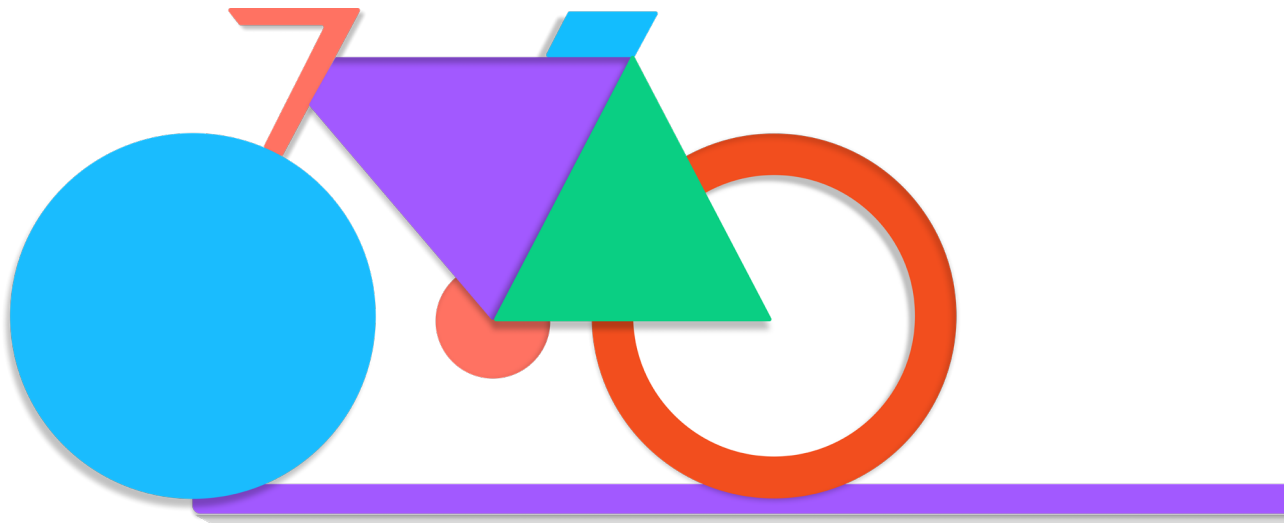
Balancing Autonomy in a Shared World

An Urban Mobility Concept for Cortina in 2035

Master Thesis
Amber van Ginkel
Strategic Product Design
Integrated Product Design
Delft University of Technology



Balancing Autonomy in a Shared World
An Urban Mobility Concept for Cortina in 2035

Faculty of
Industrial Design engineering

TU Delft

Delft University of Technology

May 2023

Master Thesis
Faculty Industrial Design Engineering
Master Integrated Product Design
Master Strategic Product Design

Balancing Autonomy in a Shared World
An Urban Mobility Concept for Cortina in 2035

Author
Amber van Ginkel

Supervisory Team
MSc. J.W. Hoftijzer
Dr. ir. S. Hiemstra-van Mastrigt
A. Veendijk

Project Partner
Kruitbosch Zwolle B.V.

Preface

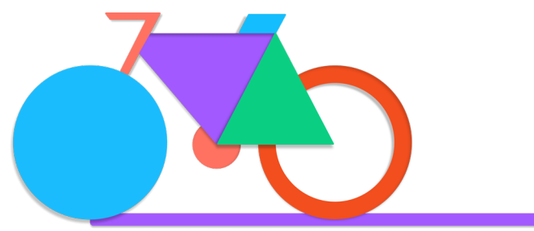
Before you lies my master thesis concluding my double degree in Integrated Product Design and Strategic Product Design at the Faculty of Industrial Design Engineering at the Delft University of Technology.

This has been a great project that taught me about what gives me energy, and where my strengths lie. It simultaneously also showed me what areas of design I did not enjoy, and contrary to past experiences, forced me to embrace this knowledge and accept myself as the designer that I am. During this report I have achieved several goals, both academic and in my personal life, of which I am very proud.

My main learning from this project is how important it is to have a clear vision; whether that is in a project or in life. Knowing where you want to go is crucial for determining your next steps; even literally so regarding mobility. I hope that this report will inspire you in making decisions for our future, and don't forget; embrace your idealism, as the decisions we make today will define our tomorrow.

Amber

Delft, May 2023



Acknowledgments

This project would not have been possible without the help of the following people.

Jan Willem and **Suzanne**, thank you both for your guidance and feedback during the project. You showed me to leave room for feedback and supported me in finding out what sort of designer I want to be, resulting in a different process than expected at the beginning. Thank you for the honesty and flexibility granted to me in the project.

Arif, thank you for our weekly chats, your kindness, and your enthusiasm about my ideas. You supported my decisions and guided me to the right person, source, or solution.

Lucas, thank you for supporting me through the highs and lows of writing my thesis. I could always bounce ideas off of you; just talking often already gave me the structure I needed, so thank you for being that person for six years already.

Everyone at Cortina, thank you for the faith in my project and the enthusiasm for my vision. This motivated me to portray it as the main message of this thesis; the balance between autonomy and sharing.

Everyone I interviewed, thank you for giving me your feedback and honesty. This project contains valuable suggestions from each and every one of you.

Lastly, I would like to thank all the people that joined me in 'het hok' at the IDE faculty while writing our theses. The small office without light seemed like a dull place to spend my days in the beginning, but your presence made it so much fun. I will never forget our many breaks at Coffee Star and not seeing daylight for five days straight.

Executive Summary

This report presents a concept for the Dutch bicycle brand Cortina, providing a micro-mobility solution for urban life in 2035. The report is divided into two phases: 1) Research & Strategy and 2) Conceptualization & Evaluation.

Research & Strategy
The mobility world is changing due to demographic transformations, sustainability challenges, and technological advancements (Lavalle et al., 2019). Consumers and governments seek more sustainable and inclusive mobility solutions that cause less environmental strain, less noise pollution in urban areas, and safer traffic (Vandercasteele et al., 2019). An example of such a solution is the right-to-repair legislation recently implemented by the European Union (Svensson, 2018), requiring manufacturers to design repairable products. The mobility solutions must combine into a coherent platform for convenient and comprehensible communication towards future users through innovations such as Mobility as a Service (MaaS) and mobility hubs. This report proposes a strategy for Cortina to navigate the future mobility world.

The brand Cortina is the second-largest seller of city bikes in the Netherlands (Marktdata, 2017) and is mainly known for its bicycles featuring front carriers. Its heritage originates in catering to underserved market segments, and its brand values are bold, fresh, innovative, and trendy.

A trend analysis about cities, mobility, and cycling in 2035 served as input for constructing a future worldview, described by the disappearance of private possessions and the rise in shared mobility, resulting in a decreased feeling of responsibility and autonomy. The design statement 'enabling people to feel like a part of something bigger without losing autonomy so they can be their authentic selves' was created in response. The statement is reinforced by an analogy describing the envisioned interaction between future user and context, forming the design vision of the graduation project.

The design insights gathered in the discovery stage form a design brief categorized by the pillars of the user-centred design described in the Delft Design Guide (Boeijen et al., 2014); desirability, feasibility, viability and responsibility.

Conceptualization & Evaluation
The Cortina Café concept was selected for further development based on the design brief criteria.

The Cortina Café presents a micro-mobility solution implemented at mobility hubs, serving as a café where travellers can repair their bicycles, buy refreshments, wait on their following form of transport, or meet up with someone else. The café concept is accompanied by the Cortina Endurance bicycle, designed for durability, personalization, transport, and easy repair, capitalizing on the right-to-repair legislation and providing Cortina with a first step towards the project's final vision within its area of expertise.

The strategy created for Cortina leads to the design vision through three stages, as described by a roadmap. The first stage encompasses reinforcement and collaboration, in which Cortina will utilize its strength and design a new bicycle while seeking partnerships with relevant players. The second horizon is expansion and experimentation, in which multiple pilots will test the concept of the Cortina Café while expanding the market of the Cortina Endurance. The third horizon describes integration and disruption, which will be the launch and growth of the Cortina Café. All these activities will eventually lead up to the future vision of 2035: creating an interaction that elicits autonomy, responsibility, trust, and cohesion in the shared mobility world of the future.
The report's final design's value proposition includes autonomy, sustainability, social cohesion, and education. The Cortina Café enables users to be in charge of their mobility products, promotes repair over replacement, and reduces the need for private car usage. The café also serves as an educational platform for repairing bicycles and workshops, promoting the culture of repairing over replacing among younger generations, endorsing Cortina's innovative brand value.

Recommendations entail further research into the concepts' viability, as this depends on the successful implementation of MaaS and mobility hubs in the Netherlands. The development of the Cortina Endurance needs further elaboration to find the optimal balance between modularity and durability.

Conclusion
The result of this graduation project should be treated by Cortina (and other mobility parties) as a visionary project that aims to inspire and guide society to a better future world. Companies must unite and be willing to share data and strategy to realize an integrated MaaS platform centred around users. Mobility players should work towards a joint visionary long-term worldview, as today's decisions will influence society's future.

Glossary

Micro-Mobility
Micro-mobility encompasses all flexible, sustainable, cost-effective and on-demand urban transport solutions aimed at facilitating short-distance travel. Micro-mobility solutions are often lightweight devices or mini-vehicles that operate at speeds under 45 kilometers per hour and are either human-powered or electric. Micro-mobility can be privately owned or shared (Abduljabbar, et al., 2021; Fong, 2019).

Right-to-repair (R2R)
The right-to-repair movement aims to ensure that consumers can repair or modify their own electronic devices, rather than being forced to rely on manufacturer repair services. The European Union is planning to introduce new rules that would require manufacturers to design products that are easier to repair and to provide access to spare parts and repair information. This type of legislation is intended to reduce electronic waste and promote more sustainable consumption patterns. (European Parliamentary Research Service, 2022; Svensson, 2018).

15-Minute City
The 15-minute city concept aims to create walkable and compact communities where residents can access essential services, such as grocery stores, schools, and healthcare facilities, within a 15-minute walk or bike ride (Moreno et al., 2021; Foresight Centre, 2019; Jacobs, 2021).

Mobility as a Service (MaaS)
Mobility as a Service (MaaS) is a framework for delivering a portfolio of multi-modal mobility services that places the user at the centre of the offer. MaaS is an integrated transport service brokered by an integrator through a digital platform. A digital platform provides information, booking, ticketing, payment and feedback that improves the travel experience. The MaaS framework can operate at any spatial scale (i.e., urban or regional or global) and cover any combination of multi-modal and non-transport-related multi-service offerings, including the private car and parking, whether subsidised or not by the public sector (Hensher et al, 2021; Expósito-Izquierdo et al., 2017).

Reader’s Guide

Process Structure
Due to the broad scope of the project the process was split up in two phases: 1) a Research & Strategy phase and 2) a Conceptualization & Evaluation phase. These phases are based on the four diverging and converging stages of design (Discover, Define, Develop, and Deliver) as described in the Double Diamond design method developed by the British Design Council in 2005 (Design Council, 2019). A visualization of the process and structure of this report can be seen in Figure A. Although the visual suggests that the project was a linear process, the reality was that it was highly iterative.

Report Structure
The Research & Strategy phase is geared towards developing a vision and a design brief to serve as input for the second phase. The Conceptualization & Evaluation phase starts with a synthesis of previous findings and continues with the development of a design context, concept, and a final design that will be evaluated. At the beginning of each chapter its purpose and relevance to the project will be explained.

In the Research and Strategy phase every (sub)chapter will be concluded with:

A Conclusion denoted by:

Design Implications denoted by:

The Design Implications discuss how the insights gathered in the previous chapter influence the further process and the design. All Design Implications generated in the Research and Strategy phase are used as input for the Design Brief.
Subchapter 1.4. Process & Methodology contains a more elaborated explanation of the design process and description of all phases individually.

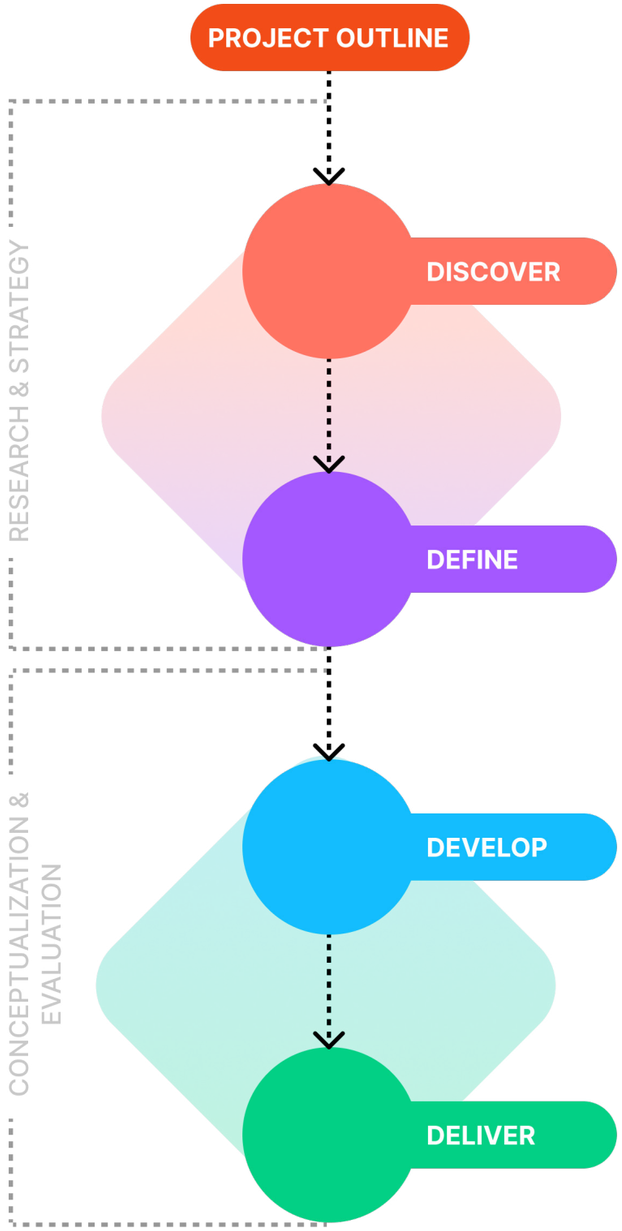


Table of Contents

1. Project Outline **14**
1.1 Partners 15
1.2 Assignment 16
1.3 Problem Definition 17
1.4 Process & Methodology 19

DISCOVER
2. The Mobility Evolution **23**
2.1 New View on Mobility 24
2.2 Changing Population & Lifestyle 26
2.3 Sustainability 28
2.4 Mobility as a Service (MaaS) 29
2.5 Mobility Hubs 33
2.6 Electrification 37
2.7 Digitalisation 39
2.8 Right to Repair 41
2.9 Conclusion & Design Implications 42

3. The Brand Cortina **45**
3.1 The History of Cortina 46
3.2 Product Portfolio 49
3.3 Target Market 52
3.4 Competitor Analysis 55
3.5 SWOT Analysis 59
3.6 The Brand Identity Prism 63
3.7 Conclusion & Design Implications 69

DEFINE
4. Future Frame Analysis & Vision **73**
4.1 Deconstruction 74
4.2 The Future Context 78
4.3 Statement 87
4.4 Analogy & Product Qualities 89
4.5 Conclusion & Design Implications 94

5. Synthesis & Design Brief **96**
5.1 Brainstorm & Brainwriting 97
5.2 Design Direction 100
5.3 Design Brief 104
5.4 Conclusion 106

DEVELOP
6. Conceptualization **109**
6.1 Ideation 110
6.2 Concept Development 112
6.3 Concept Choice 119
6.4 Conclusion 121

7. Elaboration & Development **122**
7.1 Development Approach 123
7.2 Stakeholder Analysis 125
7.3 Target Group & Target Area 129
7.4 Viability 136
7.5 Competitor Analysis 144
7.6 Vision 146
7.7 Repair Bike 148
7.8 Cortina Café Design 156
7.9 Conclusion 164

DELIVER
8. Final Design **167**
8.1 Interviews 168
8.2 Design Implications 171
8.3 Final Design Cortina Endurance 174
8.4 Final Design Cortina Café 182
8.5 Roadmap 190

9. Evaluation & Recommendations **197**
9.1 Evaluation 198
9.2 Recommendations 202
9.3 Discussion 204
9.4 Concluding Remarks 207

10. References **210**

1. Project Outline

The European Commission has predicted that the population in Europe's urban areas will increase in the coming decennia (Lavalle et al., 2019) and that the average age of its citizens will rise. By 2070, life expectancy in the EU will have risen from 80.4 (Eurostat, 2023) to 88.2 years (Vandecasteele et al., 2019), meaning cities must adjust their services and infrastructure to facilitate the aging population in the coming years.

The European Commission has defined eight significant challenges for the European urban future; affordable housing, mobility, provision of services, aging, urban health, social segregation, environmental footprint, and climate action (Vandecasteele et al., 2019). This graduation project will address the proposed challenges (with a focus on mobility) as an opportunity for the bicycle brand Cortina to stay relevant and solve mobility issues in the future city of 2035.

This chapter aims to introduce the partners and the assignment for the graduation project, followed by a detailed problem definition and a description of the problem-solving process.

1.1 Partners
1.2 Assignment
1.3 Problem Definition
1.4 Process & Methodology

1.1 Partners

The partners involved in the graduation project are the bicycle brand Cortina and Delft University of Technology.

Cortina
Cortina is a Dutch bicycle brand owned by Kruitbosch Zwolle B.V. The brand has become the second-biggest seller of city bikes in the Netherlands over the course of 15 years (Van der Wal, 2018). It has a widespread network of over 800 vendors throughout the Netherlands that supply customer service locally. Cortina facilitates the graduation project and provides the graduate student with the equipment and knowledge needed.

TU Delft
The graduation project is conducted by a student from Delft University of Technology (TU Delft) as a thesis for the double degree Strategic Product Design and Integrated Product Design. A chair and mentor provided by the university guide and assess the project. TU Delft is responsible for grading the result according to the academic guidelines.

1.2 Assignment

The graduation project aims to develop a micro-mobility concept (see Glossary) for the brand Cortina catered to people's daily lives in 2035 in Western European cities. Cortina has expressed the ambition to expand their operation to the Western European market, hence the choice for this target market. The vision derived must enable Cortina to stand out from its competitors while adhering to future company goals, which means that the design must be in line with Cortina's brand identity and Kruitbosch's sustainability goals. The latter is characterized by Kruitbosch's signing of the Cycling Industry Climate Commitment in 2021, a global initiative to make the industry more sustainable by improving the supply chain, improving the longevity of products, and thinking about end-of-life solutions.

1.3 Problem Definition

In order to define and understand the assignment provided by Cortina, the methodology for problem definition created by Roozenburg and Eekels (1995) is used. This method poses five questions to define the task and the knowledge needed to complete it.

What is the problem?

Cortina wants to be a relevant brand in the Western European city lifestyle in 2035, as it predicts that mobility will undergo many changes in the coming decade. How can the brand navigate these changes to stay ahead of its competition? To answer this question, Cortina wants to devise a strategy and visionary concept for inspiration and marketing.

Who has the problem?

The one having the problem is Kruitbosch: Cortina's brand owner. Kruitbosch wants Cortina to be a key player in the rapidly changing mobility market and expand to Western European countries on top of the Netherlands and Germany.

What are the goals?

The project aims to design a strategy for Cortina that will ensure its relevance in cities in 2035. Accompanying this strategy will be a visionary concept for inspiration and marketing purposes. In order to achieve this goal and determine what a successful micro-mobility concept will entail, a list of design specifications will be constructed. According to the Delft Design Guide (Boeijen et al., 2014), a Design Specification consists of several requirements a designer must meet to make the project successful. Jan Buijs also emphasizes the importance of a design brief in his Product Innovation Process (Buijs, 2003), describing a product innovation process as a learning process and constructing a design brief as a second step. In other work from Buijs, formulating a design brief is described as creating the design goal of a project (Buijs & Valkenburg, 2000).

What are the avoidable side effects?

Micro-mobility concepts need resources for their manufacturing. The concept may need a form of fuel. Potential negative side effects regarding depleting resources must be considered considering Cortina's sustainable brand goal. Other avoidable side effects of the micro-mobility concept can negatively affect traffic, city space, or public health.

Which ways of action are available in the beginning?

The graduation project's goal is to design a micro-mobility concept for Cortina. In order to determine what qualities this design must have, a design brief must be

constructed, consisting of requirements and insights regarding the design (Boeijen et al., 2015). To create the brief, a thorough analysis must be done about the future context and Cortina's brand identity. The design brief can measure how well the design is evolving during its creation, and at the end of the project, it is used to judge the concept's success.

In conclusion, the graduation project is divided into two parts: 1) Research & Strategy and 2) Conceptualization & Evaluation. The first part will focus on creating a design brief based on a Cortina brand analysis and a future analysis about mobility, describing the project's design goal as described by Buijs and Valkenburg (2003). The design part will construct a micro-mobility concept based on the design specifications derived from the research phase.

1.4 Process & Methodology

As the problem definition chapter concluded, the graduation project contains two phases (Research & Strategy and Conceptualization & Evaluation), with the Design Brief as the midpoint (see Figure 1.1). The two phases contain a diverging stage (exploring) and a converging stage (synthesizing). These four stages (discover, define, develop, and deliver) stem from the Double Diamond Method developed by the British Design Council in 2005 (Design Council, 2019). The double diamond method is a classic design approach that suits the project perfectly since it clearly distinguishes a research phase (discover and define) and a designing phase (develop and deliver).

Additionally, the Vision in Product (ViP) method by Paul Hekkert (2016) is used in the first three stages of the project because the project is catered to 2035, meaning that the context in which it will operate is still being determined. The VIP method considers designing for an unknown context as it lets the designer construct a future worldview through context factors. It also focuses on designing an ideal interaction between the user and product and emphasizes conscious decision-making towards a particular worldview.

Research & Strategy Phase

In order to determine what developments will occur in the domain of cities, mobility, and cycling up to 2035, extensive literature research into these topics is carried out. The Vision in Product Design method by Paul Hekkert (2016) deconstructs the original bicycle design and finds what assumptions and underlying meanings might have taken part in creating the bike. A brand analysis determines what the micro-mobility concept will need to adhere to Cortina's identity.

Using ViP, a future worldview is created using context factors found during the trend analysis. This worldview will lead to a statement and analogy, which together form the vision of the graduation project. Product qualities follow from the analogy to serve as input for the ideation phase.

Buijs and Valkenburg (2000) describe formulating a Design Brief as creating a design goal. A list of design requirements will help determine if the project is (becoming) a success (Boeijen et al., 2014). All insights and takeaways gathered during the Research & Strategy phase will be collected in the Design Brief, marking the end of the first half of the graduation project.

Conceptualization & Evaluation Phase
After the construction of the Design Brief, the Conceptualization & Evaluation phase will begin with a synthesis of previous chapters. From here, ideation will follow, out of which concepts will stem. The most promising concept is chosen to develop during the detailing phase following the requirements from the Design Brief. Insights from stakeholder interviews serve as input for a last iteration round resulting in the final design. The final design will be evaluated with a stakeholder questionnaire, resulting in recommendations for the future.

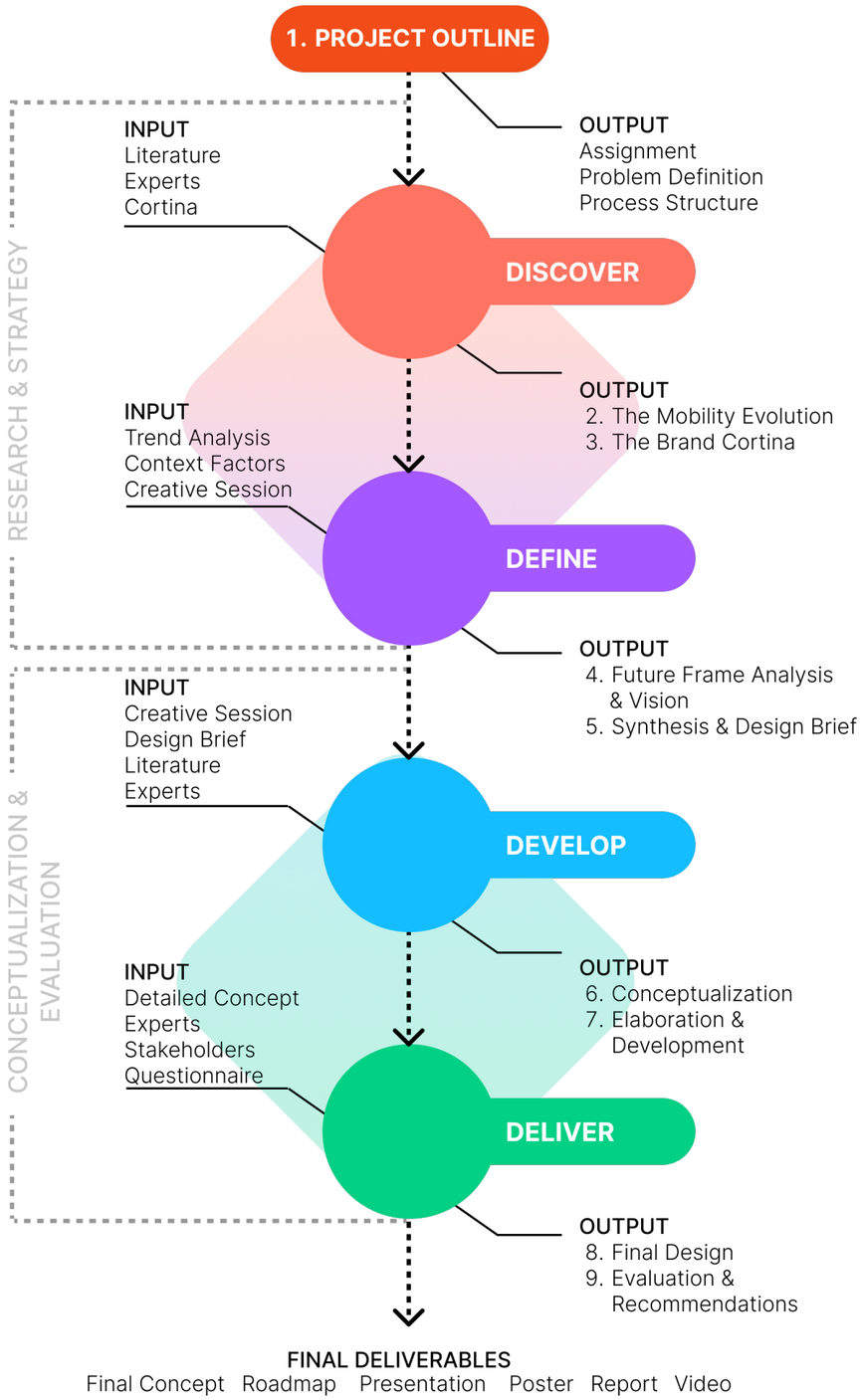


Figure 1.1: Project Outline

DISCOVER

2. The Mobility Evolution
3. The Brand Cortina

2. The Mobility Evolution

In order to design for a future context, knowledge about that future needs to be collected. Therefore, this chapter describes literature research on mobility, urbanization, and cycling in Western Europe in 2035. The findings of these analyses will serve as input for the Design Brief and for the generation of context factors that will be needed to generate a worldview later in the process. See Appendix A for a detailed description of the criteria for the literature research in this chapter.

Mobility has changed more in the last hundred years than during the rest of human history. During the twentieth century, humankind has known the widespread implementation of cars, resulting in an infrastructure catered to private vehicles and efficient transport (Schipper, 2008). As a result, many European cities nowadays suffer from pollution, congestion, and a lack of green- and recreational space (Gössling, 2020), (Vandercasteele et al., 2019). Alternatives to cars are entering the market quickly in the form of e-bikes, subscription models, and shared mobility. Cities and governments recognize that alternative transport solutions are needed but also suffer the consequences resulting from misusing shared vehicles or fast mobility concepts in bike lanes. Accompanied by the increase of companies offering new modes of transport, the world's view of mobility is changing. This chapter will highlight the trends founds during literature research regarding future mobility, urban life, and cycling in Western Europe.

2.1 New View on Mobility
2.2 Changing Population and Lifestyle
2.3 Sustainability
2.4 Mobility as a Service (MaaS)
2.5 Mobility Hubs
2.6 Electrification
2.7 Digitization
2.8 Right 2 Repair
2.9 Conclusion & Design Implications

2.1 New View on Mobility

An overarching result of many changes in several domains described later in this chapter is a predicted new view on mobility. Mulley & Kronsell (2018) and Brömmelstroet et al. (2022) foresee mobility becoming a fair and shareable consumption good instead of a purchasable utility in 2035. Foresight Centre (2021) argues that the prominence of private cars must be reduced, and shared mobility models will become necessary, including sustainable vehicle sharing solutions (Vandecasteele et al., 2019; Duran-Rodas et al., 2020). An example of a company providing such a vehicle sharing solution is Felyx. This scooter-sharing platform positions a fleet of vehicles in a city for everyone to use via a mobile app.

In the future, remote working and new convictions about infrastructure will challenge the necessity of travelling daily. Mobility as unnecessity (also called low mobility) caters to the idea of proximity and stillness and argues that we should design living spaces that limit the need for mobility (Brömmelstroet et al., 2022). Several concepts are often mentioned in the literature to achieve such living spaces.

15-minute city

The concept of the 15-minute city is gaining popularity (Foresight Centre, 2019), which aims to create walkable and compact communities where residents can access essential services, such as grocery stores, schools, and healthcare facilities, within a 15-minute walk or bike ride (Jacobs, 2021). The 15-minute city can decrease overall mobility and improve transportation sustainability by reducing the need for long-distance travel. To achieve this, the government needs to plan and design cities to prioritise walkability and bikeability and provide access to a range of services and amenities within a compact area (Jacobs, 2021). Public transportation, bike-sharing, and car-sharing can also complement the concept, allowing residents to access services and amenities beyond a 15-minute radius without the need to own a car or rely on it. The concept is already used nowadays for urban planning and is gaining popularity. Pozoukidou & Angelidou (2022) anticipate that insights from this 15-minute concept will be helpful to planners and policymakers.

Public Transport

Public transport is becoming more recognised as an essential part of the mobility network in cities. Because of this recognition, the necessity due to population growth, and improving technologies, public transport is expected to improve during the coming years (Bouton et al., 2022; Vandecasteele et al., 2019). Foresight Centre (2021) predicts that future public transport will be a flexible service based on data and demand.

Micro-Mobility

A current trend in the mobility landscape is the pursuit of more minor and more flexible modes of transport impacting sustainability (Mulley & Kronsell, 2018). Micro-mobility offers comprehensive solutions to current transport options, and Fong (2019) expects the market share to expand over the coming years.

Figure 2.1: Felyx Scooters (Gemeente Barendrecht, 2020)

2.2 Changing Population & Lifestyle

The new view on mobility is partially caused by a changing European population and its lifestyle as described in this chapter.

Population

It is not only expected that the population in Europe's urban areas will grow (Lavalle et al., 2019) but also that this population will become older on average. By 2070, life expectancy in the EU will have risen to 88.2 years (Vandecasteele et al., 2019), meaning that the coming years will force cities to adjust their services, such as health care and infrastructure. Cities are also expected to have a more diverse population as remote working enables people worldwide to work where they want to. Foresight Centre (2019) and Tijssen & Kruitbosch B.V. (2022) expect young people in 2035 to be more environmentally conscious and demand sustainable services. Due to the diversification of the population, the need for inclusive mobility expands. Every mobility user in the future will be different (Foresight Centre, 2021). Mobility has the potential for social interaction, reclaiming the street as a public space (Brömmelstroet et al., 2022).

Lifestyle

How people live their lives is changing. The nine-to-five mentality is no longer regarded as the standard practice. More and more companies are implementing flexible work hours, reducing the strain on traffic during peak hours (Vandecasteele et al., 2019). People value a healthy balance between work and private life (Tijssen & Kruitbosch B.V., 2022). Remote working, propelled by the COVID-19 pandemic and digitalization, decreases traffic and allows workers to live far from work, which has never happened before. Companies can attract talent from all over the globe because of remote work (Foresight Centre, 2019). Consumers want convenience (Tijssen & Kruitbosch B.V., 2022) and expect on-demand services that reduce the time spent on things they do not enjoy, increasing equality, omitting gender norms and moving away from a 'traditional' view of gender.

Current trends show that the popularity of women's bicycles is increasing among men. Erik de Geus (financial director of Dynamo Retail Group) has said the following: "Two out of three bikes sold are women's models, which is caused by more men purchasing women's models. Convenience plays a part in that decision" (NOS, 2017). However, it is still being determined whether the total amount of bicycle sales is divided equally between men and women, so a part of the overrepresentation of women's bicycle sales might be attributed to the fact that women cycle more. This is confirmed by data from Centraal Bureau voor de Statistiek (CBS) (2020) that shows that women travel by bike 17% more often than men. Cortina sold 29.100 women's and 17.000 men's city bikes in 2021 (Netherlands Panelmarket, 2022), endorsing this trend.

Lifestyle changes will lead to changes in mobility needs. People in urban areas will grow older, but their transport needs will increase. The number of young people owning a driver's license will decline in the coming years (Foresight Centre, 2021), resulting in a decreased demand for traditional vehicles and fewer parking spaces needed (Fong, 2019). The future customer wants sustainable convenience regarding mobility and other services (Tijssen & Kruitbosch B.V., 2022; Fong, 2019). In the meantime, the world's population will face a rising obesity pandemic due to a lack of physical activity (Foresight Centre, 2021).

City Planning

There are better solutions than a private vehicle for everyone regarding mobility. Following this insight is the recognition that mobility must be inclusive and cater to different needs. Citizens in the future will co-create mobility strategies with policymakers, and cities will act as innovation hubs due to their proximity to stakeholders and easy interaction (Vandecasteele et al., 2019). Government has to implement regulations to promote inclusivity if it is not profitable for companies providing mobility (Mulley & Kronsell, 2018). Governments recognize the environmental and spatial issues regarding private cars and will regulate their use in cities (as some are already doing). It is expected that urban governance will become more powerful in Europe, with cities acting as co-created innovation hubs (Vandecasteele et al., 2019). Policy-making will also be necessary to ensure inclusivity in new mobility models (Mulley & Kronsell, 2018). An important note is that governments must find a new way to tax mobility since their significant income (from fuel) will thin out (Bouton et al., 2022).

Future urban mobility is shared, autonomous, and electric (Miskolczi et al., 2021). Vehicle sharing will become popular and reduce the need for parking spots and reduce congestion (Vandecasteele et al., 2019). Infrastructure in the future will favour shared transit and bicycling (Bouton et al., 2022), allowing for a different approach to city planning. City planning in the future will consider consumer-friendly mobility scenarios (Bouton et al., 2022) and is data-driven (Fong, 2019). Better technology will connect citizens, improving public services and public transport.

2.3 Sustainability

Sustainability demands are one of the crucial drivers of the world's changing approach to mobility (Foresight Centre, 2019). Tijssen & Kruitbosch B.V. (2022) explained in a private trend lecture that our planet has finite resources, as the current chip shortage and gas prices confirm. There is no denying that these resources are depleting, and humanity has to find alternatives to keep up our living standards. As described in the previous subchapter, almost one in three European cities will see their population increase by more than 10% in the next 30 years, resulting in more traffic and the use of public transportation (Vandecasteele et al., 2019). Currently, roads and parking spaces take up as much as 50% of city space, while private cars are only driven 2.5 times per day on average in Europe (Foresight Centre, 2021). Cars pollute the air with carbon emissions (Figure 2.2), aid in city traffic congestion, reduce space for other mobility solutions or greenery and cause traffic incidents. (Miskolczi et al., 2021). This has led to governments and citizens wanting to reduce carbon emissions and congestion, resulting in cities making policies that decrease the use of private vehicles in urban areas, and fewer people will get a driver's license and instead opt for a greener way of transport in the coming years according to Fong (2019.

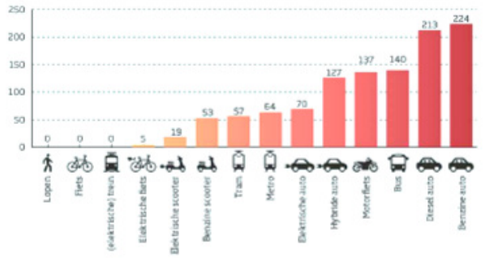


Figure 2.2: CO2 emission per km travellled (in grams) from one person (Natuur & Milieu, 2020)

Suppose nothing changes about the way we travel. In that case, expanding our population combined with private vehicles as the primary mode of transport will lead to a worse environment, decreased mobility satisfaction due to congestion, and even the obsolescence of vehicles due to a shortage of resources (Miskolczi et al., 2021). Recognizing all these problems leads to one overarching trend for our cities and mobility: We need to change how humanity sustainably employs its resources. A sustainable solution is 'zero-emission' mobility, such as walking and cycling. 'Zero-emission' mobility does not pollute the environment, making it a sustainable alternative to combustion vehicles. Walking and cycling are expected to provide important alternative transport (Vandecasteele et al., 2019) or complement transport (Rérat, 2021), simultaneously providing a solution for the obesity pandemic mentioned in the previous subchapter as well (Foresight Centre,

2.4 Mobility as a Service (MaaS)

Mobility as a Service (MaaS) has gained significant attention in recent years as a potential solution to modern transportation systems' challenges. The idea behind MaaS is to integrate various forms of transportation, such as public transit, ride-hailing, bike-sharing, and carsharing, into a single platform that can be accessed through a smartphone app or website. Although scientific research uses different definitions of MaaS, the one given by Hensher et al. (2021) offers a comprehensive explanation based on substantial literature surveyed by Hensher et al. (2020). See the Glossary for the full definition.

This subchapter describes different facets of MaaS and the (dis-) advantages of its role in the urban landscape in 2035.

Potential

As discussed previously in this chapter, the increasing demand for more efficient and sustainable transportation options is a major factor in the relevance of Mobility as a Service (MaaS) in the mobility landscape of 2035. MaaS can reduce the number of cars on the road, decrease traffic congestion, and improve air quality (European Commission, 2016; Hensher et al., 2020). Additionally, it can increase the use of public transit, decrease the need for private car ownership, and lower transportation costs for individuals (European Commission, 2016). Advances in technology, such as IoT and 5G networks, will allow for integrating various transportation systems and collecting large amounts of data to optimise transportation services (World Economic Forum, 2021; Fenton et al., 2021). MaaS can use these technological advancements to provide users with a seamless experience and improve the overall efficiency of transportation systems.

Downsides

While shared mobility options offer many opportunities and benefits, they also pose risks to road capacity, traffic congestion, and land use if not properly regulated and controlled. Research has shown that carshare members generally increase their overall use of public transport upon joining a MaaS concept (Martin & Shaheen, 2011). With the increased accessibility of mobility services comes the risk of increased mobility use.

Recent developments in transportation solutions and mobility services have proliferated in urban areas but often need more consideration for their impact on ur-

ban mobility systems or collaboration with existing infrastructure (Deloitte, 2020). As a result, cities have seen increased pollution from free-floating vehicles, increased congestion, and a decline in public transport and taxi services (Matowicki et al., 2022).

Barriers

Hensher et al. (2021) claim that unless other developments make MaaS more desirable than regular journey planners, such as bundling mobility services with non-mobility utility services to provide a more convenient way to live, MaaS is unlikely to be successful. One major obstacle to the success of MaaS is the need for compatibility between different transportation systems, making it difficult for users to plan and book trips that involve multiple modes of transportation (Kamargianni, 2018).

However, Polydoropoulou, Pagoni, and Tsirimpa (2019) found that stakeholders are motivated to join a MaaS partnership to receive better quality demand data and increase market shares and revenues. APIs and lack of related data are significant technical barriers, but the biggest barrier towards MaaS is people's attachment and reliance on their private cars (Polydoropoulou, Pagoni, and Tsirimpa, 2019; Harms et al., 2018). A survey by Fenton et al. (2021) among relevant MaaS stakeholders in Stockholm identified cooperation and partnerships as essential aspects of MaaS implementation and regulation and institutional aspects as the most significant barriers.

Several studies have shown that partnerships and collaboration are crucial between MaaS developers to ensure public-private partnership, market regulation, and legitimacy (Kanda et al., 2015; Mukhtar-Landgren et al., 2016; Karlsson et al., 2020). Another hurdle for MaaS is the need for significant investment in infrastructure and technology, including developing new platforms and integrating existing transportation systems (European Commission, 2016), which can be a significant challenge for private companies and government agencies. In addition, MaaS also faces regulatory and legal challenges, such as the need to comply with privacy and data protection laws and address issues related to liability and insurance in the event of accidents (European Commission, 2016).

Role of Government

Hensher et al. (2021) argue that to foster a healthy MaaS ecosystem, a so-called MaaS champion must rise, whose leading role would be to influence the development of MaaS to align with societal goals and push for cooperation between mobility suppliers to promote sustainable outcomes. A potential champion could be the government, as they are not profit-oriented and more suitable for promoting sustainability and positive societal outcomes regardless of money. Fenton et al. (2021) analysed survey results of MaaS stakeholders in Stockholm and concluded that the government has an important yet delicate role in facilitating MaaS while suggesting regional or national regulatory solutions in the long term to ensure legitimacy and transparency. For local governments, MaaS may offer opportunities to reduce ownership and use of private cars for passenger transport, easing pressures on urban space, the local environment, and the global climate (Fenton et al., 2021).

The government's role in MaaS seems crucial in ensuring its success. The Dutch government itself has declared that they see a role for themselves as an active mediator to guarantee standardisation, safety, and privacy in MaaS ecosystems (Ministerie van Infrastructuur en Waterstaat, 2021) and is practising with pilot apps regarding MaaS.

Government has a crucial role in providing the necessary infrastructure and technology to support integrating various transportation systems (European Commission, 2016). The government also ensures that data sharing and payment systems are standardised, creating a regulatory framework that supports MaaS development while protecting user rights and addressing legal and regulatory challenges. Fenton et al. (2021) explain that although there is a role for local governments in the development of MaaS, there is also a need for multi-level governance involving other levels of government to define the regulatory system governing MaaS or provide capital for the start-up of services (Aaltonen, 2017).

Potential

A sufficient ecosystem of MaaS players is needed to realize its potential fully. Deloitte (2020) argues that the government has a role in bringing stakeholders together and investing in promising mobility innovations while protecting disadvantaged groups. Matowicki et al. (2022) found that personal opinions about the sharing economy, environmental friendliness, and social influence impact willingness to use MaaS. Additionally, focus group research conducted by KiM (Harms et al., 2018) found that flexibility and autonomy were essential factors for potential MaaS users and that cost, convenience, choice freedom, and customization were potential benefits that could make people choose MaaS over traditional transport options. According to Heineke et al. (2021), convenience is the primary reason for using services such as ride-hailing, with safety, price and reliability as the most important features.

Sochor et al. (2017) identify four levels of MaaS integration, with examples of companies for each level (Figure 2.3). Notably, no companies are present at the fourth and most integrated level of MaaS. Reyes Garcia (2019) states that the list of MaaS providers is short and explains this partly

Figure 2.3: Levels of MaaS integration (Sochor et al., 2017).

The Future of MaaS

The Mobility as a Service (MaaS) market in the Netherlands is fragmented, with no clear dominant supplier (Garcia, 2019). Nonetheless, initiatives are underway to integrate mobility supply and demand on a unified platform. One example is Rivier, a joint venture between NS, HTM, and RET, which seeks to develop a national MaaS strategy by connecting suppliers of shared mobility to user platforms. Other companies with the potential to grow in the MaaS market are 9292, a travel app that slowly includes shared mobility options with a large customer base in the Netherlands, and Gaiyo, a MaaS app with 35.000 users in the Netherlands focused on integrated the private car in the MaaS network (Bassant, 2022).

Interference and guidance from the government is increasing. Dutch Provinces are taking responsibility for the fruition of MaaS. Province Noord-Brabant, for example, writes in their mobility vision for 2035-2050 that they will prepare the province's infrastructure for MaaS and work on an integrated public transport system and MaaS (Provincie Noord-Brabant, 2018). They expect this to come to fruition through so-called 'hubs' (about which is more explained in the next section), where all kinds of mobility connect and overlap, facilitating a seamless experience. The hubs will offer more than just mobility, as citizens can pick up groceries or drink coffee at the location. Seven municipalities in the Netherlands are also participating in MaaS pilots initiated by the government (Ministerie van infrastructuur en waterstaat, 2021). The European Commission is promoting initiatives on EU-wide multimodal journey planners, which are progressing, characterized by government policy and linking with the private sector (Sakai, 2019).

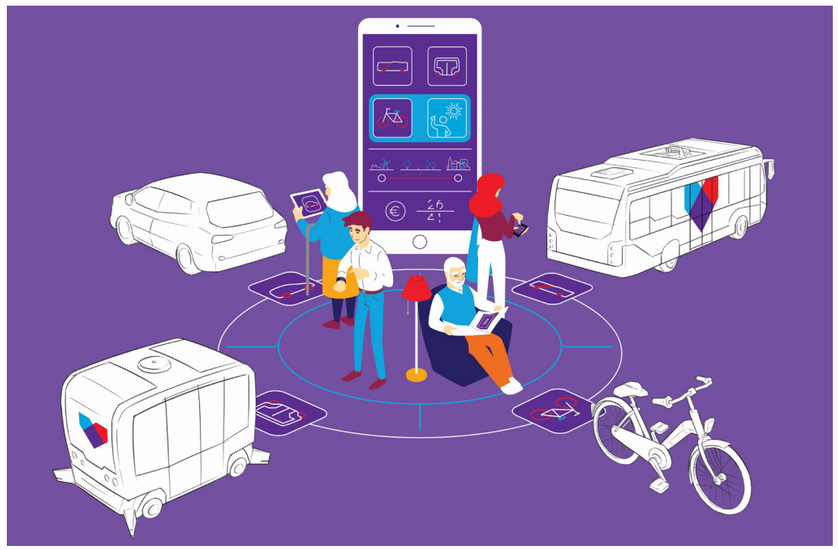


Figure 2.4: Figure about MaaS (Provincie Noord-Brabant, 2018)

2.5 Mobility Hubs

In recent literature, mobility hubs are described as clusters of either new, shared, or electric mobility services available at designated locations where travel demand is high, integrated into conventional public transport services (Anderson et al., 2017; Bell, 2019; Coenegrachts et al, 2021). Many professionals and urban planners internationally suggest using mobility hubs (Anderson et al., 2017; Bell, 2019; Ministerie van Infrastructuur en Waterstaat, 2021) to solve the problem of increasing pressure on urban regions due to the growing population and enhance economic productivity and efficiency. These hubs provide seamless connections between different modes of transportation, making it easier for people to access different parts of a city. Mobility hubs are effective in increasing the use of public transportation and reducing the number of single-occupancy vehicles on the road. Additionally, mobility hubs incorporating features such as bike-sharing stations and real-time transportation information displays increase active transportation modes, such as biking and walking (Litman, 2017).

Weustenenk & Mingardo (2023) argue that a major challenge for creating mobility hubs will be creating uniformity in design, as non-uniformity could endanger the adaptability of mobility hubs as users will not be certain on how to use the hub or what to expect (KiM, 2021). Jorritsma et al. (2021) found that supporting infrastructure in the Netherlands (including hubs) can encourage shared mobility. Different layers of the Dutch government are experimenting with mobility hubs and the role they can play in their fruition.

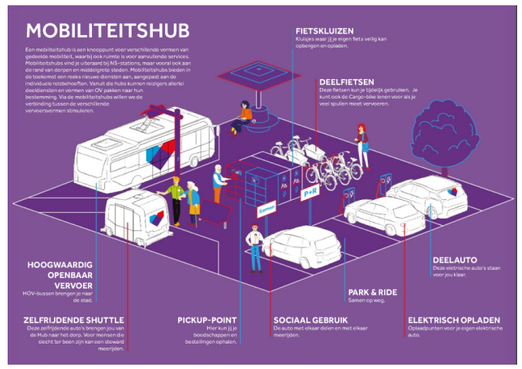


Figure 2.5: Figure showing a mobility hub of the future (Provincie Noord-Brabant, 2018)

Current pilots

Mobility hubs can contribute to various policy goals around liveability, sustainability, attainability, and inclusivity (Kennisinstituut voor Mobiliteitsbeleid, 2021). Municipalities and provinces are experimenting with mobility hubs on various scales. An example can be found in plans for a hub in Haarlem Nieuw-Zuid aimed to serve the expected growth of the traveller

population (Ministerie van Infrastructuur en Waterstaat, Nationale Spoorwegen, Federatie Mobiliteitsbedrijven Nederland, Prorail, GVB, RET, & HTM, 2021). The proposed hub will integrate various transport modes, including train, bus, bike, and car sharing, making it easier and more convenient for travellers to switch between modes. Another example is the Cobercokwartier in Arnhem, where plans for underground parking spaces were replaced by a public mobility hub, resulting in a more pleasant living and meeting space for residents.

Municipalities and provinces in the Netherlands aim to manage the public space and facilitate prosperous living for residents. The benefits of mobility hubs and shared mobility include additional green space, CO_2 reductions, and healthier citizens. Kennisinstituut voor Mobiliteitsbeleid (2021) recommends that municipalities play a directing role in coordinating the different stakeholders in mobility hubs.

In Groningen-Drenthe, there are currently 55 mobility hubs operating, designed from a minimum viable product perspective. Municipalities are experimenting with connecting the hubs to local services such as libraries, kiosks, and package points, enhancing the traveller's experience, making the area around the hub livelier, and enhancing social cohesion. In addition, municipalities make decisions about the execution and upkeep of the hubs, while the provinces and additional investors, such as NS and several EU projects, finance the initial investment. The Smart Mobility Hub near the Johan Cruijff ArenA in Amsterdam will be financed mainly by the municipality itself, together with public and private stakeholders such as transport companies and event organizers looking to turn a profit as soon as the concept is finished. In three other case studies from Kennisinstituut voor Mobiliteitsbeleid (2021), hubs are usually subsidized by regional, national, or EU funds. It is important to establish the profitability of each hub and determine whether the societal benefits outweigh the costs or whether a profit could be made from the hub by, for example, implementing a small fee for certain services.

Most current Dutch hubs are owned by the local government (the ground and physical part) and mobility companies (apps and vehicles). An example of such a hub are eHubs; multimodal hubs offering shared electric mobility, commissioned by a European international cooperation between cities, universities, and shared mobility providers (Interreg, 2019). The plan in the Netherlands is to realize 10-15 small shared electric mobility hubs in Amsterdam between 2019 and 2021 (Gemeente Amsterdam, 2019). Another company working on hubs is Hely, a company with multiple hubs in the Netherlands, owned by PON (the creator of Cortina's competition Gazelle). Hely hubs provide users in Amsterdam, the Hague, Haarlem, Rotterdam, Utrecht, and Delft with (e-)bikes, carrier bikes, and electric cars (BAM infra, 2019; Hely, 2019).

Government

According to Kennisinstituut voor Mobiliteitsbeleid (2021), the national government of the Netherlands plays a significant role in developing sustainable mobility initiatives, including mobility hubs. One of their primary objectives is to adhere to EU regulations and promote a seamless and sustainable mobility network that prioritizes the well-being of citizens. To achieve this, the government can act as a regulator by establishing laws and regulations that create a uniform and easily recognizable design for mobility hubs. In addition, the government can also provide financial support as an investor for larger mobility hub projects and guide provinces and municipalities in the planning and implementation of mobility hubs. The national government has also established several initiatives to encourage sustainable modes of transportation, such as cycling and public transport. One such program is the "Beter Benutten" program, which aims to improve the use of existing infrastructure and stimulate sustainable travel behaviour in urban areas (Ministerie van Infrastructuur en Milieu, 2016). Another initiative is the "Klimaatakkoord," which outlines the government's commitment to reducing CO_2 emissions in the transportation sector by promoting electric vehicles and sustainable modes of transportation (Rijksoverheid, 2019). Through these efforts, the national government is actively promoting the development and adoption of sustainable mobility solutions, including mobility hubs, throughout the country.

Citizens

According to a report by the Kennisinstituut voor Mobiliteitsbeleid (2021), mobility hubs provide multiple benefits to residents. These include a convenient form of mobility, access to additional services such as pick-up points for groceries or deliveries, and meeting spaces. Furthermore, mobility hubs can offer repair services, which enable residents to repair their bicycles or other products sustainably and cost-effectively. A study by the Transportation Research Board (2018) highlights that mobility hubs can also provide affordable transportation options to low-income residents, thus improving their access to jobs and other essential services. Moreover, mobility hubs can enhance social cohesion by creating a space for residents to meet and interact with each other, as noted by a report by the European Cyclists' Federation (2020). Additionally, mobility hubs can offer amenities like charging stations, restrooms, and seating areas, making the travel experience more comfortable and enjoyable. According to a study by the Victoria Transport Policy Institute, mobility hubs can provide a range of benefits to travellers, including improved mobility, reduced travel time, cost savings, increased access to destinations, and improved travel reliability (Litman, 2019). However, the mobility hub needs to strike a balance between serving the needs of travellers and residents, as an over-demand of the hub could result in new congestion problems or nuisances for residents.

It is essential for travellers that transfers are seamless and that their mobility fits their needs. They can benefit from various facilities at the mobility hub, but they mainly want to be supported in their travel style. From a questionnaire among citizens of West Brabant, it became apparent that healthy living, convenience, and the environment were the most important influences when choosing a form of mobility (Provincie Brabant, 2018).

Conclusion

As mentioned before, the implementation of hubs will be an expensive investment that is expected to come from funds from the EU, national government, and local government. Different levels of public and private investors will also provide resources depending on the hub. All owners, however, will benefit from a steady flow of travellers using their services to generate income. Citizens will benefit from hubs through an increased amount of amenities, smoother travel, and enhanced social cohesion.

2.6 Electrification

A current trend in mobility is the electrification of vehicles, such as electric cars and e-bikes. Technological advancements, sustainability demands, and a need for alternative resources cause this development.

Electric Cars

The electric vehicle (EV) is expected to be widespread by 2035 (Vandecasteele et al., 2019) due to policymakers looking to reduce carbon emissions and congestion (Fong, 2019), the decrease in energy prices due to the decentralization of energy systems (Bouton et al., 2022), and electric cars' potential to be used as shared vehicles by MaaS concepts (Miskolczi et al., 2021). Because of rising gas prices, technological improvements, and the need for sustainability, battery prices will decrease (Foresight Centre, 2021), making EVs an even more attractive solution to depleting fossil fuel, especially combined with shared mobility solutions and public transport (Miskolczi et al., 2021). However, electric cars still occupy considerably more space than micro-mobility solutions and cause congestion.

Electric bicycles

Electric bicycles have been gaining popularity since their first introduction to the market, and their presence on Dutch bike lanes is evident. Many bicycle brands recognize their popularity. For example, bicycle brand Sparta has seized to produce non-electric bikes. New brands in the bicycle market often only cater to the e-bike segment, such as VanMoof, Cowboy and MokuMono (see Chapter 3.4 Competitor Analysis). Cortina's product portfolio consists of more than half electric bicycles as well.

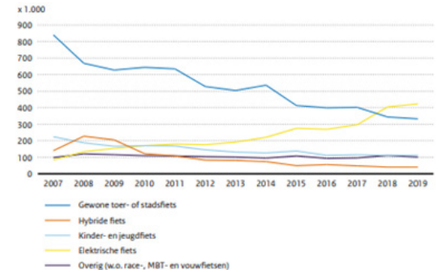


Figure 2.6: Amount of bicycles sold categorized by type of bicycle (RAI/BOVAG/GfK, 2020)

Figure 2.6 shows the bicycle sales numbers from 2007 to 2019 (RAI/BOVAG/GfK, 2020), showing the increasing popularity of electric bicycles. BOVAG (2020) also reported an increase in electric bicycle sales of 38% in May 2020 compared to the same month in 2019. The Dutch Kennisinstituut voor Mobiliteitsbeleid predicts that the use of e-bikes in 2024 will have increased by 122% compared to 2019 (de Haas & Huang, 2022).

According to de Haas & Huang (2022), the most important reason mentioned by e-bike owners for the purchase of an electric bicycle is faster transport while putting in less effort. Around 40% of

e-bikes owners bought an e-bike for their physical health, and 28% for their mental health. Among people who did not own an electric bicycle, 39% mentioned that they would consider an e-bike because of its faster transportation with less effort, 23% would buy an e-bike to reduce car use, and 22% would purchase one to travel to work. As described by de Haas & Huang (2022), the most significant barrier to purchasing an e-bike is the price (40% of owners and 61% of non-owners mentioned the price as the biggest barrier). The second and third biggest reasons to not buy an e-bike are that people have a standard functioning bike (38%) or assume regular biking is better for their health (37%).

Global trend research about the electric bicycle by Salmeron-Manzano & Manzano-Agugliaro (2018) shows that the popularity of the e-bike is increasing and that it should be considered a means of sustainable urban transport and contribute to energy saving and sustainable energy.

Considering the expected obesity pandemic mentioned in previous sections (Foresight Centre, 2021), it can be argued whether the rise of e-bikes benefits the population's overall health. When providing an alternative to a private car, the e-bike will increase movement, but when purchased instead of a regular bicycle, the amount of movement will decrease. Therefore, the e-bikes' influence on the public's health depends on what it serves as an alternative.

Alternative fuels

Apart from developing electric vehicles, various initiatives are being undertaken in Europe to introduce 100.000 hydrogen-powered vehicles and 250 charging stations by 2025. This alternative to combustion engines might play an important role in reducing the environmental impact of transport. However, the attitude towards mobility and sustainable alternatives must change to make hydrogen successful (Turoń, 2020).

As mentioned in a previous section, the most sustainable ‘alternative’ fuel for the future is human-powered or ‘zero-emission’ mobility, such as walking and cycling (Rérat, 2021), simultaneously contributing to the population’s overall health.

2.7 Digitalisation

The rise of the internet and smartphone has significantly changed how we live today, including how we use mobility. Further developments regarding Artificial Intelligence (AI), data collecting, and the Internet of Things might mean even more changes to how society offers mobility.

Mulley & Kronsell (2018) argue that the relationship between customers and transport providers will change as customers become more empowered because of digitalisation, and they can quickly source their preferred method of mobility among competitors. Digitalisation enables data collection about citizens' travel behaviour, allowing algorithms to optimise mobility services and provide flexible, demand-based services through integrated mobility platforms (Foresight Centre, 2019; Bouton et al., 2022). Automation can realise smart mobility, where automated and electric vehicles go hand in hand with public transport, which is beneficial to lessen congestion and better the environment (Miskolczi et al., 2021). Demand and preferences for mobility are diversifying, and no mobility user in the future will be the same, meaning that different forms of transport need to be combined to optimise travel flows (Foresight Centre, 2019). Integrated mobility platforms, algorithms, and data will optimise mobility services (Bouton et al., 2022). Mobility will be a flexible service, and urban transport solutions will use digital platforms to bring all available means of transport together (Vandecasteele et al., 2019).

Additionally, the rise of technology and the internet has significantly changed how people move around cities. Mobility ecosystems, which are systems that integrate various transportation options such as cars, buses, bikes, and trains, and non-mobility services such as package pick-up, have emerged as a solution to urban mobility challenges. Increased activity and exponential growth across several nontraditional areas of mobility can be expected over the next ten years (Heineke et al., 2021).

In the future, vehicle sharing might become popular, reducing the need for parking spots and reducing congestion (Vandecasteele et al., 2019). Infrastructure in the future will favour shared transit and bicycling (Bouton et al., 2022). This allows for a different approach to city planning than is currently taken. City planning in the future will consider consumer-friendly mobility scenarios (Bouton et al., 2022) and is data-driven (Fong, 2019).

Automated and electric vehicles will provide a mobility solution together with public transport (Miskolczi et al., 2021), and

be integrated into MaaS concepts, decreasing the need for parking spots in cities together with public transport (Vandecasteele et al., 2019; Bouton et al., 2022). However, there are doubts about whether automated vehicles will be widespread and self-driving by 2035 because of the current lack of legislation regarding these vehicles (Foresight Centre, 2021).

Figure 2.7: Testing Autonomous and Automated Vehicles (Automotive News Europe, 2021)

2.8 Right to Repair

In recent years, there has been a growing interest in the right-to-repair movement, which aims to ensure that consumers can repair or modify their electronic devices rather than rely on manufacturer repair services. Several European countries have introduced or are considering introducing legislation to support the right to repair. For example, France has adopted a law that requires manufacturers to provide repairability scores for specific electronic devices, while the European Union is planning to introduce new rules that would require manufacturers to design products that are easier to repair and to provide access to spare parts and repair information (European Parliamentary Research Service, 2022). This legislation intends to reduce electronic waste and promote more sustainable consumption patterns. However, there are concerns that such legislation could have unintended consequences, such as potentially increasing the cost of electronic devices or making them more challenging to produce (Yang et al., 2023).

According to a Eurobarometer (GESIS, 2020) survey, 77% of EU consumers would rather repair their existing product than buy a new one. This is not always possible as the cost of repair often exceeds the purchase price, or repair is not accessible. The right-to-repair legislation aims to hold manufacturers accountable for providing the parts needed for repairs. The legislation is currently mainly focused on the electronic sector, as electronics are the fastest-growing source of waste in the EU (European Parliament, 2023). However, it is expected to influence other industries where repairs are also apparent.

2.9 Conclusion & Design Implications

Conclusion

As a result of the changing worldview regarding mobility, European citizens and government are pushing for a more sustainable future for both the planet and its people. Society is looking for mobility solutions that cause less strain on the environment, less (noise) pollution in urban areas, safer traffic, and more inclusive mobility that caters to consumers' future needs of convenience and flexibility than our current system. This search has resulted in many subscription models, digital apps, and lease systems. These mobility alternatives now have to combine into a coherent whole for convenient and comprehensible communication towards future users, also known as the Mobility as a Service concept.

The popularity of the e-bike is a result of the changing worldview regarding mobility, as it can offer a good transport alternative to cars in urban areas. However, the desirability of this rising popularity can be questioned in light of the expected rise in obesity and unhealthy lifestyle. An e-bike is an excellent alternative to a car since it takes up less space and demands more activity from its user. However, that same e-bike is not a good alternative to a regular bike since its parts are more expensive, more resources are needed, and the user's overall activity level will decrease. Additionally, the shortage of resources needed to manufacture e-bikes also points to the necessity of an alternative solution. The aforementioned 'zero-emission' mobility might offer an exciting starting point to solve these problems, as walking and (human-powered) cycling can provide alternative transport (Vandecasteele et al., 2019).

The emergence of MaaS has relevance for the government, local stakeholders, mobility providers, and potential users (Hirschhorn et al., 2020). The implementation is related to, influenced by, and affects a more comprehensive range of themes, including sustainability, urban planning, public space, social inclusion, and ICT product service systems. Governments are stepping up as initiators in the MaaS space, and more research points to its potential.

In 2035, urban areas in Europe will be facilitated by MaaS-like systems, offering shared mobility, an integrated application, and hubs. However, it is no guarantee that the system will be perfect and affordable or that its coverage will be sufficient for everyone. That MaaS will be operating to some degree is imminent, considering the many pilots and policies implemented today.

Cortina must operate in 2035 in an ecosystem of shared mobility, hubs, and public transport. The brand needs to pick what role it will play in this system. Cooperation and partnerships are the most important aspects of making MaaS succeed (Fention et al., 2021; Kanda et al., 2015; Mukhtar-Landgren et al., 2016; Karlsson et al., 2020). For MaaS to work, a 'champion' must lead in connecting stakeholders (Hensher et al., 2021). This role is partially the government's as they have a non-profit mindset, promote sustainability, and enforce policies and subsidies. Flexibility, convenience, and autonomy influence people's decision to choose MaaS over traditional transport options (Harms et al., 2018; Heineke et al., 2021). The 15-minute city is a complementary concept to facilitate MaaS and mobility hubs in urban planning (Pozoukidou & Angelidou, 2022). Mobility hubs can be a great solution to increasing urban pressure on mobility systems (Anderson et al., 2017; Belll, 2019; Ministerie van Infrastructuur en waterstaat, 2018) if created uniformly and offering more benefits than current mobility systems (Weustenenk & Mingardo, 2023; KiM, 2021).

Design Implications

Worldview

The context the design will have to operate in considers mobility to be a consumable and shareable good (Mulley & Kronsell, 2018; Brömmelstroet et al.,2022). Remote working and flexibility between work and life will be expected, causing travel patterns to be less predictable and more diverse (Foresight Centre, 2021; Tijssen & Kruitbosch B.V., 2022).

Inclusivity

The urban population of 2035 will be more diverse than nowadays, which means its mobility needs and demands will too (Foresight Centre, 2021). Inclusivity and equality will be important in the future space, omitting the need for gendered solutions and increasing the need for adjustable and adaptable ones.

MaaS system
Many experiments and pilots point to the fact that in 2035 we will have at least some form of a MaaS system in place (Fenton et al., 2021; Ministerie van Infrastructuur en Waterstaat, 2021; Euroepn Commision, 2016; Kanda et al, 2015; Heineke et al., 2021). The design must operate in congruence with this system.

Hubs
Together with MaaS systems, hubs are expected to be implemented in neighbourhoods acting as junction points for several types of mobility (Anderson et al., 2017; Bell, 2019; Coenegrachts et al, 2021). The design must operate alongside or together with these hubs.

Sustainability
There is a rising demand for sustainable solutions regarding mobility from both the population and government to omit the harmful emissions from combustion engines and replace the space they take up with more green (Foresight Centre, 2019; Tijssen & Kruitbosch B.V., 2022; Vandecasteele et al., 2019) . The design must have a sustainable point of view to flourish in 2035's society.

Resources
The current lack of resources in the supply chain of many mobility solutions will remain (Tijssen & Kruitbosch B.V., 2022). The design can be part of a solution for this shortage or at least not increase it further.

The obesity pandemic
The rise in convenience and inactivity is causing a rise in overweight European citizens (Foresight Centre, 2021). The design can be part of a solution for this problem by focusing on a healthy activity.

3. The Brand Cortina

In order to create a design for Cortina, it is important to understand where the brand originated, its values, and how individuals perceive it. The Cortina brand will be analyzed in the following chapter to understand its identity, ambitions, and characteristics. Every subchapter will describe an aspect of the brand Cortina at the time of writing.

The Brand Identity Prism by Kapferer (2008) completes Cortina's brand analysis by describing all aspects of the brand that follow from its history, product portfolio, target market, competitor analysis, and SWOT analysis. To distinct facts about the Cortina brand from insights derived from those facts, every subchapter will end with 'Design Insights' evaluating Cortina's decisions denoted by:

The chapter will conclude with a conclusion and design implications derived from the facts and insights that will serve as input for the Design Brief.

3.1 The History of Cortina
3.2 Product Portfolio
3.3 Target Market
3.4 Competitor Analysis
3.5 SWOT Analysis
3.6 The Brand Identity Prism
3.7. Conclusions & Design Implications

3.1 The History of Cortina

The brand Cortina is owned by Kruitbosch B.V., a Dutch company in Zwolle. Kruitbosch was established in 1955 by Egbert Jan Kruitbosch and his sons as a wholesaler of bikes and bicycle parts (Kruitbosch, 2022). In the sixties, most people could buy a car due to economic prosperity, resulting in a decline in bicycle demand and production. However, due to the oil crisis and the fact that cars were not allowed on Sundays, bicycle demand rose again in the seventies, resulting in the founding of Cortina (Kosterman, 2019) in 1973 by a collaboration of bicycle wholesalers, including Kruitbosch. According to employees of Cortina, the bikes produced by this collaboration were known for their bad quality. Therefore, the bicycles were not successful, and production ceased. The brand Cortina ended up being purchased by Kruitbosch together with the children's bicycle brand Alpina.

Kruitbosch fared well as a bicycle wholesaler for the next fifty years, opening multiple locations in the Dutch province of Overijssel. In 2000, Kruitbosch was the first wholesaler to host a bike fair. During the same year, the company relaunched Alpina as a fun children's bicycle brand that became a market leader within a few years. The same strategy was applied to Cortina in 2006 when Kruitbsoch produced 4.000 Cortina bicycles, reintroducing the brand to fill an identified gap of fashionable and fun bicycles in the Dutch market, according to an interview with the Dutch magazine 'Marketingtribune' (Hoogkamer, 2018). In 2008 the company structure of Kruitbosch was reformed, and the first plans to expand to the Benelux and Germany followed. The company remains a family business, with its three shareholders being Martin, Chris, and Wilco Kruitbosch (see Figure 3.2), all grandchildren of founder Egbert Jan.

Figure 3.1: First bike-event by Kruitbosch in 2000 (Kosterman, 2019)

Figure 3.2: Martin, Chris and Wilco Kruitbosch (Wolzak, 2019)

In 2012, the first Cortina e-bike was launched (Figure 3.3), causing a growth in sales during the years after. In 2013 Cortina produced more than 100.000 bikes, and Kruitbosch received an award for 'most appreciated bicycle wholesaler'. Cortina continued to grow, and in 2017 it was the most searched bicycle brand on Google and the strongest contender in the e-bike market, according to Marketingrapport Rijwielhandel (Marktdata, 2017).

Figure 3.3: Cortina's first e-bike: the Ecomo (Mantel, 2022)

Design Insights

The history of Cortina and its founding is arduous to find and even unknown by most of Kruitbosch's employees. Was this an elaborate decision or something that grew to be so over the years? Cortina's heritage stems from collaboration and providing an alternative to cars. It was founded to fill an observed gap in the market, but this did not prove successful. Interestingly, this strategy was implemented again during Cortina's comeback in 2006 (filling the observed gap of fashionable bicycles). The second time it did result in growing sales and success. However, could using another brand name have given even better results considering the 'bad quality' stigma sticking to the brand?

3.2 Product Portfolio

The product portfolio of Cortina presented on their website as of October 2022 consists of seven models characterized by their different names (Blau, Mozzo, E-foss, E-Nite, E-Silento Pro, Common, and U4), seen in figure 3.4. Recently the brand ceased the production of specific models to simplify the decision-making process for buyers and assure the homogeneity of the line-up and brand values.

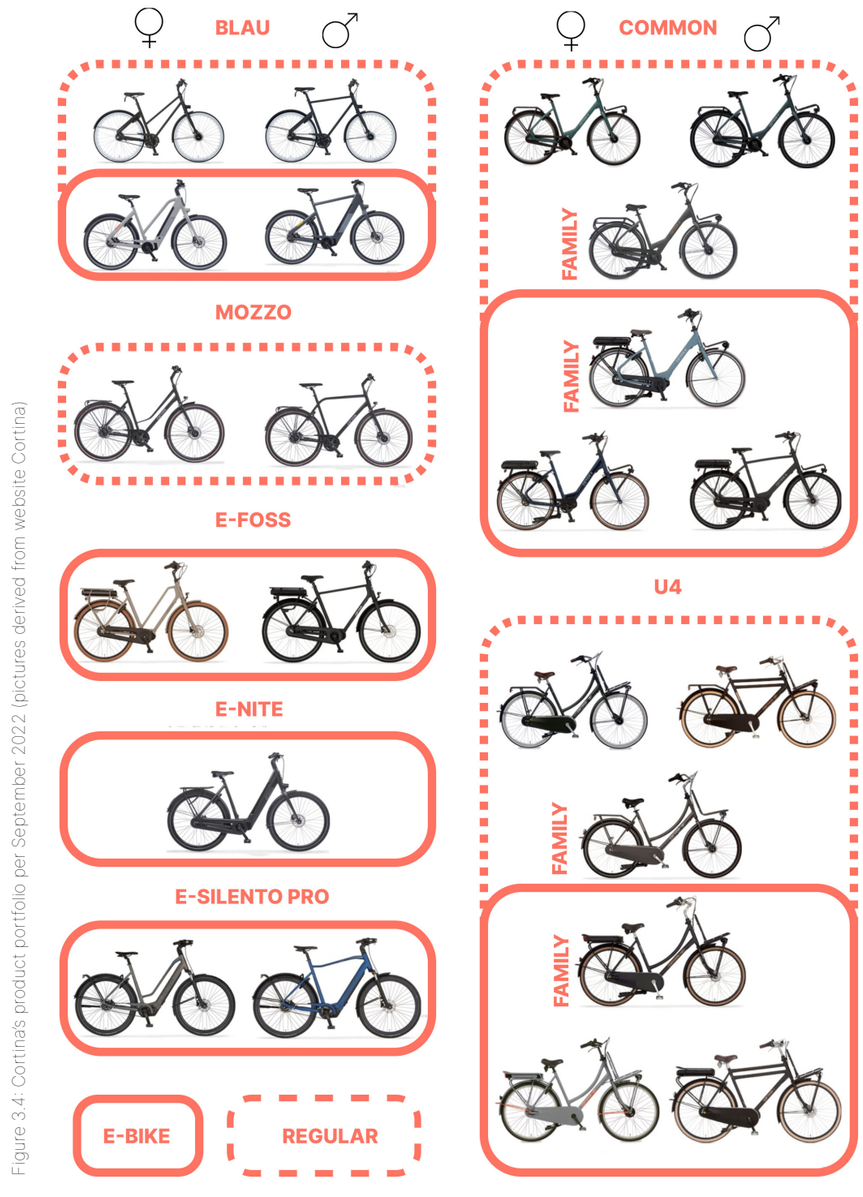


Figure 3.4: Cortina's product portfolio per September 2022 (pictures derived from website Cortina)

All but one of seven models (the E-Nite) are available in women's and men's versions. Two models are available in a 'family' version (Common and U4), providing a lowered frame for easier manoeuvring with children's bike seats. Three models are solely electrical (E-foss, E-Nite, E-Silento Pro), three offer both regular and electric bikes (Blau, Common, U4), and one category (Mozzo) consists of only regular bikes. The prices of the bikes range from 639,- for the U4 Transport to 3599,- for the E-Silento Pro. The E-Silento Pro is an exception price-wise; on average, Cortina's e-bikes cost 2500,- euros. According to Cortina employees, the most significant part of the brand's profit results from U4 sales.

Vision Bike

In May 2022, Cortina released a concept bike designed for the future based on trends and input from Dutch citizens (see Figure 3.5). The bike combines Cortina's sustainability ambitions, user demands and cycling trends. The bike is electric and features brake lights, heated handgrips, and voice control on the steering wheel.

Figure 3.5: Cortina Vision Bike (Cortina, 2022)

Design Insights

Cortina's decision to critically assess their product portfolio and give customers fewer 'choices' decreases a phenomenon called 'choice overload', which can be described as 'the complexity of a decision-making problem faced by an individual exceeding the individual's cognitive resources' (Herbert, 1955; Toffler, 1970). A particular type of choice overload is "caused by many available decision alternatives" (Iyengar & Lepper, 2000). Psychologist George Miller (1956) even claims that the human brain cannot process more than seven options (give or take two), making Cortina's product portfolio ideal for decision-making.

All bikes but the E-Nite are available in both women's and men's models. It can be argued for safety reasons and equality trends that the micro-mobility concept of the future should not have a distinction between a female and a male version, as the reasoning for this distinction stems from convictions dating back to the 1800s. Omitting this distinction adheres to the rising importance of equality between men and women (Horowitz & Fetterolf, 2020). Cortina sold 29.100 women's and 17.000 men's city bikes in 2021 (Netherlands Panelmarket, 2022), endorsing this trend. If the concept should result in a shared solution, gender neutrality will alleviate the design from providing two versions, resulting in economic advantages due to saving costs because of scaling.

The creation of the Vision Bike shows that Cortina wants to be an innovative player in the cycling industry, similar to 'concept cars' often created by big automotive brands. These concepts are not meant for mass production but are a means of showing off new technology and serving as inspiration for future designs.

3.3 Target Market

Cortina redefined its target market in the summer of 2022, resulting in a division of users across four target markets operating in the urban space. The distinctions between user groups are based on data from a study by Glocalities (2021). Glocalities distributed a questionnaire in the Netherlands, Belgium, and Germany in May 2021 among 16 to 60-year-olds living in a city or the suburbs of a big city (>100.000 residents). The questionnaire elicited 1500 respondents representative of Cortina's target market based on gender, age, education, and location. The respondents answered questions about their living situations, transport, bicycle use, hobbies, and values.
Cortina has translated the results of the Glocalities questionnaire into four target groups: 1) family life, 2) school life, 3) daily life, and 4) work life. Based on the responses of these groups' users, Cortina has created four personas displayed in Figure 3.6.

Figure 3.6: Personas created by Cortina (Cortina, 2022)

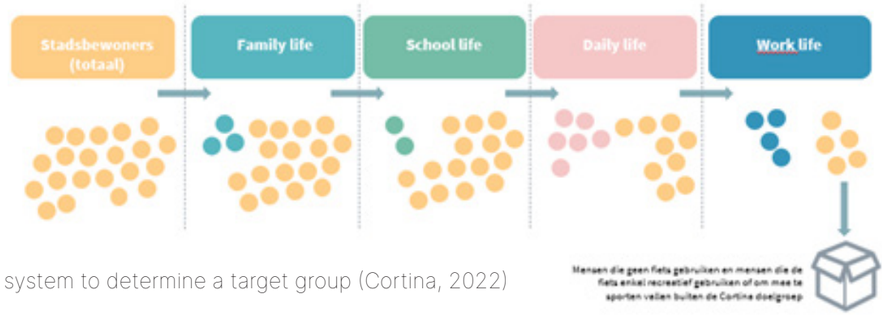


Figure 3.7: Cortina's system to determine a target group (Cortina, 2022)

Someone's primary use of their bicycle dictates to what target group they belong. This market segmentation can be seen as a funnel (see Figure 3.7), starting with all residents in an urban area. When determining to what target group a customer belongs, the first category one can belong to is 'family life' (i.e. use the bicycle primarily for transporting children). Suppose a target user does not fall into this category. In that case, the question of whether they fall into the second category, 'school life,' is asked, which is the case if the primary use of the bicycle is to get to school or university. If a user does not fall into school life either, they might belong to 'daily life', defined as using the bicycle to run errands. If a user also does not belong to the daily life category, they might fall into the work-life category; this encompasses everyone using a bike to commute, to go to friends, or to enjoy a night out. If the target user does not fall into any of the four segments, they are not a targeted customer of Cortina.

According to a workshop about Cortina's brand DNA, the brand plans to communicate these distinctive target groups to customers by attaching a coloured tag to all bicycles, indicating to which segment each bike belongs in vendor's showrooms.

Design Insights

The questionnaire conducted by Glocalities (2021) has resulted in many rich answers about users' personalities, values, and mobility. These answers translate into four personas describing Cortina's target groups. The respondents were filtered on age and location to represent Cortina's target market. The following numbers of respondents make up each target segment: family life = 165, school life = 59, daily life = 632, and work-life = 329.

Cortina's women's model U4 was the best-sold city bike in the first half year of 2022 (Netherlands Panelmarket, 2022), with 5.497 units sold. How can Cortina's best-selling bicycle be defined as having the smallest target market? This bicycle falls in the 'school life' category, as high school students primarily use it. However, only 59 respondents of the questionnaire belong to 'school life', which suggests that Cortina expects most of the 'school life' target group to buy a Cortina or that the brand wants to shrink its target market. During a workshop at Cortina about redesigning the U4, it became apparent that the sales for this model are slowly declining. Hence, repositioning or refreshing the model and target group is in order.

The utility of the 'funnel' system can be questioned. Why does transporting a child place a customer in family life? What if the bike is used for going to school and going to work? Who decides which utility is the primary use? Suppose car ownership declines in the future (Miskolczi et al., 2021). In that case, people will use alternative methods of transport for their daily activities, resulting in an even more mixed utility of the bicycle (and thus the target group). By dividing users into clear boxes like now, many contexts about someone's bicycle use get lost, perhaps resulting in tunnel vision when designing bicycles for demarcated groups that might be way more versatile in reality. Personas can be helpful when considering the end user's values and goals. However, they should be used cautiously, as the user's life is more detailed and richer than solely described in a persona.

Lastly, the target markets are defined via an 'inside-out' perspective, focusing on what Cortina offers and what market might be interested in that offer. A better way to determine what a target group needs would

3.4 Competitor Analysis

The Dutch (e-)bicycle market is a saturated one with many established brands (such as Gazelle, Batavus, Cortina, etc.) and the occasional new brand trying to enter the market (such as Veloretti in 2013, VanMoof in 2009, and Cowboy in 2017). In this chapter, two competitor analyses will be carried out for Cortina's city bikes and e-bikes since not every competitor sells both.

According to the Chamber of Commerce (2022), competitors are categorized as direct, indirect, and replacement. Direct competitors are brands that sell the same product and operate with a similar business model. To stay relevant and provide customers with a unique value proposition, Cortina must have a brand-differentiation strategy from these direct competitors. Brands that operate with a similar business model as Cortina are other Dutch (e)-bicycle brands.

Indirect competitors are businesses with the same product but a different business model. These brands provide bicycles to customers but do not similarly create revenue. An example of an indirect competitor is Swapfiets; their customers receive a bicycle in exchange for a monthly payment, or sellers of secondhand or refurbished bicycles.

Replacement competitors sell different products and generate revenue in different ways. However, they still compete for the customer's time and money. To identify these competitors, one can ask themselves what Cortina sells to its customers, which is a means of getting themselves and their stuff from A to B. All companies providing a solution to this proposition are replacement competitors. They range from other players providing mobility (car brands, public transport, scooter subscription models) or competitors who decrease the need for personal mobility. Examples are online retailers and delivery services like PostNL, Picnic, and Uber Eats.

This analysis aims to analyze Cortina's current position in the market and its competition to understand what makes the brand distinguishable. Identifying indirect and replacement competitors is valuable when considering a future strategy for Cortina, but it does not say much about its current positioning in the (e)-bike market. Indirect and replacement competitors are therefore omitted from this analysis.

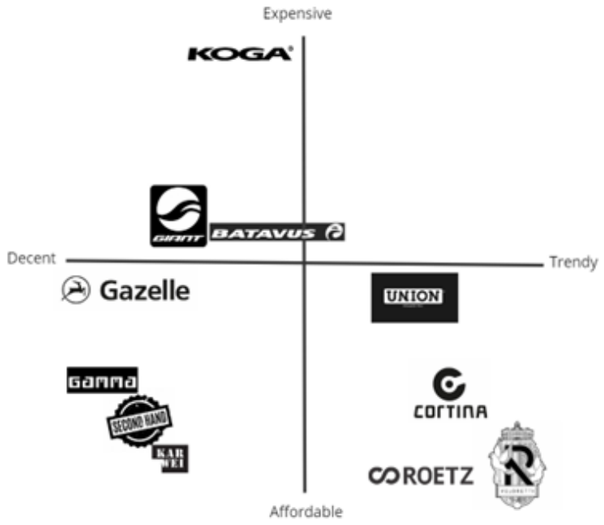


Figure 3.8: City bikes competitor analysis

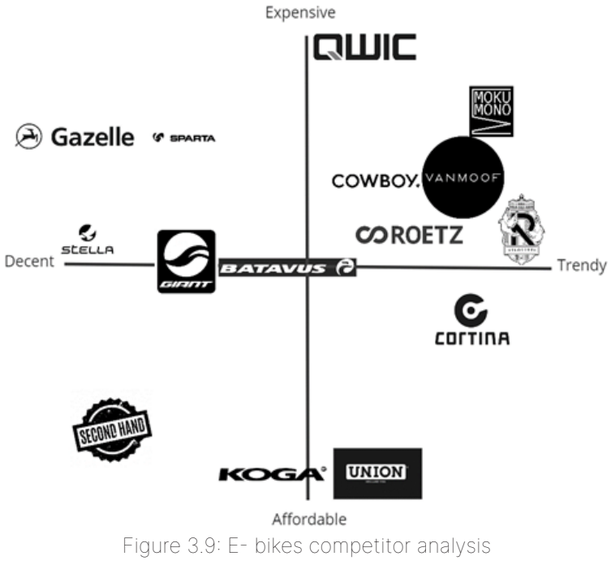


Figure 3.9: E- bikes competitor analysis

Citybikes

Cortina's direct competitors are positioned in the matrix seen in Figure 3.8. The competitors are based on data supplied by Marktdata (2017), which describes Dutch bicycle sales and the designer's observations. The vertical axis in Figure 3.8 ranges from 'expensive' to 'affordable' as the cost is an essential factor when buying a bicycle. The axis' decent' versus 'trendy' represent Cortina's brand positioning and is chosen to identify which other brands position themselves similarly and thus present the most significant competition. Union, for example, is positioning itself as a city brand, using bold colours to market its products, and therefore it is considered 'trendy'. The positioning along the vertical axis describes the average price of a bicycle by a brand.

The city bikes matrix shows that the decent high-end and trendy low-end markets are the most saturated. Interestingly, the expensive trendy market has no (known) competitors, which can be an area of interest for Cortina. The fact that the affordable and decent market is barely saturated could be due to secondhand bikes, as people who do not care for the 'trendiness' of a brand and seek something affordable might opt for secondhand.

Brands like Veloretti and Roetz position themselves in the same price range as Cortina. Veloretti positions itself as a luxury brand with muted and stylish colours and an Italian name while emphasizing that it is a brand from Amsterdam. Interestingly, Cortina could be accused of the same thing. Veloretti solely sells online and dispatches its bicycles half-assembled, meaning that the customer needs to make the final assembly. Roetz differentiates itself by repurposing parts from old bicycles and assembling them in social workplaces, emphasizing their sustainable character.

Figure 3.10 shows the Instagram pages of the three brands, clearly showing the difference between Veloretti (muted, stylish colours), Roetz (sustainability, focus on assembly), and Cortina (colourful, focus on young people).

Cortina differentiates itself from Veloretti and Roetz by having a widespread network of dealers and vendors throughout the Netherlands, providing its customer service and bicycles ready to use. By positioning itself as a 'transport' bicycle, Cortina also differentiates from the two brands. Veloretti bikes do not have a luggage carrier to optimize aesthetic and speed, whereas many Cortina's have big crates on the front carrier. Although all three brands position themselves as trendy city bikes, their unique selling points differ, resulting in different target markets. Someone looking for a responsibly sourced bicycle will buy Roetz, someone who wants a practical bike ready for the road will buy a Cortina, and someone who does not mind putting some effort into assembly will buy a Veloretti. However, this does not mean that one brand does not claim customers from the other or will not enter each other's territories at some point.

E-bikes

As seen in the E-bike matrix of Figure 3.10, most brands offer bikes around the same price point. This could be because the most expensive parts of an e-bike (such as the battery and motor) are often bought from (the same) third parties; Bosch,

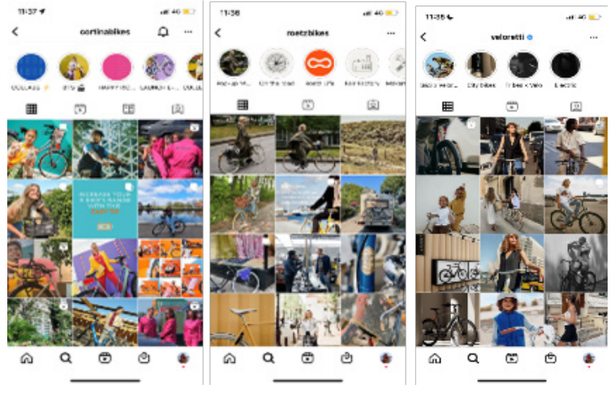


Figure 3.10: Social Media of Cortina, Roetz, and Veloreti (Instagram, 2022)

Shimano, and Bafang. All four quadrants of the matrix have active competitors besides the established and affordable one, which might be where secondhand sales come in.

Cortina finds itself on the lower end of the middle segment concerning price, again competing with trendy brands such as VanMoof and Veloretti. It is important to note that VanMoof and Veloretti have a much smaller product portfolio regarding e-bikes, with little differentiation from the established price of 2500 euros. Cortina's e-bikes range from 2249 to 3599 euros, with 2400 euros on average, providing customers with more choices than other brands. No outspokenly trendy brand scores are high on affordability, possibly presenting an opportunity for Cortina as an affordable brand.

Design Insights

Cortina differentiates itself in the city bike and e-bike markets by being affordable and trendy. A further distinction is made from brands with a similar positioning by offering service, focusing on transport bikes, and providing people with bikes ready for cycling upon purchase. There are opportunities to investigate whether the expensive and trendy city bike market or the affordable, trendy e-bike market are areas to pursue, as the competition is less active in these segments.

3.5 SWOT Analysis

A SWOT analysis gives insight into Cortina's strengths and weaknesses and helps the brand pinpoint promising opportunities and threats. Traits identified during the analysis stem from conversations with Kruitbosch employees, brand identity analysis, competitor analysis, customer research, and trend analysis. Figure 3.11 shows an overview of the SWOT analysis.

STRENGHTS
- Brand Name Cortina
- Experience & Logistics
- Innovative Company Culture
- Cycling Industry Climate Commitment

WEAKNESSES
- Limited Mobility Experience
- Negative Brand Connotations
- Unknown Outside NL
- Dependency Suppliers

OPPORTUNTIES
- MaaS
- Changing Demographic
- R2R Legislation
- Sustainability
- Alternative Fuel
- Affordable & Trendy E-Bike Market

THREATS
- Conservative Industry
- Saturated Industry
- MaaS
- Resource Scarcity
- Varying Legislation
- New Brands

Figure 3.11: SWOT analysis Cortina

Design Insights

Strenghts

Cortina is a brand with an established street presence in the Dutch market that can be leveraged for future endeavours. According to the previously mentioned questionnaire by Glocalities (2021), two-thirds of the Dutch population recognizes the name. The brand has grown to be the second-biggest seller of city bikes (after Gazelle) in the Netherlands, averaging 100.000 bikes per year (Marktdata, 2017).

Kruitbosch has been active in the cycling industry since 1955 and has amassed an extensive network of manufacturers and suppliers. The brand Cortina is sold by vendors nationwide, resulting in an extensive distribution network. Kruitbosch is a large organization that has been operating in the cycling business for multiple decades, resulting in a database of valuable knowledge, heritage, and skills regarding bike sales.

Kruitbosch and Cortina have an innovative company culture. As mentioned in Chapter 2, Kruitbosch was the first bike wholesaler to organize a fair for its customers and establish its bicycle brands (Alpina and Cortina). Cortina's pursuit of innovative technologies reflects this heritage. For example, Kruitbosch purchased shares in the business-to-business bicycle lease platform Hellorider 2020, and the company regularly gives out assignments to students to create innovative strategies and products.

Kruitbosch signed the Cycling Industry Climate Commitment in 2021, which is a global initiative to make the bicycle industry more sustainable by improving the supply chain, improving the longevity of products, and thinking about end-of-life solutions. The bundling of forces among multiple bicycle sellers can impact the supply chain more than Kruitbosch on its own and is therefore defined as a strength.

Weaknesses

Cortina is a bicycle brand with little experience or credibility in the mobility market outside of bicycles.

Cortina has positioned itself as a 'fashion' bike over the last decade. Although this positioning changed in 2022, negative connotations around (fast) fashion might exist among its customers. Elderly customers might remember Cortina as a low-quality brand from its first market entrance in 1973. Precaution is warranted regarding brand communication to ensure the correct customer perception.

The Cortina brand is established in the Netherlands and not (yet) in other Western European countries. Kruitbosch wants to expand abroad but has yet to gain experience operating outside the Netherlands.

Cortina nor Kruitbosch produces their bicycles themselves; this happens in the Czech Republic and Lithuania. Because Cortina is Kruitbosch's only adult bicycle brand, they cannot enjoy the benefits that scaling up and using the same parts for multiple brands can bring, such as competitor PON (owner of 15 bicycle brands in 10 countries) can do. Another problem with not producing itself is that Cortina depends on its manufacturers and supply chain, which also produces for competitors.

Opportunities

According to Mulley & Kronsel (2018), the status quo of mobility is currently challenged by the concept of Mobility as a Service. This might mean a new market segment relevant to Cortina.

Due to changing lifestyles and the concept of the fifteen-minute city, micro-mobility demands will grow (Vandecasteele et al., 2019). The demographic of future cities will change (Foresight Centre, 2021), demanding an increase in diversity and inclusivity. Cortina as a micro-mobility manufacturer can seize this opportunity to become part of transport in the future city.

The European Union is pushing for legislation regarding Right-to-repair (Svensonn et al., 2018). Cortina could play into this prediction and start offering convenient solutions regarding repair and refurbishing. Legislation regarding speed limits and helmets for e-bikes is expected, just as policies restrict the use of cars in urban areas (Fong, 2019).

The demand for sustainable solutions regarding transport is increasing from both governments and customers. The European Commission predicts that the use of privately owned (combustion) vehicles will decrease (Vandecasteele et al., 2019), presenting an opening for alternative modes of transportation.

New technologies in the future present themselves with opportunities. Rising gas prices and the acknowledgement of depleting resources cause research into alternative fuels to increase. Electricity, hydrogen, and natural resources as fuel will be more affordable. The emergence of the Internet of Things, health-monitoring technology, data-driven transport platforms, and autonomous vehicles also provide technological opportunities.

The low saturation of the high-end trendy city bike market and the affordable, trendy e-bike market can be an area of interest for Cortina. Further research into the lack of representation in these areas might provide attractive target markets for Cortina.

Threats

The cycling industry, including many of Cortina's manufacturers and vendors, tends to be conservative regarding innovation and is not always open-minded regarding sustainability or mobility trends.

The Dutch (e-)bicycle market is a saturated one with many established brands (such as Gazelle, Batavus, Cortina, etc.) and the occasional new brands trying to enter the market (such as Veloretti in 2013, VanMoof in 2009, and Cowboy in 2017).

In the future, mobility will become a service instead of a utility (Mulley & Kronsell, 2018) which is both an opportunity and a threat, depending on Cortina's response as the brand's current business model might need to (partly) change to accommodate the sharing/repairing/service economy.

A scarcity of resources may prove challenging in designing Cortina's future micro-mobility concepts as Kruitbosch does not produce its bikes and is highly dependent on the supply chain for delivering its products.

Kruitbosch wants to expand the Cortina brand to other Western European countries. Most countries have (different) legislation regarding mobility and traffic safety.

The car industry has many influential players that may influence policymaking. Lobbying may lead to governmental infrastructure decisions that might not benefit Cortina. The quality and use of public transport will increase in European Cities (Miskolczi et al., 2021), becoming a possibly attractive alternative to Cortina's products and services.
New brands in the cycling market focused on local production and sustainability are popping up. An example of such a brand is Roetz, which makes city e-bikes from discarded bicycle parts in a social workplace.

3.6 The Brand Identity Prism

To synthesize the findings of this chapter the Brand Identity Prism method from Kapferer (2018) is used with input from the previous chapters to define the brand Cortina. Kapferer argues that identity is crucial for a brand and needs to be durable, coherent, and realistic. Constructing an identity prism is a defence against an idealized, fickle, or opportunistic brand image. The six facets of Cortina's brand image can be seen in Figure 3.12.

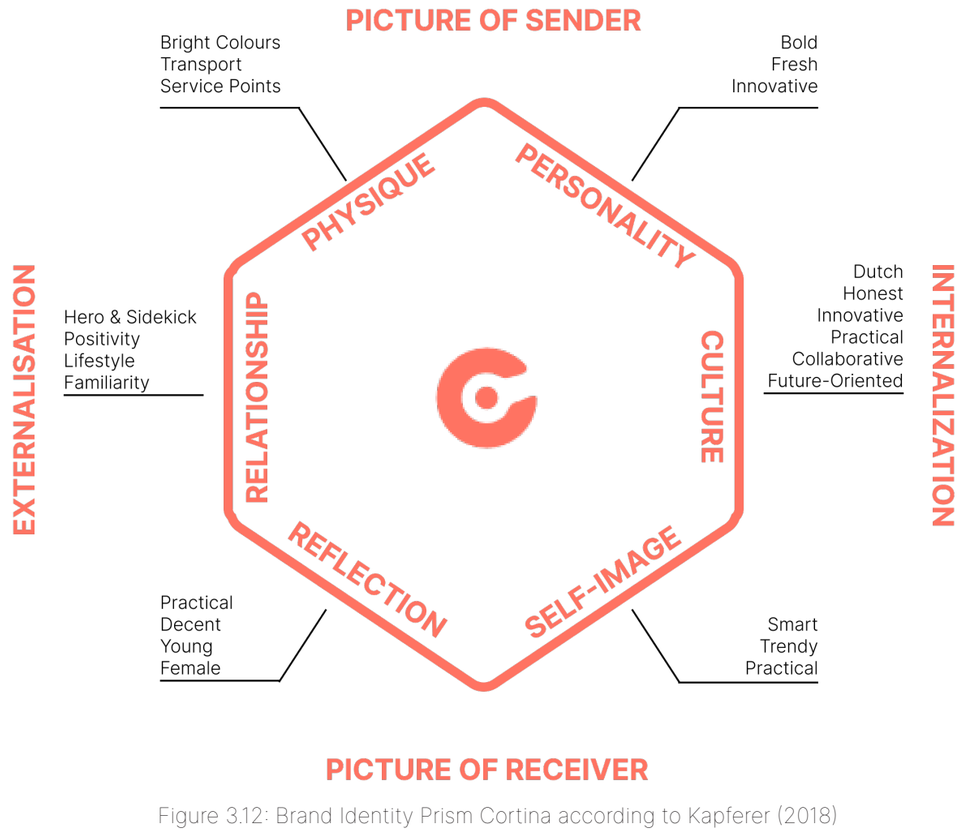


Figure 3.12: Brand Identity Prism Cortina according to Kapferer (2018)

Physique

Physique immediately pops up in people's minds when asked about a brand, consisting of physical specificities and qualities. In a questionnaire by PanelWizard (2022), 551 Dutch respondents aged 12 to 60 were asked about their image of the Cortina brand. PanelWizard is a research panel with 31.000 members, confirming ISO 20252 and 26362 certified, and considered representative of the Dutch population. Respondents to the questionnaire had to type the first thing that came to mind regarding Cortina. Many of the descriptions given were related to bicycles. The aspects mentioned most were bright colours, bicycles, and crates (as seen in Figure 3.13).

Figure 3.13: Cortina's bold advertising (Cortina, 2022)

Figure 3.14: A Cortina crate (TSO, 2022)

Other answers described the brand or people's experiences with the brand. The descriptions of innovation and service were mentioned often, which probably results from Cortina's many vendors throughout the Netherlands. Another important aspect of Cortina's physique is its logo, depicted on their bicycle in Multiple outstanding places, such as the crate and the frame.

Relationship

According to the brand image questionnaire by PanelWizard (2022), a quarter of the Dutch population would consider a Cortina if they had to purchase a bike. Among Cortina owners, this number was eight out of ten. Approximately four out of ten respondents are familiar with Cortina and have a strong positive feeling about the brand. Owners of a Cortina bicycle described that they chose the bicycle because it fits their lifestyle, it had a trendy design, and it knew the brand. Cortina describes the envisioned relationship between a user and their bikes as one between "a hero and his/her sidekick". This vision could translate to fitting the user's lifestyle, which represents the relationship users confirm to have with their Cortina bike, according to the PanelWizard (2022) results.

Reflection

According to the dataset from PanelWizard (2022), more women (71%) than men (63%) indicated knowing the brand Cortina when confronted. The age group 12-18 years tended to name the brand Cortina when asked of a bicycle brand out of the blue the most often (29%). Eight out of ten Cortina customers would consider purchasing a Cortina again. Cortina's marketing campaigns reflect the slight overrepresentation of women and the importance of the younger target market. This could be attributed to the fact that women cycle 17% more often than men (Centraal Bureau voor de Statistiek, 2020). Owners of a Cortina bicycle are perceived as young, trendy, and making a decision conforming to their lifestyle. The U4 is Cortina's best-seller with characteristic carrier and transport options, reflecting a notion of practicality on its user. Therefore, the reflection of a person buying a Cortina can also be described as 'decent', as parents often buy them for their children, so they have a robust and practical school bike that is the ultimate compromise between cost, style, and practicality.

Figure 3.15: Cortina U4 advertisement (Cortina, 2022).

Personality

Personality describes how customers perceive the brand as if it were a person. 'Eigentijds' (contemporary) and 'lef' (boldness) were characteristics that described Cortina the most in comparison with Batavus, Gazelle, or Sparta, according to the PanelWizard (2022) research. Besides those characteristics, 'fris' (fresh) and 'vernieuwend' (innovative) also suited the brand. 'Quality' was deemed less of a fit, perhaps still resulting from Cortina's history, as described in chapter 2.1. With these values, Cortina has created a new description of its personality: "Cortina believes in moving you, the city, and the future. Cortina believes that the world is a better place with bikes in it" (Cortina, 2022). During the repositioning in 2022, four company values were created and described as follows by Cortina:

- Fresh: a fresh perspective on things
- On trend: choices based on what is relevant now and in the future
- Inventive: well-thought-out solutions that are more than meet the eye
- Open: Open about where Cortina stands and where the brand is heading while being accessible to many

Culture

Cortina's company culture is honest and innovative, encouraging new ideas but being conservative in those as well. The culture is Dutch, resulting from the company's foundation in the Netherlands in 1955 and due to having mainly Dutch employees. Cortina was brought back to life in 2006 as a trendy brand that values' customer closeness', best described by good, convenient, and accessible service. The culture at Cortina is also practical and future-oriented. Ideas and critiques are communicated clearly and constructively, and colleagues are open to collaboration.

Self-Image

Cortina's marketing communication emphasizes its products' 'bold' and 'trendy' characteristics by using young people, bright colours, and collaborations with influencers, as seen in Figure 3.16. Coupled with Cortina's good service through their vendors' people purchasing from the brand buy a reliable yet trendy bicycle. By buying a Cortina, users feel like they are someone who knows what is in style while still making a practical choice for a good bike that suits their lifestyle. They, therefore, buy into Cortina's pay-off "Follow your flow" and confirm the envisioned relationship between them (the hero) and their bike (the sidekick). As mentioned before, the decision for a Cortina is, for many, an optimal compromise between style, practicality, and cost, making the buyer feel like they have made a well thought-out purchase.

Figure 3.16: Instagram contest (Weblog Zwolle, 2019)

Design Insights

Cortina's physique, relationship, and reflection (the left side of the brand identity prism) mainly result from the user's interpretation and experiences. Therefore, they can be described by consumer answers as given during the PanelWizard (2022) questionnaire. The right side of the brand identity prism (personality, culture, and self-image) can be changed internally, which is more accessible than changing the external image.

The statement made by the brand Cortina about its personality is as follows: "Cortina believes in moving you, the city, and the future. Cortina believes the world is a better place with bikes." The statement is quite generic and similar to other bicycle brands' messages. For example, Batavus is positioning its bikes as 'Citybikes with which you move effortlessly through traffic'. Alternatively, Union, who recently named a bicycle 'E-flow', resembles Cortina's pay-off 'follow your flow' (see figure 3.17).

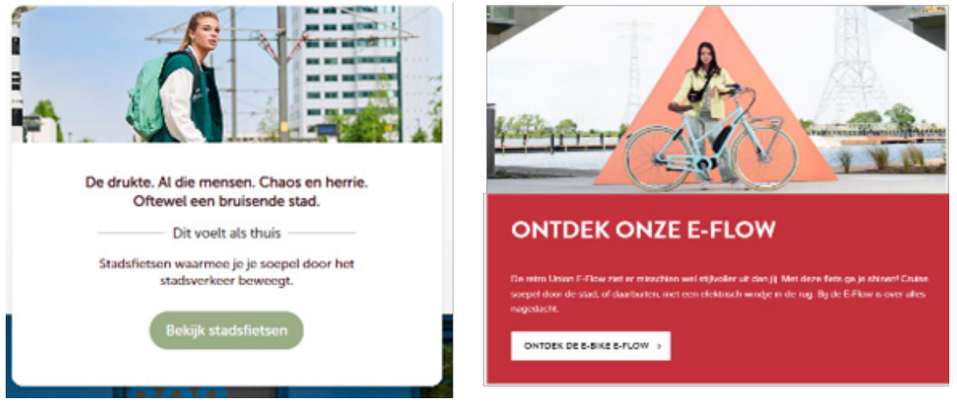


Figure 3.17: Left: Batavus Advertisement (Batavus, 2022). Right: Union advertisement (Union, 2022).

The statement describes a future perspective in which Cortina dominates the urban market. However, it might be better suited and more distinguishing for Cortina to refer to its heritage regarding personality and solidifying authenticity, which is crucial to a brand's success, according to Beverland (2018). Cortina's heritage was born from taking action where no other brand did; in 1973, by creating bicycles as an alternative to cars and in 2006, by creating modern bicycles in a market where colour and fashion were not in supply. Cortina has always addressed an underserved target segment. The brand's heritage as a

brand created by multiple wholesalers must also be remembered. Cortina was born as a team effort between competing businesses. Cortina's driving philosophy could better be adjusted to being bold, open, authentic, and innovative, emphasizing the characteristics that users already attributed to Cortina.

The personality values fresh, on-trend, inventive, and open, representing their heritage as a 'trendy' brand while moving away from the older fashion bikes' pay-off. The decision aligns with the sustainability trend stemming from the trend analysis, as 'fashion' nowadays might negatively impact the fast-fashion industry. Cortina's value of 'fresh' is congruent with customers' brand perception and resonates with their relatively young target market. 'Inventive' is a good choice considering the projected changes in the field of mobility while highlighting what consumers think of the brand. 'Inventive' relates to Cortina's heritage as a first-mover in specific target markets. Whereas all three values mentioned thus far have been described by respondents of the PanelWizard (2022) questionnaire, 'open' has not. The value, however, can be used to emphasize the collaboration out of which Cortina was born and to play into sustainability trends, right-to-repair legislations, and the customer's position regarding manufacturers. Trust and authenticity are fundamental values for a brand (Beverland, 2018), expressed by the value 'open'.

The self-image emphasized by Cortina's marketing efforts of "the hero and the sidekick" is exciting and makes the user feel empowered and free. Although Cortina's portrayed image focuses on urban living, it evolves around Cortina's user and his/her choices, as was lacking in the personality defined by Cortina. It is important, however, that when communicating with a potential customer, the brand's differentiating aspects are clearly compared to other brands.

3.7 Conclusion & Design Implications

Conclusion

This chapter analyses Cortina’s brand identity to create design implications ensuring the congruence of the final design with the brand Cortina.

Cortina’s heritage stems from collaboration and providing an alternative to cars. It was founded to fill a gap in the market but failed due to products of bad quality. Interestingly, this strategy was implemented again during Cortina’s comeback in 2006, filling the observed gap in fashionable bicycles. The second time it did result in growing sales and success. The increase in future public transport (Miskolczi et al., 2021) is an exciting search area for Cortina as this means fewer people own a car and increases the need for last-mile transport. This change also means that Cortina might need to adjust its business model to meet the changed demand. Cortina’s brand, Dutch culture, knowledge, and logistic network can make them an ideal player to explore mobility possibilities in a market where Mobility as a Service is dominant and where lifestyle changes are imminent.

Cortina is highly dependent on its foreign manufacturers to supply its products. For example, all e-bike manufacturers depend on a motor provided by one of three companies: Bosh, Shimano, and Bafang. If Cortina could eliminate this dependency, a competitive advantage can arise in price and availability. It could be valuable to find out if future concepts can alleviate this dependency somehow. An opportunity might be to look into local manufacturing, which would be easier for Cortina than brands such as PON because of their smaller production. The Right to Repair legislation (Svensonn et al., 2018) can be an opportunity for Cortina by reducing the need for virgin material in the supply chain and decreasing the scarcity of resources predicted by employees of Cortina in the future.

The micro-mobility concept resulting from this project must adhere to Cortina’s cultural values verified by the PanelWizard (2022) questionnaire and highlight Cortina’s heritage. Authenticity is essential for a brand, which Cortina can highlight by emphasizing that its strategy has never changed: creating bicycles for the underserved market segment (Beverland, 2018). Cortina’s personality can be more authentic, which is crucial to a brand’s success, according to Beverland

(2018), if its heritage of following the trends was made more apparent instead of only focusing on ‘claiming the city’. Cortina’s driving philosophy could better be adjusted to focus on its uniqueness, cooperativeness, and inventiveness, emphasizing the characteristics that users already attributed to Cortina.

Design Implications

Business Model
The design must provide Cortina with a viable business model that can generate a profit using realistically available resources in the competitive space of 2035.

Stakeholders
Cortina has an extensive network of dealers in the Netherlands and a supply chain containing relationships with manufacturers and suppliers. They must be considered while creating a design and a possible new business model.

Authenticity
The design must be authentic to the brand Cortina by adhering to its cultural values (fresh, on-trend, inventive, open) and emphasizing the characteristics that users already attribute to Cortina (unique, cooperative, inventive).

Competitive Advantage
The design must provide Cortina with a competitive advantage by offering something unique to its potential users. Cortina’s current competitive Advantage is offering good service and focusing on transport bikes.

Supply Chain
Cases in the supply chain of bicycle manufacturers threaten Cortina’s current business model. A design that is less dependent on the resources needed would solve this problem partially and perhaps provide a competitive advantage.

Right to Repair
The expected European right-to-repair legislation might be an ample opportunity for Cortina to create more sustainable products and partially solve resource shortages.

DEFINE

4. Future Frame Analysis & Vision
5. Synthesis & Design Brief

4. Future Frame Analysis & Vision

Designing a micro-mobility concept for a world that does not yet exist comes with challenges, such as uncertainty about the context, trends, and users' future needs. In addition, the mobility world is on the brink of change, as described in Chapter 2. Cortina has stated that it wants the outcome of this graduation project to serve as a source of inspiration, pushing boundaries as to what is possible. Future mobility is a consequence of the designs today and vice versa. Thus, it is essential to consider what kind of world is desirable and what products are needed to create it. A design method crafted explicitly with such a goal in mind is

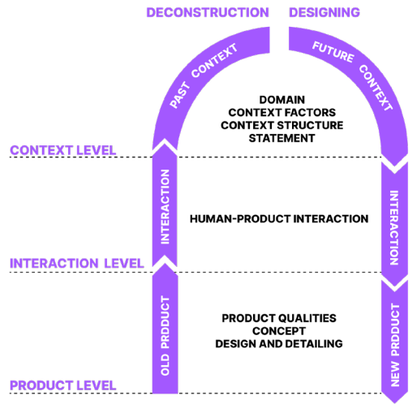


Figure 4.1: Visual overview of the ViP method.

The Vision in Product (ViP) method by Paul Hekkert and Matthijs van Dijk (2016). The ViP method allows for tantalizing viewpoints and pushing boundaries, as Cortina desired, by designing a future world and then a congruent concept. A schematic view of the method can be seen in Figure 4.1. In this chapter, the subchapter will be denoted by icons representing the stage of the ViP method the section describes.

This chapter will describe the generation of worldview, a vision, and an analogy guided by the ViP method for the future micro-mobility concept based on the analysis created in Chapter 2. A vision defines what meaning the envisioned concept will offer people in the future worldview; it consists of a statement defining what the product will offer and an analogy describing how it will be offered. The vision aims to derive what qualities the future micro-mobility must have to achieve the envisioned interaction in the chosen worldview. The vision will also describe the audience and therefore target market of the micro-mobility concept; anyone who would like to see the goal achieved and interact with the future product as portrayed.

This chapter contains a future frame analysis, a statement definition, an analogy, and product qualities of the envisioned micro-mobility concept. The product qualities and other insights from the chapter serve as input for the ideation phase and can be found in the design implications. Apart from generating ideas for the project, the analogy will serve as a source of inspiration for Cortina.

4.1 Deconstruction
4.2 The Future Context
4.3 Statement
4.4 Analogy & Product Qualities
4.5 Conclusion & Design Implications

4.1 Deconstruction

When given a design assignment, thinking of an existing product that was once the solution to the problem stated is inevitable. According to Hekkert (2016), deconstructing this existing design will help find underlying factors of the presence of the product and helps free the mind of preconceptions. As the most-used micro-mobility solution in the Netherlands, the bicycle seems the most obvious 'existing product' when considering a micro-mobility concept, considering it is responsible for 27.9% of travel (Centraal Bureau Statistiek, 2019). The bicycle as we know it today was created in the late 1800s (Andrews, 2017), meaning that assumptions made when constructing the original design might be obsolete or irrelevant to current society. To gain insight into the raison d'etre of the bicycle and to understand the current solution to micro-mobility, a classic Dutch bicycle will be deconstructed (also known in the Netherlands as an 'omafiets', characterized by its low instep, broad steer, and upright cycling position as seen in figure 4.2).

Deconstruction on the Product Level

Qualities of a product describe how people experience and interact with it. Figure 4.2 shows the product qualities of a Dutch bicycle derived from the designer's opinion and from a workshop with five Cortina employees analysing this exact bicycle to think about a redesign. All physical parts and materials are noted in black. The blue words describe characteristics. The bike is practical, reliable, inviting, and comfortable, expressing that it wants to be used. It articulates that it is robust, strong, sturdy, and proud; all qualities contribute to the feeling of being a decent bicycle that will last the user many rides.

Figure 4.2: Qualities of the Cortina U4 (the classic Dutch 'omafiets')

Deconstruction on Interaction Level

The second step to deconstruction is to analyze the interaction between the product and the user. Four everyday user interactions have been examined for the Dutch bicycle, as seen in Figure 4.3. The interactions defined are in reading order; 1) mounting the bike, 2) parking near the bike, 3) relaxing near the bike, and 4) riding the bike.
The interaction with the bicycle depends heavily on its utility. The experience can be positive (trust, relaxation, relief, joy) and/or negative (annoyance, detachment, clumsiness). The interaction can be practical and targeted (determination, readiness) or relaxed and carefree (at-ease-ness, playful, trust). Descriptions that occurred multiple times are determination, reliability, and trust, suggesting that, despite its many possibilities, the interaction between the user and the bicycle is often practical.

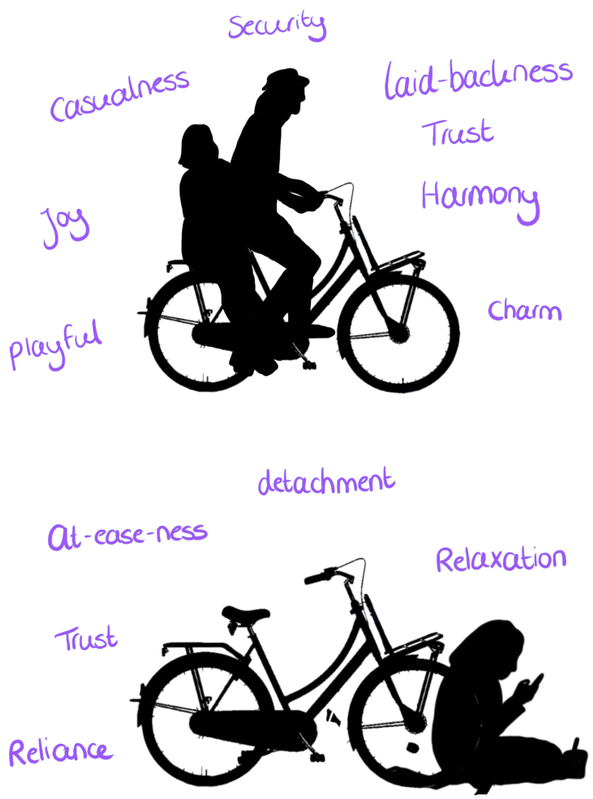


Figure 4.3: Different interactions and their characteristic

Deconstruction on the Context Level

The last step of the deconstruction phase sets out to explore the context the original designer encountered at the time of the design to find potential underlying factors that might not be relevant nowadays.

The archetypical bicycle as we still know it today (two similar-sized wheels, a chain drive, paddles, saddle, and steer) was designed in 1885 by John Kemp Starley in England (Andrews, 2017). Previous inventions, such as the penny-farthing (Figure 4.4), had existed before this but were mainly used by hobbyists and competitive cyclists. The reason for the 'safety' design by Starley (as it was called due to its similar-sized wheels) was a scarcity of horses caused by a food shortage. The ordinary person needed an alternative but affordable way to get to work. Thus the bicycle was created. An interesting example of design influencing future mobility can be found in the United States. Cycling was popular around the 1900s, but American roads were in bad condition. The increased bicycle use caused a demand for better roads, which the government eventually honoured (Stromberg, 2015).

Figure 4.4: The Penny-Farthing (Swisscycles, 2021)

As can be observed in Figure 4.5, the archetypical design of the bicycle has mostly stayed the same since 1885. The reasons for Starley to create the safety bicycle were that any man must be capable of riding it, that it was suited to the English roads of the late 1800s, and that the average man could use it for his commute (Andrews, 2017). The New York Times wrote in 1896: "The bicycle promises a splendid extension of personal power and freedom, scarcely inferior to what wings would give" (The Journal, 1896). At the time of the design, the bicycle was created solely for men and sought to provide a more comfortable and safer experience than penny-farthing. People wanted freedom, which the bicycle granted them.

Figure 4.5: The ‘safety bicycle’ designed by Starley (Andrews, 2017)

Relevance to Cortina

During the U4 redesign workshop with Cortina employees, the classic Dutch bicycle was deemed practical, reliable, inviting, robust, and sturdy. According to employees, the U4 is Cortina's best-selling bicycle, and its iconic carrier at the front is one of the first things consumers name when asked about the brand (PanelWizard, 2022). Cortina's personality is bold, fresh, innovative, and contemporary. Therefore, there seems to be a slight discrepancy between how the U4 is perceived and how Cortina as a brand portrays itself (bold versus practical, fresh versus sturdy, innovative versus reliable). Not to say that the traits mentioned cannot exist simultaneously in one product, but one can argue that certain traits oppose one another. According to Beverland (2018), congruency is vital for a brand's authenticity and credibility. Therefore, future endeavours made by Cortina should be designed with its repositioned personality as described in Chapter 3 in mind, focused on being bold, open, authentic, and inventive.

Deconstructing different interactions a user might have with their bicycle shows that the interaction heavily depends on the context of use and the goal to achieve. However, a characterization most interactions have in common is a practical one: the bike is a tool to achieve something. This interaction endorses the envisioned and described relationship in chapter 3.6 between a Cortina bike and its user of a hero and their sidekick.

The deconstruction on the context level led to exciting similarities between the first bicycle's design and the Cortina brand's foundation. Both resulted from the inadequacy of established transport: the first being horses and the second being cars. Interestingly, the safety bicycle was praised for giving men freedom but was primarily used to go to work. Upon its introduction in 1973, the Cortina bike enabled customers to cover further distances on Sundays when cars were not allowed on the roads or when gas prices rose too high due to the oil crisis. Although not always the primary means of transport, cycling is something humanity can always fall back on when all else fails.

4.2 The Future Context

The deconstruction phase of the Dutch bicycle leads to insights about the product in the present and the past. In what future will the new solution operate? This subchapter describes the design of the future context in four steps: 1) establishing the domain, 2) generating & structuring context factors, 3) finding storylines & dimensions, and 4) creating a worldview.

Establishing the domain

An appropriate domain is needed to assess what observations and considerations are relevant to the future context. According to Hekkert (2016), the domain describes the area where the designer aims to contribute. The original assignment of Cortina was to 'design the bicycle of 2035'. This objective presupposes the direction for a solution, as it dictates that the result of the project must be a bicycle, disregarding whether the context of use in 2035 still calls for such a product. A less specified description of the domain can guide the exploration of the context without restricting its outcome:

'A micro-mobility concept for the brand Cortina catered to people's daily lives in 2035 in Western European cities.'

Generation of Context Factors

A context is the sum of its defining factors, taking shape in observations, thoughts, theories, laws, considerations, beliefs, or opinions from any source. Factors are value-free descriptions of world phenomena. They can be trends when describing people's behaviour or values, developments when defining changing phenomena, states when illustrating surrounding world conditions, or principles when depicting factors unlikely to change (Hekkert, 2016).

A trend analysis (See Appendix A: Trend Analysis) yielded factors relevant to the previously described domain: 'A micro-mobility concept for the brand Cortina catered to people's daily lives in 2035 in Western European cities.' Combined with elements originating from the designer's perspective, findings from Chapter 2, and a trend lecture given by Cortina (Tijssen & Kruitbosch, 2022), multiple context factors were generated. Appendix B: Context Factors & Clustering contains a complete list of all context factors.

Structuring of Context Factors

Context factors are clustered to find out how they intricately connect. Factors can share common qualities when pointing to the same phenomenon or have emerging qualities when describing a factor not yet found. For example, ' Decrease of the nine-to-five lifestyle' and 'Women have fewer children on average' result in the emerging factor 'Decrease of people living in a classical household'. Correlating context factors are represented by eleven clusters, as seen in Figure 4.6. For more information on clustering the context factors and establishing relationships, see Appendix B: Context Factors & Clustering.

SUSTAINABILITY

We Live On A Finite Planet With Finite Resources (Principle)
Combustion Engines Omit Emissions That Are Harmful To Our Planet (Principle)
Walking Or Cycling Is Better For The Environment Than Public Transport Or Private Cars (State)
Global Warming Is Increasingly Globally Recognized As A Problem (Trend)
Due To Global Warming (Development), More People Strive For A Sustainable Lifestyle (Trend)
Due To Global Warming (Development), More People Search For Alternative Transport Methods (Trend)
It Is Detrimental To A Person's Health To Inhale Combustion Engine Emissions (Principle)
Congestion And Traffic Jams In Cities Are Getting Worse (Development) So People Tend To Find Alternative Means Of Transport (Trend)
Sustainable Legislation (Such As The Right To Repair) Is Increasing (Development)
The Infrastructure Of Future Cities Will Favor Bike-Sharing And Public Transport Over Private Vehicles (Development)
The Decrease In Private Cars Will Free Up Space In Cities (Development)
Brands Are Becoming More Sustainable (Development) Due To Demands From Governments And Customers (Trend)
Research In Alternative Fuels Is Increasing (Development)
The Use Of Electric Cars Is Increasing (Trend)
In The Future, More Vehicles Will Be Powered By Electricity Or Alternative Fuel (State)

DIGITALIZATION

There Will Be An Increasing Obsession With Security, Due To Increased Opportunities For Information Sharing And Storage (Development)
Mobility As A Service (MaaS) Platforms Are Increasing (Development)
Digitalization Is Pushing Toward Smaller And More Flexible Modes Of Micro-Mobility (Development)
Integrated Mobility Platforms And Algorithms Will Optimize Mobility Services (Development)
The Internet Of Things Creates Seamless And Data-Driven Experiences But Also Calls For Policy Regarding Data Protection (Development)
There Will Be An Increasing Obsession With Security Due To Increased Opportunities For Info Sharing And Storage (Development)

HEALTHY WORK/LIFE BOUNDARIES

Due To The Increasing Equality Between Men And Women (Development), And The Decrease In The Amount Of Children Women Have (Development), People Do Not Live In Classical Households Anymore But In More Single Apartments (Trend)
The Demise Of The Nine-To-Five Lifestyle (Trend) Will Result In More Spontaneous Activities (Trend)
People Will Be Free To Make Their Own Choices And Pursue The Life They Want Due To Societal Norms Diminishing (Trend)
The Nine-To-Five Mentality Is Disappearing And Making Way For A Balanced Lifestyle Between Work And Free Time (Trend)
Companies Are More Flexible Regarding Remote Work And Hours (Development)

CITIES OF DIVERSITY

Almost One In Three European Cities Will See Their Population Increase By More Than 10% In The Next 30 Years (Developments)
By 2070, Life Expectancy In The EU Will Have Risen To 88.2 Years (Development)
Citizens Will Be Invited To Co-Create Solutions Together With Municipalities (Development)
The Population Of Cities Will Be More Diverse (Development)
Increasing The Need For Inclusive Mobility Options

EVOLUTION

Movement Is Beneficial (Or Perhaps Even Crucial) To One's (Mental) Health (Principle)
People Need To Feel Safe And Secure (Principal)
The Society We Live In Is So Convenient That We Suffer From An Obesity Pandemic (State)

CULTURE

Political Polarization Will Lead To A Divide In The Population (Trend)
Because Of Remote Work And Flexible Hours (Development), Transport Is No Longer Merely A Means Of Moving From A To B, But Can Be Regarded As A Time For Socializing Or Introspective (Trend)
In Many Cultures, A Street Is A Social Place For Everyone (State)
The Cultural Norm Is That, When It Comes To Transport, Travel Time Is Most Important (State)

DESIRES

People Want To Belong To A Group (Principle)
People Care What Others Think And Want To Be Trendy (State)
High School Students Want A Bike With A Crate (Trend)
Everyone Wants To Be Unique (Trend)
Teenagers Have A Smartphone Around The Time They Go To High School (State)
Everyone Is Connected And Present On Social Media (Trend)

STAND OUT FROM THE CROWD

People's Brains Are Wired To Choose The Most Convenient Option (Principle)
People Value Good Service (State)
Product Differentiation Is Decreasing Due To Globalization (Development)
People Choose A Brand Identity That Fits Them When Purchasing A Good That Does Not Differentiate Much From Its Competitors (State)
Authenticity In A Brand Is Becoming More Important (Trend)

MATTERS OF THE MIND

The More Choice A Person Has, The Less Likely It Is That They Will Make A Decision (Principle)
People Are Inherently Reluctant Towards The Unknown (Principle)
People Tend To Value Order And Make Rules For Chaotic Situations, Such As Traffic Rules (Principle)
Ownership Is No Longer The Norm As Products Are Offered As A Subscription Or Service (Development)
People Rationalize Big Expenses (Principle)

FREEDOM

People Get Attached To Their Possessions And Therefore Care For Them (Principle)
A Bicycle Is An Extension Of You As A Person And Gives Freedom To Go Where You Want (State)
People Value Freedom (Principal)
Cycling Is Dutch Culture (State)
A Bicycle Is More And More An Expression Of Identity (Trend)

Figure 4.6: Clustered Context Factors

Storylines & Dimensions

The clusters found describe overarching themes and relationships in either a storyline; a specific 'narrative' describing the future, or a dimension; a conflicting relationship of opposing dimensions. This section describes the congruent storylines and dimensions in detail. For more detail about the context factors leading to these storylines and their sources, see Appendix B.

Storylines

- Due to increasing sustainable legislation from governments and demands from customers (trend), brands are becoming more sustainable (development), and research in alternative fuels is advancing (development).
- Emissions from combustion engines are bad for the environment (principle) and detrimental to a person's health (principle). The increasing recognition of global warming as a problem (trend) will lead to more vehicles being powered by electricity or alternative fuel (state), causing an increase in its research (development).
- People are looking for alternative modes of transport (trend) due to their decision to lead a more sustainable life (trend) because of global warming (development) and the worsening of congestion and traffic jams in cities (development).
- Digitalization is pushing toward more minor and more flexible modes of micro-mobility (development), just as people are trying to find a solution for a sustainable lifestyle (trend) and congestion issues (development).

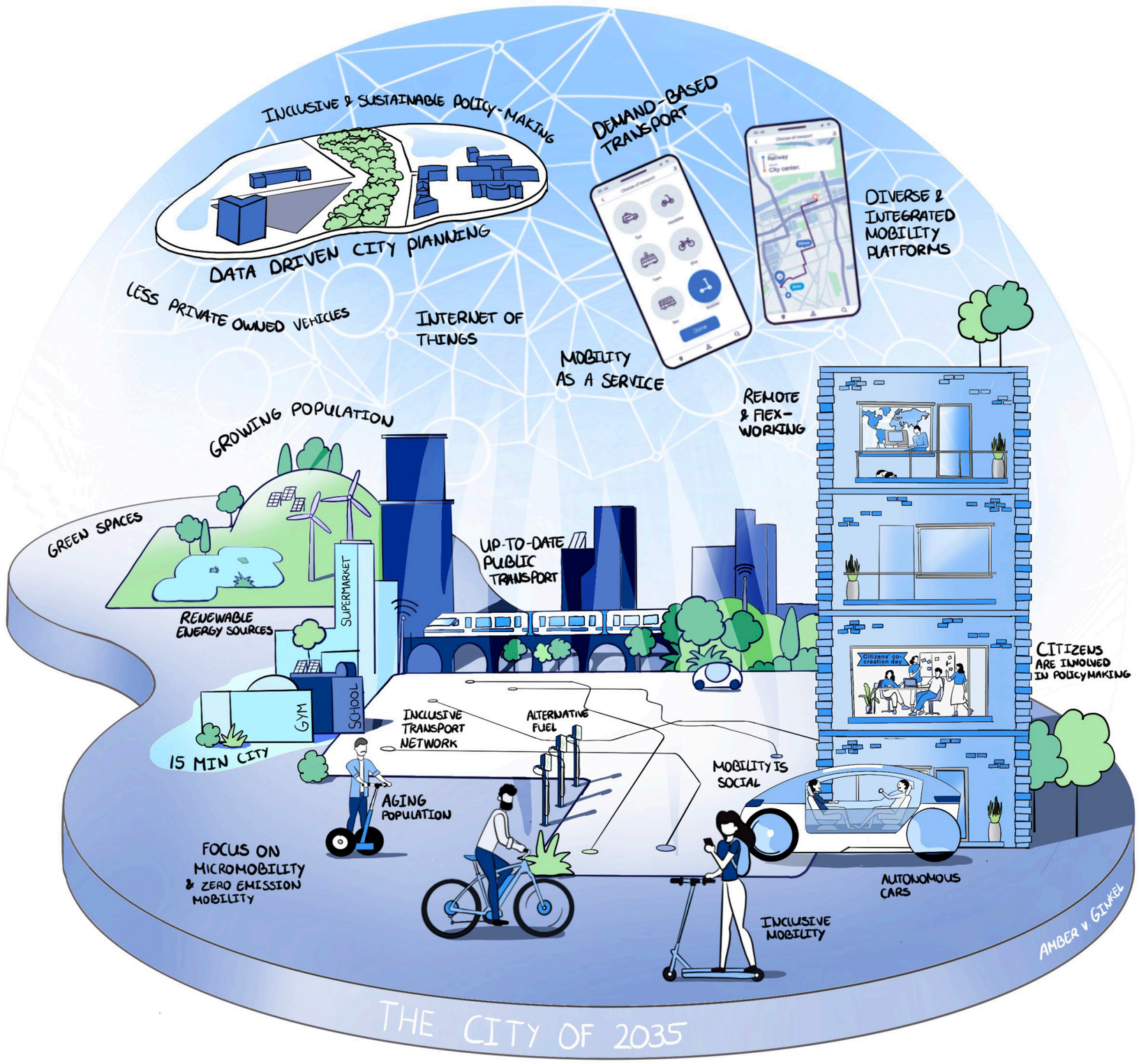


Figure 4.7 Illustration of the City of 2035 based on the narrative found in clusters

- Due to globalization (development), it is more challenging for brands to distinguish based on product alone. Therefore, brand authenticity is essential (trend) to distinguish oneself from other brands. People tend to choose the most convenient route (principle) and value good service (state), which brands can use to differentiate from competitors. People want to create order in chaos, so brands must distinguish (principle).
- Ownership is no longer the norm (state) due to a decrease in the nine-to-five lifestyle with the car as a status symbol (trend). Recognizing global warming and the private vehicle influence on the environment (trend) results in an upsurge in subscription-based business models (development). Due to the growing equality between men and women (development) and the decrease in the number of children per woman (development), people do not live in classic family-centred households anymore (trend). This results in the demise of the nine-to-five lifestyle (development), an emerging emphasis on a healthy work/life balance (trend), and people gaining the freedom to express their own identity (trend), granting more opportunity for spontaneity (trend).
- It is inherently human to crave freedom (principal), which a bicycle provides in the form of transport (state), originating from its first design. A bicycle expresses identity (trend), leaning on its heritage as a Dutch cultural symbol (state).
- The population of Western European Cities will grow and become older (trend), resulting in a need for more inclusive mobility (development) and co-cre-

Dimensions

- The Internet of Things will create seamless and data-driven experiences in the future (development), or there will be an increased obsession with privacy and security due to the increase in data collection (development) prohibiting an on-demand and personalized system from originating.
- People get attached to their possession resulting in a feeling of responsibility and care (principle). In contrast, products are increasingly offered as subscriptions (development).
- People want to belong to a group (principle), as described by the need for a smartphone (state) and bike with a crate (trend) among students, but also want to be trendy and unique (trend) while doing so.
- Current society is so convenient that the Western population suffers from an obesity pandemic (state) because people tend to choose the most convenient route offered (principle). In contrast, movement is beneficial (and perhaps crucial) to one's (mental) health (principle).
- In many cultures, a street is a social place for everyone to meet and converse (state). However, political polarization and distrust can lead to a divide in the population (trend).

Creating a worldview

The storylines apply to all or most future scenarios, but the dimensions discovered do not. The dimensions' prevalence will describe our future, depending on which conflicting clusters will prevail. The dimension found resulted in two contrasting axes seen as in Fig-

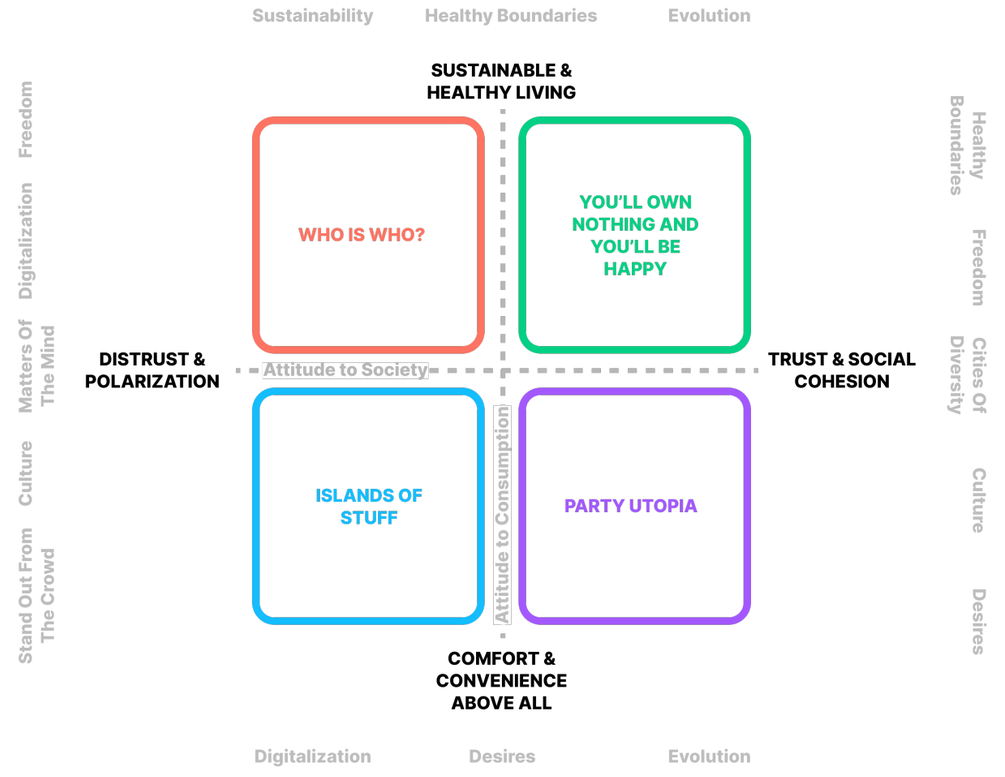


Figure 4.8 Dimensions of the Future World

The vertical axis 'Comfort and Convenience above all' versus 'Sustainable and healthy living' describes the conflict between people's biological tendency to convenience and the principle that movement (often not the most convenient choice) is crucial to one's health. The human brain is always searching for the next dopamine hit, leading to mass consumerism, which conflicts with a sustainable lifestyle. It describes society's attitude towards consumption. The horizontal axis' Trust and socialness' versus 'Distrust and polarization' describes different reactions that might ensue from increased data collection and da-

ta-dependent products in the future. It also describes sharing wealth, transport, and trust with other people. In short, it describes people's attitudes toward society. The blue words describe the corresponding clusters.

Each quadrant is named and contains attributes of a specific future world (Figure 4.9). The scenarios depicted are extremities, and all have negative and positive factors. The predicted scenarios are as follows:

Party Utopia

People are generally of good faith and open to sharing what they have with strangers. They are highly social and want to experience as much as possible. However, these experiences must be comfortable and convenient. No resource will be left untouched in the search for the cheapest and fastest way to achieve a goal. Mobility is shared when possible, but not necessarily so, and the mobility in question operates on the most straightforward resource to get by. Databases are widely accessible, and companies monitor people attempting to sell more experiences. People live in lavish houses built close together for social cohesion. This society is characterized by mass consumerism and shared greed.

Islands of Stuff

People are close-minded and do not trust strangers, let alone share with them. They are driven by consuming goods and food. Politic beliefs are polarized because of distrust, and the gap between the poor and rich is expanding. The ones who can afford it live a convenient lifestyle, heavily utilizing on-demand delivery services, resulting in obesity. The ones who cannot afford this cater to the needs and deliveries of the more fortunate, resulting in political separation. People are wary of who is using their data; therefore, shared mobility, or demand-based mobility, cannot flourish. The private car is the primary mode of transport and serves as a status symbol.

Who is who?

Due to the distrust of other people and the data anonymity, people are sheltered and focused on themselves. Legislation and the common belief in fighting climate change have resulted in a ban on gas combustion vehicles or polluting activities. Since people only care about themselves, no systems are in place to boost equality, and only the rich can afford private (and expensive) sustainable vehicles. The poor use of inadequately maintained public transportation due to companies' focus on sustainable vehicles. People have plenty of free time due to healthy work-life boundaries and use this to exercise on their own or spend time in the metaverse, where everyone is anonymous.

You'll own nothing, and you'll be happy

People feel a shared responsibility for each other and the planet. They trust strangers and are of good faith regarding their data, and recognize that a sustainable lifestyle is necessary to save their health and the planet. People join community-oriented activities and have plenty of leisure time due to their healthy work/life boundaries. Everyone shares and owns the street, and mobility is often on a shared subscription basis. Public transport is accessible to all. People live together in close knitted areas with plenty of green space and recreational activities. Data is collected to offer better services and predict
people's actions. The quadrant is named after a prediction made in 2016 by the World Economic Forum (Reuters, 2021). Since then, sceptics have often used it to describe subscription-based business models as a protest against the fact that ownership of utilities is shifting towards manufacturers out of fear of giving big corporations control and customer data.

Figure 4.9: Future World quadrants

Scenario choice

The future scenario selected to design for is 'You'll own nothing, and you'll be happy'. This decision is primarily based on the fact that the chosen worldview is the most similar to the worldview resulting from the trend analysis. Furthermore, the designer's conviction that this is the most desirable worldview most befitting Cortina's brand identity of being open, innovative, and trendy, which goes hand-in-hand with a world in which we share all, and people trust each other. The last argument for this worldview was the results of a questionnaire among 100 visitors of the Dutch Design Week in Eindhoven. Cortina attended the Dutch Design Week for two days, presenting people with a contest. Participants could submit an answer to the following question, 'How do you get from A to B in the city of 2035?' to win an e-bike. The dataset containing the results can be found in Appendix C. Of the participants, 19% answered that they expected to use an e-bike, 15% a regular bike, 11% shared mobility, 10% public transport, 5% walking, and 1% a car. The other 39% had other answers, ranging from 'flying' to 'by tunnels underneath the city'. These answers will be utilized as inspiration later in the project. Cortina initiated the contest, and therefore people might have been inclined to give replies that they deemed fitting to the brand.

From the results, most people anticipate using an electric bicycle in the future, which likely will be shared. Public transport is a future means of transport, and so is walking. The scenario that best describes this representation of (shared) (electric) bicycles is scenario four. It is the designer's opinion that this scenario is the most desirable and most in line with the afore-carried-out analysis. Furthermore, designs made today shape tomorrow, so a design catered to a particular worldview will increase the likelihood of that worldview happening. This responsibility must not be taken lightly, and the 'You'll own nothing, and you'll be happy' is arguably the most desirable one for humanity's future, hence the decision to design for the quadrant.

Lastly, the choice for the 'You'll own nothing, and you'll be happy' quadrant is deemed most realistic considering the trend lecture given by Cortina (Tijssen & Kruitbosch B.V., 2022), where the brand predicted a growing demand for sustainability and shared mobility in 2030.

4.3 Statement

Now that a future frame has been created, a response to the chosen worldview can be determined. A statement describes this response, defining the goal of the micro-mobility concept within the established context. The statement will give further guidance to the project without defining what the product will be or what it will do.

In the 'You'll own nothing, and you'll be happy' scenario, as defined in the previous subchapter, mobility is shared and subscription-based. The downside to the scenario described can be that due to the abundance of sharing- and subscription-based models, people have difficulty expressing themselves and distinguishing from others, limiting their freedom. Several studies have shown that having free choice significantly positively impacts a person's happiness (Inglehart et al., 2008), (Glatzer et al., 2010). Furthermore, subscription-based models and shared services evoke ownership and responsibility issues (Cherry & Pidgeon, 2018). For example, shared mobility options get damaged or parked unjustly, causing a nuisance (Figure 4.10). Subscription-based scooter brands such as Go have recently removed many fleets from cities due to investment problems stemming from this lack of responsibility (RTL Nieuws, 2022).

Chapter 3 described Cortina's heritage as a cooperative brand that serves unmet needs. The recommendation was made to alter Cortina's driving philosophy to cooperation and invention, making the brand authentic to its original heritage of creating bicycles for the underserved market. The statement resulting from this worldview must suit the Cortina brand.

According to Chapter 3, the statement must reverberate about sharing data, mobility, and time with others, as that is what the world will become. At the same time, the feeling of freedom and self-expression must be preserved in society not to decrease people's happiness. Although there probably will be a decrease in the ownership of vehicles, the accompanying responsibility felt by users must not decline to prohibit nuisance and abuse. Lastly, the statement must be congruent with Cortina's values. Therefore, the statement defined is as follows:

> Enabling people to feel like a part of something bigger without losing autonomy so they can be their authentic selves while interacting with the concept

The statement promotes a healthy balance between feeling like an essential part of society without simultaneously feeling like 'another cog in the machine'. The perceived sense of autonomy is crucial to the sharing economy's success and a trustful society. Responsibility, freedom of choice, and pursuit of one's interests are vital to a person's happiness (Inglehart et al., 2008) (Glatzer et al., 2010). The concept should evoke the feeling of being part of something bigger to evoke

responsibility and trust in others. According to research among 160.436 individuals in 69 countries by Jen & Sund (2010), higher levels of self-rated health are associated with higher levels of trust, indicating social cohesion. Furthermore, Delhey & Dragolov (2014) argue that distrust mediates inequality, and inequality lowers a society's well-being.

As mentioned in the statement, autonomy encompasses freedom, excitement, ownership, and responsibility. Men acquired freedom by purchasing their first bicycle, as seen in Figure 4.5. It is human nature to crave freedom, and history has shown that with a developing society, people become freer to decide their faith and become happier (Glatzer et al., 2010), demanding more evolved needs to achieve happiness such as self-actualization, which describes morality, creativity, purpose, and inner potential (Maslow, 1943). Where freedom a thousand years ago meant the opportunity to go wherever one desired, it now has become much more; it is to be whom one wants to be, express themselves, and decide the course of their life. The statement describes a balance between people's autonomy and the responsibility of society's benevolence. When people feel ownership and accompanying responsibility, they behave accordingly and take better care of the received 'thing' (Cherry & Pidgeon, 2018).

4.4 Analogy & Product Qualities

An analogy can fully describe the feeling the concept will evoke, as written in the statement in the previous subchapter.
The analogy communicates the design vision and yields characteristics and interactions useful for the project. The statement and analogy together form a vision of the relationship between the user and the product, as a product can only absorb meaning in relation to a user. The statement indicates whát the product will offer, and the analogy describes hów it will be offered. Simultaneously, the vision briefly describes the target group, composed of people attracted to the goal and interaction defined. An analogy from another domain describes the interaction envisioned in the statement. In this way, appropriate interactions emanate from another perspective.

The Equestrian Centre

A fitting analogy for the statement is one of an equestrian centre, as this construct has many aspects congruent with the envisioned statement.

An equestrian centre is a tight-knit community working towards a common goal; riding horses. The horses present at the centre are owned by people paying the centre to care for their animals or by the centre itself. In the former case, others often may use the animal in return for caretaking services. The maintenance of the horses is a shared responsibility between the centre who has to provide food and shelter, and the various equestrians that carry the responsibility of combing and saddling the animal and treating them well during a ride, which requires a high level of trust and responsibility in one another, as the goal cannot be achieved when one aspect fails.

Belonging to a tight-knit community may be one reason for a responsible feeling among the equestrians. However, another important one is the bonding between horse and rider. When horse riding, the equestrian is in control and can go wherever they please. However, they are dependent on their horse. This analogy fits Cortina's envisioned relationship between a hero and a sidekick (Figure 4.11).

Figure 4.11: Hero and sidekick (Bentley, 2022)

The equestrian feel responsible for the horse since it enables them to do what they love. The equestrian is fully autonomous while still feeling responsible for the well-being of the horse and the welfare of their community as a whole.

When it comes to the gear needed for a successful horse ride, it is partly provided by the equestrian centre as saddles and bridles get tailored explicitly to a horse. It is possible, however, to adjust the stirrups and length of the reins to the equestrian's wish. The equipment worn by the equestrian such as a cap and riding boots, is their responsibility. In the equestrian world, there are many ways of self-expression through clothing, as seen in Figure 4.12. Self-expression of the equestrian is also conveyed to the horse, as their mane and tail are sometimes braided or accessorized. Outfit choices have limits since clothing must be practical for horse riding.

Figure 4.12: Campaigns by Ralph Lauren for equestrian fashion (Ralph Lauren, 2012)

The analogy might not describe the envisioned interaction perfectly, but it is appropriate to see the interaction from a different perspective and to define product qualities. A second analogy is present in the overarching one of the equestrian centre. Horses were one of the first modes of transport used by humans, and a shortage of them in the 1800s led to the widespread implementation of the bicycle. To compare a bicycle to a horse is therefore not so far-fetched as first may seem. The bike was once designed to enhance the commoner's freedom as an alternative to horse riding. The mechanics of a society focused on the latter may very well provide insights into how to improve the mobility market nowadays. Lastly, horse riding and bicycling benefit one's health, as they are outdoor sports activities. Figure 4.13 shows the analogy of the Equestrian Centre and points out its similarities with the statement.

Product Qualities

Qualitative product qualities evoke an interaction between a user and a product. Thus, the correct implementation of them in the design of a micro-mobility concept will aid in realizing the envisioned statement. Product qualities can express a product's character or describe how the product is used or operated. The analogy provides insights into the characteristics of the desired interaction, making the concept more defined. If it is necessary to describe the envisioned interaction with both a complex system (the equestrian community) and a 'product' (the horse), it can be concluded that the final result must be of the same magnitude. Therefore, the final design must at least consist of a
system or service, and perhaps a tangible micro-mobility product.

An equestrian's attitude towards the equestrian centre describes the future user's attitude towards the possible system or service in which the envisioned micro-mobility concept shall be shared among a community. The analogy identifies this attitude as responsible, social, open, trustful, dependable, and caring. An equestrian's attitude towards their hose typifies the relationship between a user and micro-mobility product: enabling, trustful, inviting, free, supporting, caring, and responsible.

The distinction between system and product broadens the scope of the project. In the following chapter, a decision will be made regarding this split to define the scope again.

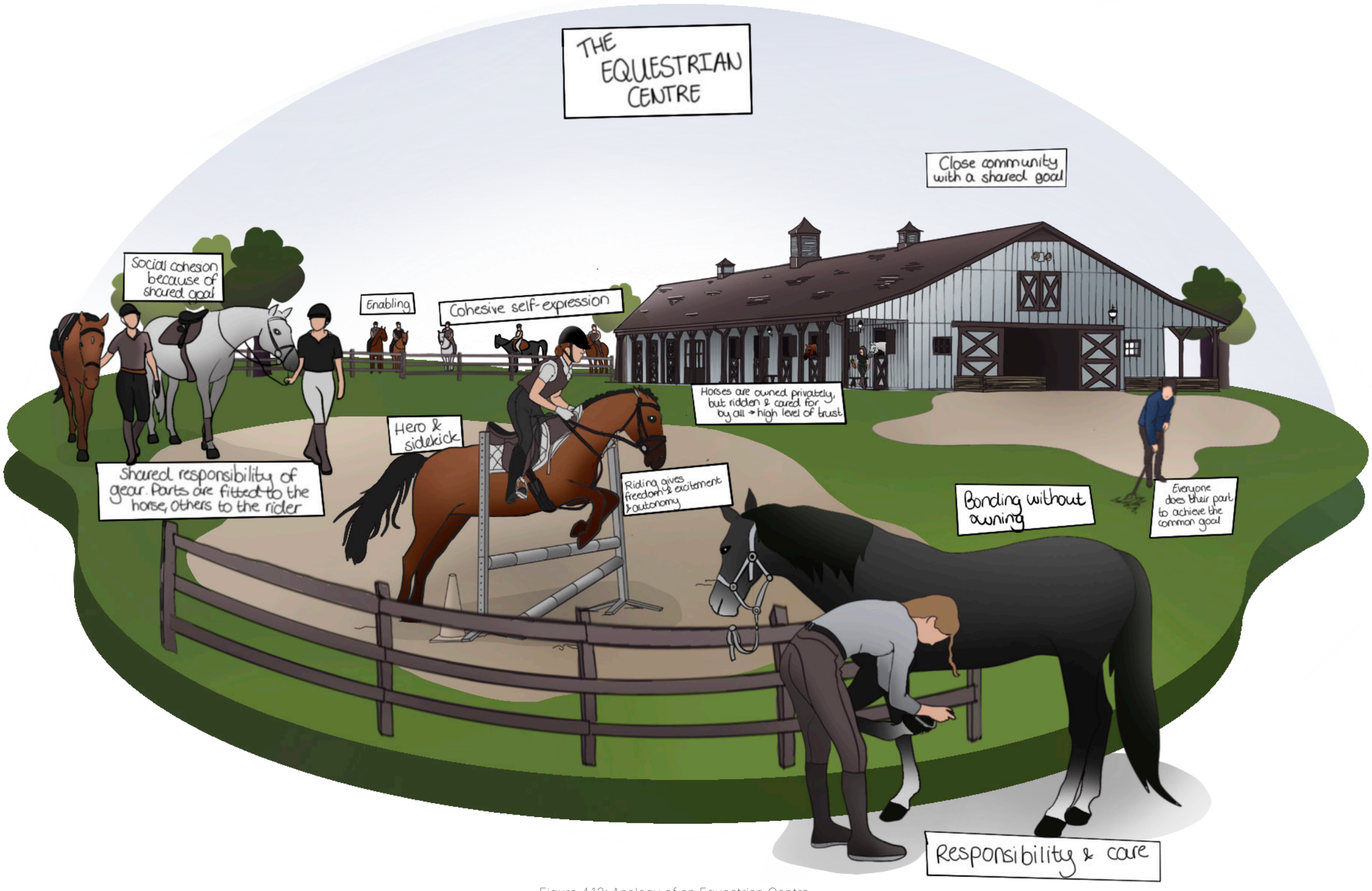


Figure 4.13: Analogy of an Equestrian Centre

4.5 Conclusion & Design Implications

This chapter utilised the ViP method (Hekkert, 2016) to create a future context in which the design will operate and an accompanying vision. During the deconstruction phase, it became evident that the interaction between a bicycle and its user heavily depends on the user's context and the goal to achieve. A joint characterisation of most interactions is practicality: the bike is a tool to achieve something. This interaction endorses the envisioned relationship between a Cortina bike and its user of a hero and their sidekick.

Although not always the primary means of transport, humanity can fall back on cycling to provide freedom. The city of 2035 will presumably be as illustrated in Figure 4.7, with variances between dimensions described in Figure 4.9. Based on the trend analysis (Appendix A), Cortina's brand analysis, and a questionnaire conducted by Cortina during the Dutch Design Week, the worldview 'You'll own nothing, and you'll be happy' is regarded as the most plausible in 2035. This worldview is characterised by shared responsibility for each other and the planet, trust, and a sustainable lifestyle necessary to save the planet.

The statement generated as a reaction to the chosen worldview is as follows: enabling people to feel part of something bigger without losing the autonomy to be their authentic selves while interacting with the concept. Together with an endorsing analogy, the statement forms the project's vision. Being their authentic selves enables people to express themselves and feel freedom while being encouraged to share, improving trust and society's happiness (Glatzer & Stoffregen, 2010). The design must make people feel part of a community with a common goal, resulting in a shared sense of responsibility, social cohesion, and high levels of trust.

This statement is reinforced by the analogy of an equestrian centre (Figure 4.13), showing that the design must make people feel part of a community with a common goal, resulting in a shared sense of responsibility, social cohesion, and high levels of trust. The design must make people feel like they have a hero-sidekick relationship befitting Cortina's brand identity relationship, encouraging responsibility and care for the concept while evoking a sense of exploration and adventure. With this goal in mind, plus the obesity pandemic and the resources shortage, the design will not be electric but encourage people to move their bodies healthily. The design must encourage people to engage in sustainable behaviour and a healthy lifestyle for the user and the planet. The product qualities derived from the analogy will serve as input for the ideation phase of the project and the Design Brief.

Design Implications

Practicality
The design must offer people mobility in a practical manner. The design must be a tool to achieve something and endorse a hero-sidekick relationship.

You”ll own nothing and you’ll be happy
The design must operate in a world as described by the quadrant ‘You’ll own nothing, and you’ll be happy’, which is described by shared responsibility for both people’s health and the planet.

Statement
The user of the concept should feel like a part of something bigger without losing autonomy so they can be their authentic selves while interacting with the concept.

Vision
An analogy of an equestrian centre describes the interaction envisioned in the statement. This analogy should serve the design and generate ideas and inspiration. The design should also adhere to this vision.

Behaviour
In order to realize the statement, the design must evoke certain feelings in users, which are responsibility, exploration, a healthy lifestyle, trust, and social cohesion.

Healthy lifestyle
The design will not be a less-active alternative to an active form of mobility to prohibit the rise in obesity. Therefore, it will not be electric but will encourage people to move their bodies and aid in a sustainable lifestyle.

5. Synthesis & Design Brief

The previous chapters generated plenty of design insights and a vision generated using the Vision in Product method (Hekkert, 2016). To use these insights to design a micro-mobility concept, they are synthesized in a Design Brief.

This chapter describes two brainstorming sessions with students and Cortina employees using product qualities from the previous chapter as input. This brainstorm generated possible solution directions refined in the design direction subchapter, narrowing the project's scope. The refined scope and the previously gathered design implications form the Design Brief in subchapter 5.3.

The tweaked design direction and Design Brief serve as input for concept creation and choice in Chapter 6.

5.1 Brainstorm & Brainwriting
5.2 Design Direction
5.3 Design Brief
5.4 Conclusion

5.1 Brainstorm & Brainwriting

Two brainstorming sessions were held to start generating ideas for the project; one with Industrial Design Students (Figure 5.1) and one with Cortina employees. Those sessions aimed to create input for the concepts to be designed and to gain insight into how well the analogy made would be understood and used as input for the brainstorming. The brainstorming with students served partly as a pilot for the brainstorming with Cortina employees. As input for ideation, the product qualities resulting from ViP in Chapter 4 served as input for how-to questions, such as:

Figure 5.1: Brainstorm Session with Industrial Design Students

- How to make something reliable?
- How to make something inviting?
- How to make something obedient?
- How to make something enabling?

Figure 5.2: Presentation for Brainstorm Session at Cortina

Detailed documentation of the output of the brainstorms can be found in Appendix D: Brainstorm & Brainwriting Sessions.

Both groups participating in the brainstorming immediately grasped the analogy of an equestrian centre. They implemented it in their ideas, validating the metaphor used to illustrate the desired interaction the concept should generate. The student group came up with a broad range of ideas mainly focused on rebuilding a city (for example employing sewer passages for mobility) that were not real-

istic but valuable for idea generation. The Cortina employees contributed ideas about bicycles and technological advancements, such as a new chain for a future bike. The sessions were valuable because they validated the analogy and yielded input fur further ideation. However, a more defined design space could have resulted in a more targeted and relevant outcome.

The brainstorming session's main conclusion was that the project's scope needed refinement, as the possible solution space was significant and viable ideas differed so greatly that comparing was difficult. Additionally, for the Cortina brainstorm, a part of the audience attended online, and the assigned presentation space did not serve as a good place for everyone to draw/write on their own. Therefore the brainstorm remained 'vocal' and did not yield any drawings. The most inspiring ideas from the brainstorming sessions are highlighted in Figure 5.3. For example, the question 'How to make something inviting?' yielded the interesting suggestion to make something transparent, giving a tangible product characteristic to an abstract quality.

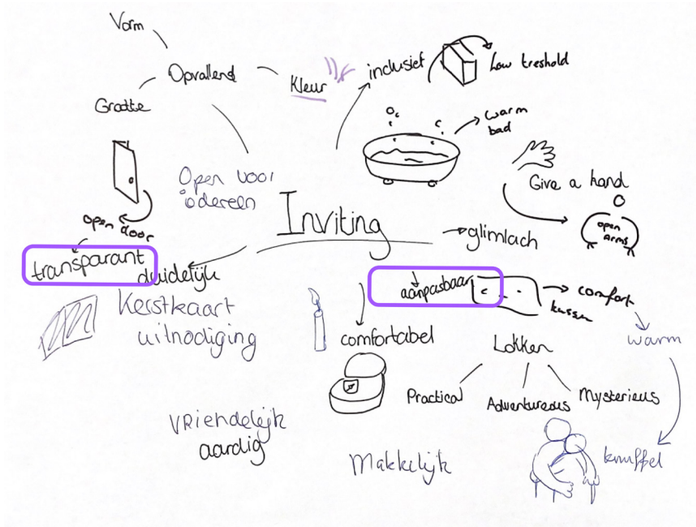


Figure 5.3: 'How-to' results Brainstorm Sessions

Brainwriting sessions

Individual brainwriting sessions were carried out alongside the brainstorming sessions to generate ideas, using How-to prompts as input and explorative sketching as a tool to develop ideas (See Appendix D).

Figure 5.4 shows a promising result of a 'How-prompt' that led to an idea circled in Figure 5.5. The explorative sketching (See Appendix D for more sketches) eventually led to three main 'themes' for potential micro-mobility concepts portrayed in Figure 5.5, 5.6, and 5.7. One focuses on modularity, one on cargo solutions, and one on the hero-sidekick relationship envisioned by Cortina. They all stem from the brand analysis, analogy, and How-to prompts. However, just as in the brainstorming sessions, a clear scope was lacking, as the possible solution space was significant and viable ideas differed so greatly that comparing was difficult.

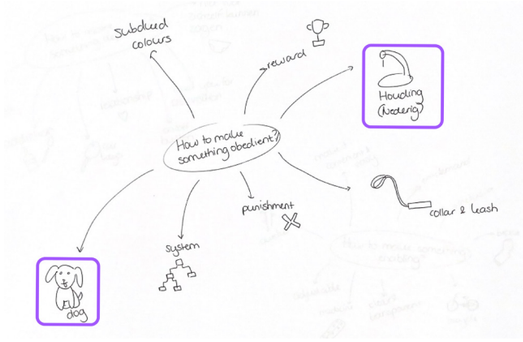


Figure 5.4: 'How-to' results Brainwriting

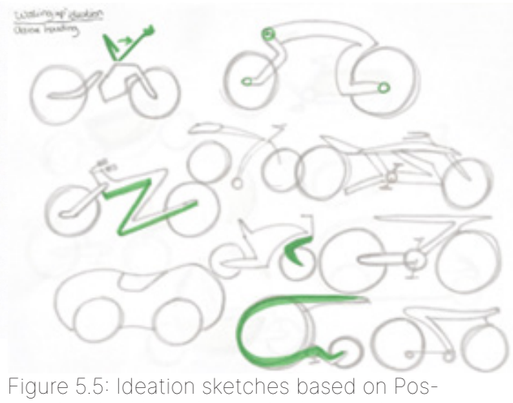


Figure 5.5: Ideation sketches based on Posture, inspired by a dog excited to see its owner

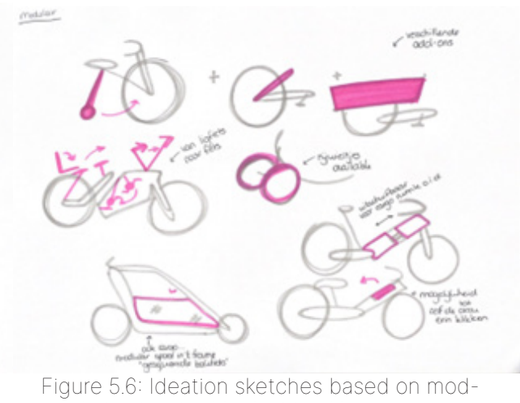


Figure 5.6: Ideation sketches based on modularity, inspired by Inviting How-to prompt (Figure 5.3)

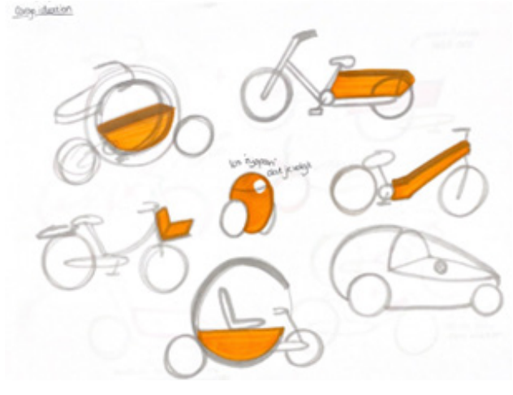


Figure 5.7: Ideation sketches based on Cargo, inspired by Cortina's brand identity.

5.2 Design Direction

After the brainstorming based on previous analysis and design vision, the solution space for the project remains very broad, which results in widely different ideas and difficulty comparing them as encountered during the first ideation sessions. Therefore, this subchapter explores multiple solution spaces for Cortina based on previous research. The main objective of this paragraph is to narrow the solution space by determining a design direction to make idea generation and comparison more feasible and define the Design Brief.

Solution Space

As concluded in Chapter 2, mobility will be a consumable and shared good in 2035, operating in an assumed MaaS system with many different stakeholders. The most important decision for Cortina is to either 1) create a strategy within this new mobility system or 2) create a strategy outside of it. The ideas generated during the brainstorming sessions describe different solution spaces. Figure 5.8 shows a visual representation of those spaces and some examples.

Within the mobility hub system, Cortina could take up different roles. They could 1A) become a provider of shared mobility by becoming the manufacturer of shared bicycles or other devices available at future mobility hubs (Figure 5.9), 1B) become a digital presence within the system and act as a connector for different mobility companies and applications (Figure 5.10), or 1C) claim a physical space in the expected mobility hubs described in Chapter 2 by opening a repair shop, a café, or another physical location (Figure 5.9). Outside of the mobility system, Cortina could 2A) focus on what they are doing and offer privately owned mobility solutions such as bicycles and cargo bikes while trying to invent micro-mobility solutions to keep up with the competition, or they could 2B) become the face of a counter-movement towards shared mobility by campaigning and emphasizing the benefits of having a privately owned vehicle such as a bike (Figure 5.11).

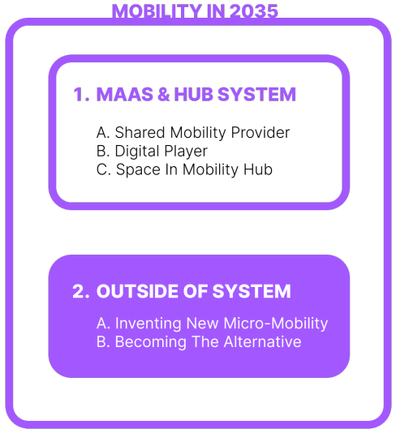


Figure 5.8: Visual Representation of Cortina's Solution Space

Figure 5.9: Cortina claiming a physical space at the hub and/or offering shared mobility.

Figure 5.10: Cortina as MaaS champion

Figure 5.11: Cortina as reliable alternative

Selection of a Direction

To better compare ideas and define the scope of the project, one of the directions portrayed in Figure 5.8 will be selected. The results of Cortina's brand analysis and the defined vision & analogy are used to substantiate the decision for a specific direction.

Brand identity

As mentioned in Chapter 3, Cortina is highly dependent on its foreign manufacturers to supply its products, and resource shortages are already hindering the supply today. A design space focused solely on creating more vehicles with the same resources already lacking might seem like the wrong direction, disadvantaging direction 2A (Inventing new micro-mobility). The Right to Repair legislation (Svensonn et al., 2018) brought up in the SWOT analysis in Chapter 3.5 reinforces this as an opportunity for Cortina by reducing the need for virgin material in the supply chain and decreasing the scarcity of resources predicted by employees of Cortina in the future, suggesting a preference for either direction 1B (Digital Player) or 1C (Space in Hub).

According to Panelwizard (2022), citizens of the Netherlands perceive Cortina as fresh, on-trend, inventive, and open. Choosing to accept and adapt to the expected rise in mobility hubs is a more logical move for Cortina than trying to create a counter-movement, especially since an approach like that is not sustainable for the long term since technological advancement will continue to happen, pointing in the first direction (Inside System).

Looking at Cortina's market size, resources, and competitors, it is unlikely that they will be able to become the facilitator of a MaaS network. Cortina has no prior experience with creating digital apps or data management on a scale that would be necessary. Therefore, scenario 1B (Digital Player) seems unlikely. Cortina has approximately 800 vendors selling its bicycles in the Netherlands and working relationships with many bicycle-related brands owned by Kruitbosch. When choosing a design space, it is essential to consider their needs and expectations regarding business in 2035. Most importantly, Cortina has a proven brand perception of being innovative and open, which better suits embracing new technologies and advancements, reinforcing the choice for direction number 1 (Inside System).

Vision & Analogy

The worldview that was seen as most desirable and therefore will be designed for, as described in Chapter 4, was 'You'll own nothing, and you'll be happy', meaning that society in 2035 is typified by shared products/services and a positive attitude towards sustainable living for health and the planet. For this worldview, the following statement emerged, forming a vision for the future design total:

Enabling people to feel like a part of something bigger without losing autonomy so they can be their authentic selves while interacting with the concept

According to the created vision, the design should facilitate feeling like a part of something bigger and taking responsibility without ownership. Solution 1C (Space in Hub) seems to fit this vision best as it will give ample opportunity to create a space where people can meet, therefore making the opportunity to share, help, and connect, counteracting the feeling of anonymity that can arise when sharing thing with people you don't know (as in solution 1A). Furthermore, it is less reasonable that people feel the need for shared bicycles in their own urban space as their low cost and relatively high usage makes owning more attractive. Parts of solution 1A can combine with solution 1C in later ideation. The design direction is as follows:

Cortina will claim a physical space within the mobility hub of 2035 to facilitate an experience where users can connect and feel like a part of something bigger while remaining autonomous over their mobility.

The role that micro-mobility solutions such as bikes and cargo bikes will have in this scope can be explored during ideation and concept generation.

5.3 Design Brief

This subchapter synthesises all insights gathered thus far in the Design Brief. Based on the original assignment, analyses carried out in previous chapters, and the design direction chosen in this chapter, a list of requirements (Lor) is made (Roozenburg et al., 1998). An LoR must define a project's creative goal (Buijs & Valkenburg, 2002) and determine the design's success during or at the end of the project (Boeijen et al., 2014). The LoR can be found in Appendix E. The requirements from the LoR are narrowed down to 15 overarching principles within the categories of desirability, feasibility, viability, and responsibility, following the pillars of a successful design according to the User-Centred Design method described in the Delft Design Guide (Boeijen et al., 2014) (Figure 5.12). This brief will be used to start the ideation phase, afterwards judge the most viable concepts, and determine the result's success at the end of the project. The list is, just like the entire project, a living thing and can be iterated throughout the project if different requirements arise.

Design Brief

The collected design implications from previous chapters result in a list of requirements found in Appendix E. The requirements are categorised and narrowed down into 15 overarching principles, making up the design brief as follows:

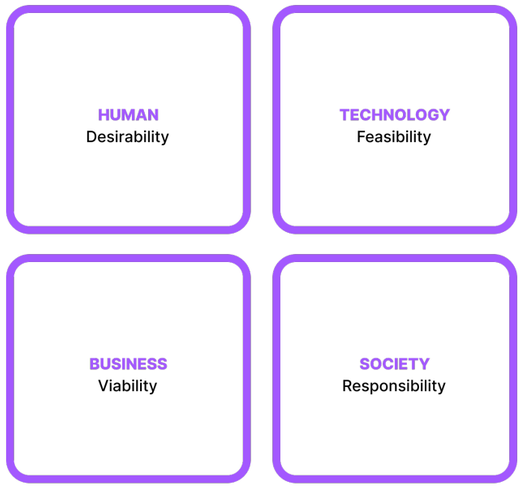


Figure 5.12: Principles of User Centered Design

Desirability

1. Authenticity
How well can the design create the envisioned interaction between the user and product of preserving autonomy while feeling like a part of something bigger?

2. Value proposition
How do the features of the concept benefit all stakeholders in the urban landscape of 2035 in Western Europe in their daily life?

3. Convenience
How easy will it be for potential users to utilise the concept beneficially?

Feasibility

4. Regulation & Legislation
Is the proposal projected to be in line with expected regulations regarding emission and R2R in 2035? Does it merely conform, or does it benefit?

5. Resources Cortina
How easily can Cortina implement the design based on its resources and network?

6. Supply
How realistic will achieving the envisioned design and necessary quantities from manufacturers and suppliers be?

7. Achievability
How realistic will the design be for existing in 2035 based on current and expected technologies?

Viability

8. Brand identity
Will the proposed concept align with Cortina's brand identity and strengthen it?

9. Competitive advantage
How much does the concept differentiate from other products on the market?

10. Business model
How complex will the accommodating business model of the concept be, and how realistic is it that Cortina will gain revenue from it?

11. Risk
How high will investment costs be, and what is the expected revenue the concept will yield?

Responsibility

12. Healthy Society
How much does the design contribute to a healthy lifestyle for its users? Does it lead to sustainable and healthy behaviour?

13. Sustainability
How much does the design impact the environment ranging from minimal impact to a positive impact? Does it not contribute to the scarcity of resources, or does it apply resources wisely?

14. Inclusivity
How much does the design take into account a diverse population? Is it adaptable, or does it ensure everyone can be included?

15. Social cohesion
How much does the design influence social cohesion in a neighbourhood? Does it enable people to know and help each other?

5.4 Conclusion

This chapter explored the possible solution space for Cortina after the analysis phase and construction of a vision. Two brainstorming sessions and brainwriting garnered plenty of ideas and a descriptive structure of solution spaces. This structure provided an overview to refine the scope to compare ideas better and serve the graduation project, resulting in the choice to pursue a solution that takes up physical space in the future mobility hub. Furthermore, all findings from the previous chapters came together into a Design Brief of 15 overarching principles, which will serve as input for concept creation and choice in the following chapter.

DEVELOP

6. Conceptualization
7. Elaboration & Development

6. Conceptualization

With the redefined scope of the previous chapter, the project goal is more precise, resulting in a solid basis for the next ideation phase. This chapter describes the selection of three promising ideas following the ideation phase and their development into concepts. One of the concepts is chosen based on the Design Brief mentioned in the earlier chapter through a weighted criteria method to develop further in the elaboration & development chapter.

6.1 Ideation
6.2 Concept Development
6.3 Concept Choice
6.4 Conclusion

6.1 Ideation

This subchapter will describe the generation of solutions in the set design direction. The ideation in this chapter continues from the brainstorming and brainwriting sessions mentioned in Chapter 5 and the ideas created while constructing a new scope.

Idea to Concept Generation

During the previous brainstorming and brainwriting sessions, it became evident that different subscription or purchase models could serve many concepts implemented as physical space in future mobility hubs. Therefore, these factors of concepts are interchangeable and will not be relevant to the decision choice. The viability of a particular concept regarding its potential profitability will undoubtedly be judged, but not based on the fact that a particular business model serves as an example of that concept.

In the first ideation phase, a repeating theme from the 'How-to's' was openness, which suits Cortina's inventive brand image. Several promising ways for Cortina to fill up space in the future mobility hubs emerged during the second ideation phase. Based on these insights, it was decided to develop one concept around innovation, which had to include an experimental character, as became apparent from the How-to prompt (Figure 6.1).
An idea that had popped up several times was using modularity or adjustability (Figure 5.3) to personalize something and make people feel welcome, encouraging social cohesion and autonomy (Figure 6.1).

Hence, a second concept direction focuses on offering an inviting space suitable for bicycle repairs at the mobility hub.

The last concept direction to investigate stemmed partly from inspiration from the company 'OnzeAuto', which provides neighbourhoods with a shared car if enough people want to join, and partly from the How-to prompt about reliability (Figure 6.2). The idea focuses on Cortina as a facilitator of connecting people and mobility in neighbourhoods, promoting social cohesion.

For all sketches created during the ideation phase, see Appendix D.

Bicycle Ideation

During the first brainwriting sessions, several bicycle ideas were developed beside the aforementioned system-like solutions. Chapter 5.1 described the three eventual ideation rounds focused on modularity, cargo, and interaction. The concept directions mentioned in this section focus on physical spaces or systems and not so much on a physical bicycle. However, a bicycle can be part of any concept direction in line with Cortina's skills and knowledge, which will be explored for each direction in the following subchapter.

To conclude, three concept directions will be further developed in the next section based on results from the second ideation: 1) innovation direction, 2) modularity & adjustability direction, and 3) connection direction.

Figure 6.1: How-to prompts from ideation phase

Figure 6.2: How-to prompts from ideation phase

6.2 Concept Development

This subchapter describes the development of the three chosen concept directions in the previous section. The main objective of this subchapter is to elaborate the concept directions to a level on which they can be evaluated using the Design Brief to select one final concept.

1. Innovation point

The concept of mobility is constantly evolving, and the Netherlands is no stranger to this evolution. As technology advances and environmental concerns rise, developing new and innovative mobility solutions is becoming increasingly important, as described in Chapter 2. The idea of a Cortina innovation point (Figure 6.3) has emerged as a response to technological advances, the expected increase in citizen input in city planning described in Chapter 2, Cortina's innovative brand value, and How-to results from Figure 6.1.

Several innovation points could be located in mobility hubs throughout the Netherlands, creating new mobility concepts with input from residents. The Cortina innovation point entails a physical space in hubs with plenty of traffic in collaboration with local municipalities. The innovation points should look like inviting 'stores' where designers, citizens, and repairmen work together on the future's mobility. Key features of the concept are:

• Serving as an advertisement for the Cortina brand while reinforcing its innovative positioning
• Transparent storefront to ensure approachability and enticing curiosity
• The possibility for travellers to test new micro-mobility options
• A Selling point for Cortina products
• A Place for citizens to give input and be involved in the exploration of new mobility
• Communicating findings to local government

Feasibility

The concept's feasibility depends on Cortina's resources to establish several innovation points, including materials and employees, and permission from local government and hub owners. Potential subsidies for mobility hubs could aid in this dependency, as the concept might qualify considering the gathering of citizen input for city planning.

Viability

The concept does not immediately entail an apparent income flow. However, an innovation point located at highly travelled places is a significant advertisement and inspiration source for Cortina, meaning

Figure 6.3: Concept Sketch of Cortina Innovation Point

profit can originate from resulting sales. The innovation point can sell Cortina accessories and carry out repairs to generate profit. Supplementary revenue streams at the innovation point could be leasing new mobility products. However, a subsidy from the government supporting potential innovation might be necessary.

Innovative ideas generated at the points can lead to successful products. However, this is not guaranteed and poses a risk for Cortina as co-creation with citizens can complicate product development regarding patenting and confidentiality.

Desirability

A mobility innovation point benefits local governments who want to support citizens thinking about their transport and generate future-proof solutions. The innovation point can provide a tangible way for people to make their ideas and opinions known. However, urban residents do not necessarily need shared micro-mobility in their residential area since owning is, in most cases, more practical and attractive cost-wise, lessening a possible revenue stream from leasing products. Lastly, it is unsure whether municipalities creating mobility hubs will prioritize space for innovation, especially for hubs in less popular areas, as the costs might not outweigh the benefits.

A benefit of an innovation point in mobility hubs is the potential for efficient and effective mobility solutions. The innovation point can harbour an environment where mobility experts, designers, and citizens can brainstorm and develop new ideas for improving mobility options' cost, safety, and convenience. Through collaboration and experimentation, the innovation point

can help to create new mobility concepts that are both efficient and effective, improving the overall quality of transportation of the future while casting Cortina as the initiator for these improvements.

Responsibility

Another benefit of the innovation points is their potential to yield sustainable mobility solutions, which is especially important given the Netherlands' commitment to reducing greenhouse gas emissions and becoming carbon neutral by 2050 (Ministerie van Infrastructuur en Waterstaat, 2019). Collaborating to improve the future will also possibly reinforce people's feeling of responsibility towards that future and each other, promoting community engagement and collaboration. The hub can help build trust and foster a sense of ownership over the transportation system by involving residents in developing new concepts, leading to increased support for new mobility options and a greater willingness to change people's thoughts about transportation. Additionally, by bringing together a diverse group of individuals, the hub can encourage collaboration and networking, leading to new ideas and partnerships.

2. The Cortina Café

The second concept direction draws inspiration from the How-to prompts of Figures 6.1 and 6.2 about social cohesion through helping one another and reliability through making someone repairable. These concepts align with the project vision regarding autonomy and sustainability goals set by Cortina. Thus, the concept of a Cortina Café facilitating repairs emerged (Figure 6.4).

The Cortina café is located at mobility hubs facilitating a spot where residents and travellers can repair their bicycles, buy a refreshment, wait on their following form of transport, or meet up with someone else. The café has a multi-purpose function, but its primary goal is to serve as a repair facility, playing into the upcoming right-to-repair legislation described in Chapter 2. The café will be equipped with tools for all users and an employee who can sell beverages or assist in repairs when needed. There will not be a full-time repair technician to encourage people to help each other and learn by themselves. Offering repairs is cheaper and more sustainable than purchasing a new item, reducing the overall resource need.

Key characteristics of the café are:

- Inviting residents and travellers to pass the time or meet up
- Facilitating jobs for Cortina vendors & alleviating pressure on the repair technician job shortage
- Facilitating social cohesion in neighbourhoods by providing tools and space for people to help each other
- Focusing on sustainability by repairing instead of replacing broken parts

- Promoting autonomy as the café provides tools, knowledge, and resources to repair and maintain micro-mobility products, enabling users to have autonomy and control over their mobility, potentially leading to a greater sense of community and self-reliance.
- Encouraging a healthy lifestyle by promoting the use of bicycles and other forms of micro-mobility, helping people to become more active and improve their overall health. Lowering the use of private cars and carbon emissions also creates a more sustainable society.
- Potentially offering a complementary Repair Bike focused on durability and easy repair with parts that can be replaced efficiently at the Cortina Café.

Feasibility

The Cortina Cafés feasibility depends on permits from the local government to take up residence in a mobility hub. Another dependency is Cortina's funds to realize the cafés and employ the people needed. Mobile vans with repair tools could be utilized instead of purchasing many buildings at once to keep costs low when starting a pilot. In the case of a complementary Repair Bike, feasibility regarding easy-to-repair parts also comes into question.

Viability

The Cortina Café can generate profit by selling food and drinks, charging people for spare parts, or hosting repair workshops. Another possibility to generate profit for Cortina would be designing and selling a Repair Bike, which has the unique selling point of being durable and easy to repair with parts available at every Cortina Café. The Repair Bike conveys the sustainability trends found in Chapter 2, offering a potential marketing narrative.

Desirability

The Cortina Café can promote community-building by providing a platform for sharing knowledge, skills, and experiences, fostering a sense of community own-

ership and responsibility towards the environment. The Café supports a resilient and sustainable community, encouraging people to repair and fix their products instead of discarding them. Moreover, Repair Café can be an excellent opportunity for people to socialize, make new friends, and connect with other community members.

The Cortina café is an advertisement for Cortina as a sustainability pioneer in the cycling world, congruent with its innovative brand value. Municipalities will have to acknowledge the desirability of the café, which entails benefits regarding social cohesion, sustainability, and increased attractiveness of the envisioned mobility hub due to its broadening amenities.

Responsibility

The Cortina Café can play a role in reducing waste and promoting a circular economy by encouraging people to repair their products instead of throwing them away, in line with the United Nation's Sustainable Development Goal 12: Responsible Consumption and Production (Department of Economic and Social Affairs, z.d.).

The café can improve accessibility to cycling by providing a low-cost and convenient way for people to repair their products and help to bridge the digital divide by providing access to repair services to people who do not have access to the internet or online repair tutorials, granting that they do find the café. By providing accessible and affordable repair services, social equity and inclusion are stimulated.

3. Cortina Exchange

The How-to prompt about reliability (Figure 6.2) focused on shared responsibility and trust. The idea for Cortina Exchange was born using the company 'OnzeAuto' as a source of inspiration, the How-to prompt, and the social cohesion stemming from the project vision.

Cortina Exchange is a small stall or building at mobility hubs where residents can exchange micro-mobility. Residents of the areas can exchange their possessions with that of others or with Cortina products. For example, someone could exchange their regular bike for a cargo bike on their grocery shopping day and let someone else use it in return. Vehicles can be traded or leased for a fee if users do not have an exchangeable micro-mobility option. To use the service, a resident must subscribe to Cortina Exchange, ensuring that all subscribed users know each other, enforcing social cohesion in the urban area and eliciting responsibility for the item borrowed, as neighbours will know who used what.

Key features of the concept are:
- Facilitating resident's desire to use the mobility form best suited to their flexible demands
- Enforcing social cohesion and willingness to help other people by removing anonymity from the exchange
- Providing additional services such as insurance and an application with an exchange schedule
- Gaining Cortina brand awareness and goodwill

Figure 6.5: Concept Sketch of Cortina Exchange

- Potentially enlarging the fleet of available mobility by implementing Cortina bicycles in the system

Feasibility

The design's feasibility depends on Cortina's resources regarding a physical building, shareable bicycles, and managing an application. The most significant dependency of the design would be whether a neighbourhood has enough micro-mobility vehicles available for exchange and, thus, the service.

Viability

Cortina Exchange is a facilitator for the exchange of micro-mobility products. Every exchange of vehicles will include an additional charge for the lease consisting of insurance, depreciation, and a small profit for Cortina. The fees would have to be high enough to generate profit but affordable enough for people to want to use the service and benefit from its security and scheduling. If the fee is too high, people may refrain from lending out their products or doing it themselves (if trust is high in the neighbourhood). Thus, the Cortina Exchange concept risks becoming obsolete when maturing; if the exchange point causes trust and connection in a neighbourhood, people no longer need the security of a middle party. Therefore, looking at additional revenue streams, such as leasing Cortina products or exchanging bike parts, such as children's seats, will be inevitable. Products owned by Cortina can be included in the exchangeable pool that people can lease instead of their neighbour's mobility. Cortina could launch a bicycle focused on modularity with interchangeable parts down the road. For example, the front of a regular bicycle could be 'swapped' for a cargo part for another fee or subscription.

Desirability

For residents living near the Exchange point, an extra service offering flexibility concerning mobility arises. It is convenient for trips that are not made daily and require different mobility than their regular option. The exchange point will also enable people to lease micro-mobil-

ity products they do not use that often to their neighbours, generating goodwill and earning a small part of the fee. Cortina is the middle-man, taking responsibility for damage and covering insurance that might be necessary. Exchanging mobility with a service like this will decrease a vehicle's 'downtime' since other people can use a product when it would otherwise collect dust, resulting in a decreased necessity for multiple separate vehicles, saving resources, space, and money. However, municipalities will need to see the benefit of the exchange points, which are increased social cohesion, decreased necessary parking spaces, and decreased private car use. According to European Cyclists' Federation (ECF) research, if cycling and walking were the default choice for less than 5 km trips, car trips in cities could be reduced by up to 30%. The provision of micro-mobility products at mobility hubs can encourage a shift from car usage to sustainable modes of transportation.

Responsibility

An exchange point for micro-mobility products at mobility hubs can promote social interaction. Borrowers and lenders of micro-mobility products can connect and build relationships, fostering a sense of community and responsibility for one another. Another benefit of a Cortina Exchange point is improving the health and well-being of residents by making micro-mobility (such as cycling) more accessible.

Micro-mobility Product

The first concept (Innovation Point) and the third concept (Cortina Exchange) explicitly feature a micro-mobility concept's design. The Innovation Point through experimenting and designing as a purpose, and Cortina Exchange through offering micro-mobility solutions within the service system. As both concepts feature a micro-mobility solution alongside a service-oriented business model, the second concept (Cortina Café) should also feature a micro-mobility solution in the form of a Repair Bike to make comparing the concepts easier in later stadia and provide Cortina with a tangible first step no matter what concept will be chosen.

6.3 Concept Choice

This subchapter describes the choice for one of the concepts presented in the previous section. The main objective is determining which of the three concepts best fits the criteria created in the past chapters. As mentioned before, the exact business models of the concepts are interchangeable and adjustable, so the judgment on viability will be made on how realistic and potentially rewarding different possibilities can be within a specific concept.

Selection Criteria

The selection criteria for the concepts are the principles composing the Design Brief in Chapter 5.3. The complete list of requirements can be found in Appendix E.

Selection Process

The Weighted Criteria method explained in the Delft Design Guide (Boeijen et al., 2014) entails giving each selection criteria a certain weight, scoring the concepts on every criterion, multiplying the scores with the criteria weight, and adding all scores together to get a final grade for each concept. Since not all criteria are equally important (for example, feasibility criteria are less critical as the project serves as an inspiration source), the weighted criteria method is fit for determining this project's most promising concept direction. Appendix F shows how the weight of the different criteria is determined.
The three concepts were scored on a scale from 1-10, describing how well they could potentially fulfil a criterion by the graduate student, a Cortina employee, and an Industrial Design Student. Figure 6.6 shows the scoring of the concepts.

Results

The Cortina café received the highest overall score (7.71 versus 6.18 and 6.51). The criteria grading was complex, as there were no abstract answers, only opinions and estimations. For the graduate student, there is also the possibility of being biased towards a specific concept. Therefore, the Weighted Criteria result is not the only argument for concept selection. Additional reasons for choosing the Cortina café concept are that it suits the worldview created in Chapter 4, potentially fulfils the project's design vision, offers potential for a flexible business model, and leaves room for Cortina to do what they do best; design a bicycle.

It is interesting to note that the Cortina employee ranked the Innovation point as the overall best scoring concept. Not by a considerable margin compared to the margins between the final weighted scores of the students, but an interesting fact mainly caused by the employees' lower scores for responsibility for the Café and higher scores for the desirability of the Innovation concept. It might be interesting to take a critical look into the desirability of the café to see if this can increase by using desirable aspects of the innovation concept.

GRADUATION STUDENT
DESIGN STUDENT
CORTINA EMPLOYEE

		INNOVATION			CAFÉ			EXCHANGE		
DESIRABILITY	**WEIGHT**									
1. Authenticity	10	8	7	9	9	9	7	9	8	5
2. Value Proposition	8	2	4	7	8	8	5	7	8	5
3. Convenience	4	4	5	5	8	8	6	5	7	7
FEASIBILITY	**WEIGHT**									
4. Regulation & Legislation	10	7	4	5	10	9	8	7	7	6
5. Resources Cortina	5	5	8	4	8	9	6	6	3	8
6. Supply	3	7	5	6	8	9	8	3	5	5
7. Achievability	2	8	8	8	10	9	6	8	8	6
VIABILITY	**WEIGHT**									
8. Brand Identity	10	9	6	7	9	9	7	8	5	8
9. Competitive Advantage	8	8	6	8	6	9	7	5	7	5
10. Business Model	6	2	4	7	7	7	5	6	5	5
11. Risk	4	2	3	6	5	7	3	4	5	5
RESPONSIBILITY	**WEIGHT**									
12. Healthy Society	10	6	8	8	8	9	5	8	7	7
13. Sustainability	8	5	6	5	9	9	6	8	7	7
14. Inclusivity	7	9	7	8	8	8	6	7	5	6
15. Social Cohesion	5	2	6	6	9	9	8	8	9	5
TOTAL WEIGHTED										
Graduation Student		5.91			8.23			6.96		
Design Student		5.84			8.61			6.50		
Cortina Employee		6.78			6.28			6.08		
TOTAL WEIGHTED AVERAGE		6.18			7.71			6.51		

Figure 6.6: Weighted Criteria Matrix

6.4 Conclusion

Chapter 6 utilized the defined scope from Chapter 5 to conduct an ideation phase, out of which three interesting concept directions followed. Those concept directions were further explored and developed. Using the Design Brief constructed in Chapter 5 and the Weighted Criteria Method, the most promising concept emerged: the Cortina Café.

The next chapter will elaborate on the chosen concept and detail the development approach of the project.

7. Elaboration & Development

This chapter describes a development approach to detailing the chosen concept from the previous chapter using the Who, What, Where, When, Why and How method from the Delft Design Guide (Boeijen et al., 2014). This method serves as a checklist to ensure all design aspects are considered via an analytic approach. Techniques such as stakeholder analysis, need-based personas, business model canvas, competitor analysis and visualization document the design aspects. The chapter concludes with a concept design ready for evaluation.

7.1 Development Approach
7.2 Stakeholder Analysis
7.3 Target Group & Target Area
7.4 Viability
7.5 Competitor Analysis
7.6 Vision
7.7 Repair Bike
7.8 Visualization
7.9 Conclusion

7.1 Development Approach

The project goal determines the level of detail and elaboration necessary to finish the project successfully. As described in Chapter 1, this goal entails developing a visionary micro-mobility concept for the brand Cortina catering to people's daily lives in 2035. A thorough trend- and brand analysis resulted in a design vision and Design Brief, followed by three concept directions, of which one was selected for further development. This chapter aims to develop the concept in such detail that relevant stakeholders can evaluate it. An accompanying roadmap will communicate the design vision to Cortina in clear-cut steps.

This subchapter aims to determine what aspects of the chosen concept must be detailed to fulfil the project goal. To ensure no relevant aspect is missing, the Who, What, Where, When, Why and How method from the Delft Design Guide (Boeijen et al., 2014) will serve as a checklist.

Who

A stakeholder and competitor analysis will determine the people relevant to the concept. The stakeholder analysis reveals critical players involved with the concept to establish potential interests. A competitor analysis confirms if other parties are developing comparable solutions to the concept or if businesses could be potential allies.

What

Chapter 1 explains the 'What' of the project in the problem definition. The concept development in Chapter 6 describes the solution to the problem. The final project deliverables in answer to the problem definition are a Café concept, a Repair Bike Concept, and a roadmap. This chapter will further develop the Repair Bike Concept in a separate section.

Where

As mentioned, a roadmap is one of the deliverables for a successful outcome of the graduation project. Given the time limit of this project and the resources available to garner a detailed roadmap, including legislation and essential partnerships, the concept's elaboration will focus on the Netherlands. This decision does not mean that the concept cannot evoke the envisioned interaction in countries outside the Netherlands, as the foundational research for the concept envelopes Western-European countries. Thorough research on mobility players and government attitudes towards hubs and legislation for all Western-European countries is not feasible.

To gauge the potential market size of the Cortina Café, an estimate of expected mobility hubs throughout the Netherlands in 2035 is necessary, as determining a target group and area.

When
The project assignment answers this design aspect clearly; the proposed solution is designed for 2035.

Why
The concept's right to exist (the 'Why') is endorsed by both the design vision and a business model canvas. The vision constructed in Chapter 4 serves as the primary guide throughout all decisions made in this project.

How
A business model canvas will detail the concept's viability to map out its activities, costs, and possible revenue (the 'How'). A visualization of the Cortina Café should answer questions about its layout and aesthetic and serve as a way of acquiring feedback from relevant parties to iterate towards a final design.

The questions answered in this subchapter present the following list of explorable topics according to the WWWWWH checklist:

- Stakeholder Analysis
- Target Group & Target Area
- Viability
- Competitor Analysis
- Vision
- Repair Bike
- Cortina Café Design
- Conclusion

Every subchapter portrays a new iteration cycle regarding the concept's design, each with unique priorities and challenges.

7.2 Stakeholder Analysis

Chapter 2 describes the expectation of mobility hubs becoming a widely implemented phenomenon in 2035 in Western Europe. This subchapter defines stakeholders concerned with those hubs and the created concept in the Netherlands. The role of each stakeholder is presented to establish key players, potential alleys, and potential risks.

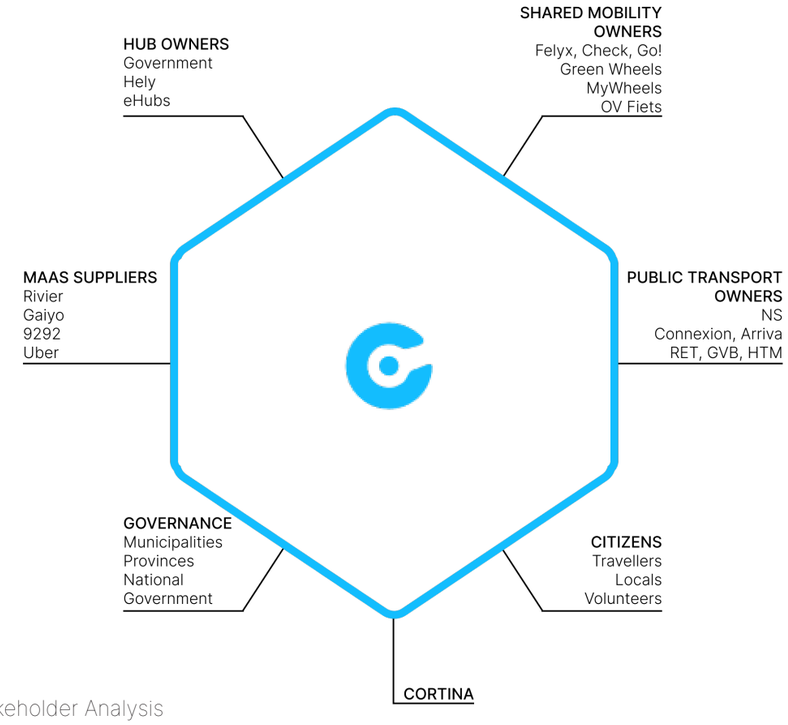


Figure 7.1: Stakeholder Analysis

MaaS Suppliers
The ultimate goal of MaaS is to create a facilitating platform that brings together all mobility providers and users. As mentioned in Chapter 2, the Dutch market currently has three large initiatives regarding MaaS; Rivier, 9292, and Gaiyo (Bassant, 2022), each focused on a different aspect of MaaS. Rivier focuses on business-to-business facilitation, 9292 on including shared mobility options in their transportation app, and Gaiyo on integrating private vehicles in the MaaS system. The Kennisinstituut voor Mobiliteitsbeleid (2021) argues that mobility services must

be convenient, cost-advantageous, customizable, and grant freedom of choice to be successful. A mobility hub that provides various options (including a Cortina café) could enhance the appeal of bundled MaaS services, benefitting both MaaS suppliers and Cortina in attracting more customers. Challenges for collaboration between Cortina and MaaS suppliers lie in ensuring a seamless integration of the cafés services and availability in the MaaS app while considering users' privacy.

Governance

The Cortina Café, located at future mobility hubs in the Netherlands, could have various benefits for all layers of government. The concept encourages sustainability by promoting repairing instead of replacing, which aids in the goal of the Dutch government to become a circular economy by 2050 (Rijksoverheid, 2019). The café enhances social cohesion and stimulates community involvement by offering a space for people to come together and share knowledge. Citizens will be encouraged to become more self-sufficient and empowered in fixing their belongings and reducing waste. Although the government's ultimate goal is its citizens' happiness and prosperity, the role of each layer of government in the Netherlands is different regarding the Cortina Café. The national government would play a role in connecting key players and establishing laws and regulations around the mobility system of 2035. Provinces can facilitate as knowledge suppliers to local municipalities and support mobility initiatives (Kennisinstituut voor Mobiliteitsbeleid, 2021). Municipalities, in their turn, can look at detailed solutions for each mobility hub and work with provinces, mobility companies, and investors to improve the quality of life for its residents.

Cortina

As the concept facilitator, Cortina will benefit from a steady range of paying travellers passing through the café and thus the mobility hub. This range of customers will increase by offering convenience, cost advantages, customization and freedom (Kennisinstituut voor Mobiliteitsbeleid, 2021).

The Cortina Café is a way for Cortina to emphasize its innovative, service-oriented, and bold brand identity. Successful partnership and integration with a MaaS app of one of the parties mentioned as a MaaS supplier will increase brand visibility and insights about potential customers' needs. Enabling customers to repair their bikes and make more sustainable decisions can lead to an increased feeling of autonomy and freedom catalyzed by Cortina, creating a positive brand association and increasing customer loyalty. The risks for Cortina involved with the launch of the café are that a location does not generate enough income due to a lack of passengers or too high costs. Several income streams must be possible to mitigate this risk, which will be explained in Subchapter 7.4. The initial investment needed to launch multiple cafés is also considerable, which can be mitigated by starting small with pilots or mobile locations. Lastly, a

risk around the responsibility of people working with repair tools exists, so it is important to emphasize that all repairs are at one's own risk.

Depending on the type and scale of the mobility hub and concept, an employee will be needed to run the café as a host and barista. In light of the design vision, the employee should be approachable and create a good ambience in the Cortina Café, which can be done by employing somebody known in the neighbourhood. Although it is convenient if the employee understands simple bike-related inquiries, they are not a bike technician. The Cortina Café is for people who want to learn or help repair bikes, alleviating part of the pressure that the repair industry suffers from in the Netherlands due to labour shortages (Hackmann, 2022), promoting sustainable solutions, and reacting to the right-to-repair legislation as described in Chapter 2.

Hub owners

As mentioned in Chapter 2.5, a mobility hub is a system comprised of different layers that can have different owners; a digital layer (an app), a vehicle layer (mobility options), a physical layer (facilities), and the ground layer (the space it occupies). Apart from the owners' specific responsibilities, everyone will benefit from a steady flow of travellers to enhance revenue streams. Chapter 2.5 also mentioned several pilot initiatives in the Netherlands, financed mainly by combinations of private investors, government funds, and European subsidies.

Shared mobility owners

Many shared mobility companies are active in the Netherlands, such as Felyx, Check, OV-fiets, and many others. Regardless of the ones still around in 2035, shared mobility owners will benefit from a spot in a mobility hub and connected MaaS network, reaching a significant customer base to which they can offer their service. Making mobility hubs and the MaaS system more attractive by enhancing facilities and creating a smooth service is in shared mobility owners' best interests.

People do not typically require a shared bicycle in their residential area, as having access to a personal bicycle is more convenient and cost-effective than renting one daily. A shared mobility system is suitable at mobility hubs that people travel to for work or leisure as a last-mile solution. Shared mobility owners are not expected to be a direct competitor of the Cortina Café, as the café's audience is bicycle owners looking for repair facilitation close to home.

Public Transport

As mentioned in the trend analysis (Appendix A), public transport will be an essential means of transport in the MaaS landscape (Vandecasteele et al., 2019), as it lends itself to unbundling short to medium-distance transportation (Fong, 2019). Public Transport suppliers will benefit from convenient travel for passengers and well-connected travel routes, generating more customers. Especially smaller scale public transport such as 'buurt-

bussen' can benefit from locating all this travel in a hub, decreasing the need for multiple trips. Mobility hubs are effective in increasing the use of public transportation, making it more manageable and cost-effective for public transport suppliers to offer diverse routes.

Volunteers

Volunteers in the Netherlands currently facilitate a small part of the transport network for less mobile travellers in smaller villages or rural areas in the shape of 'Buurtbussen' or 'Belbussen'. Mobility hubs can help increase the number of people a volunteer can help by limiting the distance they need to travel; instead of bringing someone from their home to their final destination, someone only needs to be brought from their home to the nearest mobility hub. Potential travel patterns do, however, depend on the person's abilities and willingness to try new modes of transport.

Excluded stakeholders

Stakeholders excluded from this analysis are the European Union, housing developers, and bicycle manufacturers. Although relevant to the project due to the previously mentioned R2R legislations and targets regarding sustainable mobility, the detailed implementation of the hubs is not relevant to the EU. The laws and regulations set by the Union will, of course, be obeyed and followed by the national government.

It is essential to mention that many provinces expect to increase their building activities in the coming decennia, including residential areas containing mobility hubs (Provincie Noord Brabant, 2018; Kennisinstituut voor Mobiliteitsbeleid (2021). The building developers responsible for those areas are outside the project's scope, as Cortina will not decide on the location of new mobility hubs.

The concept includes a Repair Bike geared towards the aforementioned right-to-repair legislation to cater towards the sustainability trend discussed in Chapter 2. Since the bicycle predominantly serves as an inspiration and advertising tool, the manufacturers are secluded from the project's scope.

Conclusion

Numerous players are involved in developing a successful Cortina café at future mobility hubs. This stakeholder analysis depicted the various interests of those players. Because mobility hubs are unknown territory for all parties involved, there is no ‘typical’ method of financing innovations. The most probable scenario for developing Dutch mobility hubs in 2035 is that each (group of) hub(s) will require a tailor-made combination of private investors, government subsidies, and companies. Different stakeholders must comprehend the advantage of the Cortina café to their cause, as clarified in this chapter. Especially the government, as they are vital for the permittance and the subsidies regarding the concept.

7.3 Target Group & Target Area

This subchapter aims to discover the different needs of the Cortina Cafés' potential target group by using need-based personas and to approximate the number of potential cafés in the Netherlands to estimate the market size and identify a pilot area.

Target Group

The Cortina Café's target group comprises everyone attracted to the design vision (Hekkert, 2016) constructed in Chapters 4 and 5 to make users feel part of something bigger while securing their autonomy and embracing the responsibility for their health and that of the planet. Potential users will have different demands at different times, especially with the urban population's expected diversification and lifestyle (Foresight Centre, 2021). Therefore, the café must cater to all travellers' needs.

Individuals' requirements depend on context, so need-based personas are used to map different types of café users. Koos Service Design (2023) describes need-based personas as creating customer profiles based on needs and values instead of demographics (as commonly done when developing personas). The need-based personas theory describes six tensions in three pairs behind every human choice: acquisition versus transformation, impact versus structure, and ambition versus competence. These tensions are the foundation of a model created specifically for the concept (see Figure 7.2).

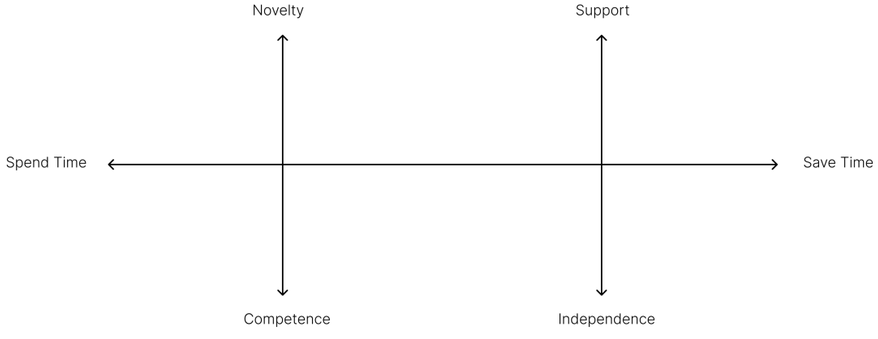


Figure 7.2: Tension Model of Cortina Café

The primary tension for visitors of the Cortina Café is whether they are looking to spend time (to meet up with a friend or wait for their next transit) or to save time (by accomplishing a quick repair, exchanging a component, or increasing their repair efficiency with knowledge). An individual's goal will influence their mindset and willingness to wait for certain services. The second tension is between novelty (seeking new experiences and looking for achievement) versus competence (the need to possess skills and understand limitations). Some visitors might be searching for knowledge, whereas others covet validation of competencies they already have. The last tension pair is support versus independence: one person might seek guidance, whereas another wants to tackle a problem alone. There must be space at the café for all these people except those seeking support and time savings. This combination of tensions would typically go to a bicycle repair professional; they want full 'support' (have someone repair for them) in the least amount of time, which is not in line with the social cohesion and enablement goals of the café. By not catering to this combination of desires, the café will not compete with Cortina's dealers. Desires corresponding with the extremities are grouped in a tension matrix (see Figure 7.3) to create need-based personas.

The following travellers are identified and shown in Figure 7.4:
- The mingler loves to sit down at the hub and have a cup of coffee. They hope to meet their neighbours and talk about anything. The mingler has time on their hands, meaning they are often a bit older, retired, and always around for a chat.
- The enthusiastic novice has a bicycle that occasionally falters, and they do not always know how to repair the issue. They enjoy going to the Cortina Café to learn or to find someone to help them.
- The stranded traveller does not live in the area but has time to kill between commutes and decides to sit down at the café for comfort and shelter.

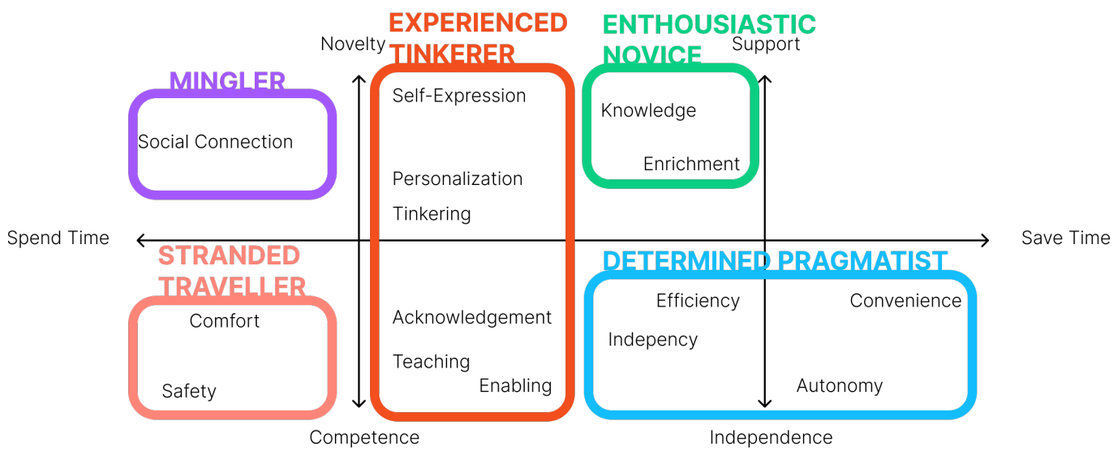


Figure 7.3: Need-Based Personas Cortina Café

- The determined pragmatist is in a hurry and prefers doing something themselves over waiting and paying for a repair technician. They are fervent users of the MaaS app to check for the most efficient routes to take while saving money.
- The experienced tinkerer is knowledgeable and open to helping others. They love personalizing their bike and inventing creative improvements. They enjoy the Cortina Café because of the available tools and space, and they enjoy having no mess at home to clean up afterwards

Figure 7.4: Need-Based Personas Cortina Café

Target Area

Although many different players expect mobility hubs to become critical elements in the Dutch mobility network of the future (Anderson et al., 2017; Bell, 2019; Coenegrachts et al., 2021, Ministerie van Infrastructuur en Waterstaat, 2021; Kennisinstituur voor Mobiliteitsbeleid (2021); Jorritsma et al., 2021; Provincie Noord-Brabant, (2018); Provincie Utrecht, 2022), no exact number of expected hubs is published anywhere. This is partially explained by the many definitions of a mobility hub, the uncertainty of future legislation and MaaS development, and the lack of an overseeing MaaS 'champion' described in Chapter 2.

Assuming that all Dutch citizens should have a mobility hub within 15 minutes of cycling distance (presuming a speed of 12 km/ph) and that 54% of Dutch ground is used for agriculture (Ministerie van Onderwijs, Cultuur en Wetenschap, 2021), the Netherlands would need one hub per 30km^2, resulting in approximately 750 mobility hubs to provide a 15-minute city coverage for all residents (Foresight Centre, 2021). These hubs will offer different facilities depending on location and expected traveller count. The Kennisinstituut voor Mobiliteitsbeleid (2021) describes six different kinds of mobility hubs depending on their location and purpose: 1) a neighbourhood hub, which is a small-scale hub that offers a vehicle sharing point, bicycle parking, and sometimes public transport; 2) a residential hub, which is a bigger-scale hub located in a neighbourhood focused on making the area sustainable and livable by reducing cars and stimulating diversity by offering a wide range of mobility; 3) a regional hub, which focuses on bringing together small groups of travellers into a dependable transport flow; 4) transfer hubs which focus on reducing cars inside a city (think of P+R facilities); 5) city hubs which are large scale city centres such as Utrecht Central Station; and finally 6) international hubs like Schiphol.

The type of hub that would benefit from a Cortina Café is type 2, whose focus is creating a sustainable and livable area in line with the concepts' vision. Type 1 offers no additional services and occupies the least space. Type 3 is not catered toward urban areas eliminating it from the project's scope, and types 4, 5 and 6 focus on transferring travellers rather than improving an urban area. Also, Kennisinstituut voor Mobiliteitsbeleid (2021) predicts that the number of type 1 and type 2 hubs will see the most significant increase in the coming years.

According to VenhoevenCS (2020) and the Kennisinstituut voor Mobiliteitsbeleid (2021), the Netherlands contains 3177 residential areas (woonwijken) with an average acreage of 10.6 km^2 per area (Centraal Bureau voor de Statistiek, 2022). Assuming one hub per 30km^2, as calculated in this subchapter, every three residential areas should share one type 2 mobility hub to ensure that citizens' travel time to the nearest hub is at most a fifteen-minutes. An ideal situation would eventually be a type 2 mobility hub for every residential area to ensure accessibility, reducing the need for private cars and enforcing social cohesion in every neighbourhood.

Pilot Area

The introduction of Cortina Cafés should be done gradually with constant reflection and learning by doing, as the future of mobility hubs and MaaS is unpredictable. As described in the stakeholder subchapter, Cortina is advised not to immediately launch multiple cafés because of uncertainty regarding the concept's viability and significant necessary investment. Cortina could test people's interest and reactions to the concept by opening pop-up stores or mobile 'cafés' without purchasing an (expensive) physical location. If the first tryouts succeed, a pilot can follow at a handful of Dutch mobility hubs. Once the concept is successfully implemented at a few locations, expanding towards other areas will become more straightforward as a satisfactory track record demonstrates trust and expertise.

The area in which Cortina conducts its café pilot must be a populated residential area with medium traffic and without a large-scale mobility node (like Utrecht Centraal does, for example) to ensure the creation of added value. The citizens must be open to mobility hubs and neighbourhood cohesion. Such an area can be found in the Dutch province of Noord-Brabant, as it contains villages and more significant urban locations serving as transfer points. Local municipalities in Brabant are working on mobility initiatives containing hubs scheduled for 2030-2040.(Provincine Noord-Brabant, 2018; Provincine Noord-Brabant et al., 2021).

The province of Brabant has 404 residential areas (Centraal Bureau voor de Statistiek, 2022), meaning that 135 types 2 hubs are needed to provide a 15-minute travel distance coverage for the entire province. Assuming that more big cities such as Eindhoven, Den Bosch, and Breda already have larger-scale city hubs, approximately 100 hubs are needed, which would still be a substantial investment.

West-Brabant could potentially be a valuable area to initiate the pilot of the Cortina Café, as the province plans to start implementing its new mobility strategy (containing hubs) in the west (Provincie Noord-Brabant, 2018), and there is an abundance of data available about traveller types and attitudes in Brabant. Traveller research through a questionnaire of 1678 residents of West-Brabant resulted in three types of travellers: 1) car-oriented travellers (47%), 2) flexible travellers (25%), and 3) car-avoidant travellers (28%) (XTNT & Smartwayz, 2020). All groups were positive towards travel apps, and all thought cycling to be a great way to get healthy movement and improve their lifestyle. Freedom, independence, convenience, health, and the environment were the most important motivators when choosing a transport option. Of the respondents, 64,75% were open to using mobility hubs.

The municipality of Brabant has pinpointed where certain types of hubs would be needed to ensure optimal travellers experience, selecting nine type-2 hubs where a Cortina café could be beneficial (Provincie Noord-Brabant et al., 2021). The municipality emphasises that every hub has to be tailored to the needs and wants of residents in the area and the travel behaviours of people coming through.

Figure 7.5: Plan for West-Brabant's mobility hubs (Provincie Noord-Brabant, 2018). Type 2 hubs are indicated by dark green and purple.

Future Perspective

After the pilot in West Brabant, Cortina will have additional information about the concept's viability and can adjust its strategy accordingly when (and if) expanding to other regions. Every province has plans and goals for future mobility, all sharing the intention to utilise hubs to reduce congestion and free up space in the urban area. Utrecht, for example, is already exploring the Merwedekanaal residential area (Figure 7.6), which is car-free and plans to build 36800 extra houses by 2040 in residential areas with low parking facilities and mobility hubs (Provincie Utrecht, 2022). Overijssel is also looking into the added benefits of hubs to connect big cities with smaller villages (Seghers, z.d.).

Gelderland is exploring mobility buses with the eventual implementation of hubs and using examples of Brabant and Noord-Holland as guidance (Provincie Gelderland, Goudappel Coffeng & APPM, 2020). Therefore, Cortina needs to communicate with the provinces about cafés' added value to specific areas to ensure implementation in the future planning of the Netherlands' mobility.

Figure 7.6: Merwede residential area in Utrecht (Gemeente Utrecht, n.d.)

Conclusion

A Cortina Café could benefit type 2 mobility hubs as defined by Kennisinstituut voor Mobiliteitsbeleid (2021) in the Netherlands. Its extra facilities might attract more users, enhancing neighbourhood cohesion and health by providing a space where all travellers defined by the need-based personas are welcome. Although no exact number of expected hubs is published, it is estimated that the Netherlands would need approximately 750 mobility hubs to ensure a density of 1 hub per 30 km². The introduction of the Cortina Cafés should be done gradually with constant reflection and learning by doing, as the mobility hub and MaaS future are uncertain for all involved. Cortina could test people's interest and reactions to the concept by opening pop-up stores or mobile 'cafés' without purchasing an (expensive) physical location. If the first tryouts succeed, a pilot in West Brabant is a good starting point for the development of the concept, with nine type-2 hubs required to provide a 15-minute travel distance coverage for the entire province (Gemeente Noord-Brabant, 2018).

7.4 Viability

This project aims to design a visionary micro-mobility concept for the brand Cortina. Although the result does not have to entail an impeccable revenue model up to 2035 to reach the project goal, the concepts' viability must be plausible to grant it a right to exist according to one of the pillars of good design (Boeijen et al., 2014) and to make pursuing the concept worthwhile for Cortina.

In this subchapter, a business model accompanying the Cortina Café is created using the Business Model Canvas as created by Osterwalder & Pigneur (2010). This method covers all essential aspects of the concept's viability. Figure 7.7 shows the Business Model Canvas created for the Cortina Café.

Figure 7.7: Business Model Canvas Cortina

BUSINESS MODEL CANVAS CORTINA CAFÉ

KEY PARTNERS
Municipalities
Provinces
Government
MaaS Companies (Rivier, 9292, Gaiyo)
Investors
Mobility Manufacturers

COST STRUCTURE
Investment
- Café
- Inventory
- Permits
- Parts & Tools

Fixed Costs
- Rent
- Salary
- Amenities
- Insurance
- Permit Fees

Variable Costs
- Beverages And Snacks Inventory
- Bike Parts Inventory
- Repair Bike Inventory

KEY ACTIVITIES
Providing Repair Tools
Selling Spare Parts
Providing A Meeting Space
Selling Beverages And Snacks
Advertising Cortina
Facilitating Repair Bike Exchanges
Selling Accessories
Hosting Repair Workshops
Informing About Maintenance
Collecting Broken Repair Bike Parts

KEY RESOURCES
High Quality Tools
Skilled Employee
Inventory Of Spare Parts
Inventory Of Snacks And Beverages
Café Located At Mobility Hub

ENVIRONMENTAL COSTS
Land
Resources For Café
Resources Bike Parts
Resources Beverages And Snacks
Amenities

VALUE PROPOSITION
Autonomy Through Enablement
Accessibility Through Affordability
Convenience
Social Cohesion
Education And Empowerment
Sustainability
Encouragement Of A Healthy Lifestyle
Enrichment Of Hub Area

REVENUE STREAMS
Selling Replacement Parts
Selling Beverages And Snacks
Charging For Repair Workshops
Selling The Repair Bike
Selling Repair Bike Parts
Selling Accessories
Subsidies For Mobility Initiatives (Perhaps Only At The Start)

ENVIRONMENTAL BENEFITS
Decrease In Needed Resources
Accessible Recycling
Decrease In Private Car Use
Increased In Social Responsibility
Sustainable Lifestyle

CUSTOMER RELATIONSHIPS
Personalized Service
Education About Environment
Positive Influence Of Repairing
Friendly, Welcoming And Informal

SOCIETAL COSTS
Urban Space
Peace & Quiet

SOCIETAL BENEFITS
Autonomy Through Enablement
Accessible Sustainable Lifestyle
Social Cohesion
Responsibility For Health And Planet
Increase In Affordability
Convenient Repair
Enriched Mobility Hub
Smoother Connections

CHANNELS
Café
Social Media
MaaS App
Dealerships
Word-To-Mouth

Key Partners

The Stakeholder Analysis from subchapter 7.2 defined key partners in realising the Cortina café. The partners mentioned in this section are needed to initiate the development of the concept.

Provinces in the Netherlands have expressed their intent and desire to work with mobility companies to realise mobility hubs (Provincie Noord-Brabant, 2018; Provincie Utrecht, 2022; Kennisinstituut voor Mobiliteit, 2021). It is crucial to contact local governments and convince them of the societal benefits of the Cortina Café to acquire needed permits and possibly funding.

Mobility as Service companies strive to facilitate on-demand smooth travel through one platform presented to the user via a mobile app. The Cortina café will benefit greatly from a successful partnership with the main facilitator of MaaS, as the location of cafés and maintenance reminders for the Repair Bike could be integrated into their app, exposing the brand to a broader audience. As mentioned in the stakeholder analysis, this ally could be Rivier, Gaiyo, or 9292.

Potential investors are key players, as setting up numerous Cortina Cafés will be expensive. Experienced investors can equip Cortina with knowledge about exploiting a café. The necessary funds and their source will depend strongly on financing from the government and (European-wide) subsidies for the mobility sector. Considering current mobility hub pilots as described in Chapter 2, it is conceivable that part of the investment expenses for the café will be split between Cortina, private investors, and the government. As mobility development matures and the cafés are successful, subsidies will probably decrease and disappear over time.

When envisioning the Repair Bike, it can be valuable to partner up with an experienced sustainable (e-)bicycle manufacturer such as Roetz. This Dutch brand makes bicycle frames from old OV bicycles and recently launched a circular

e-bike design (Figure 7.8). A collaboration between the two brands could benefit both. Cortina acquires expertise in circular bicycle design and affiliation with a sustainable brand. Roetz obtains access to a wider audience and larger-scale production as a smaller brand, selling on average 3500 bikes per year (Borovitskaya, 2022) versus Cortina, selling over 100.000 each year (Marktdata, 2017). Additionally, a collaboration between the brands sets a precedent for how mobility should be approached in 2035, with all parties uniting to create a smooth functioning system.

Figure 7.8: Roetz Life e-bike (Roetz, n.d)

Key Activities

The Cortina Cafés' key activities are divided into cycling-related and other activities. Within the cycling category, activities related to 'regular' bicycles can be distinguished from activities related to the Repair Bike. See Figure 7.9 for a schematic overview. The revenue stream section explains these activities in more detail.

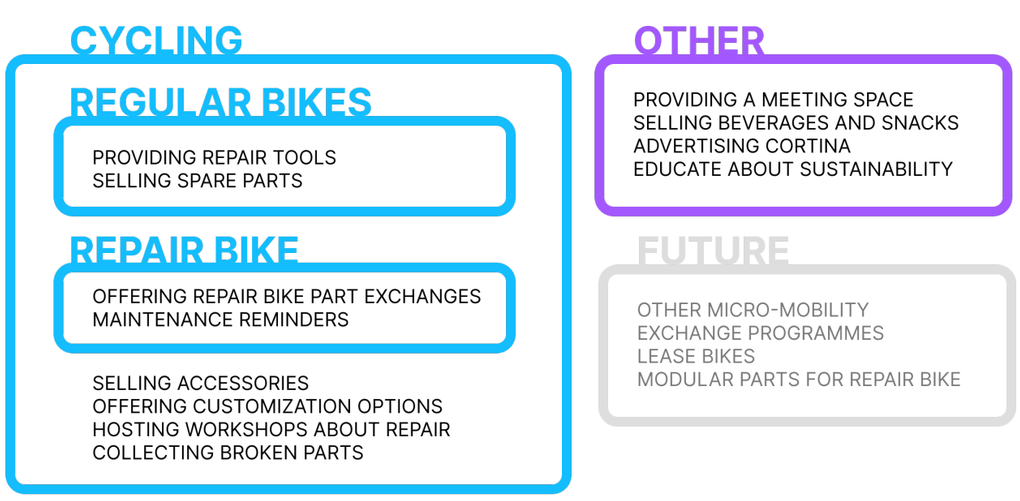


Figure 7.9: Key Activities of the Cortina Café

Future possibilities for additional revenue streams can be offering specific tools or repairs for other forms of micro-mobility, attracting a new segment of customers for relatively low investment costs (knowledge and tools). Another option is implementing an idea comparable to the second concept created in Chapter 6, Cortina Exchange, granting residents the possibility to lease their products to neighbours via the Cortina Café. Another possibility would be to start leasing Cortina bikes in the hub, although this will only be appealing for hubs that function as a non-residential endpoint of people's journeys. Lastly, modular parts can extend the Repair Bike services by offering various modules for different customer needs, exchangeable at the café.

Key resources

An essential resource for the success of the Cortina café is a collection of high-quality repair tools that is durable and easy to use to ensure convenience for the customer. A skilled and friendly employee working is important for a welcoming ambiance at the café. Inventory of replacement parts is necessary for a competitive advantage over repair shops with waiting lists for certain repairs. Inventory of beverages and snacks is required to keep the café operating. Lastly, the location and the café itself are vital resources, as without them, the concept cannot exist.

Value Proposition

The Cortina Café serves as many travellers as possible, as described by the need-based personas in the previous subchapter. Those travellers can benefit from the following value propositions:

Autonomy

The café enables people to be in charge of their mobility product by facilitating repair tools, knowledge exchange, and improving accessibility to a functioning bicycle. The café encourages people to make healthy choices for themselves and the environment by enhancing accessibility, promoting repair instead of replacement, and recycling broken parts. Being capable of repair allows users to personalize or customize their product, allowing identity expression and enforcing autonomy, despite living in a shared mobility system.

Accessibility

By providing people with a free workspace to repair their bicycles and only charging for substitute parts, the cost of executing a repair at the café is far lower than that of a repair technician, making it accessible for a broader range of individuals. The café will educate people about the maintenance of the Repair Bike, which can be accomplished via notifications in a person's MaaS app to prevent costly repairs. The Cortina Café enriches mobility hubs by offering additional facilities, stimulating more users to use the hub and justifying its existence in multiple locations throughout the Netherlands, further improving accessibility to hubs for all.

Sustainability

Enriching mobility hubs and thus attracting more users can lead to a decrease in private car usage, a decrease in harmful

combustion gasses into the atmosphere and decreasing the need for parking spaces in cities. The Cortina Café enables repair instead of replacement, decreasing the need for virgin material to make new products. By making cycling more accessible, especially with reachable mobility hubs, the café promotes a healthy movement and a 'zero-emission' form of mobility.

Social Cohesion

The Cortina Café is a welcoming space for the entire neighbourhood and travellers. The café encourages people to help each other and enriches the area with its facilities. The vision for the café entails creating a community feeling between residents that results in shared responsibility for everyone's mobility and well-being.

Education

The Cortina café serves as an educational place with the possibility of offering workshops regarding repair for all ages, making younger generations familiar with the concept so repairing instead of replacing will be normalized when they have become adults. Visitors are also encouraged to exchange knowledge. Overall, people are taught about the benefits of repairing and cycling, promoting a healthy lifestyle for the user and the planet.

Customer Relationships

The café aims to enlighten people about the benefits of repair and cycling for sustainability and health. As mentioned in the vision created in Chapter 4, the concept should make people feel like part of a group with a shared goal. A meaningful element of this vision is making individuals feel welcome and invited to the café by providing different customer journeys for the personas constructed in the previous subchapter. Chapter 3 describes Cortina's service through its widespread network of vendors in the Netherlands as a strength. Reinforcing this strength will enhance Cortina's image as a service-oriented bicycle brand.

Revenue Streams

The Cortina Café generates multiple revenue streams offering products and services (Figure 7.10).

An essential aspect of the business model of the Cortina Café is that the tools are free to use, no matter what bicycle someone owns, as the café should be welcoming to everyone. Entrusting visitors the responsibility for these tools, combined with social control, will hopefully generate goodwill and encourage users to act amenably. This phenomenon was observed at current repair café events: people want to help each other and feel like a part of a community, even resulting in small donations, despite free services. Offering the repair tools at the café for free will attract customers who might also purchase a beverage, accessory, or spare part. Charging for spare parts for both regular bicycles and the Repair Bicycle will encourage people to try and repair a current part before purchasing a new one, preventing usable parts from ending in the landfill and generating a small profit for Cortina.

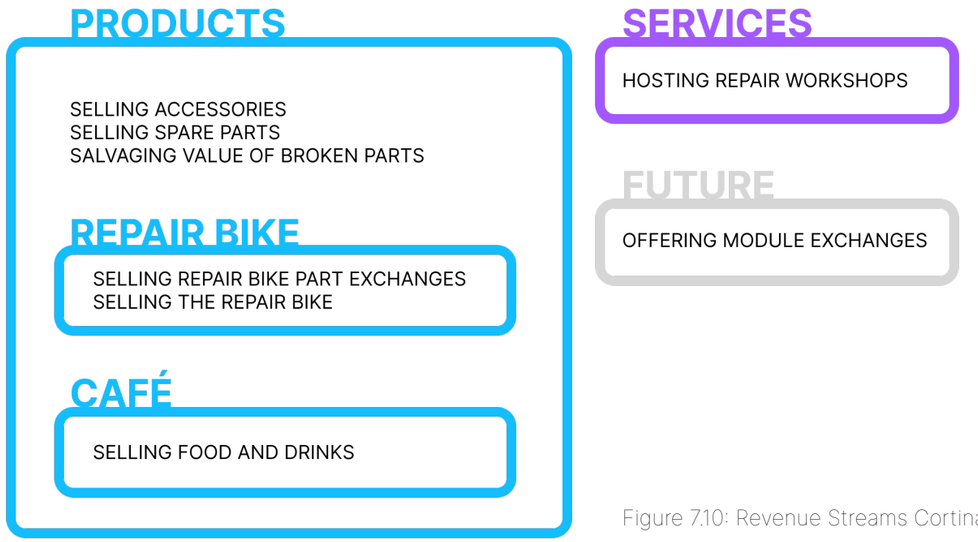


Figure 7.10: Revenue Streams Cortina Café

The Cortina Café will facilitate repair workshops for all kinds of audiences to generate additional income and fulfil the role of a sustainability educator.

A significant source of the concept's revenue is sales of the Repair Bike via Cortina's website and dealers. The Repair Bike's parts can be easily exchanged at the cafés for a small fee to prevent waste and encourage people to be mindful of their possessions and only exchange when necessary. Because of the Repair Bike's durable design, additional repair costs are expected to be lower than 'normal' bicycles. Selling the Repair Bike from the cafés appears illogical as urban space is often limited, restricting the prospect of stocking full-sized bicycles, and because competing with Cortina's dealer network is undesirable.

Completing a repair with the necessary parts at the Cortina Café should be less costly, more convenient, and more sustainable than using the service of a repair technician to obtain a competitive advantage. The exact pricing of the cafés' services is highly dependent on the economy in 2035, the availability of bicycle supplies and technicians, and the cost of other mobility. Cortina should construct a comprehensive pricing strategy to discover the optimal equilibrium between people's needs and willingness to pay. Future revenue streams could be created by offering modular parts for the Repair Bike.

Customer Segments

The previous subchapter defined five customer segments for the Cortina Café using need-based personas. As different people have various needs depending on their context, there is an overlap between the segments. Visitors coming in for a repair can also purchase accessories or run into a friend. The café offers many experiences for travellers to choose from de-

pending on their needs. The projected total market size is explained in the Target Area chapter and encompasses the users of mobility hubs throughout the Netherlands in 2035.

Cost structure

The costs of the Cortina Café consist of the initial investment, fixed costs, and variable costs. Considering the finance structure of current mobility hubs, the initial investment will probably be divided between Cortina, the government, and subsidies or private funding (Kennisinstuut voor Mobiliteitsbeleid, 2021). The amount of funding will depend on the development of mobility hubs and expected subsidies in the coming years.

The fixed costs of the café are rent or other fees permitting the café to operate, salaries, insurance, and amenities such as electricity and water. Variable costs are the cost price of beverages, snacks, spare parts, and maintenance of the café.

Channels

The customer segments mentioned are confronted with the Cortina Café when travelling from a mobility hub, via word-to-mouth, and MaaS apps. The Café, in turn, functions as an advertisement for the brand Cortina. Cortina can also utilise their social media channels to promote the repair cafe, advertise its services, and provide information to customers.

The most straightforward approach for the Cortina Café to reach a broad audience is via integration into customers' MaaS apps as a waiting spot, a coffee corner, a repair location, a shopping experience, or anything else that the consumer might appreciate. The Maas app of Repair Bike owners should inform them of necessary maintenance and direct them to a nearby café, extending the Repair Bike's lifespan and generating a continuous stream of customers for the Cortina Café

Societal & Environmental Benefits and Downsides

The social and environmental benefits and downsides are mentioned in the value proposition and throughout the previous chapters. The environmental costs consist primarily of raw resources necessary to realize a physical location and continuous services. The environmental benefits are described in the value proposition section. The societal cost is the occupancy of urban space, and the peace disturbance that increasing traffic to a specific area will bring. The societal benefits overlap with the environmental benefits and are further explained in the value proposition. Figure 7.11 shows an overview of the benefits and downsides of the Cortina Café.

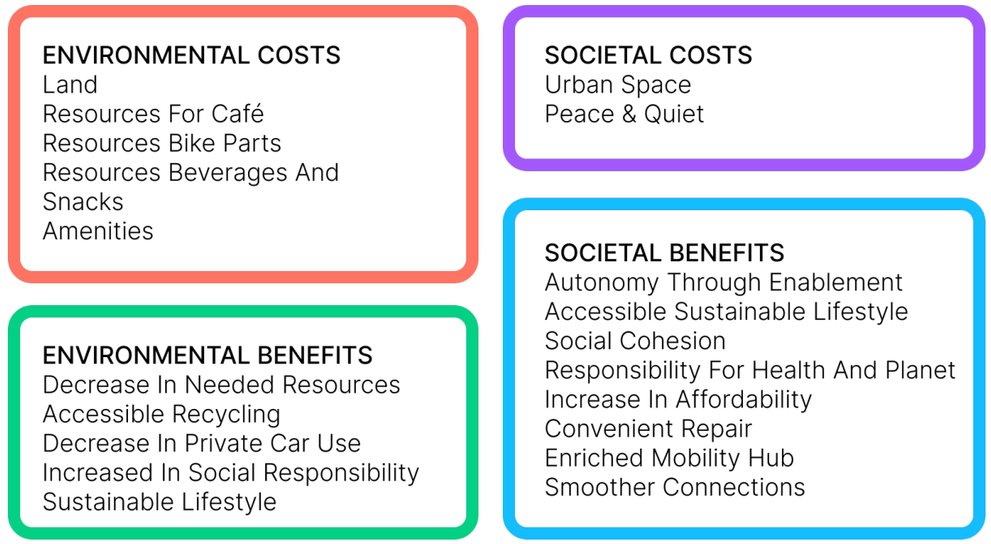


Figure 7.11: Environmental & Societal Cost and Benefits of the Cortina Café

Conclusion

The viability of the Cortina café is challenging to assess due to numerous uncertainties about funding, prospective costs, and anticipated revenue streams. The development and implementation scale of the Cortina Café depends on the success of mobility hubs and MaaS apps. As proposed in subchapter 7.3, Cortina should start with piloting the concept to explore the benefits to society and the environment mentioned in this chapter before continuing the widespread implementation of cafés. In conclusion, the concept's viability is highly uncertain as investment costs are high, and the number of Cortina Cafés established to achieve the design vision throughout the Netherlands is large. Throughout the pilot and implementation of the concept, Cortina must be critical of the balance between costs and benefit for the brand.

7.5 Competitor Analysis

This subchapter aims to describe the Cortina Cafés competition. Chapter 3 entails a competitor analysis of Cortina's current products. This chapter assesses what parties could become competition for the café concept in 2035 (Figure 7.12).

The Dutch non-profit organisation' Repair Café' organises pop-up events where people can repair (mainly) small electronics. The charity is included in the competitor analysis due to the similarities with the Cortina Café, but competing with an NGO is not desirable on ethical grounds. The Repair Café is no threat to the concept as the charity mainly repairs small electronics and pieces of clothing without making a profit. Cortina could support the NGO and its sustainable cause by donating parts, offering cafés as Repair Café locations, or collaborating on projects.

Indirect competitors of the Cortina Café are difficult to discern due to the concept's many facets but encompass all companies that provide sustainable and convenient micro-mobility. Examples are Roetz's circular e-bike or Swapfiets offering bicycle lease service, including repairs. As mentioned in Chapter 3, collaborating with Roetz could be positive for the Cortina brand. Another example of a competing micro-mobility solution is the 'low maintenance bicycle' produced by Priority Bicycles in New York City. This bike is described as low maintenance because of its belt drive and sealed weatherproof gear hubs. The cost price of the bike is 750 dollars, and it is only available in the US. In Europe, numerous bicycle brands proclaim high-quality and sustainable products, but outside of Roetz, none focus on repairability. Above all, most of the bicycles are electric, including Roetz's design.

Shared mobility initiatives such as Hely (owned by bicycle brand PON and the NS) can also compete for Cortina's target group as they experiment with mobility hubs (Bouwfonds Gebiedsontwikkeling, 2021). Currently, shared micro-mobility initiatives such as Donkey Republic or OV-fiets are not direct competitors as they focus on more populated areas where people do not have access to bikes. The Cortina Café targets residential areas, where most people will own a bike.

All forms of convenient mobility represent replacement competitors for the Cortina Café. As most future mobility initiatives strive for an integrated strategy and MaaS platform, crucial players should not compete but collaborate to construct a smooth and on-demand mobility system.

Based on the competitor analysis in this section, Cortina Café does not have direct competition. However, new or existing brands can venture into the repair and mobility market before 2035. Cortina must exploit its first-mover advantage by seeking collaboration with MaaS suppliers, the government, and other mobility facilitators to establish a position in the future mobility hub. The key to an excellent mobility network is collaboration between all parties and the integration of their services. Cortina must view its 'competition' as allies to start developing smooth and seamless personal mobility in the Netherlands.

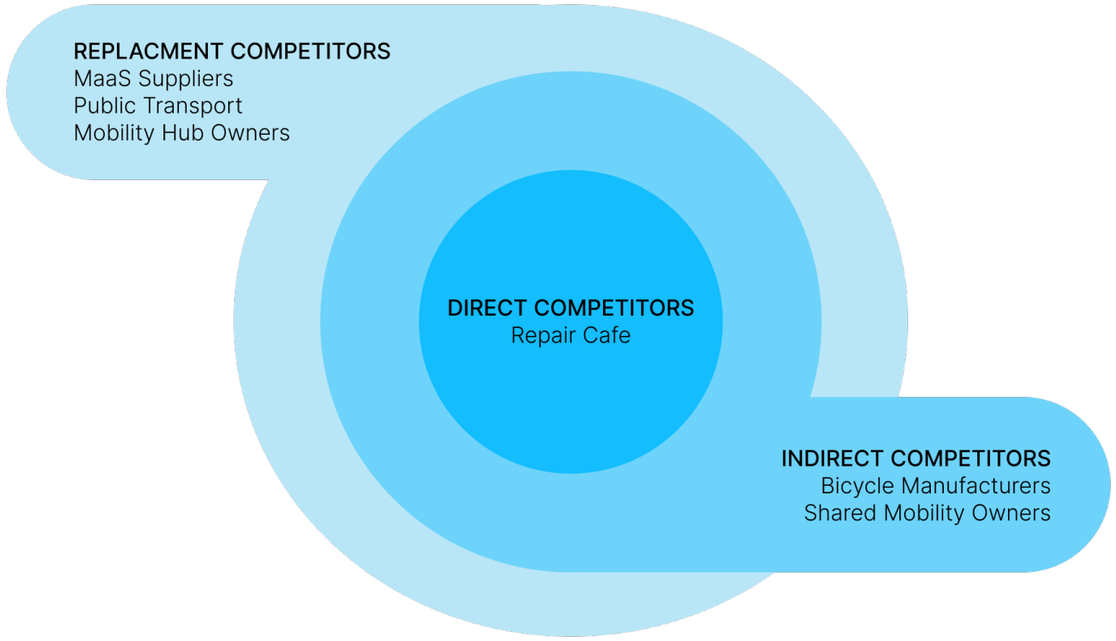


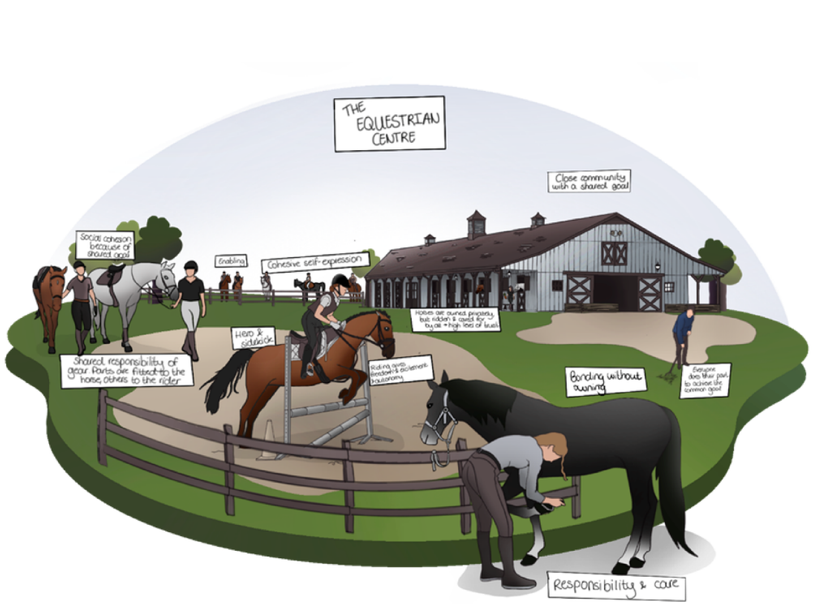
Figure 7.12: Competitor Analysis Cortina Café

7.6 Vision

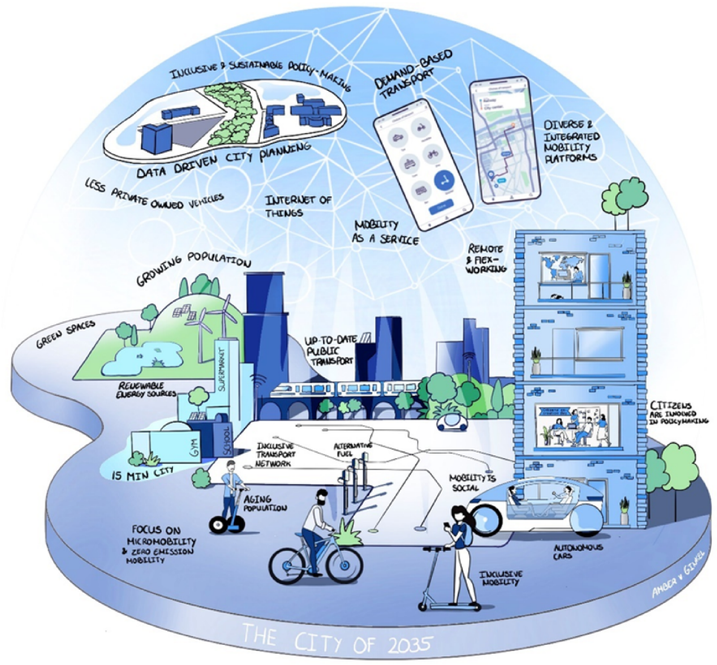
This subchapter will discuss the Cortina Café concept and the design vision constructed in Chapter 4, consisting of an interaction statement and an analogy. By interacting with the concept, a user should feel like a part of something bigger without losing autonomy and be encouraged to contribute to their environment while being their most authentic self. To illustrate the statement, the analogy of an equestrian centre was used to generate product qualities associated with the envisioned interaction in Chapter 4.4 (Figure 7.13).

Those product qualities were responsible, enabling, inviting, free, supporting, social, open, trustful, dependable, and caring. These qualities are entwined with the concept result by using them as inspiration for the ideation phase. The Cortina Café is a welcoming and inviting space where people can repair their bicycles, granting them independence and freedom in their travel options. The café stimulates social cohesion by supporting visitors in exchanging their repair knowledge. It encourages people to help and care for each other, making them feel part of a trusting society and enhancing their responsibility towards their community while educating people about the benefits of a sustainable and healthy lifestyle.

THE CONCEPT MUST EVOKE....



...THIS FEELING...



...IN THIS WORLD

Figure 7.13: Design Vision

7.7 Repair Bike

This subchapter describes the design of the Repair Bike accompanying the Cortina Café concept, as suggested in Chapter 6.2 to ease the comparison between the concepts that included a micro-mobility product and capitalize on the right-to-repair legislation (European Parliamentary Research Service, 2022; Svensson, 2018). Designing a Repair Bike provides Cortina with a first step towards the project's final vision within its area of expertise. Furthermore, cycling is expected to remain an essential method of transportation in addition to mobility hubs in 2035 (Bouton et al., 2022; Vandecasteele et al., 2019). An important goal of the Repair Bike is to strengthen the advantages of the services offered at the Cortina Café while generating profits from bicycle and spare parts sales. Another objective of the Repair Bike is to inspire Cortina for future initiatives, similar to the Vision Bike of Chapter 3.2. This subchapter aims to create a conceptual Repair Bike design that can be evaluated in the next chapter.

Opportunities for Cortina

The right-to-repair legislation allows Cortina to differentiate from competitors by offering products and services focused on durability and repairability. Launching a Repair Bike can result in positive media coverage and increased brand loyalty due to taking a proactive approach to environmental concerns. Furthermore, Cortina can attract consumers who prioritize sustainability, convenience, cost-saving, and longevity in purchasing decisions.

As mentioned in Chapter 3, Cortina currently produces bicycles on a much smaller scale than its most significant competitor PON. Thus, Cortina will have less difficulty adjusting its supply chain to launch a Repair Bike, incorporating new suppliers, implementing repurposed materials, or assembling new configurations. Repairing or repurposing parts instead of replacing them will positively impact the resources available to Cortina, enabling faster delivery times and decreased prices for spare parts as material is less scarce. The environment will benefit from reducing the demand for virgin resources.

Although repairing is a satisfactory solution to lengthen a product's lifespan, a better strategy is designing durable products that can be recycled or repurposed when they have reached the end of their lifespan. The Repair Bike's priority is durability, meaning customers will be notified of maintenance via their MaaS app to prolong the product's lifespan. If parts do defect, the customer can return them at a nearby Cortina Café for recycling while receiving a replacement part. As mentioned, the Repair Bike will not be electric to offer customers an accessible price, uncomplicated repairability, and encourage healthy movement.

Durability

Although the Repair Bike will be a high-quality product, damage to parts cannot always be prevented. According to the ANWB (2023), vulnerable components are brake pads, tires, chains, cables, and the bottom bracket of a bicycle. Race bike cycling technology improved a lot during the past few years, and innovations are slowly making their way to consumer bikes, such as using a carbon belt drive instead of a bicycle chain. A carbon belt has a lifespan that is four times longer, gives a more efficient power transfer from pedals to rear wheels due to lower friction, needs less upkeep, is lightweight, and is quieter. A carbon belt is more expensive than a bicycle chain and cannot be repaired when broken as opposed to a regular chain (Vliektweewielers, n.d.).

One of the most common bicycle repairs is mending a flat tire. As a response, airless tires are entering the market (Schwalbe, n.d.).

Figure 7.14: The inside of an Airless Tire (Anjo Jager Fietsen, 2018)

Bicycle gears are vulnerable to wear and tear and compiling debris. A consideration for the Repair Bike can be to make it single-speed, reducing the number of gears and breakable parts. The Repair Bike will mainly be used for shorter (15-minute) rides in a flat urban environment of the Netherlands, so making it single-speed is a wise trade-off to improve durability.

Finding alternatives to vulnerable parts will result in a durable maintenance-friendly Repair Bike. However, regular maintenance is the best way to extend a bike's lifespan, especially in the first year of ownership. The Cortina Café will send future Repair Bike owners notifications about maintenance via their MaaS app to ensure the best experience during their ride.

Chapter 3 identified Cortina's focus on transport bikes as a competitive advantage. The brand is known in the Nether-

lands for its U4 bicycle, which features a carrier on the front and back. A trend observed in the design of new bicycles by trendy brands (Figure 7.15) is the omittance of carriers to ensure a sportive and sleek look. The Repair Bike should feature transport options to differentiate Cortina from its competitors and enhance its brand identity.

The material choice for the bicycle frame is a trade-off between cost, sustainability, and quality. Options for materials for bicycle frames are steel, aluminium, titanium, carbon fibre and composites (Nehr, 2022). Steel is durable but heavy; aluminium is lightweight but energy intensive to produce; titanium is solid but expensive and hard to recycle; and carbon fibre and composites are strong and flexible but expensive and difficult to recycle (Spokester, 2021). However, the (race) bike industry is innovative regarding new technologies and materials. The cost of carbon fibre products will likely decrease due to higher demand by various industries (Fortune Business Insights, 2023). The decision for the material of the Repair Bike should be a carefully considered trade-off between cost, quality, and sustainability using materials available at the moment of design.

Repair

The Repair Bike should prioritise accessibility and simplicity to facilitate easy repairs. Using standardised components throughout the design will make swapping parts straightforward and adjustable without requiring specialised tools or knowledge.

As mentioned in the previous section, the race cycling world has invented many solutions to common cycling problems, such as a quick-release system to efficiently detach tires or lever systems to adjust seat height without needing tools. Cortina also utilises efficient attachment systems in its bicycles, such as the MIK system allowing users to easily connect all kinds of accessories to their bikes (Figure 7.16). Systems and inventions such as these can facilitate conveniently replacing parts. Further research is necessary on which technique would be appropriate for each replacement part, as unsafe situations due to incorrect component mounting are unacceptable. If tools are necessary for adequately mounting a piece, easier repair can be achieved by making all elements compatible with one tool.

Implementing systems such as MIK into the Repair Bike design is a way of future-proofing the concept, as modular parts could be introduced in a later stadium. These parts can be accessories to personalise the bike or products needed for a short period, such as a children's seat or cargo attachment. Opportunities for modularity make the Repair Bike an attractive option for people that want a bicycle adapting to their changing needs.

Visualization

The goal of this subchapter is to create a Repair Bike concept that can be evaluated to create recommendations for further research. This section explains the ideation phase towards a conceptual bike design. Appendix D shows the bicycle ideations

Figure 7.15: Veloretti Café Racer (Veloretti, n.d.)

Figure 7.16: The MIK-system allows for easy attachment of accessoiries (MIK, 2023)

sketched before the concept direction was chosen. The second round of Repair Bike ideation can be found in Appendix G, where the Cortina Vision Bike and the U4 from Chapter 3 served as inspiration for explorative sketching. The Figures 7.17, 7.18, and 7.19 illustrate the design of the Repair Bike. Figure 7.20 shows two renderings of the Repair Bike created through slight adjustments to a SolidWorks file of the Vision Bike by Cortina. Figure 7.21 shows the Repair Bike used in context.

Product Name

The Repair Bike requires a catchy product name for marketing purposes. Chapter 3.2 showed Cortina's product portfolio, including bicycle names, mostly comprised of one or two syllables. There does not seem to be an overarching theme among the names. The Repair Bike should stand out among Cortina's portfolio, as it has a unique selling point that the other bikes do not have. The name 'Cortina Endurance' sounds robust, active, and durable, referring to the bike's sustainable character and its intention to make cycling a more accessible activity. Furthermore, the term 'endurance' befits a hero, endorsing Cortina's brand relationship as described in Chapter 3.6.

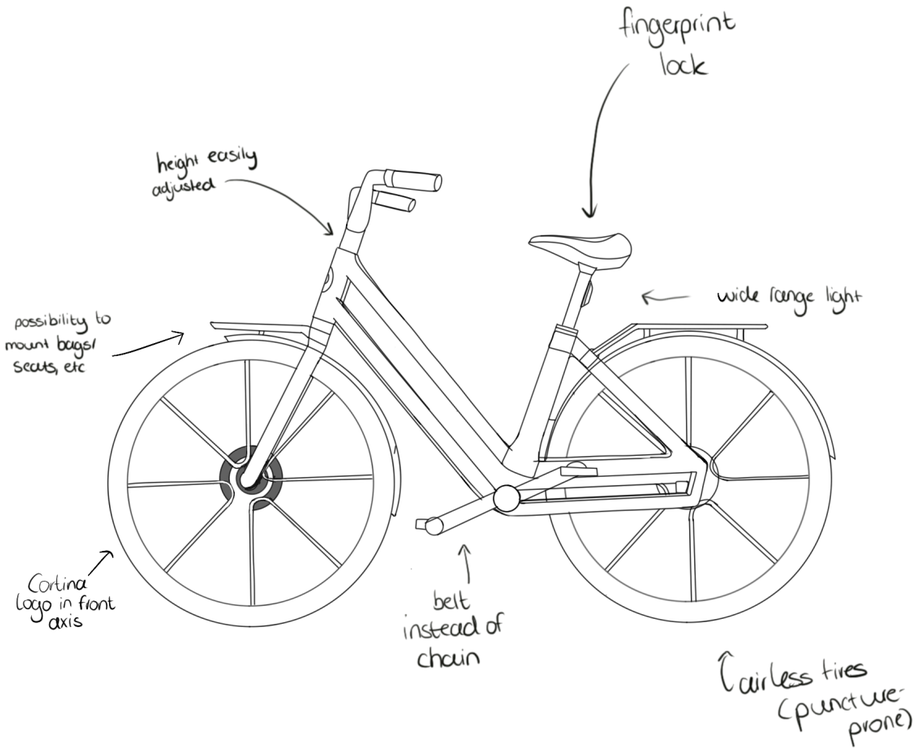


Figure 7.17: Sketch of Repair Bike based on Vision Bike and its features (see Appendix G)

Figure 7.18: Experimenting with different color configurations

Figure 7.19: Repair Bike and easily exchangeable parts

Figure 7.20: Render of Repair Bike based on SolidWorks file of Vision Bike

Figure 7.1: Repair Bike and user in Context

Conclusion

The Cortina Repair Bike was introduced as part of the café concept to ease the comparison between concepts, make the first step towards the vision easier in an area of expertise, and utilise the right-to-repair legislation described in Chapter 2.

The Repair Bike will reinforce Cortina's innovative and sustainable brand identity by being designed for durability and easy repair. The bicycle will feature a carbon belt drive, airless tires, single-speed gears, and maintenance notifications via the users' MaaS app. Several options for the material of the frame have to be researched to find an optimal balance between cost, quality, and sustainability.

Several options can provide simple and accessible repairs: standardised components, quick-release systems such as MIK, or making all parts compatible with one singular tool. By smartly designing and utilising these systems, Cortina can future-proof the Repair Bike design, as new accessories for the bicycle can constantly be introduced as long as they fit the chosen system.

This subchapter described the ideation process of the Repair Bike (of which more is shown in Appendix G). It concluded with visuals, renders, and a context visual of the concept that will be used to gather feedback for the next chapter. The chapter concluded with a product name for the Repair Bike, which will now be referred to as the Cortina Endurance, symbolizing durability and activity.

7.8 Cortina Café Design

This subchapter aims to create a layout and visual representation of the Cortina Café to gather feedback for the final design chapter.

The purpose of creating a visualization of the café is to present Cortina with inspiration and communicate the concept to stakeholders for evaluation. Input for the design is Cortina's brand personality as described by the Brand Identity Prism in Chapter 3: bold, fresh, innovative, and trendy, combined with a sustainable feel to highlight the cafés and the Cortina Endurance's right-to-repair intentions. The aesthetic of the café should be the same throughout all locations to create recognizability and approachability use potential travellers (Kennisinstituut voor Mobiliteitsbeleid, 2021) but remain neutral enough to blend in with all kinds of mobility hubs.

Convenience, health, and the environment are important motivators when choosing a transport option for Dutch citizens (XTNT & Smartwayz, 2020; de Haas & Huang, 2022). These values must be communicated with potential café users while creating an authentic feel. A brief ideation using 'How to-' prompts (Figure 7.22) inspired by Cortina's brand values and transportation, as mentioned above, motivators served as input for the café aesthetic. Additionally, AI was used to generate inspirational images (see Appendix H).

Figure 7.22: How-to Prompts Cortina Café

Materials & colours

As mentioned, the Cortina Cafés ambience should be inviting to all travellers, defined by the need-based personas in Chapter 7.3. The How-to prompt about inviting from Figure 7.22 generated 'transparency', resulting in a storefront with big glass windows to lower the entry threshold as people can see what to expect. The idea of 'clarity' results in organized repair zones to prevent people from becoming overwhelmed and to make cleaning effortless.

Wood will adorn surfaces throughout the café, emitting a natural and welcoming environment. Beams, doors, and other details are finished in brushed black steel to express Cortina's bold brand personality. The café contains numerous plants to create a pleasant ambience and induce associations with being in nature.

Cortina often uses yellow or green as an accent in their social media (Figure 7.23), which will also be used throughout the Cortina Café to induce brand authenticity.

The AI generator Midjourney was used to generate inspirational visuals for the described aesthetic as an experiment. Figure 7.24 shows several prompts and their results. For more output, see Appendix H.

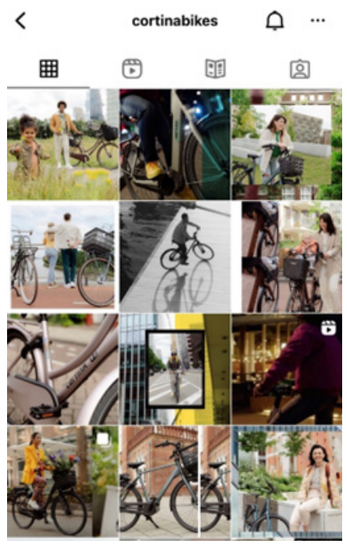


Figure 7.23: Cortina's Instagram Feed (Instagram, 2023)

Figuur 7.24: AI generated imaged by Midjourney using the prompt: Big restaurant with glass doors, wood and plants. Located in a mobility hub. Show entire large floor plan in 3D (Midjourney, 2023)

Branding & Messaging

The branding of the café must clarify Cortina's role as the concepts' facilitator to benefit from the advertising opportunity fully. However, the café must feel authentic, like a place owned by the neighbourhood rather than a branded store. Realistic messaging and transparency about the sustainable impact of the café will reinforce authenticity and defend against an opportunistic brand image (Kapferer, 2018). The Cortina Café is authentic to the brand by adhering to its cultural values (fresh, on-trend, inventive, open) and emphasizes the characteristics that users already attribute to Cortina (unique, cooperative, inventive)

The café must highlight the benefits of cycling and repair to reinforce visitors' self-image positively - for example, showcasing posters with repair tutorials and the resources saved by stated repair. The café should sell sustainable beverages to portray a coherent message crucial to Cortina's brand identity (Kapferer, 2018), suggesting reusable cups, vegan options, or reward systems for recycling. The Cortina Café educates its visitors about the benefits of cycling for health and the environment. Emphasizing good behaviour will reinforce users' feelings of contributing to their neighbourhood.

Layout

The Cortina Café is an inviting space for all travellers, defined by the need-based personas in Chapter 7.3. The layout of the café should take all personas' needs into account.

The café's interior will be visible from the outside to show potential visitors what they can expect, lowering the entry threshold and implying an open floor plan, as raising a wall would prohibit part of the interior from being visible. The space should not be too ample as the café should feel cosy and urban space is scarce. Additionally, the employee must have a good overview of all visitors, as everyone must be able to ask for help when needed.

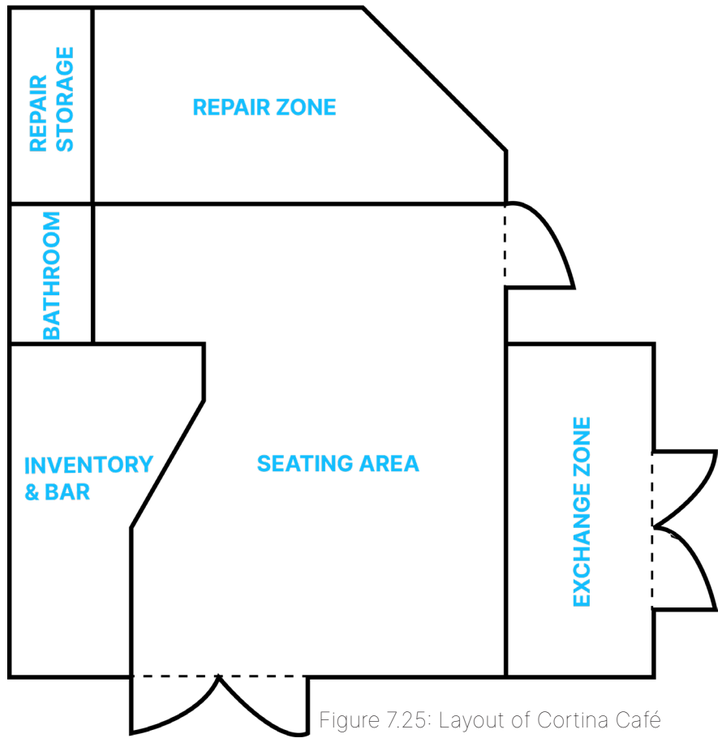


Figure 7.25: Layout of Cortina Café

The Café will attract different kinds of travellers, described by need-based personas in Chapter 7.3, which must be accounted for to create a communal space facilitating different attitudes. For example, the experienced tinkerer would not mind waiting for a specific tool or answering a question from another visitor. The determined pragmatist, however, does not want to be bothered with small talk and wants to resolve their issue as quickly as possible.

Catering to the different personas is achieved by dividing the café into separate zones; a seating area, a DIY area with extensive repair tools, and an area for quick exchanges of Cortina Endurance parts. The zones can be entered via one of three doors; one main entrance, one side entrance to the quick exchange area, and one side entrance to the main repair area. Different floor designs or wall colourings can indicate the different zones. However, the café should still feel like one coherent space to ensure transparency and opportunities for social cohesion.

Figure 7.25 shows the layout of the Cortina Café (see Appendix I for more layout ideations). The open seating area and bar near the entrance will allow the mingler to start a conversation with fellow visitors. The stranded traveller can spot an empty seat through the glass windows at the front. The experienced tinkerer can work on their hobby in the cozy ambience of the café, helping out the enthusiastic novices beside them. The determined pragmatist can take the side entrance, somewhat secluded from the rest of the café, to quickly repair while knowing whom to approach when help is needed. The cafés employee can greet anyone coming through the main entrance while keeping an overview of the entire café from behind the counter.

The floorplan presented in this section demonstrates a plausible layout of a Cortina Café. The exact size and configuration will differ on the space available and the number of expected travellers per mobility hub.

Visualization

This subchapter aimed to create a visual of the Cortina Café to evaluate in the next chapter. One visual was created by combining AI-generated images with sketching as an experiment. Figure 7.26 illustrates this process. Figures 7.27 shows a concept drawings of the daily activities inside the café for evaluation purposes.

Figure 7.26 Combining visualization skills with AI generated images. Images generated by Midjourney. Prompts from top to bottom: 1) Inside a bicycle repair shop. Show a 3D view of the layout inside. Focus on glass and wooden materials. There are people making repairs. Vector illustration style. 2) Big restaurant with glass doors, wood and plants. Located in a mobility hub. Show entire large floor plan in 3D perspective. People are repairing bicycles in the restaurant. Vector images style.3) A roomy large bicycle repair shop. Use wood, plants, and glass materials. Show the entire floor plan from a 3 perspective. Vector images style. Images generated on February 28th 2023.

Figure 7.27: Daily scene at the Cortina Café

Conclusion

A potential aesthetic and layout for the Cortina Café are proposed based on the need-based personas from Chapter 7.3, Cortina's brand personality described in Chapter 3, and How-to prompts shown in Figure 7.22. Materials and colours are selected to create a transparent and welcoming ambience while emphasizing the brand Cortina through bold accents and colours. Experimental AI images are integrated into a visual showing the layout and outside of the Cortina Café in Figure 7.26. Lastly, the visual in Figure 7.27 showing daily activities at the café will be used for evaluation purposed in the next chapter.

7.9 Conclusion

Conclusion

This chapter detailed the concept chosen in Chapter 6 by exploring a list of topics constructed through the Who, What, Where, When, Why and How method from the Delft Design Guide (Boeijen et al., 2014). These design topics included the concepts' stakeholders, target group and - area, viability, competitors, vision, Repair Bike, and Cortina Café Design.

The Cortina Café affects many parties due to being located at mobility hubs. Every future hub requires a tailor-made approach, resulting in a complex system with numerous players concerned. The development and implementation scale of the Cortina Café depends significantly on the success of mobility hubs and MaaS apps. Therefore, subchapter 7.3 suggests initiating small pilots before widespread implementation of the cafés to analyse the concept's costs and benefits. The viability of the café is challenging to evaluate due to numerous uncertainties about funding, costs, and anticipated revenue streams. Cortina must collaborate with relevant parties in the future mobility network to work towards the project's design vision.

The Cortina Endurance will reinforce the Cortina Café concept and provide a first step towards the design vision within the brand's expertise, endorsing Cortina's innovative and sustainable brand identity by focusing on durability and ease of repair.

A possible layout and aesthetic for the Cortina Café are proposed based on the need-based personas from Chapter 7.3, Cortina's brand personality described in Chapter 3, and How-to prompts shown in Figure 7.22, resulting in the visuals seen in Figures 7.26 and 7.27. The visuals will serve as an evaluation tool in the next chapter.

DELIVER

8. Final Design
9. Evaluation & Recommendations

8. Final Design

This chapter presents the final design of the graduation project based on insights gathered through expert interviews. The final design comprises a Cortina Café, the Cortina Endurance, and a roadmap explaining Cortina's steps to the project's future vision. The chapter aims to deliver the final concept for evaluation in the next chapter to generate feedback for the recommendations.

8.1 Interviews
8.2 Design Implications
8.3 Final Design: Cortina Endurance
8.4 Final Design: Cortina Café
8.5 Roadmap
8.6 Conclusion

8.1 Interviews

The Cortina Café detailed in Chapter 7 describes the desired outcome of the concept in the world of 2035. In this subchapter, interviews with relevant experts to the project will evaluate the concept's feasibility, viability, desirability, and responsibility. The stakeholder analysis served as input for the list of selected interviewees, of which everyone is an 'expert' in their niche, whether that is repair or Cortina.

To cater the interviews to various levels of knowledge about different subjects (for example, a project leader of mobility hubs is less knowledgeable about Cortina's brand identity than the brand strategist), an informal and non-structured interview approach was selected. Another reason for this method was to leave room for interviewees' opinions and ideas. A critical note about the interviews is that they took place over several weeks, meaning that some experts were presented with a more detailed concept than others during their interviews. The list below shows the chronological order in which the interviews were conducted (see Appendix J for interview notes).

Figure 8.1: Discussing self-evident public transportation (Transirede, 2023)

Experts

- Shared Car User
- Project leader Mobility Hubs Brabant
- Cortina Premium Dealer
- Bicycle Repair Technician
- Brand Strategist Cortina
- Repair café visitor
- Repair café volunteer
- Mobility Experts Transirede
- Circular Economy expert

The Mobility Experts' insights represent broad statements made at the Transirede, a yearly event that discusses mobility issues, which the graduate student attended to share her vision (Figure 8.1). The insights from this 'interview' did not come directly from one person but from insights collected during the conversation about self-evident public transportation.

Insights Interviews

The interview insights are collected in Figure 8.1 and sorted into three categories describing whether they were validating, critical, or inspirational regarding the presented concept.

The agreement by the Mobility Hub Project Leader, the Shared Car user, and the Brand strategist from Cortina that a bicycle is too affordable and convenient to share validated the decision to design a concept for personal use. The repair café volunteer, the brand strategist, and the circular economy expert endorsed the assumption that the personalisation of the bicycle led to the imaged design vision as it elicits responsibility for a product. Cortina's brand strategist validated that the concept and desired vision fits the brand and even mentioned the possibility of integrating Cortina Café into the company's dealer network.

Critical feedback mostly surrounded the viability of the café, as both the general opinion at the Transire and the Project leader of mobility hubs mentioned how complicated the mobility world is due to its many players. An important takeaway from the critical feedback was that every mobility hub needs a tailor-made approach, and incremental changes, including reflection, are crucial to reaching future mobility goals.

An interesting disagreement emerged between the bicycle repair technician and the repair café volunteer about people's willingness to repair their belongings. The technician was convinced people would rather pay to have someone else do their repairing, but the volunteer believed there was a rise in the popularity of 'old' crafts such as repair. Their difference in judgement can be explained by the clientele they serve. A logical conclusion would be that both groups of people exist. The circular economy expert emphasised that to get people enthusiastic about repair, they should not feel overwhelmed by a messy workspace, which a clean and organised repair space can counteract.

The Cortina dealer, the repair technician, the circular economy expert, and the repair café volunteer mentioned the importance of maintenance to ensure a bike's durability, validating the need for maintenance alerts in users' MaaS apps. The Cortina dealer mentioned a trend of disappearing carriers in new bicycle designs to portray a sleek look. However, many people avoid purchasing bicycles without transport options since it is impractical. This trend, combined with Cortina's competitive advantage of being a transport-focused bicycle designer, presents an opportunity for the iteration of the Endurance bike.

Figure 8.2: Interview Insights

8.2 Design Implications

The expert interviews' insights from Figure 8.2 provide input for the final design of this graduation project. The most important takeaway from conducting the interviews is the need for a roadmap to explain the realization of the design vision for 2035, as presented in Chapter 8.5. The following iterations will lead to the final designs in the next subchapters.

Start with Cortina Endurance

As mentioned in the previous subchapter, not all interviewed experts believed in people's motivation to learn repair skills. An important aspect of the Cortina Café is that it is inviting to everyone, as described in Chapter 7. Therefore it must cater to people who want to learn how to repair, people who do not, and everyone in between. This diversity is achieved through offering a repair zone for tinkerers, a quick exchange zone for Cortina Endurance owners, and a café open to anyone. To cater to the target group looking for a quick repair, the Cortina Endurance must be available during the café launch.

Furthermore, Cortina currently has the resources to design a new type of bicycle. This way, a first step towards the Cortina Café concept can be made with skills already present in the company, making the transition to the final vision of 2035 easier (Simonse, 2017).

Learn by Doing

The expert interviews endorsed that, though many sources claim that a MaaS-system and mobility hubs will exist in 2035, no one knows the details regarding finances, ownership and market leaders yet. This brings uncertainty but also opportunity. Therefore, a roadmap describing multiple pilots leading up to a broad implementation of the Cortina café is necessary. Critical reflection is essential to assess costs, benefits, and risks during every stage.

Start small

Cortina's envisioned brand image in 2035 is authentic to its heritage: creating bicycles for the underserved market segment, which wants to feel autonomous in the shared mobility world of 2035. Propelling the brand from what it is today to its 2035 vision should be done by enhancing authentic elements already present (Beverland, 2018). The Cortina Café re-

flects Cortina's values of being fresh, on-trend, innovative, and open. The innovative brand value will be enhanced in 2035 by becoming the pioneer of the right-to-repair legislation, creating a sustainable connotation as well. This transformation must be taken in small steps to ensure authenticity. Such small steps include gifting a repair kit when purchasing any Cortina bicycle to show customers that Cortina encourages maintenance and repair. A more significant step could be equipping current mobility points, such as bus stops, with small, crewless repair stations advertising the Cortina brand. This way, Cortina will gradually establish itself as a sustainable bicycle brand.

Cortina Endurance

The expert interviews emphasized the importance of bicycle maintenance. Alerts regarding maintenance of the Cortina Endurance should be incorporated into the customers' MaaS app to ensure a smooth experience without additional apps. The experts also mentioned that personalization can be an excellent tool to enhance one's feeling of responsibility. However, personalization in the form of additional bike parts must come at a cost for the customer to discourage unnecessary use of resources. Charging a small fee for an exchange or requiring the old part to be recycled can prohibit parts from ending up in landfills. In addition, the bicycle must have a carrier to adhere to Cortina's brand image and cater to the customer seeking practicality, as Cortina is best known for their iconic U4, shown in Chapter 3.

The efficient exchanging of parts presents opportunities for modularity. For example, a front wheel can be designed to swap for a cargo part. The project's final rendition of the bicycle concept will not include modularity options, as Cortina has confirmed that the earliest the Endurance could launch would be 2027. Therefore, modularity will be mentioned in the recommendations.

Feedback about the Endurance's design was that it looked very similar to the Vision bike created by Cortina and missed a personal touch from the designer. A last iteration sprint will therefore implement the feedback provided in this section for the final version of the Endurance.

Education

The educational role the Cortina Café could take as a facilitator of workshops for adults and children was mentioned throughout the interviews, fortifying the design vision of enabling autonomy.

Vendor Network

Considering the shrinking labour market for repair technicians mentioned by the interviewed experts, offering a place where people can repair something, such as the Cortina Café, may relieve the labour shortages in the repair market.

Connect repair to sustainability

In order to make the Cortina Café and bicycle a success, people must be open to learning repair skills. Sustainability is a trend, especially amongst the youth, as described in Chapter 2. Therefore, linking the repair part of the concept to the sustainable part of fixing products can benefit the concept's attractiveness.

Low barriers to entry

Repairing something can be overwhelming, especially when first starting. Although a messy workspace emits cosiness, it mostly feels overwhelming to novice repairers. Therefore, it is important that the tools in the Cortina café organized neatly and that the workspaces are inviting and clean to lower the barriers to learning and repairing. Good organization also aids in keeping track of inventory.

Eyes on the horizon

Despite its detailed exploration, the concept created in this project remains part of a future design vision. During the Transirede mentioned in Chapter 8.1, it became apparent that the mobility world lacks a future shared vision, resulting in debates about irrelevant details. The mobility should work towards a joint visionary worldview as decisions beneficial in the short-term do not always contribute to a better world long-term. The concept and roadmap in this project give realistic advice to Cortina on approaching the design vision with the information available today. Still, common sense, reflection, and critical thinking are essential to determine what will contribute to a better future.

8.3 Final Design Cortina Endurance

To implement the received feedback from the previous subchapter about the Cortina Endurance being quite similar to the Vision Bike shown in Chapter 3, a final iteration will add a personal touch to the design and truly take advantage of Cortina's distinctive brand physique. The Cortina Blau inspired a final ideation, as the previous interviews indicated that clarity and overview are essential for making repairing a non-overwhelming endeavour. The Blau has a very open design, clearly showing its configuration, especially around the pedal axis (see Figure 8.3). The iteration sprint can be found in Appendix K. Figure 8.4 shows the final iteration of the Cortina Endurance.

Figure 8.3: Cortina Blau (Cortina, 2023)

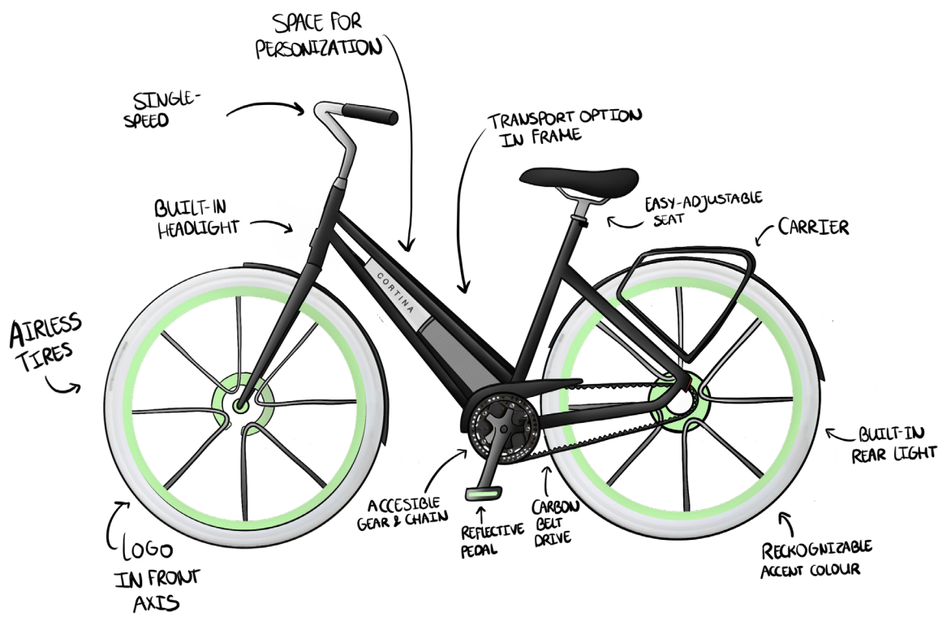


Figure 8.4: Final Cortina Endurance and functionalities

The bike incorporates the following features:

• The Endurance has single-speed gearing because fewer mechanical parts require fewer resources, improve durability, and make repairs more effortless. The bicycle is for short distances on even terrain within cities, so shifting gears will assumably not be essential.

• The design features a space for a personalised message in the frame, allowing users to express themselves. Personalisation can also make the bike less appealing to thieves, as a frame conveying somebody's name will be complicated to sell.

• The bicycle’s frame has a unique carry-on feature to emphasise Cortina's brand physique known for its carrier possibilities. From above, the frame can be viewed as a triangle with netting on the sides (see Figure 8.5). This space can transport small goods such as water bottles or grocery bags.

• The bicycle's seat and steering pin are easily adjustable without any tools via a quick-release lever as described in Chapter 7.7, allowing the user to switch quickly from a sportive to a relaxed configuration or to share the bike with another individual.

• The Endurance includes a rear carrier with an attachment system for accessories, as described in Chapter 7.7. The carrier is mounted to the rear fender to create a ''floating'' look and emphasise the form language in the shape of the carrier and that of the frame connecting the rear wheel (see Figure 8.6). A similar carrier can be attached to the front wheel axis to create more transportation possibilities.

Figure 8.5: Top View Cortina Endurance

Figure 8.6: Form language Cortina Endurance

• The bicycle features built-in lights at the front and the rear that project onto the street, as seen in Figure 8.7, for optimal visibility and safety. Built-in lights are less likely to need replacing than lights that have to be fastened separately, as they are less prone to breakage and theft.

• The inside of the Endurance's tires and the wheel axes will display an accent colour. Together with the unique spokes pattern from the Vision Bike, the Endurance will stand out on the street and accumulate brand awareness. The front axis features the Cortina logo by an open gear space connecting the spokes to mimic Cortina's ''C''. The consequences this will have on the strength and durability of the axis have to be calculated, as durability and safety are essential. Otherwise, a similar effect could be achieved by making the gap black or transparent.

• The Endurance has a carbon belt drive instead of a regular bicycle chain. A carbon belt has a lifespan that is four times longer, gives a more efficient power transfer from pedals to rear wheels due to lower friction, needs less upkeep, is lightweight, and is quieter.

• The bike's pedals contain reflectors for safety and recognizability.

• Airless tires from Kruitbosch's company Schwalbe eliminate the problem of having a flat tire. Instead of air, a self-repairing fluid makes up the inner part of the tire while maintaining an equal pressure to traditional tires, resulting in a tire that cannot be punctured.

• The carbon belt drive of the Endurance is surrounded by an accessible chain glider instead of a chain guard to make cleaning and maintenance easy. The benefits of the carbon belt drive are that it does not corrode or loosen like a standard chain, but it is inclined to pick up the same amount of dirt. Therefore, it will require cleaning, which is easy as the chain glider does not obstruct the carbon belt.

• The Endurance is designed for easy repair and upkeep by individuals with limited repair knowledge, meaning that the assembly of the Endurance will be more effortless than that of regular bicycles. Therefore, it might be possible to offer customers the option to configure their unique bike. However, Cortina should investigate how complex (and possibly costly) offering this service will be and whether projected profits will be worth it.

• The easy assembling of the Endurance presents the opportunity for modularity. Examples are putting the rear carrier on the front, selecting a different saddle type, or swapping the entire front of the bicycle for a cargo solution. Exploring desired modules can be of interest for the second Cortina Endurance.

Figure 8.7: Visibility at night

The Endurance will aid in marketing Cortina as a sustainable brand that deems autonomy and user rights essential. Its launch will react to the right-to-repair legislation in Europe (European Parliamentary Research Service, 2022; Svensson, 2018). Many interviewees endorsed that maintenance is crucial to a bicycle's longevity, so alerts about the Endurance's maintenance shall be incorporated into the user's MaaS app.

Designing a durable bicycle provides Cortina with a first step towards the project's final vision within their area of expertise. According to the estimated development time for a Cortina bicycle, the Endurance can launch in 2027. Pilots with mobile Cortina Cafés (Figure 8.8) will start shortly after the Endurance's launch, providing customers with accessible locations for maintenance or repair. If customers do not have a café nearby, they can visit their Cortina dealer for maintenance. After a few years, when the demand for new parts will increase due to wear and tear, Cortina will have multiple cafés throughout the Netherlands offering easy and convenient services. The Cortina Endurance aims to strengthen the advantages of those services while producing profits from bicycle and spare parts sales.

The Cortina Endurance presents durable solutions, efficient attachment options, and a fresh design. Solutions like quick-lever systems, the MIK system, and tool compatibility can provide an ideal configuration to make the Endurance accessible. More research can show what combinations of parts and attachments lead to trustworthy assembly. The Endurance aims to inspire Cortina for future initiatives, similar to the Vision Bike of Chapter 3.2. The bicycle reinforces Cortina's brand relationship of a hero and sidekick, as described in Chapter 3.6, by offering a reliable bike ready to explore the urban environment of 2035.

This subchapter described the design of the Endurance bike accompanying the Cortina Café concept, as suggested in Chapter 6.2 to ease the comparison between the concepts that included a micro-mobility product and capitalize on the right-to-repair legislation (European Parliamentary Research Service, 2022; Svensson, 2018). Designing a durable bicycle provides Cortina with a first step towards the project's final vision within their area of expertise. Furthermore, cycling is expected to remain an essential method of transportation in addition to mobility hubs in 2035 (Bouton et al., 2022; Vandecasteele et al., 2019). An important goal of the Endurance is to strengthen the advantages of the services offered at the Cortina Café while generating profits from bicycle and spare parts sales. Another objective of the concept is to inspire Cortina for future initiatives, similar to the Vision Bike of Chapter 3.2. Lastly, the bicycle reinforces Cortina's brand identity by offering the sidekick that the user (the hero) needs to explore the urban environment of 2035.

Figure 8.8: Cortina Café pilot with mobile café

8.4 Final Design Cortina Café

This chapter will summarize the essential features of the Cortina Café, implement the feedback received in subchapter 8.1, and propose a design for the outside of the café. Plenty of design choices regarding the concept have been thoroughly detailed in Chapter 7. This chapter will summarize those choices and reference the elaboration & development chapter when necessary.

The Cortina Café will be located at mobility hubs throughout the Netherlands in 2035. Its primary goal is to provide a workspace and tools to repair bicycles, playing into the upcoming right-to-repair legislation described in Chapter 2 and the design vision described in Chapter 4. Visitors of the café can repair their bicycles, buy a refreshment, wait during a connection, or meet up with someone else.

The Cortina Café fulfils the design vision created in Chapter 4 by expressing the product qualities derived from the equestrian centre analogy. The Café is a welcoming and inviting space where people can repair their bicycles, granting them independence and freedom in their travel options. The café stimulates social cohesion by supporting visitors in exchanging their repair knowledge. It encourages people to help and care for each other, making them feel part of a trusting society and enhancing their responsibility towards their community while educating people about the benefits of a sustainable and healthy lifestyle.

Repair

The cafés facilitate a workspace with repair tools to use for free. Entrusting visitors responsible for these tools, combined with social control, will generate goodwill and encourage users to act amenably. Free repair tools attract customers who might also purchase a beverage, accessory, or spare part. Charging for spare parts for both regular bicycles and the Cortina Endurance will encourage people to repair a broken part before purchasing a new one, preventing functional components from ending in the landfill while generating a small profit for Cortina.

Social Cohesion

The Cortina Café provides a welcoming meeting space for all kinds of travellers, whether they are looking to socialize with neighbourhoods or whether they have to pass the time between a connection. The first option can cause community-building by providing a platform for sharing knowledge, skills, and experiences, fostering a sense of community ownership and responsibility towards the environment and each other's well-being.

Sustainability

The Cortina Café promotes repairing products instead of discarding them from a sustainability and a cost-advantageous perspective through advertisements or educative workshops. Reducing waste and promoting a circular economy aligns with the United Nations Sustainable Development Goal 12: Responsible Consumption and Production (United Nations, 2022).

Enriching mobility hubs and thus attracting more users can lead to a decrease in private car usage, a decrease in harmful combustion gasses into the atmosphere, and a decreased need for city parking spaces. The Cortina Café enables repair instead of replacement, decreasing the need for virgin material to make new products. By making cycling more accessible, especially with reachable mobility hubs, the café promotes a healthy movement and a 'zero-emission' form of mobility.

Autonomy

The Cortina Café encourages autonomy as the concept provides tools, knowledge, and resources to repair and maintain micro-mobility products. It grants users autonomy and control over mobility, potentially leading to a greater sense of community and self-reliance.
The café encourages a healthy lifestyle by making cycling more accessible. Being capable of repair allows users to personalize or customize their product, allowing identity expression and enforcing autonomy, despite living in a shared mobility system.

By providing people with a free workspace to repair their bicycles and only charging for substitute parts, the cost of executing a repair at the café is far lower than that of a repair technician, making cycling accessible to a broader range of individuals. The Cortina Café enriches mobility hubs by offering additional facilities, stimulating more users to use the hub and justifying its existence in multiple locations throughout the Netherlands, further improving accessibility to hubs for all.

The Cortina Café has an educational role offering workshops regarding repair for all ages, making younger generations familiar with the concept so repairing instead of replacing will be normalized when they have become adults, as described in the expert interviews from Chapter 8.1, raising a more capable and sustainable generation.

Cortina Endurance

The Endurance will reinforce the Cortina Café concept and provide a first step towards the design vision within the brand's expertise, endorsing Cortina's innovative and sustainable brand identity by focusing on durability and ease of repair. The café offers convenience by facilitating the exchange of Cortina Endurance parts. More information about the Cortina Endurance can be found in Chapters 7.7 and 8.3.

Target Group and Target Area

Chapter 7.3 estimated that the Netherlands would need approximately 750 mobility hubs to ensure all citizens live within 15 minutes of cycling from a hub. The interviews from Chapter 8.1 advised slowly working up to a broad implementation scale of the Cortina Café. Cortina could start measuring people's reactions to the concept by opening pop-up stores or mobile 'cafés' before opening an (expensive) café location. If the first tryouts succeed, a pilot in West Brabant could be a good starting point for the development of the concept, as the province plans to start implementing a new mobility strategy, including hubs, in the coming years, its residents are open to the idea of MaaS, and nine locations that could benefit from additional facilities such as the Cortina Café have already been selected (Gemeente Noord-Brabant, 2018). Chapter 7.3 describes the selection of the target area in detail.

Viability

The Cortina Café will generate revenue through several channels shown in Figure 8.9. The cafés viability is challenging to assess due to numerous uncertainties about funding, prospective costs, and anticipated revenue streams. The development and implementation scale of the Cortina Café depends on the success of mobility hubs and MaaS apps. As proposed in chapter 7.3, Cortina should start with piloting the concept to explore the benefits to society and the environment before continuing the widespread implementation of cafés.

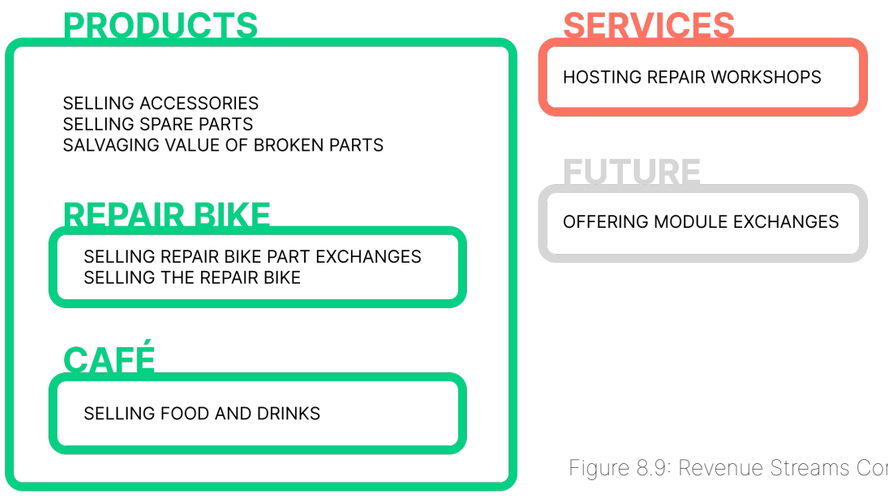


Figure 8.9: Revenue Streams Cortina Café

The competitor analysis of chapter 7.5 showed that Cortina must exploit its first-mover advantage as a repair pioneer in the cycling world by seeking partnerships with MaaS suppliers, the government, and other mobility facilitators. The key to an excellent mobility network is a collaboration between all parties to integrate different services and create a smooth experience for the customer. A complete business model canvas regarding the Cortina Café can be found in chapter 7.4.

Design

As mentioned in the expert interviews in chapter 8.1, the Cortina Cafe must feel organized and clean to put novice repairers at ease. The idea of 'clarity' resulted in repair zones visible through glass windows from the outside, lowering the threshold to enter as people know what to expect. The Cortina Café is authentic to the brand by adhering to its cultural values (fresh, on-trend, inventive, open) and emphasizes the characteristics that users already attribute to Cortina (unique, cooperative, inventive)

Figure 8.10: Daily activities Cortina Café

The inside of the café features light wooden surfaces to give a natural but clean feeling. The walls are adorned with green to represent sustainability and as a nod to the accent colour used throughout Cortina's social media and the Endurance bicycle. The outside of the café has a modern yet inviting look through a combination of warm exposed brick and matte black finishes on beams, doors, and outside panelling. Plants are part of the interior and exterior to create a pleasant ambience and induce associations with being in nature. Figure 8.10 shows the daily activities inside the café, and Figure 8.11 shows the outside.

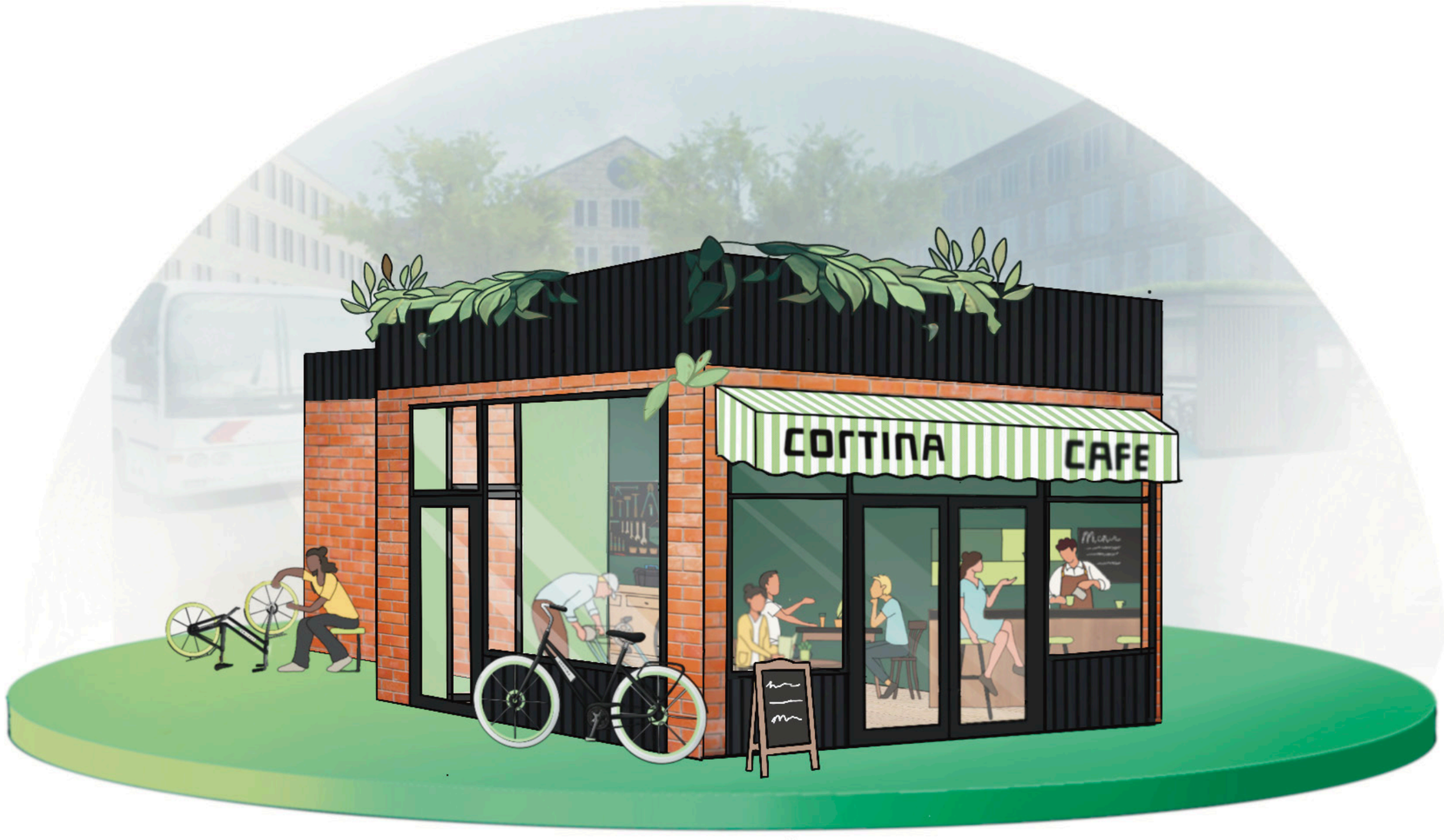


Figure 8.11: Exterior design of the Cortina Café

The layout of the café (Figure 8.12) caters to all need-based personas defined in Chapter 7.3 and shown in Figure 8.13. Catering to the different personas is achieved by dividing the café into separate zones; a seating area, a DIY area with extensive repair tools, and an area for quick exchanges of Cortina Endurance parts. The café still feels like one coherent space to ensure transparency and opportunities for social cohesion.

Conclusion

This subchapter summarized the key features of the Cortina Café and proposed a final design. The viability of the café is challenging to assess due to numerous uncertainties about the future of mobility. The roadmap described in the next section will guide the development of the Cortina Café to 2035.

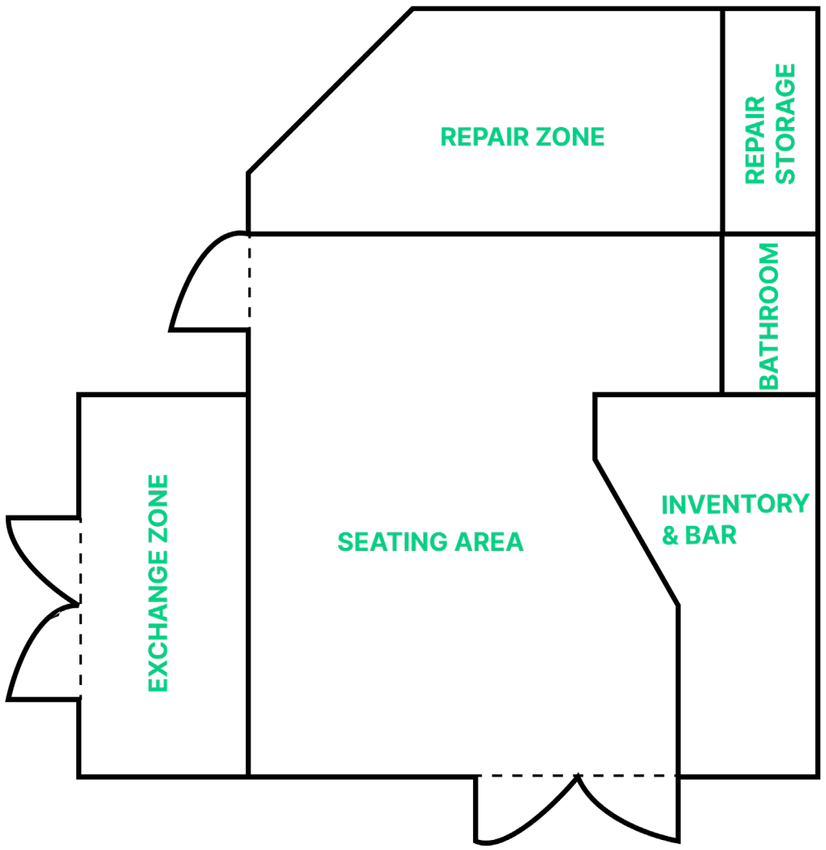


Figure 8.12 lay-out of the Cortina Café

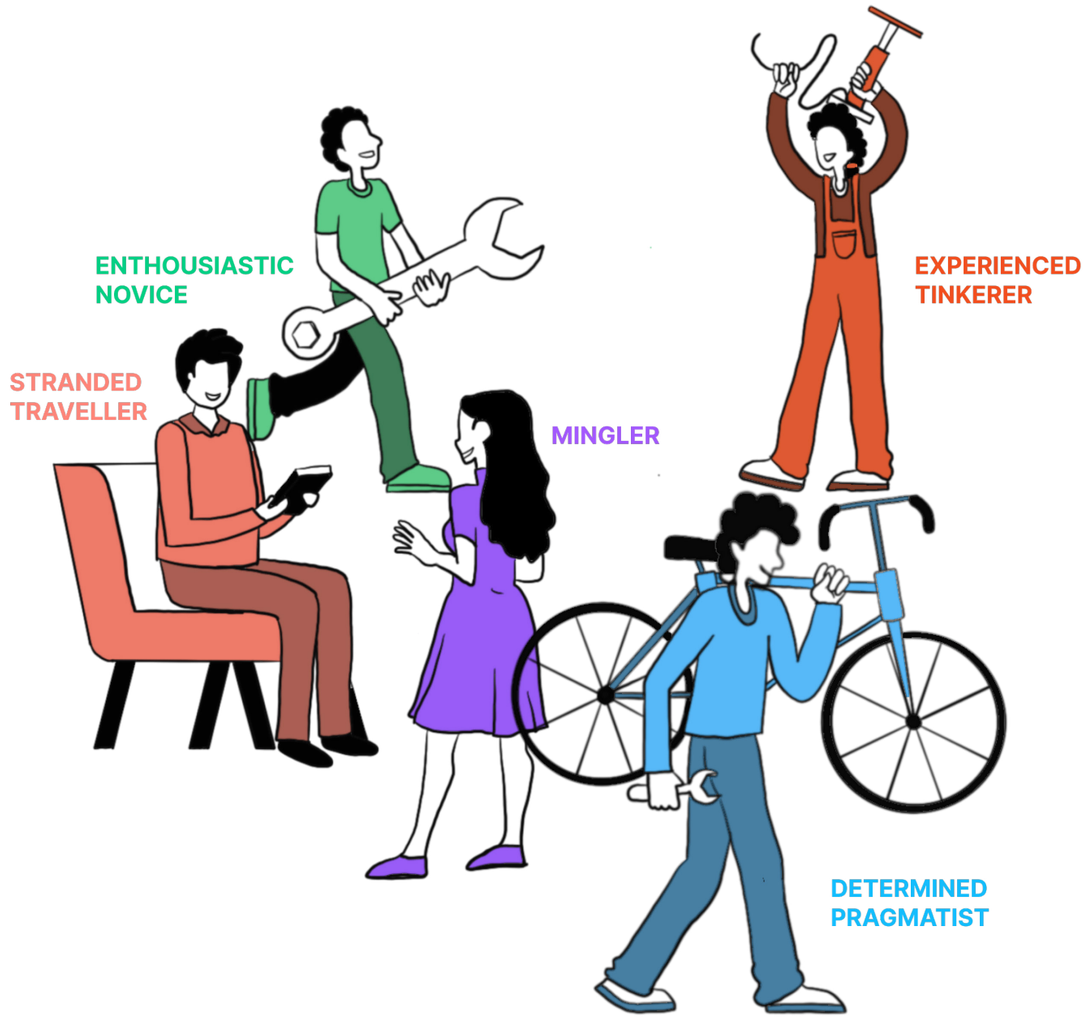


Figure 8.13: The need-based personas from Chapter 7.3

8.5 Roadmap

This chapter describes the roadmap created as a deliverable for the graduation project providing Cortina with a strategy towards achieving the design vision described in Chapter 4. The book Design Roadmapping by Simonse (2017) was used as a guideline to create the roadmap. In road mapping, three so-called 'horizons' project different phases forming a timeline towards a vision, as seen in Figure 8.14. The first horizon focuses on a continuous flow of enhancing design value to current products, carried out by designing the Cortina Endurance. During this phase, processes needed for the second and third horizons will start. The second horizon is user-centred value creation, where entering new markets results in growth and transformation. For Cortina, this second horizon entails piloting the Cortina café in several ways while focusing on developing the Endurance market by extending its services. The third horizon concentrates on value proposition creation by developing a disruptive strategic innovation that responds to the external environment resulting in long-term growth. The changing external environment is the mobility landscape through the rise of MaaS and hubs, and Cortina's response is the Cortina Café.

Given the time limit of the graduation project and the resources needed for a detailed roadmap, including legislation and essential partnerships, this roadmap will focus on the Netherlands. Thorough research on mobility players and government attitudes towards hubs and legislation for all Western-European countries is not feasible within the project's scope. The concept can still prompt the envisioned interaction in countries outside the Netherlands, as the foundational research for the concept envelopes Western-European countries.

The roadmap's top row illustrates the three horizons defined by Simonse (2017). The Market Trends section displays the trends found in Chapter 2. The Product-Service section of the Roadmap shows Cortina's goal per horizon, being respectively 1) reinforcement and collaboration, 2) expansion and experimentation, and 3) integration and disruption to eventually end up at the future vision of 2035. The Product-Service section contains four timelines: Cortina Endurance, Cortina Café, digital, and marketing.

Cortina Endurance

As described in Chapter 8.3, the Cortina Endurance provides Cortina with a first step towards the project's final vision within the brand's area of expertise, which is in line with the first horizon of road mapping: improving existing products and introducing new versions. The Endurance will aid in marketing Cortina as a sustainable brand that deems autonomy and user rights essential. Its launch reacts to the changing lifestyle & sustainability trends found in Chapter 2.

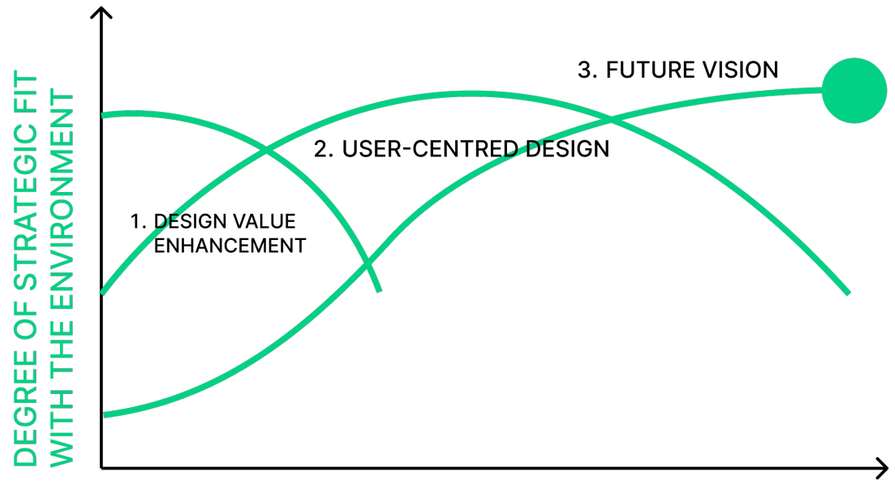


Figure 8.14: Roadmapping horizons as described by Simonse (2017)

According to the business unit manager of Kruitbosch, the Endurance can launch in around 2027 if its development is prioritised. A valuable partner for this could be circular bicycle designer Roetz, as mentioned in Chapter 7.4. Other crucial partners for realising the Cortina Endurance are Kruitbosch's own brands, such as Schwalbe, who will provide essential parts. The bicycle will enter production in 2025 and will launch right before 2027. To begin taking small steps towards a sustainable brand image, Cortina can gift repair kits to its customers when purchasing any bike.

HORIZONS

HORIZON I: DESIGN VALUE ENHANCEMENT
Improving existing products and introducing new versions

HORIZON II: USER-CENTERED DESIGN
Entering new markets with new products and services resulting in growth and transformation

HORIZON III: VALUE PROPOSITION CREATION
Creating strategic disruptive innovation with a new value proposition offering a response to the external environment resulting in long-term growth

MARKET TRENDS

- **LIFESTYLE CHANGES**: Flexible and remote work hours & increased equality
- **CONSUMABLE MOBILITY**: Increased popularity of MaaS-platforms & shared mobility
- **SUSTAINABILITY**: Growing demand for a sustainable lifestyle; R2R Legislation; Ban on combustion cars
- **CHANGING POPULATION**: Growing urban areas, increased diversity & aging population
- **DIGITIZATION**: Rapidly increasing technology improvements & data collection
- **MOBILITY HUBS**: Rising popularity mobiliy hubs in future urban planning; Start Pilot West-Brabant
- **SHARED SOCIETY**: Increase shared mobility

PRODUCT - SERVICE

REINFORCEMENT & COLLABORATION

EXPANSION & EXPERIMENTATION

INTEGRATION & DISRUPTION

CORTINA ENDURANCE

- **Development**: Start development bicycle based on results from project. Contact potential partners such as Roetz for circular bike design.
- **Production**
- **Launch Endurance**: Emphasis on maintenance and personalization. Provide a small repair toolkit with the bicycle.
- **Pilot replacement parts**: Make replacement parts for the Endurance readily available at the pop-up cafés, making replacements more convenient. Collect broken parts for recycling.
- **Pilot café**: Make replacement parts readily available at the Cortina cafés.
- **Start development Endurance II**: Iterate on previous model and develop a second version of the Endurance. Possibilities that can be added are modularity, swappable parts, etc.

CORTINA CAFÉ

- **Contact key players**: Contacting key players working on mobility hubs for collaboration in the physical and digital space.
- **Strategy, Permits & Subsidies**: Develop a joint (financial) strategy with key players. Applying for subsidies, permits, and/ or gather private investors
- **Pilot unmanned repair stations**: To establish a presence in the repair market unmanned repair stations can be created at already existing mobility hubs
- **Mobile Pilot**: A trial with pop-up cafés to learn by doing.
- **Start Cafés**: Permits, subsidies, and funding for the realization of first cafés
- **Café Pilot**: A first pilot with multiple Cortina cafés located at mobility hubs in West-Brabant
- **Reflection**: Gather data and insights collected during pilots. Reiterate strategy with partners and decide on scope for future Cortina cafés.
- **Grow Cortina Café**: With a proven concept Cortina Café can focus on opening locations throughout mobility hubs in the Netherlands to offer the service to all citizens.

DIGITAL

- **Maintenance integrated in MaaS app**: Maintenance significantly increases durability. Updates should be given via an integrated MaaS-app
- **Instruction videos**: Instruction for easy repairs can be found in the MaaS app
- **Mobile Pilot in MaaS app**: As users are becoming more familiar with MaaS apps more data should be available to locate promising pop-up points for the mobile pilot and collect data about its users.
- **Integration of first cafés in MaaS app**: A seamless integration with the MaaS app for customers containing maintenance alerts, repair instructions, availability of parts, and an appointment system
- **Seamless integration of Café and MaaS**: The insights of the pilots in combination with the expected rise of one MaaS app for travelers should result in a seamless integration of Cortina's services in the app to ensure the target audience is reached.

MARKETING

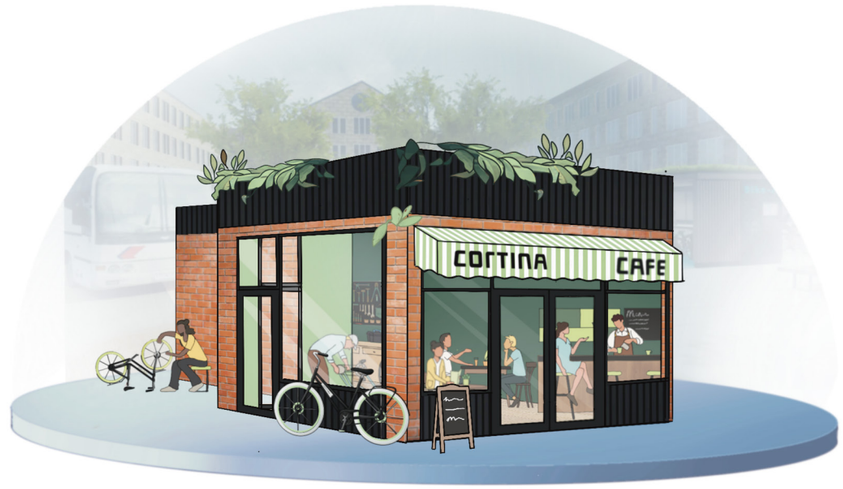
- **Vision 2035**: Distribute the results of the Vision 2035 project to reinforce inventive brand image and start the conversation around sustainability
- **Urban Jungle Campaign**: Use the results of the Vision 2035 campaign and the improved brand identity to market Cortina as a sustainability and repair leader in the cycling industry.
- **Launch Endurance**
- **Emphasize unmanned repair stations**: As an additional service to both Endurance owners and everyone else. Reinforces brand identity, offers convenience, and enables people to be responsible for their own possession.
- **Promote MaaS app**: Use Cortina channels to promote MaaS app from partner Rivier to garner users that will get familiar with the system and grow the userbase
- **Soft launch Cortina Café**: Run marketing campaigns in public transit and via the MaaS app. Send all Endurance owners an offer for a free cup of coffee during their next replacement to generate repeat visitors
- **Celebrating every café**: Mobility hubs will be tailor-made to their surroundings. Every new café will have a grand opening to gather momentum in its neighborhood.

RESOURCES

- **PARTNERSHIPS**: Roetz; Dutch Municipalities, Rivier, 9292, Gaiyo (MaaS application), investors, public transit, shared mobility providers; Government & Private investors; Owners of PT locations and municipalities (NS, Connexion); Rivier, 9292, Giayo; Dutch Municipalities, Rivier, 9292, Gaiyo (MaaS application), investors, public transit, shared mobility providers; Dutch Municipalities, Rivier, 9292, Gaiyo (MaaS application), investors, public transit, shared mobility providers
- **TECHNOLOGY**: Airless Tires (Schwalbe); Carbon Belt — Using relative new technologies from Kruitbosch' own brands; Integrated MaaS app — Rivier, 9292, or Giayo are promising initiatives to create an integrated Dutch MaaS app; Data & transport pop-up café; Technology for operating a café (cash register, inventory system, etc.); Modularity, improved materials & improved recycling methods
- **SUPPLY CHAIN**: Materials & Manufacturing; Tools & Resources; Replacement Parts; Inventory
- **LOGISTICS**: Dealers; Vendor distribution; Knowledge premium dealers; Distribution Channels for replacement parts & recycling of old parts; Dealers as employees of the Cortina Café; Expand logistic network

2023 — 2027 — 2031 — 2035

FUTURE VISION CORTINA 2035



AUTONOMY RESPONSIBILITY TRUST COHESION

An inviting Cortina Café located at several neighbourhood mobility hubs throughout the Netherlands, adding benefits for all types of travellers, both with or without the Cortina Endurance. The café facilitates social cohesion, education, and self-expression, making users feel part of their community without losing autonomy. The bike embodies a hero-sidekick relationship befitting Cortina's brand identity, encouraging responsibility for a sustainable lifestyle.

Maintenance is essential to the durability of the Endurance bicycle, as explained in chapters 7.7 and 8.2. The Cortina Café will not exist at the Endurance bicycle's projected launch, so customers must visit a Cortina dealer for maintenance or replacement parts for the first years. Maintenance notifications should be part of the user's MaaS app for a smooth mobile experience via one platform. Three potential widespread MaaS apps are identified in chapter 2.4: Rivier, 9292, and Giaya. Cortina should contact all three to ensure the integration of the concept into the future MaaS network. A separate Cortina application could temporarily offer maintenance service until a partnership is reached.

As soon as the mobile pilots described in the next section start, Cortina must have an inventory of Cortina Exchange parts and accessories to provide customers with immediate service. The same goes for the Cortina Cafés. After a few years, when the demand for new parts will increase due to the wear and tear of the Endurance bicycles, Cortina will have multiple cafés throughout the Netherlands offering easy and convenient services. The Cortina Endurance aims to strengthen the advantages of those services while producing profits from bicycle and spare parts sales. Cortina can develop a second edition of the bicycle around 2034 with modular options if the Endurance succeeds.

Cortina Café

The development of the Cortina Café concept will be more challenging than that of the Endurance bike as mobility hubs are unfamiliar terrain for Cortina. In 2024, Cortina will contact Dutch municipalities, MaaS applications, and shared mobility providers. As gathered from the interview insights of chapter 8.2, conversations among the players should start with the ideal configuration of the future's mobility, leading to a joint strategy, including a plan concerning permits and investments. Shortly after the launch of the Endurance bicycle, Cortina can start piloting crewless repair stations by equipping current mobility points, such as bus stops, and advertising the brand. This way, Cortina will further establish itself as a sustainable bicycle brand.

When the crewless repair stations operate, Cortina can start with conducting a mobile pilot, encompassing a moving van with a coffee machine and a small repair arsenal. An inventory of beverages and Endurance replacement parts is necessary for this step. The mobile pilot can attract media attention and familiarise people with the concept of a Cortina Café. Cortina can gather data from the pilot about the number of customers and repairs.

After evaluating the first pilot, Cortina can start piloting the first physical cafés in the region of West Brabant, as mentioned in Chapter 7.3. After gathering data for several years, a thorough reflection of the cafés functioning is essential, after which the proven concept can expand throughout the Netherlands.

Digital

A significant part of the future's mobility will be digital and revolve around one platform, as described in the Mobility as a Service chapter. The idea behind MaaS is to integrate various forms of transportation, such as public transit, ride-hailing, bike-sharing, and carsharing, into a single platform that can be accessed through a smartphone app or website to ensure a smooth experience for the consumer. In order to gain access to this digital platform, Cortina will have to partner up with parties concerned with MaaS. As mentioned before, the most promising ones in the Netherlands are Rivier, 9292, and Giaya.
This switch to digital also presents Cortina with opportunities. Instruction videos explaining minor repairs could be implemented in the MaaS app most commonly used in 2027 or in a separate Cortina app if an alliance is not reached by then to get a headstart in familiarising the user with the Cortina Café concept. Throughout the years, Cortina should gather user data to reflect on the concept's profitability and customise the services of each café to the neighbourhood's needs.

Marketing

Marketing is important to the success of the Cortina Café concept, as one of the project's goals is to gain a competitive advantage for the Cortina brand.

In 2023, Cortina can utilise the findings of this graduation project in a similar matter as the Vision Bike in Chapter 3 to reinforce their inventive brand image and start a conversation around sustainability and responsibility. From there on out, a marketing campaign will profile Cortina as a sustainable brand catered to urban life. An idea for the campaign is to focus on the user as an explorer of the 'urban jungle' with a Cortina bike as their sidekick. The advertisements should be bold and colourful, emphasising self-expression, sustainability and autonomy. The campaign aims to refresh consumers' memory about Cortina by enhancing brand values already attributed to the brand in Chapter 3 and slowly introducing the sustainability value without seeming unauthentic. An example is given in Figure 8.15.

With Cortina's fresh brand image in mind, a campaign will launch when the Endurance bicycle comes out in 2027. Shortly after, Cortina's social media can raise awareness of the crewless repair stations mentioned in the Cortina Café timeline to reinforce their innovative and sustainable brand image again. Around 2030, Cortina could promote the MaaS app they will have allied with to gather users, benefitting the MaaS ally by growing the user base and increasing the number of customers confronted with the Cortina Café in the app.

Around 2031, marketing campaigns for the Cortina Café should start, beginning with the owners of the Endurance bike. Over the following years, every Cortina Café opening should be celebrated in the accompanying neighbourhood. This can be broadcasted via Cortina's social media and accompanied by activities to attract customers and gain momentum and awareness. For example, every first visitor will receive a free coffee.

Together, all steps described will lead to the future vision for Cortina in 2035, focused on autonomy, responsibility, trust and cohesion. The roadmap was evaluated by the business unit manager bikes of Kruitbosch, who endorsed the vision of 2035 for Cortina.

Figure 8.15: Example of the urban jungle campaign

Conclusion

This chapter described one of the final deliverables of the graduation project: the roadmap. The strategy created for Cortina leads to the design vision through three horizons, as Simonse (2017) described. The first horizon encompasses reinforcement and collaboration, in which Cortina will utilize its strength and design a new bicycle while seeking partnerships with relevant players. The second horizon is expansion and experimentation, in which multiple pilots will be set up to test the concept of the Cortina Café while expanding the market of the Cortina Endurance. The third horizon describes integration and disruption, which will be the launch and growth of the Cortina Café, as described in the previous chapter. All these activities will eventually lead up to the future vision of 2035: creating an interaction that elicits autonomy, responsibility, trust, and cohesion in the shared mobility world of the future.

9. Evaluation & Recommendations

This chapter aims to finalize the graduation project with evaluation through a short feedback round consisting of a questionnaire among the interviewees of chapter 8.1. The insights from this questionnaire are implemented in the recommendations chapter. The chapter will feature a discussion where critical questions are raised and asked about the final concept and its development, after which concluding remarks will summarize how well the requirements described by the design brief in chapter 5 are achieved.

9.1 Evaluation
9.2 Recommendations
9.3 Discussion
9.4 Concluding Remarks

9.1 Evaluation

A questionnaire verifying the final concepts' desirability, feasibility, viability, and responsibility was distributed among the interviewed experts of chapter 8.1 to collect their final thoughts as input for the recommendations chapter. As mentioned in Chapter 8.1, the interviews took place over several weeks, meaning that some experts were presented with a more detailed concept than others. Therefore, the final results will be collected through a questionnaire similar for all experts. The questionnaire and its answers can be found in Appendix L.

Method

All interviewed experts received a link to a Google Forms questionnaire (see Appendix L). The questionnaire material is Dutch due to the participants' backgrounds. At the time of distributing the questionnaire, the final iteration of the Cortina Endurance had yet to take place. Hence, an older version illustrated the concept (Figure 9.1), accompanied by a short explanation. The questions aimed to receive feedback about the pillars of user-centred design described in the Delft Design Guide (Boeijen et al., 2014): desirability, feasibility, viability, and responsibility. The questions (translated from Dutch) were as follows:

1. Daily Life: How well does the concept contribute positively to the daily life of citizens in 2035?
2. Desirability: How substantially do you estimate citizens' need for the concept in 2035?
3. Brand Fit: How well do you think the concept fits the brand Cortina?
4. Feasibility: How feasible is the concept implementation for Cortina (assuming all project mobility plans of 2035 will become a reality?)
5. Responsibility: How much do you think the concept adds to society on sustainability, health, cohesion, etc?
6. Viability: How profitable do you think the concept will be for Cortina?

The participants answered all questions with a Likert scale rating of 1 to 7 (1 being very negative, 7 being very positive). The Likert scale will aid in comparing scores and make giving feedback uncomplicated for the participants. After every question, the respondents were asked to motivate their decision.

Results

The questionnaire received five responses from Cortina's brand strategist, the circular economy expert, the Cortina dealer, the project leader of mobility hubs, and the repair café visitor. Their scores are displayed in Figure 9.2. The horizontal

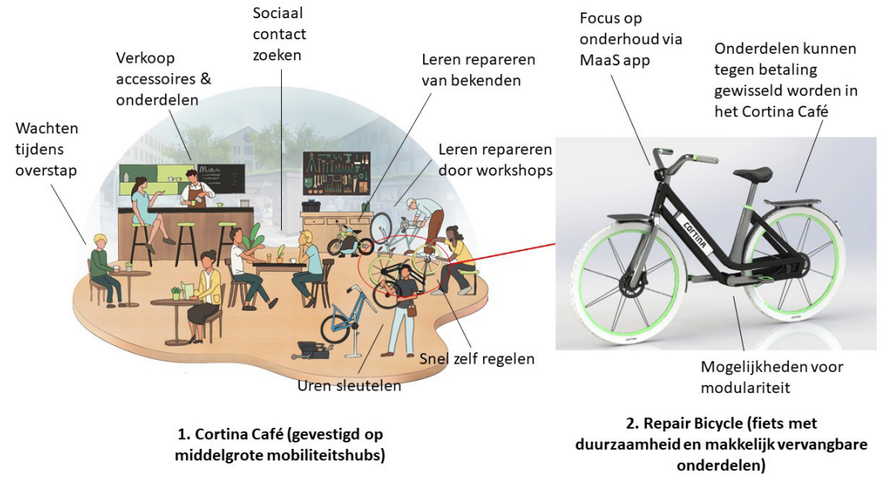


Figure 9.1: Questionnaire visual accompanying the concept explaination

The concept received comparable ratings for daily life, desirability, and brand fit, with all scores being a 4 or a 5. The feasibility scores were diverse, ranging from 2 to 5. The ratings for responsibility varied from 3 to 6, with half of the participants granting a 6. The concepts' viability received the lowest overall rating, with a 1, a 2, two 3's and one 5.

The high score for brand fit endorses that the concept suits Cortina, especially as the brand strategist rated the fit a 5. However, there is room for improvement as concerns were expressed regarding the dilution of Cortina's business model when collaborating with multiple parties. The brand dealer described the concept as refreshing and suitable for Cortina.

The responsibility received the highest rating overall rating. The experts anticipated that the concept would contribute most to neighbourhood cohesion but doubted the resemblances with bicycle repair technicians. The confirmation that experts believe the concept will positively affect society supports the design vision.

Viability received the overall lowest score as a revenue model was missing from the concept explanation. The Cortina dealer raised questions about the dealer's role in the concept and mentioned difficulties in advertising Cortina's brand while collaborating with other parties.

The positive contribution to citizens' daily life received scores ranging from 4 to 5. The comments accompanying this question expressed that contribution was mainly seen in the concept's role as a meeting place. Cortina's brand strategist expressed doubts about the position of e-bikes within the concept. The circular economy expert and the Cortina dealer

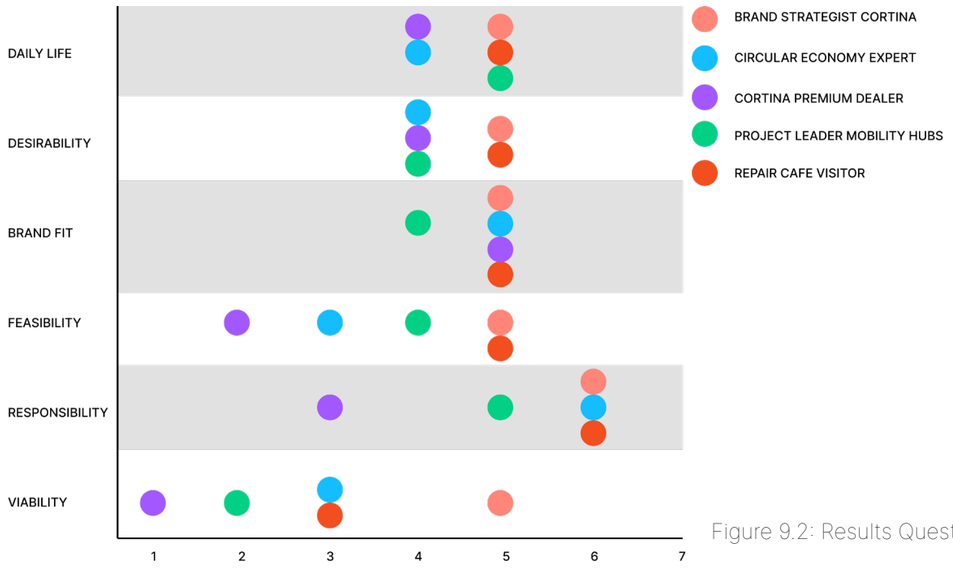


Figure 9.2: Results Questionnaire

expressed that the concept should not be limited to Cortina but focus on collaboration and creating universal services for multiple brands. The Project Leader of mobility hubs doubted whether a concept like this could work in places with lower volumes of travellers.

The desirability of the concept received ratings ranging from 4 to 5. The brand strategist believed that facilities, as described in the concept, will exist in the future but that the concept needs a specific target group. The Cortina dealer seconded the consumer's wish for easy repairs, especially in busy urban environments.

Discussion

The questionnaire was distributed eight days before the processing of data. Not all experts mentioned in Chapter 8.1 completed it. Therefore, the results lack feedback from the shared car user, the repair café volunteer, and the repair technician. However, the Cortina dealer is also a repair technician, so it can be assumed that his answers partly represent those of the missing expert.

Figure 9.2 shows that some respondents gave overall lower scores than others. Due to the expert's familiarity with the graduate student, the risk of biased answers exists.
As mentioned at the beginning of the chapter, the interviews took place over several weeks, meaning that some experts were presented with a more detailed concept than others. However, no pattern results from this timing. For example, the brand strategist, the project leader, and the Cortina dealer were interviewed within the same week, and their ratings varied towards opposite ends of the Likert scales.

Viability received the overall lowest score, as could have been expected due to the many uncertainties about funding, prospective costs, and anticipated revenue streams of the concept, as described in Chapter 7.4. Judging the concept solely based on a description and Figure 9.2 was difficult without context. Results could have been more positive towards viability if participants had been presented with the business model canvas of chapter 7.4.

The Cortina premium dealer rated the concept lowest on feasibility and viability. Due to the dealer's clientele (people looking for maintenance), it is a logical consequence that he is less inclined to believe in a concept focused on having people repair themselves. The dealer mentioned multiple times that bicycle repair technicians already bore many of the concept's responsibilities. The brand strategist of Cortina also noted skepticism about people repairing their e-bikes in the café. This indicates that the questionnaire insufficiently explained the concepts' target group, which is not bicycle repair technicians' clientele or e-bike owners. As explained in Chapter 7.3, no need-based persona is developed for people that want full 'support' (as is often needed for e-bikes due to their more complicated systems) as this is not in line with the design Vision and to refrain from competing with Cortina's dealers.

Conclusion

This subchapter described the questionnaire results of the experts interviewed in chapter 8.1, focused on the final concepts' desirability, feasibility, viability, and responsibility. The results indicated that the experts were optimistic about the designs' contribution to daily life, desirability, brand fit, and responsibility. Criticism was expressed about the concept's feasibility and viability. The results of the questionnaire will be implemented in the recommendations chapter.

9.2 Recommendations

The project and expert evaluations have led to recommendations for further development of the presented Cortina Café concept and Endurance bicycle.

Cortina Café

As described in the previous subchapter, the Cortina Cafés viability is uncertain. Cortina should critically assess the potential viability of the café and its pilots at the start of every new initiative.

The purpose of the café should be communicated to Cortina's dealer network, as there can be confusion about the concept's target group. As explained in Chapter 7.3, the café does not serve clients looking for someone to repair their bicycle but enables people to do it themselves.

Cortina should explore an educational role for the café, as the Cortina brand strategist and the circular economy expert expressed interest in educating children in the previous chapter. Not only can hosting (paid) workshops for adults increase citizens' autonomy, but inviting school classes to educational workshops can create a generation equipped with repair knowledge, with the additional benefit of familiarising them with the brand Cortina.

Cortina Endurance

Further research into the detailing of the Cortina Endurance is recommended, as described in the roadmap of chapter 8.5. Chapters 7.7 and 8.3 suggest possibilities for the bike's materialisation, functionalities, and repair options. Further exploration should provide Cortina with a more detailed configuration to realise the production of the bicycle.

Opportunities for modularity make the Endurance an attractive option for people that want a bicycle adapting to their changing needs. The modularity aspect can range from changing the saddle to changing the entire front of a bike for a cargo part. As mentioned in chapter 7.7, implementing systems that allow for easy exchange, such as MIK, into the Cortina Endurance design will future-proof the concept as it enables modular parts to be offered in a later stadium. These parts can be accessories to personalise the bike or products needed for a short period, such as a children's seat or cargo attachment.

Research into the advantages and costs of offering a custom Cortina Endurance configuration straight out of the factory is recommended to find an optimal balance between manufacturing costs and personalisation.

Europe

The initial scope of the graduation project was Western Europe, as Cortina expressed its desire to expand the project's assignment. The project's design vision is based on research encompassing Western Europe. In Chapter 6, it was decided to focus on the Netherlands for the project's final deliverables as a detailed roadmap for countries with varying legislation and policies was not feasible. Further research into expanding abroad is needed, especially regarding legislation, consumer attitude, and the introduction of Cortina in an entirely new market. Europe wide legislation is expected to change all aspects of mobility, not only in the form of the right to repair legislation, but also regarding helmets, e-bikes, and e-steps. Cortina would be wise to monitor these developments and adjust its strategy accordingly.

Collaboration

Cortina should collaborate with stakeholders in the mobility sector. As mentioned multiple times throughout the project, implementing change in mobility is difficult due to the many players, financial structures, and government involvement. Parties need to share their knowledge, data, and services to realise a world where all citizens' transportation needs are met via one smooth platform. Therefore, Cortina is advised to keep an open mind and initiate partnerships for better future mobility. One of those partnerships could be Dutch bicycle manufacturer Roetz, who recently launched its circular bike, as described in Chapter 7.5.

Vision

The design vision created in the graduation project entails a future world and Cortina's role in it. Cortina should make this vision their own and analyse which aspects they want to adopt for their goals in 2035. Cortina employees have repeatedly endorsed the vision of balancing autonomy in a shared world throughout the project. The steps to get there must be incremental, with plenty of reflection to slowly enhance Cortina's brand values of being bold, innovative, fresh, and sustainable while remaining authentic.

Supply

The SWOT analysis in Chapter 3.5 identified a dependency on foreign suppliers as one of Cortina's weaknesses. Research into mechanisms for easy repair is necessary to envision the Cortina Endurance bicycle. It might yield new manufacturing methods, presenting an opportunity for Cortina to determine whether local suppliers could fulfil the needed service. Outsourcing to local suppliers will improve collaboration, control, and often sustainability as resources need to cover less distance toward their final destination. Another benefit of the Endurance bicycle is that its durable design should decrease the need for replacement parts. The Cortina Café will collect broken pieces for recycling. This way, Cortina will have a smaller demand for new parts and an increased supply of recycled materials, decreasing its dependency on suppliers and virgin materials.

9.3 Discussion

This subchapter will discuss the project's limitations and reflect on the final design presented in chapter 8.

Branding
The first phase of the graduation project entailed an extensive analysis of the future mobility world and the brand Cortina. The future mobility world analysis served as the foundation for the project's vision in Chapter 4, meaning that the vision is not exclusively created for Cortina. The concept generation did utilize design implications from both the vision and the brand analysis. The concept is therefore designed solely for the brand Cortina. Cortina can leverage its brand name in the Netherlands to seek collaboration and partnerships. However, the question can be raised as to why Cortina should be the one to introduce the concept of the Cortina Café. The graduation project proves that developing the café would be a good strategy for Cortina's future, but is Cortina the best choice for the future of the café? The result of seeking out the advised partnerships with MaaS facilitators, government, and shared mobility owners could be implementing the concept without Cortina's brand name. In that case, a critical assessment of the costs and benefits is necessary to see whether Cortina should continue expediting the café.

Cortina Endurance
The Cortina Endurance provides Cortina with a first step towards the project's final vision within its area of expertise. It strengthens the advantages of the services offered at the Cortina Café while generating profits from bicycle and spare parts sales. The bicycle also aims to inspire Cortina for future initiatives, similar to the Vision Bike of Chapter 3.2. However, its necessity in combination with the Cortina Café can be argued. Perhaps offering both repair zones for regular bicycles and separate zones for the Endurance overcomplicates the critical features of the café or generates confusion about which bicycle owners can use the services. This distinction must be apparent to potential customers of the café.

Western-Europe
The final deliverables of the graduation project focused on implementing the designed strategy in the Netherlands. Although the research and thus the design vision result from data from Western-European countries, Cortina's brand identity is only based on data from the Netherlands, and thus the resulting insights in the design brief. Seeking partnerships abroad will be challenging, as Cortina will not be able to leverage its brand awareness or might not be familiar with key players in other countries. A possibility for Cortina could be seeking partnerships with bicycle brands such as themselves in other countries, who have the awareness and knowledge about their region and implement a strategy such as in the Netherlands but finetuned.

Uncertainty
The realization of the concept, as described in the graduation project, is very uncertain, as it is dependent on the successful implementation of MaaS and mobility hubs in the Netherlands. To counteract this dependency, Cortina's first steps towards the future design vision are designing the Cortina Endurance, which can be realized with already available resources.

Changing brand identity
The graduation project took several months. At the start, Cortina had just revised its brand identity, which started to become widely implemented near the end of the project. The brand analysis chapter was created at the beginning of the project, meaning that some visuals or insights gathered in the chapter were outdated when at the end of the graduation project. The changes suggested regarding Cortina's brand identity in Chapter 2 are based on the new strategy, which will still be relevant to the projected design vision.

Collaboration
The graduation project claims collaboration between mobility players is essential for a smooth transport system in 2035. However, there is a lot of uncertainty about which parties will be relevant stakeholders for Cortina. Additionally, it is unknown what other companies' attitudes towards collaboration will be like and whether they would consider Cortina a suitable party.

Market Size
The questionnaire insights described in Chapter 9.1 expressed concerns about a mobility hub's needed scale to warrant a Cortina Café. The fact that the cafés would ideally be located within a 15-minute vicinity of all Dutch citizens, as described in chapter 7.3, would mean that a large part of cafés would be found in less populated areas, which seems unrealistic considering the expert's doubts about its viability even within busy areas.

Target Group
The target group for the Cortina Café, as described in Chapter 7.3, is derived from need-based personas that encompass all kinds of travellers. The one group purposely excluded from this target market are people looking for support and time savings, as they typically go to a bike repair technician. However, increasing the accessibility of repair workspaces and easing repair processes might result in less clientéle for repair technicians as people would rather pay less at the café and do something themselves. The size of the repair technicians' customer base that might converge to the café must be researched to prohibit negative consequences for Cortina's dealer network.

Evaluation
As mentioned in the previous subchapters, the evaluation with experts took place over several weeks, meaning that some experts were presented with a more de-

tailed concept than others. This perhaps influenced the questionnaire results from Chapter 9.1, as not all participants fully understood the cafés business model, possibly resulting in a too-negative evaluation of the viability of the café.

Sustainability

Throughout the graduation project, several assumptions about sustainability were made, mainly regarding the benefit of recycling and repairing over replacing. The exact scope of those benefits has to be defined before advertising claims concerning environmental benefits. The launch of the cafés and the manufacturing of the Cortina Endurance both require resources, which harms the environment. The positive impact regarding resource savings and emission reduction must be explored to assess whether the eventual effect of the concept is positive.

9.4 Concluding Remarks

The objective of the graduation project is to develop a micro-mobility concept for the Cortina brand that caters to people's daily lives in Western European cities by 2035. Cortina aims to be a relevant brand in the Western European city lifestyle by predicting and adapting to the changes in mobility that will occur in the coming decade. A design brief was created based on design implications in the project's research and analogy phase to determine what a successful micro-mobility concept for Cortina entails. The brief is categorized based on the pillars of successful design described by the User-Centred Design method of the Delft Design Guide (Boeijen et al., 2014). This chapter concludes the graduation project by discussing the concept according to the pillars of the design brief.

Desirability

The user interacting with the concept should feel part of something bigger while maintaining autonomy and contributing to their environment. An analogy of an equestrian centre was created using the Vision in Product method (Hekkert, 2016) to illustrate the concept (Figure 9.5). The product qualities of the concept are responsible, enabling, inviting, free, supporting, social, open, trustful, dependable, and caring. These qualities are entwined with the concept as they inspire the ideation phase.

As a result of the product qualities, the Cortina Café concept is a welcoming and inviting space where people can repair their bicycles, granting them independence and freedom in their travel options. The café stimulates social cohesion by supporting visitors in exchanging their repair knowledge. It encourages people to help and care for each other, making them feel part of a trusting society and enhancing their responsibility towards their community while educating people about the benefits of a sustainable and healthy lifestyle.

The concept's value proposition includes autonomy, sustainability, social cohesion, and education. The café enables people to be in charge of their mobility products by facilitating repair tools, knowledge exchange, and improving accessibility to a functioning bicycle. Being capable of repair allows users to personalize or customize their product, allowing identity expression and enforcing autonomy, despite living in a shared mobility system. By making cycling more accessible, especially with reachable mobility hubs, the café promotes a healthy movement and a 'zero-emission' form of mobility. The café promotes repair instead of replacement, decreasing the need for virgin material to make new products. Enriching mobility hubs and thus attracting more users can

lead to a decrease in private car usage, a decrease in harmful combustion gasses into the atmosphere and decreasing the need for city parking spaces. The café serves as an educational place with the possibility of offering workshops regarding repair for all ages, making younger generations familiar with the concept so repairing instead of replacing will be normalized when they have become adults.

Feasibility

Designing a durable bicycle provides Cortina with a first step towards the project's final vision within its area of expertise. After the launch of the Endurance bicycle, the recommended steps from the roadmap described in Chapter 8.5 require additional resources such as partnerships, permits, suppliers, financial investments, and inventory.

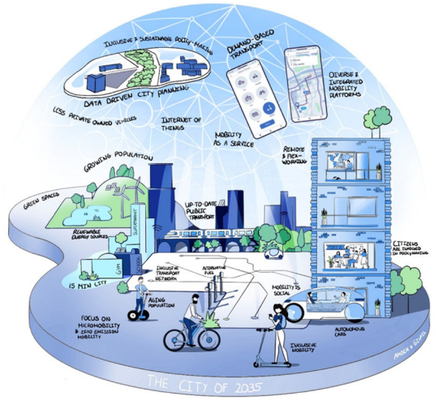
The Cortina Cafés feasibility relies on permits from the local government to take up residence in a mobility hub and offer catering services. Cortina will also need financial resources to launch cafés and employ the people needed. Mobile vans with repair tools could be utilized instead of purchasing many buildings simultaneously to keep costs low and gather data before launching multiple physical café locations.

Viability

Cortina's envisioned brand image in 2035 is authentic to its heritage: creating bicycles for the underserved market segment, represented by individuals craving autonomy in the shared mobility world of the future.
The Cortina Café is authentic to the brand by adhering to its cultural values (fresh, on-trend, inventive, open) while emphasizing the characteristics users attribute to Cortina (unique, cooperative, inventive) as described in Chapter 3. The Cortina Endurance enhances Cortina's competitive advantage generated by focusing on service and transport, as described in Chapter 3. The innovative brand value will be enhanced in 2035 by pioneering the cycling industry's right-to-repair legislation.

THE CONCEPT MUST EVOKE....

...THIS FEELING...



...IN THIS WORLD

Figure 9.3: Design Vision

The viability of the Cortina café is challenging to assess due to numerous uncertainties about funding, prospective costs, and anticipated revenue streams. The development and implementation scale of the Cortina Café depends on the success of mobility hubs and MaaS apps. The expert interviews and questionnaire both raised questions surrounding the cafés viability. Due to the uncertainty surrounding viability and the implementation scale of the café, the concept will probably be partially dependent on subsidies, especially for initial investments.

Responsibility

The Cortina café serves as an educational place with the possibility of offering workshops regarding repair for all ages, making younger generations familiar with the concept so repairing instead of replacing will be normalized when they have become adults. By making cycling more accessible, the café also promotes zero-emission mobility, which benefits the planet and the user. As mentioned in the discussion, critical research must be done about the actual scope of sustainable benefits and their effect on available resources.
By providing people with a free workspace to repair their bicycles and only charging for substitute parts, the cost of executing a repair at the café is far lower than that of a repair technician, making cycling accessible to a broader range of individuals. The Cortina Café enriches mobility hubs by offering additional facilities, stimulating more users to use the hub and justifying its existence in multiple locations throughout the Netherlands, further improving accessibility to hubs for all.

The café encourages social cohesion by supporting visitors in exchanging their repair knowledge. It encourages people to help and care for each other, making them feel part of a trusting society and enhancing their responsibility towards their community while educating people about the benefits of a sustainable and healthy lifestyle, in line with the project's vision.

Conclusion

In conclusion, this chapter presented the Final Design's desirability, feasibility, viability, and responsibility. The concept's desirability and responsibility received positive feedback from the experts in Chapter 9.1. The concept's feasibility and viability received doubtful comments due to future uncertainties. However, this was expected as the project focused on providing Cortina with a vision and strategy for 2035.
The result of this graduation project should be treated by Cortina (and other mobility parties) as a visionary project that aims to inspire and guide society to a better future world. Companies must unite and be willing to share data and strategy to realize an integrated MaaS platform centred around users. Mobility players should work towards a joint visionary long-term worldview, as today's decisions will influence society's future.

10. References

Aaltonen, S. (2017). MaaS Readiness Indicators for Local Authorities. Accessed March 13, 2019. https://civitas.eu/sites/default/files/maas_readiness_level_indicators_for_local_authorities_web.pdf

Abduljabbar, R. L., Liyanage, S., & Dia, H. (2021). The role of micro-mobility in shaping sustainable cities: A systematic literature review. Transportation Research Part D-transport and Environment, 92, 102734. https://doi.org/10.1016/j.trd.2021.102734

Anderson, K.B, Samuel, C., Derek, L. (2017). Incorporating Equity and Resiliency in Municipal Transportation Planning: Case Study of Mobility Hubs in Oakland, California. Transportation Research Record: Journal of the Transportation Research Board. 2653. 65-74. 10.3141/2653-08. Andrews, E. (2017, 12 mei). The Bicycle's Bumpy History. HISTORY. https://www.history.com/news/bicycle-history-invention

Anjo Jager Fietsen. (2018, November 30). Het Schwalbe Airless System is vanaf nu bij Anjo Jager Fietsen verkrijgbaar! Anjo Jager Fietsen. [Image]. Retrieved from https://anjojagerfietsen.nl/nieuws/het-schwalbe-airless-system-is-vanaf-nu-bij-anjo-jager-fietsen-verkrijgbaar

Automotive News Europe. (2021, February). Testing Automated and Autonomous Vehicles [Image]. Retrieved from https://europe.autonews.com/sponsored/testing-automated-and-autonomous-vehicles-test-tracks

BAM infra. (2019). Delft start met eerste multimodale mobiliteitshub Hely. https://www.baminfra.nl/nieuws/delft-start-met-eerste-multimodale -mobiliteitshub-hely

Bassant, J. (2022, 10 maart). Hoe ver is MaaS nu in Nederland? Stadszaken.nl. https://stadszaken.nl/artikel/4139/hoe-ver-is-maas-nu-in-nederland

Batavus. (n.d.). Stadsfietsen [Image]. Retrieved from https://www.batavus.nl/

Bell, D. (2019). Intermodal Mobility Hubs and User Needs. Social Sciences, 8(2), 65. MDPI AG. Retrieved from http://dx.doi.org/10.3390/socsci8020065

Bentley, S. (2022). Boy hugging horse [Image]. Retrieved from https://nl.pinterest.com/pin/131237776615221085/

Beverland, M. (2018, 12 februari). Brand Management: Co-creating Meaningful Brands (1ste edition). SAGE Publications Ltd.

Boeijen, A., van Daalhuizen, J., Zijlstra, J., Schoor, R., & Technische Universiteit Delft. (2014). Delft design guide: design methods (Revised 2nd). BIS.

Borovitskaya, A. (2022). Deze fietsfabrikant heeft e-bike gemaakt van afgedankte materialen. Business Insider Nederland. https://www.businessinsider.nl/roetz-fietsen-e-bike-circulair/

Bouton, S., Hannon, E., Knupfer, S. & Ramkumar, S. (2022, 18 april). The future(s) of mobility: How cities can benefit. McKinsey & Company. Geraadpleegd op September 16 2022, van https://www.mckinsey.com/capabilities/sustainability/our-insights/the-futures-of-mobility-how-cities-can-benefit

Bouwfonds Gebiedsontwikkeling. (2021, september). bpdDOSSIER: Infrastructuur & mobiliteit: Schakelen naar nieuwe verbindingen. Retrieved from www.bpd.nl.

BOVAG, RAI & GfK. (2020). Fietsen in de statistiek 2007 – 2019: Vakhandel verkoopt recordaantal elektrische fietsen. BOVAG. https://mijn.bovag.nl/actueel/nieuws/2020/juli/vakhandel-verkoopt-recordaantal-elektrische-fietse

Brömmelstroet, M. T., Mladenović, M. N., Nikolaeva, A., Gaziulusoy, D., Ferreira, A., Schmidt-Thomé, K., Ritvos, R., Sousa, S. & Bergsma, B. (2022, december). Identifying, nurturing, and empowering alternative mobility narratives. Journal of Urban Mobility, 2, 100031. https://doi.org/10.1016/j.urbmob.2022.100031

Buijs, J. and Valkenburg, R. (2000, 2nd ed.) Integrale Productontwikkeling, Utrecht: Lemma.

Buijs, J., (2003). Modelling Product Innovation Processes: from Linear Logic to Circular Chaos, Creativity and Innovation Management, Vol. 12 (2), pp. 766-93.

Centraal Bureau Statistiek. (2019). Mobiliteit van personen van 6 jaar of ouder naar vervoerwijze [Dataset]. In Hoeveel reisden inwoners van Nederland en hoe? CBS. https://www.cbs.nl/nl-nl/visualisaties/verkeer-en-vervoer/personen/hoeveel-reisden-inwoners-van-nederland-en-hoe-

Centraal Bureau voor de Statistiek. (2020). Onderweg in Nederland (ODiN) 2019. In Centraal Bureau Statistiek.

Centraal Bureau voor de Statistiek. (2022, 22 december). Kerncijfers wijken en buurten 2022. https://www.cbs.nl/nl-nl/maatwerk/2022/51/kerncijfers-wijken-en-buurten-2022

Cherry, C. L., & Pidgeon, N. F. (2018). Why Is Ownership an Issue? Exploring Factors That Determine Public Acceptance of Product-Service Systems. Sustainability, 10(7), 2289. https://doi.org/10.3390/su10072289

Coenegrachts, E., Beckers, J., Vanelslander, T., & Verhetsel, A. (2021). Business Model Blueprints for the Shared Mobility Hub Network. Sustainability, 13(12), 6939.

Cortina & Kruitbosch B.V. (niet gepubliceerd). Dutch Design Week Prijsvraag [Dataset; Prijsvraag]

Cortina. (2022). Cortina e-silento pro herenfiets [Image]. Retrieved from https://www.cortinabikes.be/e-bikes/product/CESIP7SMMH

Cortina. (2022). Cortina U4. [Image]. Retrieved from https://www.cortinafietsen.nl/stadsfietsen/cortina-u4-transport-damesfiets/product/CT3D50WTM

de Haas, M. & Huang, A. (2022). Aanschaf en gebruik van de elektrische fiets. In Kennisinstituut voor Mobiliteitsbeleid. Ministerie van Infrastructuur en Waterstaat.

Delhey, J., & Dragolov, G. (2014). Why Inequality Makes Europeans Less Happy: The Role of Distrust, Status Anxiety, and Perceived Conflict. European Sociological Review, 30(2), 151–165. https://doi.org/10.1093/esr/jct033

Deloitte. (2020). Mobility as a Service: de volgende revolutie in mobiliteit. https://view.deloitte.nl/rs/502-WIB-308/images/deloitte-nl-ps-MaaS-revolutie-in-mobiliteit.pdf

Design Council. (2022). Framework for Innovation: Design Council's evolved Double Diamond. https://www.designcouncil.org.uk/our-work/skills-learning/tools-frameworks/framework-for-innovation-design-councils-evolved-double-diamond/

Duran-Rodas, D., Villeneuve, D., & Wulfhorst, G. (2020). Bike-sharing: the good, the bad, and the future: An analysis of the public discussion on Twitter. European Journal of Transport and Infrastructure Research, 20(4), 38–58. https://doi.org/10.18757/ejtir.2020.20.4.5307

European Commission (EC). (2016). MaaS - Mobility as a Service. Retrieved from https://ec.europa.eu/transport/themes/urban/maas_en

European Parliament. (2023, December 4). E-waste in the EU: facts and figures. https://www.europarl.europa.eu/news/en/headlines/priorities/circular-economy/20201208STO93325/e-waste-in-the-eu-facts-and-figures-infographic

European Parliamentary Research Service & Sajn, N. (2022). Right to Repair. European Parliament. https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/698869/EPRS_BRI(2022)698869_EN.pdf

Eurostat, 2023. Life expectancy by age, sex, and NUTS 2 region [Dataset] https://ec.europa.eu/eurostat/databrowser/view/DEMO_R_MLIFEXP__custom_2539037/bookmark/table?lang=en&bookmarkId=d8bb5b19-65b5-4b47-a1e6-256e814b50a8

Expósito-Izquierdo, C., Expósito-Márquez, A. & Brito-Santana, J. (2017). Mobility as a Service. Smart Cities, 409–435. https://doi.org/10.1002/9781119226444.ch15

Fong, J. (2019, 10 mei). Micro-Mobility, E-Scooters, and Implications for Higher Education. In UPCEA's Center for Research and Strategy. UPCEA. Geraadpleegd op 19 september 2022, van https://upcea.edu/micro-mobility-e-scooters-and-implications-for-higher-education/

Foresight Centre (2021). The future of mobility. Development trends up to 2035. Report. Tallinn: Foresight Centre.

Fortune Business Insights. (2023, April). Carbon Fiber Market Size & Growth | Trends Analysis [2030]. Retrieved February 6, 2023, from https://www.fortunebusinessinsights.com/industry-reports/carbon-fiber-market-101719

Gemeente Amsterdam. (2019). Programma smart mobility 2019-2025. https:// www.amsterdam.nl/wonen-leefomgeving/innovatie/smart-mobility/

Gemeente Barendrecht. (2020, 8 september). Elektrische deelscooters van Felyx en Go Sharing nu ook in Barendrecht [Image]. Retrieved from https://barendrechtnu.nl/nieuws/aankondigingen/33381/elektrische-deelscooters-van-felyx-en-go-sharing-nu-ook-in-barendrecht

Gemeente Utrecht. (n.d.). Merwedekanaalzone | gemeente Utrecht. https://www.utrecht.nl/wonen-en-leven/bouwproject-en-en-stedelijke-ontwikkeling/bouwprojecten/merwedekanaalzone/

GESIS - Leibniz Institute for the Social Sciences. (2020). Special Eurobarometer 503: Attitudes towards the impact of digitalisation on daily lives (Versie V1) [Dataset]. Directorate-General for Communication. https://data.europa.eu/data/datasets/s2228_92_4_503_eng?locale=en

Glatzer, W., Below, S. & Stoffregen, M. (2010). Challenges for Quality of Life in the Contemporary World: Advances in quality-of-life studies, theory and research (Social Indicators Research Series, 24) (Softcover reprint of hardcover 1st ed. 2004). Springer.

Glocalities research. (May 2021). Doelgroepen Cortina [Dataset].

Gössling (2020) Why cities need to take road space from cars - and how this could be done, Journal of Urban Design, 25:4, 443-448, DOI: 10.1080/13574809.2020.1727318

Gotink, B. (2020, 30 september). Mogelijk meer maatregelen tegen parkeerproblemen met (deel)scooters in Tilburg. bd.nl. [Image] Retrieved from https://www.bd.nl/tilburg-e-o/mogelijk-meer-maatregelen-tegen-parkeerproblemen-met-deel-scooters-in-tilburg~a839aab7/

Hackmann, A. (2022, 25 november). Monteurstekort groeiend probleem voor fietsbranche - NieuwsFiets.nu. NieuwsFiets Media & Events. https://nieuwsfiets.nu/2022/11/25/monteurstekort-groeiend-probleem-voor-fietsbranche/#:~:text=Daar%20komt%20het%20gebrek%20aan,leerlingen%20het%20vak%20van%20fietstechnicus.

Harms, L., Durand, A., Hoogendoorn-Lanser, S., Zijlstra, T., & Kennisinstituut voor Mobiliteitsbeleid. (2018). Meer zicht op Mobility-as-a-Service. In Kennisinstituut voor Mobiliteitsbeleid. Ministerie van Infrastructuur en Waterstaat.

Heineke, K., Hornik, T., Schwedhelm, D., & Szilvacsku, I. (2022, 26 mei). Defining and seizing the mobility ecosystem opportunity. McKinsey & Company.

Hekkert, P., Dijk, van & Matthijs Dijk, van. (2016). VIP Vision in Design: A Guidebook for Innovators. Van Haren Publishing.

Hely, (2019). When will Hely come to my neighborhood? Retrieved from https://www.hely.com/

Hensher D.A, Mulley, C., Nelson J.D, Mobility as a service (MaaS) – Going somewhere or nowhere?, Transport Policy, Volume 111, 2021, Pages 153-156, ISSN 0967-070X, https://doi.org/10.1016/j.tranpol.2021.07.021.

Hensher, D. A., Mulley, C., Ho, C., Wong, Y., Smith, G., & Nelson, J. D. (2020). Understanding Mobility as a Service (MaaS): Past, present and future. Elsevier.

Herbert A., Simon. (1955). A behavioral model of rational choice. The Quarterly Journal of Economics 69. (February): 99–118

Hirschhorn, F., Paulsson, A., Sørensen, C. G., & Veeneman, W. (2019). Public transport regimes and mobility as a service: Governance approaches in Amsterdam, Birmingham, and Helsinki. Transportation Research Part A-policy and Practice, 130, 178–191. https://doi.org/10.1016/j.tra.2019.09.016

Hoogkamer, S. (2018). We hebben de stadsfietsen lifestyle gemaakt: Interview Cortina. Marketingtribune, 6, 40–43. https://www.kruitbosch.nl/media/1652/interview_cortina_marketingtribune.pdf

Horowitz & Fetterolf. (2020). Worldwide Optimism About Future of Gender Equality, Even as Many See Advantages for Men. In Pew Research Centre.

Inglehart, R., Foa, R., Peterson, C., & Welzel, C. (2008). Development, Freedom, and Rising Happiness: A Global Perspective (1981–2007). Perspectives on Psychological Science, 3(4), 264–285. https://doi.org/10.1111/j.1745-6924.2008.00078

Jacobs, A. (2021). The 15-minute city. Harvard Business Review, 9 9(5), 32-35.

Jorritsma, P., Witte, J., Alonso-Gonzáles, M., & Hamersma, M. (2021). Deelauto-en deelfietsmobiliteit in Nederland; Ontwikkelingen, effecten en potentie. Den Haag: Kennisinstituut voor Mobiliteitsbeleid.

Kamargianni, M. (2018). Mobility as a Service: State of the art and future perspectives. Transport Reviews, 38(5), 543-561.

Kamer van Koophandel (n.d.). How to do a competitor analysis? KVK. Retrieved on 15-10-2022 from https://www.kvk.nl/english/marketing/how-to-do-a-competitor-analysis/

Kanda, W., S. Mejıa-Dugand, and O. Hjelm. (2015). Governmental Export Promotion Initiatives: Awareness, Participation, and Perceived Effectiveness Among Swedish Environmental Technology Firms. Journal of Cleaner Production 98: 222–228. doi:10.1016/j.jclepro.2013. 11.013.

Karlsson, M., Mukhtar-Landgren, D., Smith, G., Koglin, T., Kronsell, A., Lund, E., & Sarasini, S. (2020). Development and implementation of Mobility-as-a-Service – A qualitative study of barriers and enabling factors. Transportation Research Part A-policy and Practice, 131, 283–295. https://doi.org/10.1016/j.tra.2019.09.028

Kennisinstituut voor Mobiliteitsbeleid, (2021). Verkenning van het concept mobiliteitshub. In Ministerie van Infrastructuur en Waterstaat (Nr. 978-90-8902-245–5). Ministerie van Infrastructuur en Waterstaat. Retrieved 21—02-2023 from https://www.kimnet.nl/publicaties/rapporten/2021/05/31/verkenning-van-het-concept-mobiliteitshub

Kosterman, R. (2019). Hoe Kruitbosch de fiets emotie gaf. Elsevier, 119–123. https://www.kruitbosch.nl/media/1660/28_familieportret-kruitbosch-elsevier.pdf

Kruitbosch Zwolle B.V. (n.d.). The history of Kruitbosch. www.kruitbosch.nl. Retrieved on 11-09-2022 from https://www.kruitbosch.nl/en/our-company/history

Lavalle C., Pontarollo N., Batista E Silva F., Baranzelli C., Jacobs-Crisioni C., Kavalov B., Kompil M., Perpina Castillo C., Vizcaino M.P., Ribeiro Barranco R., Vandecasteele I., Pinto Nunes Nogueira Diogo V., Aurambout J.P., Serpieri C., Marin Herrera M.A., Rosina K., Ronchi S., Auteri D. 2017. European Territorial Trends - Facts and Prospects for Cities and Regions. JRC Science for Policy Report: https://doi.org/10.2760/28183

Litman, T. (2019). Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transportation Planning. Victoria Transport Policy Institute.

Mantel (n.d.). Cortina Ecomo. [Image] Retrieved from https://www.mantel.com/cortina-ecomo-wave-elektrische-fiets

Márk Miskolczi, Dávid Földes, András Munkácsy, Melinda Jászberényi, Urban mobility scenarios until the 2030s, Sustainable Cities and Society, Volume 72, 2021, 103029, ISSN 2210-6707, https://doi.org/10.1016/j.scs.2021.103029.

Marktdata (2017). Marketingrapport Rijwielhandel. https://www.marktdata.nl/rapporten/Marketingrapport-Rijwielhandel-2020

Martin, S. Shaheen, 2011. The impact of carsharing on public transit and non-motorized travel: An exploration of North American carsharing survey data. Energies, 4 (2011), pp. 2094-2114

Maslow, A. H. (1943). A theory of human motivation. Psychological Review, 50(4), 370-960

Matowicki, M., Amorim, M., Kern, M., Pecherkova, P., Motzer, N., & Pribyl, O. (2022). Understanding the potential of MaaS – An European survey on attitudes. Travel Behaviour and Society, 27, 204–215. https://doi.org/10.1016/j.tbs.2022.01.009

McKinsey & Company. (2021). Defining and seizing the mobility ecosystem opportunity. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/defining-and-seizing-the-mobility-ecosystem-opportunity

Midjourney, van Ginkel, A. (2023, February 26). Big restaurant with glass doors, wood and plants. Located in a mobility hub. Show entire large floor plan in 3D. [AI-generated image]

Mik-Click. (2023, January 10). MIK: Revolutionair bagagedragersysteem voor fietsaccessoires | MIK. MIK. https://www.mik-click.com/nl/

Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychological Review, 63(2), 81–97. https://doi.org/10.1037/h0043158

Ministerie van Infrastructuur & Waterstaat (2019). Schets Mobiliteit naar 2040: veilig, robuust, duurzaam. Den Haag: Ministerie van Infrastructuur en Waterstaat (I&W). IATSS Research, ISSN 0386-1112, ISSN 0965-8564, https://doi.org/10.1016/j.tra.2019.09.030.

Ministerie van Infrastructuur en Waterstaat, Nationale Spoorwegen, Federatie Mobiliteitsbedrijven Nederland, Prorail, GVB, RET, & HTM. (2021). Ontwikkelagenda Toekomstbeeld OV: Nu instappen naar 2040. In Ministerie van Infrastructuur en Waterstaat. Ministerie van Infrastructuur en Waterstaat. Geraadpleegd op 21 februari 2023, van https://open.overheid.nl/documenten/ronl-2311ee8d-89c9-4278-9f75-8dd8f3e4db51/pdf

Ministerie van Infrastructuur en Waterstaat. (2021, 1 november). Mobility as a Service (MaaS): multimodaal reisadvies op maat. Mobiliteit nu en in de toekomst | Rijksoverheid.nl. https://www.rijksoverheid.nl/onderwerpen/mobiliteit-nu-en-in-de-toekomst/mobility-as-a-service-maas

Ministerie van Onderwijs, Cultuur en Wetenschap. (2021, 8 juli). Landelijk gebied. Rijksdienst voor het Cultureel Erfgoed. https://www.cultureelerfgoed.nl/onderwerpen/landelijk-gebied

Miskolczi, M., Dávid Földes, András Munkácsy, Melinda Jászberényi, Urban mobility scenarios until the 2030s, Sustainable Cities and Society, Volume 72, 2021, 103029, ISSN 2210-6707, https://doi.org/10.1016/j.scs.2021.103029.

Moreno C, Allam Z, Chabaud D, Gall C, Pratlong F. Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities. Smart Cities. 2021; 4(1):93-111. https://doi.org/10.3390/smartcities4010006

Moreno, C., & Petzer, B. (2021, 16 juni). 15-minutenstad, een netwerk van 15-minutenwijken. Verkeerskunde. https://www.verkeerskunde.nl/artikel/15-minutenstad-een-netwerk-van-15-minutenwijken

Mukhtar-Landgren, D., T. Koglin, and A. Kronsell. 2016. Institutional Conditions for Integrated Mobility Services (IMS): Towards a Framework for Analysis. K2 Working Paper 2016:16. Lund 2016. Pages 207-209

Mulley, C. & Kronsell, A. (2018, September). Workshop 7 report: The "uberisation" of public transport and mobility as a service (MaaS): Implications for future mainstream public transport. Research in Transportation Economics, 69, 568–572. https://doi.org/10.1016/j.retrec.2018.08.007

Mulley, C., & Hensher, D. A. (2020). Mobility as a service (MaaS): Charting a future context. Transportation Research Part A-policy and Practice, 131, 5–19. https://doi.org/10.1016/j.tra.2019.09.030

Nehr, Z. (2022). Bike Frame Materials Explained. Bicycle Guider - Bike Reviews, Cycling Advice, Best Picks | Mountain, Road, Hybrid, Electric Bikes and More. https://www.bicycle-guider.com/cycling-advice/bike-frame-materials/

Netherlands Panelmarket. (2022). Bicycles Productinformatie [Dataset].

NOS, (2017, 16 augustus). Veiliger of niet: de damesfiets rukt sowieso al op. NOS.nl. https://nos.nl/artikel/2188311-veiliger-of-niet-de-damesfiets-rukt-sowieso-al-op

Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons.

Palermo, E. (2022, 4 maart). Who invented the bicycle? livescience.com. https://www.livescience.com/44765-who-invented-the-bicycle.html

Panelwizard Direct & Kien Onderzoek. (2022). Bekendheid en Imago Cortina [Dataset].

Paul Fenton, Gianluca Chimenti & Wisdom Kanda (2020). The role of local government in governance and diffusion of Mobility-as-a-Service: exploring the views of MaaS stakeholders in Stockholm, Journal of Environmental Planning and Management, 63:14, 2554-2576, DOI: 10.1080/09640568.2020.1740655Fent

Polydoropoulou, A., I. Pagoni, and A. Tsirimpa. 2019. Ready for Mobility as a Service? Insights from Stakeholders and End-Users. Travel Behaviour and Society doi:10.1016/j.tbs. 2018.11.003

Pozoukidou, G., & Angelidou, M. (2022). Urban Planning in the 15-Minute City: Revisited under Sustainable and Smart City Developments until 2030. Smart Cities, 5(4), 1356–1375. MDPI AG. Retrieved from http://dx.doi.org/10.3390/smartcities5040069

Provincie Gelderland, Goudappel Coffeng, & APPM. (2020). Gelderse Mobiliteitshubs: Cruciale schakels in bereikbaarheid en leefbaarheid. In www.gelderland.stateninformatie.nl. Provincie Gelderland. Retrieved from https://gelderland.stateninformatie.nl/document/8831906/1/Eindrapport_Gelderse_Mobiliteitshubs_(PS2020-289)

Provincie Noord-Brabant, (2018). Gedeelde Mobiliteit is Maatwerk. In www.brabant.nl/vernieuwingOV.

Provincie Noord-Brabant, APPM, & Goudappel. (2021). Ontwikkelplan Mobiliteitshub West-Brabant (008047.20210430.R1.02).

Provincie Utrecht. (2022). OV-Netwerkperspectief 2025-2035: Met doorkijk naar 2050. In provincie-utrecht.nl. Retrieved on 21-02-

2023 from https://www.provincie-utrecht.nl/sites/default/files/2022-08/OV-Netwerkperspectief%202025-2035.pdf

Ralph Lauren. (2012). Ralph Lauren. [Image] Retrieved from pinterest. https://nl.pinterest.com/pin/564920346979777945/

Rérat, P. (2021) The rise of the e-bike: Towards an extension of the practice of cycling? Mobilities, 16:3, 423-439, DOI: 10.1080/17450101.2021.1897236

Reuters (2021, February 25). Fact check: The World Economic Forum does not have a stated goal to have people own nothing by 2030. U.S. https://www.reuters.com/article/uk-factcheck-wef-idUSKBN2AP2T0

Reyes García, J. R., Lenz, G., Haveman, S. P., & Bonnema, G. M. (2019). State of the Art of Mobility as a Service (MaaS) Ecosystems and Architectures—An Overview of, and a Definition, Ecosystem and System Architecture for Electric Mobility as a Service (eMaaS). World Electric Vehicle Journal, 11(1), 7. MDPI AG. Retrieved from http://dx.doi.org/10.3390/wevj11010007

Roetz (n.d.). Join the circular e-bike revolution | Roetz Life. [Image] retrieved from https://www.roetz.life/en/

Roozenburg, N.F.M. and Eekels, J. (1995) Product Design: Fundamentals and Methods, Utrecht: Lemma.

Rosenbaum-Elliott, Richard H, Larry Percy, and Simon Pervan (2015), Strategic Brand Management, 3rd Edition, Oxford University Press, Oxford.

RTL Nieuws (2022). Groene deelscooters Go Sharing verdwijnen uit meeste steden. RTL Nieuws. https://www.rtlnieuws.nl/tech/artikel/5344959/go-sharing-deelscooters-weg

Sakai, K. (2019). MaaS trends and policy-level initiatives in the EU. Iatss Research, 43(4), 207–209. https://doi.org/10.1016/j.iatssr.2019.11.001

Salmeron-Manzano, E.; Manzano-Agugliaro, F. The Electric Bicycle: Worldwide Research Trends. Energies 2018, 11, 1894. https://doi.org/10.3390/en11071894

Schipper, F. (2008). Driving Europe: building Europe on roads in the twentieth century. [Phd Thesis 1 (Research TU/e / Graduation TU/e), Industrial Engineering and Innovation Sciences]. Technische Universiteit Eindhoven. https://doi.org/10.6100/IR638670

Schwalbe (n.d.). Tour-Reader [Image]. Retrieved from https://www.schwalbe.com/nl/tour-reader/schwalbe-airless-urban

Seghers, A. (n.d.). Ontwerpend onderzoek slimme mobiliteitshubs Overijssel. Ruimtevolk. Geraadpleegd op 21 februari 2023, van https://www.ruimtevolk.nl/projecten/ontwerpend-onderzoek-mobiliteitshubs-overijssel/

Sheena S. Iyengar, Mark R. Lepper. When choice is demotivating: Can one desire too much of a good thing? Journal of Personality and Social Psychology. 2000; 79 (December): 995–1006.

Smit, P. H. (2017, 16 augustus). Veilig Verkeer Nederland wil af van fiets met stang. Is het einde van de herenfiets nabij? de Volkskrant. https://www.volkskrant.nl/nieuws-achtergrond/veilig-verkeer-nederland-wil-af-van-fiets-met-stang-is-het-einde-van-de-herenfiets-nabij~b-33952fe/?referrer=https%3A%2F%2Fwww.google.com%2F

Sochor, J., Arby, H., Karlsson, I. C. M., & Sarasini, S. (2017). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of social goals. Paper presented at the 1st International Conference on Mobility-as-a-Service, Tampere, Finland.

Spokester (2021). Bike Frame Materials: Pros and Cons. Spokester. https://spokester.com/blogs/news/bike-frame-materials-pros-and-cons

Stromberg, J. (2015, March 19). Roads were not built for cars: how cyclists, not drivers, first fought to pave US roads. Vox. https://www.vox.com/2015/3/19/8253035/roads-cyclists-cars-history

Svensson, S., Richter, J. L., Maitre-Ekern, E., Pihlajarinne, T., Maigret, A., & Dalhammar, C. (2018). The Emerging' Right to Repair' legislation in the EU and the US. Paper presented at Going Green CARE INNOVATION 2018 , Vienna, Austria.

Swiss Cycles (2021, August). Pennyfarthing. https://www.swisscycles.com/the-best-penny-farthing-bike/

The Journal (1896, May 10). Retrieved from the Library of Congress, https://www.loc.gov/item/sn84031792/1896-05-10/ed-1/.

Tijssen, R. & Kruitbosch B.V. (2022), Macro-Trend Lecture.

Toffler, A. Future shock. New York, NY: Random House. 1970.

TSO fietsen. (2022). Cortina Common Family [Image]. Retrieved from https://tsofietsen.nl/cortina-stadsfietsen

Turoń, K. (2020). Hydrogen-powered vehicles in urban transport systems – current state and development. Transportation Research Procedia, 45, 835-841. https://doi.org/10.1016/j.trpro.2020.02.086

Union (n.d.). E-flow [Image] Retrieved from https://www.union.nl/

United Nations (2022). Goal 12 | Department of Economic and Social Affairs. https://sdgs.un.org/goals/goal12

van der Wal, H. (2018, 18 februari). Familiebedrijf Kruitbosch boekt recordomzet van 87 miljoen euro met hippe fietsen. www.deondernemer.nl. https://www.deondernemer.nl/actueel/familiebedrijf/familiebedrijf-kruitbosch-recordomzet-hippe-fietsen~276078

Vandecasteele I., Baranzelli C., Siragusa A., Aurambout J.P. (Eds.), Alberti V., Alonso Raposo M., Attardo C., Auteri D., Barranco R., Batista e Silva F., Benczur P., Bertoldi P., Bono F., Bussolari I., Caldeira S., Carlsson J., Christidis P., Christodoulou A., Ciuffo B., Corrado S., Fioretti C., Galassi M. C., Galbusera L., Gawlik B., Giusti F., Gomez J., Grosso M., Guimarães Pereira Â., Jacobs-Crisioni C., Kavalov B., Kompil M., Kucas A., Kona A., Lavalle C., Leip A., Lyons L., Manca A.R., Melchiorri M., Monforti-Ferrario F., Montalto V., Mortara B., Natale F., Panella F., Pasi G., Perpiña C., Pertoldi M., Pisoni E., Polvora A., Rainoldi A., Rembges D., Rissola G., Sala S., Schade S., Serra N., Spirito L., Tsakalidis A., Schiavina M., Tintori G., Vaccari L., Vandyck T., Vanham D., Van Heerden S., Van Noordt C., Vespe M., Vetters N., Vilahur Chiaraviglio N., Vizcaino P., Von Estorff U., Zulian G., The Future of Cities – Opportunities, challenges and the way forward, EUR 29752 EN, Publications Office, Luxembourg, 2019, ISBN 978-92-76-03847-4, doi:10.2760/375209, JRC116711

Veloretti (n.d.). Caféracer Women | City Bikes. VELORETTI. Retrieved 30-03-2023, from https://www.veloretti.com/products/caferacer-women?variant=-pebble+grey&gad=1&gclid=Cj0KCQjwgLOiBhC7ARIsAIeetVBhnJfCe1JTFQP-63BC0JPPCvNUgKzFs25dKh3FVP_iixHowyNIBrsaAtqHEALw_wcB

VenhoevenCS (2020). De multimodale Hub en Rijkswaterstaat. Beschikbaar op http://venhoevencs.nl

Vliek Tweewielers. (n.d.). Wordt de riem de vervanger van de traditionele fietsketting? | Onbezorgd fietsplezier! Vliek Tweewielers VOF. https://www.vliektweewielers.nl/belt-drive-riem-systeem#:~:text=Uit%20verschillende%20testen%20blijkt%20dat,gaat%20dan%20een%20traditionele%20ketting.&text=Het%20tandprofiel%20en%20de%20soepele,verminderen%20door%20vuil%20en%20slijtage

Weblog Zwolle. (2019, maart). Modelcontest Campagnebeeld [Image]. weblogzwolle. https://www.weblogzwolle.nl/nieuws/67222/wie-worden-de-gezichten-van-de-nieuwe-cortina-campagne.html

Witte, J. J., Alonso-González, M., & Rongen, T, Kennisinstituur voor Mobiliteitsbeleid. (2021). Verkenning van het concept mobi-

liteitshub. Ministerie van Infrastructuur en Waterstaat. ISBN: 9789089022455

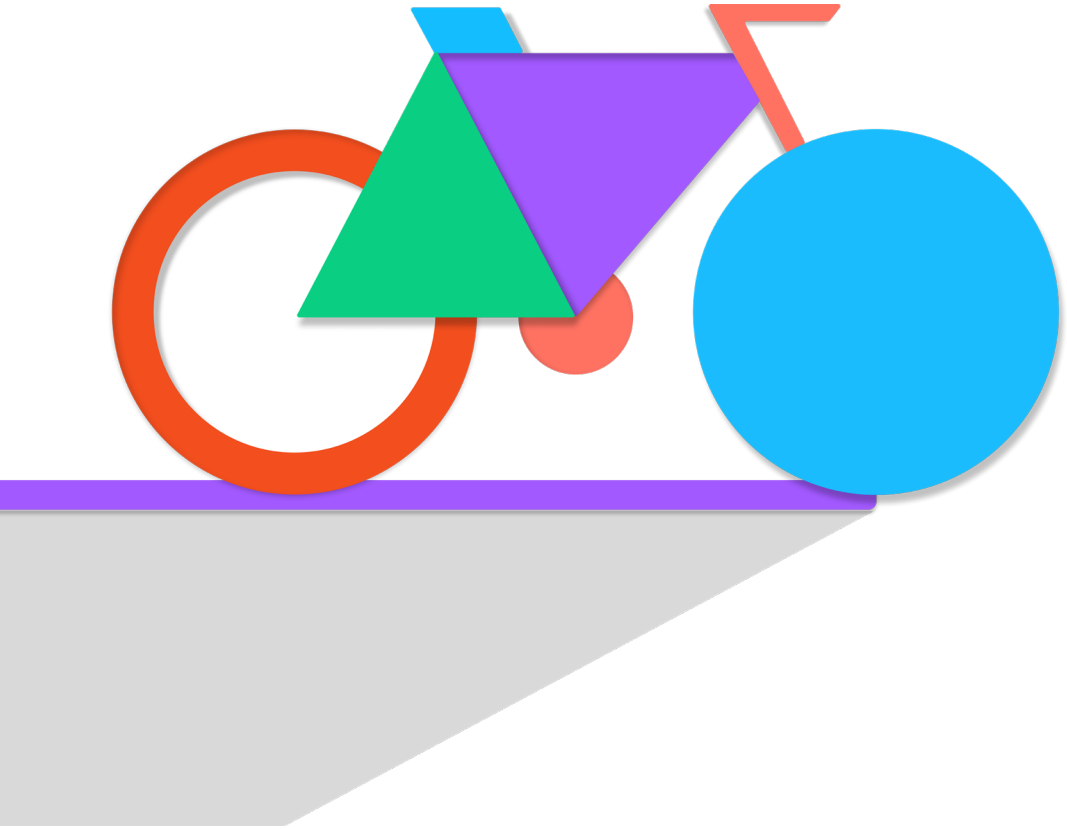
Wolzak, T. (2019, 13 juli). De drie aandeelhouders van familiebedrijf Kruitbosch [Image]. Retrieved from https://www.kruitbosch.nl/media/1660/28_familieportret-kruitbosch-elsevier.pdf

World Economic Forum (WEF). (2021). How Mobility as a Service can transform urban transportation. Retrieved from https://www.weforum.org/agenda/2021/01/how-mobility-as-a-service-can-transform-urban-transportation/

XTNT & Smartwayz. (2020). Reizigersonderzoek West-Brabant. In www.brabant.nl. SmartWayz. Retrieved 21-02-2023 from https://www.panelsmartwayz.nl/

Yang, L., Jin, C., Zhu, C., (2023, 19 januari). Research: The Unintended consequences of Right-to-Repair laws. Harvard Business Review.

Zijlstra, T. & Durand, A. (2020). Mobility as a Service: kansen en verwachtingen. Den Haag: Kennisinstituut voor Mobiliteitsbeleid. ISBN 978-90-8902-241-7



Master Thesis
Amber van Ginkel