
HEMISPHERE



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PREFACE

This report has been written by Manouk Verschure, graduation student of Industrial Product Design at Fontys University of Applied Sciences. The report has been written as documentation of the graduation internship conducted at the company MANU BV, a subsidiary of Vogel's Product BV. The assignment to design a wireless charging station to charge mobile devices wireless was provided by the company MANU. The wireless charging station needs to go one step further than the current MANU product portfolio. It also needs to be innovative compared to competitors but fit interior related products.

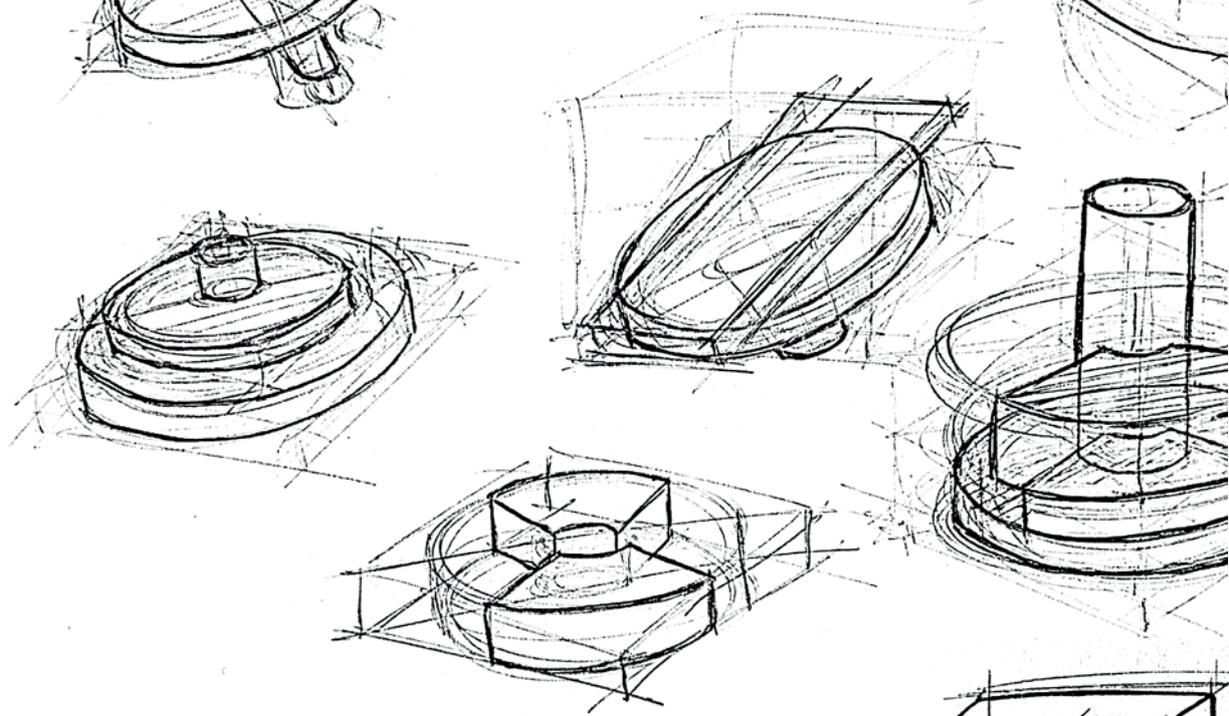
The development of the wireless charging station was led by Hendrik Nagel from February to March 2020, and taken over by Pim Rosendaal till the end of the internship period. Therefore I like to thank both for their guidance and care for the project. I also like to thank Stefan Luijben for his technical advice and guidance during the project. Outside the company, I like to thank Rick Domont, Director Business Development PHILIPS Intellectual Property & Standards. He provided the project with new insights into new technologies on the field of wireless charging.

Thereafter I like to thank all colleagues of Vogel's Products. They were willing to fill in a survey and were approachable for thinking along during the development of the project. Hereby I would like to thank Marcel Vogels for helping to set up this survey. Thereafter I would like to thank Martijn Bohnen for his accompaniment in setting up a Contextual Inquiry test. Then the participants participating in this test, Ashley, Gerard, Doreen, Annette, Stacey, Jelle and Niels are thanked as well. Their critical eye helped to evaluate the project.

Moreover, the company Vogel's Holding BV should especially be thanked for providing this opportunity to develop the new wireless charging station. Hereby giving the freedom to develop and learn from this project and its process.

Last but not least I want to thank my family, and especially Niels van de Groep for supporting me, in particular during the Corona epidemic. Together with his ideas and personal experiences, he challenged the project to be very successful.

I wish you joy reading this report and hope you will get inspired by it

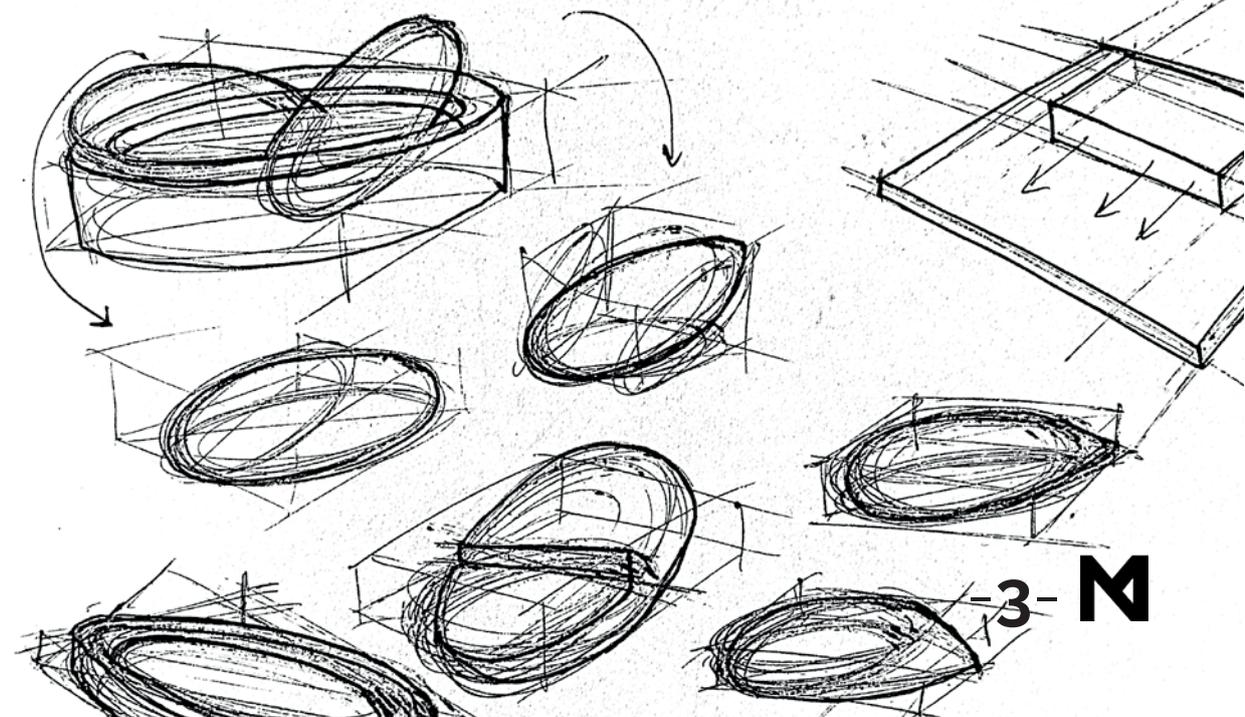


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“A better life by taking full advantage of technology and creating a balanced combination of the devices and the surroundings in which you live.”

(Hendrik Nagel Product Manager at MANU BV)

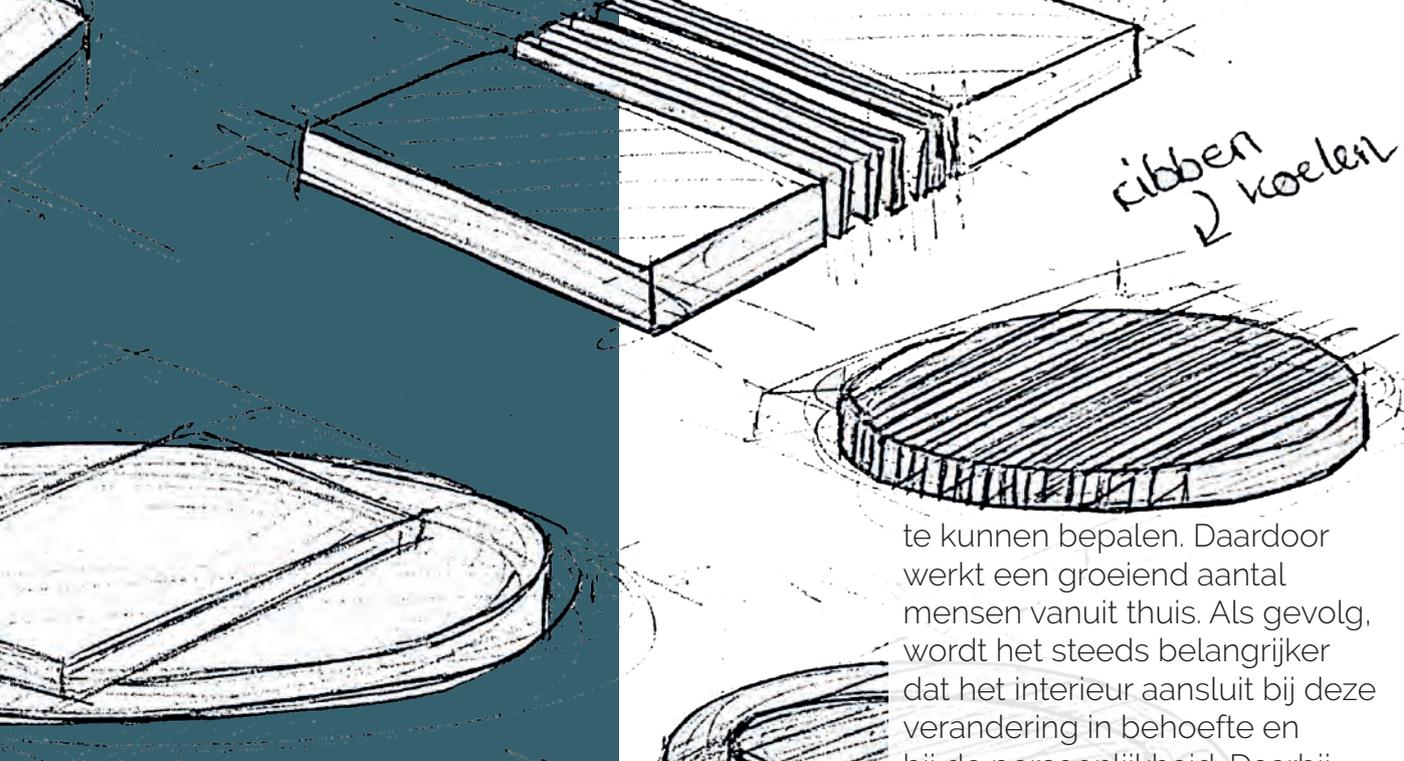
SUMMARY

Living without a mobile device has become unthinkable nowadays. For most people the smartphone has become their most precious possession. Also, other mobile devices have become part of people's daily routine. Only charging all these devices is a challenge, because every device has its own unique cable. Standardization of connections already helped to reduce the jungle of cables, but the implementation of wireless charging will help to reduce the amounts of cables even more.

Because of technology, people nowadays have gained the possibility to work from home and be more flexible in this. They have the ability to schedule their own appointments and plan their own working moments. Therefore a growing number of people work from home. Thereby it becomes more important to have an interior that fits to this changing need and

also fits the personality. Home becomes an office that demands more flexibility in working with different devices at different workspaces. The wireless charger station is intended for mobile devices and will provide flexibility of wirelessly charging designed to fit every interior.

During the development process, research on which technology fits best to consumers needs is determined first. The chosen wireless technology will be purchased and the design of the charging station will be built around this wireless technology. On the basis of the technology, concepts are created and the most promising concept is chosen to develop as the final concept. This final concept is worked out technically by consulting the engineering department of Vogel's Products before they potentially start producing the device.



SAMENVATTING

Leven zonder mobiele apparaten is tegenwoordig niet meer voor te stellen, voor de meeste mensen is de smartphone dan ook een van hen meest dierbare bezit. Ook andere mobiele apparaten zijn onderdeel geworden van het dagelijkse leven. Echter is het opladen van al deze mobiele apparaten een uitdaging, elk apparaat heeft namelijk zijn eigen unieke oplaadkabel. Standaardisatie van aansluitingen heeft in de jungle van kabels al voor een grote vermindering gezorgd. Echter zal de implementatie van het draadloos opladen dit aantal alleen maar verder gaan terugdringen.

Nieuwe technologieën hebben de mogelijkheid gecreëerd om vanuit thuis te kunnen werken en op deze manier flexibeler te kunnen zijn. Het stelt mensen in beschikking zelf afspraken in te plannen en zelf werk momenten

te kunnen bepalen. Daardoor werkt een groeiend aantal mensen vanuit thuis. Als gevolg, wordt het steeds belangrijker dat het interieur aansluit bij deze verandering in behoefte en bij de persoonlijkheid. Daarbij verandert het huis in een kantoorruimte dat vraagt om meer flexibiliteit in het werken met verschillende apparaten op verschillende werkplekken. Het draadloze laadstation is ontworpen om flexibiliteit te bieden door middel van draadloos laden samengepakt in een design dat past in ieder interieur.

Tijdens het ontwikkelingsproces zal eerst bepaald worden welke technologie het beste gebruikt zou kunnen worden gelet op de behoeften van de consument. Deze gekozen draadloze technologie zal worden ingekocht, waaraan het design hier omheen gebouwd zal worden. Op basis van de technologie zijn concepten gecreëerd, de meest kansrijke is ontwikkeld tot het uiteindelijke concept. Het uiteindelijke concept is met behulp van de engineering afdeling van Vogel's Products technische uitgewerkt zodat deze klaar zal zijn voor eventuele productie.

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“Wireless charging stations for multiple devices are increasingly on the market but often designed to be a high-tech gadget.”

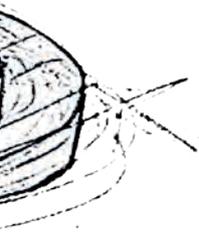


INTRODUCTION

The growing need for living a more flexible life creates new opportunities on the market. Devices that could offer more flexibility to the user's life, and help them to be connected all the time. Only all these devices have their own unique charge cable, which is a big downside. These cables are part of an environmental pollution factor, a growing number of people are concerned about. For these reasons other solutions for charging mobile devices are investigated. Thereof the wireless charging technology looks very promising

and nowadays is incorporated in a growing number of mobile devices. More wireless charging stations for multiple devices become available in the market but are often designed to be a high-tech gadget. These devices are often not seen as an interior object. That's why they mostly do not fit into a well-decorated interior. The company MANU is focusing on designing charging solutions that fit into a carefully decorated interior. These products are created to make life easier and fit to the future users of mobile devices. The HEMISPHERE will fit the MANU philosophy and follow up on the LUMI DECK and QUBE from the MANU product portfolio. In this report, the development process of the HEMISPHERE will be explained and implemented.

1. BACKGROUND INFORMATION



MANU BV is a subsidiary of Vogel's Product BV that focuses on the development of supporting products for the interior. To have an open mind towards the future and looking at other product opportunities, MANU is set up to develop new products with a futuristic mindset.

The first concept MANU created was tested in a focus group session in 2016. This concept got a lot of criticism and from this, the first released product, the LUMI DECK was created. But because the LUMI DECK had too many functions, the idea for the QUBE arose. This is a simple device, able to charge devices without any wires. To accomplish this a power-bank was implemented for extra portability, that could charge itself at the base station. But only 1 device could be charged at a time. Because of this inconvenience, the idea for the Hemisphere was born.

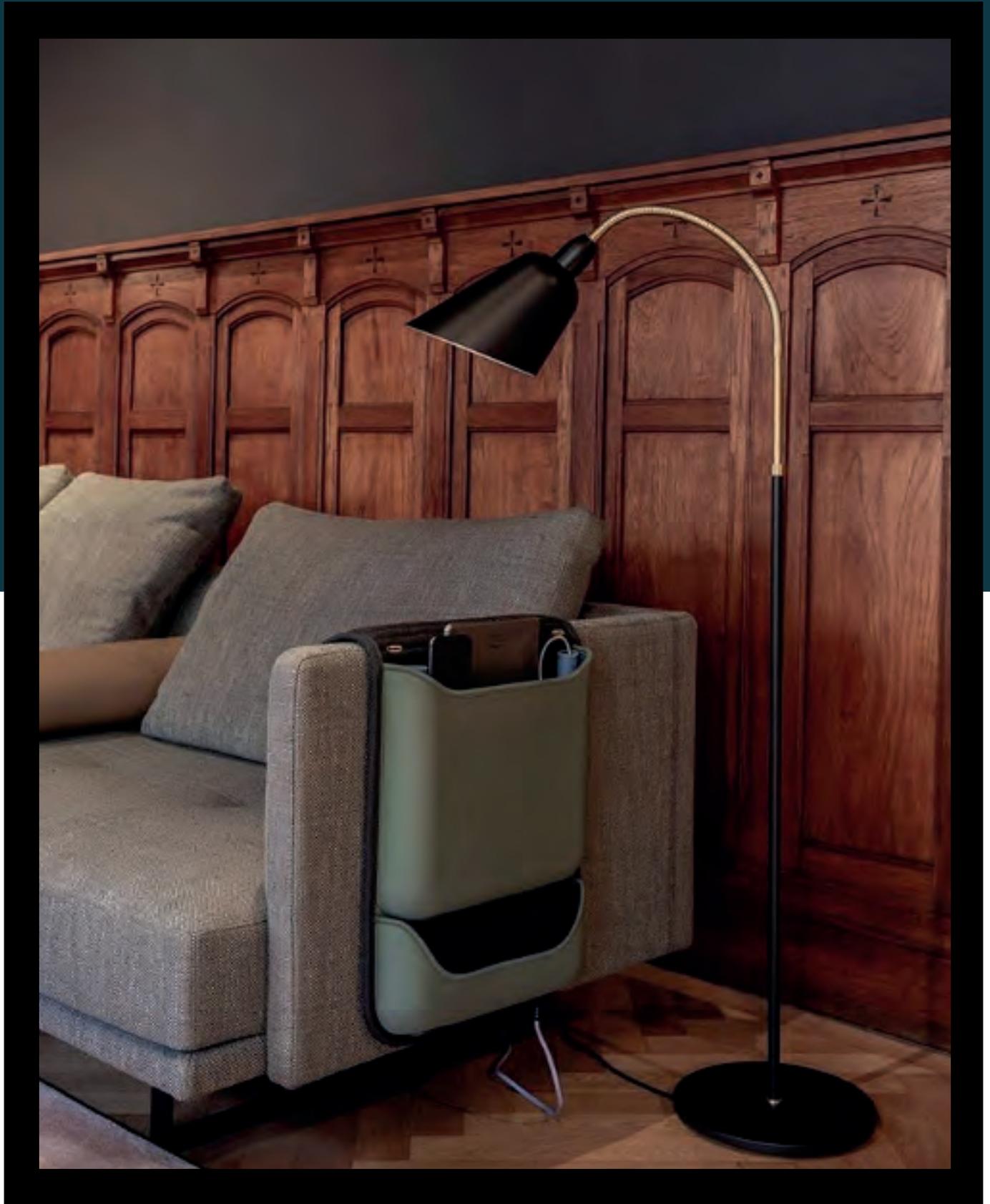


MANU LUMI DECK - and Mood light



MANU Qube - Blue

MANU



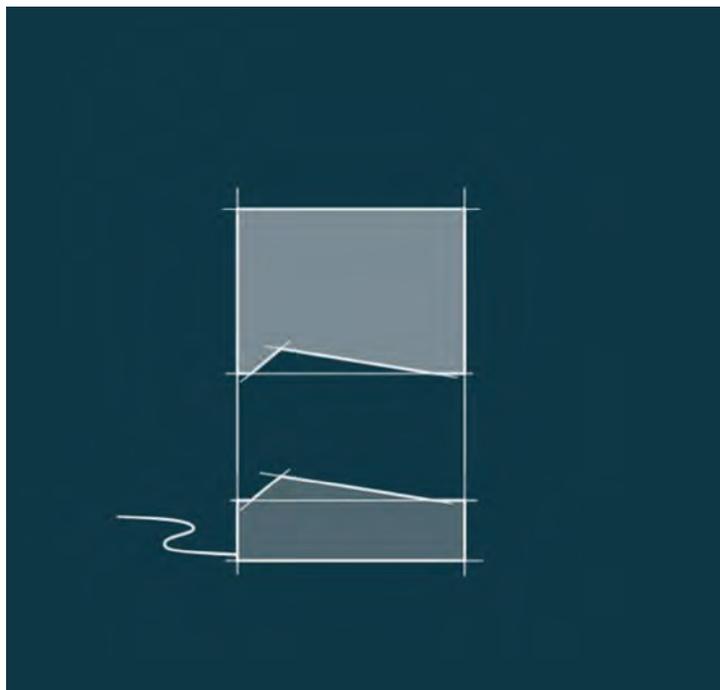
MANU Kangaroo Stand - Green

1.1 THE BRAND

MANU

The company Vogel's Holding BV is a European market leader in audio and video equipment. Vogel's creates the ultimate experience of sound combined with the perfect view. The company is focused on both the business and the consumer market. All products are produced in various numbers of flexible companies specialized in techniques or production externally. In 1973 Harry Vogel's built his first wall bracket, from there he started building the company till what it is today. Vogel's distinguishes itself by taking great care of designing and engineering for the future.

MANU is a Dutch brand focused on designing supporting products with an interior touch. The product portfolio of MANU exists of items made for home or office. Their products are carefully designed and crafted to bring out the best convenience to the MANU signature. MANU produces wirelessly charging stations up to practical organizers to support products. The goal of MANU is to charge people's precious devices without compromise to fit the interior. In short, supporting products which would be an addition to the interior deserve to be placed on a prominent spot in the room.



MANU QUBE - line drawing

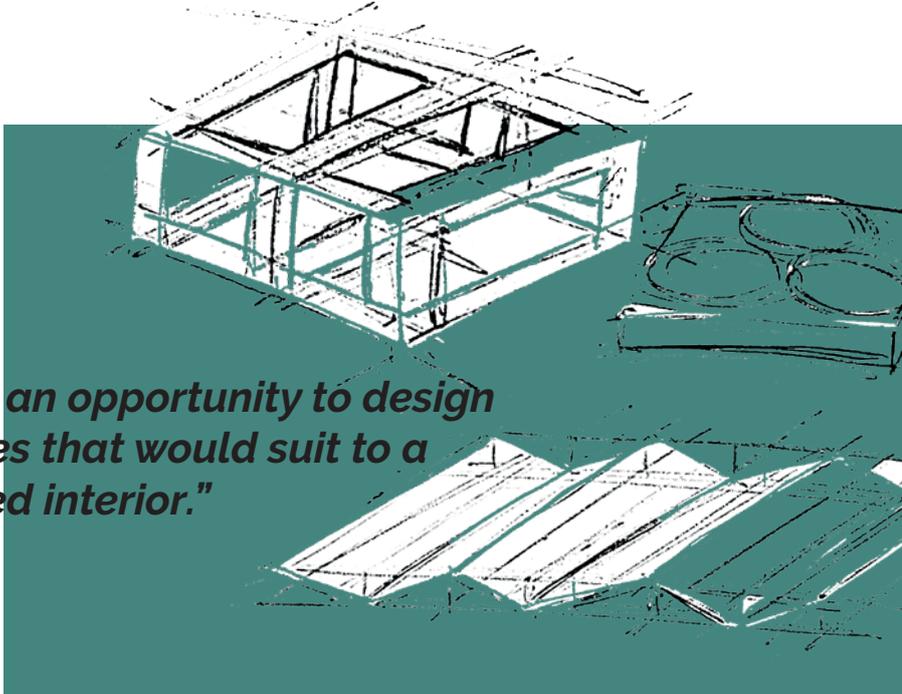
1.2 LEAD UP TO THE PROJECT

In a changing society where people use an increasing amount of mobile devices daily, there is a growing need to charge these devices in an easier way. That is why the convenience of charging multiple devices at once, in this project will be translated into a wireless charging station for multiple devices. But where does this need for charging multiple devices at once come from?

Technology makes people feel connected but also creates stress. They do not experience being able to turn off their minds anymore. Thereby a cluttered home environment by an increasing amount of cables adds extra irritation which results in stress. A wireless charger could help with this. Trends show that people want to reduce the amount of stress they experience by adding more flexibility to their lives. They spend more time at home and want to make it easier to disconnect by creating a personal environment where they can relax.

Wireless charging stations currently in the market are mostly designed as a gadget. This makes most of these devices not suitable to fit in a well-decorated interior. MANU noticed this opportunity and started designing charging devices for the interior.

In other words, people are being overwhelmed by new technology, which makes them more flexible on one hand but more bound to cables on the other hand. Charging all these devices is a challenge and increases the amount of stress to the user. Charging devices wirelessly in a design that would suit a well-decorated interior would fulfill this need.



“MANU noticed an opportunity to design charging devices that would suit to a carefully created interior.”

1.3 DESCRIPTION OF ASSIGNMENT

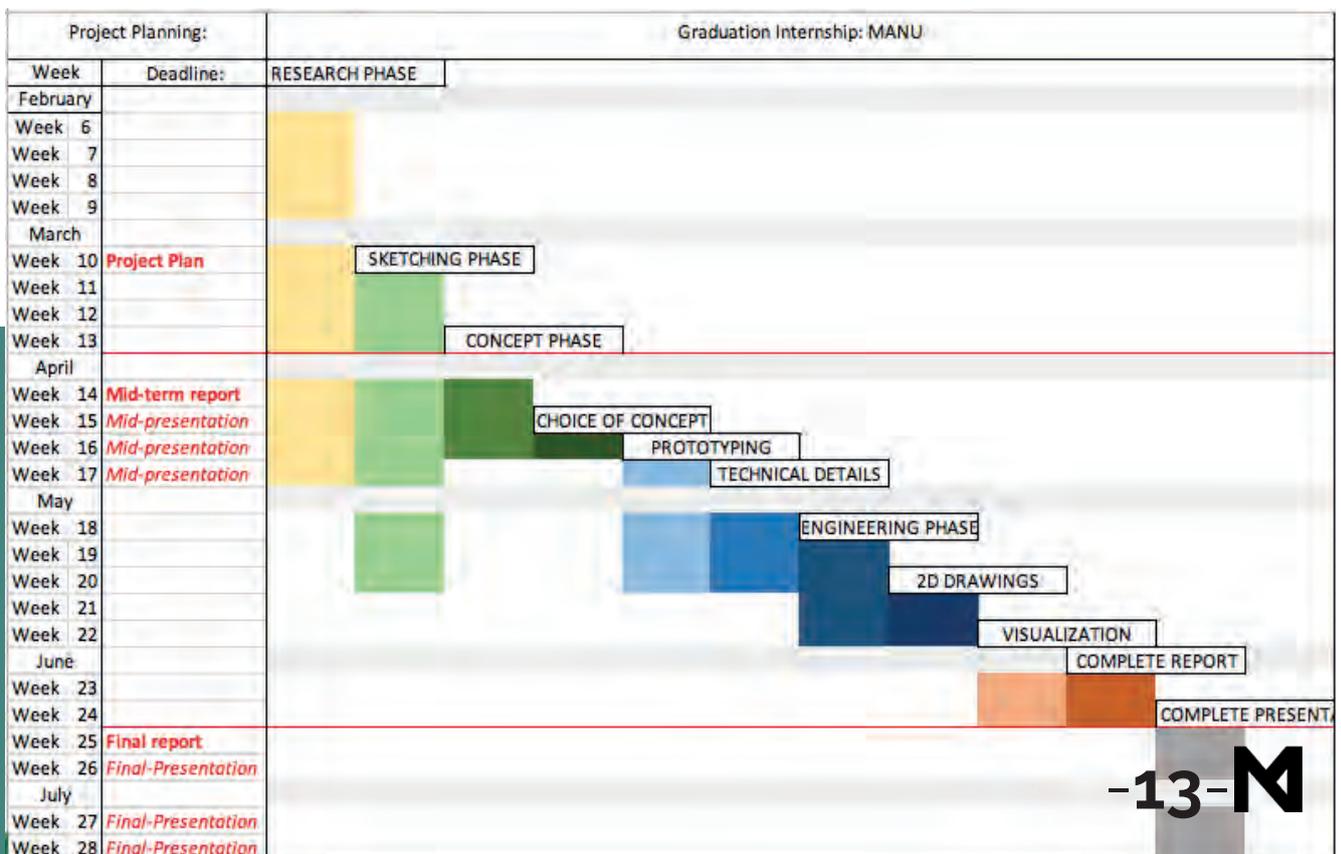
Design a product, that can charge multiple smartphones or other smart devices wirelessly at once, in a more user-friendly way the current chargers allow. Within the device, no compromises should be made in the aesthetic aspect to which the charging station should be designed as an interior object.

The project planning will be used as a guideline during the complete development of the project. At first, research will be done on different technologies where after one technology will be chosen. After determining which technology is most suitable, the target group will be determined. The needs of this target group will be set and opportunities additionally to this group will be researched. Thereafter the sketching phase will take place, different product suggestions

1.4 PROJECT PLANNING

will be created, wherefrom concepts will be composed. One concept will be chosen, tested with users, and translated into a technical design that could be taken into production.

The plan of action will be elaborated in the appendix and can be found on page 3-4.



2. COMPETITIVE COMPANIES FOR MANU

To distinguish the market position of MANU at the moment, research towards competitors has been done. During this research, a division has been made between interior brands and brands which are marketing wireless charging stations. MANU would like to

position itself as an interior design brand that creates products that could wirelessly charge devices. For that reason, two different markets need to be researched to complete the image of the competition.

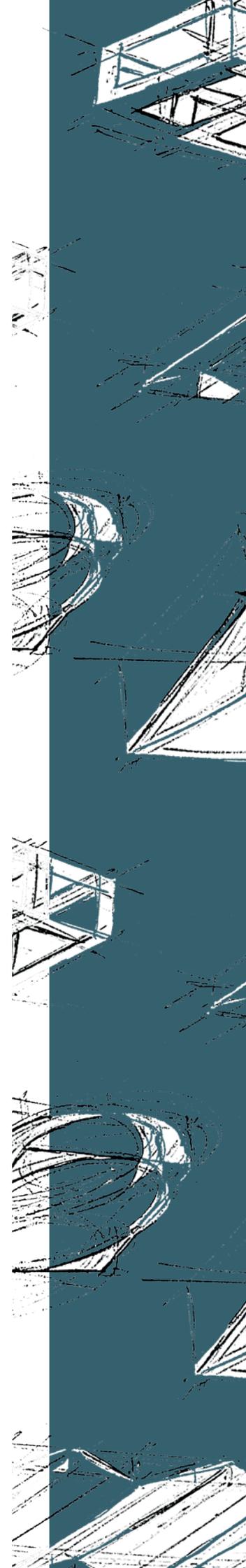
2.1 COMPETITIVE COMPANIES ON CHARGING DIVICES

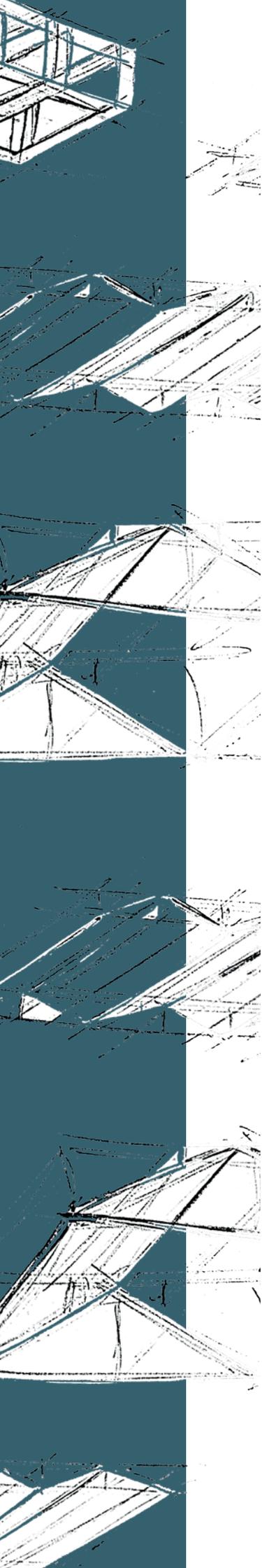
Most important for MANU is creating interior design objects, with the addition of charging a smartphone wirelessly. With this MANU has a unique distinctive position on the market.

The brands MANU wants to measure itself to brands like Native Union. An international company, focusing on creating a luxury lifestyle image, customers want to

feel connected to. The products of Native Union are positioned as mobile tech accessories for influencers that want to have something innovative and unique. (Native Union, z.d.-c)

Looking at reviews of Native Union products, the Drop XL wireless Charger – Multi-Device Charging pad for 120,50 euros (on Amazon)





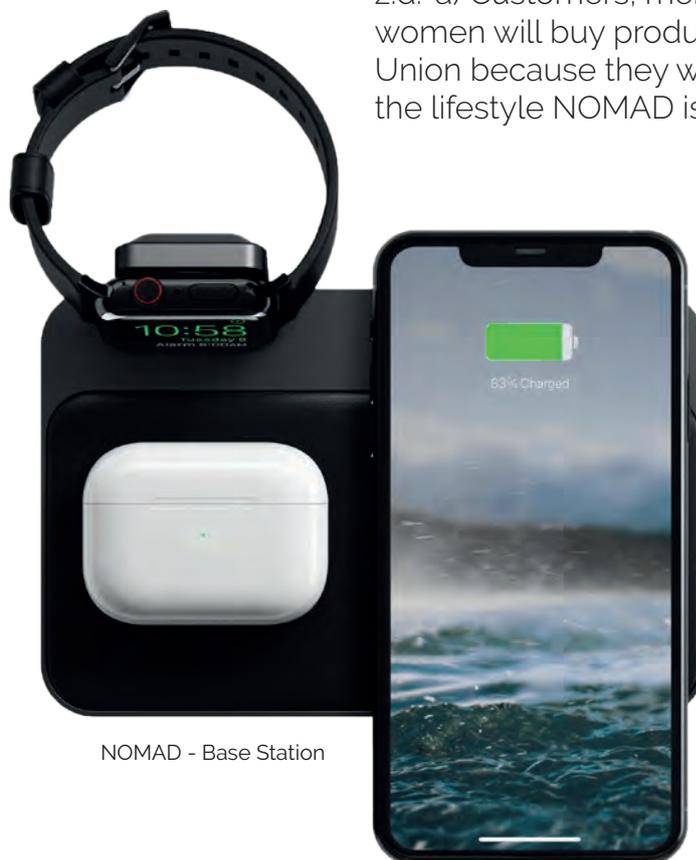
fits best with a MANU product. Customers are very positive about this charger. 'Expensive, but well done' and 'Great product, feels quality and built premium'. Customers see the value of this charger and are willing to pay extra for a more luxury product. (Amazon, z.d.-c



Native Union - DROP XL

Another brand MANU wants to compare to is Nomad. Nomad is a company founded in the United States, and focusing on creating a professional but stylish lifestyle for men. Their products are designed with great care, expressed by taking the time to work out the details. Their products are positioned for young men who have a highly educated job and want to look classic, strong, and trustful. (NOMAD, z.d.)

Looking at the products of NOMAD, the Base Station Apple Watch Edition is fitting best into the price range and product portfolio of MANU. This charger is priced at 139,95 euros (on Amazon) and is well received by customers. 'Very stylish and in my opinion is of high quality' and 'Just what I wanted'. Customers feel it is more important to have a product fitting their personality than buying a product that just 'does the job'. 'Well made, slightly thought out!' (Amazon, z.d.-a) Customers, men, and women will buy products of Native Union because they want to fit into the lifestyle NOMAD is standing for.



NOMAD - Base Station

A lower-priced company compared to MANU, fitting the same lifestyle would be Walter Wallet. Walter Wallet is a playful Dutch company focused on making life more colorful. Their products are positioned as tools to make life easier and make the user look stylish while using them. (Walter Wallet, z.d.) Products from Walter Wallet are positioned as gadgets and less about a complete lifestyle like Native Union or NOMAD.

The chargers of Walter Wallet fit to MANU because they have an unique look and feel people feel connected to. The Walter Bamboo Dock with Wireless Charger



Walter Wallet - Walter Bamboo Dock

Another product portfolio who meets the products of MANU is Bluelounge. This American brand focused on making customers' lives easier. They like to organize customers' personal devices to give them structure and peace of mind. Their products are known for their basic forms and colors. But their main priority is making the life of the customer effortless. (Bluelounge, z.d.)

Looking at reviews from Bluelounge shows customers are reacting more on the practical side of their products. A charger that is suiting products of MANU best would be the Sanctuary4 Multi-device charging for 91,70 euro (on Amazon). This device can charge multiple devices and is presented as an interior product. 'Build quality, while not spectacular, seems pretty solid' and 'Using a LifeProof case, makes it difficult to set the phone

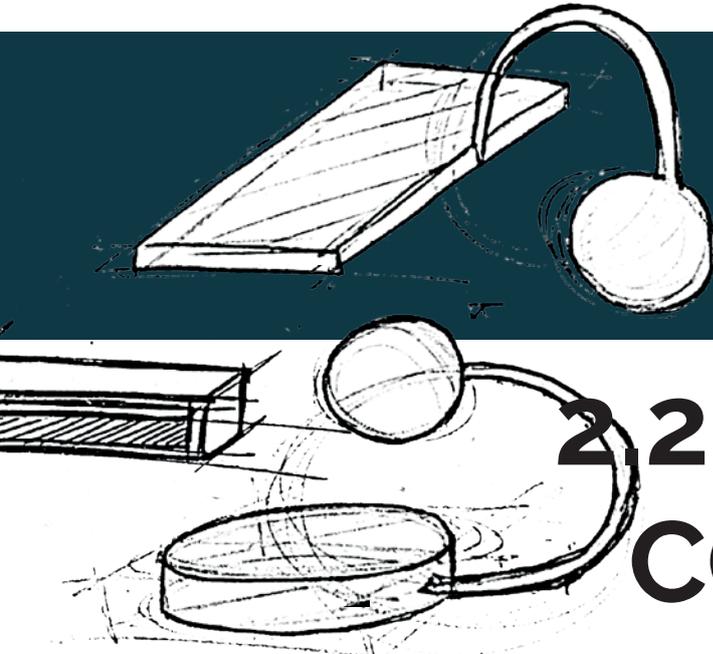
for 59,90 euros at Bol.com fits products of MANU most. Multiple devices can be charged, and other personal things like keys can be stored. This product is not received without complaints. 'Looks nice but does not work properly' and 'Doesn't meet expectations'. Quality has been traded in for the low price. 'Nice product, but is not thought'. (Bol.com, z.d.) For those reasons MANU has put quality first and is therefore aimed for a higher price range.

straight'. It seems these customers are not often willing to pay more for multiple charging devices. 'The price is really high for what is basically a fancy cord organizer'. (Amazon, z.d.-b)



Bluelounge - Sanctuary4 Multi-device charging

In summary, there are two types of companies. Companies like Native Union and NOMAD that are presenting themselves as lifestyle brands. Or companies like Walter Wallet or Bluelounge that focus on products that look practical and nice but care less about a lifestyle image to fit in. MANU is positioning itself to the lifestyle side of these two types of companies. The brand MANU wants to be seen as a producer of interior design products.



“create flexible environments for the flexible, future user.”

2.2 COMPETITIVE COMPANIES ON INTERIOR PRODUCTS

Because MANU is positioning its products as an interior design brand, also a closer look needs to be taken at interior design companies. Then the position of MANU on the market can be better defined.

A Dutch company developing products in line with MANU is Spell. Spell is a brand designing interior furniture for living and working environments. They create flexible furniture elements for the flexible, futuristic user. Some products have a built-in option to charge devices wirelessly. The price of their wireless chargeable products reaches from 318,00 euros for

the EMBRACE INTERACTION PLATFORM, to 4.169,00 euros including integrated wireless charging technology in a table between two seats, SHUFFLE Pair Wing Sofa - tech. (Spell, z.d.)



Spell - EMBRACE INTERACTION PLATFORM



Muuto -THE DOTS
X-SMALL HAAK

A company focused only on furniture design is Muuto. Muuto presents itself as Scandinavian design with aesthetics and functionality. The strength of Muuto is combining young entrepreneurs and designers to create a new creative team. Items from Muuto are recognizable by the use of different perspectives and minimalistic design. The product portfolio of Muuto reaches from THE DOTS X-SMALL HAAK of 18,50 euro to a couch compose 3 SEATER of 3.350,00 euro. (Muuto, z.d.) MANU wants to position itself in this line of design and admires the minimalistic design.

A more luxury and minimalistic looking interior brand is MENU. MENU is an interior brand which uses minimalistic and graphical forms in their design. They make use of fine lines combined with basic forms to create their furniture and lighting. Because of that a trustworthy and luxury appearance is created. The product portfolio of MENU reaches from an Afterroom Coat Hanger Small of 49,95 euro to Eave Dining 280 of 3.847,00 euros. (MENU, z.d.) MANU wants to associate with this brand to create the same luxury feeling and atmosphere as MENU has. They refer to a certain lifestyle MANU wants to create with their products as well.

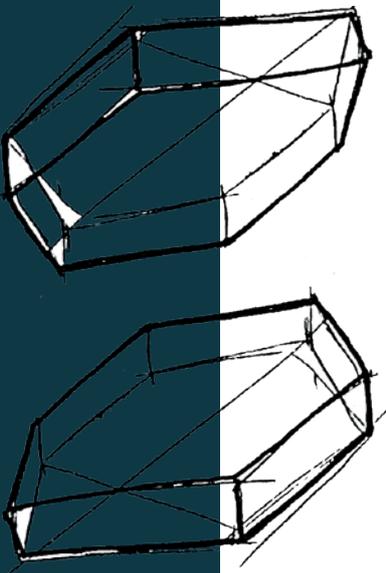
Another high standing design brand is the Danish brand HAY. This brand presents itself with designs accessible for everyone. It uses minimalistic design combined with patterns and rough materials. Because they make use of rounded forms and a lot of colors, a soft and playful character is created. The product portfolio of HAY includes a drinking glass TINT of 21,30 euros to furniture CAN 3 SEATER of 2142,30 euros. (HAY ApS, z.d.) MANU would like to fit in this category, affordable design for the majority of customers. Minimalistic design but affordable for most of the customers.



MANU as a brand is positioning itself between HAY that does affordable designs for a wider range of people and Muuto / MENU that distinguish themselves as high-end design brands. Products of MANU need to be accessible for a wider range of people but also need to be uniquely designed products. What MANU distinguishes from interior brands is by adding a wirelessly charging option to the product.



3. TARGET GROUP



Having a clear image of the target group with their needs is most important before starting the design process. The needs of the target group will create boundaries that help the design process go easier. Tests can be executed within this group which

will improve the product even more. Because MANU had varying designers, it was wise to investigate the customers of MANU again. Because the customers buying MANU products turned out to be different than the target group MANU had focused on first.

3.1 CURRENTLY DESCRIBED TARGET GROUP



Primary target group
The current target group is described as working, above modal earning, educated women aged 25 to 45-years-old. These women are independent, stylish, sensitive and fashion-conscious. They are interested in design and like to try out new types of food and drinks. Also these women shop at stores like Bijenkorf, Loods 5, VT Wonen and small boutiques. And additionally, they read magazines like Linda, TV wonen and Elle.

The secondary target group
The secondary target group would be a male version of the primary described target group. The assumption is made that men, with the same type of interests as these women, will also be interested in the same products.

To really understand the described target group, the persona's were made that will give the user an actual face which makes it easier to empathize with them. Two personas including one male and one female version are included in this document.

The current target group is a very specific group of people. Especially because women were targeted while it has turned out more men purchase MANU products.

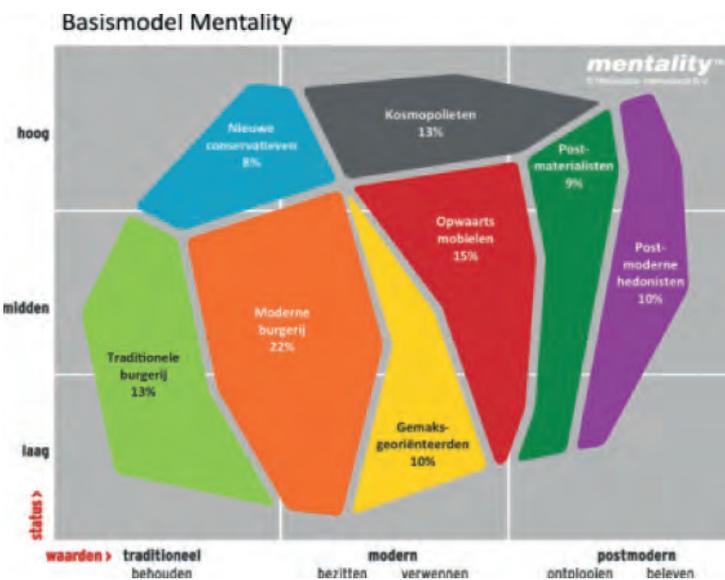
Products made for women have been overpriced compared to products made for men. In some cases, even the same product is more expensive for a woman than a man. The department of Consumer Affairs in New York City found similar products made for men and women being charged 7% to 13% more for the female variant. This is called the Pink Tax, a woman pays more for specific products or services. These products are mostly personal care products. It is seen as gender-pricing or discrimination. (Elliott, 2020)

less about buying a male product. It is proven they are willing to spend more money and therefore they are being charged more. But because they are aware of this phenomenon, they feel the need for gender-neutral products. Emancipation changed the idea of men and women being not that different anymore. Both wanting to fit a certain lifestyle that is not so different from each other.

For these reasons it is important for the HEMISPHERE to focus on the future customer. This customer should not be defined as a woman or man but should be determined because of their needs and lifestyle. These needs and lifestyle will fit a mentality group which will represent the target group for the MANU CHARGER 2.0.

Because more women are aware of this, they would probably care

3.1 MENTALITY GROUP



Source: (Motivaction, z.d.-a)

The target group that would be a better fit for MANU will be described on the basis of a mentality group. These groups translate the value and lifestyle of different kinds of people into distinctive groups. Because of the influence of social-demographic characteristics such as age,

social class, and residence are strongly reduced. These factors do not determine if people are successful anymore. For this reason, segmenting at a certain age and area will not give reliable results nowadays. (Motivaction, z.d.-b)

With mentality groups, communication has to fit their world and must be specific for them. The mentality-model is based on 8 different Dutch living environments that are defined based on personal ideas and values suiting to the lifestyle of every group. A group includes people from the same environment of work, free time, politics with shared ambitions, drivers, and consumers' behavior. (Motivaction, z.d.-b)

3.1.1 COSMOPOLITANS



The cosmopolitan is seen as a critical world citizen with postmodern values such as autonomy, rationalism, and equality. They would like to be successful and are focused on self-development. New experiences and exploring different possibilities to enjoy life. They value materialistic things that fit their lifestyle and that they want to be associated with. (Motivation, z.d.-c)

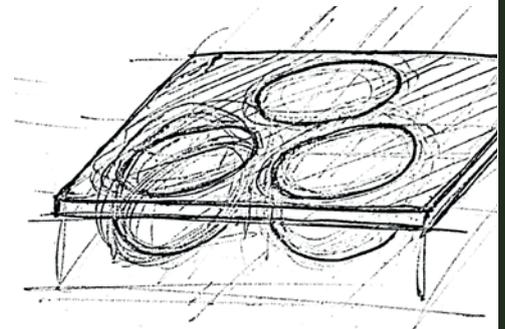
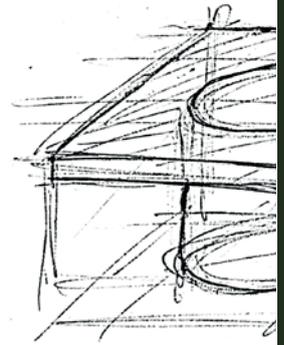
Society and politics
The cosmopolitan is internationally orientated and therefore interested in international politics. They care about international shifts and trends and want to adapt to them. Therefore they are very tolerant and like to discover other cultures than their own. They respect these and would like to learn more about them. (Motivation, z.d.-c)

Lifestyle

The cosmopolitan values their identity and status, this is also seen in their drive to their income. They are very ambitious and have a strong drive to self-development. Therefore they often like culture and art. They are impulsive and would like to discover new experiences by traveling. In their journey to new discoveries, they are technologically and consumption minded. They like to have material things that represent them. (Motivaction, z.d.-c)

Social relations and social demographic

The cosmopolite likes to be social and has a social network where they spend a lot of time. They search for like-minded people they can associate with and can add to their network. The cosmopolitan has an above-average income and is mostly young, 25 till 35 years old. This group contains an equal balance between men and women. (Motivaction, z.d.-c)



3.3 TREND RESEARCH

For the HEMISPHERE to fit the lifestyle of the Cosmopolitan, other kinds of research need to be conducted. The cosmopolitan will be influenced by small changes in society, or shifts happening worldwide. These changes will unconsciously influence the

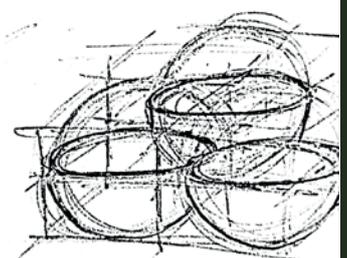
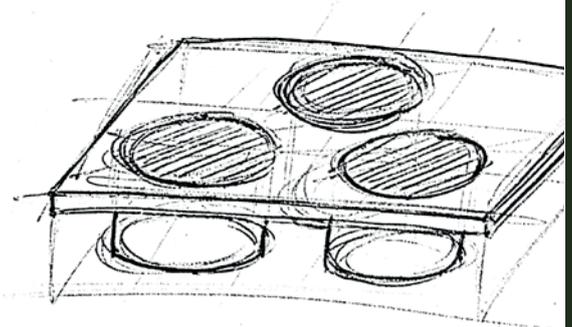
choices they will make on buying products or services in the future. For these reasons, it is important to detect these changes and translate them into trends. These trends will help to get a better understanding of future needs.

3.3.1 DESKTOP RESEARCH

The research starts by looking at online sources nationally and internationally. Hereby it's important to look at significant changes in people's needs, this could indicate a shift. This shift could lead to a trend. But to make

sure a new trend is developing, more research towards other products or services needs to be done.

The best way to indicate if a trend is emerging is by looking at articles of international newspapers, or new products,



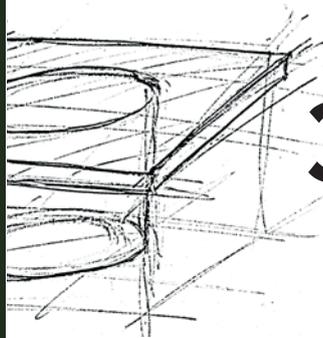
or services offered online. When the same type of service, idea, or product is presented, a trend is formed. This trend is formed out of a certain need a group of people encounters and is acting on. As a result products and services are invented to satisfy this need. This need can originate from government regulations or environmental changes. Also, it could exist out of a tragic event or groundbreaking discovery, like the Coronavirus. As long as there are new events that people will be influenced by, a new need is present and a new trend will emerge.

The method to conduct trend-research is named: Cross-Cultural Analysis research. This research will be done cross-cultural to get a complete worldwide picture, which fits best to the cosmopolitan. This trend method is used to predict trends that will be relevant for 5 to 10 years, which

will also fit this project. By this type of research especially macro trends will be looked at, but also micro,- and megatrends are relevant.

Microtrends are focused on current needs that will only last for about a year. Macro trends are based on different values people have and will be relevant for about 5 to 10 years. Megatrends, on the other hand, are on a society level and can last longer than 10 years.

Within the cross-culture method, articles that indicate a connection to a similar need will be grouped. The grouped articles with a change of needs, will be analyzed and defined to a trend with its own characteristics. Each trend has its own set of characteristics. The trends created will be used to shape the design concept to fit the cosmopolitan better.



3.4 THE 3 MAIN TRENDS

The cross-cultural analysis method is based on translating sources with a common need into one trend. This trend will be tested on 5 different W-factors, What, Why, Where, Who, and When.

- **What:** the name of the trend.
- **Why:** drivers of the trend.
- **Where:** the impact of the trend.
- **Who:** leaders of this trend.
- **When:** features and consequences of this trend.

Within the conducted research, 3 trends were discovered that fit to the project and were therefore implemented in the design process. To keep an open mind, there was not only looked at articles about electronic devices but at all kinds of products. The reason for this was that examples could unconsciously influence the design process.

3.4.1 TREND 1

SOUNDNESS TRAVEL

Because of the rush of everyday life, people are searching for tranquility combined with a wellness experience. They find this wellness in traveling where they can completely de-stress.



By Simon Migaj

Trend 1:
SOUNDNESS TRAVEL
"We enjoy the feeling of being somewhere else, meeting new people, seeing colors and landscapes" (TREND TABLET, z.d., pp. 1-3).

Why: mental relaxation, health, and experience

Where:

TREND TRAVEL
Photo reportage:
anama
(TREND TABLET, z.d.)

WELLNESS CRUISE
Goop at Sea
(Celebrity Cruises, z.d.)

TRAVEL NEXT LEVEL
Online travel agency
(EQUINOX EXPLORE, z.d.)

Who: The Bucket List Family
The Bucket List Family is a family originally from the U.S. that was traveling all around the world and shared all their experiences online. They share photos and videos of their journey and visit the most exotic locations in the world. (The Bucket List Family, z.d.)

When:
The majority of people nowadays feel the need for wellness traveling. Compared to overall tourism, wellness travel is growing twice as hard. Also, most wellness tourists are spending 178% more than the average traveler. These tourists associate traveling with personal well-being and something that would need to fit their lifestyle. Most travelers are higher educated women between 30 and 60 years old. (Rubinstein, 2020)

The complete elaborated version of trend 1 can be found on page 4-5 of the appendix.

3.4.2 TREND 2

MIND MINIMALISM

Because of hectic lives people nowadays live in, there is a growing need for minimalism. Minimalism will order the mind to the only necessary basics. It will create physical and mental peace.

Why: Mentally ordered, less stress, beauty in surroundings, less worry

Where:

LUXE, MINIMALISTIC
Sneaker: JAK Shoes
(Staff, 2020)

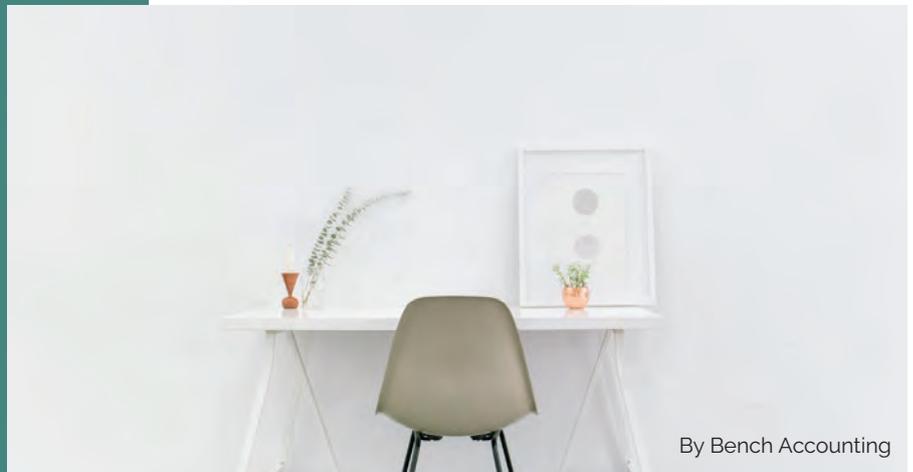
THE LONGING FOR
LESS
Book by: Kyle Chayka
(Chayka, 2020a)

MINIMALISTIC
MAKEOVER
Fashion: KENZO
(Silbert, 2020)

Who: Jelle Derckx
Jelle Derckx is an actor, writer, and blogger. After he graduated in 2007 at the Utrecht theater academy he decided to focus on living as minimalistic as possible.

During this process, he invented the platform "grow thinkers together" with his girlfriend Claire. On this platform, they publish articles, podcasts, and videos about living sustainable and minimalistic. (Derckx, 2019)

Trend 2:
MIND MINIMALISM
"We think that our machinery and technology will save us time and give us more leisure," he wrote, "but really they make life more crowded and hurried." Philosopher Richard Gregg 1993 (Chayka, 2020, pp. 1-3)



By Bench Accounting

When: The phenomenon of minimizing belongings to order the mind is becoming more relevant today. Technology has made enormous steps and made life a lot easier. But because life has made it easier, it also brings more rush which results in more stress to

daily life. Philosopher Richard Gregg already noticed this in 1933, he published an essay about what more technology and machinery would be bringing. The essay is called "The Value of Voluntary Simplicity" and foresees the need of people wanting to unplug and slow down. He noticed the effect of technology on people and therefore criticized this development. (Chayka, 2020b)

The complete elaborated version of trend 2 can be found on page 5-6 of the appendix.

3.4.2 TREND 3

FLEXIBLE TOUCH

Creating more possibilities for workers to work flexible will be in favor of their wellbeing. Today's technology ensures that people can no longer switch off. This happens not

only in their personal but also work life. People are experiencing an increasing amount of performance pressure. Which leads to the upcoming need for flexible working in the near future.



By Brooke Cagle

Trend 3:
FLEXIBLE TOUCH
"The survey of over 1,000 workers also revealed that two-thirds felt that the "always-on" work culture has negatively impacted their health." (Ali, 2020, pp. 1-3)

Why: Peace of mind, sharing economy, feeling of community, being outside of the bubble.

Where:

IKEA Without PARKING Concept store: IKEA (Lieshout, van, 2020)	SUPERLOFTS Housebuilding project (SUPERLOFTS, 2019)	FLEXIBLE WORK Product: Keyless acces (Reinerink, 2019)
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Who: Annic Ten Duis
Annic is a Dutch entrepreneur who has more than 17 years of experience in undertaking businesses. In 2012 she started her own coaching and advising company called 'Wonderen Publishing & Consultancy'. Most of the time she is working flexible hours and is engaging others to do the same. This helps to get more creative and be as successful as she is. (Ten Duis, 2020)

When: Several studies have been done that prove more employees are suffering from the increasing pressure. Workers have difficulty separating work from personal life and are experiencing physical and mental health issues. This is caused by the feeling of never being able to turn off anymore. A survey study was done by Quartz insight in partnership with Citrix Systems. They discovered having the possibility to work flexible is one of the top 3 most important benefits to employees. Most employees felt being on

'working-modus' all the time. Out of 1000 filled in surveys, 77% said having the opportunity to work flexibly would make them more creative and innovative. (Ali, 2020)

The complete elaborated version of trend 3 can be found on page 6-7 of the appendix.

3.5 FIELD RESEARCH: EXHIBITION VISIT OBJECT IN ROTTERDAM



The design of HEMISPHERE will be built around technology that will be used to charge a smartphone. To get inspired for the outside appearance of the charger on a different level, Object in Rotterdam was visited. Hereby the latest interior trends, materials, and shapes are viewed, Object is one of the most important Dutch design exhibitions of the year. Their exhibition is meant as a platform for new innovative and upcoming designers of different fields related to interior. The designers are carefully chosen to create a high standard design exhibition including well-known and upcoming designers. The exhibition was included in the Art Rotterdam week powered by Rotterdam Festivals. (Object, z.d.)



Own archive:
Polarized lights by Klaas Kuiken

Use of transparent

Products that are very popular with the public and seen as inspiring are often transparent. The framework of the object is emphasized which makes it interesting to look at. A strong and open look gets created by making the frame visible, which gives a trustworthy appearance to the object. In addition, the transparent material is often an added coating which creates an extra experience while looking at the object. Nothing can be hidden which gives the object an honest and true appearance.

Basic shapes

Minimalistic, Scandinavian, and futuristic shapes are very popular at the moment. Designers notice the technological changes and implement them unconsciously into their designs. High-detailed cheap products have been taking over the market, therefore minimalistic forms have become a luxury. These minimalistic designs are becoming more popular and will fit the future customer.



Own archive:
Plumber's Piece by Studio Roex



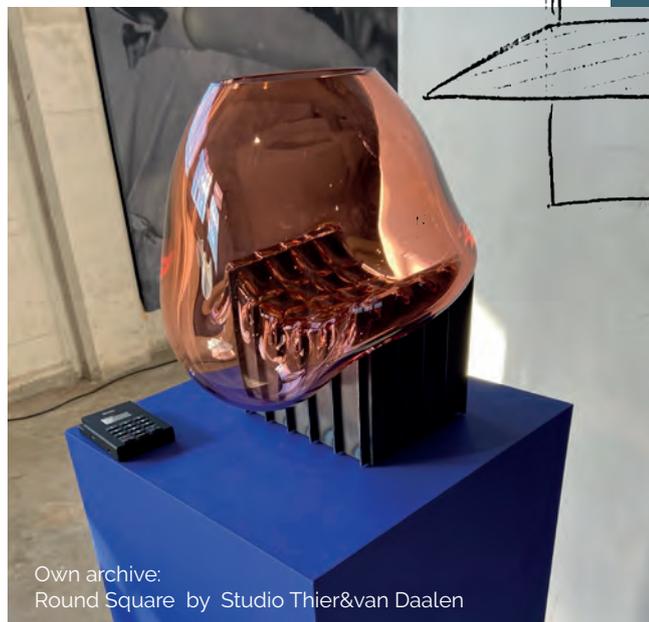
Own archive:
graduation project by Daan Snippe

Geometrical / patterns

Also, geometrical forms and patterns are often seen at the exhibition. These together with the basic forms characterize the old Bauhaus style, which is becoming popular again. This art movement was very popular from 1919 till 1932 and characterized by geometrical forms. Their designs characterize primary colors and emphasis on functionality. It was the start of modern and industrial design and therefore timeless and nowadays still used as inspiration. The quote of Bauhaus: form follows function. (Kunst-modernisme.blogspot, z.d.)

Soft combined with raw

Other products presented were a combination of raw materials cast in soft shapes. Also by using large shapes but rounding them softly. A variety of materials was used to create a neutral but impressive appearance. This made an object look neutral and not only addressed to men or women.



Own archive:
Round Square by Studio Thier&van Daalen

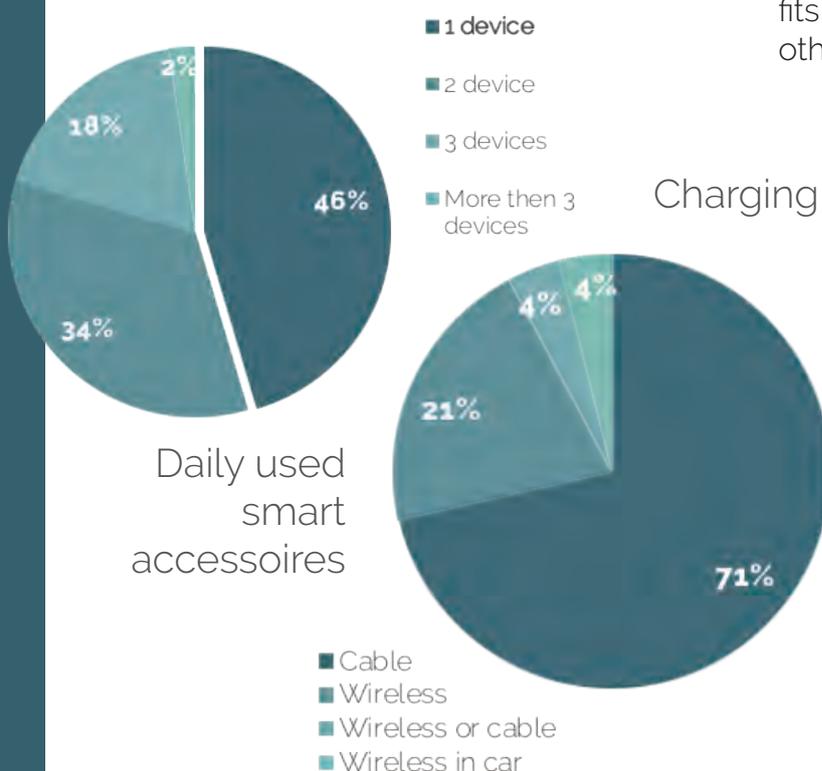
4. CONSUMER RESEARCH

To create a realistic and complete view of the needs of the Cosmopolitan, two types of research have been done. The first one is viewing an old Focus group session video of 2016. The second is looking at people's current needs by a new-made survey executed with the employees of Vogel's Products B.V. Eindhoven. With these two methods, the voice of the customer will be observed in two different situations. The results will be compared and could lead to new insights, or to the conformation of assumptions made.

Within a focus group session, a selected group of 5 to 15 people is asked to give their opinion about a set topic. A tutor is present to lead the discussions and ask

certain questions the client has determined in advance. During this session, a new concept will be presented. The group will respond to the concept and test it. The advantage of this method is that a complete picture is formed by the participant, the context of an answer is clear in contrast to taking a survey. The downside is, when a participant is prejudiced, this participant could also influence the rest of the group. This results probably in less reliable answers.

The questionnaire was translated into a combination of open,- and multiple-choice questions. Within this survey, questions about experiences with current wireless chargers and charging locations were asked. Within the first few multiple-choice questions will be determined if the participant fits into the Cosmopolitan profile, others will be filtered out.



4.1 FOCUS GROUP 2016

The Focus group session took place in Den Bosch on the 5th of July in 2016. All participants lived around Den Bosch. During this session the Dock + was presented, a product that as a result of this session not reached the market. Because of the negative comments, MANU decided to develop the concept further first. The total number of participants was 8, all women and between 27 and 35 years old. Of this number, 6 participants were interior oriented and 2 did not have a large interest in the interior.

By hearing the purpose of the concept, the participants were positive at first. They liked:

- Having the smartphone nearby
- Having a fixed spot to charge the smartphone
- Having all small things together

But after the concept was presented, it did not meet the expectations of some participants. The product is nice and trendy but not innovative, luxury, or new enough. A clean, Scandinavian luxury design aspect was missing.

M-30-

Participants would not position this product in an interior store; 'It is not something you would just take along in an interior store'. They like the shape of the design because of the rounded edges that make it clean and feminine. The price participants would pay for this product would be between 15 and 40 euros. Participants are reminiscent of this product within a HEMA portfolio and kept in mind that most HEMA products are not above 50 euros.

Positive:

- + Fixed location to charge the smartphone
- + Storing little things
- + Customizable

Negative

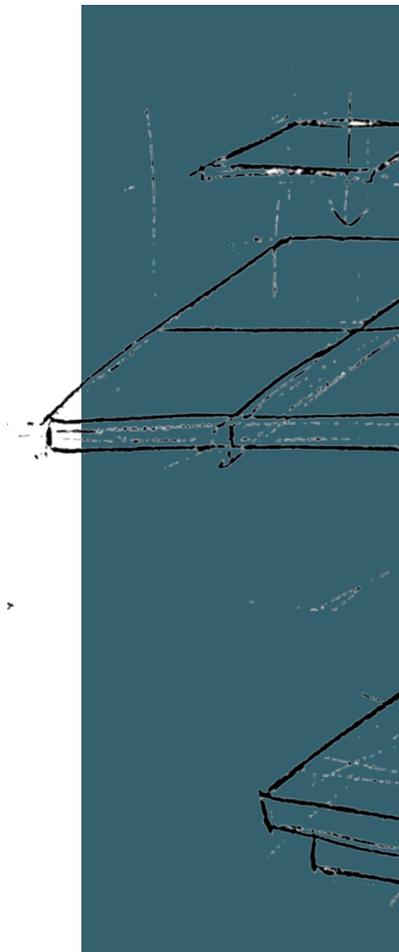
- The extra tray is too small
- Too big
- Do not see the added value

To improve the appearance of this product participants suggest:

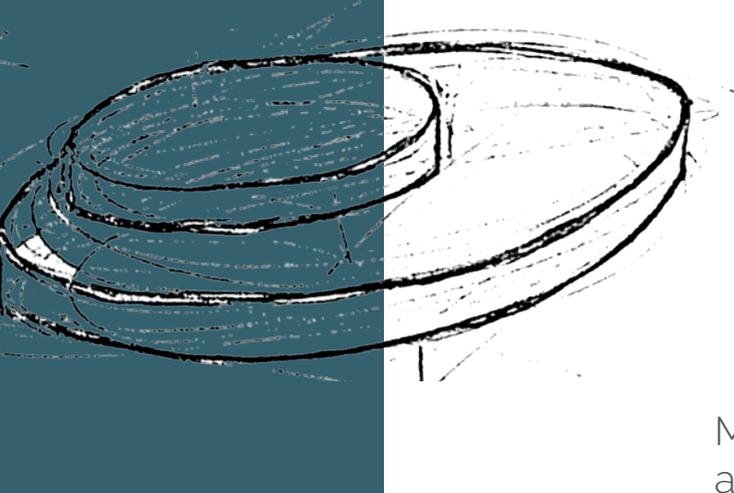
- No visible cable around the product
- The visibly attractive product that is centrally orientated
- A showpiece for the living room
- Additional accessories
- Preferred to have the phone flat while charging
- Modular system

In the design process of the HEMISPHERE needs to be taken along that customers feel the need for a central charging location in their home. This object has to have the appearance of a showpiece that is visibly attractive from all sides. The design of the devices has to fit a Scandinavian and minimalistic home.

*"Safety is:
'Knowing
where my
phone is"*

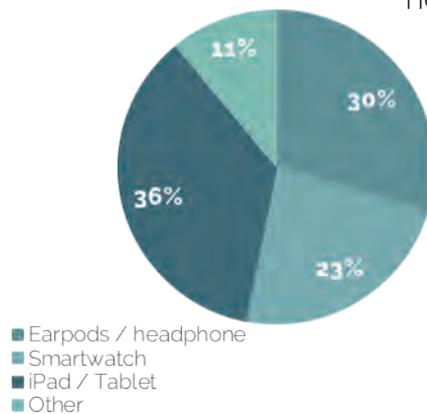


4.2 SURVEY RESEARCH

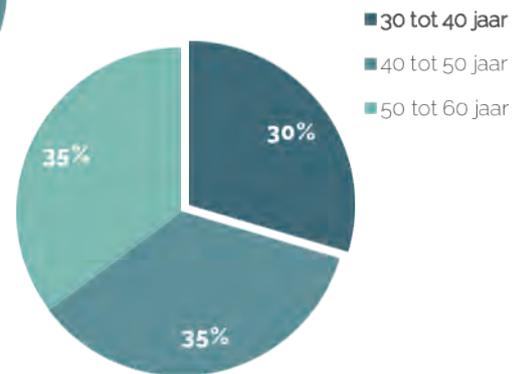


The insights gathered from the Focus group session of 2016 are used to design the survey. After seeing the video of the focus group sessions assumptions were made about customer needs. To test if the needs of 2016 were still relevant, and ask questions about new developments of today, a new survey was designed.

Most used accessoires



Age participant

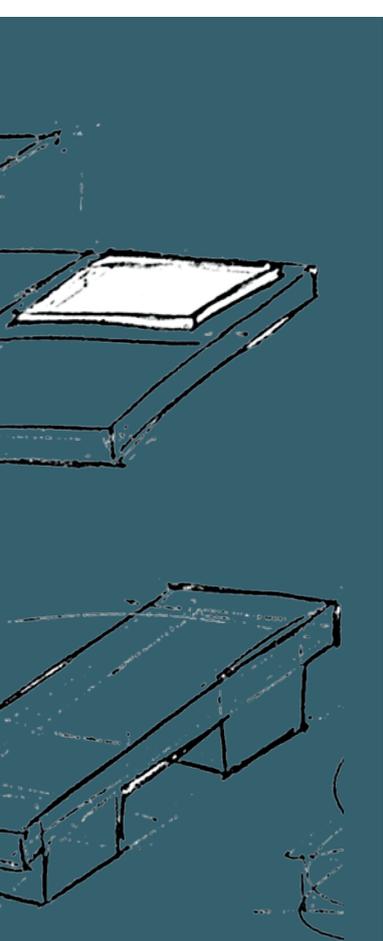


General

About 92 participants participated in the survey thereof about 67 participants were fitting the Cosmopolitan profile. To decide if participants fit the Cosmopolitan profile, their level of shared income was asked. The Cosmopolitan is defined as a modal income of €34.301 or higher. Second, the age was asked, most Cosmopolitans are between 25 and 40 years old. But because Cosmopolitans are not only defined by age, all answers of the Cosmopolitans were used. Within the Cosmopolitans, there was a balance of 65% man against 35% woman. In the analysis, only the answers of the Cosmopolitans will be used.

Sort device

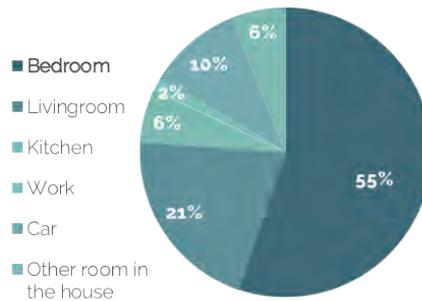
Most participants are Apple smartphone users, namely 75%. But it should be noted most employees have an Apple company phone. Of all participants, 46% is using only one smart device, their phone. Employees who use more than one smart device are, an iPad or Tablet most named. To charge their smart devices, 71% of the participants name a cable for charging their devices.



Charging location

The bedroom is by 55% of the participants named as the most used charging location. Named reasons therefore are: "I never lost it while charging it overnight and then can use it all day long" or "I do not use my smartphone while sleeping". Remarkable is participants feel the need for having a fixed charging location, otherwise they lose their phone in the house. Also, when asked which location they prefer to charge their phone, only 37% named the bedroom and 30% of the living room. Comments on this were: "Central place in the house" and "I spend most of my time there". This suggests participants feeling the need for having a fixed charge possibility in their living room which they currently do not have.

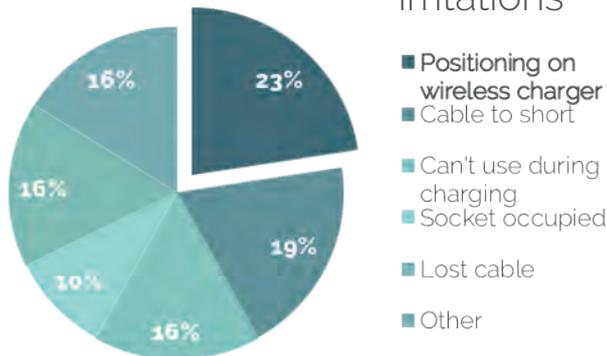
Current charging location



Preferred charging location



Most named irritations



cable being too short. And a shared 16% of the participants named; a lost cable, socket occupied and not being able to use their phone while charging. Comments to the lost cable: "Finding the right charger and cord" and "Cable lost when needed". These refer to a need of having a fixed location to prevent cables from getting lost.

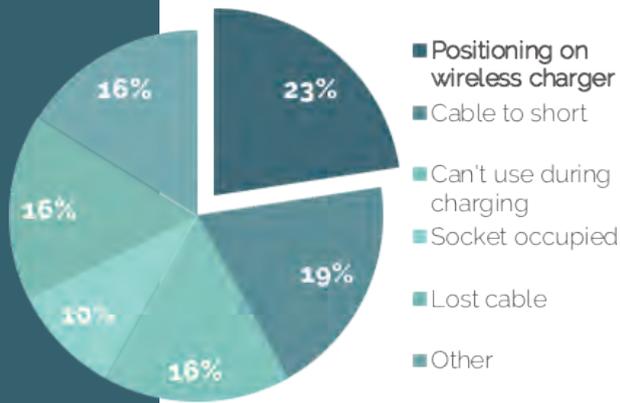
Irritations charging

When asked which negative experiences participants currently feel charging their smartphone, 23% named positioning their phone on a wireless charging device. Comments made: "If the phone is not exactly right, it keeps reconnecting and disconnecting from the charger" or "The smartphone must be in exactly the right place on the wireless charger". Other comments also suggest, positioning a phone on a wireless charger is a large disadvantage. Then 19% named the

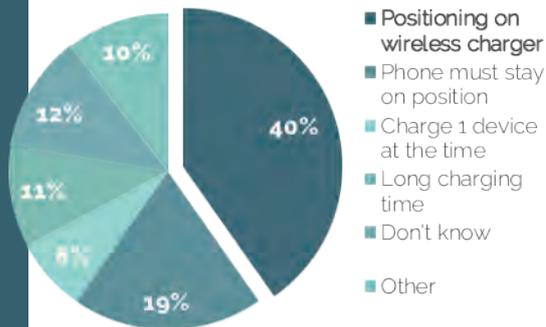
Wireless charging

About 53% of the participants used a wireless charger before. Participants who did not use a wireless charger before named, 55% not being in contact with it before and 29% not having the wireless charging option. What participants feel a wireless charger should abide by is, the possibility to use the phone while charging. This is a large disadvantage of wireless charging while using a cable the phone could still be used during charging. Other comments refer to the charging speed: "It would be nice if the charging of your device went faster wirelessly than with cable" or "Faster than cable would be nice"

Most named irritations



Disadvantage wireless charging



In short could be concluded most participants 46% only often charge one smart device, namely their smartphone. The majority of 55% charge their phone out of practical reasons in the bedroom. But 30% would prefer to charge their phone in the living room. Participants feel the need for a fixed charging location in the living room. It is a central location in the house and would prevent the phone and cables from getting lost. Then the most named negative aspect by 23% of the participants is positioning the phone on a wireless charger. Another named negative aspect is loading speed.

5. THE NEED FOR WIRELESS CHARGING:

There is a growing awareness of the pollution caused by charging cables and adapters. Around 300 million euros is being wasted annually on cables. Because of this the European Parliament has created rules to enforce the use of a universal connection. These rules will go in effect as of July 2020. (Meijer, 2020)

However companies like Apple already objected to this idea, saying a universal connection will

stop innovation. Also a universal connection still requires cables. This is why wireless technology takes it one step further by removing cables or connections on a phone altogether. (van Miltenburg, 2020)

Because of this wireless technologies are becoming increasingly popular. And companies are starting to offer more technologies to make this possible. (van Miltenburg, 2020)

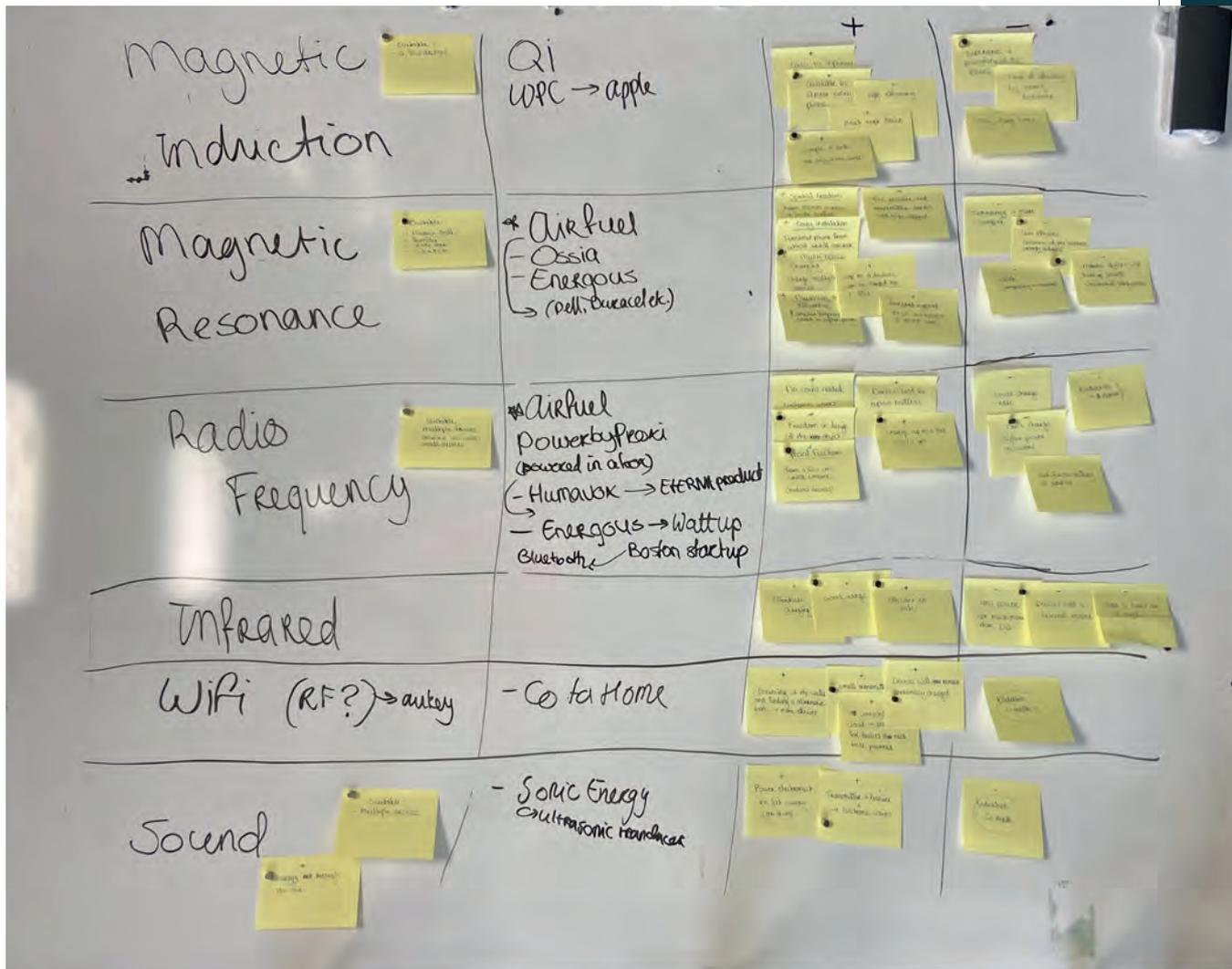
5.1 DIFFERENT TECHNOLOGIES

The founder of wireless charging is Nikola Tesla, he lived in the 19th century and researched: radio, remote controls, X-rays, electrical motors and so on. One of his last ideas was creating a world without wires. He experimented with radio waves, but these would only reach a short distance. He wanted

to build a big machine to create electricity to charge all devices on the planet. Doing this by sending electricity through the ground, he never succeeded because he went bankrupt. This Tesla coil Tesla invented is still used today for experiments on high schools. (Wirfs-Brock, 2016)

Further information about the Tesla coil can be found on page 7 of the appendix.

Own archive:
Photo of research on different technologies



5.1.1 MAGNETIC INDUCTION

After Tesla developed the first step toward wireless charging, Nokia launched the first wireless chargeable phone in 2009. After this the Nokia Palm Pre, Lumia 820 and 920 followed in 2012. When the Google Nexus 4 and the Galaxy S line of Samsung build-in wireless charging support in 2013, wireless charging started growing. (Gibbs, 2017)

The Wireless Power Consortium (WPC) developed the current most used wireless charging technology called Qi. This technology exists out of a transmitter coil that transmits an electrical current to the build-in receiver coil. The distance between a transmitting and receiver coil can not be more than 40 mm. Otherwise, the coils can not create an electromagnetic field. In this field, the electrical current will be converted into the direct current (DC) which will charge the battery. (Grabham, 2020)

The electromagnetic field created during the process is called an electromagnetic flux. This flux is optimal when the coils are close to each other and aligned. The efficiency drops quickly when the coils are further apart. The size, alignment, and distance between the coils will determine the coupling factor, the amount of energy between the coils. In most optimal conditions the charging rate has 60% efficiency or a 0.6 coupling factor. (THE WIRELESS SOLUTION, 2017)

The Qi technology had been used by large smartphone manufacturers like Nokia, Samsung, Motorola, Apple, Sony, Blackberry, LG and HTC. It is also built-in vehicles, IKEA furniture or used by retailers like Starbucks. Different wattages from; 5W to 15W are applied at the moment. An upcoming series is expected to be able to charge up from a 25W. (Grabham, 2020)

5.1.2 MAGNETIC RESONANCE

A different technology used for charging over a longer distance is called magnetic resonance. It was discovered in 2007 by researchers from MIT who later founded WiTricity. The technology is based on induction charging. They discovered it was possible to increase the distance between the coils by using

a non-radiating flux. Without using a strong coupling, the coils would be set to the same resonant frequency. Then an 'energy tunnel' can be created which prevents losing some of the energy. (THE WIRELESS SOLUTION, 2017)

Multiple devices can be charged at once, charging over a longer distance and charging through objects. Most important is that the two coils are tuned to the same electromagnetic frequency. Energy can be transmitted when devices or objects come near the same resonant frequency, at the moment only used in the automotive industry. For this reason, the electromagnetic field would not cause any harm, the energy remains concentrated on the object it is connected to. The energy source will not be dispersed into the room. Only the efficiency drops

over a longer distance, this is still a challenge in development. (THE WIRELESS SOLUTION, 2017)

At the moment resonance charging has an efficiency of 30% at a distance of 2 cm between the coils. At a distance of 75cm between the coils, the efficiency drops to 15%. Another problem could arise when other electronic devices operate on the same bandwidth. (THE WIRELESS SOLUTION, 2017)

Further information about magnetic resonance can be found on page 8 of the appendix.

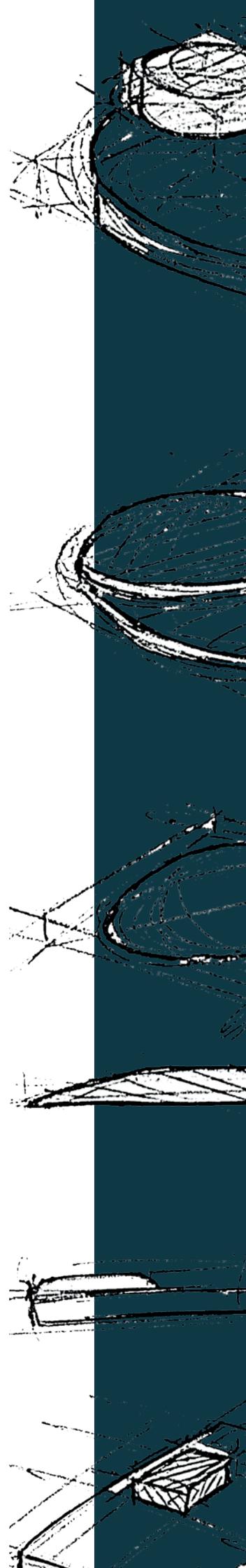
5.1.3 RADIO FREQUENCY (RF)

Another technology used for wirelessly charging is via radio frequencies. This technology makes use of radio frequencies sent via electromagnetic waves to charge devices. These waves are sent via a transmitter to a receiver which will convert the waves into electricity. The receiver is based on an electronic circuit, which means it can be made a lot smaller than a coil named before. (Humavox, 2016)

The RF technology offers a wide range of design possibilities, only because it is sending unconcentrated waves, high power receivers could not charge quickly. Which makes this technology suitable to charge multiple small devices. It would be best suitable to charge small devices like sensors. (Wasserman, 2019)

Then there is another notable difficulty using the RF technology, the possible radiation. Many people are concerned about radiation being harmful and dangerous for the human body. Most studies are executed on mobile phone use, but new studies also researched the effects of the base stations. A study performed in 2017 conducted with 14.829 Dutch people between 31 and 65 years old, confirmed a high number of complaints connected to radiation. A relationship between exposure and the complaints could make what means the RF technology still needs to be investigated more. It also shows the concerns people have towards radiation. (Bortkiewicz, 2019)

Further information about Radio Frequency can be found on page 8 of the appendix.





Other information about SAR-regulations created to test absorption of Radio Frequencies by the human body, can be found on page 9 of the appendix. In addition elaboration on basic principles of Radiation can be found on page 9-10 of the appendix.

5.1.4

INFRARED

Another technology suitable to charge devices wirelessly is via Infrared. Invisible light is concentrated on a device to charge it. Devices can be charged over a longer distance in a wide range without any loss of energy. This makes this technology very efficient and safe to use. Energy will not be spilled into the room and cause possible harm. (AUKEY, 2019)

Further information about Infrared charging can be found on page 10 of the appendix.

The devices have to be in direct line with the infrared light, otherwise, the device will not get charged. At the device a sensor needs to be placed to receive the incoming infrared, this will then be translated into energy. This technology is suitable to charge multiple devices at once. These devices have to have a receiver or need to be plug-in to a receiver, also they need to be in direct line with the infrared light transmitter. (AUKEY, 2019)

5.1.5 WIFI

The ideal technology for charging devices would be charging via an operating WIFI network. Then devices in the room could be charged over-the-air without needing to lay flat or add a receiver to the device. Some devices are curved and therefore not suitable to charge for example on charging maps. (Dolcourt, 2019)

Within this technology, multiple devices will automatically be connected and charged in a range of 9 meters. All devices need to be connected to the same WIFI network via the cloud or mobile app. Devices will then be charged on the same basis as radio frequency charging. (Grenz, z.d.)

Further information about WIFI charging can be found on page 10 of the appendix.

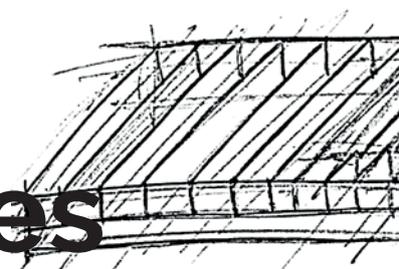
Further information about Sound charging can be found on page 11 of the appendix.

Another possibility of charging devices wirelessly is by ultrasound technology. Charging devices by transferring energy via soundwaves is one of the newest technologies. For this technology, a kind of speaker system is used to send acoustic energy through the air.

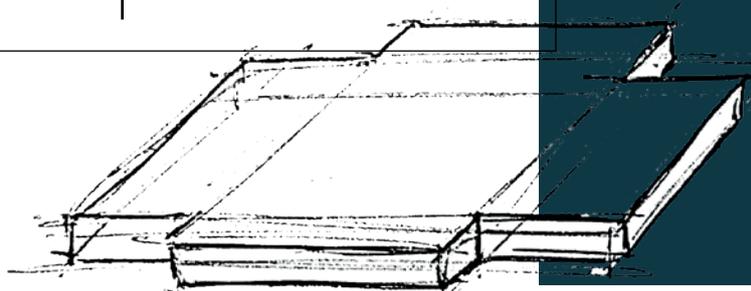
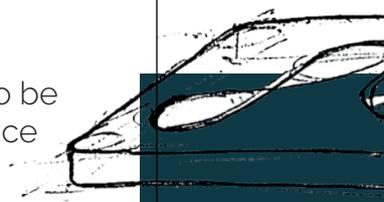
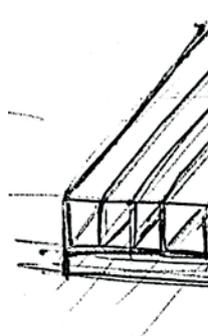
5.1.6 Sound

Multiple devices can be charged at all distances. These waves will be converted by ultrasonic transducers into electric power for the device. The sound will not be disturbing for the user because it is an above human of 20.000 Hertz range. (Jones, 2019)

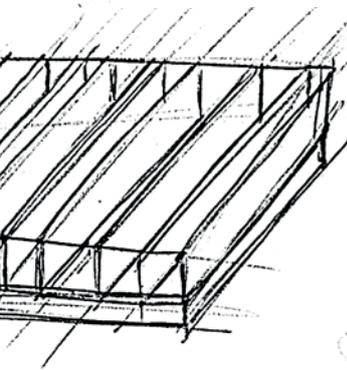
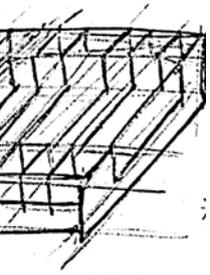
5.1.7 Overview of all wireless technologies



TECHNOLOGY	PROS	CONS
MAGNETIC INDUCTION	<ul style="list-style-type: none"> - 60% efficiency - Used by large smartphone manufactures - Different wattages from 5 W till 15 W 	<ul style="list-style-type: none"> - Alignment of distance - Efficiency can drop quickly - Charge 1 to 1
MAGNETIC RESONANCE	<ul style="list-style-type: none"> - Based on Induction charging - Longer distance charging - Charge multiple devices 	<ul style="list-style-type: none"> - Efficiency of 30% at a distance of 2 cm - Charge objects on the same resonance frequency
RADIO FREQUENCY (RF)	<ul style="list-style-type: none"> - Charge devices over a distance of cm to a few m - Flexible to built in 	<ul style="list-style-type: none"> - Receiver need to be placed in the device - Decrease of capacity over a longer distance - Concerns about radiation
INFRARED	<ul style="list-style-type: none"> - Concentrated energy - Charge multiple devices - Capabilities not reduced by an increased distance 	<ul style="list-style-type: none"> - Charge in direct line - Receiver need to be placed in the device
WIFI/RF	<ul style="list-style-type: none"> - Based on RF - Charge multiple devices - Smart charging by WIFI-network 	<ul style="list-style-type: none"> - Based on RF - Concerns about radiation
SOUND WAVES	<ul style="list-style-type: none"> - Charge multiple devices - Charge devices tens of meters away - Waves are not disturbing for the user 	<ul style="list-style-type: none"> - Receiver need to be placed in the device



5.2 CHOICE OF TECHNOLOGY



Because there is not a lot of information on possible technologies, other than magnetic induction, it is difficult to make a well-informed decision on which technology to choose.

To create a better perspective on the different technologies and their real pros and cons, a meeting with Rick Dumont, an expert working in the wireless charging consortium of Philips was planned. Rick Dumont is Director Business Development of Philips Intellectual Property who has worked at Philips for several years.

Philips is one of the founders of wireless charging technologies and holds all patents concerning wireless phone charging today. They developed the Qi brand, a magnetic induction technology which is now used in almost every wireless mobile phone charging device.

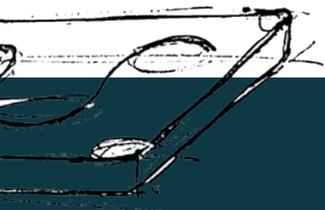
For the development of the HEMISPHERE, magnetic resonance technology first seemed to be the most promising technology. But after a small discussion, it appeared to be impossible according to Rick Dumont.

Magnetic resonance needs to create high-frequency peaks to reach over and transfer energy to the device. Because it is not possible to concentrate the energy waves to only a small device, a lot of radiation will be diffused into the room. This makes it difficult to charge a device over a larger distance. Because of the larger coils and smaller distance between them it is possible to apply in the automotive industry but not in consumer electronics.

Also, the high-frequency peaks are on a level that is unhealthy for humans, the environment and bad for the battery of the devices. Also building a system that could send these high-frequency energy waves would be too expensive for the consumer electronics market. In short, according to physics and the financial view, it is not possible to use magnetic resonance.

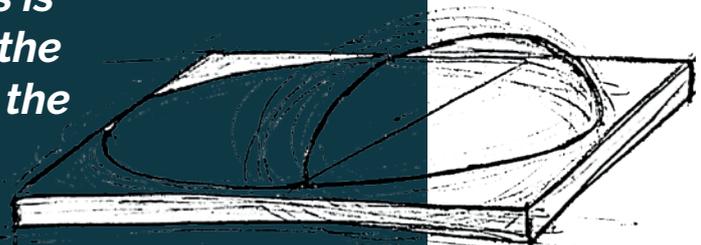
Rick Dumont's advice was to use the magnetic induction and be creative with the possibilities this technology has to offer.

The full elaboration version of the interview with Rick Dumont can be found on page 11-12 of the appendix.



“high-frequency wave needed to charge devices is very harmful to humans, the environment and bad for the battery of devices.”

Rick Dumont



6. LIST OF REQUIREMENTS AND WISHES

List of Requirements and Wishes:

MANU

Last review: 11-06-2020

1. THE CONDITIONS OF USE

- | | |
|------|--|
| 1. 1 | The primary function of HEMISPHERE is wirelessly charging suitable personal devices. |
| 1. 2 | The secondary function of the HEMISPHERE is enhancing the aesthetical value of an (domestic) interior. |
| 1. 3 | Use of HEMISPHERE is effortless, no need for positioning the smartphone |
| 1. 4 | The charging station should be suitable to charge 3 devices at once. |

2. THE PRODUCT: CHARGER 2.0

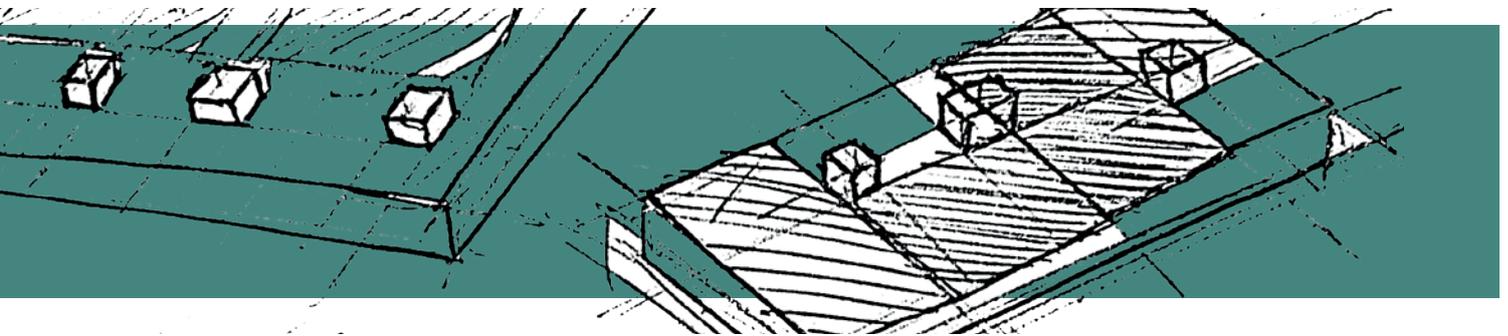
- | | |
|------|--|
| 2. 1 | HEMISPHERE makes the charging of smart technology more user friendly. <i>A product is user friendly if it is easy to learn, understand and use within 5 minutes, and aiding in reaching a goal successfully.</i> |
| 2. 2 | HEMISPHERE can be taken apart into 6 PARTS, without the purchasing parts |
| 2. 3 | HEMISPHERE can be used by multiple personal devices included the Qi charging option |
| 2. 4 | HEMISPHERE meets all European inspections, standards and regulations. |

3. THE DESIGN

- | | |
|-------|--|
| 3. 1 | HEMISPHERE is a functional design product. <i>A product may be labelled as a design product if it is aesthetic, attractive without its main function and thorough down to the last detail.</i> |
| 3. 2 | The design follows the scandinavian style. <i>It is minimalistic and follows the quote; 'Less is more'.</i> |
| 3. 3 | HEMISPHERE should be suitable for, living room and hall. |
| 3. 4 | HEMISPHERE should be suitable to use for multiple persons at the time. |
| 3. 5 | The design of the HEMISPHERE must be visible attractive for the viewer from all sides. <i>The design should not have a determined back,- or front-side.</i> |
| 3. 6 | HEMISPHERE design makes use of is geometrical shapes |
| 3. 7 | The dimensions of the HEMISPHERE should not be larger then (l) 250 x (b) 250 x (h) 100 mm |
| 3. 8 | The HEMISPHERE should be designed by taking the end product lifecycle into account on ease of dis-assembling. |
| 3. 9 | The choice of material for the HEMISPHERE design should be made with taking the environment into account be atleast bio-based material. |
| 3. 10 | The power cable is circular, coloured black and should be atleast 1 m long. |
| 3. 11 | The color of the HEMISPHERE design should be RAL colour to fit to the QUBE RAL5008 design |
| 3. 12 | HEMISPHERE should be able to withstand a fall of 750 mm. |
| 3. 13 | The top surface of both sleeves are maximally 3 mm thick. |
| 3. 14 | The maximum weight on the charging part is 300 g |
| 3. 15 | Both top wireless charger transmitters are maximally 4mm away from the top surface of the sleeve covering them. |
| 3. 16 | Within the HEMISPHERE design the powerbank need to blend in the total design. |
| 3. 17 | All recesses for the technology in the cores are dimensioned to clamp the technology. |
| 3. 18 | The design of the HEMISPHERE will be in favor of the magnetic induction technology. |



4. THE TECHNOLOGY	
4. 1	The HEMISPHERE should be universal to use for every smartphone device including the Qi technology.
4. 2	The HEMISPHERE and the powerbank should effortlessly be aligned during the charging process. <i>It should be easy to position the device on the charging area.</i>
4. 3	The station of the HEMISPHERE needs to be designed to fit two wired magnetic induction devices of the dimensions, 62 mm diameter.
4. 4	The powerbank of the HEMISPHERE needs to be designed to fit the dimensions of (l) 160 x (b) 80 mm of the technology.
4. 5	The distance between the device and the wireless charging technology should not be more than 4 mm
4. 6	Confirm the RED regulations the charger should not have a lower limit radio frequency spectrum under RTT&E Directives between 9 kHz and 3000 GHz range.
4. 7	To address the wastage of phone charge cables, the universal useable Qi technology needs to be implemented
4. 8	The charger must be suitable to use in the Union confirmation nr. 676/2002/EG of the European Parliament and International Union for Telecommunication (ITU).
5. THE PRODUCTION	
5. 1	The HEMISPHERE will be produced minimum 1000 till 5000 times.
5. 2	The total production costs should not be more than 60 euros
5. 3	The visible parts of the HEMISPHERE should have a premium finishing to fit to MANU products



7. CONCEPT DESCRIPTION

After the sketching phase, 3 concepts with their own characteristics were created. These concepts are designed with a few important consumer insights kept in mind. One of them is positioning the phone correctly, otherwise it will not charge. Positioning the phone is the most named downside in the MANU survey (Feb. 2020) and on the internet.

In addition, most participants in the survey charge their phones in the bedroom. While they indicate to rather charge their phone in the living room. Participants explained that they spend most of their time there and would like to have a fixed charging location in the living room. Thereafter, they explained it will be less likely to lose their phone in

their own home. Also, the phone does not need to be charged overnight.

Another important consumer insight used in creating the concept is the need for disconnecting. This need was noted in the Focus Group of Dock + experienced in 2016 and in the trend: FLEXIBLE TOUCH. Research has shown that because people are connected to their phones all day there is a growing need to disconnect from this once in a while.

The most important aspects summed up are:

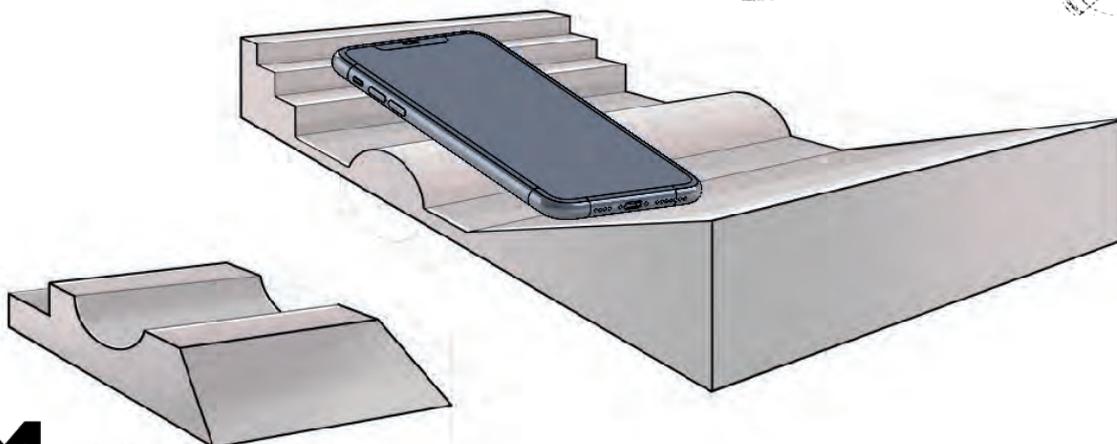
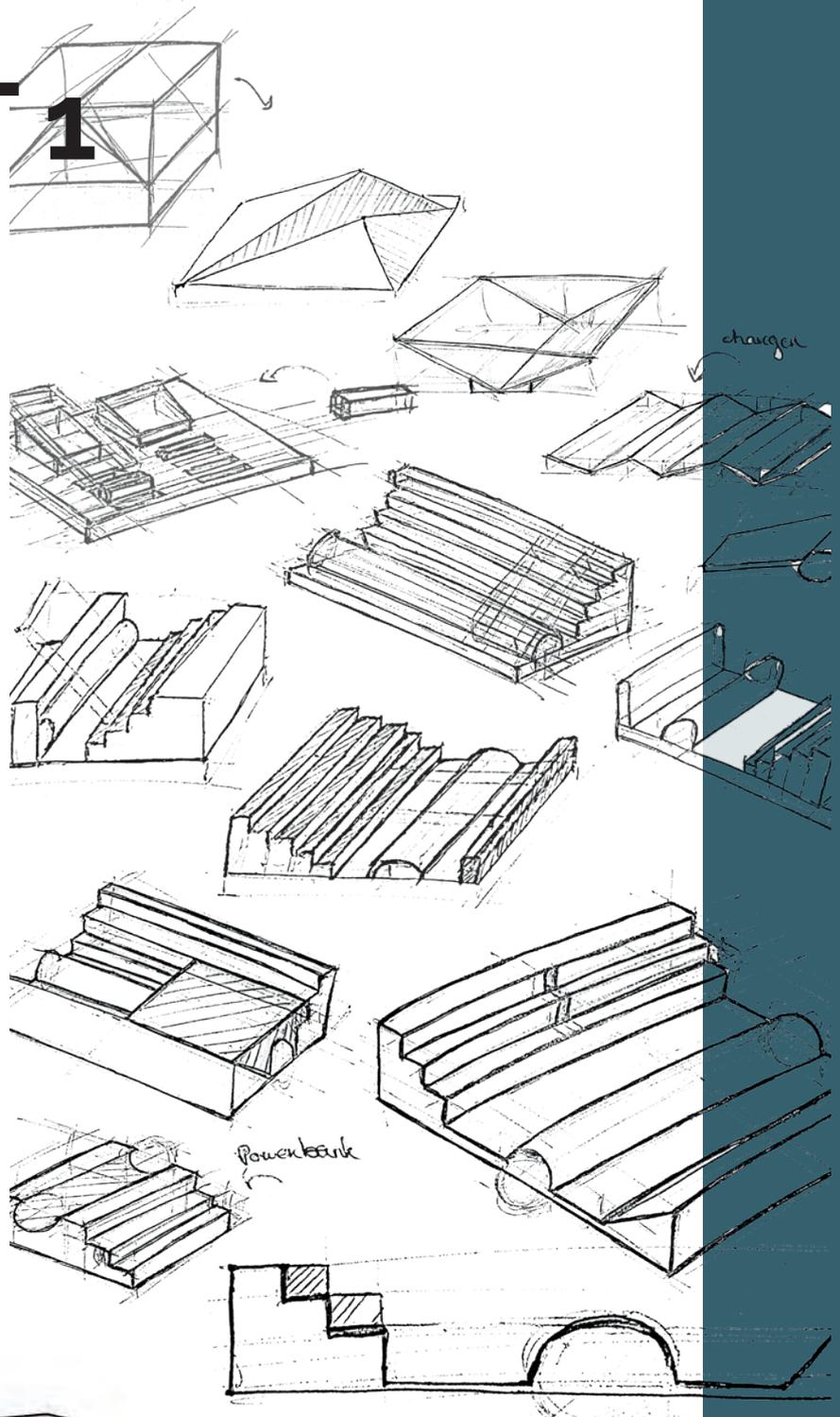
- Ease of positioning the phone
- Central positioned interior design charging device
- Disconnection from the phone

7.1 CONCEPT 1

Interaction combined with the positioning of the phone was the main focus of the first concept.

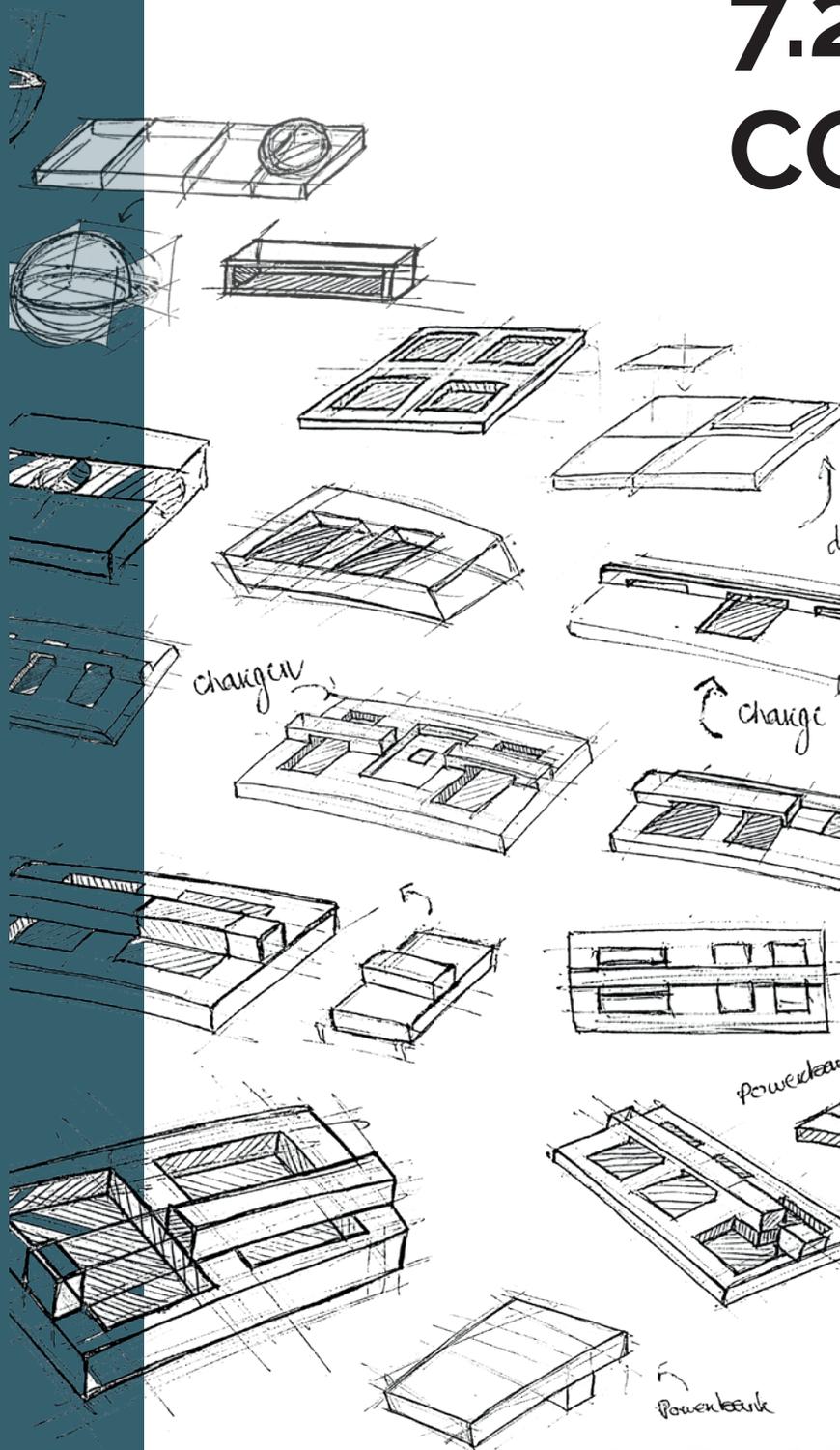
The charging station is meant to charge any type of phone that supports wireless charging. In all wireless chargeable phones, the charging coil is positioned in the middle. Which in this concept means the middle of the phone needs to touch the half-cylinder. The top of the phone will then be placed on top of the stair step. The end of the phone will be supported by a bevel shaped in a triangle.

The user will be triggered by the design because the positioning of the phone is interesting and playful. Thereby is the design of the charging station itself visibly attractive from all sides. In addition, the included power-bank could be taken out and along.



7.2

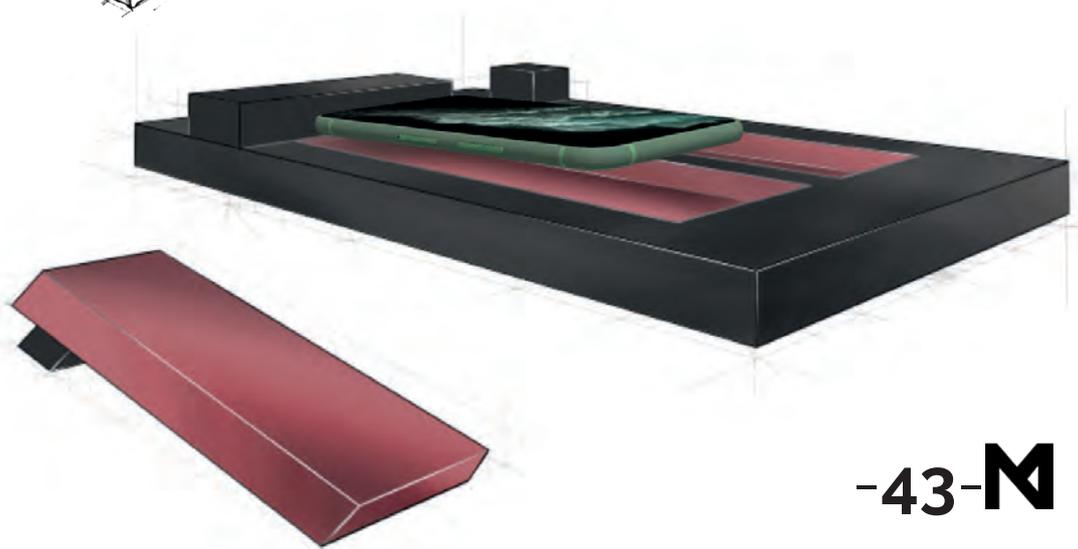
CONCEPT 2



Within the second concept, a minimalistic station that could be centrally positioned in the living room, and would guide the user to position the phone correctly was taken as the main focus.

On this minimalistic charging station design, multiple phones that support wireless charging could be charged. The cutouts are meant to place the phone in, the bar above the cutouts makes positioning of the phone easier. In addition, will the bar probably stop the tendency of the user to take the phone while it is being charged in the station. The station is accessible to position the phone in from all sides, which makes it suitable to place in a central position in the living room.

The minimalistic design is in favor of the function and will therefore fit every interior. The included power-bank can be taken out and taken along.

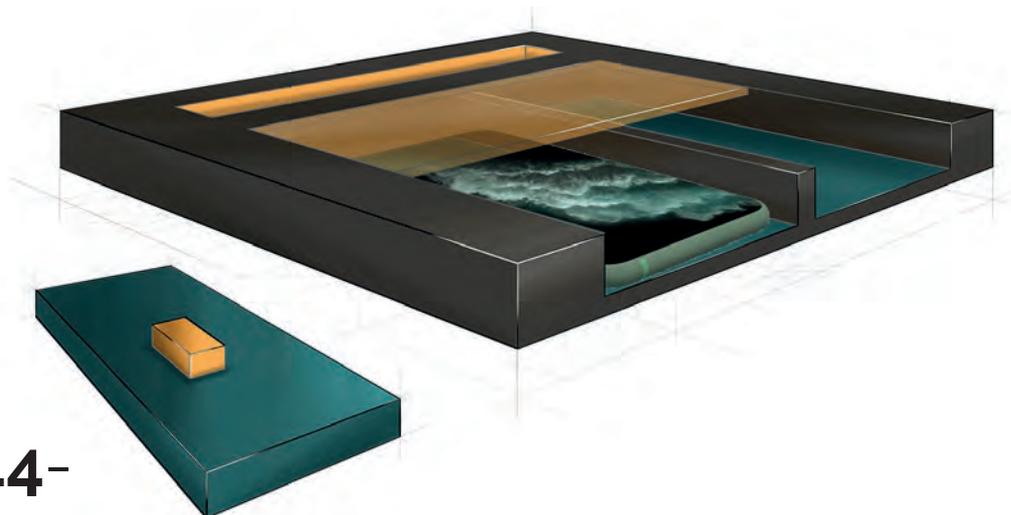
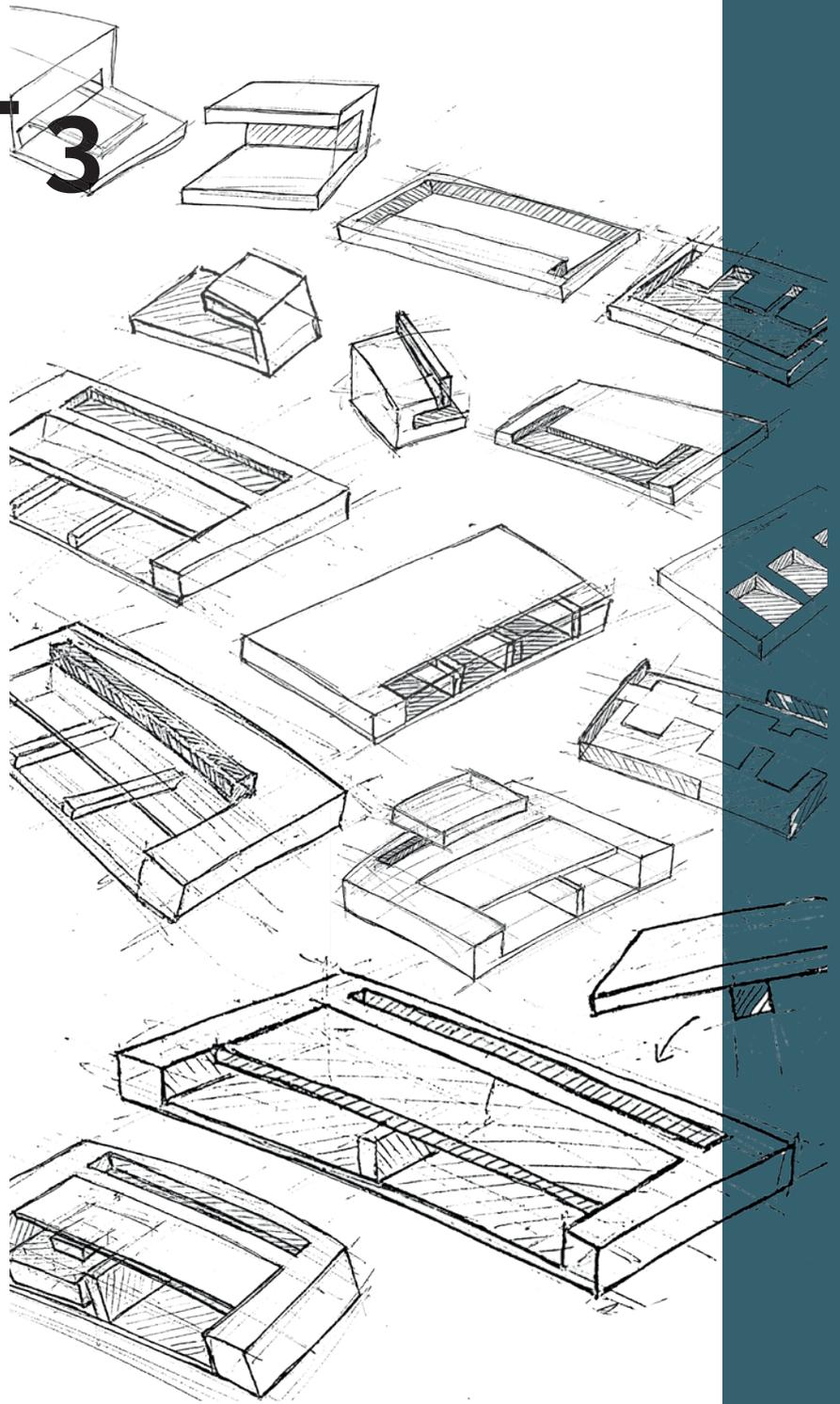


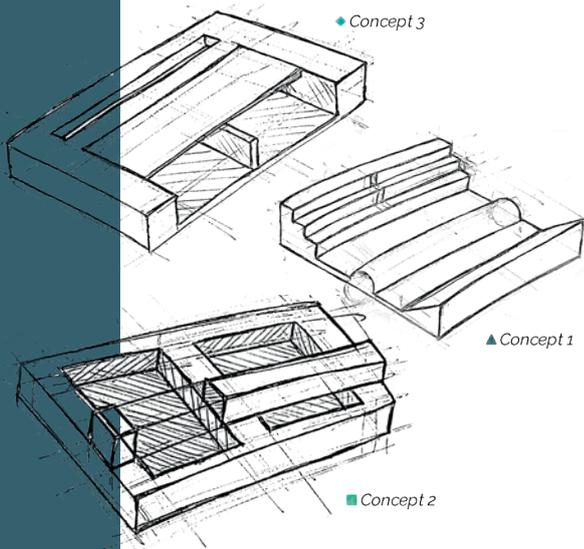
7.3 CONCEPT 3

The third concept was focused on creating a disconnection of the user to the phone while it is being charged.

Within this concept, the phone needs to be slid in from the side of the station to the right position. This station is suitable for all phones that support wireless charging. While the phone is slid into that station the user is guided to disconnect from it. The phone is covered by transparent glass and positioned in an almost covered tray. This means the user is not tempted to take out the phone while it is being charged which makes the user truly disconnected for a moment.

The phone could also be placed on top of the attached power-bank to charge, or the power-bank could be taken along. To charge other devices with wireless charging technology, the power-bank could be placed on top of the charging device.





8. KESSELRING METHOD

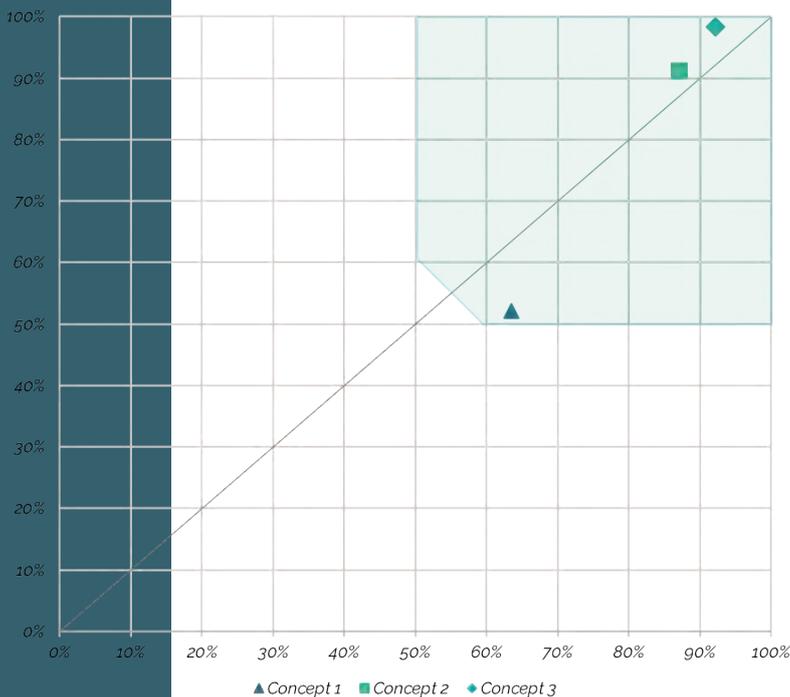
To make a well-considered decision on which concept would be most suitable to develop further, the Kesselring method was used. The Kesselring method works by testing multiple concepts on the basis of predetermined requirements. The requirements are drafted based on manufacturing and functional aspects with each given a rating to their importance. This rating will be from 1 till 3 which each requirement thereafter will be giving a score of 1 till 5 on functional

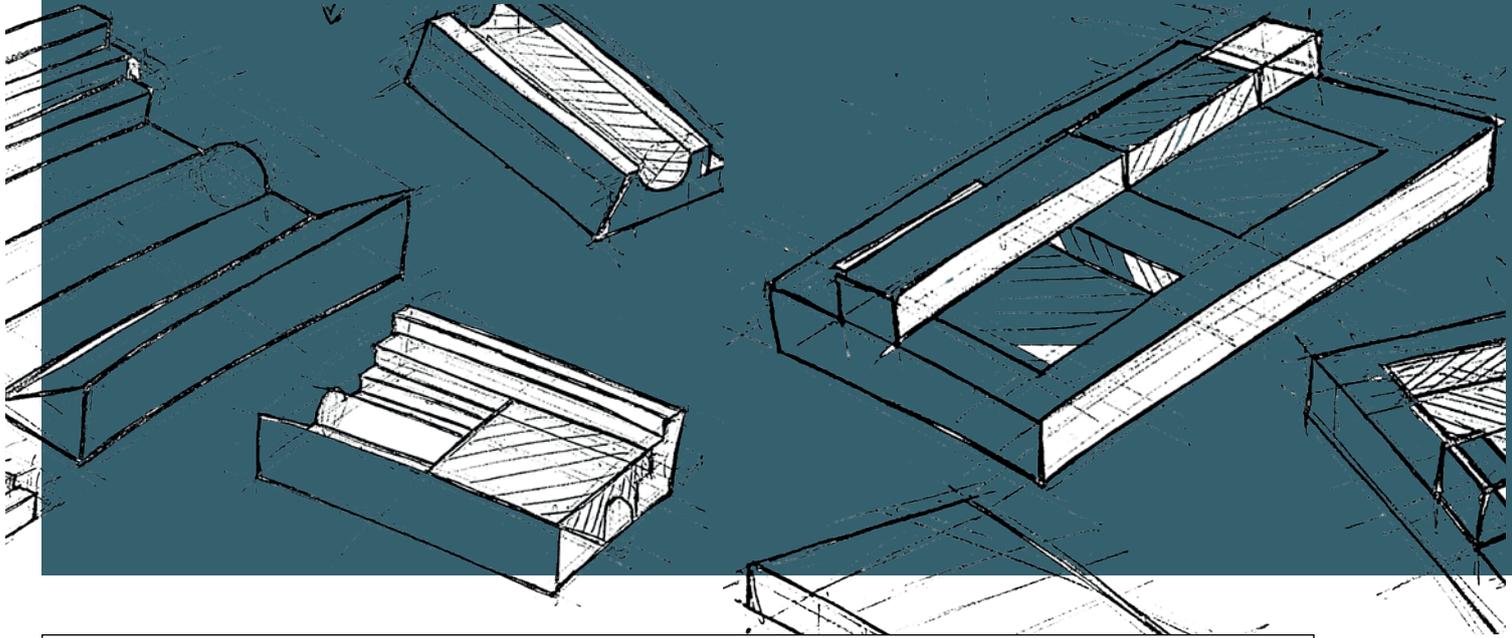
and manufacturing aspects. The final score is the score multiplied by the importance rating. The concept with the highest score will be chosen to develop further.

The Kesselring method is used because all concepts are designed with one important consumer insight in mind. As a result, they all have a different point of view which makes them unique. Using this method the concepts could be tested objectively.

Concept 1 scores lowest with 58% because the design is interesting but too playful to be very user friendly. Also, concept 1 is only suitable to charge mobile phones. This also applies to concept 2 to which the charging spot is difficult to access for non-flat devices. However, on user-friendliness and design aspects concept 2 with 89% and 3 with 95% score very similarly what would make them both suitable for further development. The decisive factor of concept 3 was the stronger disconnection element combined with user-friendliness and safety. The station itself is also designed to charge multiple non-phone devices. Therefore concept 3 has been chosen to develop further.

Kesselring-Method





Functional requirements	<i>Weighting (1 till 3)</i>	<i>Concept 1</i>	<i>Concept 2 (1 till 5)</i>	<i>Concept 3</i>
Ease of positioning of the smartphone	3	15	12	15
Disconnection of the user to their phone while charging	3	9	10	15
The HEMISPHERE makes charging of smart technology more user friendly.	2	8	8	10
While charging the phone has to lay flat	2	0	10	10
The smartphone should not lose charging contact while charging	3	6	15	15

Manufacturing requirements	<i>Weighting (1 till 3)</i>	<i>Concept 1</i>	<i>Concept 2 (1 till 5)</i>	<i>Concept 3</i>
HEMISPHERE should be suitable for, living room, bed room and hall.	2	6	10	10
The Phone should not get damaged during charging	3	9	12	15
The design of the HEMISPHERE will be in favor of the implementing technology	3	3	15	15
The secondary function of HEMISPHERE is wirelessly charging multiple devices at once.	1	1	3	3
Possible to place multiple coils next to each other inside the device	2	4	10	10

9. DEVELOPMENT OF CONCEPT 3

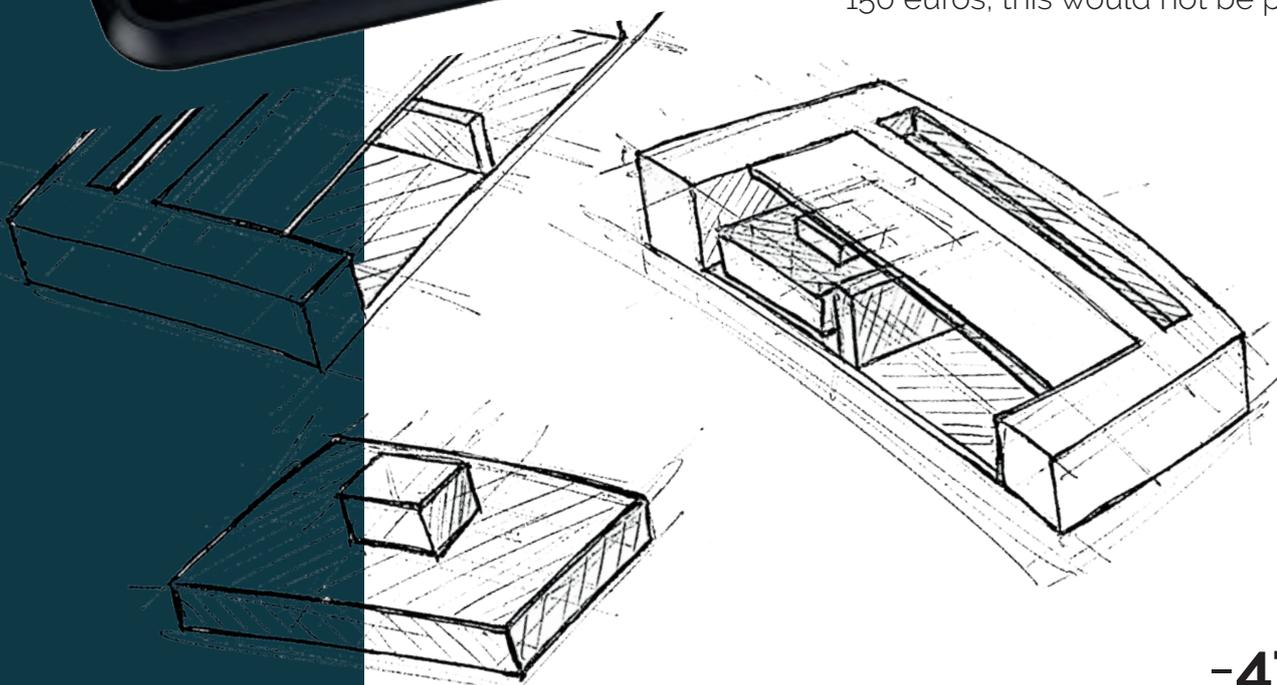
After making the choice for concept 3 a new sketching phase started. The idea behind the concept was kept in mind to create a more sophisticated design. The interior design element needed to be added a bit more so that it would be suitable for the MANU brand.

Also, it is researched which possible devices should fit on the charging station. At the moment 46 mobile devices support wireless charging, from which

2 foldable phones. In addition, there are 2 tablets, 14 different earphones, and 3 headphones. Thereby are headphones upcoming in this wireless charging market and therefore also important to take along the design process.

Another important development in wireless charging technology are the multi-coil chargers. This is a mat including 16 or more charging coils which makes positioning of the phone unnecessary. Unfortunately, would this technology make the consumer price of the concept too expensive to what MANU has planned. The consumer price of the HEMISPHERE concept should not be more than 200 euros. With the cost of multi-coil technology being between 100 and 150 euros, this would not be possible.

Multi-coil Wireless charger with 16 coils, by ZENS.



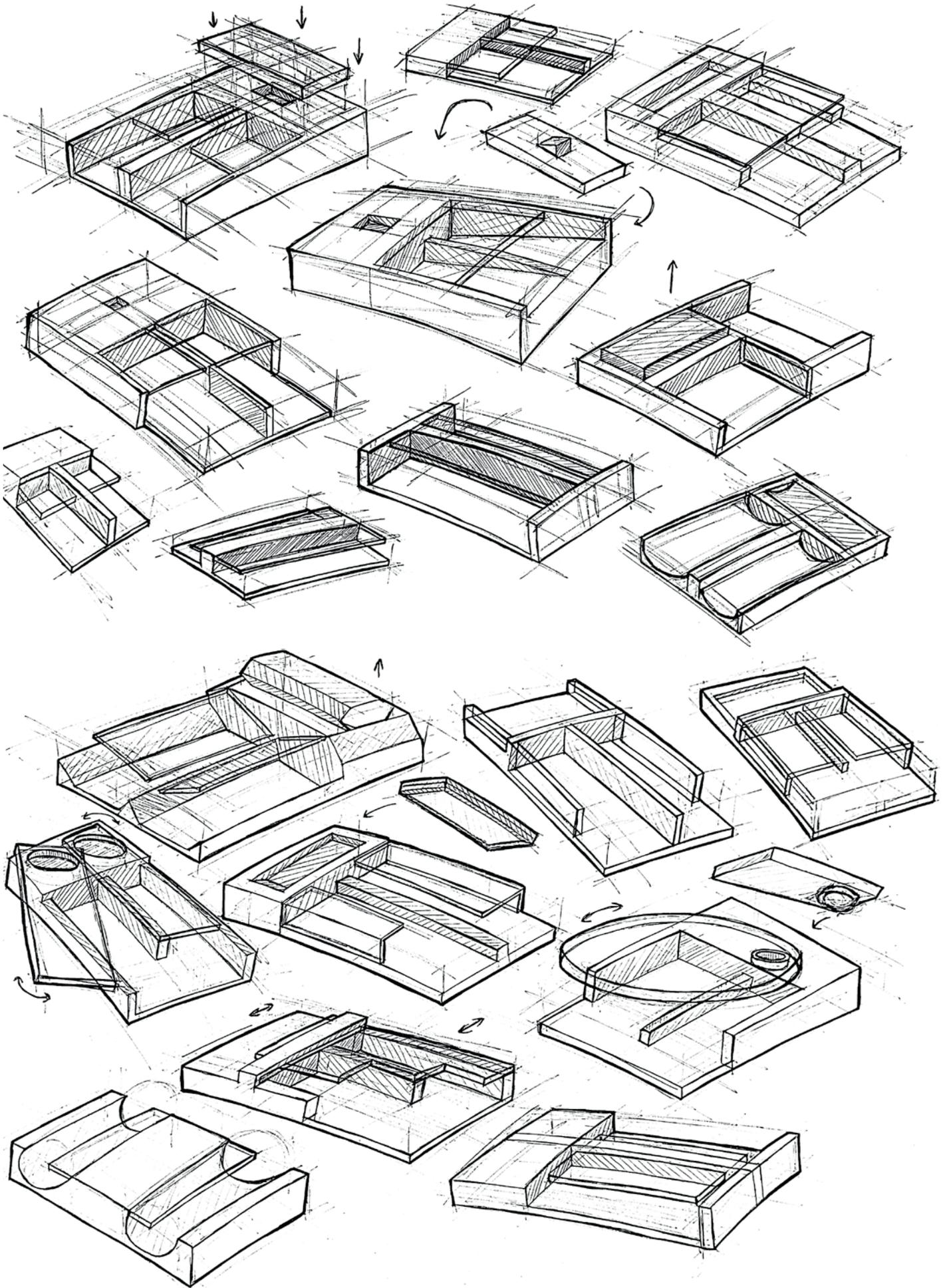
9.1 VALUE PROPOSITION HOUSE (VPH)

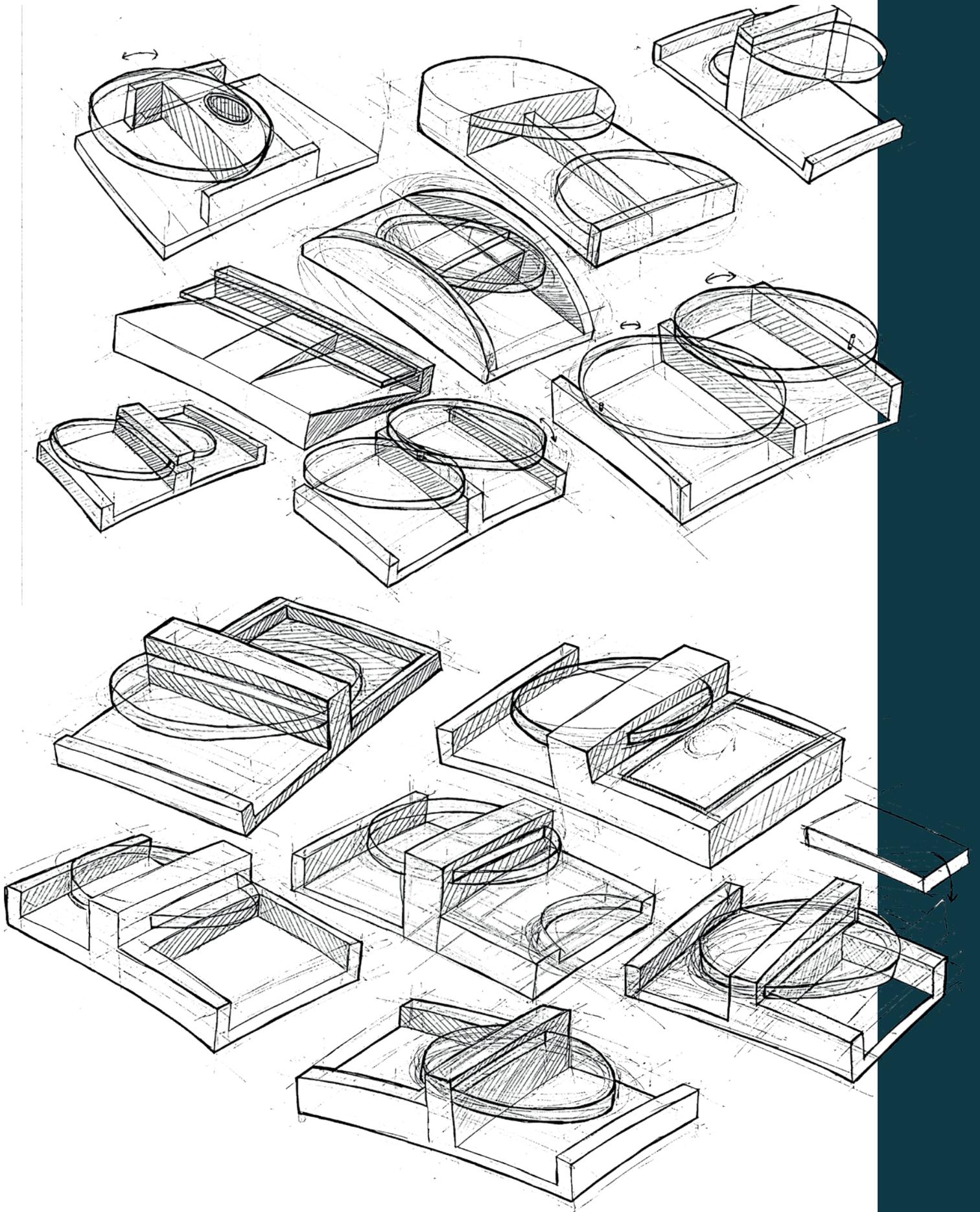
The Value Proposition House (VPH) is used as a tool to design products based on consumer insights. In the VPH, a new product will be described that meets consumer needs. Furthermore, innovations and

benefits will be described to create an overview of what the new product will represent. Using this model new concepts could be tested to decide if they will be developing this further or not.

Within this context, a Value Proposition House is filled in to test concept 3. In the VPH model, the target group is described in short, the found consumer insights and other important elements the HEMISPHERE product has to meet. But most importantly what the HEMISPHERE has to offer to be distinctive in the market.

<p>1. Target group</p> <p>Early adopters who value their identity and status, are materialistic and curious to new technologies packed together in design products that fit their lifestyle.</p>	<p>2. End-user insight</p> <p>In a jungle of cables, not having to plug-in or position the smartphone on a charging mat to charge it along with other personal devices at once, on a centrally located position in the home, to disconnect or connect to the smartphone quickly while charging.</p>	<p>3. Competitive landscape</p> <ul style="list-style-type: none"> - Walter Bamboo Dock - Native Union Drop XL - Nomad Base Station Hub
<p>4. End-user benefit</p> <p>The wireless charging stations offer ease of smartphone positioning, the possibility to charge multiple devices at once and attractive interior design to make the user inclined to disconnect from their smartphone quicker.</p>	<p>5. Reasons to believe</p> <ul style="list-style-type: none"> · Ease of smartphone positioning · Suitable to charge multiple devices at once · Central located charging station, (Visible attractive interior design object to be seen) · Suitable to place on a coffee,- or dinner table · Being disconnected to the smartphone for a moment (designed to put the phone away) · Universal for smartphones and other personal devices including the Qi wireless charging technology 	<p>6. Discriminator</p> <p>MANU offers a wireless charging station to charge multiple devices at once without needing to positioning the smartphone packed together in an interior design object.</p>
<p>Brand positioning: <i>"We create beautiful products to enhance your (digital) lifestyle" MANU combines a great taste for design with the ideal usability of mobile devices.</i></p> <p>Expanding experiences:</p> <ul style="list-style-type: none"> · No hassle while positioning the smartphone · Only needing one device to charge all 	<p>Leading/Innovative:</p> <ul style="list-style-type: none"> · User-friendly design · Reduction of cables · Charging station as an interior object 	<p>Brand personality:</p> <p>Positive, trustworthy, confident, tranquil, passionate, devoted</p> <p>Quality:</p> <ul style="list-style-type: none"> · High-quality materials · High-quality technology (ZENS) · Secure device





9.2

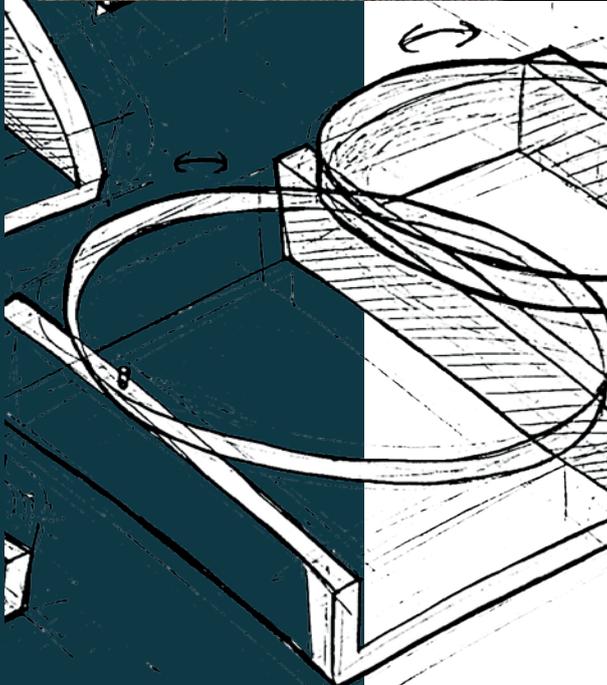
PROTOTYPING PHASE

Own archive: Prototype 1



During the prototyping phase, the made sketches were translated into prototypes. A prototype would create a better perspective on the dimensions of the sketches. Also, tests could be conducted to experience the concept of user-friendliness and esthetics.

To make the prototype as realistic as possible, the wireless charge technology was implemented. In this way, the experience in using the concept should be most close to reality.



Own archive: Prototype 2

The first model was made of foam, but because there was decided to test the model with multiple potential users, a new model was made in cardboard. This material would create a more realistic feeling of the final product

9.3 CONTEXTUAL INQUIRY TEST

During the Contextual inquiry test participants, most resembling the Cosmopolitans have been asked to test the HEMISPHERE prototype. Some participants were in possession of a wireless chargeable phone, others empathized with having one. The participants, who were both men and women, were in the age group of 20 to 60 years old. In total 7 participants participated in the contextual inquiry test.

The Contextual inquiry test is a qualitative method of research to get insights from users directly while testing the product. During these tests, participants were placed in an almost equal to the home-situation to test the prototype. Because of that, participants will be more likely to feel confident to share their honest opinion. Thereby could the questionnaire ask further explaining of the participant during the testing of the prototype.

The test was conducted in the Showroom of Vogel's and took in total 1 hour per person. The test was divided into two parts, in the first part, the product was tested so that the participant could be observed. During the second part, the participant was interviewed.

“Contextual inquiry test is an qualitatively method of research to get insights from users directly while testing the product.”creating a clear overview.”

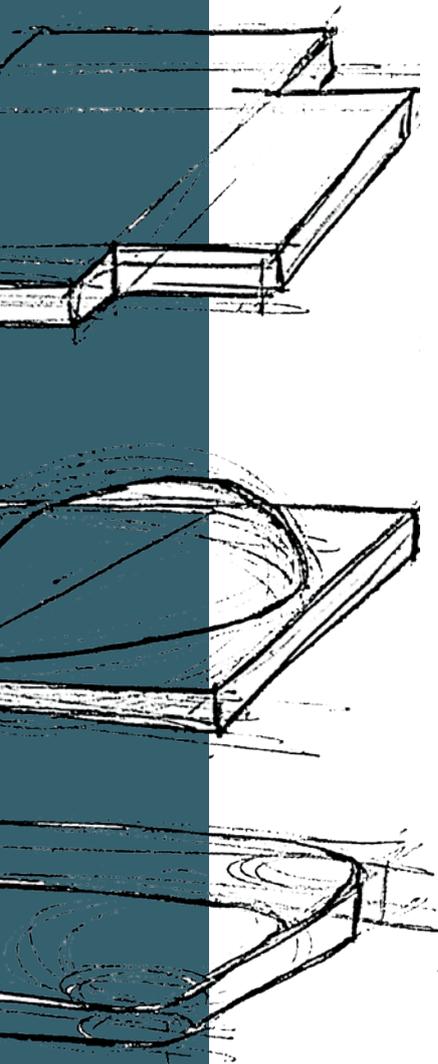


The test session will be divided into 4 different assignments. In the first assignment, the participant had to unbox the concept, to observe the first impression on the prototype. In the second assignment, the participant had to test the prototype and place it in the room they felt most suitable. Then the power-bank was tested separately. The power-bank is the most expensive component in the prototype and therefore its value by participants needed to be tested.

After testing the concept a small interview was held, which is divided into 3 sections. The general impression of the participant using the prototype, the overall design, and the price the participant would be willing to pay.

The findings and experiences coming from this test were used to adjust the design. All participants remained anonymous and referenced by a number

The program of the contextual inquiry test can be found on page 13-15 of the appendix



Own archive: Photos taken during the test in the showroom of Vogel's

9.4 AFFINITY DIAGRAMMING

To structure the answers of the Contextual inquiry test and translate them into usable data, the method affinity diagramming was used. Affinity diagramming is a method to structure thought and ideas gathered from a group session. This method creates creativity and is therefore mostly used during brainstorm sessions. Information will be diagrammed by grouping to its affinities to create an overview.

The overall experience of the participants was very positive. Positioning the phone was named as very easy and the design was described as futuristic and minimalistic. A few aspects at forehand were important to group separately, others stood out during the grouping process. The test results were divided into 8 groups, whereof 2. Half-round tray side, 3. Power-bank, and 5. Light element stood out.

1. Half-round side
2. Half-round tray side
3. Powerbank
4. Design of the concept
5. Light element
6. Design details
7. Charging location
8. Sales location



“Affinity diagramming is a method to help make sense of mixed information by clustering bundles and building groups, creating a clear overview.”

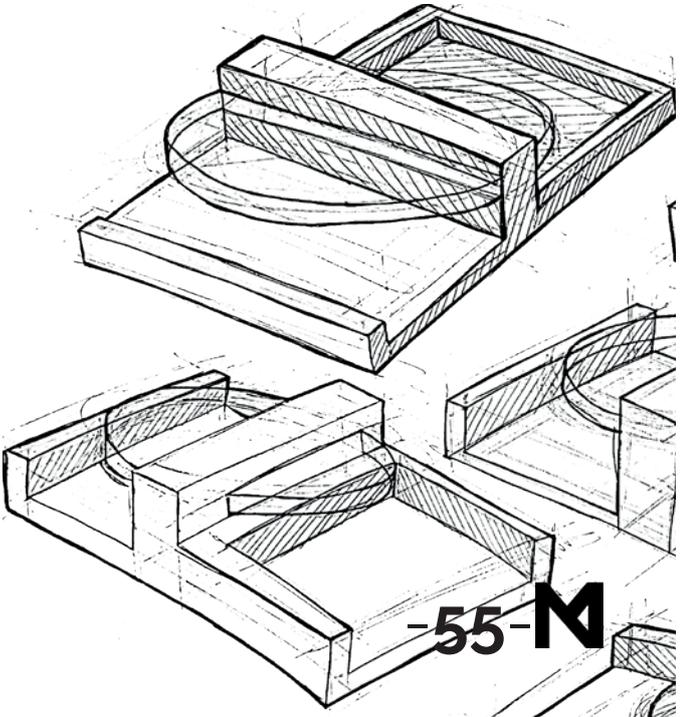
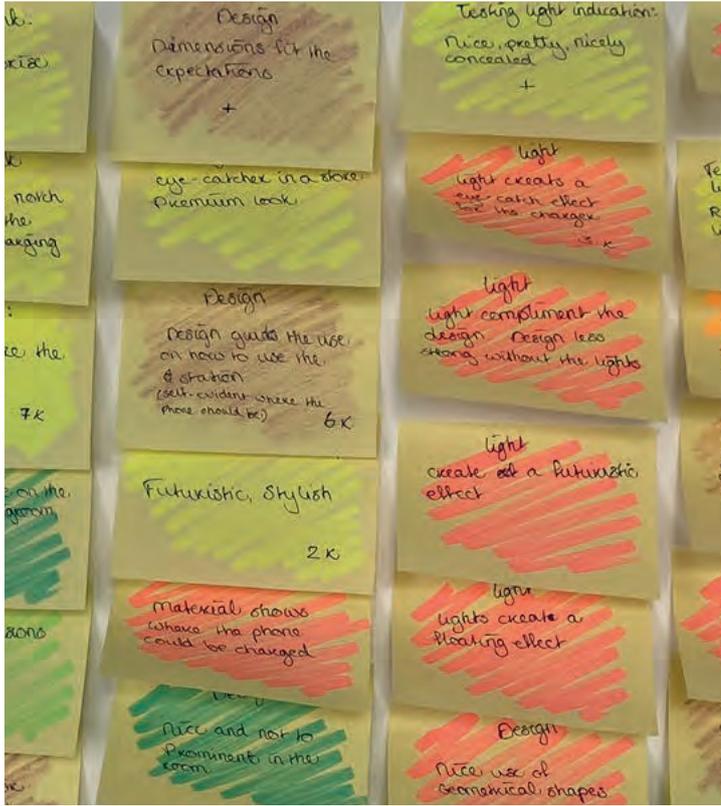


<p>2. Half-round tray side: <i>'Not user friendly'</i></p> <p>NEGATIVE</p> <ul style="list-style-type: none"> - Difficult to take the phone out quickly (e.g. incoming call) - Half-transparent circle seen as an obstacle (opening to small, edges to high) - Awkward design, would be the last option to use 	<p>3. Power-bank: <i>'A nice surprise'</i></p> <p>POSITIVE</p> <ul style="list-style-type: none"> - Seen as solution when no electrical outlet is nearby - Nice to use while watching tv <p>NEGATIVE</p> <ul style="list-style-type: none"> - Two hands needed to take the power-bank out of the station - Would only use the power-bank on the same floor 	<p>5. Light element: <i>'Light compliment the design'</i></p> <p>POSITIVE</p> <ul style="list-style-type: none"> - Necessary element to know the phone is charging - Nice decorative effect - Seen as an addition, not as an atmosphere element itself
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Another element tested was the location participants felt the prototype should fit in a home. The living room was mostly chosen for which it was intended. This test was important because potential customers of MANU did not always recognize where to place a product of MANU in their home.

Important aspects to take from this test:

- The design is seen as fit to the MANU portfolio
- The positioning of the phone described as effortless
- Tray-side came out as a disappointment
- Power-bank received as an indispensable element
- Light element is seen as practical and essential to the design
- Possibility to charge one other device by USB on the charging station



9.5 CHANGE OF CONCEPT

Overall the prototype was received positively during the Contextual inquiry test, the prototype was fitting to the need described and at which the positioning issue was solved. Only the half-tray side came out very negative, it was seen as not user friendly. Participants understood the disconnection idea behind it but would not buy a product to fulfill this need. Which explains the negative feedback on the half-tray side.

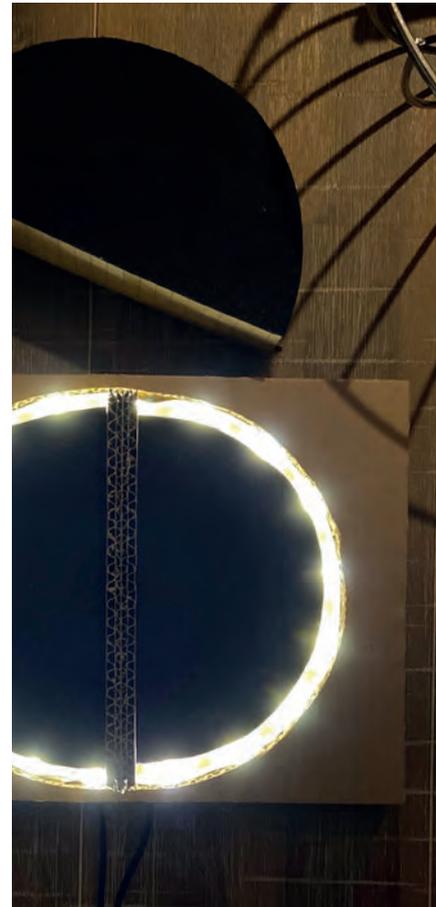
Only this result contradicts the research done on the need for disconnection to the phone. People say they feel the need to disconnect more often, but in reality not feel the need for a product that provides this.

Because disconnection was the main idea behind this concept, the concept needed to be reexamined. This was done by looking at other answers out the Affinity diagram combined with the VPH. Other than that all other needs named in the VPH were fulfilled, only the disconnection element could be left out.

This meant the half-round tray side would need to be replaced in the design. The half-round side was seen as very user-friendly and blended completely with the power-bank in the design. For that reason, the decision was made to almost mirror the half-round side. One half-round circle is a bit

heightened to create a dynamic effect opposite the other half-round side. Also, the mid-shot was lowered to make it easier to take out the power-bank.

After building a new prototype to experience the real dimensions, the participants of the Contextual inquiry test were asked again for their opinion on the prototype. This new prototype was positively received and seen as an improvement compared to the old prototype.



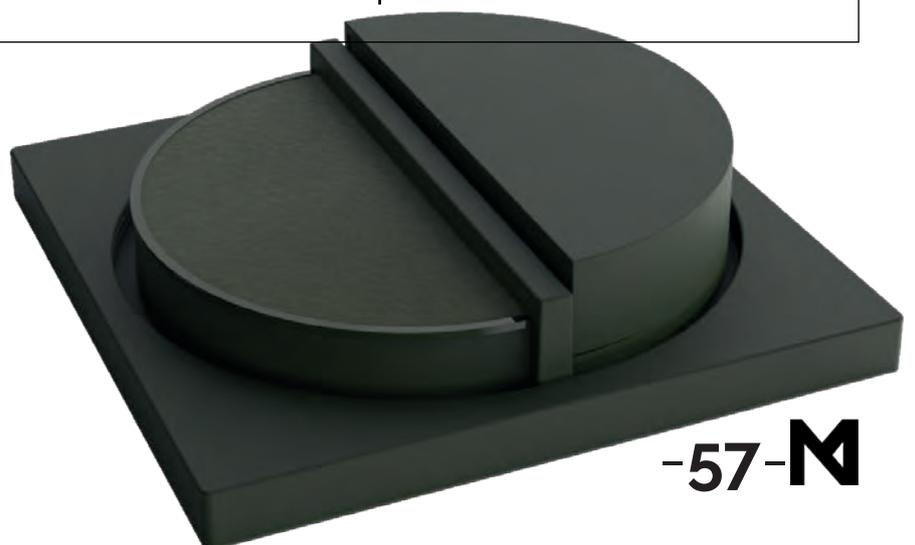
9.6

MATERIALISATION

One important design aspect of the HEMISPHERE concept was to reduce the number of cables in the living room for esthetic but also environmental reasons. Therefore the environment needs to be taken into account in choosing the material to use in the HEMISPHERE concept. In addition, with an eye on the future, possible recycling methods were taken into account. Therefore during the design process it is decided to not use any glue to assemble the charging station.

MANU has planned to produce between 1000 and 5000 units, and the consumer price of the station can not be more than 150 till 200 euros per unit. That is why the production method of inject-molding and the material plastic has been chosen. But because not every plastic is equally environmentally friendly, research has been done on which plastic best to use. As a result Polylactic Acid (PLA), fully biodegradable, and bio-based Polyethylene (Bio-PE), a combination of PE and plant basis were chosen to compare.

Material	Positive	Negative
Polylactic Acid (PLA)	<ul style="list-style-type: none">- Thermoplastic: Suitable for injection molding- Equal characteristics as (PP) and (PE)- Fully compostable	<ul style="list-style-type: none">- New recycling method needed (Therefore today mostly burned and not recycled)- Expansive comparing to other plastics- Low transition temperature (not yet resistant to high temperature)
Bio-based Polyethylene (PE)	<ul style="list-style-type: none">- Thermoplastic: same characters as PE- Suitable for appliances- Fully recyclable (use regular PE recycle methods)	<ul style="list-style-type: none">- After processing, the plant base PE can no longer be separated from the oil-based PE- A bit more expansive compared to oil-based PE

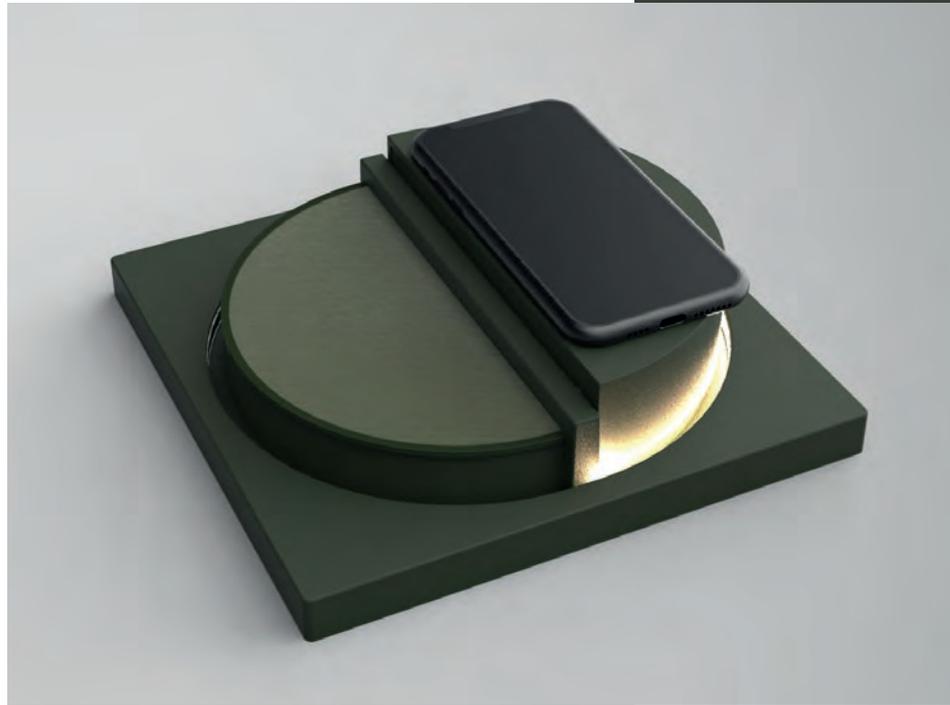


Because PLA is still in development which would make the product more expensive and the recycling possibilities smaller, it has been decided to use PE in the final concept.

Only the top surfaces where the phone will be placed on, needs to have a soft touch. Participants in the Contextual inquiry test were of the opinion the phone should lay on a soft surface so that the phone could not get damaged. The specific material is depending on the remaining budget. The material will be clicked into place and only placed on the station itself, for usage reasons it will not be placed on the power-bank.

The parts that will be purchased are the wireless chargers and power-bank from ZENS, the LED light elements from LEDHOME, these will be clicked into the charger. And the rubber feet on the bottom from BUMPER that will prevent the station from sliding.

The technical drawings of the HEMISPHERE can be found on page 17-24 of the appendix.





9.7 PRICE CALCULATION

HEMISPHERE					
	Description	Number of parts	Material	group	Euro
1	Injecting molding per product	3	Bio-PE	Plastic	€ 11,38
2	Punching	2	/	Production	€ 0,29
3	Assembling costs	1	/	Production	€ 5,00
4	ZENS type: Pu K	2	/	Electronics	€ 14,40
5	ZENS Powerbank	1	/	Electronics	€ 22,29
6	PCB + USB in station (assumption)	1	/	Electronics	€ 3,00
7	Feet	4	Rubber	Feet	€ 0,11
8	Sillicon + LED	2	Silicon	Electronics	€ 0,37
9	Wood screws M3 x 26 mm	4	Staal	Screws	€ 0,19
10	Wood screws Micro Ka M1 x 6 mm	4	RVS	Screws	€ 0,02
11	Top-side material Suedine Zand	2	Textile	Top	€ 0,08
12	USB cable	1	Aluminium hd	Electronics	€ 0,98
13	Box + printing	1	Cardboard	Packaging	€ 1,89

Total: € 60,00

Manufacturing costs		
Number of products		5000
Material costs Bio-PE euro/kg	€	0,46
Injecting molding		
Top station:		Costs per part
Mold costs	€ 12.908,87	€ 2,58
Production costs	€ 5.709,00	€ 1,14
Weight per component in kg	0,14482	€ 0,07
	Sub total costs:	€ 3,79
Total parts needed	1	
	Costs per product	€ 3,79
Sub-total costs injecting molding per product:		€ 11,38
Punching costs		
Top material:		Cost per part
Mold costs	€ 200,00	€ 0,02
First 1.000 parts production costs	€ 75,00	€ 0,08
Second production costs for 9.000	€ 450,00	€ 0,05
	Sub total costs:	€ 0,15
Total parts needed	2	
	Costs per product	€ 0,29
Assemblage costs:		
Assemblinkg costs / h	€ 60,00	
Number of assembles / h	12	
	Costs per product	€ 5,00
Total manufacturing cost:		€ 16,67

Consulted during the calculation: (Press Release, 2018) (ODP, 2020), (Drukland, z.d.)

Bottom station:		Costs per part	
Mold costs	€ 12.379,28	€ 2,48	
Production costs	€ 5.039,94	€ 1,01	
Weight per component in kg	0,12428	€ 0,06	
	Sub total costs:	€ 3,54	
Total parts needed	1		
	Costs per product	€ 3,54	

Click system:		Costs per part	
Mold costs	€ 2.868,21	€ 0,57	
Production costs	€ 2.459,00	€ 0,49	
Weight per component in kg	0,00089	€ 0,00	
	Sub total costs:	€ 1,07	
Total parts needed	2		
	Costs per product	€ 2,13	

Powerbank		Costs per part	
Mold costs	€ 5.621,68	€ 1,12	
Production costs	€ 3.809,00	€ 0,76	
Weight per component in kg	0,07289	€ 0,03	
	Sub total costs:	€ 1,92	
Total parts needed	1		
	Costs per product	€ 1,92	

Consulted during the calculation: (Bumperspecialties, 2020), ("Square Shape 06X06mm Small Size Silicon Bendable LED Flex Neon Sign Tube with SMD1808 2835 Flexible LED Strip for LED Indoor or Outdoor Lighting", z.d.-b), (Electronic, z.d.), (Aliexpress, z.d.), (R2H Marketing & Internet Solutions, z.d.)

Purchase list:							
Name part	Full name	Total number needed	Costs	Purchase costs	Costs per part	Number for product	Total costs per product:
Feet	Cylindrical Flat To	20.000 parts	€ 533,20	€ 533,20	€ 0,03	4	€ 0,11
Bendable LED Flex Neon Tube	Square Shape 06	2.500.000 mm	€ 5.500,00	€ 1.833,33	€ 0,18	2 x 250 mm	€ 0,37
Top-side material station	Suedine Zand	137.254.902 mm²	€ 779,41	€ 389,71	€ 0,04	2	€ 0,08
ZENS charger	ZENS type: Pu K	10.000 parts	€ 72.000,00	€ 72.000,00	€ 7,20	2	€ 14,40
ZENS Powerbank	ZENS Powerbank	5.000 parts	€ 111.450,00	€ 111.450,00	€ 22,29	1	€ 22,29
PCB board in station (assumption)	PCB board in stat	5.000 parts	€ 15.000,00	€ 15.000,00	€ 3,00	1	€ 3,00
Wood screws M3 x 26 mm	Wood screws M3	20.000 parts	€ 2.784,00	€ 928,00	€ 0,05	4	€ 0,19
Wood screw Micro Ka M1 x 6 mm	Wood screw Micro	20.000 parts	€ 318,00	€ 106,00	€ 0,01	4	€ 0,02
USB cable	USB cable	5.000 parts	€ 4.900,00	€ 4.900,00	€ 0,98	1	€ 0,98
Total:							€ 41,43

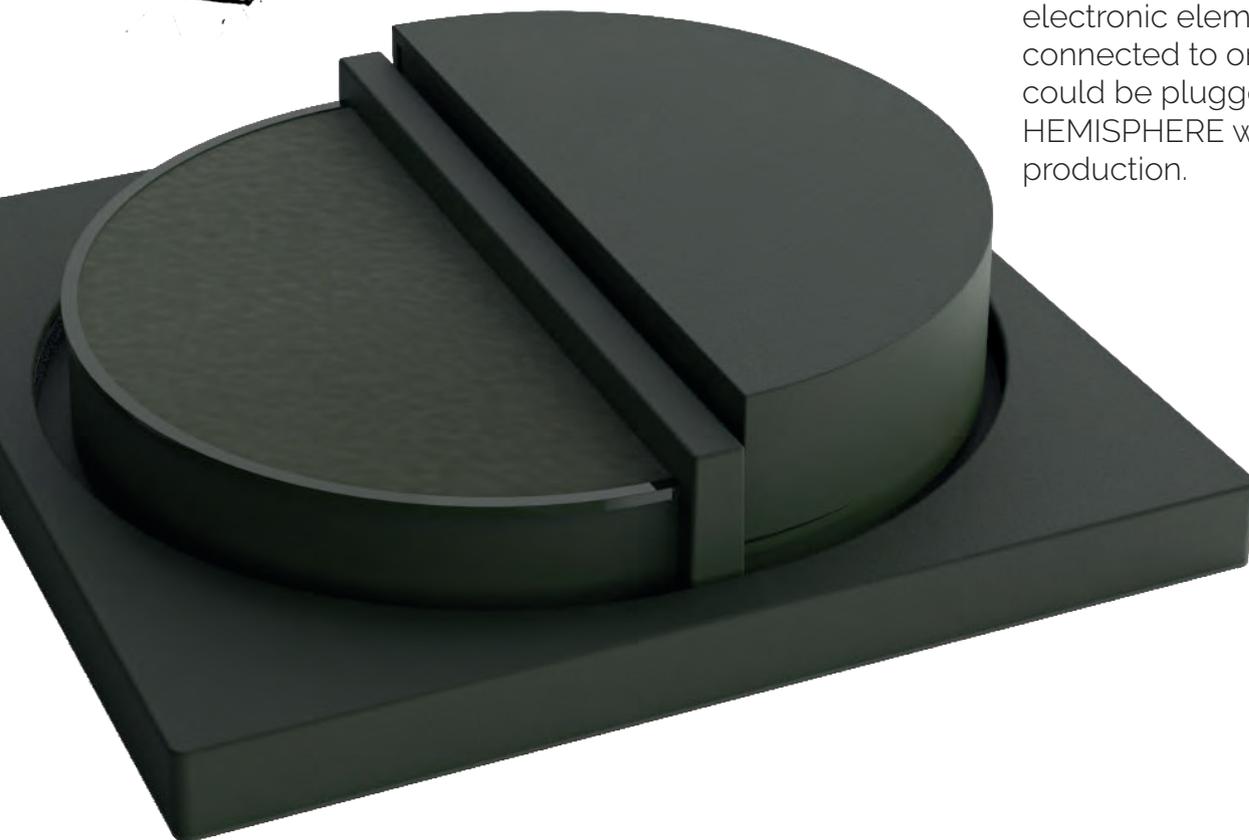
9.6 FUTURE OF THE PRODUCT

The HEMISPHERE concept is designed to be the successor of the QUBE and will be developed further if MANU recognizes its possibilities. Some elements will need to be elaborated further before the concept could be taken into production.

For the finish of the HEMISPHERE surface, there has been chosen to use a surface that requires a 2.5 degrees draft. This is already implemented in the Solid Works 3D model, wherefrom a mold could be designed. Furthermore, the same technology used in the QUBE will be applied in the HEMISPHERE, only one additional wireless charger is added. Also, a new PCB board needs to be designed to connect the two wireless chargers to the LED lights.

The LED light element will need to be programmed to shine when a phone is charging and turn off automatically when the phone is fully charged. The lights will also not shine when the phone is on the station but not connecting to a charger. Otherwise, the light will be off.

Also, a new PCB board needs to be designed for the power-bank. The same goes for the module itself which is used in the QUBE. The dimensions of the current PCB board and module does not fit the new HEMISPHERE power-bank dimensions. Furthermore, a mold needs to be made for the click system, which is used to secure the material on top of the charging station. Finally, all electronic elements need to be connected to one cable that could be plugged in. Then the HEMISPHERE will be ready for production.





10. CONCLUSION

The entire process of the HEMISPHERE project was more than interesting. At the start a lot of research has been done, this created a solid background to build the concepts on. But because MANU was eager to bring something completely new to the market, so at first different technologies were researched.

On the internet, different rumors suggested developments of other technologies for charging devices wirelessly. Thereof Magnetic Induction seemed the most promising technology, it creates freedom of charging your devices without needing to make physical contact. It only turned out different companies tried to develop this technology into a product but failed in succeeding. After a meeting with Rick Dumont, it became clear Magnetic Resonance was not achievable for the electronic consumer market. Thereby MANU has no ambition in developing the technology themselves and was decided to choose the trustworthy standard Qi technology.

By choosing for the Qi standard which means Magnetic Induction technology, the design boundaries changed drastically. Also, consumer needs towards the design concept changed, positioning was the main problem magnetic induction was facing, which was the main problem to solve in the new concept. Also, other consumer needs needed to be taken along like stress and minimalistic trends. This stress is mainly caused by people being connected to their smartphones all the time.

For that reason, disconnection was the most important design aspect in choosing the final concept. To refine the chosen concept to its final design new sketches were made, whereof a prototype was built. To test if this prototype would fulfill the needs of the customer the prototype was tested with potential users by a Contextual inquiry test. The outcome of this test came out as a surprise.

The participants described the prototype as a nice, minimalistic new MANU product which was complemented by the added lighting.

Only the disconnection section was not understood and seen as not userfriendly. This made the concept questionable and it needed to be reexamined. When the disconnection element was not taken along, all other needs seem to be successfully fulfilled. The station is seen as a solution for the living room at which positioning was described as effortless. For that reason, the design was slightly adjusted and a new prototype was built. This new prototype was presented to the participants again and received as an improvement.

Because the HEMISPHERE was designed to be a replacement for cables towards the environment, the choice of the material has to meet this same character. Hereby the decision of using bio-based PE by injecting molding was made. This material is suitable for household appliances and could be recycled through regular methods. Also, no glue will be used to assemble the HEMISPHERE. Only the electronic section of the HEMISPHERE concept will need a bit more development to make it ready for production.

In short, the project has been very interesting whereof a lot of new discoveries were made. The research towards different technologies showed only the Qi technology is far developed enough to be applicable in this concept. Subsequent research on consumer needs showed a contrary between described needs in resources about disconnecting, to experiences of people in real life. Therefore an impactful design change has been made at the last moment, from which the final 3D model is created. To also meet environmental requirements, bio-based PE material and no glue is used to assemble the HEMISPHERE. Nevertheless, will the electronic elements need a bit more development before the HEMISPHERE could be taken into production. But the positioning problem seemed to be solved by the HEMISPHERE and altogether it has become the best version of itself.

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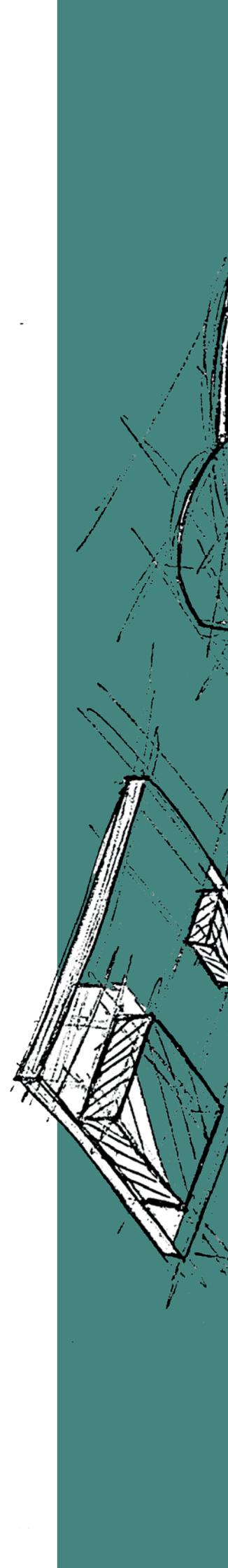
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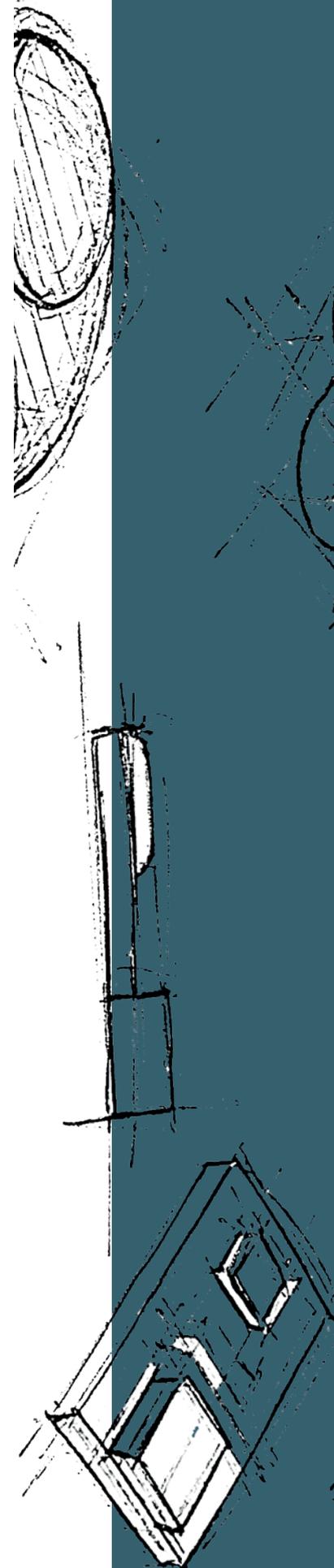
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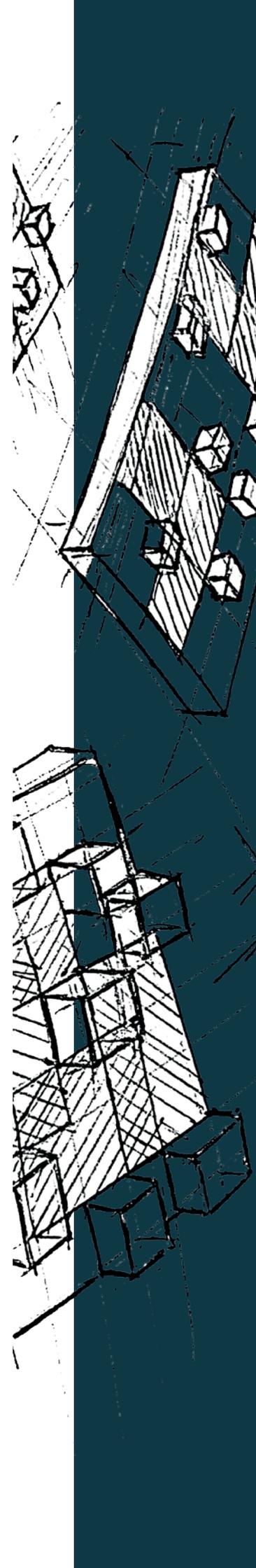
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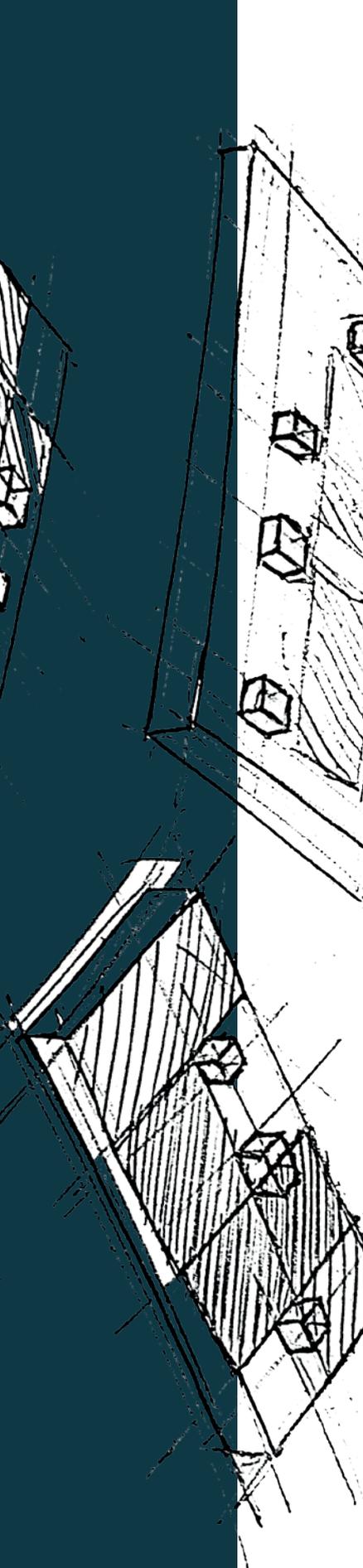
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Issued by the FHTenL Examination Board, September 2017

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