out, is divided in of two main parts, a GPS analysis and a survey of the users. The visitors of Kildeparken in the investigation were given a GPS unit when enter the park and were encouraged to wear the device until their exit, where they were asked to complete a questionnaire.

The aim of the research was to provide an overview of the users and give a perception of the park. The aim of the GPS track was to provide an overview of the parts of the park that users used most and to identify the period of staying in the park.

The results

The purpose of visiting the park are scored as following: “Get fresh air”, “Experience nature”, “Peace and quiet”, “be in a better mood” and “improve my condition”. The five objectives of stay in the park are characterized as one - person activities and less as group activities.

The duration of stay in the park is described in the GPS map on the right.

Another interesting part of the survey was the rank of the importance of the various elements in the park, where tables and benches are coming while barbecue areas and playgrounds are ranked as less important.

Since people are not used to public furniture for working with a laptop it is understandalbe that non of the answers refer to something familiar with the subject.

The results of this study are used during the project more as information around the field and less as guidelines for the new concept. Although the diagrams and figures are taking into consideration, it is not used as specifications for the product.
The GPS map shows in which parts of the park the visitors spent most of their time. This is the relative allocation of time.
**CHOISE OF SUBJECT**
The chapter sum up the perspectives of the project and gives a brief description of the product that is to be designed.

**Approach**
The approach to the concept is to create an alternative way of using the park. Inspiration to the project is taken from people sitting in the grass of the parks with a laptop in their hands.

**The concept**
The concept relies on the need for an attractive and efficient way to work in a park. The concept is to design a workstation that it will be used in open public spaces and more specific, the project will be positioned in a main case study for Aalborg’s central park, Kildeparken.

The focus is to give to the user the ability and the freedom to use Danish public parks as a working environment. This will include aspects such as power supply to charge your laptop, provide internet connection and an additional sitting to work on, where the design of the product will take in consideration the characteristics and the surroundings of a park.
PROBLEM STATEMENT
Various problems when working in a park were found, such as power supply and internet. The following problem is stated for the project:

How to develop a workstation that will improve the conditions of people who want to work in a park with their laptops
By stating the problem, a more specific research about the problems in public parks is performed. Results from the interviews are used to define the demands of the target group. Furthermore, the phase includes an investigation on the ergonomic aspects of a park.

An idea generation is carried out and through evaluation, two main concept proposals are further developed and explored through rough sketches.

The specifications of the product are defined and a final concept for the project is specified.
PHASE TWO
CONCEPT DEVELOPMENT
PROBLEMS IN PUBLIC SPACES
The chapter presents some of the basic problems that somebody deals in a park.

After stating the problem, working with public spaces, the different problems that somebody might deals with in a park, are highlighted.

Power supply
Main problem when working with a laptop in a park, is that the battery sooner or later is running out.

No Internet
Although the percentage of public squares with free wireless internet is increased rapidly, the situation in the parks remain the same, with no direct access. That is because according to danish legislation, non of the municipalities is allowed to provide free internet since it comes against the private business. Although private internet providers could offer internet legally in the parks, nothing like that exists until today since the way to charge the user is not easy.

Noise
Children, dogs and loud people are some of the distracting and unpleasant noises. No silence regulations in the parks.

Sun / Wind / Rain
No shelter for protection against the weather is provided. The sun usually affects the quality of the light in the screen of the laptops, while wind and rain make the stay in the park unpleasant.

Uncomfortable sitting
The common benches in the parks are especially designed to offer short time sitting since the comfortability of them is limited.

When a person decides to go and work in a park, is usually aware of the conditions described. Most of the problems is usually possible to avoid or choose not to deal with (in case of bad whether conditions, you stay home), but in the first two cases, power supply and no internet, is aspects that you are aware of but you can not react since there is no appropriate infrastructure.
The approach to the concept development is to create an understanding of how people interact with the park. A way to achieve that, was to take several photos of a person using a laptop in different possible sitting positions in a park. The positions were spontaneous in the majority and the duration of each of them was based on the comfort of the user.

The second step, was to evaluate the pictures and grade them according to time and the comfortability of usage. The positions where also highlighted with comments concern the surrounding elements, like benches, trees, wet grass etc.

The purpose of the research it was not to use the outcome as standards. Since it is based in personal opinion and observation, it was mostly used as an catalog of ergonony aspects to consider later on in the project. The research of ergonomy has mainly been used as an inspiration for new concepts as well for forming the new product.

The results of the research can be found in the appendix.
VALUE AND VISION
The objectives of this chapter is to determine the values of the new service and the interaction vision.

Value mission
The purpose of the value mission is to state the design goals through key words and get an overview of where the project is focusing. Metaphors and images clarifying the keywords in relation to the project have been found through mind maps and presented here. The wish for the project is to achieve the design of a product that will reflect the connection of people with the nature. Rise the meaning of workstation in a more spiritual level and restructuring the traditional work environment.

Alive
- Like being in a concert

Connection
- Like going back to your routes

Identity
- Like a buoy in the sea
Interaction vision

As with the value mission, the interaction vision is described by key-words. Metaphors and images are used also here in order to clarify their meanings. The intention is to create a better image of the vision for the interaction between the user and the product. The abstract level of the value mission is becoming here less general and more concrete regards the user and the surroundings of the product.

Playful

Like being in the sea with an inflatable mattress

Reliable

Like turn on an apple computer

Interactive

Like talking with a friend

ill. 2.3.3 Interaction vision
Idea Generation is a stage for developing as many ideas as possible without any criticism. The more ideas the higher the chances are that some of them are really valuable. The main methods used for this stage are brainstorming, reversed brainstorming, and impulse technique.

**Brainstorm**
The first step was to write in the paper whatever was. That

**Reversed Brainstorm**
In reversed brainstorm, the used as positive statements from which several negative statements were created. These were used as bases on which to create ideas that later were turned into positive ideas.

**Sum up**
The sum up stage is used to create an overview of the ideas that have been produced so far and to choose which ideas to move forward to the next stage. The ideas were grouped and overlapping ideas were removed using the method of summarizing. When it was possible ideas were combined to decrease the number of those left and to improve them. Lastly, ideas that were not able to be categorized and ones that were not found relevant were removed.

**Rouch Sketching**
The selected ideas are further developed by small notes and quick sketching in order to get a better understanding of the concepts. Throughout this process, two out of four concepts were chosen to work with.

**Workstation**
- igloo workstation (provide shelter for rain and wind)
- artificial solar trees
- solar flowers
- fountains - waterfalls (use the energy)
- bike stand / workstation (park your bike - produce energy by cycling)
- lazy boy for parks
- statues workstations
- cactus workstations
- net - kiosk (buy one time workstation)
- pieces of art (several components used as desk/chair etc)
- carpet workstation
- hidden inflatable workstation
- playground / workstation (use the energy that the children produce by playing)
- artificial grass hills
- workstations one with the landscape
- high tech benches

ill. 2.4.1 Brainstorm
SUM UP
In this chapter the ideas are summarized and presented through conceptual sketches.

A big statue, composed of different shape/size modules that can be disconnected and used individual as sitting and battery for the laptop. When finish the work, return the module to the initial statue where it is charged again.

Concept workstations

Artificials trees collecting solar energy. The trees work as a power supply to the user but also as sitting and shelter.

Artificial hills

The concept of this idea is to make the workstations one with the nature. Small artificial hills are rising up in the park's landscape offering to the user power, internet and natural sitting.

Hide the workstations when not in use. The mechanism is underground. When is activated a balloon comes out providing sitting, power and wireless internet.

ill. 2.5.1 The four concepts
CONCEPTS
The chapter is a brief description of the two concepts that were shortlisted

Concept 1:
Inflatable workstation

Idea
The main idea of the first concept, is to keep the view of the park as pure as possible when there are no users acting on it and from the other hand, change drastically the view of the park when there are people interacting with it. The product is hidden under the ground when it is not activated until somebody chose to work on that spot.

Observations
Inspired from the flowers and their cyrcle of life, the product is planned under the ground and remains there until is activated by someone.

Difficulties of this project could be on the technical aspects of the under ground part of the product.

When the product is closed it can not be seen in the park. The product is planed under the ground and connected with electricity and internet cables.

The user activates the workstation with his mobile phone. Send an sms to the number written in the lid.

The balloon blows up automatically creating a sitting for the user. The balloon has sockets for electricity. Wireless internet is provided within an radius of 5 meters.

Several balloons are planned all over the park.

ill. 2.6.1 Inflatable workstation
Concept 2: Pieces of art

Idea
Based almost on the opposite idea of the concept one, the core idea is how the user affects the daily view of the park according to his use. Deconstruction of the statue’s module and construction of it in a different way after the use.

Observations
Based on the idea of people interacting with the surroundings inside the park, the users choose how they will deconstruct the main statue, how they will form the view of the park by spreading all the modules around the park according to their preferences for work and how they will construct the statue again when returning the modules.

The difficulties of this concept could be on design the different modules in such a way that it will be able to fit (attach) all together in a lot and different combinations, while having the functions of charging and sitting at the same time.
SPECIFICATIONS
The following chapter describes briefly the specifications of the new product

The product design specifications have been formed through the research phase and contain all the necessary information that should be taken in account during the design process.

Performance:
The balloon should be inflated in an average time of 10 sec.
The balloon has to carry out a pressure approximately equal to 3 people of 90 kilos at the same time.
The mechanism should be a stable system.
It should be as much quiet as possible during the inflating / deflate procedure and silent when used.
Need only one person to perform the activation

Environment:
Working temperature: The mechanism should be possible to work also at 42 degrees of heat (maximum summer temperature)
The balloon should be resistant to sun rays and strong wind.
Waterproof

Life in Service:
The mechanism is required to work 18h/day and have to work well up to 5 years after use. But it should work until the 10th year without any horrible error.

Maintenance:
The maintenance cost to operate machine is paid for energy usage and internet and in case of a problem it is should be possible to replace only parts.
The energy should be the cheapest and the most efficient one such as electric and the energy resource have to be safety and not damage the machine.

Target Product Cost:
The manufacturing costs, should be as minimum as possible.
The final cost of use should reflect the value of price and not be way over the price of a normal hour in an internet cafe.

Shipping and packing:
The item can be easy to move or ship, the product should be compact without a problem of destroy during the shipping, some parts of the product could be bought separate as regular equipment.

Size and weight:
After assembly the product should be small enough to be storaged easily. The weight of the product also needs to be light enough so one person to be able to handle with it.

Materials:
The materials that are consider should be environmental friendly since the context of the product is the park. The texture of the material should also be user friendly and related to the surroundings.

Maintenance:
The maintenance cost to operate machine is paid for energy usage and internet and in case of a problem it is should be possible to replace only parts.
The energy should be the cheapest and the most efficient one such as electric and the energy resource have to be safety and not damage the machine.

Target Product Cost:
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Size and weight:
After assembly the product should be small enough to be storaged easily. The weight of the product also needs to be light enough so one person to be able to handle with it.

Materials:
The materials that are consider should be environmental friendly since the context of the product is the park. The texture of the material should also be user friendly and related to the surroundings.
Both of the concepts fulfil the needs of a person who want to work in a park since provide sitting, power supply and network. The difference between the two concepts stands on the effect that the products have in the final view of the park and the experience of the user.

The first concept appears when it is in use while the second concept almost “disappears” when in use. The two concepts evaluated through the level of realization, the personas and the research phase and finally it is decided to work with the concept number one, since it is consider more innovative and interesting to work with.

**Concept 1: Inflatable workstation**
Deal with interaction between the park and the humans. How the motion of the people affects the view of the park

**Concept 2: Pieces of art**
Deal with the abstract idea of deconstructing a statue and the interaction between the users and the art pieces of a park
A more specific research about the focused working area is carried out. Mechanical solutions for construction issues of the potato and the balloon are given. A shape board is created in order to be used as a tool in the design of the final form.

Subjects covered also in that phase are styling, mechanical and kinematic systems, manufacturing and materials. Finally, the aspects of ownership of the service and booking are considered.
Inflatable objects are those that can be inflated with gas, usually with air, hydrogen, helium and nitrogen. Each gas is used for the different attributes that offers.

The main advantage of an inflatable is that it can be stored in a small space where not inflated, since inflatables depend on the presence of a gas to maintain their size and shape.

**Inflation motors**

The ways of inflation of the products varies from manually to mechanic or even natural inflation, always according to the purpose of use. The most common and simple way is using mechanic inflation. Electric motors of different power are usually used for small objects while products that require big and continuously amount of air, make use of benzin motors to inflate. The common problem of both electric and benzin motors is the noise that produce when are in use.

**Materials**

In addition to the common balloon, whose material (rubber) is greatly stretched when inflated, most inflatables are made of material that does not stretch upon inflation.

The choise of the suitable material is usually based on the distinction between high-pressure or low-pressure inflatables. In a high-pressure inflatable, structural limbs like pillars and arches are built out of a tough, flexible material and then inflated at a relatively high pressure. Low-pressure inflatables are usually built of lighter materials. For products that are not made only for decoration but also for real use with people (interaction), most common materials are PVC and Hypalon due to the attributes that offer.
In the design of the part under the ground (potato), there are several considerations that have to be taken into account, regarding the size and dimensions as well as the mechanical system.

The potato should include the following parts: air booth, electric pump, air chamber or balloon, hose, core, electric sockets.

The main functions of the potato are:
- Protect the mechanism from water and land
- Provide power
- Provide internet
- Store the balloon
- Control the air flow
- Lift the lid
**DESIGN OF THE POTATO**

This chapter describes the functions of the potato

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**Motion**
The potato hides the balloon and the mechanism of the product when not in use. When it is activated there is motion to the system.

**Operation**
The operation of the potato can be divided to 4 steps:

First: The lifting motor operates to raise up the lid - pad from the lowest position (closed) to the highest (open). When the core reach the highest position, the external air valve opens in order to provide air to the electric pump and inflate the balloon.

Second: The air pump operates to inflate the balloon.

Third: When the balloon is inflated to a determined pressure. The air pump stops. The valve locks in order to keep the pressure steady.

Fourth: When the user decides to close the balloon, the air pump inverts the air flow from inside to outside, sucking all the air that is inside the balloon.

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![ill. 3.2.3 Motion of the potato](image-url)
Air flow
In order to be protected from leaves or other garbage from the park, the external air valve is under the main lid. It is exposed only when the product is activated. When the lid comes up, the air goes through the external air valve to the main core and from there it is sucked to the motor where is comprasred and relisead again in the air booth. The comprasred air makes the balloon to inflate outside the potato. The reverse procedure is followed when the product is deac- tivated.

Repairing
The potato should be easily acces- sible in case of problem in the mech- anism and general maintanace or even for changing the balloon.

The lifting mechanism is attached in the central core of the product and is easy to get out and repair without the need to unplant the whole potato from the ground.

Since the most exposed and frag- ile part of the product is the bal- loon, should be easy to remove and change but also it is consider impor- tant to secure that the air will not be easy to escape through the unions of the construction. Rubber endings in the unions has been chosen in order to prevent that. In the picture can be seen the way the balloon is attached.

Two main rings trap the balloon in the potato. The rings are easy to remove and change the broken balloon or even replace it with another one with a new shape or color.
MECHANISM
The chapter highlights the mechanical parts of the potato and more specific the two motors.

The potato contains two basic mechanisms, the lifting and the inflation mechanism as illustrated in the previous chapter.

Lifting mechanism
The lifting mechanism operates only in the first and the last step of the use of the nectar. In the activation and deactivation of the workstation. In both cases, the forces on the mechanism will be from the central core and the lid of the nectar. That means that the motor used for the lifting operation does not need to be of big power. The size of motors like this one, gives the possibility to be attach with the mechanicm inside the central core.

Inflation mechanism
In addition to the lifting mechanism, one more motor has to be included in the potato for the inflation of the balloon. Since the deflation of the balloon should also becoming automatically, by sucking the balloon inside, the motor has to be able to operate with both air flows, in and out (blow and suck). The size of a motor of that category can be really small, but since the balloon has to be totally inflated in a specific time, a bigger motor is selected. The motor in the picture is consider ideal, since it can inflate a volume as big as the nectars in less than 10 seconds and the size of it, it is not over 20 x 10 x 10.
POWER AND NETWORK

The chapter presents the connection of the potato with the power and internet source of the park.

The Nectar is planted 50 cm underground and the only way to supply the potato with power is through underground cables in the park. For that reason, the installation of the nectar requires a cable infrastructure.

The cables coming from the park are connected in a high position on the exterior surface of the potato. That is for two reasons, for easy placement, since it doesn’t require deep digging but also in order to have easy access in case of problem or general maintenance. The cables go through the internal walls of the potato down to the inflation motor and through the central core up to supply the four sockets and the wifi device.

With green color is illustrated the cable for electricity and with orange the internet one.

When the nectar opens and the central core comes out, a wireless internet connection is created in an area of 5 meters radius around the base. The wifi device is positioned exactly under the lid / sitting, so as to provide better signal for the user. The device is supplied with energy and net signal as it can be seen in the illustration.
SHAPE INSPIRATION

In this chapter, shape, colors, texture for the balloon are examined.

The listed pictures illustrate characteristics, features and inspiration found in the research phase. The board is used as a guideline for the design of the balloon.

Shapes coming from the physical environment. Shapes that offer open and closed surfaces that can be used for laying with a laptop. Different depths in the shape create shalows, highlights and focus points such as the central core with the sockets.

Clear lines and basic shapes. Forms that can be memorable not only for the user of the workstation but also for the rest of the citizens in the park.

Strong distinguish lines stand out in the surface creating focus points that can be used for making the compilations of the material more interesting.
Playing with the physical light. Forms that work with dark and light, creating shadows and noticeable forms in the park.

Interesting texture in the surface of the product in order to give to the user a feeling of a more natural touch.

The use of strong colors can be applied to highlight the product inside the green surroundings. Combined with fine materials, it is a good way to identify the nectars that used in the park and give a new impression to the view of the park.
The initial sketching proposals for the upper part of the product, are done in consideration with the results from the ergonomy analysis of the park, the shape board inspiration and the general feedback from the interviews and the research phase. Based on those, the form that is designed is more abstract and leaves the user free to play with the balloon and choose himself how to use the sitting surface.

The idea was to avoid a form that would reflect the image of a normal office workstation, something that would look like a chair or a bench for example.

The form of the nectar is based more on the natural forms that somebody can find in a park. In that direction, simple forms where examined and the focus was more on how the form of the product can be produced easily and achieve maximum use from the user.

The form of the balloon is indicative for the project and not the only possible solution. Since the potato and the mechanism remains the same, the balloon could have any shape or color. Here, it is presented one solution.

ill. 3.6.1 Dimensions of the balloon

ill. 3.6.2 Sketches a
The balloon has been designed in such a way that it will offer to the user as many combinations of work as possible. From one person sitting with the laptop standing in front of him to multi users working laying their back in the openings that the shape creates. The possibilities of balloon are many since the user can decide to work also in the grass and just use the nectar for power and internet source.
**FINAL PROPOSALS**

The following chapter is a presentation of the final product.

An effort was made to hide from the final shape the main constructions and the functions of it. Looking back at the shape board, clear lines, characteristic and memorable shape have been achieved, while the color that has been chosen for the example balloon highlights the position of the product in the green background of a park. Also the shape creates surfaces that more than one person can use.

In the illustration above, it is the motion of nectar when it is activated. Starting from the straight lid in the ground when it is not in use, rising up the central core and blowing the balloon until it reaches the final shape.

ill. 3.7.1 The final form
ill. 3.7.2 The potato

ill. 3.7.3 The balloon

ill. 3.7.4 Motion when activating the nectar
FINAL PROPOSALS
The following image is an example of the product inside a park
OWNERSHIP
Three different cases are consider as possible owners of the system

Case 1:
The municipality owns and runs the nectars. A manufacturer produces the products for them. A new department is introduced, that takes care of the procedural aspects of the service.

This scenario, although could be the ideal since the municipality handles all the aspects concern the public spaces of a city, it is not so feasible since it requires to run a new department within the municipality that will deal only with this section. Something that is not of such an interest fot the municipality.

Case 2:
The municipality owns the nectars and the infrastructure but outsource the management of the service. Possible companies to rent the infrastructure in order to make business, are interent providers, (stofa, TDC, cibercity), companies deal with electronics and hardware appliances or also companies focus on public furniture and want to extend their business as service providers.

In that scenario, the municipality runs competitions where the winner takes the control of the service for a specific period (some years).

Such way of give cooperation between private companies and the municipality exist in the public toilets, where you have to pay in order to enter, or for example the storage rooms (lockers) in the train stations.

From the three cases, the second one is consider to be the most appropriate for the specific project. The method of outsourcing parts of a municipality’s service is a common method to provide to the citizens goodies without increase the operational costs of the municipality.

Case 3:
An exterior company decides to produce the nectars and establish the new service. In agreement with the municipality, make use of specific areas in the park.

This case it is possible that is coming against the free competition rules of the market and so to be consider illegal by the danish legislation.

ill. 3.9.1 Cases of ownership
An important issue of the service is the ability to book in advance a nectar or not. Several considerations regarding the user and his expectations when goes to the park carrying a heavy bag with his laptop, to the management of the data in the system were taken into account. Here are the basic scenarios that were examined:

**Case one: Spontaneous use**
The main idea behind the nectar is the freedom of choice to work in a park without limitations of power supply, internet connection and more. In that context, the nectar should be there and available to use any time without any booking. In case of spontaneous use only, the information for the people who are at home and want to visit the park are eliminated (carry the laptop or not?).

**Case two: Booking**
The system gives you the ability to book a workstation as many hours as you like, even a whole day. The user is charged no matter if the nectar is activated (use) or not (the user decided not to go to the park). In this case there might be the problem where somebody is in the park and wants to work spontaneously but all thenectars are taken although non of them is used at the specific moment.

**Case three: Time booking**
Able to book a nectar from your home according to the hours you assume you are gone work in the park. e.g. book today for three hours after I finish the danish lessons tomorrow. The booking is achieved through the web site of the system. You find the one you want to work to and you book it for three quarters. The workstation is marked as “booked” in the web site. If the user does not arrive on time at the park, then the nectar is open again to anybody who wants to book it or use it on spot.

**Case four: Status shared**
Since the central core of nectar provides four sockets and since the design of the balloon offers “sitting” for more than one person at the time, the case of shared booking is consider. The user can book from home and choose the status of his nectar. Booked or shared. Which means that you want to share the workstation with somebody else and split the cost.

**Case five: Multibooking**
The system should give also the ability to a user to book more than one nectars. Based on the personas, and the habits of a seventeen years old boy like Casper Gerhar, it is examined the case of booking more than one neighbor nectars.

In order to provide to the user a variety of alternative ways to work with a nectar, several cases for booking were chosen for the system. The case of time booking and the ability for shared status was chosen. Of course, spontatenous use without any booking is support from the system. In Addition, multibooking for the users is offered.
The position of the nectars on Kildeparken's map was made with two basic guidelines.

The GPS analysis
The GPS analysis provided input to the project about the movement and the duration of stay of the users today. It is believed that the nectar, used as a working point will change the view of the map drastically. In that context the gps analysis used more as tool to identify how is the situation today, and not as plan for the new system.

Uer research and Personas
The most important aspect to the position of the nectars where the feedback from the users and hypothetic scenarios with the personas.

For example looking at the case of persona number one, Anders Pedersen would search for a quite place away from noise points such as the paths, the fountain and the playground, in order to enjoy his work. For people like Anders, several nectars has been positioned away from the tall red squares of the map on the right.

In the case of the second persona, Birthe Jacobsen, it is important for her to work somewhere around the playground in order to have continuously eye contact with her daugther who is playing. Based again in the gps analysis and the place where people usually stay around the playground, some nectars positioned in a broad radius around that.

Examine the last persona, the young student, Casper Gerhar, the idea of a combination of nectars came. Children at the age of Gerhar are used to meet in big groups (seven, eight or even more) at the park and then go for online games in an internet cafe. The idea of these games is the social gatherings. In an attempt to transfer this atmosphere in the park, combination of nectars are proposed. This means nectars positioned so closed to each others in order to make the communication between the users possible.

ill. 3.11.1 GPS map
The number of nectars positioned in the park in an initial stage it is decided to be thirty. If we consider that each nectar has a power socket capacity of four laptops the number of possible users is up to 120. The number of nectars can change according to the results of the use.
MANUFACTURING AND MATERIALS

This chapter presents the manufacturing techniques and the materials that were taken into consideration for the product.

In order to have a basic idea of the production process, different manufacturing techniques and materials are considered and presented here.

Since the potato is planned under the ground it is considered very important to be as environmentally friendly as possible.

The lid is the only part of the potato which is above the ground. It is the part that protects the mechanism and the balloon from weather conditions and vandalism when it is not in use.

Material: Aluminium
Manufacturing technique: Flame jet cutting and welded

The best solution for the environment providing good protection to the mechanism at the same time, is a 70% recycling plastic.

Material: Polyethylene (PE)
Manufacturing technique: Rotational molding

The electric socket as well as the internet sockets and the cables, are standard components from the market.

ill. 3.12.1 Materials of the potato
The user interacts only with the upper part of the product and mainly the balloon. Apart of the human effect in the product, which varies from sitting, pushing, laying, touching etc, the balloon should be durable in time but also against the weather conditions, with basic problem the strong sun.

The moveable part of the lid. Since it is also used for sitting, made of hard PVC.

Material: PVC
Manufacturing technique: Rotational molding

Two materials considered for the balloon, hypalon and PVC. Although the first ones offers better durability under the sun, due to financial aspects, PVC is consider more suitable

Material: PVC
Manufacturing technique: Compilations of parts

The aluminium ring, it is screwed in the top of the potato

Material: Aluminium
Manufacturing technique: Flame jet cutting and welded
BRAND
The chapter introduces the name and the logo of the new brand built around the product

Based on the values that the product should reflect, a characteristic name is found in order to create and support a brand for the product. A short brainstorm with possible names was carried out and evaluated on criterias such as innovation and memorable links.

Nectar, was the name that stand out from the others and that was basically because of the associations that creates in somebodys minds. Based on the movement of the insects inside a park, trying to find their food, nectar. In the same way of thinking, people are trying to find their workstation somewhere around the park.

The name also has to be supported with a logo that would fit in the product’s profile. The following logo has been designed for that purpose.

ill. 3.13.1 Logo of the nectar
The last part of the project is an evaluation of the final product and a reflection upon the whole process.
REFLECTION
A general evaluation upon the master thesis theme, the process and the outcome

The task of working with a product’s physical and theoretical development was both difficult and challenging. The main focus of the project was to cover in an acceptable level both the front office and the back office of a service designed to cover a specific need of the people.

**Project focus**
The semester of the thesis started with a complete different topic and a point of view almost opposite than the one presented. Unfortunately, the initial concept, a new service for bike stores, came out to be extremely big and unsafe project for one-person work in a duration of 5 months period and the change of subject was consider necessity. Soon after the status seminar, the project has been started from the early begging.

This shift of the theme has resulted in spending valuable time on the first phase of the semester and cause a lot of frustrations and stress during the process.

From the other hand, it could be characterized as an interesting aspect in terms of real life projects, deadlines and restrictions. The shifting of the project can be described as probably helpful in complete understanding of the size and the complexity of the projects that one person can handle.

**Process reflection**
The effort of the thesis was to present a shift focus towards the technical aspects of a product design project and interaction between actors in a service design context. When examining this project in perspective it is clear that the depth of each section it is not particularly explanatory consider the importance of the information provided. The evaluation of the process according to personal targets seem to be partly accomplished.

However, one of the goals that has to be highlighted is the goal of being able to describe a product through different point of views and creating an image of use for a product that is new in the market as idea.
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ILLUSTRATIONS

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CD
The CD contains data and illustrations that has been used during the process but not presented in the report