Stay Connected
Keep moving

A connected car service for small and medium enterprises

Tijn van Vliet
Master thesis

TU Delft

anwb

Colophon

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Connected car service for small and medium enterprises

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ANWB in combination with own work

Executive summary

ANWB Connected connects the Engine Control Unit of almost any vehicle to the internet, by using a dongle, with GPS sensor, that is plugged into the vehicle. The ANWB wants to increase the amount of users of this technology. And ANWB Kleinzakelijk, responsible for the Small and Medium Enterprise market, wants to grow its members by broadening the product portfolio with amongst others a product based on the ANWB Connected technology. The project brief for this graduation project was: How can the ANWB support Small and Medium Enterprises with a connected car service?

Qualitative research was done to research the needs and context of drivers of and employees responsible for company vehicles. And to research what value the ANWB Connected technology could offer these people. The research showed that the target group is diverse and what the company vehicles is used for and how they are taken care of differs per enterprise. However, the company vehicles are almost always vital for a smooth operating enterprise and it is thus important that these vehicles are always available and functioning in an efficient manner. The ANWB Connected technology can retrieve information from the vehicles to keep those moving and improve the efficiency of the use of those vehicles.

After the research phase the design brief was defined as: Create an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant and personalized information.

The app that was designed uses the information from the dongle to provide the user of personalized and relevant information to help them increase their efficiency and keep their vehicle functioning. This information is separated in three sections: (1) On the Go, helping improve the daily efficiency of drivers by providing the most relevant traffic information, informing them what the most efficient fuel station is and fully automating their trip log and parking transactions. (2) Vehicle, helping to keep their vehicle moving by preventing problems and help solve problems the best way possible when they do occur. And (3) Administration, decreasing the administrative task load and helping fleet owners get insight in the use of their vehicles.

This app was designed and evaluated in a usability test. The results of the test were positive, and recommendations for the improvement of the usability were made. The desirability within the target market still has to be researched, in order to make a well deliberated decision on how to continue with the development of this app.

Figure 1. Source: AWNB Beeldbank

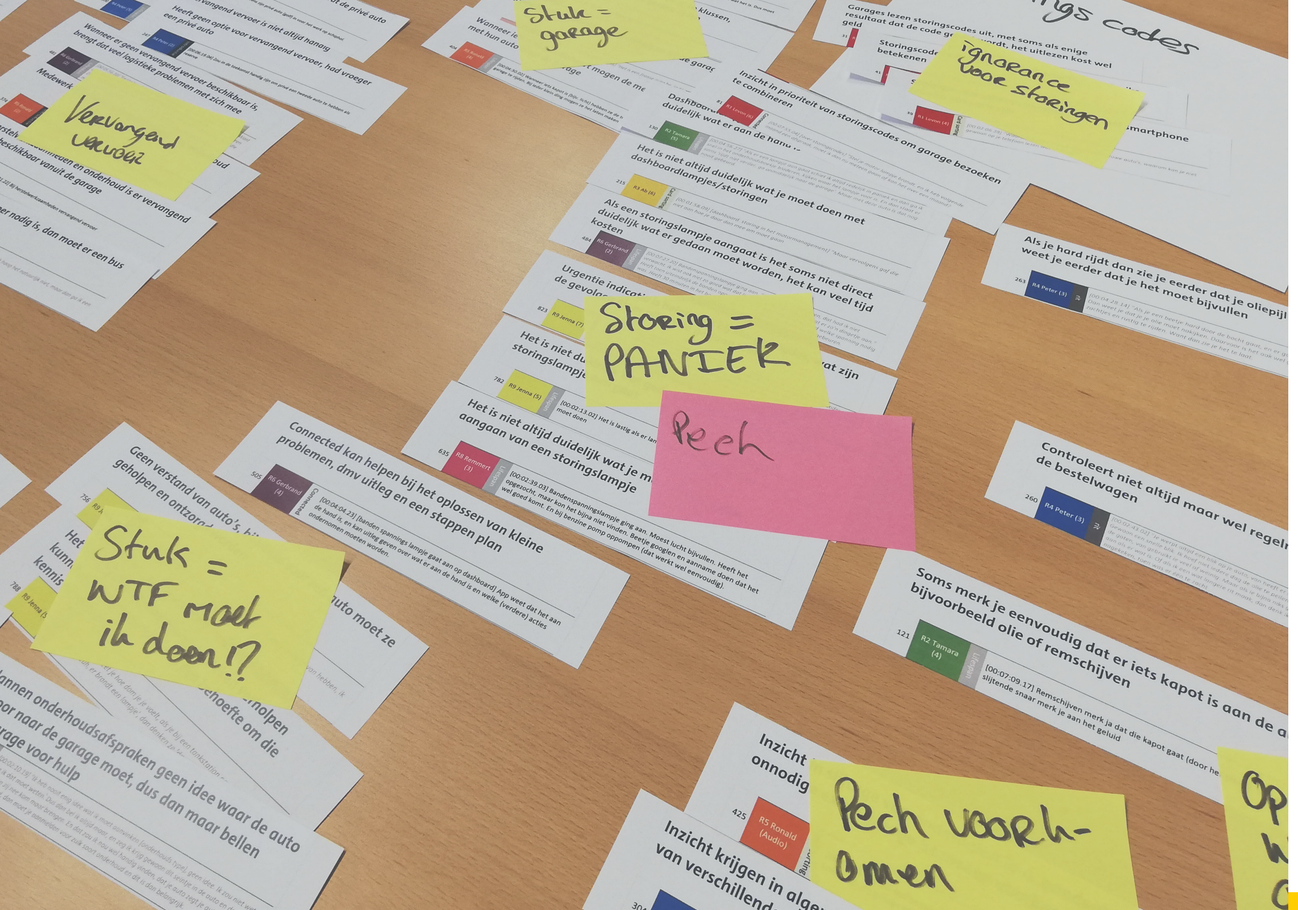


Figure 2.

Contents

1. Introduction

This thesis report is the result of the graduation project of the master Design for Interaction at the Delft University of Technology. This project is commissioned by the Royal Dutch Touring Club ANWB. This report will give an answer to the project brief: How can the ANWB support Small and Medium Enterprises with a connected car service?

This section will elaborate on: The history and activities of the ANWB and its mission: to facilitate people in being able to move an travel freely and enjoyably; ANWB Connected, an existing product that helps drivers know more about their vehicle by connecting it to the internet; and ANWB Kleinzakelijk, that provides the services of the ANWB to Small and Medium Enterprises.

Both ANWB Connected and ANWB Kleinzakelijk have the ambition to grow, this creates an opportunity that is defined in the project brief of this project: How can the ANWB support Small and Medium enterprises with a connected car service? This project will use ANWB Connected and adapt it fit the context and needs of the target group and will deliver a concept product that is the solution to the project brief, this concept will be delivered in the form of use cases and wireframes. The project has a user-centred focus and will be structured after the double diamond model.

Figure 3. ANWB offices in The Hague. Source: AWNB Beeldbank

Figure 4. Source: AWNB

1.1 ANWB

The AWNB is an association that was founded in 1883, nowadays its mission is to help its 4,5 million members to move freely and enjoyably by providing them many different services and products. The involved stakeholders in this project are the ANWB Connected and ANWB Zakelijk business units.

Short history

The Royal Dutch Touring Club ANWB was founded in 1883 as a bicycle association. One of the goals was to promote the use of the bicycle and to lobby for the rights of cyclists. With the rising amount of cars, the ANWB started to attract car owners as members. And in 1946 it started with the Wegenwacht, a service that helps vehicle owners with their vehicle problems wherever they are. Nowadays the association has grown to have over 4,5 million members. ("Geschiedenis", 2018)

Mission and activities

The mission of the ANWB is to facilitate people in being able to move and travel freely and enjoyably. [Dutch: De ANWB maakt het voor iedereen mogelijk zorgeloos en met plezier onderweg te zijn.] (see Appendix B) This mission results in a wide range of products and services. In order to create products that the members want to use, every product and service has to be created with the three client promises in mind.

A broad range of products and services

The ANWB has a broad product portfolio supporting this mission: "The ANWB offers a wide range of products and services related to roadside assistance and medical and repatriation assistance abroad, legal assistance, travel, information products, insurances, selling travel related products and many other products and services in the areas of recreation, tourism and mobility. Furthermore, the ANWB is active in lobbying in the fields of driving, mobility, travel and recreation." ("The Royal Dutch Touring Club ANWB", 2019)

Wegenwacht

One of the core businesses, that the ANWB is best known for, is the roadside assistance service, Wegenwacht. When a member has a problem with their vehicle, one of the 900 Wegenwachten, a vehicle mechanic, will go to the member to solve the problems. This service is thus an insurance that vehicle problems will be solved whenever and wherever you are.

Helpen+

With the mission and the promises comes something else that makes every ANWB product and employee stand out: The 'Helpen+' mentality. Helpen+ means that the ANWB always tries to go one step further than the customers would expect.

Promises

In line with the Helpen+ mentality, the ANWB has three client promises that its products should adhere to: (1) We recognize and acknowledge you; (2) We will help you proactively; and (3) We do not waste your time. (see Appendix C)

Stakeholders

This project has three different stakeholders, they are:
ANWB Connected, the despartment responsible for the development and marketing of the existing product which is the technological base for this design project;
ANWB Kleinzakelijk, the department responsible for selling the ANWB products to Small and Medium Enterprises.
The target users.

What these stakeholders do and what their role is in this project will be explained in the next chapters.

Conclusion

The product designed in this project should be in line with the mission of the ANWB, and it should be designed according to the client promises. For this project that means that it should enable businesses and business drivers to be able to move freely, it should do this while recognizing and acknowledging the users, helping them proactively and not wasting time. This all ties up into the Helpen+ mentality of the ANWB.

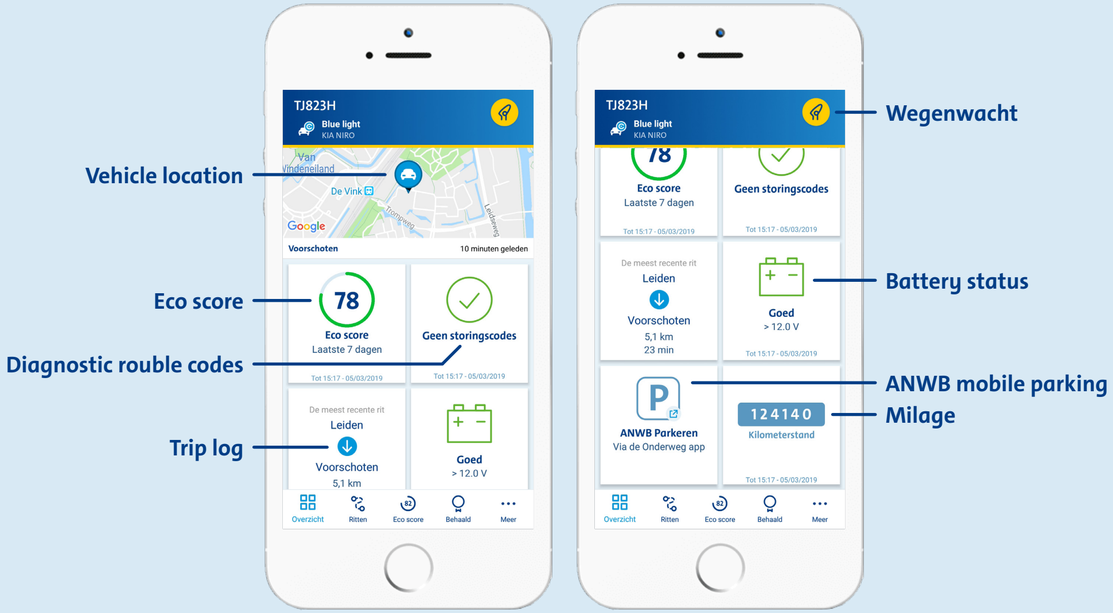


Figure 5. ANWB Connected Car app

1.2 Connected car

ANWB Connected is a product that provides drivers with information about their vehicle. This helps drivers to know the technical status of their vehicle and possibly prevent breakdown, with insight in their driving behaviour they can improve their fuel efficiency, Connected keeps track of the trips made and it can automatically end mobile parking transactions. To be able to do this a dongle with connectivity and a GPS sensor is plugged into the on board diagnostics port (OBD-II) of their vehicle.

This chapter will elaborate on what Connected does for the users and how it works. It will also elaborate on the joint venture Intelematics that creates parts of this product. And it will end with the growth opportunities that are needed because of lower then expected sales results.

Stakeholder

The development and marketing of the ANWB Connected product is the responsibility of the product innovation team and the portfolio management team, both part of the assistance (= Hulpverlening) department within the ANWB. In this thesis these two stakeholders will be discussed as one stakeholder, described as ANWB Connected.

Connected system

The ANWB Connected product consists of several elements that together form a system (see figure 6). The input from the vehicle is gathered with the dongle and it is processed by the back-end in the cloud. The output of the system is displayed to the user with the Connected app.

Figure 6. The system of ANWB Connected, whith the dongle as main input source and the app as output

App

By connecting the vehicle to the internet and thus the drivers smartphone the app can offer a wide range of features. The four unique selling points ANWB promotes Connected with on its website are: (1) Know your vehicle and be able to prevent vehicle breakdown; (2) safe up to 15% on fuel; (3) get insight in your driving behaviour; and (4) automated ending of mobile parking transactions. (“Haal alles uit je auto - ANWB Connected”, 2018)

The features of the app are:

Vehicle location

It shows the current location of the vehicle, and enables the owner to navigate to it when it is e.g. parked in an unknown location.

Eco score

The Eco score expresses the driving behaviour in a number, a higher Eco score means more efficient driving behaviour. This enables drivers to improve the fuel efficiency.

Diagnostic trouble codes

When the Engine Control Unit (the computer in the vehicle) detects problems in the vehicle, they will be shown in the app. This helps drivers to get insight in the technical status of their vehicle.

Trip log
The app keeps track of all the trips made with the vehicle. The trip log shows the details of all the trips that are made.

Wegenwacht
Whenever something is wrong with the vehicle, the driver can get in contact with the Wegenwacht. They can help solve any vehicle problem, wherever the vehicle is.

Battery status
With a patented algorithm the AWNB can predict when the battery needs to be replaced. The current battery status is always shown in the app. (“Patent op pech voorspellen van grote waarde voor fleet management | ANWB Zakelijk”, 2019)

ANWB mobile parking
ANWB Connected can stop a mobile parking transaction by detecting that the vehicle has been started. This way it is impossible to forget to end your parking payment.

Mileage
The app shows the estimated mileage based on the driven trips.

Other features
The app also features a leader board, where drivers can compare their Eco score to other drivers. Drivers can also earn badges for example their first trip with an Eco score higher than 90.

Dongle
To be able to show the information in the app, a dongle needs to be plugged into the On-Board Diagnostics port of the vehicle. The dongle is able to send the data to the internet, and it has a GPS sensor to track the location of the vehicle.

On-Board Diagnostics
The On-Board Diagnostics (OBD) is a system in vehicles that can detect if and what is wrong with a vehicle. For some of the problems the OBD can give the driver feedback in the form of a Dashboard Warning Light (DWL), however not all so called trouble codes are displayed on the dashboard (Johnston, 2015). The trouble codes that are not displayed on the dashboard can be read via the OBD-II port in the vehicle. The Connected dongle is plugged into this OBD-II port and reads the information.

The OBD-II ports are required in all petrol cars build from 2001 and later and all diesel cars build 2006 and later (“ANWB Connected connector / dongel - ANWB Connected”, 2019). Although the OBD-II is a standardization, the information that is transmitted through the port can differ per make and model (year). Where the legislation is clear about cars, it is not clear whether vans and trucks have OBD-II ports as well.

Figure 7. ANWB Connected app and dongle. Source: ANWB

Intelematics
The technology behind Connected is not developed by the ANWB alone. The development is done by Intelematics, a joint venture of sister clubs of the ANWB from the UK, Austria, Australia and the United States of America. Advantages are the shared cost of development, but the most important sharing of data to be able to make better data analysis.

Need for growth
The Connected product was introduced in 2015. Currently (August 2019) the ANWB members can get Connected for only 2,99 euro per month and a onetime payment of 19,99 euro for the connector, these are promotion prices and it used to be ca. 5 euro per month with a onetime payment of 50 euro for the dongle. Since the introduction of Connected the sales have never met the expectations that the ANWB had for the product. In order to increase the sales of the product, the ANWB is seeking for new opportunities for the product.

New propositions
The two directions that are currently being explored are a new proposition for the existing market, of which the result is called Smart driver. The other direction is this project that needs to find an opportunity on the market of Small and Medium Enterprises.

Smart driver
In a user centred project to find a better proposition for the Connected technology in the consumer market, Smart Driver was developed. Smart Driver supports drivers with vehicle information in order to educate the driver, so they become smart. The proposition exists of three elements: (1) Smart roadside assistance (Slimme Wegenwacht), with the data from the vehicle the Wegenwacht can quicker diagnose the problem and thus solve the problem quicker; (2) Prediction and prevention of vehicle problems, having the real-time data from the vehicle enables the ANWB to use algorithms to predict when problems will occur; and (3) personalized advice, drivers always have up to date information about the status of their vehicle and when needed they can always contact the ANWB for help and advice. This proposition has been validated and the first results indicate that potential users are interested in the product. For more information about Smart Driver see appendix D.

New market
The technology behind Connected has the potential to help a lot of drivers. Currently the product is focussed on the consumer market, the biggest market for the ANWB. However, an opportunity is seen to introduce the product in a new market, namely for small and medium enterprises and freelancers. Introducing the product into a new market might require adaptations to be able to fit with the needs of the new users.

Conclusion
The goal of this project is to redesign ANWB Connected so it can be introduced into the market of small and medium enterprises. This is done in a user centred manner. Therefore, if we look at the ANWB Connected system, the scope of this project will be the app and the user (see figure 8).

Figure 8. The scope of this project highlighted in the ANWB Connected system

1.3 ANWB Kleinzakelijk

ANWB Kleinzakelijk provides small and medium enterprises with the ANWB products. In order to grow the amount of clients, it is currently growing its product portfolio, and shifting from a roadside assistance provider towards being a mobility provider. One of the products that can be part of the expansion is Connected.

Small and Medium Enterprises

ANWB Kleinzakelijk [Dutch for 'small businesses'] is the department within the ANWB that is responsible for the sales and marketing of ANWB products (mainly roadside assistance) to small and medium enterprises (SME) as well as freelancers.

Characteristics

Small and medium enterprises are defined by the ANWB as enterprises with a maximum of 10 company vehicles. It is estimated that 1.7 million SME's and Freelancers in the Netherlands have one or more company vehicle(s), of which 41.000 are clients of the ANWB (see appendix F). This target group is very diverse, however some typical distinctions are:

- *Small and Medium Enterprise or Freelance*: Where a freelancer has the full responsibility for the vehicle and drives the vehicle itself, but within SMEs the roles, the enterprise might have a fleet manager and people that only drive the vehicles.
- *Blue or white collar*: Blue collar workers are more likely to have a van to use their vehicles to move tools and equipment, where white collar workers are more likely to have a passenger car.
- *Owned or leased vehicles*: Enterprises with owned vehicles have to take care of their vehicles themselves and are financially responsible for maintenance. Where enterprises that lease their vehicles do not have those responsibilities.

Figure 9. Source: AWNB Beeldbank

Product portfolio

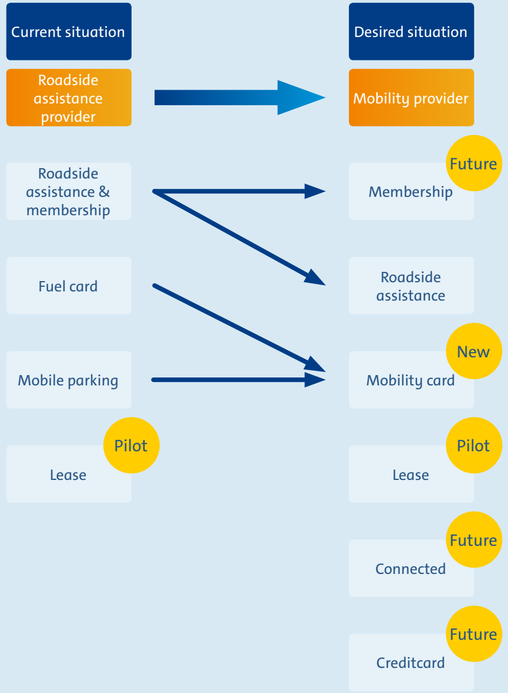
Currently the core product of ANWB Kleinzakelijk is roadside assistance. Currently clients are not able to purchase services from ANWB Kleinzakelijk, without having Wegenwacht. Next to Wegenwacht, ANWB Kleinzakelijk offers a fuel card and a mobile parking. And currently a pilot is running to lease vehicles (see the left side of figure 10).

Growth strategy

ANWB Kleinzakelijk has the ambition to grow the amount of clients. To do this ANWB Kleinzakelijk wants to move from a roadside assistance provider to a mobility provider. In order to become a mobility provider, new products will be developed. To do this, enterprises can become an ANWB member without the obligatory roadside assistance, and the product portfolio will be expanded with new products, such as a mobility card, a credit card and a Connected car product (see figure 2). (Appendix E)

Connected

One of the products that is part of the expansion is ANWB Connected, that currently is available for consumers. It is expected that especially the trip log feature of Connected can be of value for business drivers. Market research conducted in 2017 for the ANWB (see appendix D), shows that 41% of the ANWB clients and prospects are interested in a trip registration device, however only 6% of ANWB clients and 5% of the prospects actually have a trip registration product. This research also showed an interest in all-in-one invoices, mobile parking services and a mobile platform for the mobility services.



Mobile platform

The market research shows an interest in one mobile platform (app) for all ANWB Kleinzakelijk products. ANWB Kleinzakelijk does have the wish to have its own mobile app, because it currently does not have its own app, but only uses external apps for separate products such as the mobile parking service.

Kleinzakelijk and consumer market

Kleinzakelijk and the consumer market are both part of the ANWB, and both provide their clients of roadside assistance. However, they both use different customer relationship management systems. Therefore business clients are unable to use e.g. the apps that regular members can use.

Conclusion

The target group of ANWB Kleinzakelijk is really diverse, in order to design a product for this target group it is important to research their context and needs. A Connected product fits with the growth strategy. But because Kleinzakelijk cannot directly use consumer products, a new product should be developed, this creates the opportunity to adapt the product to the user needs. Whenever the result of this project could allow to be able to be expanded to become the only mobile touchpoint for ANWB Kleinzakelijk clients, it should not be avoided but embraced.

Figure 10. Expanding the product ANWB Kleinzakelijk portfolio to become a mobility provider.

How can the ANWB support Small and Medium Enterprises with a connected car service?

Project brief

1.4 Project brief

Both ANWB Kleinzakelijk as well as ANWB Connected have the goal to grow. The project brief for this opportunity is: *How can the ANWB support Small and Medium Enterprises (SME) with a connected car service?* This chapter eleborates on what this brief means and why it is set up this way.

Opportunity

ANWB wants to grow the amount of users of the Connected technologu, one of the possibilities is putting the product in a new market, namely the market of Small an Medium Enterprises. ANWB Kleinzakelijk, who is responsible for the market of Small and Medium Enterprises, is also planning on growing, however with product development. This creates the opportunity to introduce (an adapted version of) ANWB Connected on the market of Kleinzakelijk. Because the market is already known and the product already exists, parts of the risks described by Ansoff (1957) are eliminated. However, existing product should be adapted before it can be introduced to the market. This adaptation is the goal of this project.

The brief

The goal of this project is to design a product that is based on ANWB Connected and is designed for Small and Medium Enterprises. Thus, the design brief is: *How can the ANWB support Small and Medium Enterprises (SME) with a connected car service?*

ANWB

This project is commissioned by the ANWB, and the two internal stakeholders are ANWB Kleinzakelijk, representing the business interests, and ANWB Connected, the product and technical possibilities.

Support

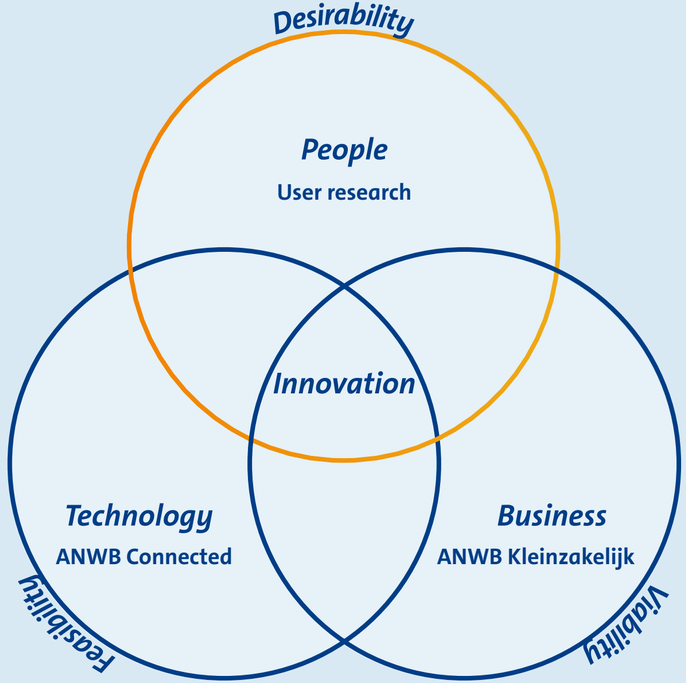
The goal of this project is to design a product that the target group would like to use and that actually adds value for the users. And the goal is not to research what the best way or story is to sell ANWB Connected, without any or only limited adaptions, to the clients of ANWB Kleinzakelijk. This is also in line with the strategy of the ANWB, to facilitate people to move. In order to design a product that adds value the context and needs need to be researched with a user centred method.

Small and Medium Enterprises

The target group for the research and the potential design are small and medium enterprises, including freelancers, within the Netherlands that have up to 10 company vehicles. This target group is really diverse, research is needed to understand those differences. Having enterprises as a target group in a user centered project can be a challenge. In such a case it is important to understand what the (business) needs of the enterprise are, as well as the (user) needs of the employees. These needs are not necessarily alligned.

Connected car service

The starting point for this project is the existing product ANWB Connected. This project researches the needs of the target users, and the product should be adapted to those needs. This will be done with changes in the app, rather dan technological changes in the Connected system.



1.5 Project scope

Good product innovation takes the desirability, feasibility and viability of the new product into account. In this project these characteristics are represented by the three main stakeholders: the users, ANWB Connected and ANWB Kleinzakelijk. This project has a user centred approach and therefore will focus on the users, by discovering their context and needs and designing a product that is desirable for them. With those results a product based on ANWB Connected is designed for Small and Medium Enterprises.

Successful innovation

Three characteristics of product innovation determine the success of product development (Orton, 2017):

- Desirability. Does the solution solve a real problem the users had, and does it solve it in a suitable manner.
- Feasibility. Can the product be made with the resources available.
- Viability. Does the product have a sustainable business model to survive and be valuable.

In order to create product that has the potential to become successful, these three characteristics have to be taken into account.

Stakeholders

This project has three mains stakeholders, and they all represent one of the characteristics of good product innovation. In this project their goals, requirements and wishes are taken into account in order to design a good product.

The users – desirability (People)

Research that is part of this project will uncover the context and needs of this target group, in order to know what a desirable product is.

ANWB Connected – feasibility (Technology)

ANWB Connected is the technical base for this product. This project will take into account the possibilities of the product, and will only adapt the front-end of the product, being the app and what this can offer to the users.

ANWB Kleinzakelijk – viability (Business)

ANWB Kleinzakelijk has the experience about what could potentially be a viable innovation, and what could fit with their strategy.

Project focus

All goals, requirements and wishes of the three main stakeholders will be taken into account during this project. However, the focus will be on the target users and their context and needs. The target users are not represented in within ANWB Connected and ANWB Kleinzakelijk. To create a balance between the three stakeholders, this project needs to research the context and needs of the users and present and advocate these needs within the AWNB.

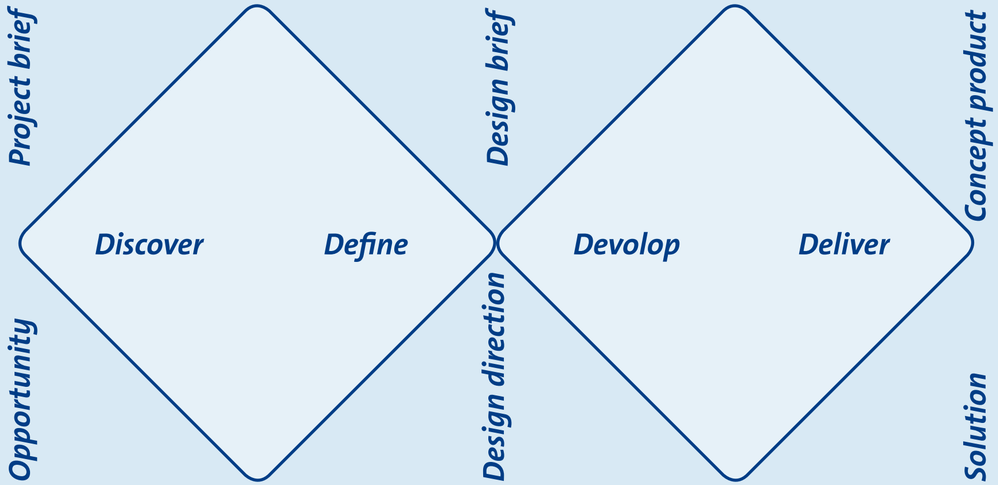
Intended research results

The intended research results are insights, personas and journeys to create insight into the context and needs of the target group. The results will be focused on the development an ANWB Connected product for Small and Medium Enterprises, and therefore might be less usefull on other product development projects.

Product design

This product will be delivered in the form of a product structure, use cases of the proposed features and requirements for those features. At last the product proposal will be validated with the users.

Figure 11. The relation between the three main stakeholders.



1.6 Project setup

This project aims to design a product that is the solution to the question 'How can the ANWB support Small and Medium Enterprises with a connected car service?' This project will be done with a user-centred focus. To structure the project the double diamond model (Design Council, 2019) will be used. The project will start with discover, where information is gathered. In Define the design direction will be defined in the design brief. In develop the solution to the problem in the design brief is designed. And in deliver this solution is validated, the improved design is shown and recommendations are made.

Phase 1: Discover

The goal of the first phase is to create knowledge about the target user and gather other relevant information that is needed to define a problem. In order to gather information interviews based on the context mapping method (Sanders & Stappers, 2012) are conducted in order to understand the context and needs of the target users. This information will be presented in the form of insights, personas and journeys. Alongside these interviews, feedback on the existing ANWB Connected app is gathered from reviews and usability test results.

Phase 2: Define

The goal of the define phase is to converge the knowledge gained in the discover phase to one problem statement in a design brief. To do this design directions, based on the research results, are made. Together with the internal stakeholders the most promising direction will be chosen.

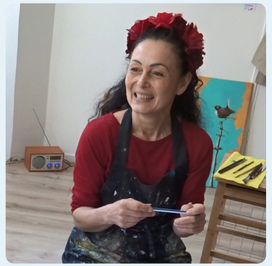
Phase 3: Develop

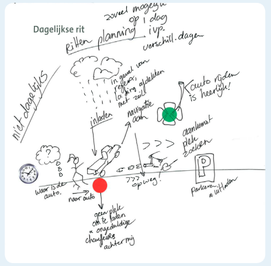
The goal of the develop phase is to design a product that is the solution to the problem from the design brief. To structure this development the five elements of user experience model (Garrett, 2011) is used. In this model five elements are defined in order to design a good digital product, these elements are: strategy, scope, structure, skeleton and surface. The strategy and scope of the product are already defined in the design brief. The develop phase will design a structure and skeleton for the product.

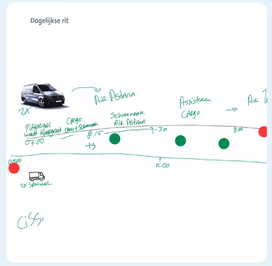
Phase 4: Deliver

The goal of the final phase is to validate the product concept, deliver the final design and give recommendations for future development. To product is evaluated in a usability study, based on these results reommendations for future development of the product are made.

Figure 12. Double diamond model. Source: Design Council, 2019

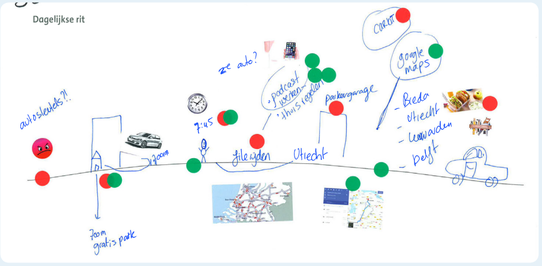






2. Discover

The first phase of the double diamond is discover, the goal is to create knowledge about the target user and gather other relevant information that is needed to define the design goal and design brief. To discover the needs and context of the target users interviews were conducted based on the context mapping method (Sanders & Stappers, 2012). These interviews resulted in 5 key insights: (1) Most drivers do not know what to do with vehicle problems, or how to fix them; (2) Changing driving behaviour is a big challenge; (3) Lease drivers experience their vehicle differently, and experience less breakdown; (4) Drivers know that phone use is dangerous, but sometimes still use them while driving; (5) Drivers have to perform several (small) tasks around their vehicle, that all take valuable time. The interviews also resulted in a segmentation, where users are segmented on their role to the company vehicles: (1) Vehicle managers; (2) Driving vehicle managers; (3) Drivers. For each of these segments a persona and journey are created to uncover the needs main needs of the target users: an always functioning vehicle; efficient trips; easy administration and cost reduction. Card sorting of potential features resulted in three requirements: it should speed up processes concerning the vehicle; give more information than is already available in the vehicle itself and it should be a supportive product.



1. What are the needs and context of drivers of and employees responsible for company vehicles?

2. How can ANWB Connected be of value for drivers of and employees responsible for company vehicles?

2.1 Research questions

The project brief asks for a product solution that helps small and medium enterprises (including freelance workers) with a connected car service product combination. To be able to design such a product-service combination that fits with the needs of the target group, two things have to be researched: (1) The context and needs of the target group, and (2) what connected is, how it works and what the target group might expect from such a product-service combination.

1. What are the needs and context of drivers of and employees responsible for company vehicles?

1. What is the context of drivers of company vehicles?
2. What are the needs of drivers of company vehicles?
3. What is the context of employees responsible for company vehicles?
4. What are the needs of employees responsible for company vehicles?

2. How can ANWB Connected be of value for drivers of and employees responsible for company vehicles?

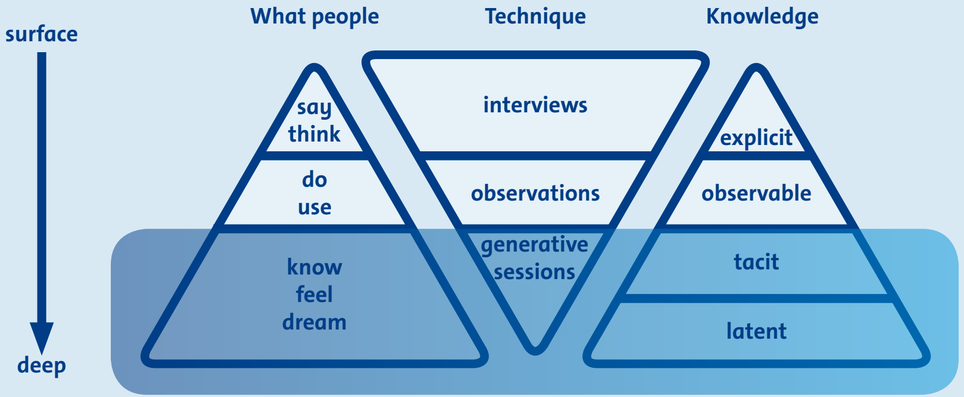
1. What is the ANWB Connected product and what can it be in the future?
2. How is ANWB Connected currently used, and what is the user experience of the product?
3. What do drivers of company vehicles expect from a connected product?
4. What do drivers of company vehicles think of the existing ANWB Connected?
5. What do drivers of company vehicles need more than ANWB connected currently can offer, or is it already sufficient?
6. What do employees responsible for company vehicles expect from a connected product?
7. What do employees responsible for company vehicles think of the existing ANWB Connected?
8. What do employees responsible for company vehicles need more than ANWB connected currently can offer, or is it already sufficient?

Research activities

In order to answer these research questions, the following research activities were executed:

- In depth interviews (based on Context Mapping, including card sorting and app feedback)
- App review (stores, social and usability research)
- Benchmark analysis

In chapter 2.2, 2.3 and 2.4 the method, analysis and results of the context mapping shown. Chapter 2.5 shows the review of the feedback on the Connected car app. And chapter 2.6 shows a benchmark analysis of product similar to ANWB Connected. With the results of these research activities the research questions will be answered in the conclusions in chapter 2.7.



2.2 Context mapping method

The in depth interviews were executed with 10 participants to research the needs, wishes, pains and frustrations of the drivers of and the employee responsible for company vehicles. The result of the analysis of these interviews are five key insights, a segmentation, persona's, customer journeys and feedback on the potential of a connected car service as well as feedback on the current ANWB Connected car app. To research the needs and context the interviews are based on the Context mapping method (Sanders & Stappers, 2012).

Goal

In order to create knowledge about the targets context and needs, the context mapping method (Sanders & Stappers, 2012) is used because:

- It 'involves the end-user as the 'expert on his or her experience'" (van Boeijen, Daalhuizen, van der Schoor, & Zijlstra, 2014)
- It is useful in the pre concept stage of the design process
- 'A contextmapping study helps you to understand the users' perspectives and to translate users' experience into a desirable design solution' (Van Boeijen, et al., 2014)

Therefore the goal of the interviews is to identify opportunities that can be acted upon to improve future experiences (Sanders & Stappers, 2012).

Method

The context mapping method uses two principles in order to gain useful knowledge about he needs of the user:

1. Generative tools enable people to talk about their latent needs;
2. Talking about the present and past enables people to talk about their future.

Latent needs

Research is done to create knowledge, Sanders and Stappers identify four levels of knowledge: (1) explicit, (2) observative, (3) tacit and (4) latent. The first two levels are easy to uncover with interviews or observations. The latter two are harder to uncover, however with generative sessions and tools researchers are able to uncover what people know, feel and dream (see figure 13) (Sanders & Stappers, 2012)

With generative sessions and tools people are asked to make something with tools that are provided by the researcher. What they make can be a collage, timeline or a three dimensional model for example. These things can be made with for example photos and other images or with materials like Lego. Respondents create an artefact, that can help them talk about latent needs that they couldn't express before.

Future

The goal of this research, and this project as a whole, is to know what kind of experience the users want in the future. However, it is hard for people to talk about what they want and need in the future. Context mapping uses generative tools to be able to discuss the future without asking 'what if..' questions. To do this, four steps help express experiences from the present past and future can be seen (see figure 14), those four steps are:

1. Document current activities and situations
2. Recall memories from earlier experiences
3. Reflect on those earlier expressions
4. Express future experiences

Figure 13. Different levels of knowledge about experience are accessed by different techniques. Source: Sanders & Stappers, 2012

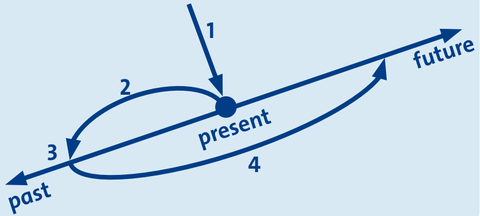


Figure 14. Four steps that help express experiences from the present past and future. Source: Sanders & Stappers, 2012

Setup

10 in depth interviews of around 1 hour were executed. The setup was as followed (for the full interview script see Appendix H):

Interview script

Introduction to the interview
Explain who the researcher is and what the goal of the interview is.

Background of the participant
To get to know the respondent and to create a comfortable environment for the interview.

Role of the vehicle
Understand what the company vehicle is used for and what the importance is.

Daily trip (timeline)
Respondents were asked to use a timeline to draw and write a typical daily trip (see appendix I). They could also use a trigger set in the form of two sticker sheets (see appendix J). The goal of this exercise is to understand what the vehicle used for on a daily basis, what are positive and negative moments and why are these moments experienced that way. With this exercise respondents describe their current situation.

Vehicle life span (timeline)
Again respondents were asked to use a timeline and the trigger set, this time to describe events, concerning the vehicle, that do not happen on a daily basis. The goal is to understand what things the respondent has to take care of over the lifespan of the vehicle, and what is experience positive and negative and why it is experienced that way. This exercise first discusses moments from the past and then reflects on them.

Car information (card sort)
Respondents were handed a set cards with possible features for the Connected product (see appendix K). They were asked what information or feature they would be most interested in, by ordering the cards. This way respondents could talk about their future needs in a concrete manner. The card sorting tool was created by employees of the ANWB for other research and was slightly adopted for this use.

ANWB Connected
After the respondents created a product in their mind, based on the possible features, they were shown screenshots from the current ANWB Connected app (see appendix M). Respondents were asked to react to the app.

Completion of the interview
Concluding the interview.

Tools

The tools used during the interviews:
- Interview script (appendix H)
- Consent forms
- Timelines: daily trip and vehicle lifespan (appendix I)
- Trigger set (appendix J)
- Card sorting tool (appendix K)
- Screenshots of the ANWB Connected app (appendix M)
- Red and green dot stickers
- Pens and markers
- Video camera
- Voice recorder

Recruitment

In order to recruit a representation of the target group, it is important to have mix of all the characteristics of the target group.
- Freelance and Small and Medium Enterprises
- Drivers and employees responsible for the vehicles (within Small and Medium Entrprises)
- Blue and white collar
- Lease and owned vehicles

Five respondents were recruited by reaching out personally via a personal network. And five respondents were recruited via a recruitment agency.

Execution

The interviews were executed on location at the respondents. The interviews took 60 minutes.

Documentation

The interviews were documented using a video recorder and an audio recorder as back-up. Photos and scans were made of the artefacts created during the interviews. The interviews were (partially) transcribed, during the transcription the core of what the respondents said was objectively written down, and interesting quotes were fully transcribed.

Figure 15. Analysis on the wall.

2.3 Analysis approach

TThe transcripts of the interviews have a lot of rich data. However, to be able to use this data in the design process it needs to become knowledge, to do this the data should first be made into information and that information can become knowledge (Rowley, 2007). To create knowledge from information a process called analysis on the wall is used (Sanders & Stappers, 2012).

Statementcards

Data > information

In order to create information from the transcripts, relevant quotes and paraphrases are interpreted to become objective statements.

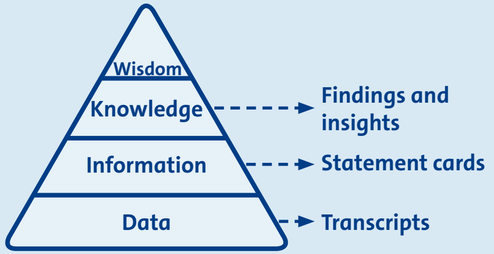


Figure 16. The Data Information Knowledge Wisdom Hierarchy. Source: Rowley, 2006.

during the analysis, because all statements are on more or less the same level and more to the point than the original quotes.

In figure 17 a statement card is shown, the most important element is the statement. But the statement cards show on what quote or paraphrase it is based, as well as which respondent it is from. With the time stamp and file information it is possible to easily find back the original quote in recordings.

Analysis on the wall

Information > Knowledge

In order to create knowledge from the statements, they need to be compared and grouped to find patterns and clusters. These clusters are created with a method called analysis on the wall, a method that creates both useful information as well as inspiration for the design process from the data (Sanders & Stappers, 2012). In this type of analysis the statement cards are latterly taped to the wall to form clusters.

Giving these clusters a meaning creates findings. By combining findings and understanding the reasons behind them, insights are created. Insights tell something about the attitude, behaviour, needs or context of your users in general, and are applicable on more situations than the one discussed in the interviews (Sticktail, 2019).

Figure 17. Statement card, with respondent information and original quote.

2.4 Results

The analysis on the wall forms the basis for the research results. The results of the Context Mapping interviews together give insight in the context and needs of the target users (research question 1). And some help to understand what the target users expect from a future product and think of the current ANWB Connected app (research question 2). This is a short overview of the results that will be elaborated on in the following chapters.

Segmentation

To understand what the differences are within the target group a segmentation is made. It creates segments based on attributes that result in different needs. The segmentation is the base for the formulation of the personas.

Personas

In order to focus on the actual goals of the target user personas are created to represent different segments (Miaskiewicz & Kozar 2011). These three personas help to create empathy and design a product that fits with the context and needs of the users. The following journeys are made for each of the personas.

Journeys

For each persona a journey is mapped, for a daily trip and for the life span events. For each phase of the journey goals, actions and needs are defined. From these needs, user stories that can be used in the design process are derived.

Key insights

Key insights are created and selected from the insights and findings from the analysis on the wall. The key insights were selected because they are an opportunity for Connected and/or they have a high priority for the target users.

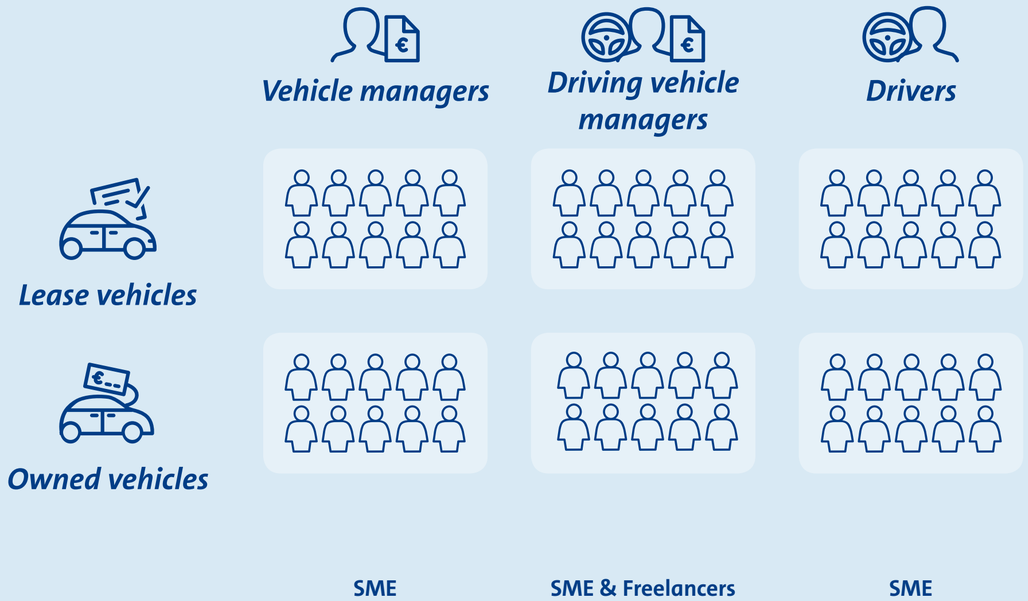
Card sorting

In the interviews respondents reacted to potential features of ANWB Connected, and were asked to prioritize them. Based on the reactions, three requirements are set.

Connected feedback

The feedback that respondents gave on the ANWB Connected app, can be used to validate the current product and it gives insight in how and what the target group expects from the product.

Figure 18.



2.4.1 Segmentation

To understand what the differences are within the target group a segmentation is made. It creates segments based on attributes that cause different user needs. It is identified that users in the target group can have different roles towards the company vehicle(s), and the vehicles can be leased or owned.

Roles

It is identified that people can have two 'roles' towards a company vehicle. They can be responsible for a company vehicle (or all of them) and they can drive a company vehicle. One person can also both be responsible for the vehicles and drive one.

Vehicle managers

A vehicle manager has the responsibility for the administration and financial decisions of all the vehicles within its enterprise. They are, for example, responsible for deciding on when to order new vehicles, and they decide how the vehicles are maintained. A vehicle manager that does not drive a vehicle itself can only be part of a Small or Medium enterprise.

Driver

The people that use the vehicle are called drivers. They typically have less responsibilities. But might have to take care for the vehicle and thus have to bring it to the garage and keep track of all maintenance. And even if a driver does not have to keep track of the maintenance, it has to solve vehicle problems when they occur when driving. A driver that does not have the responsibilities of a vehicle manager can only be part of a Small or Medium enterprise.

Driving vehicle manager

When someone both has responsibility over the vehicles within the enterprise and drivers a vehicle itself, they are considered to be a vehicle manager. A freelancer is automatically a driving vehicle manager, because they both drive the vehicle as well as having the responsibilities for it. Driving vehicle managers can also be part of Small and Medium Enterprises.

Vehicle

Company vehicles can either be owned or leased. This difference has an impact on the vehicle manager and on the driver.

Lease

When an enterprise or freelancer leases their vehicles, a lot of responsibilities are handed to the lease company. They do not have to decide on how the vehicles are maintained, because this is all included. And because lease vehicles are typically not older than five years, they do not break down a lot, and when they do the lease company is responsible for solving the problem. The driver also might have a different relationship with the vehicle, because it is replaced often.

Owned vehicles

When enterprises or freelancers have their own vehicles they are responsible for everything concerning the vehicle themselves. They have the freedom to go to any garage, but also have to decide whether to solve a small problems which costs extra money.

Figure 19. User segmentation.

Conclusion

Roles

The different roles have different needs, and would use a product in different ways. When a product is designed for Small and Medium Enterprises it will be used by all three roles, and thus should be designed to serve them all in a manner that fits with their needs and goals. Designing for only freelancers might result in a more focused design goal, however it would exclude a big part of the target group of ANWB Kleinzakelijk.

Vehicle

The differences between leased and owned vehicles is the biggest concerning the technical state of the vehicle (having to maintain it and having to solve vehicle problems). Vehicle owners are expected to be interested in knowing the technical state of their vehicles to prevent problems and want to know how to solve vehicle problems when they occur. On the other hand it is expected that lease drivers would be less interested in the technical status of their vehicle, and in solutions on how to fix possible problems, because their vehicles experience less problems and the lease company has the responsibility to solve the problems. As with the roles, choosing one of the segments might result in a more focused design goal that fits better with the user needs, but would exclude target users.

Design for all enterprises

The intend of both ANWB Kleinzakelijk and ANWB Connected is to grow. In agreement with all stakeholders the decision was made not to select a segment of the market, but rather focus on all potential clients. This effectively means that the type of vehicle is deemed irrelevant in the further design process. But the users role towards the vehicle still is relevant because different roles have different needs.

Floris

Vehicle manager (SME)

Age	56
Occupation	Owner architectural office
Status	Married, 2 children
Location	Nijmegen

Floris only has an e-bike, however he is responsible for the 4 company vehicles for his employees.

Goals

- Enable comfortable driving for all employees
- Save on vehicle cost, without restricting the employees and comfort

Casper

Freelancer

Age	42
Occupation	Handy man
Status	Divorced
Location	The Hague

As a handyman, Caspers' van is his office. Every tool he needs is in there, this way he can solve every problem his clients have.

Goals

- Focus on his work, rather than administration
- Reduce on vehicle cost, without limiting himself

Annick

Driver (SME)

Age	32
Occupation	IT consultant
Status	Single
Location	Utrecht

As an IT consultant Annick has to go to a lot of different clients. Her vehicle enables her to be flexible and efficient in her plannig.

Goals

- Arrive in time at the client
- Focus on work, not on peripheral matters

2.4.2 Personas and journeys

Three personas are created to get inspired during the design process. For each of these personas a journey is mapped. In these journeys goals, actions and needs are shown. The user needs are used to create user stories, that later will be used to define and design the product.

Personas

Personas can be used in order to focus on the actual goals of the target users (Miaskiewicz & Kozar 2011). Each persona represents one of the roles from the segmentation, this way the three personas together are able to represent almost all users in the target group. The personas are created to be able to identify the needs for each user, and to inspire during the design process.

Journeys

For each of the personas a journey is mapped. These journeys consist of two parts (x-axis): (1) the journey of a (daily) trip with the vehicle (on the left page) and (2) the journey over the vehicle lifespan (on the right page). Each part is then split up in phases. For each of these phases the goals, actions and needs are mapped (y-axis). Based on the user needs, users stories are created [As a user I want to ...]. These user stories can be used in defining and designing features for the product. But most of all, the journey maps can be used as inspiration for the design process. (Gibbons, 2018)

Floris

Vehicle manager (SME)

Age	56
Occupation	Owner architectural office
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Location	Nijmegen

Floris only has an e-bike, however he is responsible for the 4 company vehicles for his employees.

Goals

- Enable comfortable driving for all employees
- Save on vehicle cost, without restricting the employees and comfort

Phase	Pre trip	Trip start	Trip	Arrive	Get fuel
Goals					Reduce on fuel cost
Actions		Floris does not have a vehicle himself. Therefore he does not have a completly filled journey.			Ask employees to refuel responsibly
Needs				Know where employees are	Means to promote responsible refueling
User stories				As a vehicle manager I want to be able to see where my employees are	As a vehicle manager I want my employees to feul responsibly As a vehicle manager I want to have insight in the cost of all vehicles

Purchase	Administration	Maintenance	Small vehicle problems	Vehicle breakdown	Damage	Accident	Vehicle renewal
Get a vehicle for a new employee or to replace old vehicle	Sufficient administration with little effort	Have a well maintained fleet		Know if the employee needs assitance in order to continue	Make sure the damage is repaired to avoid unnecesarry costs	Know if the employee is okay, and if assistance is needed	Know when to renew the vehicles
Make decisions: lease or buy, budget, type, etc.	Collect relevant documents and send those to the accountant	Decide on how the vehicle is maintained					
	All in one invoice to hand over to accountant	Know whether the vehicles are maintained as scheduled		Insight in vehicle and employee status	Insight in vehicle and employee status	Insight in vehicle and employee status	Know when to renew, and what financially is the best option
	As a vehicle manager I want to have all the vehicle spendings in one overview	As a vehicle manager I want to know wether the vehicles are cared for in the right way			As a vehicle manager I want to have an overview of the current vehicle status		As a vehicle manager I want the options for new vehicles, to make the right financial decision

Annick

Driver (SME)

Age	32
Occupation	IT consultant
Status	Single
Location	Utrecht

As an IT consultant Annick has to go to a lot of different clients. Her vehicle enables her to be flexible and efficient in her plannig.

Goals

- Arrive in time at the client
- Focus on work, not on peripheral matters

Phase	Pre trip	Trip start	Trip	Arrive	Get fuel
Goals	Know when, where and how to go	Get ready for the trip	Get to the destination as easy and quick as possible	Park the car and go to the destination (e.g. work)	When needed get fuel
Actions	Check agenda and where the destination is, and check traffic info	Start navigation, flitsmeister, etc. and connecte phone to vehicle		Find a parking spot, pay if needed	Find a (cheap) fuel station, get fuel and pay
Needs	Accurate information about when, where and how to go	The best and most up-to-date navigation and a working vehicle	Accurate traffic information and the fastest route	Know where an empty and/ or best priced parking spot is	Know when and where to get fuel
User stories	As a driver I want accurate and relevant traffic information to decide how an when to travel	As a driver I want navigation that helps me to get at my destination as fast as possible As a driver I want to be notified before my trip, when something is wrong with my vehcile		As a driver I want to know where I can find an empty parking spot As a driver I want my parking transaction to start and stop automatically	As a driver I want to be able to plan when I have to refuel As a driver I want to easily find a fuelstation

Purchase	Administration	Maintenance	Small vehicle problems	Vehicle breakdown	Damage	Accident	Vehicle renewal
	Follow employers guidelines and keep all necessary documents	Have the car maintained as the prescribed by the employer	Solve the vehicle problems as quick as possible	Get the vehicle going again	Find source of the damage / fill in insurance / get it fixed	Make sure everyone is okay and continue as quick as possible	Get a new, possibly better, vehicle
Give input on what vehicle is prefered	-Trip log -Keep receipts and invoices	Know when / plan apointment / bring vehicle / stay mobile	Recognize a problem and figure out how to solve it	Figure out what the problem, if needed get assistance	Inspect damage / fill in insurance forms / plan vehicle repair	Check what happened and check everyone / fill in insurance	Give input on vehicle choice
	Easy way to store and collect the administration data and info	Know what has to be done when, combine the appointments	Know what to do and what the priority of the problem is	Know what to do when breakdown occurs, get the right help asap	Easily fill in the insurance form and get the vehicle repaired	Know what to after an accident / get everything fixed and going	Know when you may get a new vehicle
	As a driver I need a system that automatically logs my trips As a driver I do not want to deal with receipts and invoices	As a driver I easily want to plan the vehicle maintenance	As a driver I want to know how I can solve vehicle problems and when they need to be solved		As a driver I want assistance in resolving vehicle damage	As a driver I need to know what to do when an accident has occured	As a driver I want to be notified when I may search for a new vehicle

Casper

Freelancer

Age	42
Occupation	Handy man
Status	Divorced
Location	The Hague

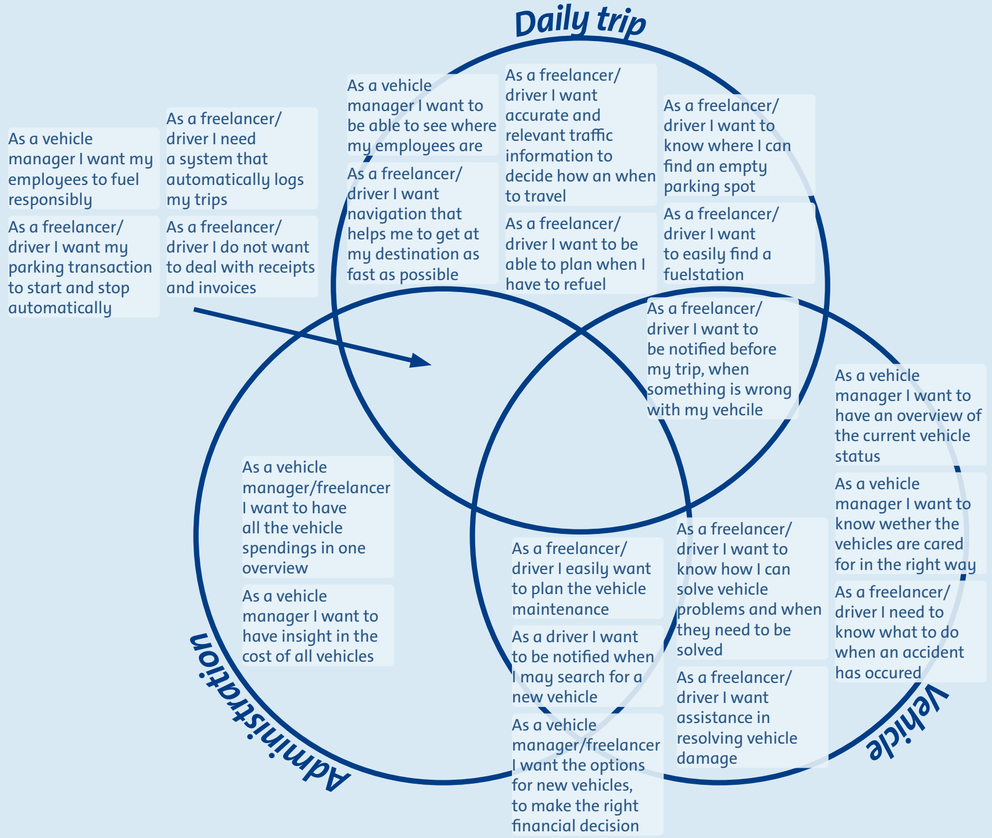
As a handyman, Caspers' van is his office. Every tool he needs is in there, this way he can solve every problem his clients have.

Goals

- Focus on his work, rather than administration
- Reduce on vehicle cost, without limiting himself

Phase	Pre trip	Trip start	Trip	Arrive	Get fuel
Goals	Know when, where and how to go	Get ready for the trip	Get to the destination as easy and quick as possible	Park the car and go to the destination (e.g. work)	When needed get fuel
Actions	Check agenda and where the destination is, and check traffic info	Start navigation, flitsmeister, etc. and connecte phone to vehicle		Find a parking spot, pay if needed	Find a (cheap) fuel station, get fuel and pay
Needs	Accurate information about when, where and how to go	The best and most up-to-date navigation and a working vehicle	Accurate traffic information and the fastest route	Know where an empty and/ or best priced parking spot is	Know when and where to get fuel
User stories	As a freelancer I want accurate and relevant traffic information to decide how an when to travel	As a freelancer I want navigation that helps me to get at my destination as fast as possible As a freelancer I want to be notified before my trip, when something is wrong with my vehicle		As a freelancer I want to know where I can find an empty parking spot As a freelancer I want my parking transaction to start and stop automatically	As a freelancer I want to be able to plan when I have to refuel As a freelancer I want to easily find a fuelstation

Purchase	Administration	Maintenance	Small vehicle problems	Vehicle breakdown	Damage	Accident	Vehicle renewal
Get a vehicle to replace old vehicle	Sufficient administration with little effort	Have the vehicle maintained so it keeps working well	Solve the vehicle problems as quick as possible	Get the vehicle going again	Find source of the damage / fill in insurance / get it fixed	Make sure everyone is okay and continue as quick as possible	Know what the best financial option is (keep vehicle, lease, etc.)
Make decisions: lease or buy, budget, type, etc.	Collect relevant documents and infor tosend to the accountant	Know when / plan apointment / bring vehicle / stay mobile	Recognize a problem and figure out how to solve it	Figure out what the problem, if needed get assistance	Inspect damage / fill in insurance forms / plan vehicle repair	Check what happened and check everyone / fill in insurance	Way financial options and select a new vehicle
	All in one invoice to hand over to accountant	Know what has to be done when, combine the appointments	Know what to do and what the priority of the problem is	Know what to do when breakdown occurs, get the right help asap	Easily fill in the insurance form and get the vehicle repaired	Know what to after an accident / get everything fixed and going	Know when to renew, and what financially is the best option
	As a freelancer I want to have all the vehicle spendings in one overview As a freelancer I do not want to deal with receipts and invoices As a freelancer I need a system that automatically logs my trips	As a freelancer I easily want to plan the vehicle maintenance	As a freelancer I want to know how I can solve vehicle problems and when they need to be solved		As a freelancer I want assistance in resolving vehicle damage	As a freelancer I need to know what to do when an accident has occured	As a freelancer I want the options for new vehicles, to make the right financial decision



2.4.3 User needs

In the customer journeys user needs were identified. These user needs have been translated into user stories. These user stories were clustered into three overlapping clusters: Daily trip, vehicle and administration. And for each persona three main needs were identified.

Clusters

The user stories from all three customer journeys were used to form the clusters. The clusters represent different activities and moments in the use of a company vehicle. During the daily trip drivers are busy getting to their destination and therefore have needs like having accurate traffic information. The cluster vehicle is about the technical state of the vehicle and solving vehicle problems when they do occur. And the last cluster, administration, is about the administrative tasks everyone has to perform. These three clusters do overlap, for example trip logging is an administrative task, but it will be done on a daily basis.

Needs per persona group

Drivers

Drivers have three main needs:

- A functioning vehicle, to be able to do their job effectively
- Efficient and easy trips to arrive at the destination in time
- Efficiency in administrative tasks

Vehicle managers

Vehicle managers have three main needs:

- Vehicles that support employees with their job
- Efficient administration
- Know vehicle costs and reduce them were possible

Freelancers

Freelancers have three main needs (that overlap between the driver and vehicle manager):

- A functioning vehicle, to be able to do their job effectively
- Efficient and easy trips to arrive at the destination in time
- Efficient administration
- Know vehicle costs and reduce them were possible
-

Figure 20. Clustered user stories.

1. *Most drivers do not know what to do with vehicle problems, or how to fix them*

2. *Changing driving behaviour is a big challenge*

3. *Lease drivers experience their vehicle different then drivers of owned vehicles*

4. *Drivers know that phone use is dangerous, but sometimes still use them while driving*

5. *Drivers have to perform several (small) tasks around their vehicle, that all take valuable time*

2.4.4 Key insights

Analysing the interviews resulted in many insights. These insights have either a high (estimated) impact or have great potential in product development. The other insights can be found in appendix O.

Vehicle problems

1. Most drivers do not know what to do with vehicle problems, or how to fix them

Most of the drivers do not know what to do when a dashboard warning light turns on. They will search in the manual or on google for help. When warning lights keep turning on without a clear defect, drivers might start to ignore those warning lights.
"Dat was even schrikken, dat had ik niet verwacht. Ik wist ook niet zo goed wat dat lampje betekende. Opeens gaat er zo'n dingetje aan." – Gerbrand (Technical consultant)

When vehicle problems occur, drivers act differently to solve the problem.

1. Go to the garage, they will fix the problem
"Maar dan kachel ja even langs de garage en dan zit er een of ander storinkje in en dan is dat voorbij." – Mart (E-commerce manager)

2. Figure out what needs to be done, can I do something myself?
"Weet je hoe dom je je voelt, als je bij een tankstation naar binnen loopt en vraagt 'ja, euh, er brandt een lampje', dan denken ze 'daar komt weer zo'n blondje" – Jenna (Strategy consultant)

3. Fix it yourself, because you have most of the knowledge needed
"Ik kan die bus hier niet binnen zetten, als ik die bus hierbinnen zou zetten dan doe ik het zelf wel" – Peter (Handyman) [note 270]

Recommendations
- Give drivers accurate and relevant information about their vehicle 'status'
- Provide relevant 'trouble shooting' guidance

Driving behaviour

2. Changing driving behaviour is a big challenge

Drivers differ on their awareness and willingness to adapt their driving behaviour.

1. A few drivers are aware of their (bad) driving behaviour and are not willing to change it
"Ik weet mijn rijgedrag, en ik ben er tevreden mee. En iedereen kan zeggen wat die wil, maar ik rijd schoon en goed. Klaar." – Peter (Handyman)

2. Other drivers would be interested in knowing their driving behaviour, but would however not change their behaviour because it is not a priority for them
"Daar ben ik niet gemotiveerd voor. Niet omdat ik niet geef om het milieu ofzo, maar én omdat het marge is, het is maar rommelen in marge in mijn ogen, en ik heb er gewoon de aandacht niet voor." – Remmert (Managing Director)

3. And some drivers would want to change their driving behavior
"Die eco score is voor bij belangrijk, dat ze elkaar in evenwicht kunnen houden, ik vind het leuk om er een competitie van te maken. Zodat je wel de een met de ander kan vergelijken" – Ronald (Construction Manager)

In general people are more interested in the fuel cost and the possibility to save money than in being more eco-friendly. Knowing and improving the driving behaviour can be interesting for some drivers, however when your behaviour levels out on a certain level it is hard to keep motivated.
"Ik vind zuinig rijden wel leuk, en dan had ik elke keer een acht. Toen dacht ik, ik wil hoger. Uiteindelijk kwam ik erachter dat ik niet hoger kwam dan die acht, en toen heb ik er eigenlijk niks meer mee gedaan." – Jenna (strategy consultant)

Recommendations

- Fuel costs are more relevant for business drivers than 'eco score'
- To design for behaviour different methods have to be evaluated and applied (Michie, S., Van Stralen, M. M., & West, R. (2011). The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implementation science, 6(1), 42.)

Lease is different

3. Lease drivers experience their vehicle different then drivers of owned vehicles

Lease drivers don't experience a lot of breakdown, because they drive relatively new vehicles.
"Je hebt nooit pech hè, met een gloednieuwe auto." – Anja (HR manager)

Lease drivers experience vehicle breakdown or maintenance different than vehicle owners, because they don't have any financial responsibility for the vehicle.

Lease drivers have a different 'relationship' with their vehicle. This does not mean that they through their vehicle around. Some even say that you have to care for a lease vehicle 'because it is someone else's'.
"Aan de ene kant weet ik, het is niet mijn auto het is een auto van mijn baas, dat betekend dat ik er gewoon goed voor moet zorgen, want met andermans eigendom moet je gewoon goed omgaan." – Gerbrand (Technical consultant)

Recommendation

- Focus on companies with owned vehicles might have a bigger chance

Phone use

4. Drivers know that phone use is dangerous, but sometimes still use them while driving

All drivers are aware that the use of phones has a bad influence on their driving behaviour. However they 'use' their phone in different ways:
1. Some drivers put their phone on the backseat, and don't touch it until they arrive;

2. Others connect the phone to the Bluetooth of the vehicle and are open for incoming calls;
"Gebeld worden, niet zelf bellen. En appen en al dat soort andere dingen dat probeer ik gewoon absoluut niet te doen. Nee, dat doe ik gewoon niet. Daar reageer ik ook niet op." – Ronald (Construction manager)

3. Others also make calls themselves;
"Ik vind het heel fijn dat je even kan bellen, je zit in een ruimte waar niemand anders kan meeluisteren. Dus je kan een goed gesprek met je collega's hebben" – Gerbrand (Technical consultant)

4. Some have to touch their phones once in a while, to connect earplugs or to adjust the navigation.
"Ook omdat het gewoon ongelofelijk verleidelijk is om met je telefoon bezig te zijn tijdens het rijden. Ondanks dat ik er ongelofelijk op tegen ben. Er komen gewoon dingen binnen. En de audio via de carkit is slecht voor de ontvanger, dus ik doe mijn koptelefoontje toch in." – Remmert (Managing Director)

"Als je een app maakt, moet je altijd voorkomen dat het interessant is om in de auto te bekijken, want dat wil je gewoon niet." – Remmert (Managing Director)

Recommendations

- An app should not be interesting to use while driving

- Reduce phone use while driving with Connected.

Small tasks

5. Drivers have to perform several (small) tasks around their vehicle, that all take valuable time

These tasks are:
Most drivers still have to get petrol, when they have to, they have three things they have to do:

1. Know when and where to get fuel
"Moet ik nog tanken voordat ik ergens naartoe ga. Dat zie je natuurlijk wel op het moment dat je in de auto stapt, maar misschien wil je dat nu alvast weten voor je planning" – Ab (real estate agent)

2. Insert their mileage into their phone (if they have a fuel card)
"Als ik ga tanken moet ik altijd mijn kilometer stand én mijn pincode onthouden, dat is soms best lastig" – Remmert (Managing director)

3. Keep the receipt when (if they don't have a fuel card)
"Nu heb je allemaal die bonnetjes, dat vind ik heel erg onhandig dat wil ik allemaal niet, ik wil ook geen kilometers bijhouden, ik wil gewoon alles op één hoop" – Jenna (Strategy consultant)

When parking in a city centre, they have to pay for parking. Most people pay with some digital product; however, this could work easier.
"Ja dat lijkt me top. Ik snap ook niet waarom die app dat niet heeft. Flitsmeister gaat automatisch aan als ik verbinding maak met bluetooth of wegrijd. En waarom dat ding niet zegt van 'je rijdt nu 60, volgens mij parkeer je niet meer. Dus ja dat lijkt me een topoplossing." – Mart (E-commerce manager)

Some have to keep track of the driven kilometres

1. For a tax approved trip registration
"Dit is een automatische km registratie, ja top dit moet je doen. Stel je voor ik heb straks klanten buiten Schiphol, dan moet ik alles bijhouden. Ik weet niet of je weet wat je allemaal nodig hebt om KM te registreren" – Levon (Owner cleaning company)

2. To be able to send invoices to their clients
"Maar dan zou ik er wel een label aan toe kunnen voegen van welke klant dit is, dan wil ik het wel daarvoor kunnen gebruiken." – Jenna (Strategy consultant)

Most people have to keep all of the maintenance invoices from the garage and the fuel receipts together in one binder.
"Omdat mijn auto op de zaak staat krijgt job [accountant] gewoon de benzinebonnen, de onderhoudskosten en dat verwerkt hij in de cijfers." – Tamara (Artist)

Conclusion

First conclusions per insight will be discussed. At last possible opportunities to focus on in design are discussed.

Vehicle problems

1. Most drivers do not know what to do with vehicle problems, or how to fix them.
Vehicle problems do not occur very often, however when they do occur they can have a big impact on the business of the driver. Helping businesses in preventing vehicle problems and solving them faster when they do occur could be an interesting insurance. Besides, solving vehicle problems is the core business of ANWB Kleinzakelijk.

Driving behaviour

2. Changing driving behaviour is a big challenge.
Changing driving behaviour is expected to have a positive impact on fuel expenses. And many enterprises are interested in saving money. However, it is expected that a big group of drivers would never change their driving behaviour based on any type of advice. This would directly impact the savings that could be made.

Lease is different

3. Lease drivers experience their vehicle different then drivers of owned vehicles.
Lease drivers and drivers of owned vehicles have totally different needs for their maintenance, and lease drivers are expected to experience less breakdown. Because their needs are different, choosing one would have a positive impact on the value that the product can offer to the end-user.

Phone use

4. Drivers know that phone use is dangerous, but sometimes still use them while driving.
Limiting phone use could be interesting for Small and Medium enterprises, and might even be more interesting for bigger companies. However, it is expected (not validated) that freelancers would not buy a product that limits themselves on their phone use, and 60% of the ANWB Kleinzakelijk clients is a freelancer.

Small tasks

5. Drivers have to perform several (small) tasks around their vehicle, that all take valuable time.
Not every driver has to perform all of the tasks described, but most drivers will have to perform some of them. Doing these small tasks takes a bit of time each day. Reducing the time spent on the small tasks increases the time that could be spent on the (billable) core business.

Focus for design

Insight 1 (vehicle problems) and 5 (small tasks) are expected to be most promising for the target users. Insight 3 (Lease is different) will be taken into account in the segmentation. Insight 2 (change behaviour) could be interesting, however it might be hard to actually have an impact on the fuel expenses. Insight 4 (phone use) is expected not to be viable, due to the fact that 60% of the clients are freelancers, who will most likely not buy any product that reduces their phone use.

Connected should speed up processes

Connected should show more than the dashboard

Connected should help solve porblems

2.4.5 Design principles

In the interviews respondents reacted to potential features of ANWB Connected, and were asked to prioritize them. Based how the cards were prioritized and grouped and on how the respondents reacted to them, three requirements are created. All findings from the card sorting can be found in appendix L.

Connected should speed up processes

Because the vehicle is connected to the internet, drivers can know more about their vehicle quicker. Because more information is available problems can be solved quicker.

Connected can gather a lot of information, however not everything is relevant for the user. They do not want an overload of information because that would mean a decrease in efficiency. This means that the product should filter or limit in such a way that only relevant and/or useful information is transferred to the user.

Connected should show more than the dashboard

Connected can show information from the vehicle, but when it is the same information as the dashboard of the vehicle is already showing it would not be useful. A few option to prevent being irrelevant:

- Show information that is not shown on the dashboard;
- Show additional information to what is shown on the dashboard, like explanation or solutions;

Connected should help solve problems

When Connected can know what is wrong with the vehicle, users expect it to tell them what to do to solve the problem. It can assist in determining the priority of the problem, what the problem is and how they can solve it. And all with the goal to have the user back on the road with a functioning vehicle as quick as possible.

Requirements for design

These three requirements should be used in the design process. When the product is being designed and it has been decided what features will be in it, the full results in appendix L can be used as guidance in designing them.

Figure 21. Product requirements.

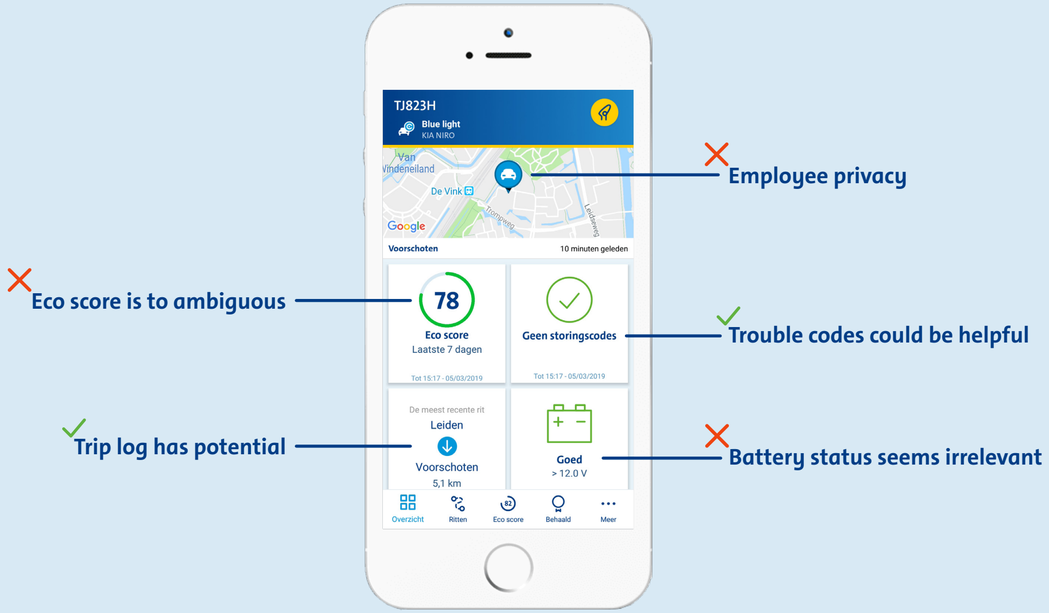


Figure 22. Feedback from interview respondents.

2.4.6 Respondent feedback

At the end of the interviews respondents were shown screenshot of the ANWB Connected car app (see appendix N) and after a short explanation they were asked what they thought and in what way they could use the app. These are the five findings based on those reactions.

Eco score is ambiguous

For many respondents it was not directly clear what the eco score is. It only became clear what the score meant when they looked at de detail page. But still some things were unclear:

- What the score was based and how it was calculated;
- How scores of different vehicle types could be compared;
- What the terms 'accelaratie' [=acceleration] and 'stationair' [=stationary] mean.

When looking closer to the eco score detail page, most respondents were most interested in the fuel consumption and the associated cost.

Trip log has potential

Most respondents do not have to hand over comprehensive trip log data to tax authorities. However, they would use this data when sending invoices to their clients. Adding a label for which client a trip was made would be useful.

Employee privacy

Employees do not want their employer to be able to see where they are at any moment. Especially not when they also use their company vehicle in private situations.

Trouble codes could be helpful

Knowing what is wrong with your vehicle can be helpful, but only if it shows more information than you can already find on your dashboard.

Battery status seems irrelevant

Most respondents want their vehicle to be in working order. However, they would rather only see the details when something is wrong instead of seeing that every part is working properly.

ANWB Connected car app

Some of the respondents see value in the app, however they expect that they are able to see overviews of all the company vehicles (in cases of SME's), and most would like to add labels to the trip log. Other respondents however do not see much value in the app, mostly because features can be replaced by free alternatives.

Conclusion

ANWB Connected as it was presented would not be sufficient for the target group to be an interesting product. It should minimally be adapted to serve enterprises with more vehicles, and the trip log should include custom labels for invoicing to clients. But, for most of the target users these changes would not make it a desirable product. In order to become desirable the product needs to offer more value. This value can be added by offering a more complete product, that does not mean that it should be able to do everything, but when the app offers trouble codes users expect the app to help them with prioritizing and solving the problem for example.

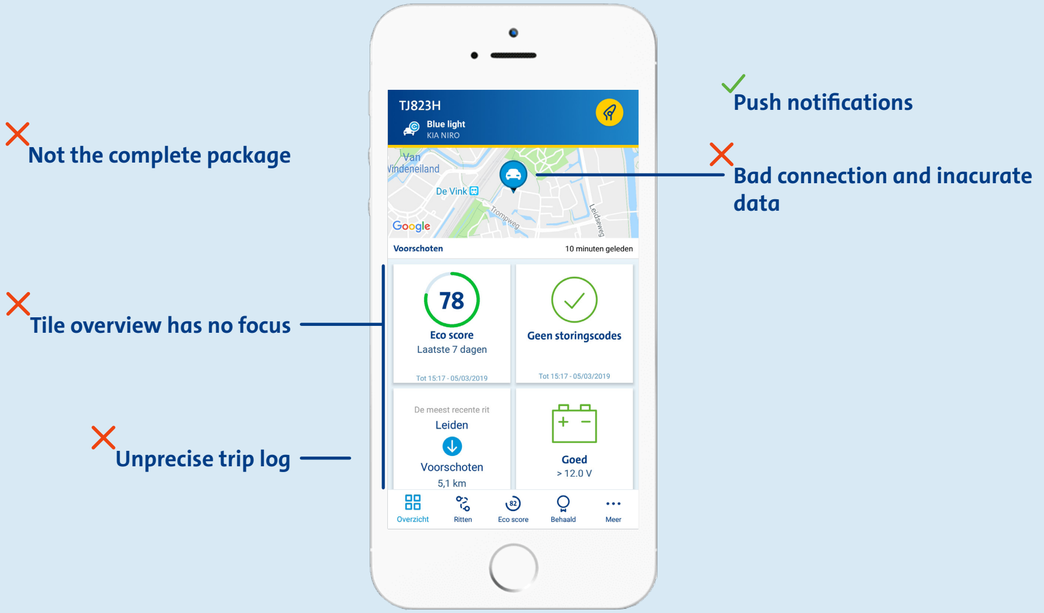


Figure 23. Feedback from internet reviews.

2.5 Current user feedback

ANWB Connected is already on the consumer market since 2015. And in that period users have had the opportunity to give feedback on the app. And last year the ANWB executed two usability tests for the app. This feedback can give insight into the user experience of ANWB Connected.

Feedback sources

The feedback is gathered from both the iOS app store (Apple store, 2015) and the Android Playstore (Google Play, 2019), were users can rate the app and give feedback or a recommendation on the app. A dedicated Facebook group for ANWB Connected users is another source for valuable insights (insert source). And the two usability test give insight in the usability of the app, the results can be found in appendix P and Q.

Consumer feedback

The feedback is provided by users of the consumer product, and have a different expectation of the product in terms of what it can offer. But the findings on the usability and the technical functioning of the app are relevant for this design process.

Not the complete package

Respondents form a usability test mentioned that the app does not have all the features they need when they use their car. They would like to see an app with navigation, traffic information, parking and fuel locations in one app.

Tile overview has no focus

The tiles on the dashboard have no focus and the respondents of one of the usability test did not find the information presented useful. The menu bar however was clear to use.

Unprecise trip log

One of the complaints in the app store reviews was that the accuracy of the trip log. The mileage in the app differs from the actual mileage in the vehicle.

Bad connection and inaccurate data

Some app store reviews complain that the some data misses: trips are not measured from start to end and the current location of the vehicle is not up to date.

Push notifications

Respondents from a usability test would like to have a push notification when Connected detects something. Especially when the app has no daily relevance and they would not look in it every day.

Conclusion

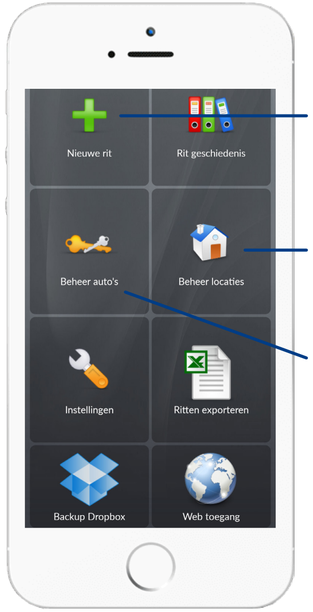
The technical problems that cause data to be lost or not shown have big impact on the reliability of the product. And the trip log is with the current technology not accurate enough to serve as a comprehensive trip log to hand over to the tax authority (Belastingdienst, 2019). The current app does not have a main goal, it rather is a combination of features that the Connected technology can offer.

2.6 Benchmark analysis

In the app stores several apps for company vehicle management can be downloaded. And other apps also use OBD information to show the vehicle status in an app. In this chapter some of these apps are show, to learn what is good and what can be improved upon in possible features for the future ANWB Kleinzakelijk and ANWB Connected product. Most apps are shown in one screenshot, but Drivvo is shown in four screenshot, because it is an intersting and appealing app. The apps were inspected on the information that they show, and how they show it to the users. This benchmark does not include all potential competitors.

CTA Registration

Trip log



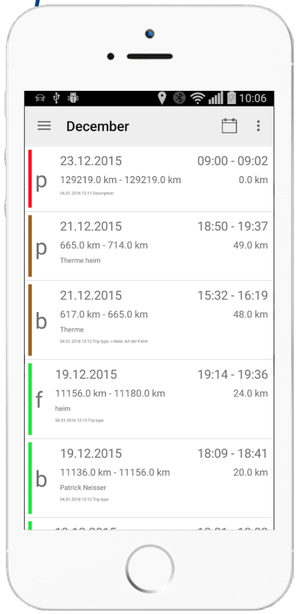
✗ **Manual registration**
All trips have to be logged manually.

✓ **Locations**
It alows to preset locations

✓ **Fleet ready**
The app can be used for fleets of several vehicles

Mileage logbook - TripTracker

Trip log

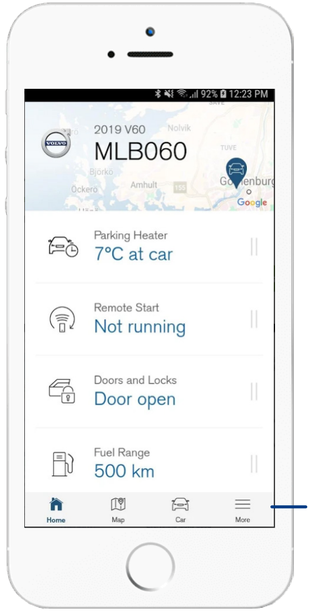


✓ **Clear overview**
Clear overview of the automated trip log, with labeling options.

✗ **Visually unappealing**

Volvo On Call

Vehicle app



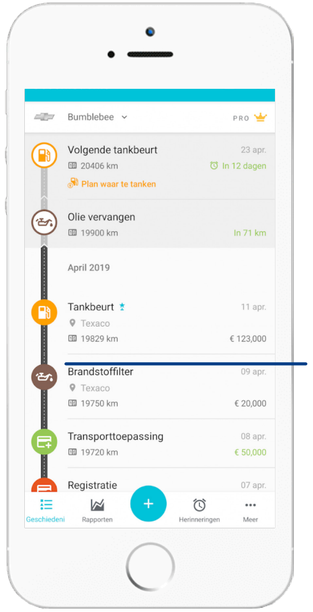
✓ **Attractive design**
A visually attractive app that clearly shows what it offers.

✓ **Integrated connectivity**
Volvo drivers do not need a connector, it is all integrated in the cars.

✓ **Menu structure**
The app has a clear structure.

Drivvo
History

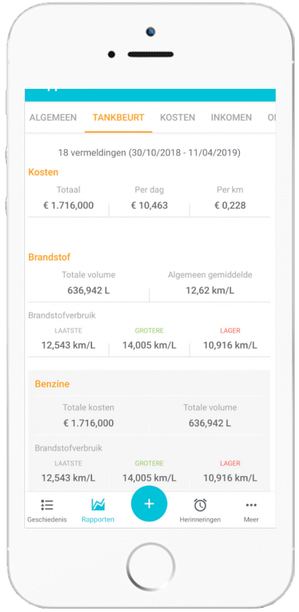
Fleet management



All in one overview
It shows all vehicle expenses in one overview.

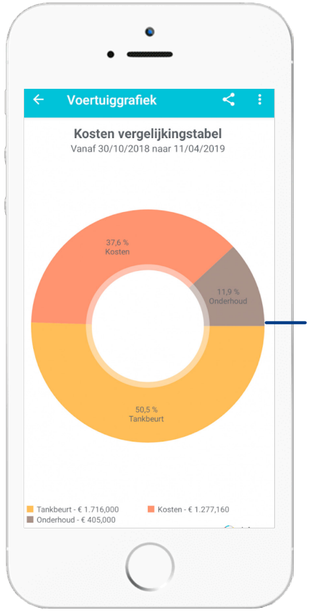
Visual with icons
The icons make the overview scanable and easy to use.

Drivvo
Reports



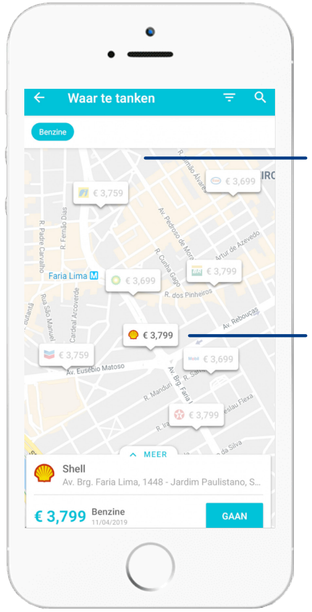
Detailed information
The app also shows detailed and complete reports.

Drivvo
Vehicle graph



Useful graphs
For who does not like numbers, the app shows useful graphs to create quick insight in the e.g. vehicle cost.

Drivvo
Fuel station locator

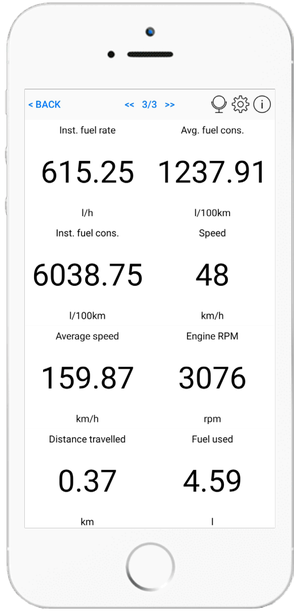


Useful tools
The app has useful tools, like this fuel station finder.

Fuel cost reduction
Refueling at affordable fuel stations can safe money.

Car scanner

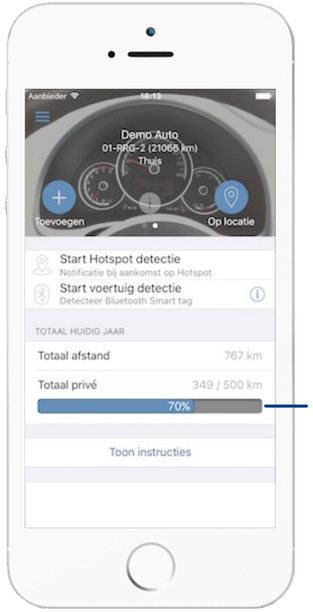
OBD



Information overload
A lot of information is presented, but users have to make sense of it themselves.

Routereg

Trip log

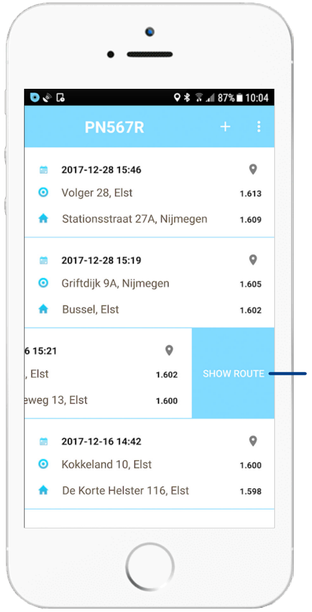


Single purpose
The only use of this app is to track the kilometres of one single car.

Clear insights on homepage
The only purpose of the app is trip logging. The driven kilometres are immediately clear.

Track assistent

Trip log



Clear and functional
The trip overview shows the most relevant information in a no nonsense way.

Show more
Each trip can be viewed on a detail page

Conclusion

The existing apps provide the users of different information. Most of them are single purpose: showing OBD infromation, trip logging or fleet cost management. None of the reviewed apps was an all purpose app. Some of the product do not seem to be mature yet, however to compete with them a good functioning and visually appealing app is needed.

2.7 Conclusion

In the discover phase information has gathered through research. With this information the research questions can be answered.

Needs and context

1. What are the needs and context of drivers of and employees responsible for company vehicles?

What is the context of drivers of company vehicles?
When someone drives in a company vehicle this often means that they need that vehicle to be able to execute their job (efficiently). This can mean that the vehicle carries the materials and tools need, it can be the fastest or efficient mode of travel to arrive at the office or the driver has to go client or different locations.

In general drivers have three concerns:
- The vehicle must function and be available. Drivers often have to deal with the maintenance and vehicle breakdown, this can have an effect on their ability to do their job, especially when problems occur unannounced.
- Get to the destination as efficient as possible. Drivers have to navigate to their destination, and will try to avoid traffic jams at any cost, to do this they use their knowledge and several apps and tools. And when they arrive on the destination finding a parking spot can be a problem.
- Efficient and effective administration. Nobody likes administration, but some drivers have to collect all their receipts and invoices. And for some companies it is important to track the driven kilometres to invoice them to their clients.

What are the needs of drivers of company vehicles?
Drivers have three main needs:
- A functioning vehicle, to be able to do their job effectively
- Efficient and easy trips to arrive at the destination in time
- Efficiency in administrative tasks

What is the context of employees responsible for company vehicles?
It was assumed that employees responsible for the company vehicles would have different needs than drivers of the vehicles. This can be true, however in many situations these two 'roles' overlap in the form of a driving vehicle manager in a small or medium enterprise or in the form of a freelancer with a company vehicle.

Vehicle managers have three main concerns:
- Have functioning vehicles for employees. With this comes the responsibility to provide the vehicles, by leasing or owning them. Owning the vehicles adds extra responsibilities, concerning the finances and maintenance.
- Efficient administration. Most vehicle managers would like to reduce on administration where possible.
- Cost efficient fleet. The vehicles are necessary for the company, however they are an expensive asset.

What are the needs of employees responsible for company vehicles?
Vehicle managers have three main needs:
- Vehicles that support employees with their job
- Efficient administration
- Know vehicle costs and reduce them were possible

Figure 24. Source: Multimerk

ANWB Connected

2. How can ANWB Connected be of value for drivers of and employees responsible for company vehicles?

What is the ANWB Connected product and what can it be in the future?

ANWB Connected is a product that provides drivers with information about their vehicle. This helps drivers to know the technical status of their vehicle and possibly prevent breakdown, with insight in their driving behaviour they can improve their fuel efficiency, Connected keeps track of the trips made and it can automatically end mobile parking transactions. In the design process the focus will be on the app and not on the technical components of ANWB Connected. Therefore it is not possible to design a product that produces comprehensive trip log for tax authorities. The competing apps do not seem very mature yet, however to compete with them a good functioning and visually appealing app is needed.

How is ANWB Connected currently used, and what is the user experience of the product?

The technical problems that cause data to be lost or not shown have big impact on the reliability of the product and the user experience. And the current app does not have a main goal, it rather is a combination of features that the Connected technology can offer.

What do drivers of company vehicles expect from a connected product?

Drivers of company vehicles expect that Connected can support them with: speeding up processes concerning the vehicle; more information than is already available in the vehicle itself and they expect it to be a supportive product.

What do drivers of company vehicles think of the existing ANWB Connected?

They showed only little interest in actually purchasing the product. It offers some features that could be interesting, such as a trip log in order to send invoices to clients. However, many drivers in SMEs had concerns about their privacy.

What do drivers of company vehicles need more than ANWB Connected currently can offer, or is it already sufficient?

In order to be interesting for drivers, the product should or be a complete package or should do one thing good and completely. For the existing features drivers wanted to see: customizable client labels in the trip log, insurance that private use of the vehicle is kept private and the trouble codes page should be able to help understand and solve vehicle problems.

What do employees responsible for company vehicles expect from a connected product?

The employees responsible for the company have the same expectations for Connected as the drivers. They expect that Connected can support them with: speeding up processes concerning the vehicle; more information than is already available in the vehicle itself and they expect it to be a supportive product.

What do employees responsible for company vehicles think of the existing ANWB Connected?

Of all respondents two vehicle managers within SMEs showed most interest in ANWB Connected. They were interested in knowing where their vehicles are, what they technical status is and they expected it to help with fuel efficiency.

What do employees responsible for company vehicles need more than ANWB Connected currently can offer, or is it already sufficient?

As said above, the product should be adapted for the use within companies with several vehicles. Most important is creating overviews of all the vehicles. And in order to increase the fuel efficiency, comparing the Eco scores within the enterprise is expected to be valued and could have an actual impact.

General conclusion

All research has been done to be able to design a product based on ANWB Connected for the clients of ANWB Kleinzakelijk. In order to design a desirable, viable and feasible product three questions are important: What to do, who to do it for, and how to do it.

What to do?

Based on the insights and user needs, a few opportunities are identified:

- Help to prevent vehicle problems and help to solve them when they occur, in order to always have a functioning vehicle
- Help with small tasks and administration to save time
- Help drivers to arrive at their destination efficiently
- Change driving behaviour in order to reduce vehicle cost
- Stimulate safe driving, by preventing phone use

It might however be hard to change driving behaviour, and thus the increased fuel efficiency might not improve drastically. And it is expected that freelancers would not want to limit their own phone use.

Who to do it for?

Small and medium enterprises with company vehicles and freelancers with a vehicle can be quite different. However, the intend of both ANWB Kleinzakelijk and ANWB Connected is to grow. And therefore it might be best not to chose a segment to focus on, but rather design for the complete target group, taking in mind that the added value of the product might be lower.

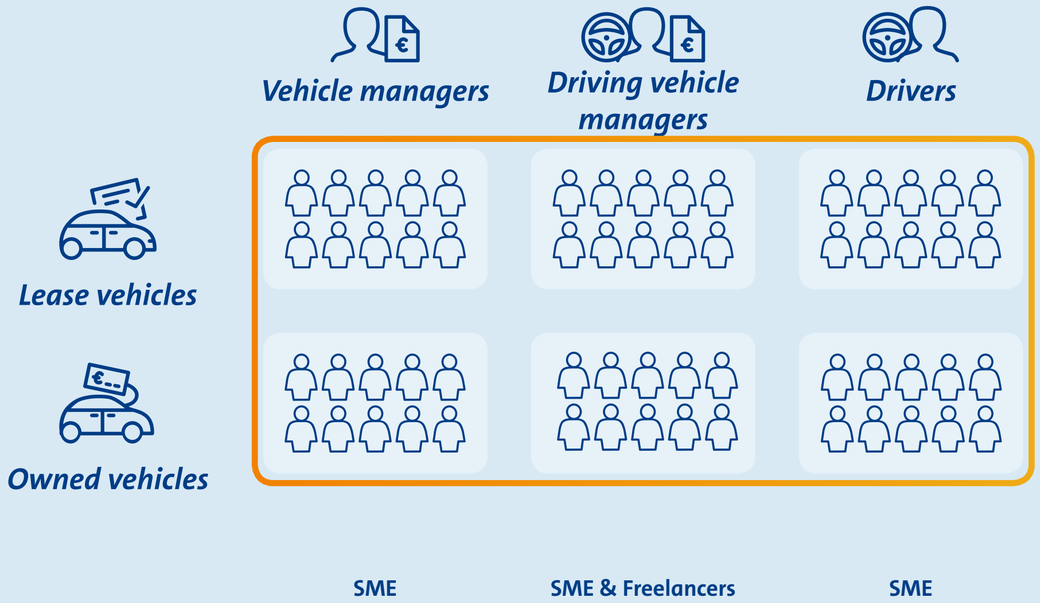
How to do it?

The new ANWB Connected for Kleinzakelijk product should speed up processes concerning the vehicle; give more information than is already available in the vehicle itself and it should be a supportive product. The product should be focussed on adding benefit to the company it is used by, easy things to do this is showing overviews of the complete fleet and adding customizable labels to the trips. It is important to note that the trip log is currently not accurate enough for official use, need for 100% accurate trip log was not studied yet.

3. Define

In the discover phase all relevant information is gathered, and an understanding of the needs and context of the users is created. The goal of this phase, define, is to select the relevant and important information in order to set up the design brief. The design brief contains who has the problem (target user), what problem they have, what the goal is, what the possible side effects can be and what the requirements are (Roozenburg & Eekels, 1998). The design brief is: Create an app for vehicle managers and drivers within small and medium enterprises and for freelancers that helps them to stay mobile and efficient with their company vehicle(s), by providing relevant personalized information.

Figure 25. Source: AWNB Beeldbank



3.1 Target users

The research showed that there are significant differences within the target group, causing different needs. In order to design a product that fits with the needs of the users it is important to define who fits within the target group. In some cases the design can fit better with the needs if a smaller more specific target group is choosen.

Freelance or SME

The segmentation makes a difference between different roles employees can have within a company. Only within an SME can have different roles. The choice is to focus on freelancers, SMEs or on both.

Freelancers

Freelancers are both responsible for their vehicle and drive in them. When a freelancer relies on its vehicle to execute its job, security that it works can be useful. Freelancers typically have to do most of their administration themselves, or they use external parties and products to help them.

Small and Medium Enterprises

Because small and medium enterprises can have different 'roles', and several vehicles. A vehicle manager has the need for overview of the complete fleet, and a driver might have the need for privacy. Focusing only on SMEs gives the opportunity to solve these problems with better fitting solutions.

All SMEs and freelancers

Designing for both freelancers and SMEs increases the potential reach of the product, which would make this a more viable direction. It does increase the complexity of the design process, and the resulting product might fit less to individual needs.

Figure 26. User segmentation.

Leased or owned vehicles

Whether the vehicle is leased or owned has impact on the technical functioning of the vehicles, and on the way they are maintained.

Lease vehicles

With leased vehicles, the lease company is responsible for providing a functioning vehicle, when something is wrong (breakdown or maintenance), the lease company should offer a solution to the driver. And lease vehicles tend to be newer and therefore break down less. Therefore, lease drivers are less interested in technical information about the vehicle. They might however be interested in other features that Connected can offer.

Own vehicles

The company is fully responsible for the maintenance and solving of problems with the vehicle. Therefore drivers might be more interested in the technical state of the vehicle, to know what is going on with the vehicle.

All vehicles

Designing a product for both leased and owned vehicles will increase the potential reach of the product. This might result in a product with more features, of which some are less relevant for some users.

Design for everyone

Both ANWB Kleinzakelijk and ANWB Connected have the intend to grow the amount of clients. Therefore it is intersting not to exclude any potential users. The design and development process might become more complex. And the product might fit less with the individual needs of the user. The target group for this project will be all drivers of and people responsible for company vehicles in companies with a maximum of five vehicles.

3.2 Problem

A good product design solves a problem. So what is the problem that the target group has, that needs to be solved. And can be solved with the ANWB Connected technology. Based on the research five problems were identified that fit those criteria.

Unexpected vehicle breakdown

Vehicle problems and breakdown can happen at any random moment. In those situations drivers do not always know how to solve the problems, and it costs a lot of time and frustration. Preventing vehicle breakdown, and help solve the problems when they occur can help all drivers and companies to stay mobile. Solving vehicle breakdown is already the core business of the ANWB, therefore this problem is interesting to solve. It is noteworthy that a similar product is already being developed by the AWNB, however that product will only become available for the consumer market.

High administrative load

Drivers have to perform several small tasks on a more or less daily basis, these tasks are: getting petrol, parking and parking payments and logging their trips (for taxes or for invoices). These task may not take much time, but accumulated they account for some valuable time that is not spend on the business. Therefore drivers would be helped with a product that helps them do these tasks efficient, or takes all the work out of the hands of the drivers.

Market research (appendix F) has already shown that 40% of the target group is interested in some form of trip logging system, but only 5% the target group has one. Therefore this seems to be a problem that can be solved with a viable product.

Time lost in traffic

Traffic jams are a big problem for drivers. It can take valuable time, when the driver does not take the fastest route, or does not leave in time. To prevent spending unnecessary time in traffic, good traffic information and prediction is needed. The ANWB offers traffic information to drivers via different platforms, however ANWB Kleinzakelijk clients can not use the ANWB Onderweg app, the mobile touchpoint for traffic information. Thus the ANWB can help drivers by providing traffic information on their smartphone.

High fleet cost

Vehicles are expensive, and they consume expensive fuel. Reducing on these cost is always interesting for enterprises. Changing the driving behaviour can have a big positive impact on the fuel cost. It might however prove to be hard to actually change the driving behaviour of a stubborn employee.

Unsafe driving behaviour

Drivers sometimes use their phones while driving, even though they know the risks. Limiting or eliminating this phone use while driving can improve the safety of the drivers. This can especially be interesting when an employer does not want its employees to use their phone while driving. However, freelancers are not likely to purchase a product that restricts themselves. And it is in line with the effort the ANWB is putting into the reduction of phone use while driving (“Laat je niet afleiden | ANWB”, 2019).

Solve three problems

With the technology of ANWB Connected, the clients of ANWB Kleinzakelijk should be helped with vehicle breakdown and the time lost due to solving the problem, daily tasks that take valuable time and the time lost to traffic jams.

Figure 27. Design poblem directions.

3.3 Goal

The goal of the product is to solve the three problems that the target group has. Those problems are: unexpected vehicle breakdown, daily tasks and administration and traffic jams. They can all cost valuable time of the drivers.

Always functioning vehicle

Drivers can experience vehicle breakdown, and solving that takes valuable time. The best solution to vehicle breakdown, is no vehicle breakdown by preventing it from happening. Because connected can read information about the vehicle it knows what is wrong with the vehicle and could help preventing problems. And when problems are not prevented it should be able to help solve the problems in the fastest way suitable.

Increase efficiency

Both the daily tasks and the traffic jams can take time that could be spend on actual work. The goal is to increase efficiency by limiting or eliminating the tasks and traffic jams. Some of the tasks can be automated with the Connected technology, or at least be semi-automated and thus easier to execute. ANWB Connected is not going to solve traffic jams, but it could help drivers to know when and how to go to their destination.

Always functioning vehicle and increase efficiency

The product should help the users in always having a functioning vehicle and it should increase their efficiency.

Figure 28. Product goals.

3.4 Design guidelines

This list of design guidelines consists of requirements, wishes and other things that should be taken into account during the design and devlepment process of the product.

ANWB Connected technology
ANWB Connected is the technical base for this product. This project will take into account the possibilities of the product, and will only adapt the front-end of the product, being the app and what this can offer to the users.

App as mobile touchpoint
Because the problems will be solved happen on the road, the product should be able to go wherever the user goes. And because Connected can transfer data from the vehicle to the internet, the best mobile touchpoint is an app. This app should become available for iOS and Android.

Speed up process
Because the vehicle is connected to the internet, drivers can know more about their vehicle quicker. Because more information is available problems can be solved quicker.

Connected can gather a lot of information, however not everything is relevant for the user. They do not want an overload of information because that would mean a decrease in efficiency. This means that the product should filter or limit in such a way that only relevant and/or useful information is transferred to the user.

More than dashboard
Connected can show information from the vehicle, but when it is the same information as the dashboard of the vehicle is already showing it would not be useful. Therefore the app should show (additional) information that is not shown on the dashboard.

Help and support
When Connected can know what is wrong with the vehicle, users expect it to tell them what to do to solve the problem. It can assist in determining the priority of the problem, what the problem is and how they can solve it. And all with the goal to have the user back on the road with a functioning vehicle as quick as possible.

Client promises
According to the ANWB client promises the product should recognize and acknowledge the user, it should proactively help the user and it should not waste the time of the user.

Product growth
ANWB Kleinzakelijk is expanding its product portfolio. And it might want to have a (mobile) digital touchpoint for its existing and future products. Therefore the app design should be able to expand/adapt to incoorporate different products. However, these products are not taken into account in the design, at this moment.

Phone use while driving
The use of smartphones plays an increasing role in traffic accidents (SWOV, 2018). So, when designing an app for smartphones that has something to do with vehicles and driving it is extremely important to design the product in such a way that drivers will not be tempted to use it while driving.

Employee privacy breach
The Connected technology tracks a lot of information about the vehicle. Especially the location and driving history can be private information, especially when vehicles are used privately. The design should take into account that private use of the vehicle should stay private and should not get into the hands of employers or other colleagues.

Roadside assistance becomes redundant
It might never come so far that all vehicle problems can be prevented, and it definitely will not be soon that the Wegenwacht becomes redundant. But it might be something to think about in the future.

Data can be used against the driver
This year someone got convicted, partially, because of the data from the engine control unit showed that he was driving at a speed of 165 km/h (NOS, 2019). And later this year someone got arrested because data showed that he was ignoring information from the dashboard (Borst, 2019). The data that Connected will store could also be used in these kind of prosecutions. The ANWB should think about what its stance is in the possible situation that it is asked to hand over information. And users should be aware that this data is being stored and could be used against them.

Data hacking
With retrieving data and storing that data the danger of hacking should be taken into account, and the data should be stored and protected. But moreover, potential users should be convinced of the safety of the product, because it is something consumers think about nowadays. And they could be scared that their vehicle will be hacked.

Create an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant personalized information.

Design brief

3.5 Design Brief

The design brief for this project is: create an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant personalized information. Read what that all means:

'Create an app'

The product should be a service, with a digital touchpoint in the form of an app. The product gives information about the vehicle, and therefore this information needs to be available wherever the vehicle goes. This means that an app is the best possible touchpoint.

'for enterprises'

The target users of the future product will be everyone who drives a company vehicle in an enterprise with a maximum of ten company vehicles, and everyone that is responsible for a company vehicle within such an enterprise. Effectively this means that the product will be used by freelancers who are both the driver and vehicle manager of their vehicle and by vehicle managers, driving vehicle managers and drivers within a small or medium enterprise.

'that helps them'

The mission of the ANWB is to facilitate people in being able to move and travel freely and enjoyably. And every product and employee should follow the 'Helpen+' mentality, which means that the ANWB always tries to go one step further than the customers would expect.

And one of the requirements from the user research was that users expect the product to tell them what to do to solve the problem. It can assist in determining the priority of the problem, what the problem is and how they can solve it. And all with the goal to have the user back on the road with a functioning vehicle as quick as possible.

'to stay mobile'

Drivers can experience vehicle breakdown, and solving that takes valuable time. The best solution to vehicle breakdown, is no vehicle breakdown by preventing it from happening. Because connected can read information about the vehicle it knows what is wrong with the vehicle and could help preventing problems. And when problems are not prevented it should be able to help solve the problems in the fastest way suitable.

'and increase efficiency'

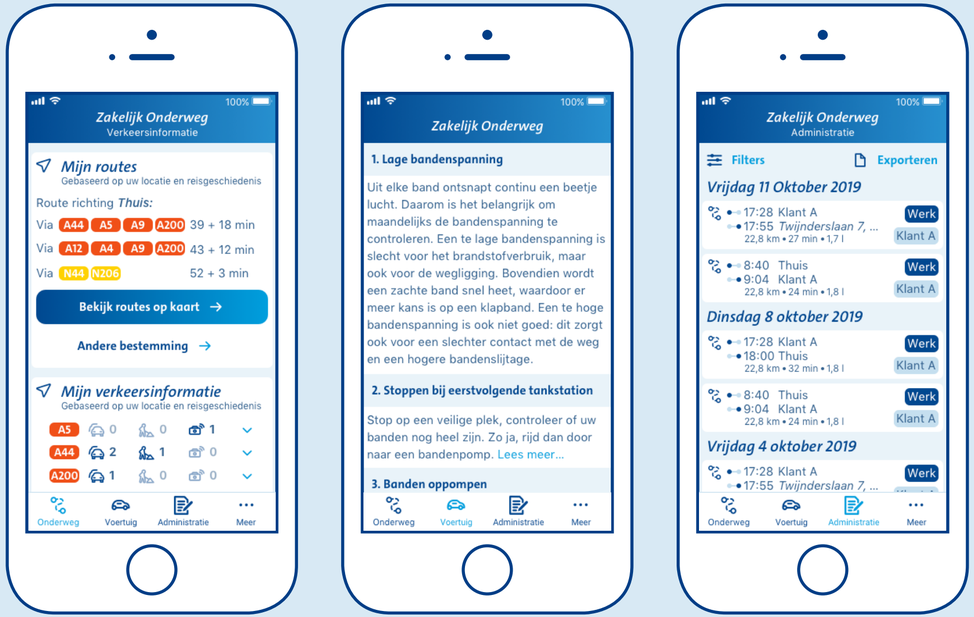
Both the daily tasks and the traffic jams can take time that could be spend on actual work. The goal is to increase efficiency by limiting or eliminating the tasks and traffic jams. Some of the tasks can be automated with the Connected technology, or at least be semi-automated and thus easier to execute. ANWB Connected is not going to solve traffic jams, but it could help drivers to know when and how to go to their destination.

'with their vehicle(s),'

This should need an explanation.

'by providing relevant personalized information.'

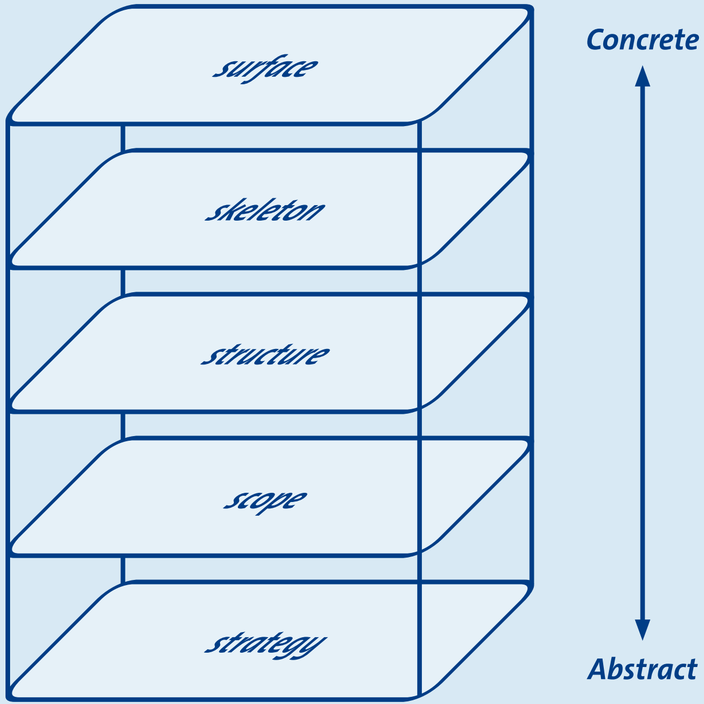
The ANWB has three client promises for its products: (1) We recognize and acknowledge you; (2) We help you proactively and (3) We do not waste your time. Because the Connected technology gathers data about the vehicle (and thus the user), it is possible to fulfil these promises by providing relevant (= no waste of time) and personalized (= recognition) information.



4. Develop

The goals of the develop phase is to create and design “an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant personalized information.” (=Design brief). To structure the design process of the app, the five elements of user experience model by Jessie James Garett is used (Garrett, 2011). This model separates 5 elements (steps) that have an impact on the design and user experience of a digital product. The first chapter in this section will explain more about the model of Garrett (2011). Chapter 4.2 is about the structure of the app and how it was established. Chapter 4.3 is about the skeleton of the app. And, at last, chapter 4.4 discusses and shows the surface of the app, which contains the visual design of the app

Figure 29. Screens from the app.



4.1 Method: Five elements of UX

Designing a digital product that has the intended user experience, is a complicated process. A model to make this process less complex is the five elements of user experience model by Jessie James Garrett (2011) (see figure 25). This model separates the design of digital products into five elements (or planes or steps). Each element focusses on an other part of the design, and influences the element above (and below). In this project the elements were defined from bottom to top, ending with the surface. In this chapter you will read more about the elements and how they were used in this project.

Strategy

Within the model, strategy is defined as the goal that both the company and the users want to reach with the product. The strategy from the AWNB perspective was already defined in the introduction of this report (section 1). That strategy is that ANWB Kleinzakelijk and ANWB Connected want to introduce a product based on the Connected technology into the market of ANWB Kleinzakelijk (see chapter 1.4). The strategy towards the user is to add value for them by providing a product based on the Connected technology.

Scope

The scope of the product has been defined in the design brief (see chapter 3.5). This design brief is: “Create an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant personalized information.”

Structure

This phase defines what users can do with the product and how they navigate through it. This navigational structure is defined in this app structure.

Skeleton

The skeleton usually is made up of wireframes based on the defined structure. Defining what elements (buttons, tabs, images and text) would be placed where in order to create the most optimal layout. In this project the skeleton was not made with wireframes, however, the structure was defined into greater detail defining what information, buttons and links are needed for each feature. In combination with the ANWB design system (see chapter 4.4) this was a more efficient approach to design the app.

Surface

The surface plane contains the visuals, images and text that make up the apperance of the product. In this project the ANWB design system ‘Poncho’ and existing ANWB apps were of great influence on this final step of designing the app.

In the next three chapters you will erad more about the structure (4.2), skeleton (4.3) and surface (4.4) of the app.

Figure 30. Five elements of user experience. Source: Garrett, 20111

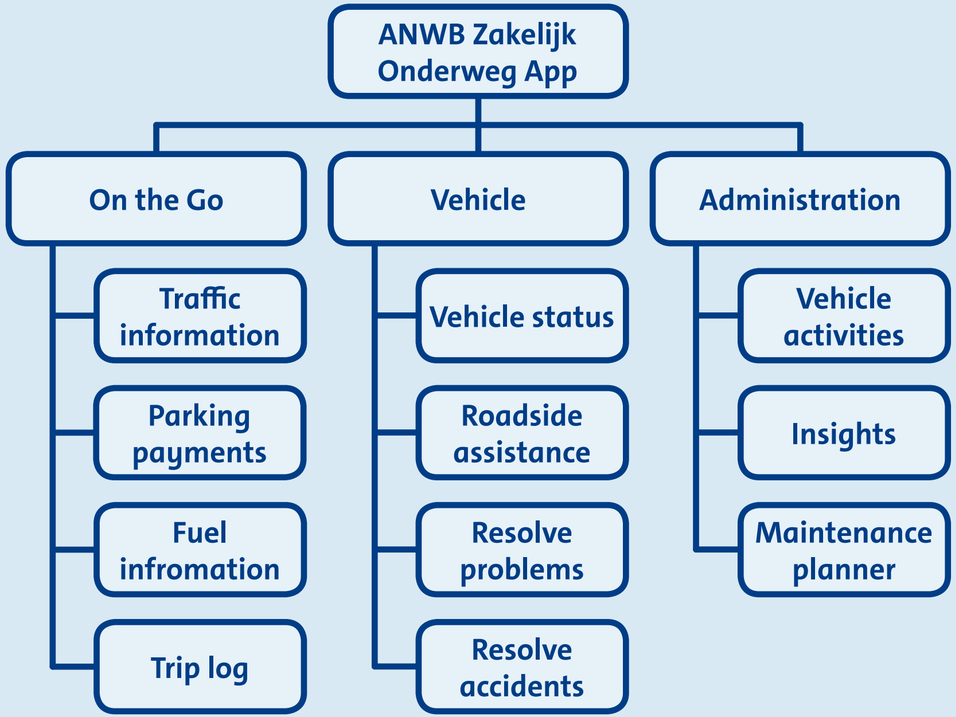


Figure 31. The structure of the app.

4.2 Structure

The structure of the app is based on the customer journey of the target users. Because the journeys show three different groups of needs, the app structure is adapted to those needs. This ensures that the user can find the right information at the right moment. In this chapter you will read about the structure of the app. And about how this structure was created.

Creating structure

The roots of the structure are at the customer journeys developed in the discover phase (see chapter 2.4.3). From these journeys user stories were extracted. Clustering these user stories formed three clusters. The first cluster is focussed on the daily trip and being on the road and needing to arrive at a destination as quick and easy as possible, it is called 'On the Go' (or 'Onderweg' in Dutch). The second cluster is focussed on the technical elements of the vehicle and is called 'vehicle' (or 'voertuig' in Dutch). And the last cluster is focussed on administration and improving the overall efficiency of the vehicles based on gahtered data and is called 'administration' (or 'administratie' in Dutch). These three clusters directly translate into the three main sections of the app. See figure 26 for the structure of the app and figure 27 for the process of creating the structure.

On the go

The goal of on the go is to increase the efficiency of the daily trip. This is done by providing relevant traffic information in time before trips; automating parking transactions; informing drivers when and where to get fuel and by automatically registering trips. Providing drivers with the most accurate and relevant information could make their trips more efficient. Because it has an influence on the daily trip, this section has daily relevance for the user. Therefore, this section will

Figure 32. The process that helped create the structure.

be the homescreen and will show up when the app is opened. This section contains four features, these features are:

Traffic information

Having accurate and relevant traffic information can help drivers make the right decision about when to leave and what route to take. Because Connected keeps track of all trips that the user makes, it can predict when the next trip will be and where it will go to. Therefore, the app can focus on showing the traffic information in the neighbourhood of the user and on the route to their next destination. And it can notify users in case of delays on their upcomming trip.

Parking

Connected knows where and when a vehicle is parked, and it knows when it leaves that parking spot. By automatically checking whether the vehicle is parked in a paid area it can start a parking payment transaction. When the vehicle leaves, the transaction is ended. When Connected takes care of these parking transactions, drivers never have to think about parking payments anymore. Push notification will inform the driver about the parking status and when they will exceed any time limit.

Fuel

Informing drivers about the amount of fuel they have left, and the range they can drive with that fuel, can help them plan when they have to get fuel. Providing them with information about what fuel stations are cheapest can reduce fuel cost. Combining this with the new ANWB mobility card, and the fuel payments can also be shown

in the app.

Trip log
The dongle keeps track of all trips made by the driver. The driver does not have to do anything for this. They can add labels to certain locations that will automatically be added to trips, for example a trip to the office is always for ‘work’, and a trip to the gym is always ‘private’. On top of those labels, they can make personalized labels for example for their clients. All trips can be found in an overview and can directly be exported and shared.

Vehicle
The vehicle section is all about the technical status of the vehicle. Technical information that the dongle receives from the vehicle will be shown here. But, in situations that the dongle has not detected any problems but the driver does experience problems, they should be able to find a solution in this section. This section thus has no daily relevance, it will only be used ‘in case of emergency’. The goal of this section is to prevent vehicle problems and solve them as quick as possible when they do happen.

Vehicle status
The dongle gets information from the Engine Control Unit via the OBD port. When a trouble code is send from this Engine Control Unit to the dongle, it will be shown in a clear and understanable manner to the user in this section of the app. It should explain what is wrong and how the user can solve the problem. In companies with several vehicles, the vehicle manager can see the status of the vehicles within its fleet here.

Roadside assistance
When the driver needs roadside assistance, they should be able to contact them directly. This can be done with the app or via a phone call.

Resolve problems
Vehicle problems can be hard to solve, however some smaller problems can be easy to fix. However, some drivers need support in solving these problems. The app should provide clear and easy to understand information that guides drivers in solving small problems themselves.

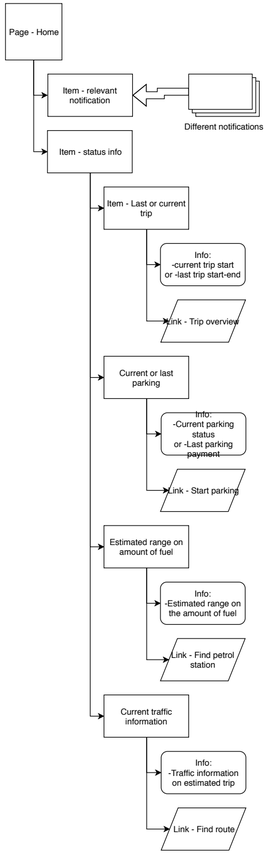
Resolve accidents
When a driver gets into an accident, they might not know what to do. Providing them with a quick and easy to follow step plan with what to do (like safety and insurance), can help them get through difficult situations a little bit easier.

Administration
This section has less daily relevance, and contains the overview of all vehicle activities, insights in the cost and use of the vehicles. And it helps with planning the maintenance of the vehicles.

Vehicle activities
The logged trips, parking transactions and refuelling can all be found in this overview. This overview can be exported. The user can also filter the list on the type of activity or the label, they can also select a time period so they can export the items they want.

Insights
With the insights in the use of the vehicles, companies are able to improve their vehicle efficiency.

Maintenance planner
It is important that the vehicles are maintained in the right way, therefore drivers can see when they have to make new appointments. And vehicle managers can see how their vehicles are maintained.



4.3 Skeleton

The skeleton usually is made up of wireframes based on the defined structure. Defining what elements (buttons, tabs, images and text) would be placed where to create the most optimal layout. In this project the skeleton was not made with wireframes, however, the structure was defined into greater detail defining what information and buttons needed to be on what page. In combination with the design system (see chapter 4.4) this was the most efficient way of designing the app.

Detailed structure

After the structure with the sections and features were defined, more detail was added to it. These details include what information, images and buttons should be available for each of the sections and features of the app (see figure 27 on the left page).

No wireframes

The step of classic wireframes has been skipped in this design process. This was done because of the already defined detailed structure, and because the AWNB has a design system that enables designers to quickly create new designs (more about the design system in the next chapter).

Figure 33. Segment of the detailed app structure.

4.4 Surface

The surface is the last element or step defined in the model of Garrett (2011). In this chapter the 'visual' design will be shown in several scenarios that showcase some of the features of the app. Before showing the design and how it works, first you will read more about the ANWB design system 'Poncho, Existing ANWB apps and the ANWB Tone of Voice.

Design system 'Poncho'

The ANWB has a design system, that enables designers and developers to create consistency in all digital designs of the ANWB. In this design system elements and components are defined. With these elements and components whole pages can be created without having to design new buttons or components. This design system enabled the process of going from a detailed structure to a visual design without first having to design wireframes.

ANWB apps

The ANWB already has apps available in the app stores. Some of these apps do solve some of the problems that the business drivers have. Therefore these apps can be used as inspiration and parts can be directly copied into the design of this app. Copying features from one app to another might come across as unusual, however ANWB Kleinzakelijk clients are currently not able to use the AWNB apps. The two apps that are relevant are the ANWB Onderweg app and the AWNB Wegenwacht app. Screens in the scenarios that have been copied from the existing apps are marked with an *.

ANWB Onderweg app

In the ANWB Onderweg app, traffic information, digital parking payments and fuel station information are combined in one app. Members can log in and find all traffic information and can set traffic alerts for their most driven routes. They can start and end parking transactions from their phone, without having to walk to a parking meter. And they can find fuel stations and the fuel prices at those stations in the app.

Figure 34. The exisiting ANWB Onderweg app and the ANWB Wegenwacht app

ANWB Wegenwacht app

In the ANWB Wegenwacht app, users can report their vehicle breakdown without having to make a phone call. The app asks several questions about the users location and what is wrong with the vehicle. After reporting the breakdown, users receive feedback on the estimated time of arrival of the Wegenwacht.

Tone of voice

An app is more then just visuals, text (or copy) is a big part of almost any app. The style that the text is written in is called the tone of voice. The ANWB writing guide (appendix R) requires that all communication has a contemporary feeling. And it requires all direct 1-on-1 communication to be formal (use 'u' instead of 'je'). And the research in the discover phase (section 2) found that the target group wants to focus on their work rather than on their vehicle. Therefore the communication in the app should be direct and convey clear and unambiguous information. In situation unforeseen or unexpected situation, like vehicle problems or breakdown, the tone of voice should be reinsuring and helpful.

Scenarios

In order to display the design of the app in an efficient and effective manner, some of the proposed features have been designed and are displayed in scenarios consisting of several successive pages. Not all proposed features have been designed at this moment, this does not mean that they should not be part of the final app. However, for some features not enough information about what users expect from them has been gathered in the discover phase.

Traffic information

Drivers need accurate traffic information in order to decide what route to take or even to depart earlier or postpone the trip. Drivers use many different sources for traffic information. And in most cases drivers have to check the traffic information themselves, search through lists or use a route planner.

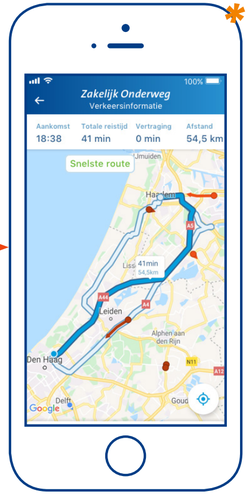
Because Connected knows where a driver has been, it can predict when and where the driver will be going next. The traffic on the upcoming route will be shown in the app, and when the traffic causes serious delays users receive a push notification.

Just like in the ANWB Onderweg app for consumers, all traffic information can be found in a list and on a map (“ANWB Onderweg: Parkeerapp, Verkeerapp en Tankapp”, 2019). So even when a driver is going to a new destination, it will have the most accurate information at hand.

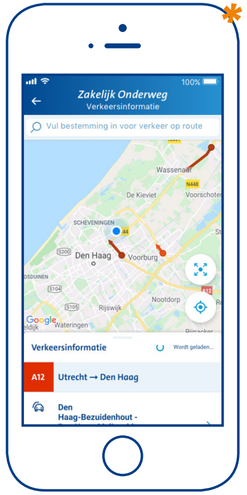
The scenario at the right starts with the following instruction: “It is 17:00 and you are about to go home from you office, you receive this notification on your smartphone, what would you do?”

At the moment the user usaully goes on a trip to a common destination (e.g. 17:00 going home), the user receives a push notification of the current delays on its trip to that destination

From the notification, the app opens in the traffic information section. The user is able to compare different routes and their travel times, in order to see what route will bring them to their destination quickest.



The routes can be compared on a map, showing the quickest first and giving two alternatives.



From the traffic overview page, the user can also find the traffic map, where all traffic jams are shown on a map.

And a complete overview of all traffic, roadwork and speed controls in the Netherlands can be found in the ‘filelijst’.

Fuel

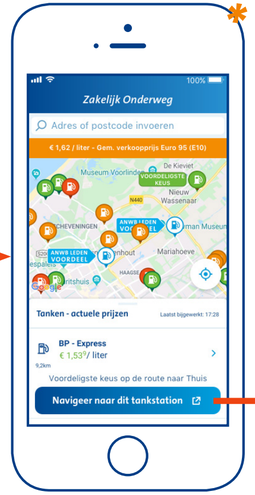
Drivers can check the amount of fuel that is left in the tank on their fuel gage, many can also predict the range they can drive with that amount of fuel. However, some poeple are only triggered by the fuel warning light.

When Connected is able to predict the amount of fuel left, it can provide users with the estimated range they can drive before they have to get fuel. This can help users to plan when they have to get fuel, and maybe leave a little earlier in order to arrive in time at their destination.

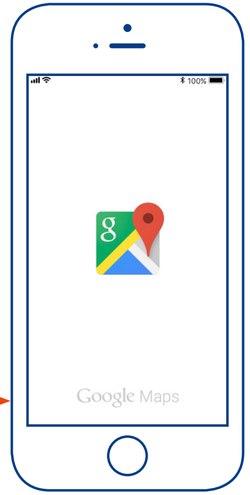
Whenever drivers have to get fuel, they can easily find fuel stations on the route to their next destination. And they can see what fuel station is the most economical, this way they can easily reduce on fuel cost.

The scenario at the right starts with the following instruction: “What would you do, when you receive this notification.”

Whenever the estimated range is low, users will receive a push notification that they have to get fuel soon.



Opening the notification shows the map with the fuel stations in their surroundings. The most economical choice on the route to their next destination will be highlighted.



When the user wants to navigate to a fuel station, the navigation app of their choice opens with the fuel sation as destination.

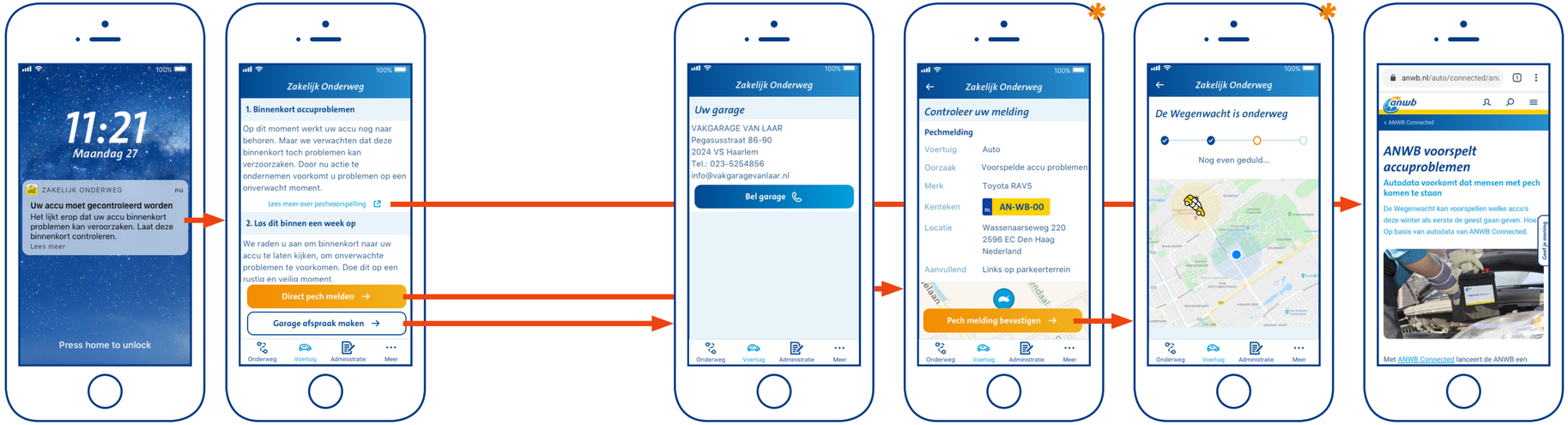
Battery prediction

Currently drivers are only informed about the status of their vehicle battery whenever they are at garage, when the battery warning light turns red on their dashboard or whenever their battery is flat. Especially this last situation is highly unwanted.

The ANWB has developed a algorithm for Connected that can predict when the vehicle battery is expected to go flat. When the algorithm predicts that the users battery will go flat soon, they will receive a notifcation. Users can then either go to their garage or let the Wegenwacht help them with the upcomming trouble.

This battery prediction is part of the vehicle status in the vehicle section fo the app.

The scenario at the right starts with the following instruction: “You have just arrived at your destination and receive this notfication, what would you do?”



When the battery is predicted to go flat soon, users receive a notification that they have to let their battery get checked.

After opening the notification users can read about what the problem is, and how they can solve it. They can directly report the problem to the Wegenwacht, or get in contact with their garage.

When the user wants to make an appointment they are able to directly make a call to their garage.

Or they can requist the help of the Wegenwacht. Their information is already prefilled.

After confirming their situation, the Wegenwacht is on its way and the user receives feedback on the estimated time of arrival.

When the user wants to read more about how the ANWB can predict battery problems, they will be linked to the information page on ANWB.nl.

Roadside assistance

Unfortunatly Connected is not able to predict and prevent all vehicle problems, or even detect what is going wrong. And it can occur that drivers will be in a situation where they do need the roadside assistance. In safe situations the driver can get the roadside assitance via the app. In dangerous situations they always need to make a phone call.

The scenario at the right starts with the following instruction: “You are on the highway and your vehicle has broken down, you need roadside assistance. What would you do?”

Users can get the roadside assistance via in the vehicle section.

Drivers are asked to report in what situation they are. When the dongle can recognize the situation, it will skip this step.

In unsafe situations, users will always have to make a phonecall.

When drivers are in a safe situation they are asked to answer some questions about he problems they are experiencing. If possible they are given help to solve the problem themselves.

Tire pressure warning

Many vehicles have dashboard warning lights that inform drivers about vehicle problems. But, when such a warning light turns on, it can cause a lot of stress and confusion. Solving the problem can take a lot of time, not because of the difficult solution, but because in many cases drivers do not know what to do.

Connected can get information about problems from the Engine Control Unit. When problem occur, drivers can be informed and be presented with a solution. The notification they receive needs to have the urgency of the problem in it. The solution can be that the driver can do it themselves, but it can also be that they have to get roadside assistance or have to go to their garage.

In the case they can do it themselves, they are presented with a clear step by step guide to solve the problem. An example of such a situation is a low tire pressure, shown in this scenario.

The scenario at the right starts with the following instruction: “You get into your car in the morning, and receive this message. What would you do?”

When the dongle recognizes a problem, the user receives a notification informing them about what to do, and when to do it.

The users receive detailed information about what the problem is. When to do something about it, and what they should do to solve it.

They can easily solve the problem themselves with the step-by-step guide.

Whenever they are not sure about what to do. They can easily call the technical help desk for help.

Export trip log

For a lot of small businesses it is important to keep a trip log. It can be for the tax authorities, but in may cases it is used for invoicing to clients. Currently many businesses keep their trip log on a paper sheet, keep track in an excel document, or search the distance with a route planner when they are making the invoice.

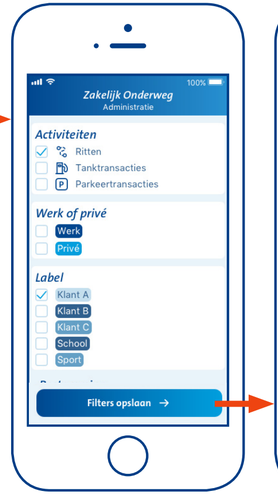
Connected automatically tracks all trips that the vehicle makes. By creating different destinations, labels can automatically be added to trips to certain locations. So all trips to the adress of a certain client will automatically get the label of that client. The trips are also automatically logged ‘work’ or ‘private’, this can also be done based on the moment the trip is made, for example trips in during the weekend are always private. This way drivers do not have to keep track of their trips and do not have to add labels to them.

When they want to have an overview of the trips, they can easily export the list. Only want to export trips for a certain client or in a certain period, that is possible because of the filters.

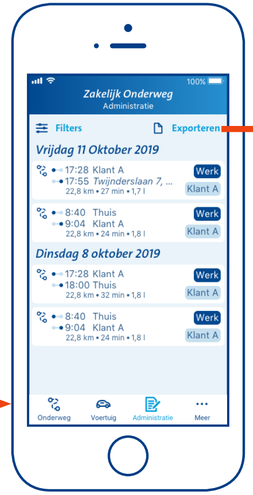
The scenario at the right starts with the following instruction: “Your boss wants an overview of the trips you made for client A in the past week. Can you show me how you would do that?”

The activity overview can be found in the administration section of the app.

In the activity overview all trips, parking transactions and refueling transactions can be found.



By filtering the user can create a selection of activities to export.



The overview can be expored to PDF, and directly be shared with for example your boss.

5. Deliver

In the last phase, deliver, the concept design will be tested and evaluated in order to improve the design and give recommendations to the ANWB on what to do with the concept and this project. You will first read about the usability test that was conducted. Then the final design adapted to the results of the usability test will be shown. And at last the recommendations on how to continue with this project are discussed.

Figure 35. Source: AWNB Beeldbank

5.1 Concept evaluation

In order to evaluate the usability of the concept, a usability test was conducted with a digital prototype. The results of the test provide feedback on the usability of the concept, and will help evaluate the concept. In this chapter you will read about the setup of the usability test, the results and the recommendations for the concept based on this test.

Goal

The goal of this usability test is to get a first reaction on the usability of the product and a first impression what people think about the concept. And with the results of this usability test, recommendations can be made towards the ANWB about whether this concept can be viable from a usability perspective.

Method

In order to study the usability of the concept, a usability study was setup. The goal of this study was to evaluate the usability. In order to do this a clickable prototype was created, and participants were given scenarios to execute. During the test the focus laid on the expectations, understanding, behaviour and experience during the use of the prototype.

In order to understand what the participants do, and why they do it, they were asked to think aloud. And after all scenarios a short evaluation about their experience and thoughts was done.

Figure 36. Source: AWNB Beeldbank

Setup

The usability test was conducted with 4 respondents, each test took around 45 minutes each. They followed a test script, the prototype was a digital clickable prototype and the test was conducted in a lab setting.

Test script

In order to make sure all test were executed in the same manner, a test script was created. This test script consisted of the following elements:

Introduction
Explanation of what will be done, how the prototype works and ask respondents to think aloud.

Explanation of ANWB connected
AWNB Connected is explained to the respondents with a youtube video explaining how it works (“Haal alles uit je auto met ANWB Connected”, 2017).

Scenarios and use cases
For each task the respondents were given a situation (time and location) and a task to conduct. The six scenarios were:

1. Traffic information
2. Tire pressure warning
3. Exporting trip log
4. Battery prediction
5. Get roadside assistance
6. Fuel warning

For the full test script see appendix S.

Clickable prototype
The designed scenarios shown in chapter 4.4 are all part of a clickable prototype in Sketch. Each of these scenarios has its own task and during the usability test, respondents will be asked to execute the task.

The design for the prototype was made for an iPhone, the test however was done on a MacBook laptop. The respondents had to use the mouse and track-pad in order to navigate through the prototype.

Recruitment
The target group of the product is hard to recruit for a usability study. Therefore, unfortunately, the recruitment was done within the ANWB. In order to get a good understanding of the usability of the product, 4 respondents were recruited. On average, 4 respondents already find about 75% of all usability problems within a product (Nielson, 2000).

Execution
The usability test was executed in a lab setting with 4 participants, they were internally recruited within the AWNB. Two of the participants are freelance workers that use their car to go to their work and clients.

Documentation
During the test, notes were taken digitally to be able to create findings of the user test. The tests were recorded in case something had to be listened back to.

Results
Based on the executed usability test, findings were documented on all of the tested features.

Traffic information
The traffic information warning is perceived as useful, many drivers already check the traffic information before leaving the office. The notification that told what the quickest route would be was, however, not directly taken as a true fact. Most people want to compare their options. And for some it is important to know what the source of the traffic jam is, to be able to weigh the severity. In order to decide on what route to take, people like the map with different routes and expect to be able to see what the traffic jams are on those routes.

In general people thought the traffic information page was a little cluttered and contained to much information to be taken in at first glance. And at last people would like to be able to start the selected route as navigation or in their navigation app or system.

Recommendations:
- Combine ‘my routes’ and ‘my traffic’, so the detailed information can be found per route;
- Make it easier to see the different routes on the map;
- Declutter the traffic information page.

Tire pressure notification
The notification and explanation did not gave clear indication of the urgency of the problem. When people get such a notification they expect to be able to directly know when and what to do.

The notification currently indicates that ‘the tire pressure might be low’. For some people this indication is vague and they would expect that, because it has been measured by the vehicle, the notification would be true. And thus should be ‘Your tire pressure is low.’ or ‘You need to inflate your tires.’

The explanation about what was wrong and what to do was helpful, however it was perceived as a an overwhelming amount of information, that for some would only be interesting to read the first time this problem occurs. The page consisted solely out of text and could use some visuals to help ‘scan’ the page better.
The help and guidance provided was perceived as to general and not as useful as expected. People expect the app to know what tire pressure is needed, because it already knows what vehicle they have. It would be appreciated when the app would help find a (free) tire pump in their neighbourhood.

Recommendations:
- The urgency of the problem is the most important aspect of a notification, and should thus be clear within the notification;
- The information has to be personalized and relevant, for example by providing the right tire pressure;
- The information can be improved by using visuals to make it easier to scan.

Trip log
The activity overview shows the information that it has to show, however people do experience an overload of information. The most relevant information is the day of the trip and the begin and end point. The other information is interesting, however could be hidden behind a ‘click’. The labels were perceived as useful, and people expect them to be added automatically when the app recognizes certain locations. Exporting a certain selection was clear, however people did not see that the ‘filter page’ was scrollable, and they expected to select and de-select certain items before the final export step.

Recommendations:
- De-clutter the overview, by only showing the most relevant information in the overview (date, activity and route) and giving more detailed information on the detail page of an activity;
- Enable users to select and deselect items before exporting.

Battery prediction
The notification does not tell the user what is really wrong, what they should do and what the urgency is (when they have to do it). People expect, especially from the ANWB, that the message (or the information page) tells them what the source of the problems is, when exactly they have to do something and what they then have to do.

Recommendations:
- Give the user clear information on the urgency of the problem;
- Enable users to postpone the notification;
- If able, be more clear about what the source of the problem is, and why the user should get their battery checked.

Roadside assistance
Most people find it easy to reach out to the ANWB roadside assistance via the app. However, the notification that the dongle has not detected any problems with the vehicle frustrates people (even in a scenario based setting). The message that nothing has been detected can come across as the app telling the user they are wrong. Other people do not mind the notification because it is based on technology, and technology can be wrong.

Recommendations:
- Users do not want to see that ‘everything is alright’ when it is clearly not.

Fuel prediction
In general people already know when to get fuel based on the fuel gage on the dashboard. They also tend to have a standard spot to get their fuel. The notification that advises users to get fuel is less relevant then the other shown notifications. These not important messages can even lead to users turning off all messages. Searching a fuel station alongside the road they will take and being able to select

the cheapest station is, however, interesting.

Recommendations:
- Show the fuel stations on the route to their destination;
- Only show fuel notifications when users will not be able to reach their next destination.

General
In general the notifications can be useful for the user. However, they will almost always have some negative connotation to them. It is important that the language used in the notifications is clear and unambiguous and immediately tells the urgency of the problem. And at last the notifications should not 'tire' the user, therefore it might be needed to limit the amount of notifications that they receive in order to prevent them of turning them off.

In the scenarios the moment people received the notifications also was different for the tasks. People react different to the notifications based on the moment they receive one. In the morning, when going to work, people do not have the time to do low priority tasks. As one of the respondents described: 'Do I need to change my plans, or can I continue and do this at the end of my day?' It might be better to send notifications about tasks that have to be performed within (for example) a week at the end of the day.

The ANWB is seen as a knowledgeable association that knows what they do and does that right. This means that users will almost blindly trust on the information shown to them, especially in critical situations, it therefore is important that the information is right. On the other hand, if the information is obviously wrong (for example in a situation where the dongle does not detect any problem, but there is clearly something wrong with the dongle), it can have a big impact on the trustworthiness of the product.

People do have a slight feeling that they are being followed like in big brother. However, when this information is used in the right way and helps the user to get things done easier, it might be more accepted.

Conclusion
Based on the results of this user test, it is possible to answer two questions: How can de usability of the concept be improved, and what is the response and impression of the concept?

Usability
In general users can execute their tasks without big struggles, thus the usability is 'fine'. However, some aspects of the design need improvement being: the copy used in the app and notifications, the overwhelming and cluttered pages need to be 'cleaned up' and pages that help drivers solve their problems show to much information and can be improved by (for example) adding visuals.

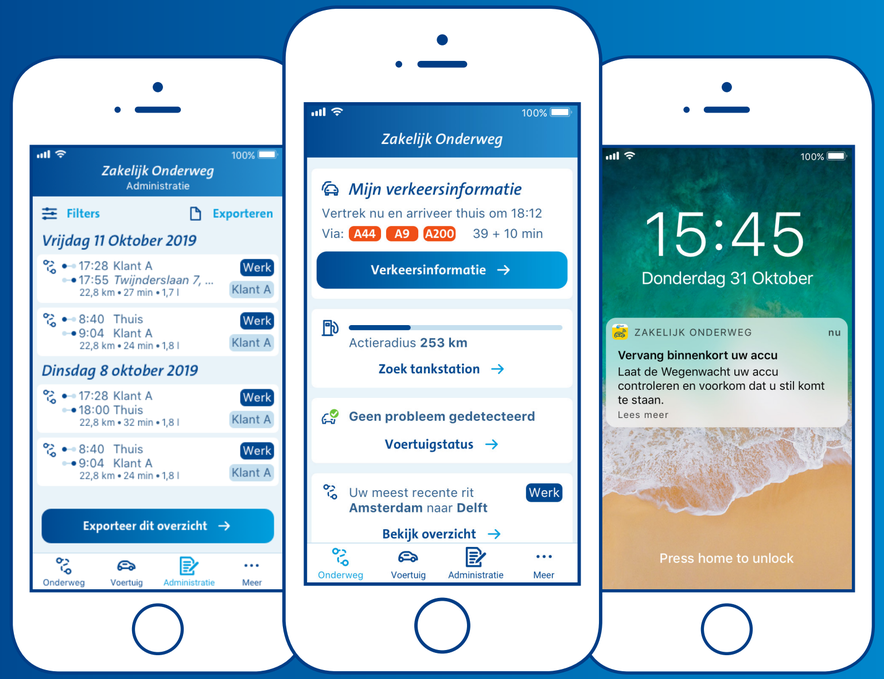
The text used in the notifications and in the app needs to be direct, and give the users an understanding of the problem and when to solve it (the urgency). But the text also needs to calm and reassure the users. This balance needs to be found in order to inform the users with the right information, without causing to much stress and confusion.

Some pages show an overwhelming amount of information, and do this is in a way that users do not know where to look. These pages need to be 'cleaned up' and get focus, this means that design choices have to select information that they user will be presented first. Instead of letting the user select what information they want to see.

And at last the solution pages that should help drivers solve vehicle problems, currently exist almost completely out of text. To help users scan the pages easier, visuals should be added. And information that users might only want to read once, or some do not need at all might be hidden in the first place.

Concept
In general the information that the app provides to the users is seen as useful. And the notifications that inform users that something is wrong with their vehicle are also received in a positive manner, people will be frustrated that something is wrong but are glad they are informed about it. Users expect the app to help them solve the problem they are presented with, in some cases the given solutions are not detailed and personalized enough.

Users will probably have some doubts about their vehicle being tracked and followed all the time. However, when they receive relevant and personalized information in return users might accept it more. It is expected that returning value to the users will satisfy them more with being followed then informing them that the information 'is used in a safe manner'.



5.2 Design showcase

Stay connected
Keep moving

ANWB Business On the Go app

ANWB Zakelijk Onderwe app

- ✓ **Increase the efficiency of company vehicles**
- ✓ **Prevent vehicle problems**
- ✓ **Connected with the dongle**

- Efficient administration with all your trips, parking and fueling in one overview.
- Users will always have the most relevant an personalized information at hand. Improving their vehicle efficiency.
- Vehicle problems can be prevented. When they occur you will be on the move in not time.

Figure 37. App design show case

5.3 Project evaluation

In this concluding chapter of this project report you will read about the limitations, conclusions and recommendations of the project.

Limitations

In order to make a well deliberated choice on how to act upon the results of this project, it is good to be aware of the limitations of this project.

Complex target group

The target group for this project was defined as all clients of ANWB Kleinzakelijk, which can be all small and medium companies and Freelancers with company vehicles. This is a big, brought and complex target group. It was hard to find representation for the full target group within the respondents of the in depth interviews. This means that it is possible that not all needs and aspects of the target group have been represented in the results of the research in the discover phase.

Learning process

This graduation project also was a learning opportunity. And learning often comes with trial and error. This project, however, has strived to deliver the best solution and design to the given assignment.

Limitations usability test

The respondents that took part in the final usability test, did not fully fit within the target group of the product. The findings of this test can tell us something about the usability and how the product is perceived by a more general public. However, the findings from this test cannot be used to draw conclusions on the desirability of the product.

Design everything for everyone

In order to make the product viable and interesting for the complete target group of ANWB Kleinzakelijk, choices were made to keep the target group brought. The goal within the design brief was brought as well. The first can have the result that not everyone within this brought group will have the same intended user experience while using the product, because it is almost impossible to design a product that is focussed on everyone's context and needs. The latter causes that a lot of features have been proposed, however they have not all been designed into detail.

Figure 38. Source: AWNB Beeldbank

Conclusions

The project brief for this graduation project was: How can the ANWB support Small and Medium Enterprises (SME) with a connected car service?

In order to answer that project brief, qualitative research was done to answer the two main research questions: What are the needs and context of drivers of and employees responsible for company vehicles? And, how can ANWB Connected be of value for drivers of and employees responsible for company vehicles? The answer to the first question is that in most cases the vehicles are needed to be able to work, therefore they want the vehicles to always function and to use them in an efficient manner. The answer to the second research question is that Connected can help companies retrieve information from their vehicles to help them with keeping their vehicles working and help the improve efficiency.

After the research phase the design brief was formed: Create an app for enterprises that helps them to stay mobile and increase efficiency with their vehicle(s), by providing relevant and personalized information.

The product that was designed to this design brief can be seen in the previous chapter. This product uses the Connected dongle and technology not just to provide the user with data from the Engine Control Unit, but it uses the data that is gathered to provide the user of personalized and relevant information that helps drivers and companies to keep their vehicles functioning and improves their efficiency.

The usability test performed to evaluate the concept showed that the interaction (almost) has the intended interaction and that the product can add value. However, the desirability within the target group has not been determined yet.

Recommendations

This project has lead to the design of a concept app. This app is an answer to the project brief that this project started with. However, the ANWB has to make a decision on how to value this project and how to continue to introduce the Connected technology on the ANWB Kleinzakelijk market. In this recommendation you will read about the possible directions and choices that can be made or can help to continue in the future.

Three options

This project proposes to design a new app, that is different to what already exists. However, other options to introduce Connected to Small and Medium enterprises have been identified, but not explored. The three options that can be considered are:

1. The app as designed in this project;
2. Make minor changes to the existing ANWB Connected app;
3. Enable the Kleinzakelijk clients to use the consumer apps.

1. Continue with this project

The app designed in this project fits with the needs and context of the target users. The investment (time and money) that has to be done to introduce this project is expected to be higher then the other two options presented. But when the ANWB decided to go with this new, all in one, user centered app.

When the AWNB decides to continue with the design from this project, it is advised to validate the interest from the target group into the product. The next step is to create priority in the features, because the current proposal contains many features where users might, at first, only need a few of those. And at last, keep evaluating the usability with the target users.

This project was executed with a user centered focus. The viability and feasibility of the proposed concept were taken into account, however have not been measured and determined in this project. It is advised to investigate what a viable business model for this product could be and whether the ANWB is able to develop all technological aspect of the design.

2. Redesign existing Connected app

When the investment of designing a completely new app is deemed to be to big, redesigning the existing Connected app stays an option. To do this, the user insights from the discover phase can be used to make adaptations to the current design. However, a redesign of the current features might not fit with all the needs of the target group.

3. Use existing apps

Many features that are proposed in the app design in this project already exist or are being developed within the ANWB. However, the clients of ANWB Kleinzakelijk are not able to use these consumer apps. The problem is that the Customer Relationship Management systems are different, causing that Kleinzakelijk members cannot log into the consumer apps. This project has not researched the opportunities and costs of enabling the Kleinzakelijk clients to log into consumer apps. However, it might be useful to research this to be able to compare it to the cost of developing and maintaining a new app.

Untrustworthy technology

One last note that has to be taken into account when making any decision on using the Connected technology in the ANWB Kleinzakelijk market, is the reliability of the technology and software. The app store reviews and the dedicated Facebook group are filled with complaints that data is missing in the app, or that the dongle is not functioning properly. And the trip log deviates from the actual travelled distance, which can be a problem when businesses want to use the product to send the trip log to the tax authorities.

Reflections

I honestly hope I will never have to do a graduation project again. But whenever I will have to, first read the following statements.

Manage Expectations

You are doing this project alone, and you do not work as fast as a design team. Be realistic about what you think you can do within the project, and communicate this clearly to your stakeholders. Whenever they ask for more, explain that you are not going to give guarantees.

Plan for delays

Doing a graduation project is a complicated process. But the thing you will be graded on is a thesis, text on paper. So do not forget to write what you are doing, have done and have learned. It will save you a lot of stress at the end of your project. Here is a short day to day week planning:
Monday – Communicate, with stakeholders and coaches;
Tuesday – Planning, based upon the feedback think about what you will do on Wednesday;
Wednesday – Project work, actually work on doing the project;
Thursday – Write, do not forget to document everything you are doing;
Friday – Nothing, some of these activities probably took more time, plan for that to happen.
In all seriousness, do not expect that you will actually be designing, researching and writing five days a week.

Stand still

Whenever you do not know what you should actually do, dare to stop and stand still. Do not continue doing something because you planned to do it weeks ago. Always evaluate what you are doing, and where the project is going.

Dare to chose

Designing is making choices, so date to make them. If someone else is in charge of making the decision hand them all information needed to make the best possible decision. If they will not make a decision, ask why and try to answer those questions (even if you have to do more research to answer that question).

Personal goals

In the project brief I defined three personal goals, this is a short reflection on those goals.

Have an impact

One of my goals was to have an impact on the life of potential users by designing and delivering something that the ANWB will actually continue with. I am not sure I succeeded in that. I might went a little to far with designing something that fits with all user needs, and lost the reality of the technology and cost of development of the product.

Context Mapping

I wanted to use the context mapping method in the project. Unfortunately I was not able to use any sensitizer in the research. However, the use of the creative tools was, even in unknown settings, successful. Having different methods and ‘moments’ in the interviews gave a lot of different perspectives on the same topic.

Usability testing

Unfortunately, the target group was hard to reach to be able to do a full usability test with the target group. However, I did eventually use my interviewing skills in the last evaluation test.

Figure 39. Source: AWNB Beeldbank

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