# THE 'NEXT GENERATION' FOOD DELIVERY E-BIKE

A product and service strategy for Union

Master thesis
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# PREFACE

This master thesis is the culmination of my graduation project and the final part of my Masters study Strategic Product Design at the faculty of Industrial Design Engineering at Delft University of Technology.

During the course of my industrial design experience I have come to realise that I like to work with people, in an energetic and dynamic environment. Union (and Gazelle) have most definitely provided such an environment. I have been able to put my theoretical knowledge from the past few years into practice, within their supporting and vibrant environment. Although the assignment turned out to be more design oriented than I had originally envisaged, I am glad that it also enabled me to also use my SPD background. The assignment challenged me to pick up lost skills and reminded me how much I enjoyed them, producing an end-result that is a balance between the design and a business oriented strategy.

There are several people who helped me during this graduation process, whom I would like to thank. First of all, I would like to thank Hugo Velthuis for taking me on as a graduation intern and giving me the opportunity to get to know Union as a company, as well as work with a great and diverse group of people, from whom I've learned a lot. His enthusiasm, involvement and the way he was always available to provide advice during this project really helped me bring it to a satisfactory conclusion. Secondly, I would like to thank Erik Jan Hultink and Sijia Bakker-Wu for their guidance and support during this project. Their clear and valuable feedback gave me the right guidance to achieve my potential.

# EXECUTIVE SUMMARY

Union is one of the oldest Dutch bicycle manufacturers, and is connected to the large conglomerate Pon Holding. They offer simple but stylish bicycles with a focus on the urban area, for the consumer market. Recently they have linked their brand to the Food & Beverages domain, and are keen to collaborate with businesses in this sector.

The Dutch electric bicycle market has been growing rapidly in the last decade and is expected to continue to grow over the next decade. Since Union has the ambition to expand their portfolio, a new electric bicycle is a logical next step for them. The emerging trend of the food delivery market has been growing in the Netherlands as well, and an increasing number of food delivery companies are changing their mode of transportation from gasoline vehicles to electric bicycles. Union has realised that this combination of circumstances gives them a potential opportunity to combine the development of a new e-bike with an entrance into the food delivery e-bike market. Creating a product proposition only for the B2B food delivery market will not be profitable, in terms of sales volume, so Union would like to combine the product with its regular consumer sales. Accordingly, the research question for this project is 'How can Union enter the food delivery e-bike market, with a product and commercial proposition that primarily serves the needs of food delivery companies, and secondly, is suitable for consumers as well?'

Analysing the food delivery e-bike market has shown that (the few) competitors currently offer low quality bicycles for a relatively high price, which leaves room for improvements in terms of product, price and service. User research within both target markets has revealed several interesting overlapping problems, needs and desires, which are seen as key focus points. Generating creative ideas, based on these key focus points has resulted in a selection of proposed features and specifications, which are the starting point of the concept design.

Ultimately, the design activities have led to the development of the Union DELI, an e-bike designed for food delivery companies. With a simple but robust design, integrated battery and mid-motor, it is optimal for daily intensive use and weight transportation. This in combination with the 'connected' e-bike service (a service that lets the client see and use relevant e-bike-data) food delivery companies can ensure an even better experience for their customers. The e-bike can be customised as desired through the use of modular lighting and transportation elements. The integrated lights can be replaced by one or two food boxes. This modular design makes the Union DELI also suitable for regular use. Client branding ensures that the e-bike represents visually the client's brand. Repair and maintenance and financial services are all included in the lease construction of the DELI. The geometry and design appearance of the e-bike are based on user desires combined with Union's brand positioning and portfolio. The DELI therefore fits well with the Union brand. Finally, recommendations for further research combined with a roadmap are presented to give an overview of the activities and next steps that should be taken to prepare for the launch of the DELI.

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# INTRODUCTION

## CLIENT DESCRIPTION

The client during this project is Union, a manufacturer and online retailer of bicycles, based in Dieren (near Arnhem). Union started its business in 1904, making it one of the oldest Dutch manufacturers of normal and electrically powered bicycles. In 2012 Union became part of the Pon.Bike Department of the Pon Holding, which is globally known for its presence in the transportation sector. This new ownership gave Union the opportunity to give the brand a makeover and develop a new design mission: 'to encourage urban citizens around the globe to choose the bike over other forms of transport'. Union has grown into a strong and steady brand, specialised in producing urban city bicycles for the consumer market.

## PROJECT BACKGROUND

Research has shown that the electric bicycle market has been growing rapidly the last ten years (Oortwijn, 2016), and will continue to grow over the next coming decade. One reason for this, among others, is the emerging trend of food delivery services. An increasing number of (food) delivery companies are changing their mode of transportation from gasoline vehicles (delivery bus, -scooter) to electric bicycles.

Since Union already has the ambition to expand their electric bicycle segment, Union identified a potential opportunity to combine this with an entrance into the business-to-business food delivery e-bike market.

Union has noticed that these food delivery companies currently use low quality bicycles from unknown suppliers or B-brands. Union believes that they can offer a better proposition in terms of product, price and service.

Figure 1 Gazelle and Union factory and office in Dieren

## PROBLEM DEFINITION

Union does not currently offer a product or service proposition that suits the food delivery market. Creating a product proposition especially for this B2B market will not be profitable for Union, in terms of sales volume, unless it can be combined with the regular consumer sales. The fact that the needs and values of both these target markets are different, creates a challenge for this project.

## ASSIGNMENT

Looking at the given problem and Union's ambitions, the assignment of this project has been formulated as follows:

*Create a new product and commercial proposition that can be implemented within the next 2 years, fitting Union's existing brand DNA, which enables Union to enter the food delivery e-bike market, and which is suitable for consumers as well.*

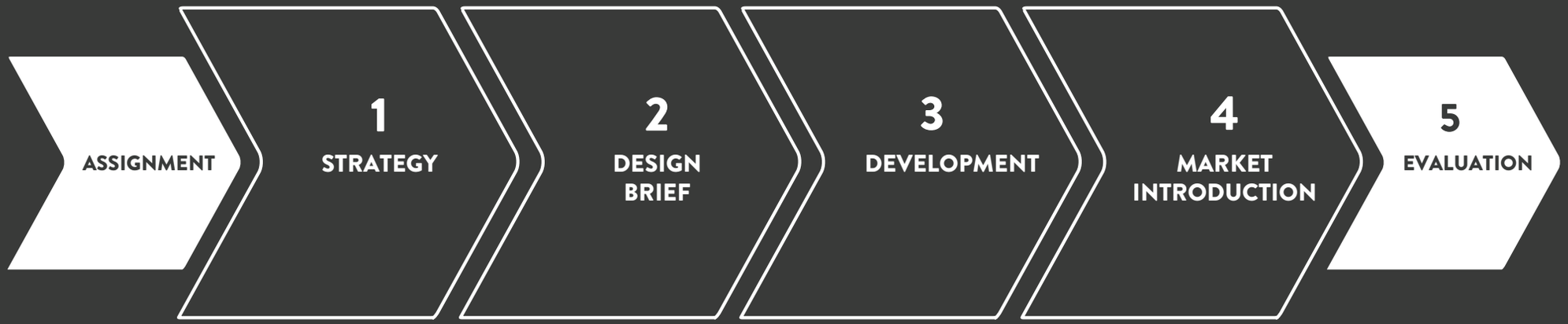
Union already has experience in developing products for the consumer market so the main priority of this assignment is delivering a proposition for the food delivery market. To realise this assignment, the similarities (and differences) in the needs of both target markets need to be identified, the preconditions of entering the food delivery e-bike market must be explored and Union's brand image and strategy must be understood.

## APPROACH

This project concerns a product innovation process, where a focus lies on the research and analysis part of the process. Jan Buijs has created such an innovation process, which is called the Delft Innovation Method (2005). This method is a circular five-stage innovation model (Figure 2, next page) that has an emphasis on the fuzzy front end (FFE) of the design process, which states that innovation is a company's response to changes in business, technology and socio-cultural contexts. In this particular assignment the urge for Union to innovate is driven by changes in its competitive (business) and user (socio-cultural) environments. Because of the similarities in focus (innovation with emphasis on analysis and FFE of the process) and in drivers of innovation, this method seems to fit well with this particular assignment. Therefore, the structure of this project is based on the stages of the DIM model (2005). The model consists of the following stages:

1. Product use
2. Strategy formulation
3. Design brief formulation
4. Development
5. Market introduction

The first stage, the Product use stage, is briefly indicated in the sections Project background and Problem definition. Since Union does not offer a product and service in this market yet, this first stage will not be further addressed. This means that this project will start with the Strategy formulation stage, and ends with the Market Introduction stage. To conclude the project, an Evaluation part is added at the end. All the activities that are performed within each of the stages are mentioned below.


ASSIGNMENT
1
STRATEGY
2
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## 1 // Strategy

The Strategy formulation stage is to map Union's current strategic and competitive situation, and includes two parts: an internal analysis and an external analysis. In the internal analysis, Union's brand strategy and core principles will be explored. In the external analysis, Union's context will be mapped, describing both target markets (the food delivery and consumer e-bike market) its competitive environments and related trends and developments.

## 2 // Design Brief

In the Design Brief stage, user research is performed and discussed in order to discover and elaborate on the needs and desires of both target markets. The results are presented in the form of key focus points. A design goal is formulated and, based on this, creative solutions and ideas for the key focus points are generated. This stage ends with a proposal of features and specifications for concept directions. These will serve as a design direction for the next stage, the Development stage.

## 3 // Development

In this phase, the design activities are carried out. First, the technical aspects of the development process of the e-bike are discussed. After that, the design process is addressed, resulting in a product and service concept. At the end of the phase, the concept is evaluated.

## 4 // Market Introduction

In this final stage of the Delft Innovation Model, the final product is presented and a proposal is made for the introduction to the market. Here, the promotion, distribution and sales are addressed, the revenue model is mapped and the viability of the business case is indicated. The stage concludes with a proposal for potential clients.

## 5 // Evaluation

In this last step, the outcome of this project is evaluated and recommendations for future developments and activities are suggested, accompanied by a roadmap. To conclude this report, a personal reflection on the project in general is included.

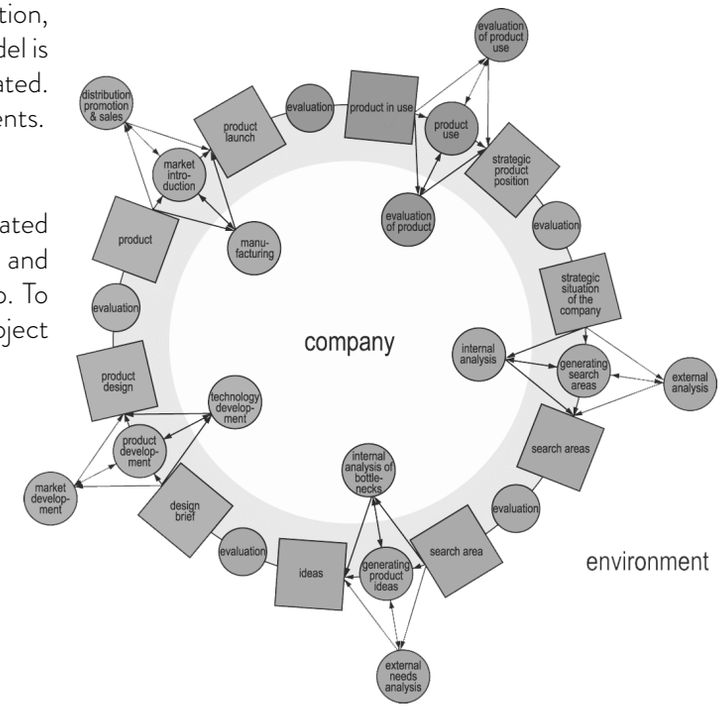



Figure 2 Delft Innovation Model, J. Buijs, 2012

# 1 STRATEGY

In this stage Union's current strategic and competitive situation is mapped. This stage is divided into two parts: an internal analysis and an external analysis. In the internal analysis, Union's brand strategy, core principles, portfolio and current target group will be explored and explained. In the external analysis, Union's context will be mapped, describing both target markets (the food delivery e-bike market and the consumer e-bike market), its competitive environments and related trends and developments.

# 1.1 // INTERNAL ANALYSIS

*A company analysis will be presented to introduce Union. A complete overview of Union's activities is given and their brand strategy and core principles are discussed. At the end, Union's main strengths and weaknesses are formulated.*

## COMPANY PROFILE

Union, founded in 1904, is one of the cornerstones of Dutch cycling culture. Union has over 100 years of experience in building bicycles for the Dutch, making it one of the oldest Dutch manufacturers of normal and electrically powered bicycles. In 2012 Union became part of Pon.Bike, the Bicycle section of Pon Holdings. Since then, Union has been growing rapidly and a company transformation moved the brand portfolio to a modern, progressive and trend-setting profile. Union has a compact product assortment and has customer needs at its heart. Both the product assortment and current target segments are discussed briefly, later this chapter. Union is currently located in Dieren, under the same roof as Gazelle, where most of the bicycle design and assembly occurs.

### Part of Pon.Bike

Pon.Bike is the bicycle department of Pon Holding, the largest Dutch conglomerate to deliver quality products and services in the transportation sector. It has a powerful brand portfolio, and is therefore an important player in the global bicycle market. Now that Union is part of Pon. Bike, they are connected to a large network of leading bicycle and mobility service companies around the world (*S1*), amongst which knowledge and resources can be shared and transfered. Other strong brands within this network include Gazelle and FietsNed.

### Region, Channels & Marketing

Currently, Union is sold in the Netherlands and in Belgium. Union has ambitions to expand abroad: at the moment the vast majority of sales (90 percent) still occurs on their own soil. Within the Netherlands, approximately 10.000 units are sold each year, 57 percent of which is sold in the urban areas, of which 32 percent is sold in the cities that belong to the conurbation called 'de Randstad'. Figure 3 shows the distribution of Union's sales across the country. The larger the circle, and the darker the colour, the higher the sales. To raise awareness, Union makes use of online marketing through, for example, social media and email newsletters. Offline marketing through, for example, PR stunts and campaigns is also used. The brand awareness among Union's target group is not yet at the desired level (*W2*). To improve this, Union is busy with co-branding activities for marketing purposes. They are currently focussing on linking the brand to the food and beverages sector and are very keen to collaborate with businesses that are related to those particular industries. Examples of these co-branding collaborations are Union's activities with food delivery company Foodora and the lifestyle and food-hotspot platform CityGuys (Figure 4). The sales channels that Union uses to reach their target group are their online webshop and a dealer network. Only 5 percent of the sales are driven via the webshop, and the remaining 95 percent still through the dealers (Figure 5). This means that Union is most dependent on the dealer (*W1*).

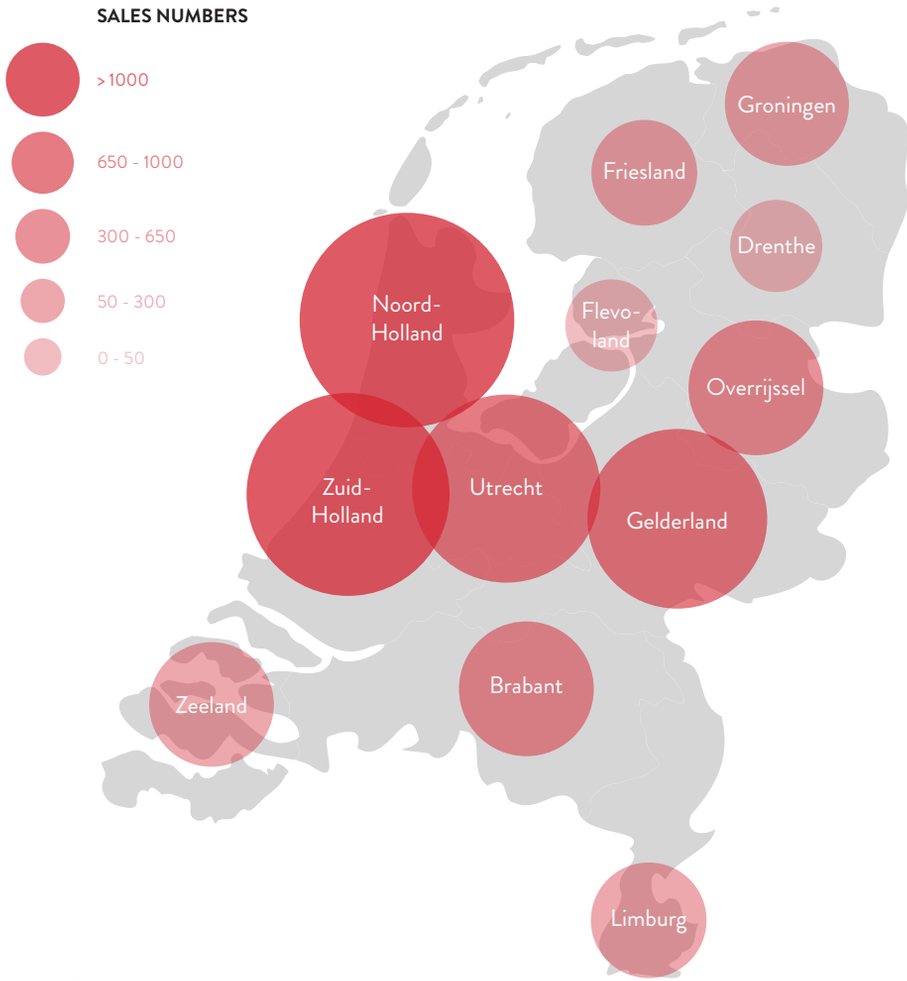



Figure 3 Sales distribution across the country

Figure 4 Co-branding PR stunt with CityGuys Pizza Bike Tour


Figure 5 Union dealer Philipsen Tweewielers, Rotterdam

1

**DESIGN FOR GLOBAL URBAN PURPOSE**

Union is offering a cleverer cycling experience by solving urban needs with an ecosystem of user-centered products and services (*S2*).

2

**VALUE EXPERIENCE OVER PRODUCT**

Union is expanding into an ecosystem of products and services that integrate seamlessly into everyday urban life.

3

**CHALLENGE THE STATUS QUO**

Union is an entrepreneurial brand that aims to make every urban cycling experience better with every action, including the long-established Dutch one.

4

**PROVE DUTCH CRAFTSMANSHIP**

Union combines their legacy of craftsmanship with cutting edge Dutch design, to prove their reputation and to keep striving to make the best bicycles they can.

Figure 6 Union's four brand principles



## BRAND STRATEGY

Though Union is one of the cornerstones of the Dutch cycling culture, they are very much aware of the changing cycling market, and try to anticipate it. Therefore, Union is aiming to become a modern, digital, global urban cycling brand. To move towards this aim, Union has developed four core principles that are the underlying foundation of their brand strategy (Figure 6). These four principles guide Union in every expression of the brand, including product, collaborations, communications and internal policy. These four principles represent the Union Brand DNA, as more fully described to the left.

Based on the foundation of these core principles, Union has established its company's purpose, explained through the 'Why, How, What' (Sinek, 2009).

**WHY?**
**MISSION**

To encourage urban citizens around to globe to choose the bike over other forms of transport.

**HOW?**
**VISION**

A clever cycling experience fit for today's urban demand.

**WHAT?**
**PROOF**

An ecosystem of cycling related products and services, to encourage everyone, everywhere, to enjoy cycling around the city in the best way possible (flexible, seamless and quick).


Figure 7 Union promotional imagage

## PORTFOLIO

As mentioned earlier, Union has a compact product portfolio. The assortment of regular bicycles is divided into three segments: the Daily Companion, the Transporter and the Commuter. Each segment focuses on a cyclist's different need. Within these segments, Union offers several models (male/female) and in several colours. The prices of these bicycles start from €399. Next to regular bikes, Union also offers one electric bicycle model. All three segments are shown and described on the right page. In addition to Union's core products (bicycles), they offer a range of services and accessories that improves the customer's cycling experience, such as chain-locks and carriers, as seen in Figure 8.
.

When looking at all of Union's bicycles, several overarching key features can be distinguished. With these unique product features Union aims to improve every urban cycling experience, and to distinguish themselves from alternative products and brands within this market. First of all, Union believes that form and styling follow function, and that all the elements on the bicycle should be there because they fulfill a user-need. They therefore keep the design of the bicycles modest and simple. All Union's bicycles have an aluminium frame. This has two main benefits; 1) It is a lightweight material, therefore ensuring a light and easy cycling experience, and 2) because of its high corrosion resistance, the bicycle is fairly maintenance free. Some essential parts of Union's bicycles, like the brakes and the gears, are purchased from Shimano, one of the largest bicycle-parts companies in the world, which ensures the highest-quality. And because of the in-house knowledge and production facilities, the production costs of the bicycles are relatively low. This enables Union to offer an appealing price-quality ratio (S3).


Figure 8 Union's accessories, LR: chain lock, rear-carrier, front-carrier

**DAILY COMPANION**
**FLOW**

A trend setting, slim retro-design bicycle. Ideal for shorter distance in dense city environments.

**TRANSPORTER**
**LOAD**

A sturdy and robust aluminium bike with large and solid carriers. For all-round use, but ideal for transport.

**COMMUTER**
**LITE**

A lightweight aluminium design-bicycle with a belt drive (instead of chain drive) and integrated front- and back light. Ideal for commuting and long-distances.

**ELECTRIC**
**FAST**

An e-bike with front-wheel motor and battery placed underneath the rear carrier, Ideal for commuting and long distances.

## CURRENT TARGET GROUP

Union focuses on the young professional 'urban citizen & commuter' target group (age 25-45) (Figure 9). These people are urban residents who make use of the bike intensively. They use it as their standard means of transport, on a daily basis. These people are digitally aware, and are used to shopping and orienting themselves online. They see a bicycle as a lifestyle product, and it therefore needs to fit with their own lifestyle. Union cleverly anticipates this with their three slightly different product segments, each representing a certain lifestyle.


Figure 9 Overview Union's current target group

## CONCLUSION INTERNAL

From this analysis it can be concluded that Union has several core competences, but also some points for attention. These are formulated in the form of strengths and weaknesses. First, the strengths are described:

### Connected to Pon.Bike (S1)
Because Union is part of Pon.Bike, they have access to a lot of knowledge and facilities of other associated companies, within (and outside) of their practising sector. This gives them an authentic and reliable image.

### Focus on urban area (S2)
Union offers a cleverer cycling experience by solving urban needs with an compact ecosystem of user-centered products and services. Union only introduces new products and styles when it believes it will bring a true improvement for the user.

### Good price-quality (S3)
Union offers top-quality products for an accessible price. They deliberately choose to keep their price accessible (compared to, for example, sister-company Gazelle), because this gives Union a competitive advantage.

Secondly, the weaknesses are stated:

### Dependent on dealer (W1)
Union has clear values that they stand for, and has a clear message which they want to convey to their customers. Because the dealers are the intermediary for Union and their customers, Union is dependent on the dealers for also conveying this 'Union-message'.

### Low brand awareness (W2)
Union has a clear target group, but the brand awareness among this target group is not yet as desired.

# 1.2 // EXTERNAL ANALYSIS

*In this chapter, Union's external environment will be mapped. First, general information regarding electric bicycles and the e-bike market will be analysed by answering the questions: What is an e-bike? What does the Dutch e-bike market look like? For what purposes are they used, and by whom are they made? Then, the market with the primary focus for this project, the food delivery e-bike market, will be zoomed in on. It will be elaborated extensively, describing its environment and its main competitors. After that, the secondary market (and its competitors) is also briefly discussed. Finally, trends concerning these two markets are presented.*

## ELECTRIC BICYCLES

What is an e-bike?

An electric bicycle is a bicycle with an integrated electric motor that provides extra power and pedal assistance while cycling. The electric motor is aided by pedalling, hence the term 'pedelecs'. These bicycles can reach a top speed of 25 km/h. Pedelecs do exist that are more powerful and reach a higher speed, and these are called speed pedelecs. But for this project, the focus lies on normal pedelecs. In the Dutch market, the average price for an e-bikes is €1,800.00, which is almost double the average price of a regular bicycle. The main advantage of an e-bike is that it enables the rider to travel greater distances in less time and with less effort, than on a regular bicycle. The two key components of an e-bike are its motor and battery.

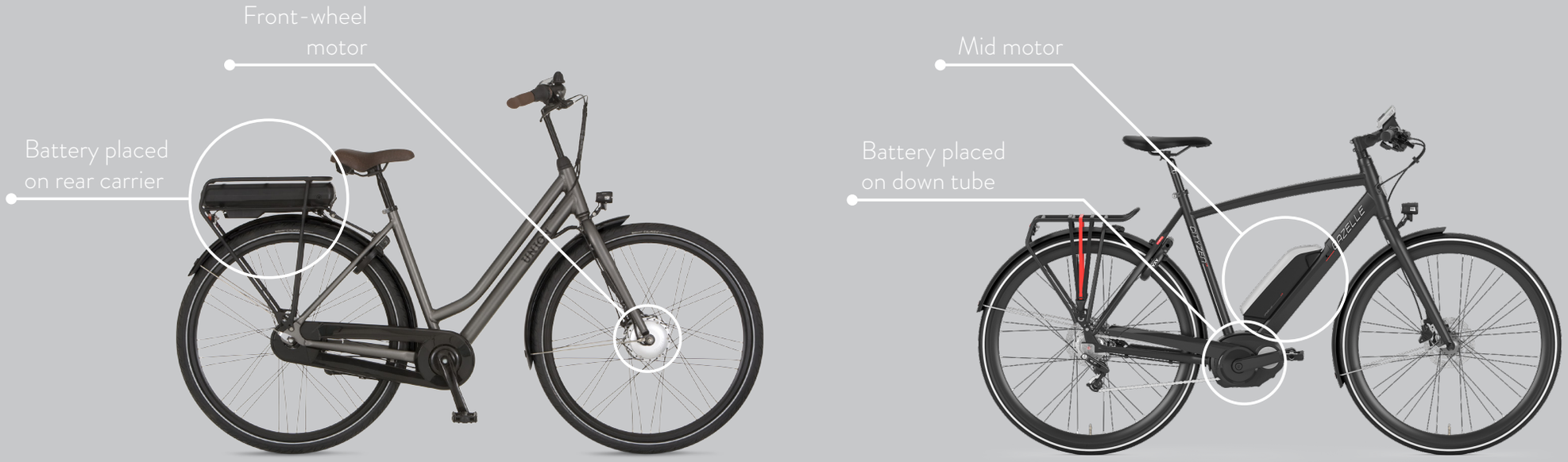
*Motor*

There are several different types of e-bike motors. The location and technology of the motor is crucial for the riding comfort. The most common brands are BOSCH, ION, YAMAHA, Bafang, E-motion, Ecomo, Shimano Steps and Panasonic. The three locations where the motors are placed are:

- **Front-wheel motor** - quietest, relatively cheap, but less powerful assistance
- **Mid-motor** - most popular, powerful, nice cycling experience, but sensitive to interference
- **Rear-wheel motor** - most natural cycling experience, but heavier rear-end of bike

*Battery*

The distance that can be travelled with a full battery (action radius) mostly depends on the Watthour (Wh) of the battery. Some e-bike providers offer a choice of batteries with varying capacities, from 300 up to 600 Wh. Batteries are most often located under the rear-rack or on the down tube of the e-bike, and are usually detachable for charging convenience. For comparison, the motor and battery locations of the Union Fast and the Gazelle CityZen are shown in Figure 10. A clear overview of all the specific names of the bicycle frame tubes can be found in Appendix A.




**UNION FAST**

**GAZELLE CITYZEN C8 HMB**

Figure 10 Examples of different locations of components, l-t-r: Union Fast , Gazelle CityZen C8HMB

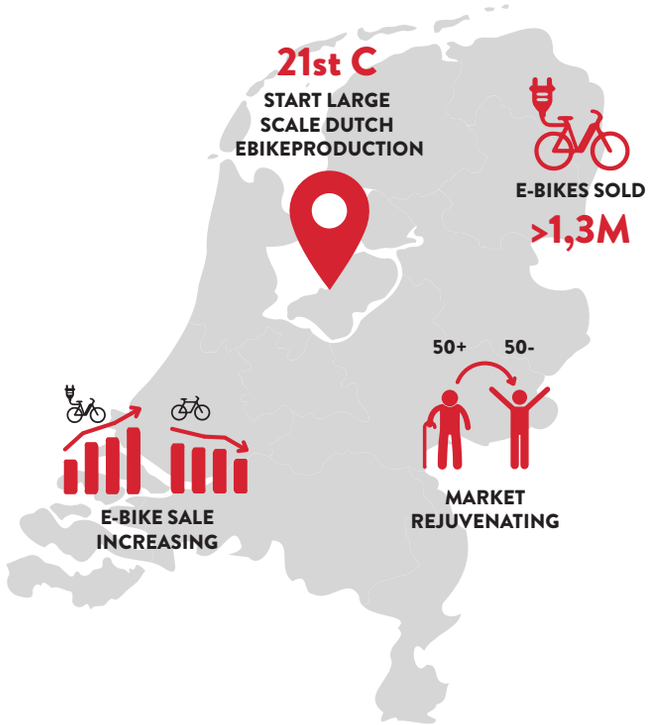



Figure 11 Dutch e-bike market infographic

## Dutch e-bike market

The first ideas for electric bicycles started in the nineteenth century in the US. But it was not until two centuries later that the technology had improved significantly, enabling the production of e-bikes on a large scale in the Netherlands, which was done by Sparta. Nowadays, the Dutch electric bicycle market is a large market in which many players are active. The two holdings that posses the largest shares of the Dutch bicycle market are Accell Group NV and Pon Holdings BV. Both holdings own many leading bicycle manufacturers and brands. For example, the Dutch brands Batavus and Sparta belong to the Accell Group. Market research has shown that the Dutch e-bike sector experienced a huge growth of 24%, in electric bicycle sales in 2015, leading to a total of 276,000 bicycles sold. In contrast, the sales of regular bicycles, has dropped (Oortwijn, 2016). The number of e-bikes in the Netherlands (currently more than 1,3 million) is still growing (Rabobank, 2017). The growth of the e-bike sector is driven by the under-50 age group where sales numbers are increasing more than in the over-50 market. This means that the market is rejuvenating. The increasing sales to this younger target group is happening especially in the urban areas, where (e-)cycling has become part of a healthy lifestyle, which is particularly evident in commuter traffic (Rabobank, 2017).

## Purposes & Producers

E-bikes are most commonly used in the general consumer market (B2C). Within the consumer e-bike market e-bikes are being used for many different purposes, like commuting, leisure or trekking for instance. But nowadays, e-bikes are also increasingly deployed in the business-to-business market (B2B), for example for food delivery purposes. When looking at organisations that produce e-bikes within the consumer market and the food delivery market, a distinction can be made between producers that focus their products only on the consumer market and producers that focus specifically on the food delivery market. Then there are producers that focus on the consumer market, but whose products are also being used in the food delivery market. With this project, Union wants to do this the other way around; Union aims to develop an e-bike with a focus on the needs of food delivery companies, but with the intent that the same e-bike can be sold on the consumer market as well. Union is currently the only bicycle brand that uses this market strategy, making this project unique. Since the food delivery market is Union's primary focus, and therefore as yet unexplored, this market will be zoomed in on elaborately in order to map the environment and its main food delivery e-bike competitors. Later on in this chapter, the consumer e-bike market will also be briefly examined.

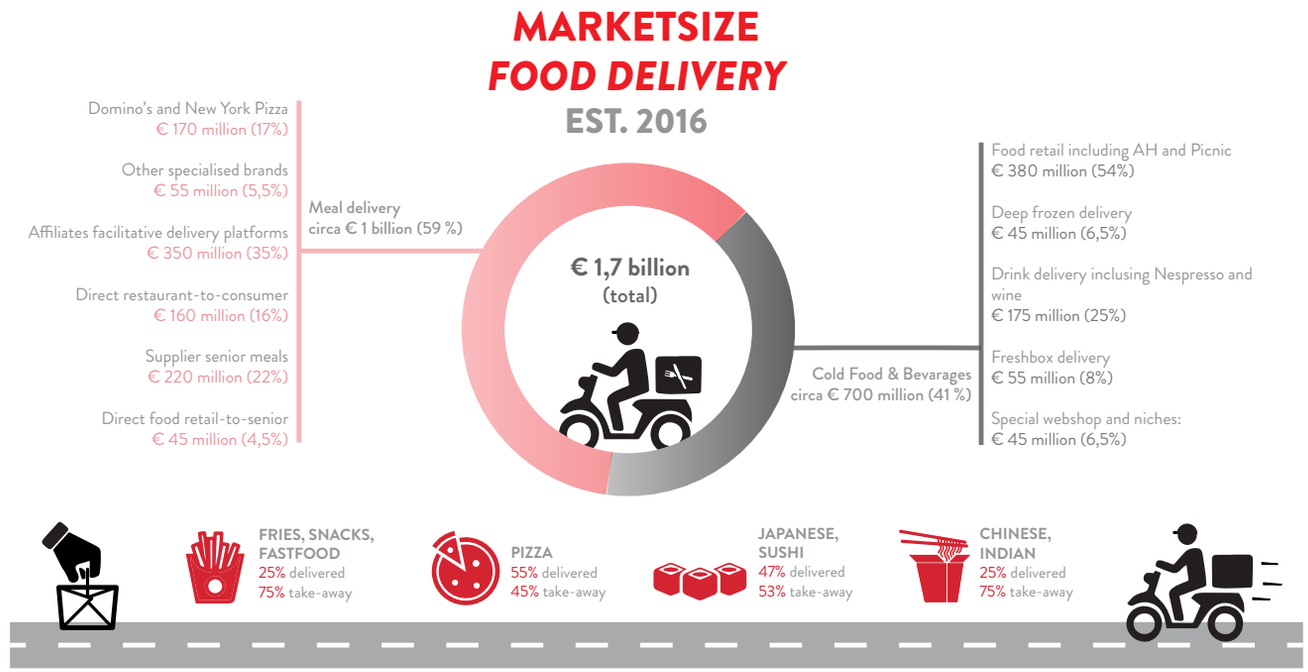
## FOOD DELIVERY MARKET

The food delivery market is growing rapidly worldwide as an increasing amount of new online platforms emerge and expand (Hirschberg, 2017). This trend applies equally to the Dutch food delivery market. Research shows that the revenue of this market in the Netherlands, at the end of 2016, amounted to €1,7bn. (FSIN, 2016) and that it has an expected growth that could result in a market volume of €2,884bn. in 2021 (Statista, 2017). According to the Foodservice Instituut Nederland (FSIN) the main drivers of the market growth are 1) modest economic growth - consumers' spending power has increased, and they are willing to spend more money on food (and convenience), and 2) digital technology - the penetration of internet and smartphones have a major impact on the market, since smartphone users take full advantage of the technology.

### Marketsize

The market can be divided into two different segments (Figure 12) (FSIN, 2016):

- **Meal delivery** - (fast food) restaurants, facilitative delivery platforms, direct restaurant-to-consumer, supplier senior meals and direct food retail-to-senior
- **Cold food & beverages delivery** - food retail, deep frozen delivery, drink delivery, freshbox delivery and special webshops and niches.




The meal delivery segment holds the largest share in this market with a percentage of 59%.

Figure 12 Marketsize Dutch Food delivery market

## TOP BRANDS
## *REVENUE*
## EST. 2016

1 Thuisbezorgd.nl (via affiliates) €250.000.000

2 Domino's €101.000.000

3 New York Pizza €65.000.000

4 Apetito €37.500.000

5 Bezorgbeer (rev. holding) €33.200.000

6 Just Eat Nederland €17.500.000

7 Spare Rib Express €16.500.000

8 Food Connect €8.800.000

Figure 13 List of top brands (in revenue) in Dutch meal delivery market (FSIN, 2016)

Figure 13 lists the brands that are responsible for the largest revenues in the Dutch meal segment. From this, it can be concluded that the majority (6 out of 8) of these brands are either (fast food) restaurants or (affiliates of) facilitative delivery platforms.

### Food delivery going 'green'

Until a few years ago, most of the food delivery companies used petrol-driven scooters as their main delivery method. The biggest expenses for them was investing in their delivery 'fleet' and in their driver's (scooter-licence required). But in the last couple of years the delivery method has changed and many of these brands have switched to using e-bikes instead, like for example Thuisbezorgd (Out of home shops, 2016). The main reasons for switching are space- and cost-efficiency, as well as contributing to a reduction in pollution (sQoot Lease, 2017).

### Food delivery e-bikes

A food delivery e-bike is an e-bike that is specifically designed for the purpose of food delivery. Due to the increasing number of food delivery companies in urban areas nowadays, the food delivery e-bike is a rising phenomenon in the daily street scenery. These food delivery e-bikes often feature an integrated mechanism on which delivery boxes can be mounted. These delivery boxes can be placed at the front and/or at the back of the bicycle. Additionally, these bicycles are often made to be as basic but as sturdy as possible. Most food delivery e-bikes are offered through a rent or lease construction, and in some cases they are offered for sale. A maintenance service is often offered by these companies as well, either included in the lease price or offered additionally.

## COMPETITORS - FOOD DELIVERY E-BIKES

There are several different companies in the Dutch e-bike market that offer a delivery e-bike, as further expanded below. At the end of this paragraph they are mapped in a positioning-matrix, on the basis of their level of food delivery orientation and their ability to offer a 'total proposition'. The definition of a 'total proposition' includes:

- An e-bike that is specifically designed for food delivery purposes
- Food boxes
- Service
- Financing

Union is interested in offering such a total proposition.

### Ebike4Delivery

In the Dutch market, the largest player at the moment is Ebike4Delivery. This brand is known for their e-bikes that are specifically designed for food delivery. Their bike is called the DeliverEbike, and is developed through a collaboration of Accell Group and Protanium, a brand that develops electric components for e-bikes. By making use of Accell's Research and Development department, they have 16 years of e-bike experience (Accell Group, 2016). They started developing this 'DeliveryEbike' three years ago, and after many improvements they currently offer a third generation model to their clients. The delivery


Figure 14 DeliverEbike specifications

e-bike is equipped with several specifications, which are seen in Figure 14. Ebike4Delivery offers the bicycles to their clients through two different options; a purchase contract or a full-operational lease contract. Leasing a bicycle is possible from €3,05 per day (for a minimum period of four years). This leasing price includes service- and maintenance, all-risk insurance, (several options of) food box(es) and personalised branding (with stickers) on the food box (small extra fee). Many known food delivery companies make use of this DeliverEbike, including large food delivery companies like Thuisbezorgd and Domino's Pizza. Ebike4Delivery convinces potential clients by allowing them to test their e-bike for a period of a week. Ebike4Delivery is one of the few brands that offers the total proposition, and therefore they would be Union's main competitor.

### GreenMo Rent

The second largest player is Greenmo, a supplier of food delivery mobility (scooters, e-scooters and e-bikes). At first, they offered normal e-bikes to their clients (from the consumer bicycle brand Qwic), as seen in Figure 15. But they recently designed and produced a food delivery e-bike for Thuisbezorgd that specifically fits delivery purposes (Figure 16). The bicycle's main characteristics are that it is 'hufterproof' (strong and not easy to damage) and simple. Almost all the wires and cables are eliminated or hidden in the frame. The battery is mounted inside the frame and is not removable, and the e-bike has a front-wheel motor. On the front side it has a rack, for a possible delivery box. Greenmo is also close to offering the total proposition, although delivery e-bikes are not their primary business. They also have a strong focus on normal and electric delivery scooters.

### Other

Another brand that claims to specialise in delivery e-bikes is Cyclefix, which offers the Donke-bike and the Atom Cargo Pro (Figure 17). This is a small organisation, and does not have any known clients at the moment. Because this organisation is so small, it will be most likely unable to produce and offer service on a scale that is big enough to be interesting to large food delivery companies. Next to this, the products of several consumer e-bike brands are also used for food delivery purposes, though they are not primarily designed for this purpose. Examples of these brands are Stromer (Figure 18) and Qwic. Both these brands offer a range of e-bikes for the consumer market; Stromer is known for its technically high quality and exclusive commuter e-bikes, and Qwic for their variety of accessible and affordable e-bike models. These latter three brands will not be looked at for inspiration during the rest of this analysis, because their intentions differ from those of Union. This is due to either the size, and thus the scope of the organisation, or the primary purpose of the products of the organisation. However, they will be shown in the positioning matrix in the next paragraph.


Figure 15 Regular Qwic consumer e-bike, offered by GreenMo as delivery e-bike


Figure 16 GreenMo's new delivery e-bike, for Thuisbezorgd


Figure 17 Cyclefix delivery e-bike


Figure 18 Regular Stomer consumer e-bike, used as delivery e-bike

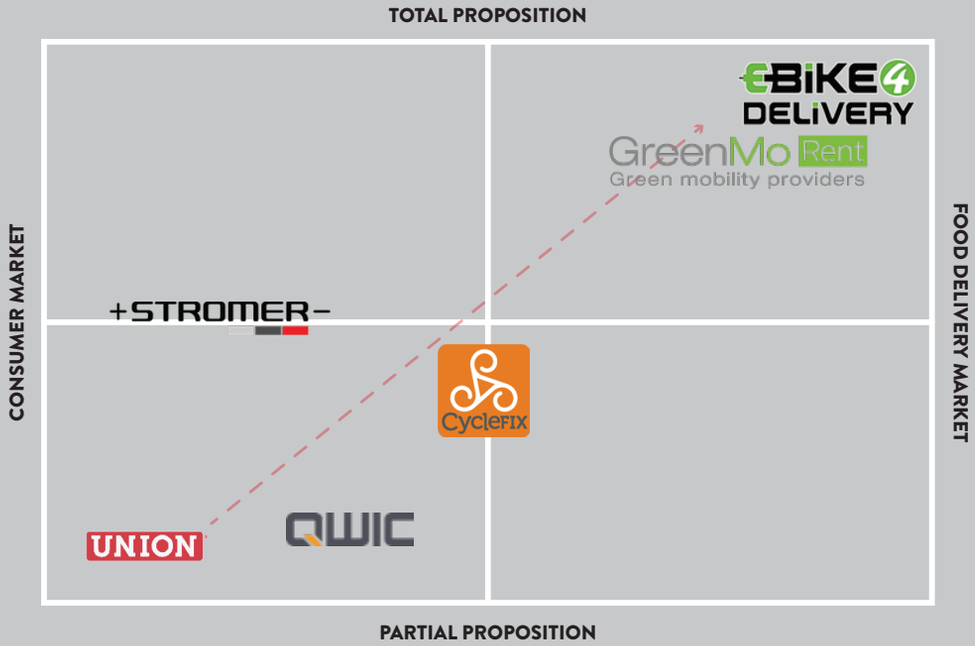



Figure 19 Positioning matrix Food delivery e-bike market - total proposition - food delivery market

**GOAL**

Total Proposition (for a competitive price)

## Positioning

To compare these brands with each other, and to establish the preferred position for Union in this market, a positioning matrix is made. The brands are mapped according to their level of food delivery orientation - is the brand active in and focussed on the food delivery market or more on the consumer market? - (X-axis), and the level of offering the total proposition (Y-axis) (Figure 19). As the matrix shows, Union is currently located in the bottom left corner, indicating that Union is not active in the food delivery market, nor does it offer a delivery e-bike with leasing proposition and all its accessories (W3). It also shows that Ebike4Delivery, Union's potential main competitor, is positioned in the upper right corner, because they currently do offer the total proposition for the food delivery market. As mentioned earlier, this is the position that Union preferably wants to be in, and therefore Union's strategy is to move from the bottom left corner to the upper right corner. Union believes that they will be able to accomplish this position by drawing on the high quality e-bike experience of Gazelle, the optimal service delivery of Fietsned (a repair service provider which is part of Pon.Bike) and the financial services of Volkswagen Pon Financial Services.

## CONSUMER E-BIKE MARKET

Since Union already knows the regular consumer e-bike market well, and because this market is their secondary focus for their intended e-bike product, this analysis will be kept brief.

As stated previously, the e-bike market is getting younger. With the target group changing, desires for the design and style of the e-bike are changing as well. This relatively younger segment does not want to be associated with the 'electric-image', which is mainly interpreted as old, dull, frumpy and lazy. They want it to be a product that they can identify with. That is why today, sporty and trendy e-bike models are becoming popular, compared to the more conservative designs that where were sold up to now.  The focus of this target group lies more on the design, and less on the specifications of the e-bike. This is reflected in consumer demand, and in retail sales (Fietswinkel Rotterdam, 2017). Examples of these trendy and sporty types of e-bikes are transport, retro and commuter e-bikes.

There is not just one specific commuter bike type, because various types of bikes are used for this purpose, from hybrid to road bikes. But they all share common looks and characteristics. They look sporty, are designed to reach higher speeds than a regular bicycle and are suitable for long distances. The e-bikes usually have a mid-motor. An example of a commuter e-bike is the Gazelle CityZen C8HBM, shown in Figure 20. A transport bike is a robust bike that is designed for transporting goods and is suitable for (heavy) loads. There are many different versions, but most have a large carrier above the front-wheel. Most of the parts are of a heavier quality compared to a normal bicycle. They come with a front-wheel motor or mid-motor. An example of a transport e-bike is the HeavyDuty NL C7HMB, shown in Figure 21. Union is primarily interested in designing an e-bike for food delivery purposes (riding long-distances, carrying weight), therefore, the transport and commuter bicycles will be their focus when looking for inspiration .

Figure 20 Gazelle CityZen C8HMB

Figure 21 Gazelle HeavyDuty NL C7HMB


Figure 22 Overview of interesting competitors of Union

## COMPETITORS - CONSUMER E-BIKES

Many bicycle brands have responded to the growing demand for trendy and sporty e-bikes by extending their product portfolios and developing their own commuter and/or transport versions of the e-bike. Some of Union's current competitors have entered this market as well. The most interesting and inspiring competitors have been chosen are and shown on the left (Figure 22). They are mapped in a positioning matrix, which will be explained next. A brief description of these competitors and an overview of their portfolio can be found in Appendix B. Obviously, more brands exist that offer these type of e-bikes. But because they operate on a small scale, or in a different price-range and market, those brands will not be taken into account. Examples are BSP (very lean product offer), and Koga and Stromer (high-end, luxury commuter e-bike brands). These brands are added to the positioning matrix for comparison.

### Positioning

In the positioning matrix the brands are mapped on the values premium versus budget (X-axis) and long distance versus and short distance (Y-axis). A Premium brand can be described as a high-end, high-quality and exclusive brand, and a budget brand is more accessible, with less quality and lower priced. A long distance brand has a portfolio that is more focussed on sporty and

long-distance cycling, whereas a short distances brand has a portflio that focusses more on short daily usage. These values are chosen because those are important considerations for the consumer. As the matrix in figure 23 shows, Union is located in the middle of the bottom left half, which means that Union is a brand that is currently focussed more on short-distance cycling, and slightly more budget than premium. Cortina is quite similar to Union, but is a bit less premium. Vogue and BSP are the extremes on the (bottom) left side. They have little to no long-distance cycling focus, and are very budget oriented. Koga and Stromer are the extremes on the upper right side. They have a serious focus on long-distance cycling, and are very premium oriented. It also shows that Gazelle, Sparta and Batavus are brands that share a quite similar focus (a bit more premium and average commuter/daily use) and are most centred, and therefore most average on each value.

This matrix shows that there is an empty space in the upper left corner, which means that there are few competitors that offer budget-long-distance e-bikes. This could be an interesting opportunity for Union's new e-bike development. Union is content with their current overall position in the consumer market. They have no ambition to change and wish to maintain this position.

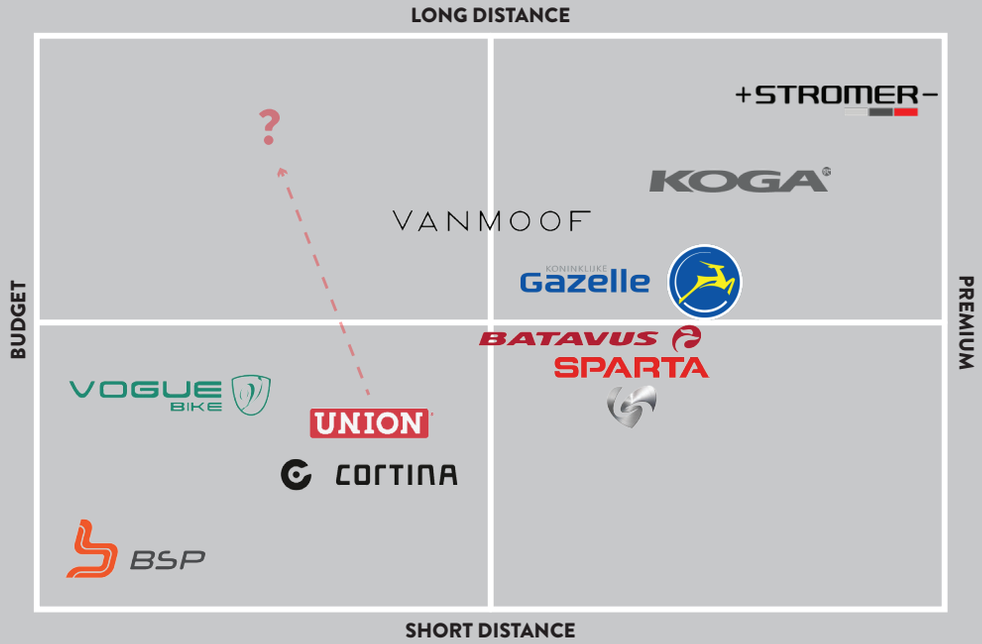



Figure 23 Positioning matrix Consumer e-bike market - long vs. short distance - premium vs. budget

**OPPORTUNITY**

Budget - Long-distance e-bike

## TRENDS

Trends and developments, also called context factors, are changes in society that occur over a certain period of time, which are related to, for instance, people's preferences, the economy and technology. Factors concerning the food delivery (e-bike) market and the consumer e-bike market, are gathered by researching several resources, such as reports, magazines, newspapers, internet. The trends are structured into different themes based on the DEPEST method: Demographic, Economic, Political, Ecological, Social, Technological (Van Boeijen et al, 2014). A selection of the most important and interesting trends is made by evaluating the full list on the basis of three questions; 'Is it **relevant** for, **inspiring** for and **coherent** with this particular assignment?'. Some of these trends have been addressed earlier, but they are mentioned again here, to keep the overview complete. The full list of factors can be found in Appendix C.



**D**

### URBANISATION

More and more people are moving to the cities, which causes an urban population growth (Statista, 2017). The urban mobility will increase with it, which will lead to an increase of traffic congestion (Prnewshire.com, 2016). Both factors cause that the use of cars are discouraged and the use of bicycles encouraged in urban areas (Accell, 2017) and an increasing number of urban citizens try to replace trips with the car and start using a bicycle for example for commuting. Reasons for these people to use an (e)bike are because it is cheaper, faster and healthier than the car (Intelligent Energy Europe, 2010). Additionally, many corporate employers incite their employees to start using e-bikes for commuting by offering company e-bikes or allowances, which is made possible by the WKR (Werkkostenregeling) (Rabobank, 2017). Because of this growing interest in the commuting e-bikes, the e-bike market is rejuvenating (Kennisinstituut voor Mobiliteitsbeleid, 2015) and the wishes for design are changing. All these factors have significant effect on the (lifestyle) e-bike sales.

## E ECONOMIC GROWTH

The economic growth in the Netherlands has ensured that consumers' spending power has increased. They are willing to spend more money on food, which has an positive effect on the growth of the food delivery business (Laurijssen, 2017). Next to that, the increase of consumers' spending power means that a growing number of people are within reach of purchasing an e-bike.

## P GOVERNMENTAL SUPPORT SUSTAINABLE MOBILITY

Environmental awareness is not just increasing among citizens, but also the government. The Dutch government is supporting sustainable mobility, which is reflected for example in the adjustment of subsidy regulations to stimulate 'green mobility', mainly in the delivery business, but also in corporate environments. Governmental schemes to promote private (e-) cycling (Prnewswire.com, 2016) also have an impact. This has a positive effect on the growth of both the B2B and B2C e-bike markets.

## E INCREASING ENVIRONMENTAL & HEALTH AWARENESS

People are becoming more critical and are making more conscious choices (Accell, 2017). 'healthy' and 'green' are two important factors to which consumers pay more attention when considering using or purchasing products. This is also a main driver of the increase in (e-)bicycle commuting.

## S INFORMATION AND CHOICE OVERLOAD

The options and possibilities within the bicycle sector are endless (Rabobank, 2017), which makes it harder for the consumer to choose and could lead them to suffer from 'choice stress'. Therefore, the consumer has a need for simplification, and, accordingly, the presentation of products has become more important. Additionally, people often choose the most easy-to-purchase option (Accell, 2017).

## T DIGITALISATION

The infiltration of the internet and smartphones has a major impact on the growth of the food delivery market (Laurijssen, 2017). It makes it easier for consumers to order their food and more attractive and easy for new online platforms to enter the market.

## T TECHNOLOGICAL PROGRESSION

Technology is progressing constantly and becoming more complex, which provides ongoing improvements in the form and functionalities of e-bikes (Accell, 2017). This especially affects the electric motor and battery systems. By using new materials and technical applications, these improvements can ensure for example the increased safety and comfort of e-bikes. These improvements also allow e-bikes to be modified and deployed for other sectors and markets, for example delivery services. Further, improvements in costs can also be a positive outcome of new technological possibilities.

## CONCLUSION EXTERNAL

From this external analysis it can be concluded that there are several interesting opportunities, but also some threats that can be of influence for this assignment. The most important findings from this analysis are summarised below.

### General e-bike market

The Dutch e-bike market is growing rapidly and is rejuvenating, and this growth will continue. Sales are increasing particularly among people under 50 who use their e-bike for commuting, in urban areas. E-bikes are becoming a lifestyle product. Mid-motor e-bikes are the most popular.

### Food delivery e-bike market

This market is growing worldwide, including in the Netherlands, because of the increase in food delivery platforms. More and more delivery companies are switching from scooters to e-bikes as their main means of transport. Therefore, the demand for food delivery e-bikes is increasing.

### Competitors - food delivery

Union's main competitor is Ebike4Delivery. They offer the total proposition (delivery e-bike, service, financing, boxes) for the food delivery market. The type and quality of the other delivery e-bikes that are currently offered is not very high, which leaves room to exceed this. Union has the ambition to do exactly this.

### Consumer e-bike market

Trendy and sporty e-bikes are gaining popularity since younger people are interested in buying e-bikes. Many different bicycle brands are responding to this growing trend by developing their own lifestyle e-bikes.

### Competition - consumer

Some competitors have little to no long distance cycling focus, and are very budget oriented (Vogue and BSP). Others have a serious focus on long distance cycling, and are very premium oriented (Koga and Stromer). Then there are a few competitors that have a quite similar focus to each other (Gazelle, Batavus and Sparta), which is average in terms of cycling distance, and a bit more premium oriented. Union is a brand that is currently more focussed on short distance cycling, and slightly more budget than premium. Few competitors offer a budget-long distance e-bike. This could be an interesting opportunity for Union.

### Trends

The trends are grouped per the type market they are influencing. Influences on the Dutch (consumer) e-bike market: *Urbanisation* - A growing urban population will lead to an increase in traffic congestion, which will encourage the use of (e-)bikes, for example for commuting. *Governmental support of sustainable mobility* - Adjustments to subsidy regulations to stimulate 'green mobility' in the delivery business and in corporate environments have a positive effect on B2B e-bike sales numbers. The government also carries out schemes to promote private (e-) cycling. *Increasing environmental and health awareness* - People are becoming more critical and are making more conscious choices. 'Healthy' and 'green' are becoming important considerations. *Technological progression* - Technology is progressing constantly and becoming more complex, enabling ongoing improvements in the form and functionalities of e-bikes. *Information and choice overload* - The options and possibilities within the bicycle sector are endless, making it harder for consumers to choose, and may lead to 'choice stress'.
Influences on the Dutch food delivery market: *Economic growth* - Consumers' spending power has increased. They are willing to spend more money on food, which has an positive effect on the growth of the food delivery business. *Digitalisation* - The infiltration of the internet and smartphones makes it easier for consumers to order their food and more attractive and easy for new online platforms to enter the market.

**STRENGTHS**

Connected To Pon.bike (S1)

Focus On Urban Area (S2)

Good Price-Quality (S3)

**OPPORTUNITIES**

Consumer e-bike market rejuvenating

E-bike as life-style product

Budget - long-distance e-bike

Increase demand of food delivery e-bikes

Few quality food delivery e-bikes

Urbanisation

Governmental support of 'green' mobility

Increased health + environmental awareness

Technological progression

Digitalisation

**WEAKNESSES**

Dependent On Dealer (W1)

Low Brand Awareness (W2)

Lack of experience in food delivery e-bike market (W3)

**THREATS**

Large client base Ebike4delivery

Market experience Ebike4Delivery

Consumer 'choice stress'

## 1.3 // STRATEGY CONCLUSION

At this stage the internal and external environments of Union are analysed. These analyses resulted in, respectively: strengths and weaknesses, and opportunities and threats. This stage concludes with an overview of these four results, which can be seen on the left.

The combination of these factors has led to the idea that creating an affordable (budget) but quality e-bike with a sporty appearance might be an interesting direction for this project. But first, before this idea will be further explored, an extensive user research should be performed to identify the specific user needs and desires, especially in the food delivery e-bike market, since Union does not yet have experience in this market and with its users.

# 2 DESIGN BRIEF

In this phase, user research is performed and discussed to discover and elaborate on the needs and desires of both user groups of the identified project scope, in relation to e-bikes. The results are presented in the form of key focus points. A design goal is formulated and, based on this, creative solutions and ideas for the key focus points are generated. This phase ends with a proposal of features and specifications for concept directions. These will serve as a design direction for the next phase, the Development phase.

# 2.1 // USER RESEARCH

*User research is performed to identify the needs, wants, desires and values concerning e-bikes, of both the food delivery companies and consumers. Before user research, a clear indication of the intended target groups is given, in the Scope. The methods of the research and the analysis are explained briefly. And finally, the results and conclusions are presented in the form of key focus points and a design goal. A complete design brief can be found in Appendix D.*

## SCOPE

For this project, the scope contains two target groups, that need to be addressed.

Meal delivery
The main target is the food delivery market. And as explained earlier, this market can be divided into two categories: meal delivery and cold food & beverages (FSIN, 2016). The meal delivery market is responsible for most of the revenue within the total food delivery market. And within the meal delivery market, the (fast food) restaurants or (affiliates of) facilitative delivery platforms are the top-brands. Therefore, the focus for the scope within the food delivery market will be on the **Meal delivery category**, specifically the (fast food) restaurants (for example Domino's) and (affiliates of) facilitative delivery platforms (for example Thuisbezorgd.nl). Union also sees potential in the Cold Food & Beverages Delivery market, and in the delivery market in general, for example in the Albert Heijn or PostNL delivery services. But for this project, it has chosen not to include this category, because the scope would be too broad, and this category deals with much larger quantities and heavier weights for delivery orders. This would give rise to difficulties later on, when design choices need to be made.

Young urban professionals
The second target is the regular consumer market. Since Union already has a focus on the young urban professional (age 25-45), and the demand for e-bikes is growing among younger adults (Rabobank, 2017), this target group will remain the same. Next to this, the popularity of commuting is growing rapidly among this target group, and, from the external analysis, a gap in the 'budget-long distance' e-bike market has been discovered. Therefore the scope within the consumer market for this project will be **Young urban professionals** (age 25-45), with a slight focus on **long distance cycling**.

## METHODS & ANALYSIS

First, pre-research was done to discover the general attitudes that people have about e-bikes, and their market. After that, interviews were conducted with several people from both target groups. The main goals of these interviews were to identify the needs, wants and values of both groups, concerning e-bikes. Additionally, it was important to gain insights in to why and how an e-bike would be attractive for each user group. Observational research was also performed, to capture and get insight into the behaviour and interaction of the users with the electric bicycle. The full research set-up can be found in Appendix E. Research centred around the following question:

*What makes an e-bike attractive for either the food delivery market, or the consumer market?*

The following sub-questions were addressed to further investigate this topic, and were used as a reference points for the basis of the interviews for each target group. All the complete interviews can be found in Appendix F.

*What are the needs of each target group? And what not?*
*What problems do they encounter?*
*What would they want to improve (about their e-bikes)?*
*What motivates them to purchase (or lease) an e-bike?*

From the meal delivery target group, research was conducted with three e-bike experts (owner/manager of bicycle shop E-bike Masters, Bike Shop Rotterdam and online platform Fietsvoordeel.nl), three meal delivery company managers (Thuisbezorgd, Foodora and New York Pizza), six meal couriers from four different companies (Domino's, Thuisbezorgd, Sushi Point, New York Pizza). And, from the young urban professionals (yup) target group, six potential and seven current e-bike users.

The research data (Appendices G and H) is analysed to search for interesting overlaps in the responses of both target groups. Before analysis, all the restrictions and requirements that are important for Union from a business perspective are recorded (Appendix I). Instead of narrowing the ideas and options down by taking the restrictions into account, these restrictions are put aside, so that the data can be studied with neutral and fresh eyes. This process can be described as 'diverging'. As many as possible interesting overlapping insights between the two user groups as possible are sought and formulated. Insights that apply to only one of the target groups, but which can be translated or converted into an idea for the other group as well, are also included. Eventually, these insights are discussed, evaluated and selected in consultation with Union experts, resulting in a list of Key Focus Points. This analysis is schematically visualised in Figure 24.

## RESULTS

Several interesting themes were found from the full list of overlapping insights and problems (Appendix J). To address and support each theme, quotes from the participants are included. These overlapping themes and the supporting quotes can be found on the next two pages. Some observational images are seen in Figure 25. The rest of the observational material can be found in Appendix K. The eventual Key Focus Points are based on these overlapping themes.

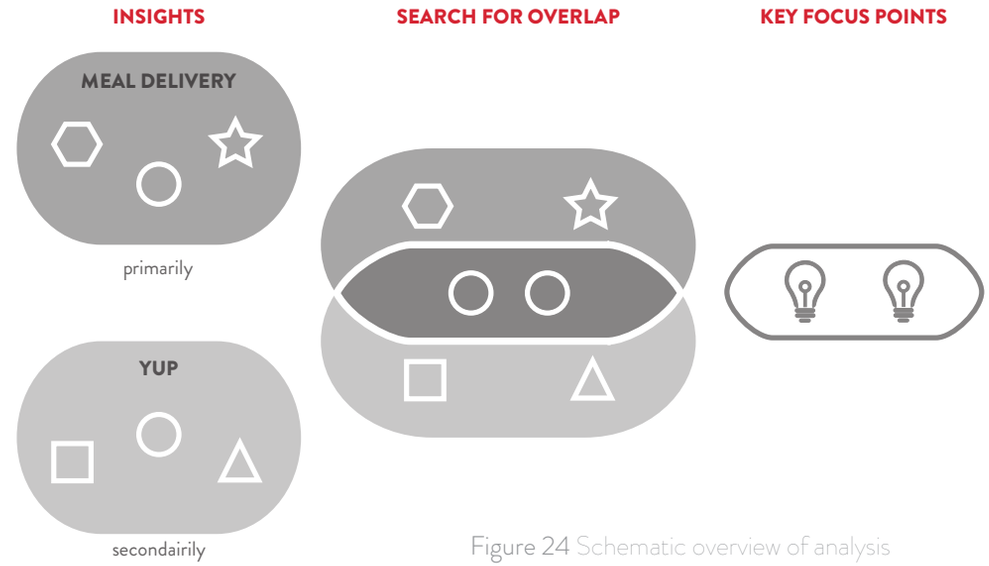



Figure 24 Schematic overview of analysis

| THEME | STRENGTH | BATTERY | BALANCE & STABILITY | DAMPING |
|---|---|---|---|---|
| MEAL DELIVERY | *"The strength and reliability are also very important to us, when choosing a delivery e-bike."*<br>New York Pizza Manager<br><br>*"We are looking for a bike that is solid and that is durable. As little as possible should be breakable"*<br>Foodora Manager | *"Reducing the amount of charging moments is an important point of attention."*<br>Foodora Manager<br><br>*"An important aspects of a delivery e-bike is the durability of the battery."*<br>New York Pizza Manager<br><br>*"I wish the battery would last longer."*<br>Domino's Courier | *"The e-bikes we have now are heavy in weight, which makes it hard to pedal without electrical assistance."*<br>Foodora Manager<br><br>*"The front-wheel brake is dangerous sometimes. If you brake too hard, the back of the bike can lift off the ground."*<br>Thuisbezorgd Courier | *"Currently, the damping is not ideal on the front and rear ends of the bike. A person can absorb those shocks and vibrations better."*<br>Thuisbezorgd Manager |
| YUP | *"A good luggage carrier, which is strong and provides enough possibilities for panniers or a child seat. A good and sturdy luggage carrier is very important!"* | *"It is very important that the battery lasts long enough."*<br>Potential user #5 | *"It's important that the bike is in balance when transporting things on it."*<br>User #3 | *"An e-bike must be impact resistant."*<br>User #1 |

## TRANSPORTATION

*"We made the switch from a meal box at the rear carrier to a backpack. Mainly the quality of the food has improved because of this."*
Foodora Manager

*"Preferably (a box) on the rear end of the bike, with a bike with a low entry, because it is better for stability."*
New York Pizza Manager

## STORING & PARKING

E-bikes parked tight in a small place. Results in difficulties when manoeuvering through while storing and taking out the e-bikes. E-bikes and the couriers bump into other parked e-bikes or a backpack catches on protruding objects. Many loose charging cables lying around on the floor, which little attention was paid to.
Observations at Thuisbezorgd

## (EXTRA) SERVICE

*"By offering an extra or over-service, you could win."*
Thuisbezorgd Manager

*"Among other things, country wide coverage of repair and maintenance service could be a gamechanger."*
New York Pizza Manager

## APPEALING DESIGN

*"The cooler the bike, the better. For example, the delivery boys refuse to get on the Miss Grace (whereas the girls do)."*
Thuisbezorgd Manager

*"An ideal delivery e-bike must have our company branding."*
Foodora Manager

---

*"The ability to transport baggage is an important aspect for me."*
User #1

*"The location of the charging point must not be obstructed."*
User #1

*"Repair and maintenance service is very important, because an e-bike is an expensive purchase."*
User #6

*"The biggest problem is that most e-bikes have that 'old- lady' design, I don't want that. It has to be tough and cool."*
User #2

---

*"The younger consumer segment is more brand oriented and looks specifically at the design."*
E-bike expert at Bike Shop Rotterdam

*"The consumers find the 'box' (battery) on the rear carrier too much of an 'electric-image'."*
E-bike expert at E-bike Masters



Figure 25 Images from user research, l-r: Current consumer e-bike user, Courier at Thuisbezorgd warehouse, Fietsvoordeel.nl shop

## CONCLUSION USER RESEARCH

Though both target groups (meal delivery companies and young urban professionals) have specific problems and needs, this project focuses on the problems that occur in both target markets, and especially the ones that are crucial for the food delivery market. The Key Focus Points are based on the most interesting overlapping themes (see pages 43 and 44), derived from the research data. The key focus points with their reason of importance are described to the right.

With these key focus points and the findings from the analysis from the previous stage in mind, a design goal is formulated, as seen in the bottom right corner of this page. The design goal together with the key focus points, will serve as a starting point for idea generation, and are accordingly important for the next stage (Development).

## KEY FOCUS POINTS

Motor
Must be suitable for heavy load and hufterproof (and many start-stops)

Range
Batteries run down too quickly, meal couriers currently need two batteries during one shift

Weight Distribution
Important for the balance and stability

Vibration damping
Important for the riding comfort and quality of the food

Loading
Important when transporting goods, food, and other things

Storing / Parking
Very chaotic at meal delivery company warehouses

Service
Offering an extra service (next to standard repair/maintenance) would make a difference

Branding / Design
Essential for meal delivery companies, can be more appealing

**DESIGN GOAL**

*"Design a total proposition which meal delivery companies and young urban professionals can use intensely and for long-distances on a daily basis, without having to worry that the bike will easily 'wear down'. And offer it for a better price and with a more stylish design than the competitors do."*

# 2.2 // IDEATION

*In this chapter, the ideation process is elaborated upon and the first ideas for concept directions are generated through the use of creative techniques. Eventually, ideas are selected, which are presented as proposed features and specifications for the product concept in the next chapter.*

## PROCESS

To generate creative solutions and ideas, a brainstorm technique (Roozenburg, 1995) in combination with How-To's (H2s) (Tassoul, 2005) is used. This technique consists of three steps: 1) problem statements (in the form of H2-questions), 2) idea generation ('diverging'), and 3) idea evaluation & selection ('clustering' & 'converging').

Problem statements
Defining problem statements was done by formulating several How-To-questions (H2s), based on the key focus points and several important design requirements, which can be found in Appendix I. During the rest of this brainstorm, the formulated design requirements are 'put aside' again. Nine H2s that were used for this brainstorm were:

- H2 make an e-bike hufterproof?
- H2 minimise shocks and vibrations?
- H2 enlarge the range of the bike and life of the battery?
- H2 offer extra service?
- H2 make loading (goods) easy?
- H2 make branding appealing for companies?
- H2 optimise weight distribution?
- H2 make an e-bike suitable for heavy loads?
- H2 store / park / organise many e-bikes?

Idea generation
Many ideas were generated in the answers to the H2s. All ideas were allowed. This step can be described as 'diverging'. The right hand page shows an overview of a some ideas with the corresponding H2s (Figure 26).

**PROBLEM STATEMENTS**

**IDEA GENERATION**

**IDEA EVALUATION & SELECTION**

**H2 MAKE AN E-BIKE 'HUFTERPROOF'?**

No display

Wires inside

No gears

Mid-motor

Integrated lights, batteries

**H2 ENLARGE THE RANGE OF THE BIKE AND LIFE OF THE BATTERY?**

Stronger battery

Dual-battery

Solar-charging battery

Charging stations in city

**H2 OPTIMIZE WEIGHT DISTRIBUTION?**

No front-rack

Mid-motor

Battery in frame

No rear-carrier

Double standard

**H2 MAKE BRANDING APPEALING FOR COMPANIES?**

Official (owner) partnership

Striking branding

**H2 OFFER EXTRA SERVICE?**

Repair at nearby shop

GPS-tracker

Check up every month

Connect to iphone

**H2 MAKE AN E-BIKE SUITABLE FOR HEAVY LOADS?**

Handlebar lock

Fat tyres

Mid-motor

Fat / solid frame

**H2 MINIMISE SHOCKS AND VIBRATIONS?**

Front-fork suspension

Rear-fork suspension

Saddle-pillar suspension

Fat tyres (air-suspension)

**H2 MAKE LOADING (GOODS) EASIER?**

Low step-through

Smaller frame

Smaller tyres

Handlebar lock

**H2 STORE / PARK / ORGANSZE MANY E-BIKES?**

Flip handlebar 90°

Hang on wall

Different height levels

Figure 26 Generated ideas from H2-questions

Idea evaluation & selection

As seen in Figure 27, there are many promising and overlapping ideas, that fit with more than one H2s. For example, the idea of a mid motor is a solution for 'H2 make an e-bike 'hufterproof'?' and for 'H2 optimise weight distribution?' and 'H2 make an e-bike suitable for heavy loads?'. All the promising ideas arising from each H2 question are evaluated and discussed with Union experts. Based on the well-defined requirements and a realistic 'expert-eye', a selection of ideas is made. This selection of ideas is seen on the right in the visual below (Figure 27). This visual represents the relationship between the different H2s and the selected ideas. It shows that many of the selected ideas are ideas that fit with several H2s. These selected ideas will be presented as proposed features and specifications in the next chapter, Concept directions.

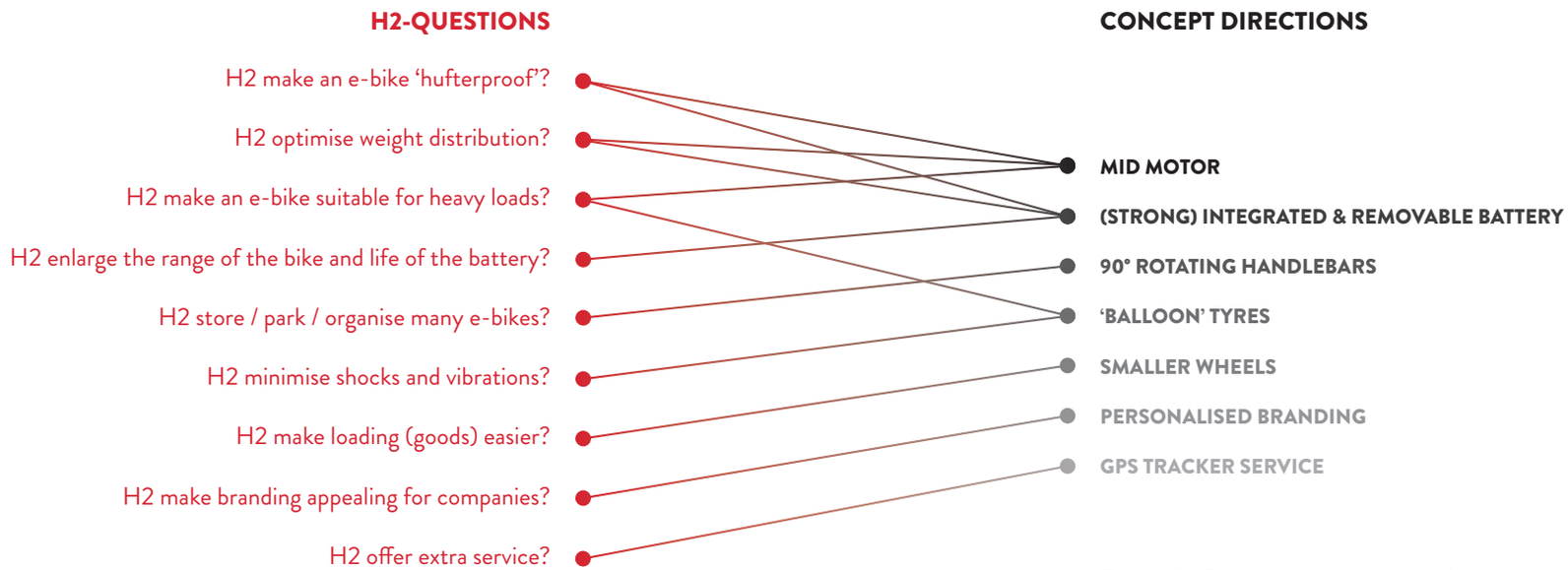



Figure 27 Retalionship between H2s and selected ideas (concept directions)

## 2.3 // CONCEPT DIRECTIONS

*The selected ideas for proposed features and specifications arising from the brainstorm session described in the previous chapter will be presented. The advantages, unique elements and some examples of each idea are given. This is done to convince other people at Union of the viability of the ideas. In the next phase, the Development phase, some of the ideas will be further examined and elaborated upon.*

### MID-MOTOR

Ebike4Delivery uses a Bafang front-wheel motor at the moment (Figure 28a). A mid-motor has many advantages compared to a front-wheel motor (see below). Options for a mid-motor that would fit Union's budget are for example a Bosch or a Bafang system (Figures 28b and c).

More powerful

Suitable for heavy loads

Better weight distribution

Low in maintenance


Figure 28 From top to bottom; a. Bafang front-wheel motor Ebike4Delivery, b. Bafang mid-motor, c. Bosch mid-motor

## (STRONG) INTEGRATED & REMOVABLE BATTERY

Ebike4Delivery uses this mechanism at the moment (Figure 29a). The battery on the rear-carrier is most common among e-bikes. But more and more consumer e-bike brands are starting to use integrated batteries (Figures 29b and c). Different locations are possible, for instance on the side of the down tube or in the seat tube. Compared to a battery on the rear-carrier, the advantages are:

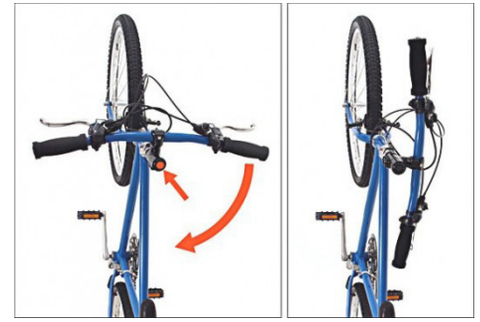
- Hufterproof
- Better weight distribution
- Less 'e-bike look'

Figure 29 From top to bottom; Integrated and removable battery in frame a. Ebike4Delivery, b. Sparta, and c. Stromer

## 90 ° ROTATING HANDLEBARS

Rotating handlebars are a technical specification that enables the user to store a bike more conveniently (Figures 30a and b). Currently, this technology is only used on regular bicycles, but Union sees potential to adapt this to e-bikes as well. This way, clever parking/storing solutions can be employed, for example the smart storing solution designed by Jung Tak (Figure 30c).

- Uses less space
- Easier for storage and parking
- Less theft-prone



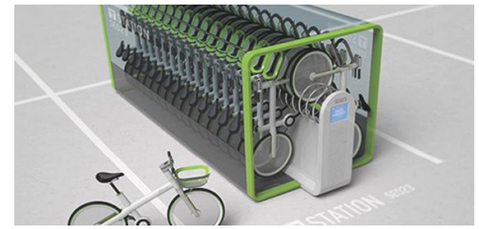


Figure 30 From top to bottom; a. and b. Examples of rotating handlebars, c. 'T-bike' smart parking design by Jung Tak

## ‘BALLOON’ TYRES

These tyres are commonly used on trekking bikes, such as on bikes from Simplon, Stromer and Trek (Figures 31a, b and c). These tyres can vary in diameters from 50-70 mm (a normal tyre is 37 mm). Compared to normal tyres, balloon tyres have many advantages:

- Provides good damping and suspension
- Rarely get punctured
- Low in maintenance
- Saves a lot of money on front or rear-fork suspension system
- High loading capacity (160 kg)
- Low rolling resistance
- Tough and robust look

## SMALLER WHEELS

Smaller wheels, for example 26 inch, are commonly used in combination with balloon tyres. Together with the large diameter of the balloon tyre, the total circumference of the wheel is almost the same as a normal (37 mm, 28 inch) wheel. Again, Simplon, Stromer and Trek often make use of this combination (Figures 31a, b, and c).

- Lower step-through
- Convenient for loading
- Does not appear small because of the thick tyres
- Smaller tyres are stronger than larger ones


Figure 31 From top to bottom; Trekking bikes from a. Simplon, b. Stromer, and c. Trek

## PERSONALISED BRANDING

To make a delivery bike interesting and appealing for companies, manufacturers offer personalised branded (e-)bikes. This happens mostly through the use of colours, logos, stickers or sign plates (Figures 32a, b, and c). Union sees an opportunity to be creative in this (design) area by coming up with a striking branding solution, which could be a way to stand out.

- Room for creativity
- Way to stand out
- Competitors offer it as well
- Must for B2B brands




Figure 32 From top to bottom; a. Bike and box branding from Ebike4Delivery for Thuisbezorgd, b. Branded bike from Foodora, c. Customised cargo-bike Deliveroo

## GPS-TRACKER SERVICE

The GPS-tracker innovation is emerging in the bicycle sector. Many small start-ups offer tracker devices and accompanying tracking systems through the use of a mobile application (Figure 33a). These devices can be bought by private individuals, but currently there are also bicycle manufacturers who already integrate such systems into their bikes, like for example the VanMoof Electrified S (Figures 33b and c).

- Anti-theft
- Able to see how full battery is, locate fleet, navigate, etc.
- Extra service interesting for both B2B and B2C

Figure 33 From top to bottom; a. Sherlock GPS-tracking device and system, b. and c. VanMoof integrated tracking device and system

## 2.4 // DESIGN BRIEF CONCLUSION

In this Design Brief stage user research was conducted resulting in key focus points and a design goal. Based on the design goal, and the key focus point, concept ideas were generated and ideas were selected. To conclude this stage, the two main outcomes that are important for the next stage (the design goal and the concept directions), are again briefly presented in the overview on the right.

**DESIGN GOAL**

*"Design a total proposition which meal delivery companies and young urban professionals can use intensely and for long-distances on a daily basis, without having to worry that the bike will easily 'wear down'. And offer it for a better price and with a more stylish design than the competitors do."*

**CONCEPT DIRECTIONS**

Mid-motor

Strong integrated removable battery

90 ° rotating handlebars

Balloon tyres

Smaller wheels

Gps-tracker service

Personalised branding

# 3 DEVELOPMENT

In this phase, the product design activities are carried out. Before designing, the technology aspects of the development process, such as the manufacturing capabilities and different transportation methods, are discussed. Then the product design starts with sketching the (basic) frame. From many sketches, one concept sketch is selected, which is further detailed. At the same time, the idea for the extra service is also elaborated. The stage concludes with an evaluation of the product and service concept with a delivery e-bike expert.

# 1.3 // TECHNOLOGY ORIENTATION

*Before the actual design of the delivery e-bike can begin, it is important to address the technical aspects involved in the development of a delivery e-bike. Therefore, the proposed features and specifications for the concept directions that need extra technical attention are indicated and discussed. Additionally, the general bicycle manufacturing methods and capabilities will be elaborated. Finally, the different methods of transporting food on a(n) (e-)bike will be addressed.*

## TECHNICAL FEATURES

Some of the ideas for the concept directions are technical solutions that require professional knowledge and expertise. These technical elements will not be taken into account when designing the frame. This means that the development of these elements will not be included in the Development stage of this project, but will be left for Union (or other technical or mechanical experts). This applies to the following concept directions that will be discussed.

Union decides internally which brand and type of electrical mid-motor and battery system, and which diameter of balloon tyres, should be used. The location (and the size) of the battery can vary, within the limits of the brand of electrical system ultimately chosen. Because these are basic bicycle parts that Union is familiar with (and are bought from suppliers), this does not need extra attention. The more technical - and currently unfamiliar proposed features are the rotating handlebars and the GPS tracking service. These features both require (external) knowledge and expertise, since Union does not (yet) have the knowledge and capabilities to develop this themselves. For the rotating handlebars, Union has the ambition to develop this part and technique themselves, which requires them to invest in this knowledge and capability. For the development of the GPS tracking service, Union will need to work closely together with Gazelle and an external ICT party, since they have already started developing ideas for such a service.

## FRAME SHAPES AND FORMING TECHNIQUES

Alongside the technical aspects of the loose bicycle features and specifications, the manufacturing possibilities for the core of the bicycle (the frame) need to be taken into account as well. Different metal forming techniques are used in the bicycle industry to produce desired tube profiles for the frame. Two commonly used examples are extrusion and hydroforming. Both techniques and their characteristic shapes are explained briefly here.

### Extrusion

With extrusion, the metal is forced through a die, which has a specific cross-section. When the metal leaves the die it is in the form of the new cross section. This process is used for the production of basic profile shapes, like round and rectangular profiles (Figure 34). This is a standard production method, and most commonly used. Union uses this technique the most.

### Hydroforming

With hydroforming, the form of the profile is obtained by a simultaneous application of internal pressure (and axial force). The form medium of this internal pressure is a fluid. This technique is suitable for the production of more complex profile shapes, with tight tolerances (Figure 35). This means that there is a greater freedom of design. But the downside is that it this a relatively expensive production method (compared to extrusion), and therefore mostly used for high-end bicycle frames. Union does not use this technique very often. Gazelle, in contrast, does.

Figure 34 Extruded bicycle tubes

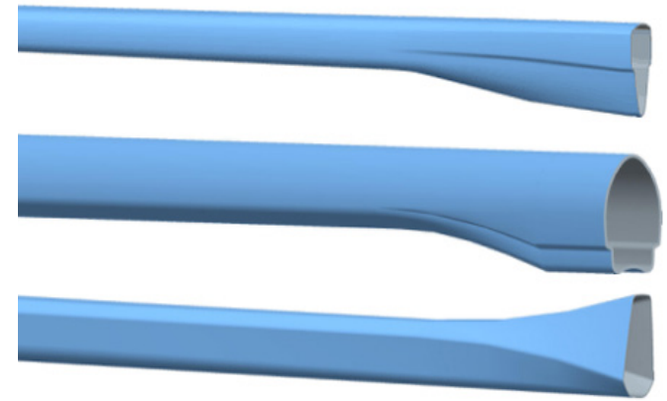


Figure 35 Hydroformed bicycle tubes

## TRANSPORTING METHODS

The user research has shown that meal delivery companies have different preferences when it comes to transporting their food on a(n) (e-)bike. Most facilitative delivery platforms, like Thuisbezord.nl and Foodora, prefer couriers to carry the food in a delivery bag on their backs, whereas fast food restaurants mostly carry the food in a delivery box attached to a front carrier of the bike. All options have their advantages and disadvantages: having the box up front lets the rider keep an eye on the transported goods, making sure nothing happens to it, but can interfere with the courier's visibility; the box on the back allows the cyclist to have a clear view of the road, but he cannot see when something happens to the load; carrying the food in a backpack lets the human body absorb the shocks and vibrations of the road, which benefits the quality of the food, but can be physically exhausting for the courier. Because Union does not want to limit themselves by focussing only on one transportation method, they will take all options into account.

For transporting the food in a backpack, no special or extra features need to be designed on the bike. In contrast, the transportation of food on the front and/or back of the bike does require special features to be added.

There are two common methods to transport a load, in this case a delivery box, on a bike. The first is with (removable) racks, which are fixed, or can be mounted, above the front- or rear-wheel. These racks are available in all sorts of sizes, shapes and weight capacities. Onto these racks, for example, an aluminium tray or plate with an elastic clamping-system can be mounted, on which the food box can be fastened. This is shown in Figure 36a. Foodora made use of these in the past (Figure 36b).

The second method employs a (removable) beam, which is fixed or can be mounted to the head tube or to the seat tube. Ebike4Delivery uses fixed beams on their delivery e-bikes. An example of this is shown in Figure 37b. They make use of a plate with a tube that is attached to the bottom of the food box, which slides over the beam and is attached with screws. Another option is to attach a plate or tray, just like one described above, to the beam, on which the food box can be fastened. An example of a removable beam is shown in Figure 37a.

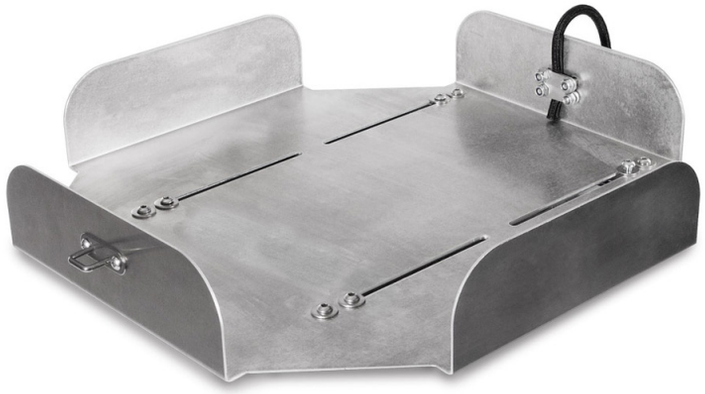



Figure 36 a. Metal plate to which delivery box can be fastened, b. Foodora using the plate


Figure 37 a. Removable beam, b. Fixed beam Ebike4Delivery

# 3.2 // PRODUCT CONCEPT DESIGN

*For the development of the delivery e-bike, a design style is proposed. Based on the design style, the first exploration sketches for the frame design are made. From these sketches the design process evolved, resulting in a concept sketch.*

## DESIGN STYLE

Several elements of the delivery e-bike concept will be designed and detailed, including the frame design and transportation method. To make sure the design fits with the wishes and needs of the delivery companies, but most importantly with Union's brand DNA, a design style is proposed:

*The product should have a robust, clean and simple look.*

For this design style, Union has chosen to focus on one of its positioning points - 'Keep it simple' - because this may be the most important one for them, being the brand proposition that visually differentiates Union from Gazelle (Union's other brand positioning points can be found in Appendix D). To visualise this design style and to get a feeling of desired product forms, a collage (Bruens, 2007) with inspirational images of products is made, which is seen on the right hand page.

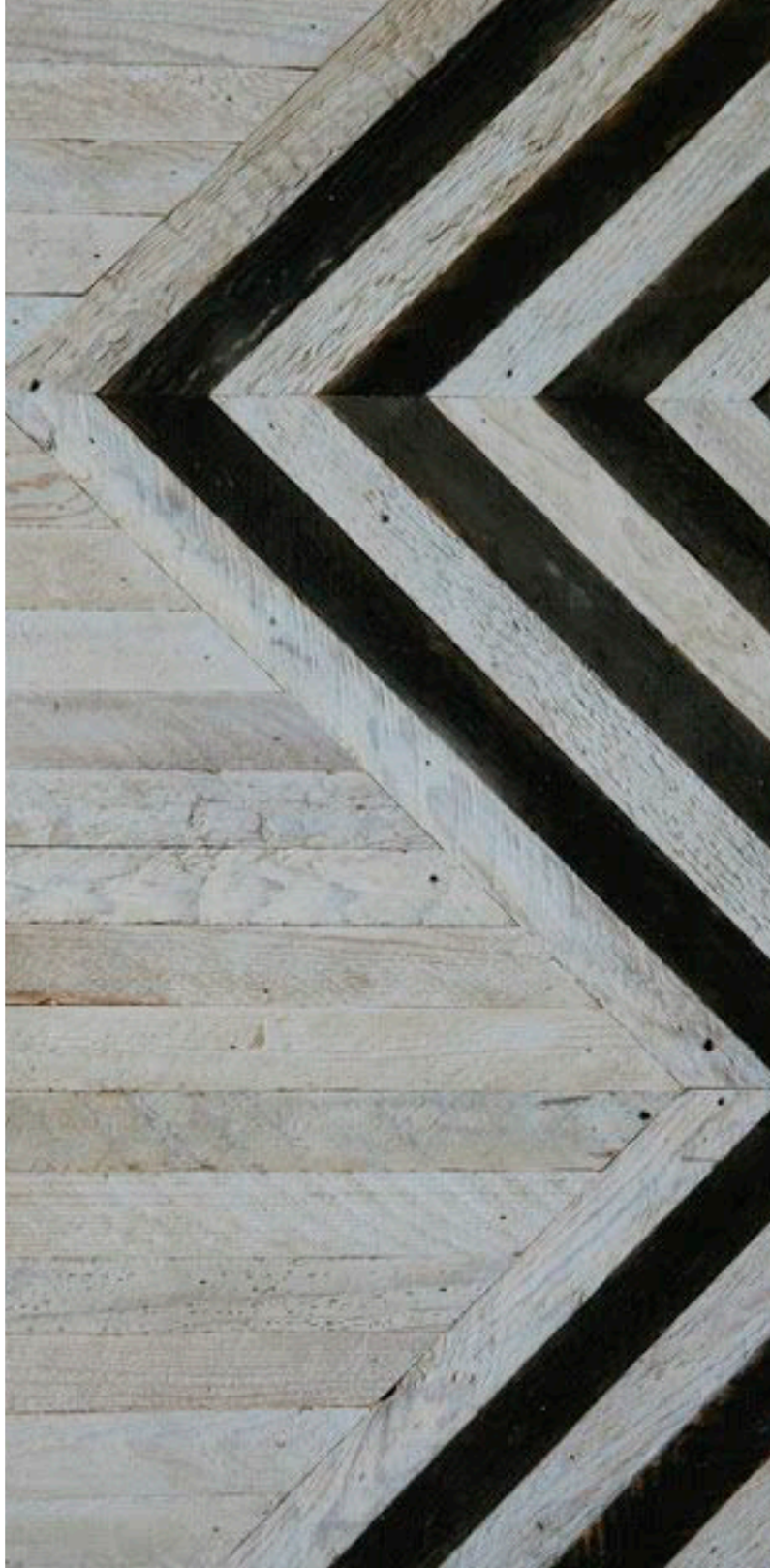
Form / Colour Anatomy, Bruens (2007) states: "Simple shapes like cylinders, cubes and pyramids make strong objects." Therefore, the design language, shapes and forms and that are used in this collage are:

- Repetition of basic geometrical shapes
- Smooth and tight lines
- Little details
- Earthy colours

The repetition of basic geometrical shapes and the earthy colours have an calming effect for the eye. Additionally, these earthy colours also give the products a robust and solid look.


iScan


CYCLOTRON



## FRAME ANALYSIS AND SKETCHES

To explore the form of the frame, many small exploration sketches are made, which can be seen in Figure 38. The exploration sketches vary in the position of the integrated battery, in order to explore the different appearances and styles that these positions produce and to explore the possibilities available. These sketches are made without applying the restrictions of the technical engineering aspects. This list of restrictions and requirements is further defined throughout the project together with Union's mechanical engineers. This list can be found in Appendix L.

Using these exploration sketches, a selection of potential frame designs is made in consultation with Union's mechanical engineers. These sketches were selected according to two basic requirements: 1) entry level - having a low entry is a main requirement for food delivery companies, and 2) producibility - complex frame shapes require complex production methods. The selection of potential frames that appeared to be the most interesting and appealing are shown in Appendix M. Using these selected potential frames and bearing in mind Union's advice to make the frame form 'one whole', a new concept sketch is made in side-view and perspective, which is seen in Figure 39. The full concept development process along with all the sketches can be found in Appendix M.

Figure 38 Exploration sketches frame design

## CONCEPT SKETCH

In this concept the lower tube and the chainstay merge into one another via a smooth angle just above the bracket. The chainstay, front- and rear fork are made wider, flatter and tapered towards the end. This way all the parts get an similar, robust look, which also helps to unite all the separate parts. A battery integrated into the down tube is chosen because in that location it is best protected, which makes it more 'hufterproof'. Detailed sketches are made of the rear- and front lighting functions of the bicycle. In collaboration with the mechanical engineers and designers at Union, these sketches will be translated into 3D Solidwork models. These sketches will serve as the main (visual) guidelines for the final design.

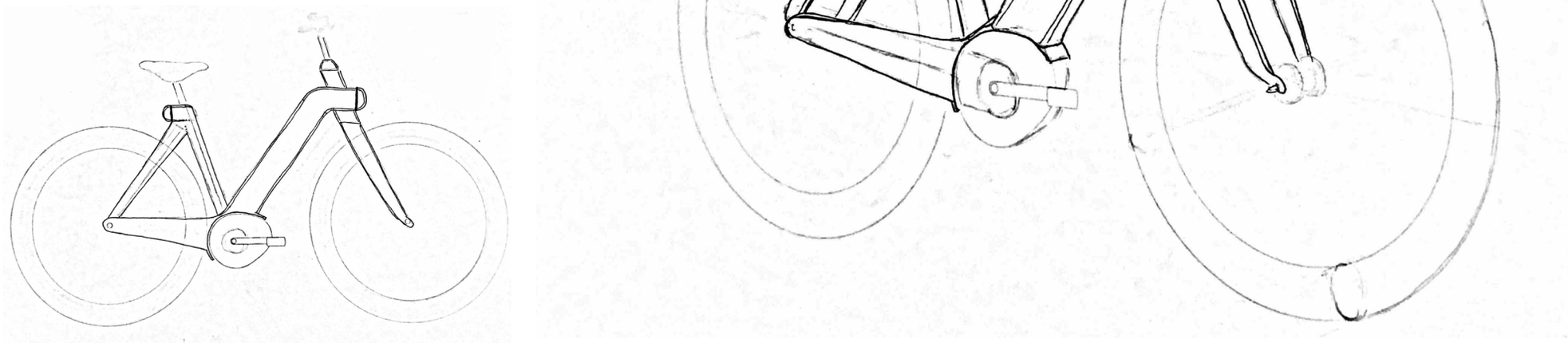


Figure 39 'One whole' concept sketch in 2D (left) and 3D (right) perspective

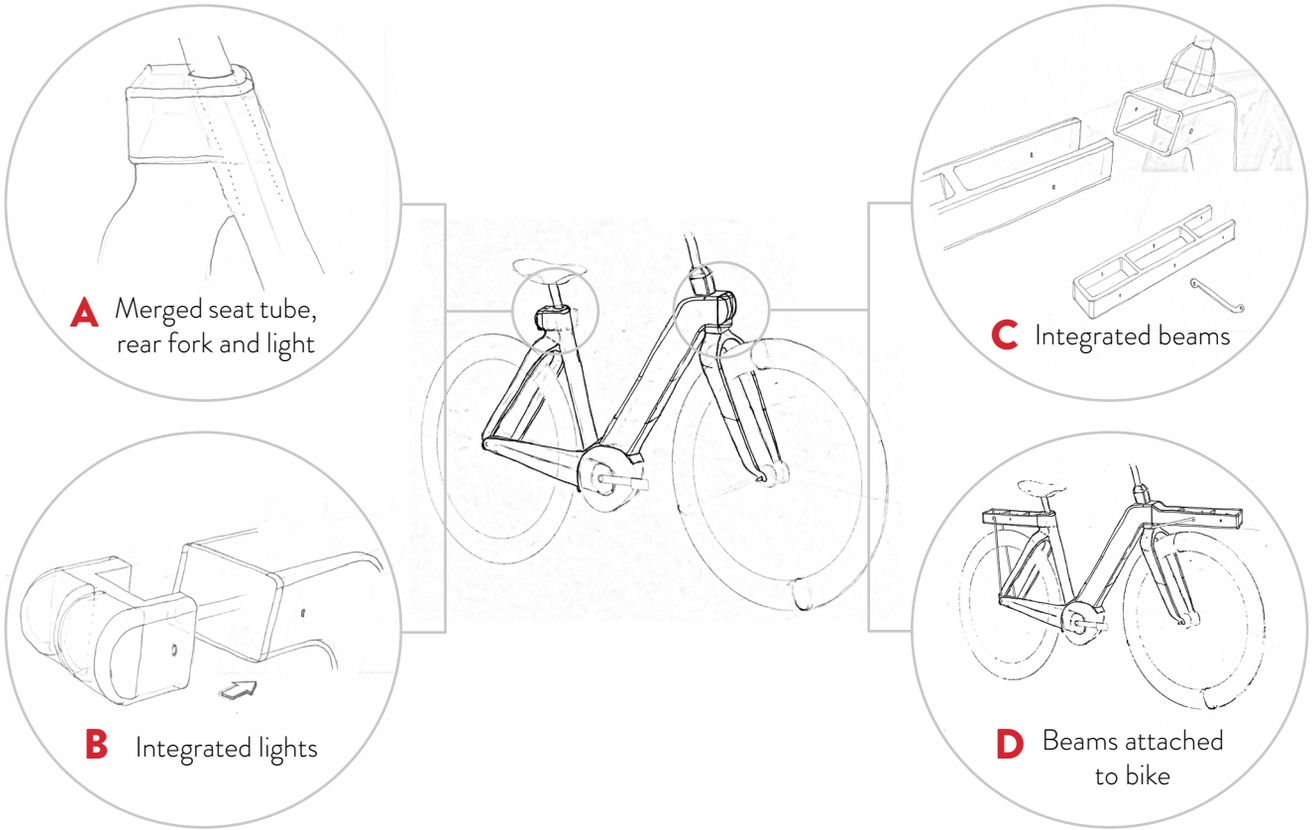



Figure 40 Overview of details of concept

## DETAILS

### Seat tube

The rear fork and seat tube join each other right below the rear light, and merge into each other. Assembled in this way, these parts gain a coherent look (Figure 40a).

### Lights

Both front and rear lights are integrated into the lower tube and the seat tube (Figure 40b). This integrated light system is taken from the design for the Union Lite bicycle. Because the tube will be a bit wider and higher than that of the Lite, the lights are tilted 90° and two of them are placed next to each other. The lights can be clicked out of the tube, leaving an access port for modular possibilities.

### Transportation beams

In order to be able to transport food onto the e-bike, two H-shaped beams are designed to fit exactly along the head tube, into the access ports, where the lights would normally be located (Figure 40c), which make them integrate nicely into the frame. When the beams are attached, the lights can again be clicked into the ends of the beam. The beams can be secured with screws and an extra support beam. The support beam at the front is attached to the head tube, and the rear beam is attached to the wheel axle (Figure 40d). Food boxes can be slid onto the beams. Because these beams are modular parts that can be removed, the frame is also suitable for consumers. Additionally, delivery companies can choose whether to use a box in front, on the back, or not on attached to the bike at all.

## 3.3 // SERVICE CONCEPT DESIGN

*As mentioned earlier, Gazelle is currently developing a 'connected' service concept for e-bikes, where relevant e-bike-data can be seen and used by clients. This way, all the stakeholders involved can be connected to each other and real time client insights and data can be gathered. Gazelle has found several different B2B target groups that would benefit from this kind of concept. Food delivery companies are one of them. Therefore, this concept will be implemented into the delivery e-bike from Union.*

### 'CONNECTED' E-BIKE SERVICE

How it works

This 'connected' e-bike service includes a hardware module that is placed into an e-bike, where it is powered by the battery. Through satellite signals, data from the module is sent to a connected platform, where the data is gathered and translated. Software such as this, in the shape of a mobile application or other web portals, enables all the involved stakeholders to see and use the data that is relevant to them (Figure 41). The software can be modified for each stakeholder specifically. The design of the platform is outsourced to an ICT company.

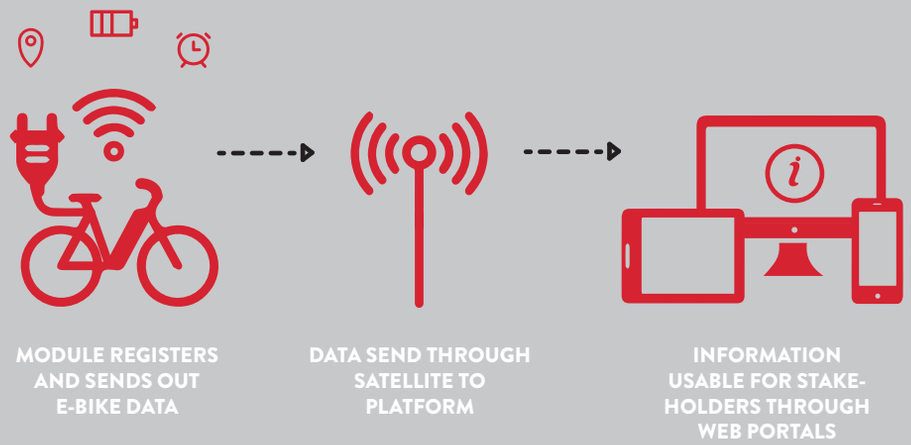



Figure 41 Schematic overview 'connected' e-bike service

For food delivery

Endless insights can be requested, ranging from, for example, GPS location to tyre pressure. Each stakeholder or client will have specific priorities about which data and functions are relevant. Examples of data that could be useful for food delivery companies are:

- GPS location for track & trace and 'time-to-deliver'
- Tyre/brake/light status
- Battery level and range
- Amount of km/days until service (per part), service notification
- Lock/unlock
- Theft alarm
- Employee ID log in for staff-management

In a second conversation with a manager from Thuisbezorgd, they confirmed that this data would be useful for them (see Appendix N). Gathering input from potential clients about which functions and insights are relevant for their businesses, will eventually lead to a final selection of available features. The further development of this service (hardware and software) will be conducted and specified by Gazelle and the ICT company.

## STAKEHOLDERS & BENEFITS

In addition to the food delivery companies, there are other stakeholders that are connected through this platform, and who will benefit from this service. These other stakeholders are FietsNed and Volkswagen Pon Financial Servcies (Figure 42). The dealer is left out of this stakeholder overview, because this channel is not in direct contact with the 'connected' e-bike service.

### FietsNed

Service provider FietsNed is part of Pon.Bike and is a large franchise-organisation of bicycle-technicians, who deliver repair and maintenance (r&m) work throughout the entire country. They are specialised in offering services for e-bikes and they offer 24/7 roadside assistance thanks to mobile workshops. They currently deliver this service to owners of Gazelle lease e-bikes. Because they are recognised by Gazelle as a reliable company and are able to operate on a large scale, FietsNed will be the r&m service provider for Union's delivery e-bike. This means that they will also be connected to the platform. FietsNed is aware of this proposition, and has agreed to collaborate on this.

### Volkswagen Pon Financial Service (VWPFS)

VWPFS is a financial services organisation that offers financing, insurance and leasing propositions in, amongst others, the automotive industry. They are also part of Pon. They offer their services for both private and business purposes. VWPFS already works with Gazelle, to provide the lease construction for their e-bikes. With their knowledge of the bicycle sector, VWPFS is a suitable partner to provide the financial service for Union's delivery e-bike. Just like FietsNed, they are aware of this proposition, and have agreed to collaborate on this project.

### Benefits

The most important benefits of the connected e-bike service relative to each of the stakeholders separately is demonstrated in the visual on the right hand page (Figure 43). In this overview, Domino's is used as an example of Union's food delivery company client. Domino's is a franchise organisation, meaning that different parts of the franchise will benefit from the 'connected' e-bike service in different ways. The parties that are highlighted in the overview are:

- Franchisor (for the Netherlands) - The overarching company holding the brand and giving out franchise licenses to the franchisees in the Dutch market.
- Fleet manager - The party that invests in the e-bike fleet and manages it. This can either be the franchisor or a franchisee. (Since the investment in the fleet is a full operational lease, the fleet is not on the balance sheet of the fleet manager)
- Franchisee - Individual store owner that operates under the franchise brand and a franchise license.
- Courier - Employee who delivers the food, employed by a franchisee.
- Customer - Orders food and is the end-user of the delivered products.

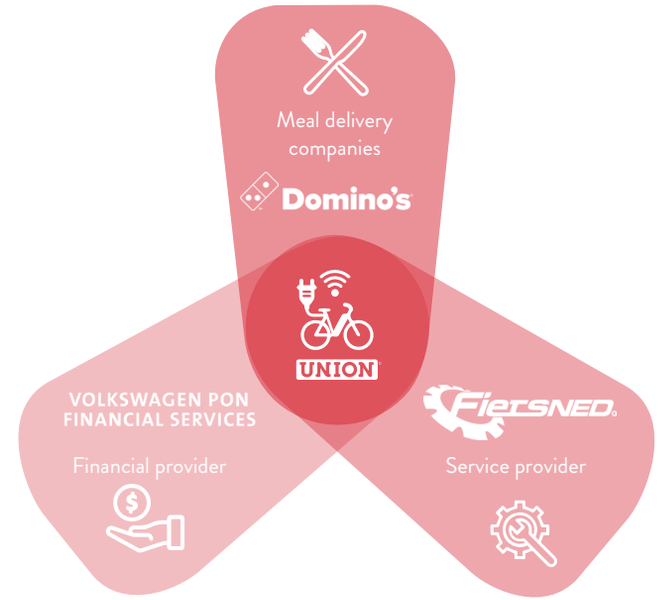



Figure 42 Overview of stakeholders who are connected with the platform of Union's delivery e-bike

# STAKEHOLDER BENEFITS

## UNION

+ Gains insight into performance of separate bicycle parts
+ Smarter investment in bicycle parts
+ Ability to advise clients and partners on (planning their) replacement- or further investments
+ Maintenance of large market share

## FRANCHISOR

+ Better overall customer experience (a benefit that applies to all parties within company)

## FLEET MANAGER

+ Gains insight into the performance of their fleet
+ Receives advice on replacement- and further investments
+ Better response possibilities following theft

## FRANCHISEE

+ Gains insight into the performance of the couriers (staff management)
+ Better insight into the availability and status of the fleet
+ Fewer disruptions in the delivery process

## COURIER

+ Fewer disruptions during delivery shift
+ Hassle free (automatic) notification to repair service
+ Accurate route guidance

## CUSTOMER

+ Fewer disruptions in delivery process because of less material breakdown
+ Track and trace courier
+ Real-time delivery times

## FIETSNED

+ Better and more efficient planning of maintenance and repair work
+ Receives info for stock management
+ Better insight into failures around targeted repair assistance

## VOLKSWAGEN PON FINANCIAL SERVICES

## VWPFS

+ Better perspective on (residual) value development of leased out fleet (important for return on offered financing)

Figure 43 Stakeholder benefits 'of connected' e-bike service

# 3.4 // CONCEPT EVALUATION

*Before the final design proposal, it is necessary to verify and evaluate Union's delivery e-bike product and service concept with potential partners and clients. Since this is a business-sensitive matter concerning confidential information, it has unfortunately not been possible to conduct this verification with the relevant managers within the partner and potential client companies. To be able to evaluate the concept nonetheless, an interview with a delivery e-bike expert has been conducted. Through this alternative method new valuable insights, feedback and opinions towards Union's concept delivery e-bike are obtained. The delivery e-bike expert who is interviewed is the key account manager of Union, who is in direct contact with the potential clients and partners, and therefore has a lot of inside knowledge about their preferences, needs and expectations.*

## METHOD & ANALYSIS

The concept is evaluated on several aspects of the proposition; the design of the e-bike, the 'hufterproof'-ness of e-bike, transportation possibilities, the 'connected' e-bike service and the client branding. The expert is asked to give his opinion about each aspect. In addition, the expert is asked to state what he is most and least satisfied about in the delivery e-bike proposition, and if there are points that would need more attention or need to change. At the end, there was room for general remarks. The set-up of the interview and the full written results can be found in Appendix O. The images and information presented in section 3.2 and 3.3 were used as visual material and explanation of the concept during the interview.

## RESULTS

In general, the expert was quite pleased with the concept of the proposition. The results are stated briefly per aspect. After that, areas of satisfaction and dissatisfaction and general comments about the concept are discussed.

- Total design - Nice and simple design. Clients would like the frame to be high gloss instead of matt, since that is easier to (keep) clean.
- 'Hufterproof'-ness - E-bike looks very tough, sturdy and robust.
- Transportation possibilities - Good to have two possibilities. Suggests integrating the food box and the beam, so that the food box itself can be clicked onto the e-bike. And suggests replacing the rear beam with a carrier, so that it is stronger and has more loading volume.
- Client branding - It is a bit unclear what kind of different branding options there are. At what stage are clients allowed to choose their own design and colour? Suggests also offering branded stickers for the food box.
- 'Connected' e-bike service - The service does not yet have enough added value, since the price of such a service is still very high. In maybe two years, when this type of technology is more common, and the price is more accessible, this service will be interesting for meal delivery companies. The anti-theft possibility is something they would be particularly interested in. Also for consideration: large meal delivery companies have their own software applications that they use for taking orders and navigating. They would want to be able to combine their own application with the new service.

The expert was most satisfied by the modular and robust design and the fact that the e-bike has a mid-motor. The points for attention were the way the food box is connected to the e-bike and the unclear client branding options. A general remark was that a four year leasing period is maybe too long. Many lease companies are changing their leasing period to a standard of three years, since clients are more comfortable with that.

## CONCLUSION CONCEPT EVALUATION

From the concept evaluation it can be concluded that Union's delivery e-bike proposition, including the 'connected' e-bike service, has several advantages, but also some points for attention. The advantages of (purchasing) the delivery e-bike, for potential clients, are described below. After that, the points for attention are addressed.

### Main advantages

By purchasing Union's delivery e-bike, meal delivery companies would have access to a sturdy, robust and 'hufterproof' e-bike, of high quality, which they would be able to customise in a way that fits their preferences. In the future, with the 'connected' e-bike service, they would have fewer problems around theft (and other service problems), since the e-bike can always be tracked down due to the GPS facility in the integrated hardware module.

### Points of attention

Some very specific action points can be identified from these results. First of all, the transportation mechanism should be further explored, so that the delivery box can be directly attached onto the bike. Options for a rear carrier should also be explored, to see if this fits into the design and with the wishes of Union. Another action point relates to client branding, where clear guidelines should be stated. For example, stating what branding options a client has per purchasing volume. Food box stickers should also be included as a branding element. A fourth point for attention when developing the service: hardware must be capable of connection to different types of software, so that each meal delivery company can still make use of their own applications. And since a three year leasing period is becoming more popular, it could be wise to switch from a four to a three year leasing period.

**PRODUCTION**

To produce an e-bike that is simple and affordable, the basic production technique like extruding will generally be used rather than hydroforming, which is more complex.

**DESIGN STYLE**

A combination of Union's brand positioning and potential clients' wishes as obtained during the user research, resulted in a design style: 'The product should have a robust, clean and simple look.'

**FRAME DESIGN**

Basic geometrical shapes are used, that form 'one whole', and have a robust look. It has integrated modular transportation elements. Ideally, the boxes are directly attached to bike. The client branding options should be further elaborated.

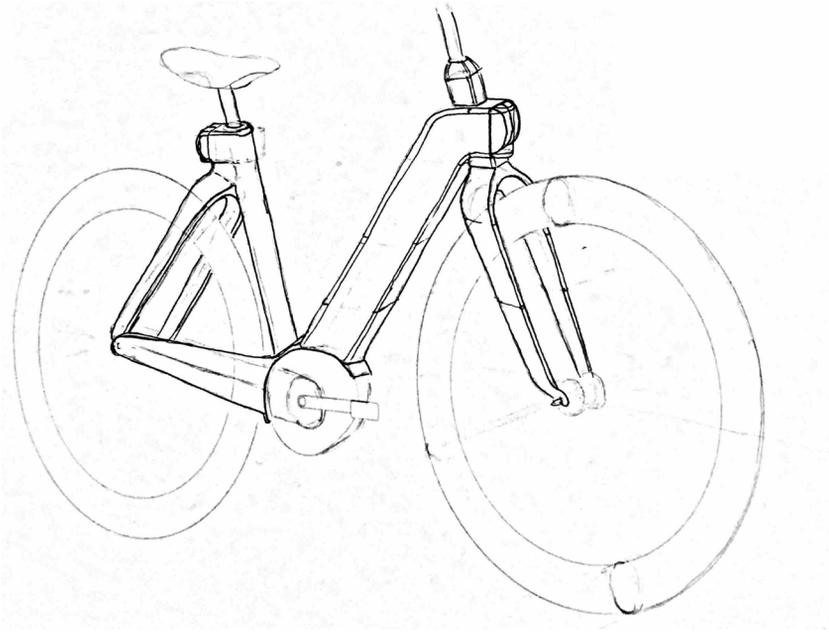
**SERVICE DESIGN**

The 'connected' e-bike service includes a hardware module (placed in the e-bike) and software, which lets all the stakeholders see and use important e-bike data. The development will take a long time (and probably still is expensive) and is done by an external party. The service therefore will not be implemented directly.



## 3.5 // DEVELOPMENT CONCLUSION

In this Development stage a technical orientation was performed, design style was proposed and design activities were executed. This resulted in a product and service concept for a delivery e-bike in combination with a 'connected' e-bike service. Eventually, this concept is evaluated by an delivery e-bike expert. The most important insights, findings and creations from this stage which will be a starting point for the next stage when the finalisation of the concept will be done, are summarised to the left.



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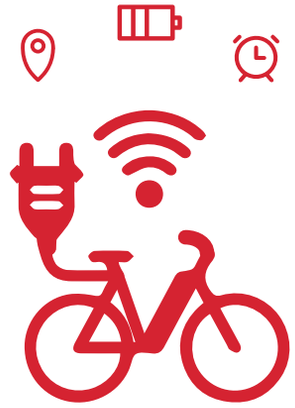


# 4 MARKET INTRODUCTION

In this final stage, the final product is introduced and presented. All the special features and branding elements are discussed and visualised. After the product is presented, the implementation plan is elaborated, whereby the promotion, distribution and sales are addressed, the revenue model is mapped and the viability of the business case is indicated. This stage concludes with a proposal for potential clients.


## 4.1 // FINAL DESIGN

# UNION DELI

The Union DELI is an e-bike designed for food delivery companies. The simple but robust design, integrated battery and mid-motor make it optimal for daily intensive use and weight transportation. And through the 'connected' e-bike service, which lets clients see and use relevant e-bike-data, food delivery companies can ensure an even better experience for their customers. Union offers the DELI e-bike together with matching food box(es), repair and maintenance services and financial services.


Domino's
Now Cooking
Real Deal
4.99
ALLE MEDIUM PIZZA'S
BIJ AFHALEN
70 - 72
Domino's

BASIC DELI WITH
NO FOOD BOXES


DELI WITH ONE SMALL
FOOD BOX UP FRONT


DELI WITH A SMALL FRONT
AND A MEDIUM REAR FOOD BOX

Figure 44 Three modular versions of the Union DELI

Modular design

The e-bike can be customised as desired through the use of modular lighting and transportation elements. The integrated rear and front lights can be replaced by a food box with a mounting mechanism or carrier onto which a food box can be attached (Figure 44). The lights can then again be placed onto the end of the mounting mechanism and carrier. There are several different food box options and optional branding elements that can be added to the DELI. This modular design makes the Union DELI also suitable for regular use by private customers.

Values

The Union DELI has several main characteristics that make it unique.

- **High performance** is guaranteed by the carefully selected e-bike specifications, such as an integrated battery with a large range, a powerful mid-motor and a hufterproof design.
- The ability to **customise** the e-bike proposition to clients' individual wishes is offered through a modular design and through modular leasing options.
- **Unburden** the client with the quality mobile repair and maintenance service offered by FietsNed.
- **Convenience** is ensured by the 'connected' e-bike service, which makes available to the client, among other things, extra e-bike information and direct connection with repair services.
- **Financial risk and owner risk minimalised** through full operational lease product provided by VWPFS.
- On top of all this, it is possible to offer the total proposition for a **competitive price**, since most of the partner organisations are connected to Pon.

## Specifications

The e-bike is powered by an electric Bosch system, with a 400 Wh removable integrated battery in the down tube of the frame and a mid-motor. It has a 26 inch wheel size and tyres with a diameter of 55 millimeters. These specifications can be seen in the overview below (Figure 45).The DELI will also feature 90° rotating handlebars, except this is not yet shown on this particular 3D model.

## Colours

This Union DELI is presented with a predominant dark grey colour for the frame and blue accent colours (since this is a proposed design for Domino's, and blue is their main colour). Within certain parameters, which will be elaborated later on, the client will be able to customise the frame design and colours. But for smaller clients who may not want a personalised frame, Union will offer the DELI in two standard colours, black and white.

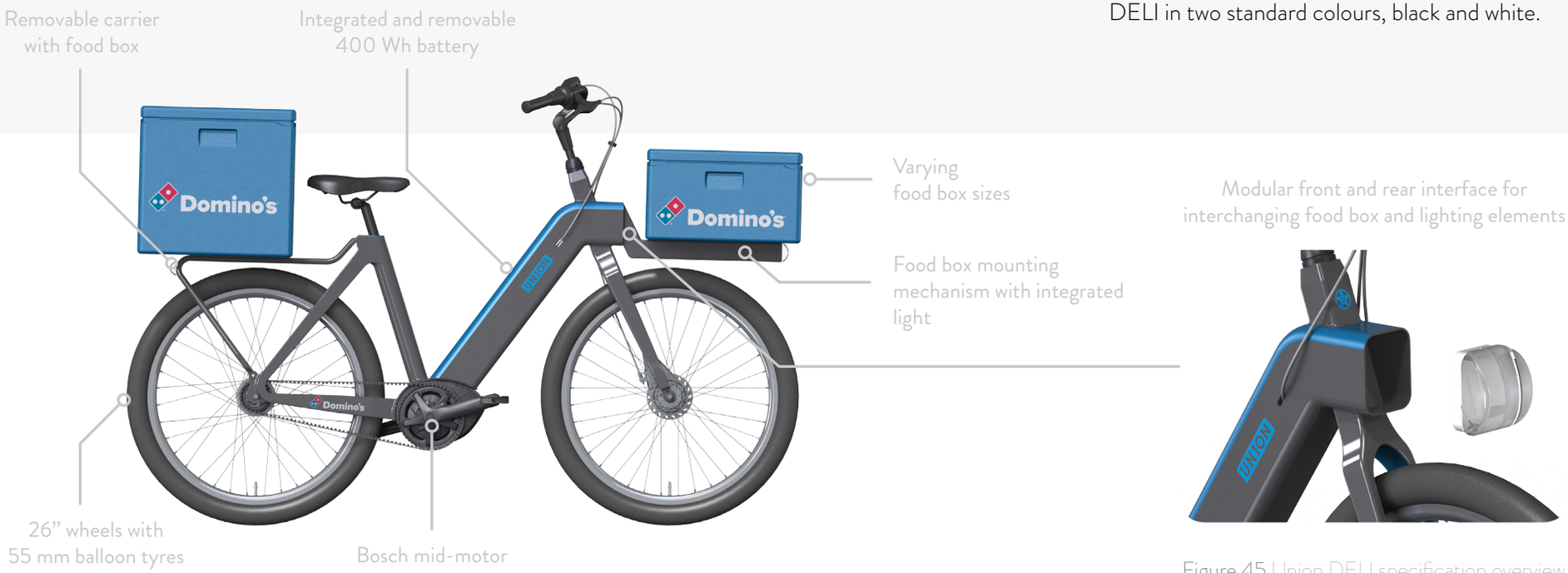



Figure 45 Union DELI specification overview

## BRANDING

### Union branding

For the branding of the DELI, two considerations need to be taken into account. First of all, it is important that the design fits the branding requirements of Union, so that the e-bike is clearly recognisable as a Union bike. After the Union branding is specified, the branding elements for potential clients need to be shaped. These need to fit, at all times, with the specified Union branding requirements.

### Branding requirements

Union uses three essential brand elements to characterise their bikes. These are shown in Figure 46. The first one is the name of the bicycle model, placed vertically down the seat tube (1). The second brand element is the horizontal Union brand logo which is placed on the down tube of the frame (2). The last one is the Union badge, placed on the front of the head tube (3). These three brand elements are incorporated all in the DELI's design.


Figure 46 Union brand elements incorporated in DELI design


Figure 47 (Incorporated client branding image)

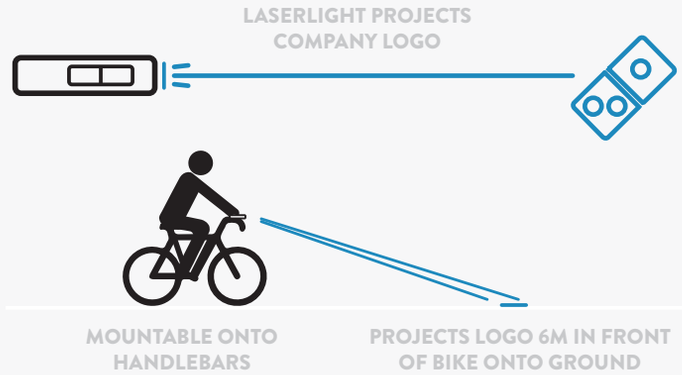



Figure 48 Branded lasterlight, additional client branding

## Client branding

To ensure that the design of the DELI also appeals to clients, several client branding options are proposed in the form of design and optional additional elements. These different branding options are offered based on purchase volume restrictions. With a purchase volume of 250 e-bikes and more, the client will be able to choose a completely personalised design. This includes the choice of their own colour (combination) on the frame, an incorporated brand logo on the chainstay, as seen in Figure 47. In the examples shown the colour blue is used for the accents, since this is Domino's main colour. With a purchase volume of 100 to 250 e-bikes, the client can choose from the standard frame colours offered (black or white), and a brand logo transfer (sticker) that fits on the chainstay. Clients that wish to purchase a smaller volume (less than 100 e-bikes), are offered client branding through the optional branded food box stickers. Thanks to these varying branding options, the e-bike design can be customised and will visually represent the client, while still respecting Union's design style and requirements. A further optional branding element that is offered is a laser light. This can be mounted onto the handlebars and projects a small coloured brand logo onto the ground, six meters in front of the bicycle (Figure 48). It ensures enhanced visibility for the cyclist and is a subtle way of advertising. This projection technology already exists, and produced by a British startup (Blaze) and is already commonly used in London (Blaze.com).

# 4.2 // IMPLEMENTATION

*For the implementation of the Union DELI there are several aspects that need to be taken into account. First, the promotional and distribution activities are discussed, to explain how Union will reach and convince their potential clients and deliver the proposition. The revenue model is mapped to give a clear overview of the complex network of partners and suppliers and their transfers of money, knowledge and resources. Then, a brief financial analysis is done in the shape of a price and cost estimation, to validate the viability of the business case. These aspects are based on the building blocks from Osterwalder and Pigneur's (2010) Business Model Canvas. The full elaborated business model canvas can be found in Appendix P. This chapter concludes with a list of proposed potential clients for the Union DELI.*

## PROMOTION & DISTRIBUTION

Union will use several channels to raise awareness of the DELI among clients. These channels are both offline and online marketing channels. Direct face-to-face contact with larger (potential) clients is the most important one. This happens through personal visits to clients by Union's key account managers. Visual presentations during these visits will help the client to get a feeling for the proposition. Another channel is the dealer channel. This will only be used to inform smaller and local (potential) clients (indirect channel). A large PR stunt, in the shape of a pilot study with a large client (for example Domino's), will be planned to raise awareness especially in the beginning, just after the launch. This will create lots of publicity on the streets, not just for potential new clients but also for regular consumers. The aforementioned are all offline marketing channels. The DELI will also be promoted and explained extensively through online marketing channels. This will happen directly through Union's website and indirectly through different kinds of social media.

To convince clients to purchase the DELI, demo-models of the DELI will be available for clients to test the entire time that the product is on the market. In addition, the sales force and dealers will need to be well informed and trained about the DELI's unique proposition, in order to be able to sell the products properly. To be able to clearly and convincingly explain the DELI's USPs (as described in the previous chapter) will be a vital element of this sales process.

Distribution of the DELI will be the responsibility of FietsNed. Union will bring the e-bikes to FietsNed, who will then distribute and deliver the e-bikes to the client, on location. Following a sale, customer relationship management will be provided on an ongoing basis through client visits. This will occur four times a year and will be conducted by Union's key account managers. The ongoing r&m service will be provided by FietsNed.

## REVENUE MODEL

Union's complex network of partners and suppliers, and the transfers of money, knowledge and resources, is visualised through the revenue model which is seen in Figure 49. Union will purchase all the separate e-bike components (electrical system, food boxes, hardware) from several suppliers in order to produce a DELI. Union's revenue will be generated by selling the complete DELI at a selling price to VWPFS, making VWPFS the legal owner of the DELI. VWPFS will conclude all the service and financial arrangements by purchasing the r&m service, software and insurance from FietsNed, the ICT company and an insurance company, respectively. VWPFS will pay these companies through a yearly fee. The client then 'purchases' the Union DELI through a leasing contract, which they enter into with VWPFS. The client will pay a monthly fee to VWPFS in exchange for the right to make use of the Union DELI and its accompanying services for a fixed period of time (three years). VWPFS will have a recurring revenue through these ongoing payments. The ongoing repair and maintenance service will be provided to the client by FietsNed, as mentioned before. The monthly fee that the client needs to pay will depend on which optional elements he wants to add to the Union DELI (small or large food box, one or two food boxes, etcetera).

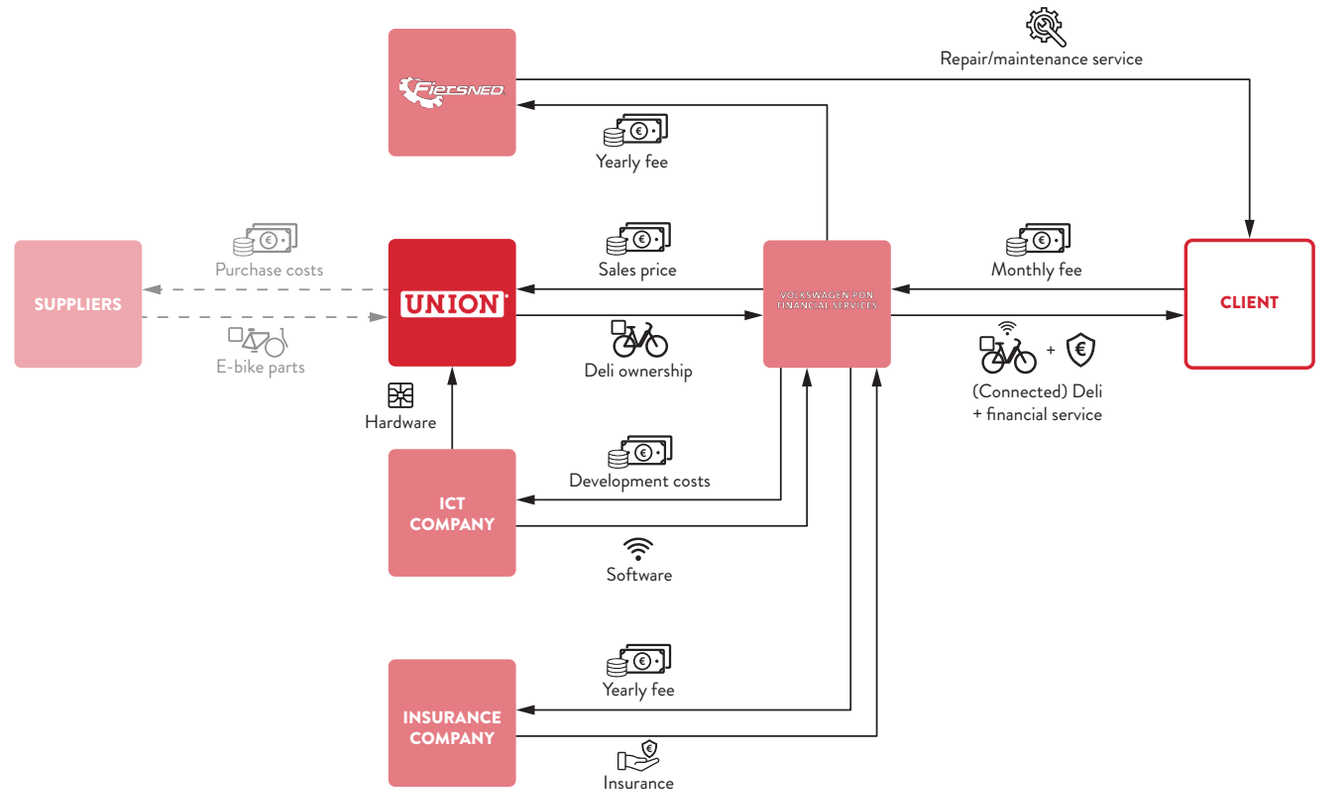



Figure 49 Revenue, knowledge and recource streams of the Union DELI

## BUSINESS CASE VIABILITY

For the implementation it is important to evaluate the viability of the business case. This is done by creating price and cost estimations, on as realistic a basis as possible. The prices and costs used are estimated amounts, and based on assumptions. An overview of the calculations can be found in Appendix Q. Before discussing the calculations, the three leasing options that Union wants to offer, will be explained.

### Leasing deals

To offer clients a customised leasing deal, the Union DELI will be available under three different leasing options and with three optional additions, which are seen in Figure 50. The financial and repair services are naturally included in each deal, and are therefore not shown in this overview. The DELI Basic deal includes just the lease of the e-bike. The DELI Food box 1 and 2 deals include the lease of an e-bike in combination with one and two food box(es), respectively. Within these two deals, the client also has a choice of several different sizes and shapes of food boxes. Each deal has a different price. The client can supplement their deal with optional additions such as branded food box stickers, a branded laserlight and the 'connected' e-bike service. These optional additions can be obtained through a single fee (stickers) and monthly fee (laserlight and 'connected' service). The following price and cost estimation is made based on the Food box 1 deal (e-bike + one small food box) without any optional additions.

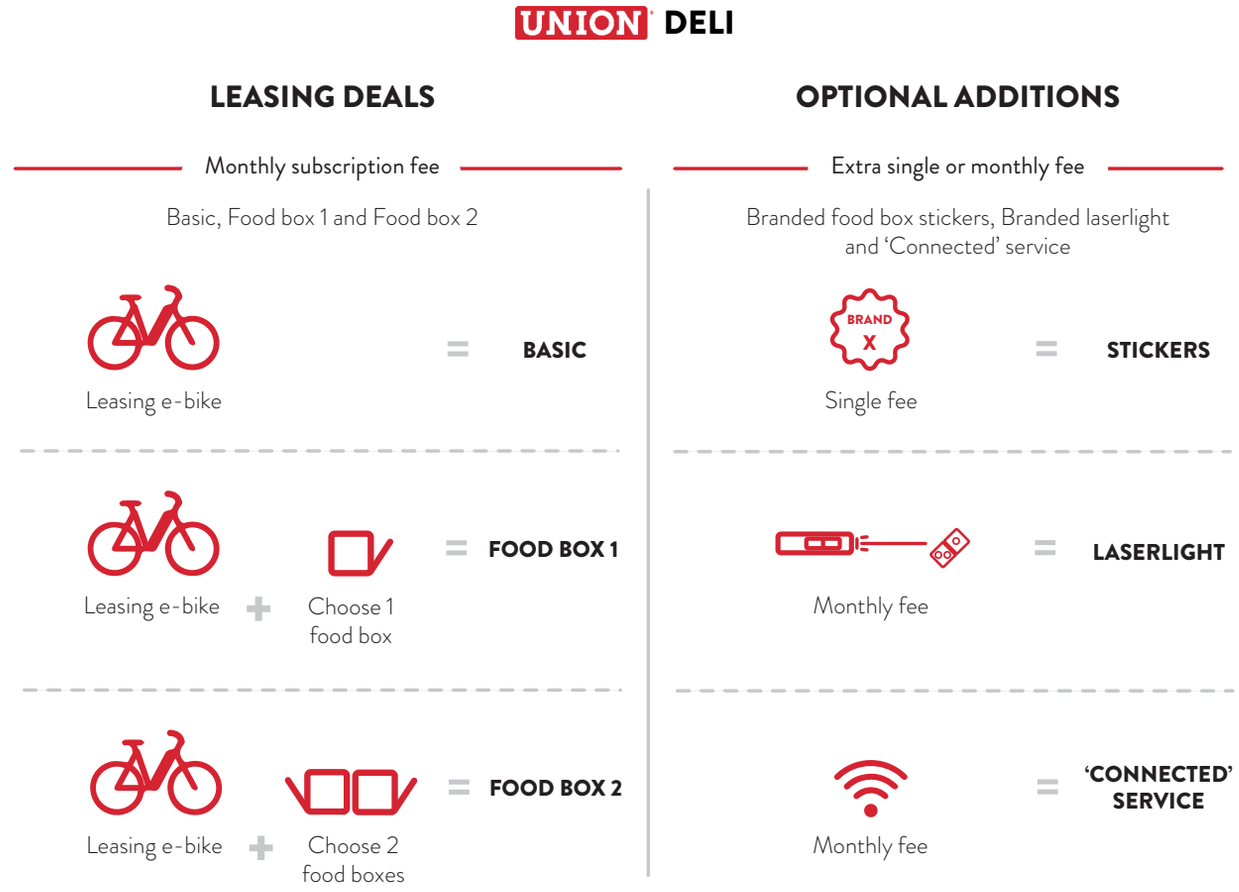



Figure 50 Overview leasing deals and optional additions

### Target price and suggested retail price

The cost price is calculated using a top-down method. That means that this calculation starts with stating a target leasing price per day (which is calculated from the monthly fee) and a suggested retail price. This target price is based on insights from the market and user research. On the basis that meal delivery companies wish to pay the lowest price, and that the main competitor has set its lease price to €3.05 per day (for a four year period), Union has chosen to stay below that price, with a target price of €3.00 per day (for a three year period). This estimated lease price includes:

- An e-bike with a 400Wh battery
- One small food box
- Repair, Maintenance and Tyre service (by FietsNed)
- Roadside assistance (by FietsNed)
- Insurance and leasing service (by VWPFS)
- Waste disposal fee for battery
- 'Roadworthy' preparation (by FietsNed)

When the suggested retail price of the bicycle, including the battery and the food box, is set at a maximum of €2,200.00, the lease price per day is calculated at €1.92, so that fits perfectly within the target lease price.

### Lease price calculation

This lease price is calculated by taking the suggested retail price and subtracting the value added tax (because it is a B2B transaction). From this amount a dealer-margin is deducted, calculated according to the purchase of an indirect channel. This amount, together with the costs of all the other elements that are mentioned above, makes a sum that is the client's investment cost. The investment cost and the leasing period (in months) is input into a special lease-price-calculator, and calculates the corresponding leasing price per month. The lease price per day is calculated from this monthly leasing price.

### Cost price

Union has a set margin percentage of 20% that they want to receive on each e-bike sold. The suggested retail price of €2,200.00 (e-bike + battery + one small food box) minus the margin of 20%, leaves a cost price of € €1,760.00. This estimated cost price will be the budget that Union has for the development and production of one DELI e-bike (with the Food box 1 deal).

### Profit

An estimation of Union's profit at the end of the first year of the DELI's production can be given, based on the assumption that Union will sell 2,000 DELI e-bikes in their first year, and that they will spend €10,000.00 on large marketing activities during (or before) that year. This profit amounts to €870,000.00, a figure that Union is content with.

Overview of important numbers

| | |
|---|---|
| **TARGET LEASE PRICE PER DAY** | **€3.00** |
| **SUGGESTED RETAIL PRICE** | **€2,200.00** |
| **COST PRICE** | **€1,760.00** |
| **PROFIT (END YEAR 1)** | **€870,000.00** |

| FRANCHISE | DELIVERY METHOD | OWNER | STATUS |
|---|---|---|---|
| **DOMINOS** | DeliverEbikes + scooters | Partner organisation | Interested in pilot study |
| **NEW YORK PIZZA** | Sparta delivery e-bikes + scooters | Partner organisation | Interested in outcome of Union DELI concept |
| **BEZORGBEER** | DeliverEbikes + scooters | Partner organisation | No contact yet |
| **SPARE RIB EXPRESS** | DeliverEbikes | Partner organisation | No contact yet |
| **TACO MUNDO** | DeliverEbikes + (e-) scooters | Partner organisation | No contact yet |
| **FACILITATIVE PLATFORM** | | | |
| **THUISBEZORGD.NL** | DeliverEbikes + own brand | Partner organisation | Already in contact |
| **FOODORA** | Regular bicycles | Couriers | Would only consider e-bike once profitability is proven |
| **DELIVEROO** | Regular bicycles | Couriers | No contact yet |
| **UBEREATS** | Bicycles, scooters, cars | Couriers | No contact yet |
| **HUNGRY.NL** | (E-)bicycles, scooters | Connected restaurants | No contact yet |

Figure 51 Overview potential clients

## POTENTIAL CLIENTS

A list of potential clients has been drawn up, which can be seen the overview on the left (Figure 51). This will help Union to plan their future sales operations and marketing strategies. This list includes, among others, the names of the top meal delivery brands in the Netherlands. For each of the meal delivery brands several aspects are indicated:

- Type of organisation - Is it a franchise or an online facilitative platform?
- Current delivery method - Does the brand use (electric) bicycles, scooters, cars, or a combination?
- Ownership - Who owns the delivery vehicles used?
- Status - Is there already contact with the brand? If so, what is the status of that contact?

Union already is in contact with three large meal delivery companies. It is suggested that Union should actively approach other large companies to broaden their network, raise awareness and find out who ares interested acquiring the DELI proposition.

# 4.3 // MARKET INTRODUCTION CONCLUSION

In the Market Introduction stage the final design of the Union DELI is presented and explained, a brief financial analysis was done and potential clients were proposed. For the implementation of the DELI there are two main aspects that are of importance for Union to consider. These aspects are briefly summarised in the overview on the right. The strategic advantages that Union gains from introducing the DELI proposition are also described, concluding this stage of the process.


### UNIQUE SELLING POINTS

Union should have a clear understanding of the unique selling points of the DELI proposition and they should be able to communicate them properly, not only to convince clients to purchase, but also to make sure that the dealers are well briefed.

**HIGH PERFORMANCE**

**CUSTOMISABLE**

**UNBURDENING**

**CONVENIENT**

**COMPETITIVE PRICE**

**FINANCIAL RISK & OWNERSHIP REMOVED**

### PROFIT

Based on realistic assumptions it has been proven that the DELI business case is financially feasible. Whit a suggested retail price for each DELI of €2,200,00 and assuming the cost price does not exceed an amount of €1,760.00, Union will generate a profit of €870,000.00 in its first year. This is a generous amount, which Union would be pleased with.

### STRATEGIC ADVANTAGE UNION

With the delivery e-bike proposition Union will be able to enter a new market, the meal delivery market (B2B). Within this market, the demand for e-bikes is growing rapidly. The DELI e-bike proposition is a clever solution that allows Union to respond to this growing market. Within this market, Union will (probably) be the first bicycle company to offer such a product and service combination, giving them a competitive advantage. The delivery e-bike concept could also be a step towards entry into even more delivery markets (think of grocery and mail delivery) in the future. Since the product is suitable for the consumer market as well, it will also increase Union's current market share. With the consumer and food delivery market combined, Union would possess a large market share. And if Union is able to keep their leasing price (without the service) below the price of their main competitor, it will have a great deal to offer their clients: a better e-bike of higher quality, for a lower price. That is exactly what the clients want, and is a major competitive advantage.

# 5 EVALUATION

In this last step, the outcome of this project is evaluated and recommendations for future developments and activities are suggested, accompanied by a roadmap. To conclude this report, a personal reflection on the project in general is included.

# 5.1 // PROJECT OUTCOME

*This thesis provides a possible solution for the problem that was stated in the introduction of this report (as seen on the right). During the project, the assignment evolved into a design goal (as seen on the right). The last chapter of the previous stage depicted the final design of the Union DELI. This project outcome is evaluated on the basis of goals from both the assignment and the design goal, and if and how these goals are achieved.*

### Implementation within 2 years

The DELI product-service combination can most definitely be implemented within the next two years. If everything goes to plan, the launch-preview of the DELI will be in August 2018. The 'connected' service is a project on its own, that goes beyond Union's operations. The final development of this service will take longer than the development of the e-bike itself, and will therefore be offered later on, when the market is more mature. It is currently unknown when exactly this service will be available.

### Fitting Union's brand DNA

During, and prior to, the design process, much attention is given to Union's core competences, brand positioning and branding requirements. This is reflected in the clean and simple look of the e-bike, and the branding elements that are used. For design inspiration, one of Union's own current models (the Lite) was considered, resulting in a design that fits well with Union's existing portfolio. Additionally, this proposition fits extremely well with Union's desire to penetrate the Food & Beverages sector.

### Suitable for meal delivery companies (and consumers)

The product is primarily designed according to the needs and desires of meal delivery companies. The choice of certain product specifications, like a mid-motor, balloon tyres and a strong, integrated battery in the frame, makes this e-bike suitable for intense use. By integrating several modular elements, like the removable food boxes and an optional branded laserlight, the DELI can also be used as, and marketed as, a regular consumer e-bike.

### Competition

When looking at the food delivery e-bike market, it can be concluded that the DELI product-service combination is an innovative proposition that, in this market and in this combination (for food delivery and the consumer market, with the option for the 'connected' service), is not offered yet. Union is able to offer the high quality DELI for a lower price than their main competitor, which gives them a strong competitive advantage.

**PROBLEM**

*"How can Union enter the food delivery e-bike market, with a product and commercial proposition (that can be implemented within the next 2 years and fitting Union's existing brand DNA) that primarily serves the needs of food delivery companies, and secondly, is suitable for consumers as well?"*

**DESIGN GOAL**

*"Design a total proposition which meal delivery companies and young urban professionals can use intensely and for long-distances on a daily basis, without having to worry that the bike will easily 'wear down'. And offer it for a better price and with a more stylish design than the competitors do."*

## 5.2 // RECOMMENDATIONS

*Since a graduation project is intended to take approximately six months, there are several activities that could not be included during this project. And because the focus of this project was more on the analysis part, overall design and implementation of the DELI, rather than on the detailed design and technical development of it, there are certain details that still need to be considered and actions that need to be taken before (and after) the actual production and launch of the DELI can be put into motion. These actions and considerations, in the shape of recommendations, are described below. They are structured by making a distinction between recommendations concerning the product, service, partners and suppliers (all three more short term) and the long term. The most important activities up to the launch of the DELI are presented in the accompanying roadmap on the next page.*

### Product level

Some of the e-bike specifications (and exact costs) of the Union DELI need to be further detailed or developed. Several important points that still need to be addressed are: the type of electrical mid-motor and battery system; the modular access port interface; the exact food box mounting mechanism; the rotating handlebars, and the final frame design. The detailing will be done and choices will be made by Union's engineers. The current 3D frame design presented in this report is a quick prototyping model. For the actual production of the e-bike a detailed and realistic 3D SolidWorks model needs to be constructed. The current 3D model design can be used as a reference. For the actual implementation of the service, it is important for Union's engineers to bear in mind that the service hardware module needs to fit inside the e-bike frame. This is something they should consider while finalising the design. When the design is finished, samples should be produced and tested by Union. After a second optimisation and before the actual launch, a pilot study with a large client should be conducted.

### Service level

Before introducing the 'connected' e-bike service, Union should execute focused user research to determine the clients' exact wishes and needs with regards to such a service. On the basis of this research, Union can make well-considered decisions about the content of the service application. Such research could potentially be performed during a pilot study (if samples of the service are already available at that time).

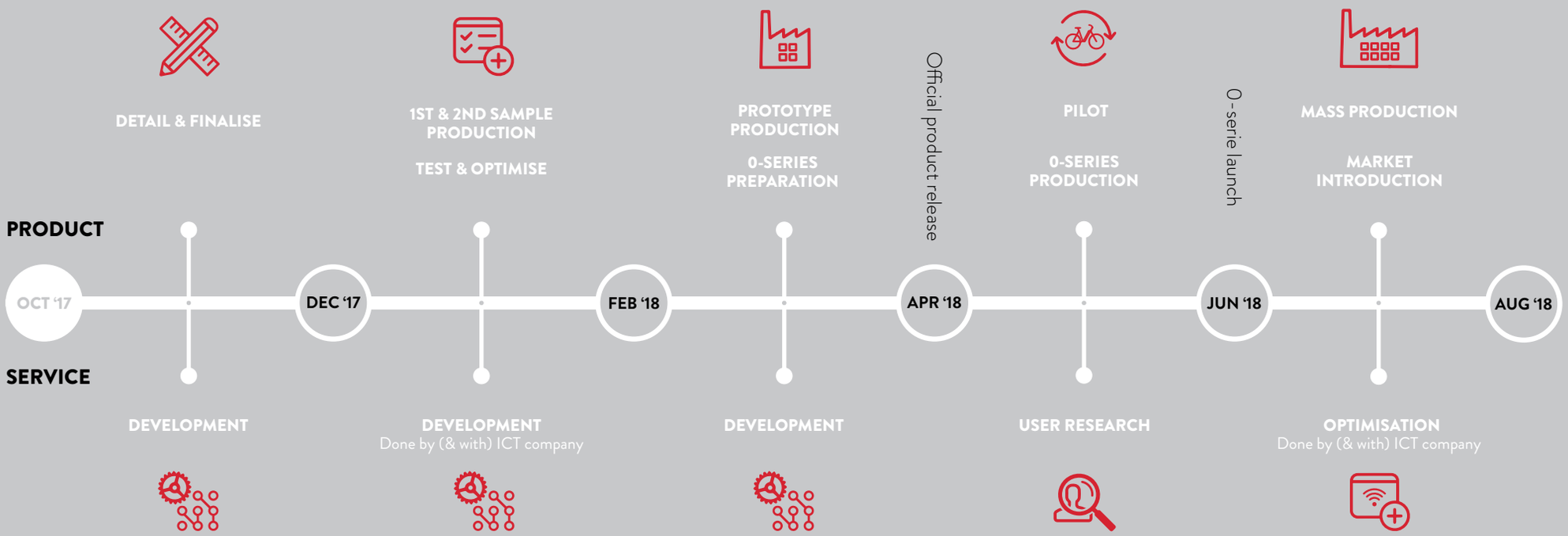
### Partners and suppliers

Union should make agreements about planning a clear timeline for the development of the 'connected' e-bike service with the ICT company and with Gazelle, so that Union knows when the service will be available and when it can be included in the DELI proposition. Alongside that process, Union should find appropriate suppliers for food box stickers, food boxes (and mounting mechanisms), and decide which types and sizes they want to offer. Lists of suggested suppliers and potential food box shapes and sizes can be found in Appendix R. An example of such a company is Enviado, who has expressed interest in a possible collaboration with Union. They should also get into contact with the British startup Blaze, to discuss a collaboration for the development of laserlights with varying brand logos.

### Long term

After the execution of the pilot study, and for example after the first year following the launch, extra feedback from clients regarding their whole experience of the Union DELI should be obtained. This feedback should then be used for optimising and improving the product (and service). Union should start with the launch of one DELI model (the model suggested in this report). After a certain period of time they could develop a second model, one that has for example a different gear or braking system, or a stronger or lighter battery. This way, Union can respond even better to the varying wishes of their clients and customers.

# Roadmap


DETAIL & FINALISE
1ST & 2ND SAMPLE PRODUCTION
TEST & OPTIMISE
PROTOTYPE PRODUCTION
0-SERIES PREPARATION
Official product release
PILOT
0-SERIES PRODUCTION
0-serie launch
MASS PRODUCTION
MARKET INTRODUCTION
PRODUCT
OCT '17
DEC '17
FEB '18
APR '18
JUN '18
AUG '18
SERVICE
DEVELOPMENT
DEVELOPMENT
Done by (& with) ICT company
DEVELOPMENT
USER RESEARCH
OPTIMISATION
Done by (& with) ICT company

# 5.3 // PERSONAL REFLECTION

*This last chapter brings to a close my master thesis, and with that the phase of my life as an Industrial Design student. In this reflection I would like to take a moment to look back at the project, and reflect on the process, the deliverables, my experiences and what I have learned along the way.*

Project

This graduation project was my first large individual project for a real client, and I remember that the idea of that frightened me a little beforehand. But when I had my first conversation with Union, where I was welcomed very enthusiastically and with open arms, this nervousness soon turned into excitement and motivation. And despite my lack of knowledge of and experience with bicycles, I accepted the opportunity gratefully. I thought it would be good to challenge myself to gain a deeper understanding of a product and a business that (before this project) I did not have a specific affection for. And it has turned out to be a great experience, where I have learned a lot. Not just about how a bike is assembled and produced, but also about the entire financial and organisational constructions around it. Union has been the perfect learning environment: on the one hand, Union is a small, straightforward and open organisation, where the things you come up with are taken seriously and seem meaningful. And on the other hand, they have the knowledge, resources and capabilities of a large multinational (because of their connection to Pon Holding and physical proximity to Gazelle), which make it possible to actually realise and develop your ideas. The fact that this project really mattered and could make a substantial difference to this company therefore gave me an extra incentive to perform well and deliver an end result of significant value.

Deliverables

The assignment was challenging: the desire to create a product that satisfies the needs of two very different markets. At a certain point I doubted if it would be realistic and viable to combine the needs and desires of both markets into one product, but I am happy with the end result. I think that making use of modular elements is a subtle and realistic solution for this rather complex problem. This, in combination with the (anticipated) 'connected' e-bike service, means that Union can offer its clients and customers a proposition that not many of its competitors can. The fact that this proposition (without the service) can be offered for a price lower than its competitor's is a major competitive advantage. When looking at the end result I think I can confidently say that this DELI proposition, or at least the e-bike, truly fits with the Union brand, in terms of design and product and marketing strategy.

Process

Due to my Masters SPD, the focus of this assignment was on the analysis and the implementation parts. At the beginning of the project I had some struggles with the analysis part. I had trouble reaching enough depth and relevance in my analysis, and found it difficult to bring a clear structure to it, especially with respect to the user research. To improve and sharpen the analysis, I took some extra time to perform it more thoroughly. This extra time delivered a better basis, through which I got a clear indication for my design direction. During the Ideation phase, well-considered and relevant concept directions were generated. But because this project did not have a technical approach, and I was not able to design a technically new e-bike, some concept features (for example the rotating handlebars, food box attaching-mechanism) missed out on further exploration and explanation, which is a shame because these features are valuable elements of the proposition. I therefore sincerely hope that the provided suggestions are useful. The actual design sketching and drawing during this project has pleasantly surprised me. I had not done that for a long time, and I was doubting my skills. But even though it took some time, I enjoyed it a lot, and have even

received enthusiastic feedback about it. Towards the end of the project, while working on the market introduction, it was a bit of a challenge to figure out the financial part of the DELI. I spent quite some time trying to understand this complicated lease construction, and working out how and when the DELI would be profitable. With some help internally I eventually came up with a simplified model, which is used in this report.

### Learnings

During this project I have had many new learning experiences. I have learned how large scale projects are handled on a daily basis within an organisation. I have worked closely with professionals from many different disciplines. And because all these people were so kind and open about sharing their knowledge with me, I have learned a lot about the different departments and steps required for the development, production and introduction of a new product within an organisation. The fact that I have been able to successfully cooperate and communicate with different disciplines, has made me realise that I very much enjoy working in a team, in a diverse environment. My most important lesson was finding out that I am capable of more than I expected. At Union I was given a lot of freedom to create and come up with things by myself. Sometimes I doubted myself and the choices that I made, but the positive and enthusiastic feedback I received made me feel that my opinion and work really mattered, which in turn gave me more confidence.

I am proud of my work and grateful for all the things I have learnt and experienced during this last seven-and-a-half months. These are all valuable lessons which I will take with me into my professional career. And I truly hope that one day, when I look out on the street, I can say: 'I made that e-bike'.


Domino's

## 5.5 // REFERENCES


Accell Group (2016). *Annual report 2016 - Progress and performance.* Available at: http://annualreport2016.accell-group.com/docs/Accell_AR_2016/index.php?nr=25&language=en&r_code=Accell_AR_2016 [Accessed 17 Apr. 2017].

Bafang-e.com. (2017). *BAFANG | Drive Systems |*. Available at: http://www.bafang-e.com/en/drive-systems.html [Accessed May. 2017].

Batavus.nl. (2017). *Elektrische Fietsen van Batavus. Een gevarieerd aanbod!*. Available at: https://www.batavus.nl/elektrische-fietsen [Accessed Apr. 2017].

Blaze. (2017). *Laserlight | Blaze*. Available at: https://blaze.cc/laserlight/ [Accessed Jul. 2017].

Boeijen, A., Daalhuizen, J., Zijlstra, Y., Schoor-Rombouts, R., & Kuntonen, J. (2016). *Delft design guide* (1st ed.). Amsterdam: BIS Publishers.

Bosch eBike Systems. (2017). *eBike reikwijdtecalculator voor Bosch-aandrijvingssystemen*. Available at: https://www.bosch-ebike.com/nl/service/actieradius-calculator/ [Accessed May 2017].

BSP. (2017). *e-bikes - BSP*. Available at: https://www.bsp-fietsen.nl/fietsen/e-bikes/ [Accessed Apr. 2017].

Buijs, J. (2012). *The Delft innovation method* (1st ed.). The Hague: Eleven International Pub.

Cortina Fietsen. (2017). *Elektrische fietsen*. Available at: https://www.cortinafietsen.nl/fietsen/elektrische-fietsen#?minPrice=0&maxPrice=2500&sort=1 [Accessed Apr. 2017].

Ebike4Delivery (2017). *Bezorgen zonder zorgen doet u op een DeliverEbike!*. Ebike4delivery. Available at: http://www.ebike4delivery.com/ [Accessed 17 Apr. 2017].

Enviado. (2017). *Produkte*. Available at: http://www.enviado.de/produkte/ [Accessed Jun. 2017].

FSIN (2016). *Markt voor foodbezorging in ruim twee jaar verdubbeld*. Food Service Instituut Nederland. Available at: https://fsin.nl/nieuws/435/markt-voor-foodbezorging-in-ruim-twee-jaar-verdubbeld [Accessed 25 Mar. 2017].

Gazelle.nl. (2017). *Advies aanschaf elektrische fiets*. Available at: https://www.gazelle.nl/elektrische-fietsen/advies-aanschaf-elektrische-fiets.

GreenMo Rent (2017). Available at: http://greenmo.nl/ [Accessed 18 Apr. 2017].

Hekkert, P., & Van Dijk, M. (2011). *ViP-Vision in Design: A Guidebook for Innovators*. BIS Publishers.

Hirschberg, C. (2017). The changing market for food delivery. *McKinsey & Company*. Retrieved 6 March 2017, from http://www.mckinsey.com/industries/high-tech/our-insights/the-changing-market-for-food-delivery

IJZERSHOP. (2017). *Metalen Profielen | Online bestellen | Staal |Rvs - IJZERSHOP*. Available at: http://ijzershop.nl [Accessed Jul. 2017].

Intelligent Energy Europe. (2010). *Promoting Cycling for Everyone as a Daily Transport Mode*. PRESTO Cycling Policy Guide.

Jones, T., Harms, L., & Heinen, E. (2016). Motives, perceptions and experiences of electric bicycle owners and implications for health, wellbeing and mobility. *Journal Of Transport Geography*, 53, 41-49. http://dx.doi.org/10.1016/j.jtrangeo.2016.04.006

Kennisinstituut voor Mobiliteitsbeleid (KiM). (2015). *Fietsen en lopen: de smeerolie van onze mobiliteit*. Ministerie van Infrastructuur en Milieu.

Koga.com. (2017). *KOGA | E-bike | City & Touringbikes | Trekking | Mountainbike | Race*. Available at: https://www.koga.com/en [Accessed Apr. 2017].

Laurijssen, B. (2017). *FOOD DELIVERY IN NEDERLAND GROEIT SPECTACULAIR | Foodservice Alliance. Foodservicealliance.be*. Retrieved 29 March 2017, from http://foodservicealliance.be/nieuws/food-delivery-nederland-groeit-spectaculair

Metaal Magazine. (2017). *Metaal Magazine • Metaalnieuws voor professionals in de metaal*. Available at: http://Metaalmagazine.nl [Accessed Jul. 2017].

Oortwijn, J. (2016). *Huge Growth in Dutch E-Bike Sales in 2015 - Bike Europe. Bike Europe*. Retrieved 25 March 2017, from http://www.bike-eu.com/sales-trends/nieuws/2016/4/huge-growth-in-dutch-e-bike-sales-in-2015-10126019

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation*. Hoboken, New Jersey: John Wiley & Sons.

Out of home shops. (2016). *Thuisbezorgd stapt over op elektrische fietsen*. Retrieved from http://www.outofhome-shops.nl/nieuws/horeca/fastservice/thuisbezorgd-stapt-over-op-elektrische-fietsen

Packir.com. (2017). *Pizza Delivery Bag,Food Delivery Bag,Heat Insulated Backpack,Food Delivery Box-Packir, Famous Brand From China.* Available at: http://www.packir.com/ [Accessed Jul. 2017].

Pizzatassen.nl. (2017). *Koop groothandel pizza tas, pizzatas, isolatie tassen en warmhoudtassen voor catering en horeca.* Available at: http://pizzatassen.nl/pizzatassen.nl/index.php?lang=nl&action=home [Accessed Jul. 2017].

Prnewswire.com. (2016). Growth Opportunities in the Global Bicycle Industry 2016-2021: Trends, Forecast, and Opportunity Analysis, July 2016. Available at: http://www.prnewswire.com/news-releases/growth-opportunities-in-the-global-bicycle-industry-2016-2021-trends-forecast-and-opportunity-analysis-july-2016-300381702.html [Accessed 18 Apr. 2017].

Prothanium. (2012) *New 2012 Protanium bike and group set catalogue.* Retrieved from http://www.protanium.com/resources/katalogOK2012_oct_VersLow.pdf

Rabobank,. (2017). *Tweewielerspeciaalzaken.* Rabobank Cijfers & Trends. Retrieved from https://www.rabobankcijfersentrends.nl/index.cfm?action=print&branche=Tweewielerspeciaalzaken

Schreiber, K. (2016). *eSERVICES: FOOD DELIVERY.* Hamburg: Statista. Retrieved from https://www.statista.com/download/outlook/whiterpaper/Food_Delivery_Outlook_1116.pdf

Schwalbe.com. (2017). *Balloonbikes.* Available at: https://www.schwalbe.com/en/balloonbikes.html [Accessed Jun. 2017].

Sherlock. (2017). *Sherlock | The ultimate anti-theft device for your bike.* Available at: https://www.sherlock.bike/en/ [Accessed Jun. 2017].

Simplon.com. (2017). *E-BIKE.* Available at: http://www.simplon.com/en/products/e-bike/ [Accessed Jun. 2017].

Sinek, S. (2009). How great leaders inspire action. *TED (Technology, Entertainment, Design) Talk at TEDxPuget Sound, WA.*

Sparta. (2017). *Alle elektrische fietsen | Sparta.nl.* Available at: https://www.sparta.nl/elektrische-fietsen [Accessed Apr. 2017].

sQoot Lease. *(2017) Bezorgdiensten | sQoot.* Retrieved 29 March 2017, from http://sqoot.nl/bezorgdiensten/

Statista (2017). *Food Delivery - Netherlands | Statista Market Forecast.* Retrieved 9 March 2017, from https://www.statista.com/outlook/374/144/food-delivery/netherlands#takeaway

Statista. (2017). *Netherlands: distribution of new bicycle sales, by category 2007-2016 | Statistic.* Available at: https://www.statista.com/statistics/620262/distribution-of-new-bicycle-sales-in-the-netherlands-by-category/ [Accessed Mar. 2017].

Statista (2015). *Netherlands - urbanization 2015 | Statistic. Statista.* Retrieved 18 April 2017, from https://www.statista.com/statistics/276724/urbanization-in-the-netherlands/

Stromerbike.com. (2017). *stromerbike.com - Stromer Bike.* Available at: https://www.stromerbike.com/nl_NL.html [Accessed Apr. 2017].

Thermo-future-box.com. (2017). *Products - Thermo Future Box.* Available at: http://thermo-future-box.com/en/products.html [Accessed Jul. 2017].

Trekbikes.com. (2017). *Super Commuter+ 8S | Trek Bikes (NL).* Available at: https://www.trekbikes.com/nl/nl_NL/fietsen/elektrische-fietsen/super-commuter/super-commuter-8s/p/1922630-2017/ [Accessed Jun. 2017].

Vanmoof.com. (2017). *Electrified S – The revolutionary electric bike - VanMoof.* Available at: https://www.vanmoof.com/nl_nl/bikes/electrified-s [Accessed Jun. 2017].

Vermeulen, M. (2014). Te veel keuze demotiveert en verlamt. *Volkskrant.*

Vogue Fietsen (2017). *Elektrische Fietsen.* Available at: https://www.voguefietsen.nl/e-bikes [Accessed Apr. 2017].

Yankodesign.com. (2017). *Super Smart Bike Sharing | Yanko Design.* Available at: http://www.yankodesign.com/2012/10/11/super-smart-bike-sharing/ [Accessed May 2017].