hochschule mannheim

CARUSO dataplace

# Requirements Specification for a telemetry data visualization dashboard for Caruso GmbH

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In cooperation with the company Caruso GmbH

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# Change Log

**Table 1:** Change log

| Version | Date | Description | Author |
|---|---|---|---|
| 0.1 | 18.12.2022 | Setup of the intial document with table of contents | Marvin Karhan |
| 0.2 | 20.12.2022 | Add first key notes for the first chapter and modify the change log style | Joel Staubach |
| 0.3 | 21.12.2022 | Add non-functional requirement Chapters and outlook | Jan Mayer |
| 0.4 | 23.12.2022 | Add project background, goals and solution | Joel Staubach |
| 0.5 | 24.12.2022 | Add stakeholders chapter, except Personas | Joel Staubach |
| 0.6 | 26.12.2022 | Add Current Situation, Context Of The Work, Product Boundary, Use Case Table, Individual Product Use Cases, Functional Requirements, Personas | Joel Staubach |
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# Contents

# Introduction

This document is intended to reflect the requirements of the data appetiser of the client Caruso GmbH. The purpose of the data appetiser is to demonstrate the value of telematic data from cars to potential customers for Caruso.

The document is based on a scaled down version of the Requirements Specification Template Volere by James Robertson & Suzanne Robertson and is intended to discuss the requirements for a solution to the required problem.

# Chapter 1

# The Purpose of the Project

"How might we help non-technical stakeholders to understand the value of telematics data with visualizations / dashboards?". This question was posed to students of the Mannheim University of Applied Sciences by the company Caruso GmbH at the start of the winter semester 2022/23 as part of the course "Projektsemester Software Engineering (PSE)". Over the course of two semesters, an application will be developed which will convince Caruso's potential customers to buy their product with easily understandable data visualisation.

## 1.1 The User Business or Background of the Project Effort

The company Caruso has been producing a standardised interface for telemetry data of connected cars from various manufacturers since 2017. Connected cars are vehicles which can share physically measured data (telemetry data) such as temperature or tire pressure through an internet connection.

Caruso enters into contracts with car manufacturers (OEMs) such as Mercedes or BMW to buy their telemetry data. This proprietary vehicle information is collected and standardised into a single interface, the Caruso API. For example, data items in the Caruso API include the position of a vehicle or its next service date. External customers can then subscribe to data items or packages of their vehicles. How they are billed depends on the data item, though it is often monthly. Some may be billed per car per month, some per access per month and some incur a flat fee per month. Caruso sells these data items and packages to customers like auto repair shops, insurance companies or roadside assistance companies.

Many of these customers are medium-sized companies which need to be convinced of the value of this interface and the data before they are willing to invest in access to the Caruso dataplace. These customers are called decision makers. They are the representatives of a company which decide to buy the data. Usually they are executives without a technical background, meaning that they don't understand the value of raw data items alone. These decision makers are much more interested in their data being visualised in an easily understandable way that also shows its value. Especially important is live data of a vehicle such as its position changing as it is being driven.

Caruso currently does not offer an application with which live data can be explored by a non-technical user. Currently, scripts are used to gather data of a vehicle through the interface and accumulate it in an Excel or HTML report. These reports are manually created by multiple Caruso employees and have to be individually created for every customer.

## 1.2 Goals of the Project

The overarching goal of this project is as follows: "Through an improved workflow, data items that are relevant to the decision maker can be visualised more quickly and comprehensibly by the sales employee". The product being developed will aid the sales employee of Caruso to more quickly and efficiently develop presentations for potential customers and decision makers. This goal can be split into separate sub-goals:

1. The product visualises live information of the vehicles. This increases the decision maker's trust in Caruso.
2. The product shows the data items in a way that is comprehensible to non-technical decision makers. This makes the value of the data more readily apparent.
3. The product is reusable for multiple decision makers. This reduces the time investment and manual work necessary for each data data appetiser.
4. The product is easily configurable without technical knowledge. This will allow the non-technical employees of Caruso, such as a sales employee, to prepare an data appetiser without help of a developer.

## 1.3 Overall Solution

Broadly speaking, the solution to the question posed by Caruso is a web-based application which hosts multiple dashboards. Each dashboard is configurable to fit the needs of individual decision makers. They include data items from the decision maker's vehicles, visualised into an easily understandable form, for both individual vehicles and groups of vehicles (fleets). The solution will be called Carvis in the following chapters.

# Chapter 2

# The Stakeholders

In this chapter, we will identify the key stakeholders of the project and describe their needs, expectations, and concerns as they relate to the project. By understanding the needs and expectations of our stakeholders, we can ensure that the project meets their requirements and delivers the desired outcomes. Figure 2.1 shows the stakeholders of the project. Stakeholders are separated into three categories: the core target group, direct stakeholders and indirect stakeholders. The core target group are the main beneficiaries of Carvis, the people who are intended to use the product. The direct stakeholders are people and organisations who are linked to the project. They either work on the project or provide critical information without which it could not succeed. The indirect stakeholders are people and organisations who also profit from the success of the project but have no direct impact on it.

## 2.1 Core Target Group

The core target group consists of three stakeholders: the Caruso sales employee, the Caruso configurator and the decision maker of a potential customer company. The following section will present the obligations of each stakeholder and explain their relevance to the project.


**Figure 2.1:** Stakeholders

### 2.1.1 The Sales Employee

The Caruso sales employee is a representative of Caruso who negotiates and closes contracts with decision makers of other companies and sells them Caruso services. Their obligations include:

- the acquisition of customers,
- the preparation of sales pitches for decision makers,
- the presentation of the sales pitch to build the decision maker's trust in Caruso data,
- the answering of any remaining questions the decision maker may have,

- the preparation of customer-specific data items,
- and the closing of contracts with decision makers.

The Caruso sales employee is essential both in the current and the planned future process of acquiring new customers. They were the main point of contact for questions during the design sprints.

### 2.1.2 The Decision Maker

Decision makers are potential customers of Caruso which are interested in the data provided. They are often the executives of medium-sized companies which hope to improve the workflow in their company or develop new applications using Caruso data. According to Caruso, the most profitable customers are insurances, roadside assistance companies, auto repair shops and fleet management companies. During the design sprints, contact to the decision makers wasn't established directly but their wishes were expressed by the sales employee. Still, their interests are a core driver in the design of the product as it is ultimately intended to convince them to invest in Caruso services. They:

- decide whether or not to enter into contracts with Caruso on behalf of their companies,
- often have little technical know-how,
- and will only buy a product whose value they appreciate and which they trust.

### 2.1.3 The Configurator

The Caruso configurator is an employee which aggregates customer data into an Excel or HTML report. They have technological skill and will prepare the data for sales pitches at the request of the sales employee. Their obligations are:

- the aggregation of vehicle data,
- the creation of Excel or HTML reports,
- and the manual configuration of reports to accommodate a decision maker's individual requests and wishes.

After the successful conclusion of this project, the configurator will have a much smaller role or will not be needed at all as Carvis will automatically aggregate the required data and will provide an interface for the sales employee to configure it without needing technical know-how.

## 2.2 Other Stakeholders

The other stakeholders of the project are the direct and indirect stakeholders. As they are not directly responsible for any requirements of the project, they will not be mentioned in the following chapters and will only briefly be described here.

### 2.2.1 Direct Stakeholders

- **The eight eyes Team**: The eight eyes team has identified Caruso's wishes and the requirements for an application to fulfil them. This resulting document will provide developers the basis for a successful project.
- **The Professors**: The professors established the first contact to Caruso and organised the central aspects of the project as part of the PSE course.
- **The OEMs**: The OEMs provide the raw vehicle data which Caruso buys and standardises. Without them, this project would not be possible.

### 2.2.2 Indirect Stakeholders

- **The Shareholders**: The shareholders invest in Caruso and thus profit from any new contracts that may be closed as a result of the success of this project.
- **The Competition**: The competition are companies which offer similar services to Caruso. They will be negatively impacted by this projects success.
- **The Drivers**: The drivers are the customers of the decision makers. They will profit if the further use of Caruso data leads to better customer service or new applications they might use.
- **The Caruso Development Team** The development team will expand and maintain the Carvis system in the future.

- **The Data Security Officer**: Data security officers handle the security of Caruso data. Caruso cares about the security of their customer data, however according to Caruso it should not be a priority for the purposes of this project.

## 2.3 Personas

A representative persona has been created for each stakeholder of the core target group to better understand and gain deeper insight into their challenges. These personas include demographic information, a job description, goals, aspirations and challenges they face at work. It also describes how Carvis will support them to overcome their challenges and meet their goals.


**Figure 2.2:** Persona: Sales Employee

Figure 2.2 shows "Cornelius von Grünwald" who is representative of the sales employee. As such it is his job to acquire new customers and hold presentations to showcase Caruso data. He has little technical know-how and relies on developers

(configurators) to prepare data for him. He prioritises building trust between him and his customers and values their individual wishes.

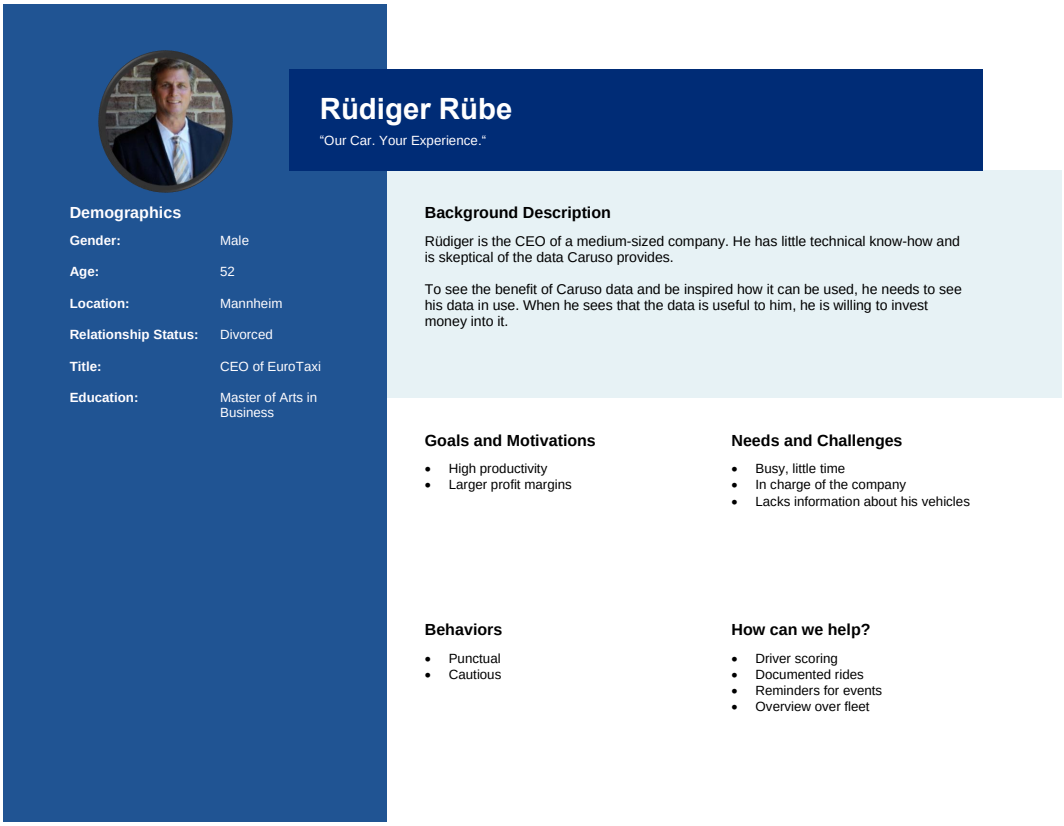
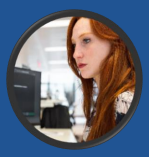



**Figure 2.3:** Persona: Decision Maker

Figure 2.3 shows "Rüdiger Rübe" who is representative of the decision maker of a fleet management company. He is the CEO of a medium-sized taxi company called EuroTaxi. He is interested in expanding his business with innovative technologies, however he needs to first be convinced of their use as every investment is a big risk in terms of time and resources spent. As he has little technical knowledge and little time, data items need to be presented in a simple and engaging way.

Figure 2.4 shows "Annie Ainsley" who is representative of the configurator. She is a senior Caruso developer who is intimately familiar with the Caruso API and data items. She is often asked by Cornelius to prepare data for him which takes time away for other tasks. She is also not familiar with Rüdiger or other decision makers and can't cater to their wishes well, so she has to be in close contact with Cornelius while she prepares the data for him.



## Annie Ainsley

"Why work for 10 minutes when you can automate the task in 10 hours?"

### Demographics

| | |
|---|---|
| **Gender:** | Female |
| **Age:** | 36 |
| **Location:** | Mannheim |
| **Relationship Status:** | Married |
| **Job:** | Developer at Caruso |
| **Education:** | Bachelor of Science in Computer Science |

### Background Description

Annie is one of the core developers at Caruso. She has been with the company for a long time and knows its systems well.

She often must devote time to preparing data appetisers which would be better spent on other work, but she also lacks the time to automate this task.

### Goals and Motivations

- Less redundant work
- More time for actual development, not just presenting data

### Needs and Challenges

- Little time for work outside of core development
- Continuous manual development of tasks that should be automated
- Doesn't know the customers well

### Behaviors

- Likes optimisation
- Dislikes redundancy

### How can we help?

- Automate the creation of data appetisers
- Make the automation easily and quickly expandable for future use cases
- Make the automation configurable by Cornelius

**Figure 2.4:** Persona: Configurator

# Chapter 3

# Constraints

In this chapter, we will explore the constraints that must be considered in the design of our product. These constraints represent limitations that apply to the entire product, and must be taken into account no matter how we choose to solve the problem at hand. In this section, we will discuss the description, rationale, and fit criterion for each constraint, and how they are written in the same format as functional and non-functional requirements. Understanding and adhering to these constraints will be crucial to the success of this project.

## 3.1 Partner or Collaborative Applications

This chapter explores applications that the product will collaborate with, namely the Caruso dataplace. By examining these partner applications, we can identify potential integration issues and design constraints. The dataplace can be found *here*.

As Carvis is a data appetiser for connected car data provided by Caruso, this constraint affects the data sources and the type of data that can be used. As the data provided by Caruso is ever evolving it is best to check the available data items on the Caruso dataplace platform.

The Caruso dataplace provides a data catalogue and a Caruso API documentation. The data catalogue provides a list of all available data items and their description. The Caruso API documentation provides a list of all available Caruso API endpoints and their description and examples. The data catalogue and the Caruso API documentation are available on the Caruso dataplace developer zone. The data pro-

vided by Caruso is only available for cars that are supported by Caruso. The list of supported cars is available on the Caruso dataplace.

## 3.2 Schedule Constraints

Time is a constraint imposed by the nature of this project as a student project. This constraint largely affects the content of the application, as it limits the resources we have in terms of the widgets we can include. In order to manage this constraint, we have focused on the fleet management use case, which includes widgets that are relevant for all use cases.

By focusing on the fleet management use case, we have been able to maximize the resources we have within the given time frame and create a product that meets the needs of our stakeholders to the best of our ability. This enables to deliver a product that can be used in a production environment.

## 3.3 Budget Constraints

One constraint that we will not need to consider in the design of our product is budget constraints. Because this is a demo application that will only be used for a short time frame per user. As such, we do not need to worry about staying within a specific budget. By not having to worry about budget constraints, we will have more flexibility in our design choices and can focus on creating a product that meets the needs and expectations of the stakeholders.

# Chapter 4

# Relevant Facts and Assumptions

There are a wide variety of customers that Caruso is looking to acquire. Figure Figure 4.1 shows which of them are the most valuable customers. Carvis should mainly focus on those in the top right corner, as they are the best prepared and represent the highest yield opportunity.

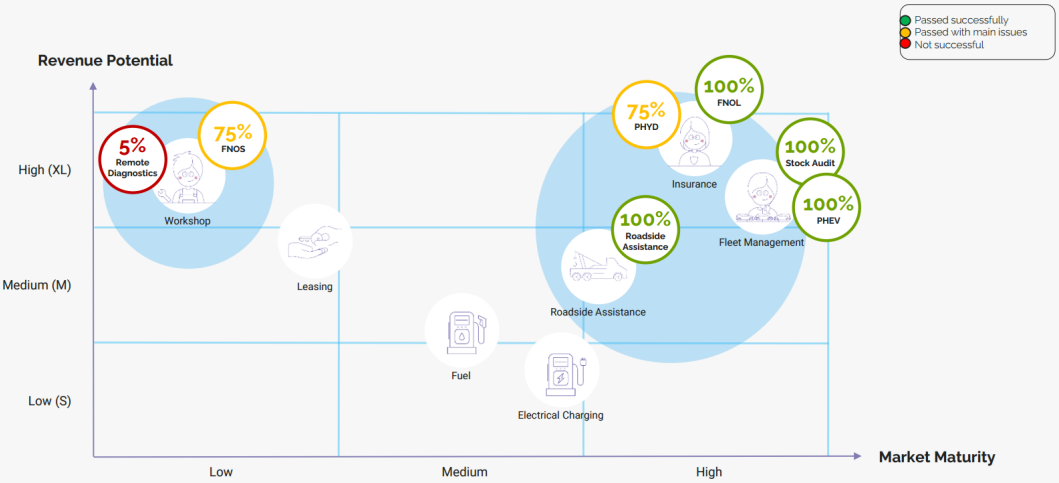



**Figure 4.1:** Graph of different Caruso customers ordered by revenue potential and market maturity.

A possible conclusion to the aforementioned statement could be that only large companies are compelling customers, which is not the case. Large companies have a lot of resources to invest in innovative technologies, so the demand for a data appetiser is lower. On the other hand, medium-sized companies typically want to know what they are investing their money and time into before allocating resources. This is where Carvis helps to highlight areas where Caruso data items can be used.

Widgets designed as part of this project where not designed in cooperation with decision makers, instead the input of the Caruso sales employee was used. As

a result of this, it is not certain that the widgets fit the needs of the specific use cases. The process of adjusting the widgets is the responsibility of the configurator. Talking to the decision makers is not part of the scope of this project.

The goal of this project is to deliver a finished product that meets the needs of our stakeholders, including Caruso. We understand that Caruso may not want to invest additional development time of their team to make adjustments to the application. As such, a modular system using widgets is the best solution for this project.

# Chapter 5

# The Scope of the Work

This chapter describes important aspect to consider when building a new product. It determines the boundaries of the business area to be studied and outlines how it fits into its environment. Understanding the scope of the work and its constraints allows to establish the scope of the product and ensure that it will fit seamlessly into its intended environment.

In this document, we will delve into the current situation and the context of the work in order to fully understand the scope of the project. The current situation includes an analysis of the existing business processes, that will be changed by the Carvis. The context of the work, on the other hand, identifies the boundaries of the work that need to be investigated in order to build the product. This includes understanding the adjacent systems and their interfaces with the work context, as well as the details of when, how, where, who, what, and why they produce the necessary information. By understanding both the current situation and the context of the work a clear and comprehensive scope for the project can be established.

## 5.1 The Current Situation

The current way of acquiring new customers is shown in figure 5.1.

Entry into a new contract currently requires three stakeholders: a decision maker, a Caruso sales employee and a Caruso configurator. The process can be split into four steps: first contact, persuasion, testing and conclusion. During first contact, the decision maker and sales employee enter into contact with each other. The sales

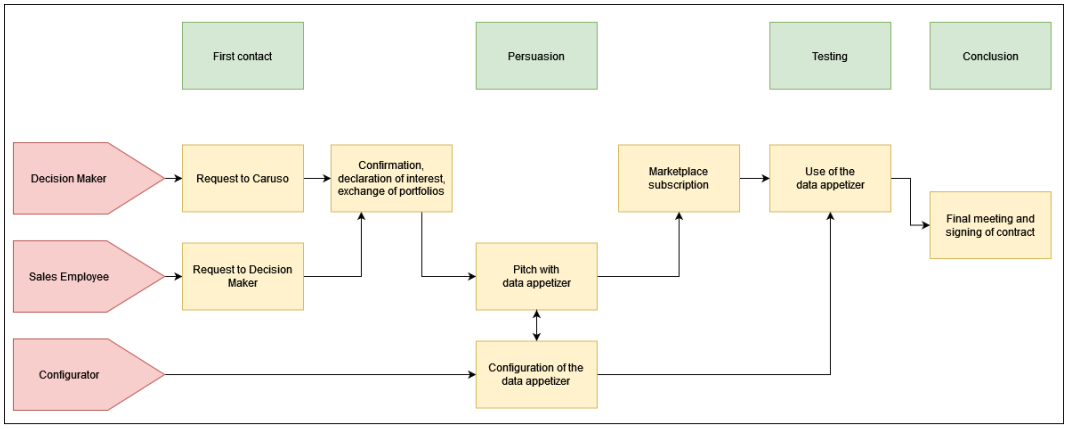



**Figure 5.1:** Stakeholders

employee gauges a decision makers interest in Caruso services or a decision maker becomes aware of Caruso through advertising, word of mouth or some other means.

After contact is established, the sales employee of Caruso holds a meeting with one or multiple decision makers. Here data items of publicly accessible cars, Caruso vehicles or dummy cars are presented. For this purpose, a manually created HTML or Excel report of aggregated vehicle data of past rides is used. These include data such as distance driven per day of the week for an entire fleet of cars.

After the sales pitch, the decision makers trusts and wants to use Caruso's services. They can then create an account in the Caruso dataplace and receive the aggregated data shown during the presentation to look at for themselves. This data usually isn't live.

After the decision makers are convinced of the value of the data, a final meeting is held where any open questions can be discussed with the sales employee. Finally, a contract is entered by the two parties.

## 5.2 The Context of the Work

Figure 5.2 shows the communication between the core target group, the Carvis and the neighbouring systems in the form of a context diagram.

The decision maker has access to both the Caruso dataplace and Carvis. The access to the Caruso dataplace is required as the decision maker needs to create an account and register vehicles before they can access Carvis.

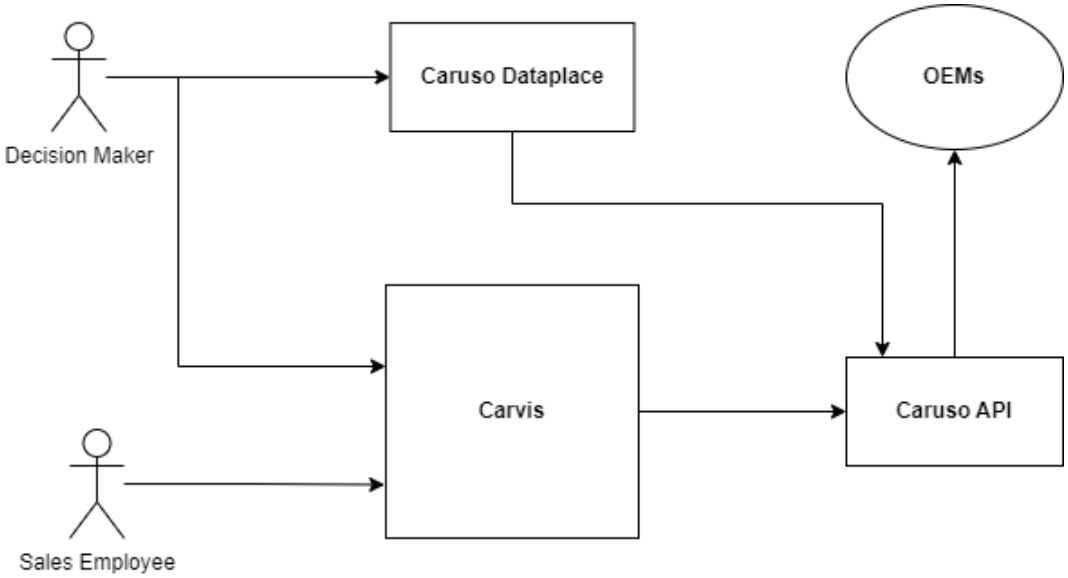



**Figure 5.2:** Context Diagram

The sales employee uses Carvis to present Caruso data to the decision maker. They are not allowed to access the decision makers data but can use placeholder cars publicly accessible in the Caruso dataplace. The configurator only needs access to Carvis in order to configure it for the sales employee. Both systems get their data from the Caruso API which receives live data from the OEMs and standardises it.

# Chapter 6

# The Scope of the Product

This chapter will present the use cases of Carvis under consideration of the decision maker, the sales employee and the configurator. The use cases will be given a description and a walkthrough in the form of a high fidelity prototype.

## 6.1 The Product Boundary

Figure 6.1 shows a use case diagram for the stakeholders of core target group and their use cases for Carvis. All use cases are given an id which will be referenced in future chapters.


**Figure 6.1:** Use Case Diagram

## 6.2 Use Case Table

**Table 6.1:** Use Case Table

| UC ID | UC Name | Actors | Description |
|---|---|---|---|
| UC_1 | View vehicles | Decision maker, sales employee | The decision maker or sales employee views all vehicles of their project in a list. |
| UC_2 | View vehicle information | Decision maker, sales employee | The decision maker or sales employee chooses a vehicle and views its given data items. |
| UC_3 | View fleet information | Decision maker, sales employee | The decision maker or sales employee views statistics for all vehicles in a fleet. |

| | | | |
|---|---|---|---|
| UC_4 | View projects | Sales employee | The sales employee views the projects which they want to configure. |
| UC_5 | Create project | Sales employee | The sales employee creates a project for a new decision maker. |
| UC_6 | Edit project | Sales employee | The sales employee edits a project. |
| UC_7 | Delete project | Sales employee | The sales employee deletes a project. |
| UC_8 | Reset project | Sales employee | The sales employee reverts a project to its template, resetting all changes. |
| UC_9 | Create template | Sales employee | The sales employee creates a template by taking a snapshot of a project. |
| UC_10 | Edit table | Sales employee | The sales employee edits the table in which all vehicles are shown. |
| UC_11 | Create widget | Sales employee | The sales employee adds a widget visualising a data item of a vehicle or fleet to a project. |
| UC_12 | Delete widget | Sales employee | The sales employee removes a widget visualising a data item of a vehicle or fleet from a project. |
| UC_13 | Move widget | Sales employee | The sales employee edits the position of a widget visualising a data item of a vehicle or fleet in a project. |

## 6.3 Individual Product Use Cases

This chapter presents a variety of scenarios that demonstrate the various ways in which our application can be used. These scenarios will be broken down into reproducible steps and illustrated using our prototype as a reference point. The use cases are grouped into two main perspectives: the decision maker and the sales employee. The purpose of this chapter is to provide a clear and thorough understanding of how our application can be utilised in a variety of different situations. By walking through these use cases, we hope to give a sense of the flow and functionality of the application and how it can help decision makers and sales employees achieve their goals. The clickable prototype is available *here*.

### 6.3.1 The Decision Maker's View

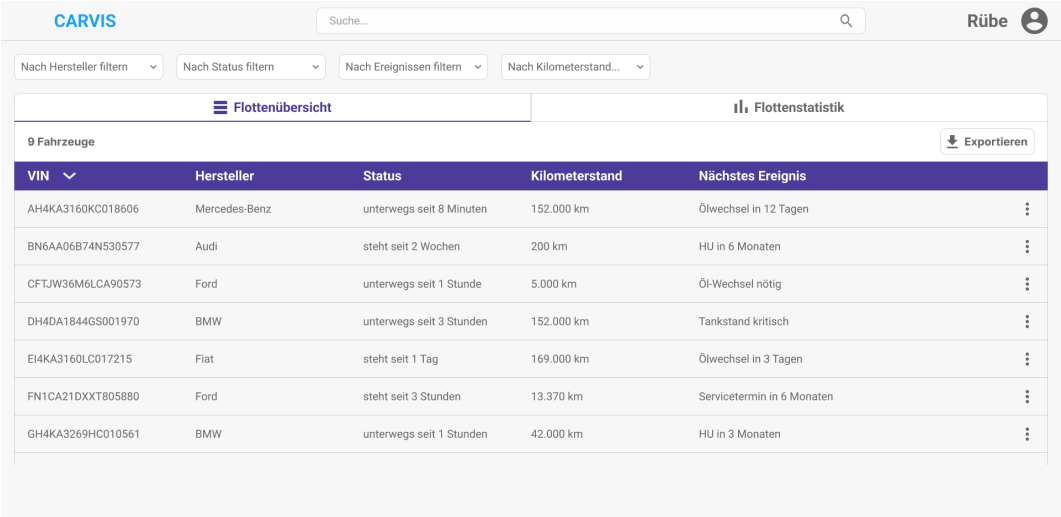



**Figure 6.2:** Decision maker's view: home page

Figure 6.2 shows the initial view from which the decision maker always starts after logging into Carvis. Use case UC_2 is carried out on this page and use cases UC_1 and UC_3 are facilitated as well.

#### *Use Case 1: View Vehicles*

The scenario begins in the initial view seen in figure 6.2. On this page, the decision maker or sales employee can view a chart of all vehicles linked to their Caruso dataplace account. This table consists of columns to identify vehicles, for example listing the manufacturer or its current status. The vehicles can be sorted by column in ascending or descending order by clicking on the label. Vehicles can also be filtered by these categories, for example only showing vehicles from one manufacturer, or be searched directly through the search bar.

#### *Use Case 2: View Vehicle Information*

This scenario begins in the initial view seen in figure 6.2. The decision maker or sales employee chooses a vehicle which they wish to view in the table. Optionally, filters can be applied to find the desired vehicle. By clicking on it, the user reaches the vehicle page seen in figure 6.3.

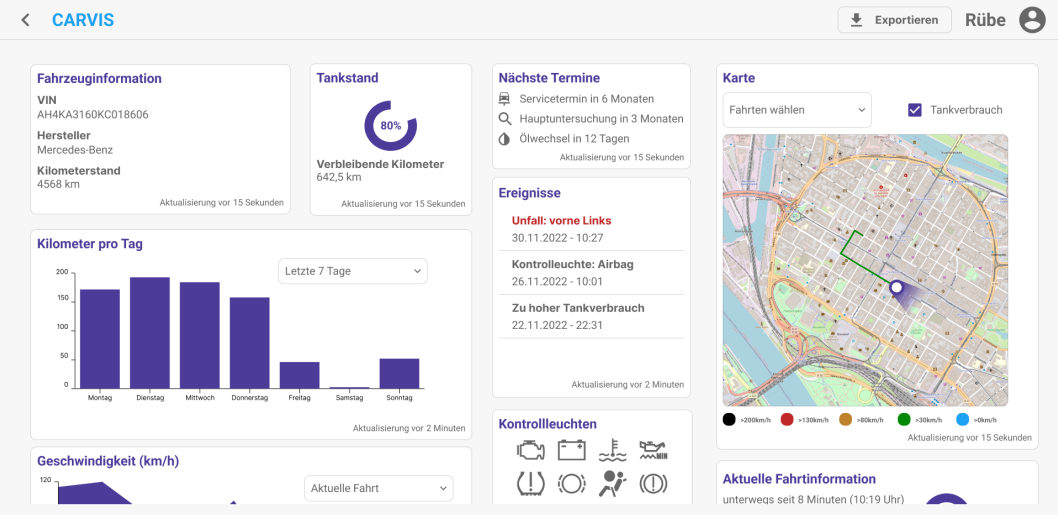



**Figure 6.3:** Decision maker's view: vehicle page

This page contains all of the information relating to the selected vehicle. The data items which are made available by Caruso are grouped into white boxes called widgets. An example is the general information widget which includes the VINand manufacturer. Every widget shows when the data was last updated so that the decision maker can see how current it is. In the case that a data item is not available either due to error or lack of support from the OEM, a text notifying the user is shown instead, as can be seen in figure 6.4.


**Figure 6.4:** Decision maker's view: unsupported data item

### *Use Case 3: View fleet information*

This scenario begins in the initial view seen in figure 6.2. The decision maker or sales employee can click on the tab "Flottenstatistik". This opens the page seen in figure 6.5.

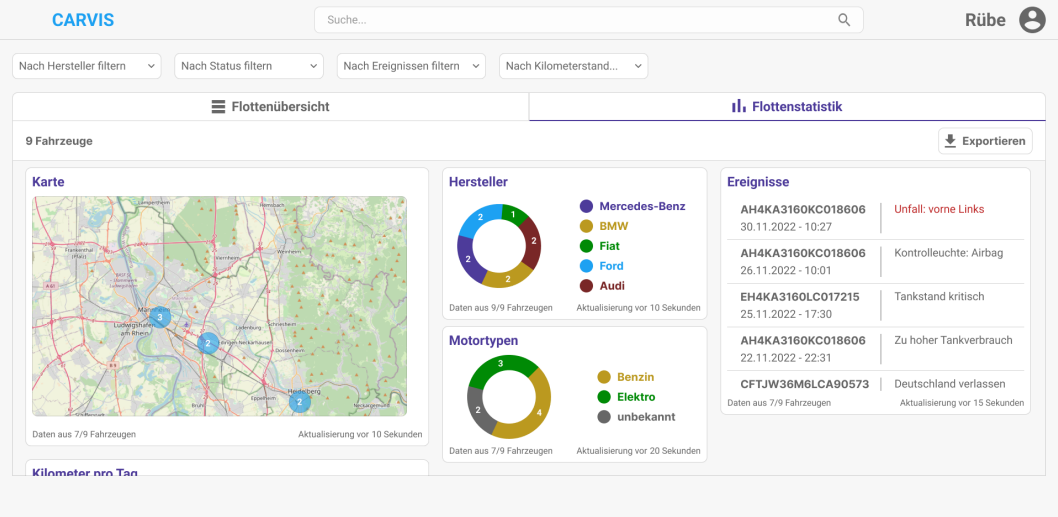



**Figure 6.5:** Decision maker's view: fleet statistics page

This page shows widgets of fleet-specific data where the fleet consists of all vehicles registered to the user. Like the main table, this view can be filtered and searched.

Widgets include a map showing the position of all vehicles, a chart showing the distribution of manufacturers in the fleet or a list of all past events.

These widgets not only show the last update but also how many cars support the data item. Knowing the exact number of cars aides in the interpretation of the presented data and prevents misunderstandings.

### 6.3.2 The Sales Employee's View

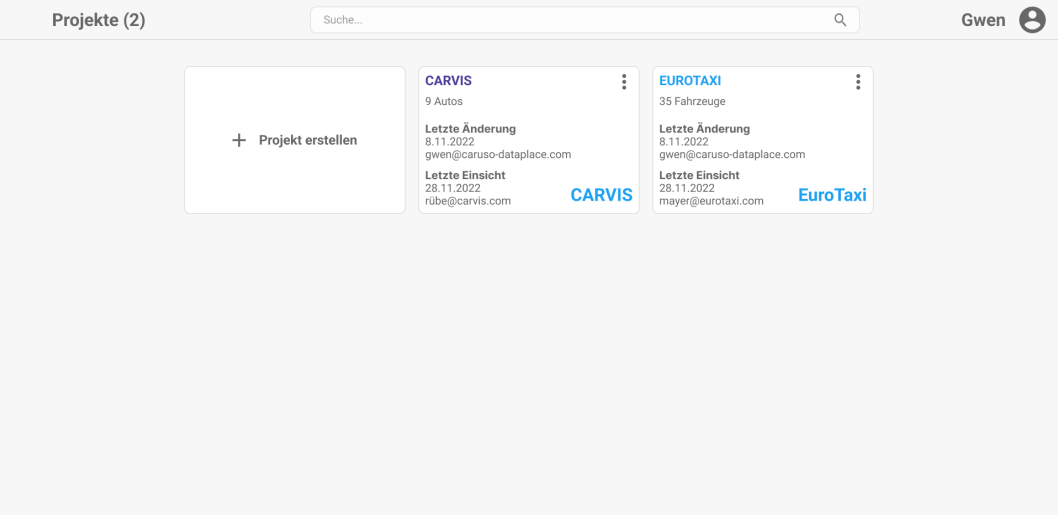



**Figure 6.6:** Sales employee's view: vehicle page

Figure 6.6 shows the initial view from which the sales employee starts their work once they have logged in.

#### *Use Case 4: View Project*

This scenario begins in the initial view seen in figure 6.6. The sales employee sees the available projects shown in white tiles. These include information such as the company name, logo, as well as metadata such as when the project was last viewed or edited. The sales employee can filter the list of projects through the search bar to only see the projects in which they are currently interested.

#### *Use Case 5: Create Project*

This scenario begins in the initial view seen in figure 6.6. The sales employee clicks the button labelled "Projekt erstellen". This opens a popup as seen in figure 6.7.

The sales employee inputs a Caruso dataplace account to be linked to the project, as well as any further accounts which should be allowed to view the project. They then input a logo, company name, and two primary colours which the company uses in their branding. Next, the sales employee clicks "Speichern", which opens the template view seen in figure 6.8 to begin work on the configuration.

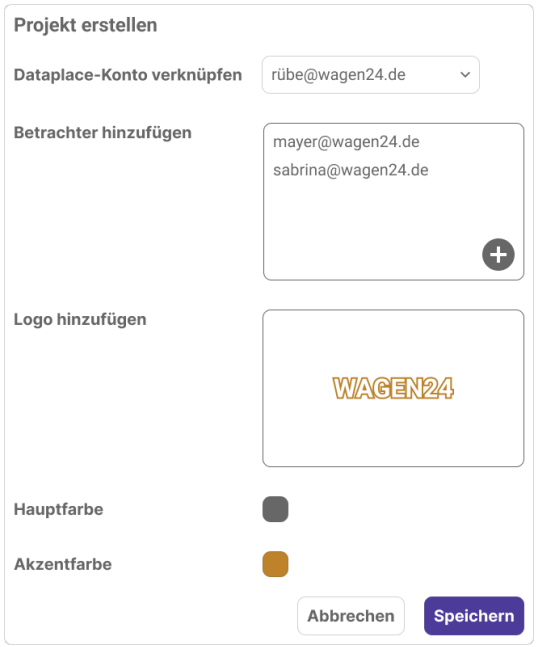



**Figure 6.7:** Sales employee's view: vehicle view

This list can also be filtered via the search bar. Each template shows a preview so the sales employee can see which one best fits the new project. On clicking a new template, the new project is created.

#### *Use Case 6: Edit Project*

This scenario begins in the view seen in figure 6.6. The sales employee clicks the vertical dots in the top right corner of the project box. This alters the project box as seen in figure 6.9.

The sales employee clicks "Bearbeiten" which opens a popup similar to figure 6.7 in which the project information can be edited Once done, the sales employee clicks "Speichern" and the project is successfully edited.

#### *Use Case 7: Delete Project*

This scenario begins in the view seen in figure 6.6. The sales employee clicks the vertical dots in the top right corner of the project box. This alters the project box as seen in figure 6.9. The sales employee clicks "Löschen". After confirmation by

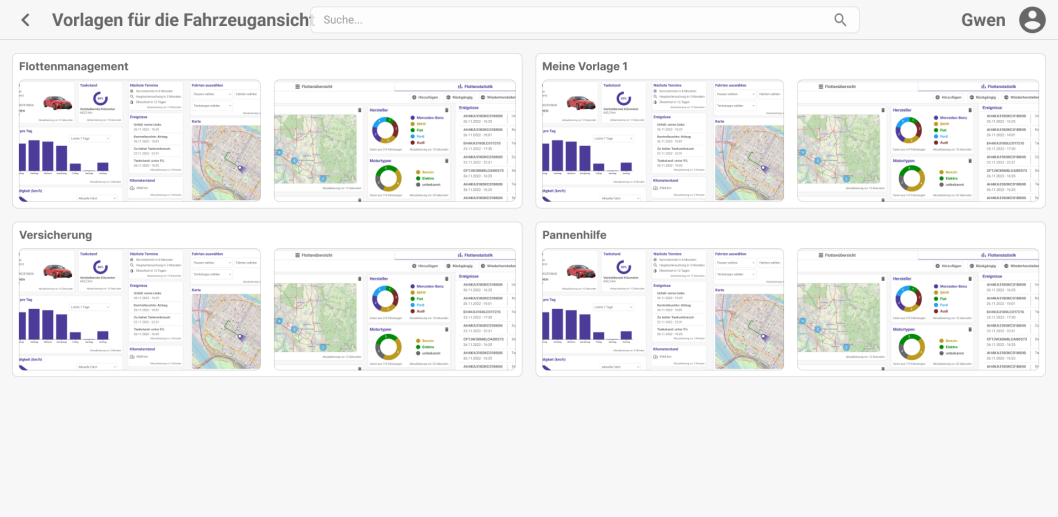



**Figure 6.8:** Sales employee's view: vehicle view

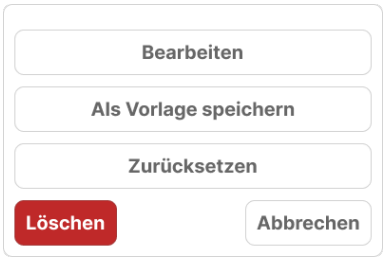



**Figure 6.9:** Sales employee's view: edit project

the sales employee, the project is deleted and removed from the list of available projects.

### *Use Case 8: Reset project*

This scenario begins in the view seen in figure 6.6. The sales employee clicks the vertical dots in the top right corner of the project box. This alters the project box as seen in figure 6.9. The sales employee clicks "Zurücksetzen". This opens a view of available templates as seen in figure 6.8. The sales employee chooses and clicks a template which resets the project to that template

### *Use Case 9: Create Template*

This scenario begins in the view seen in figure 6.6. The sales employee clicks the vertical dots in the top right corner of the project box. This alters the project box as

seen in figure 6.9. The sales employee clicks "Als Vorlage speichern". This offers the option to name the new template. Finally, the template is saved and available in the list of templates.

### *Use Case 10: Edit Table*

This scenario begins in the view seen in figure 6.6. The sales employee clicks a project which they want to edit. This opens the project to the page seen in 6.10.

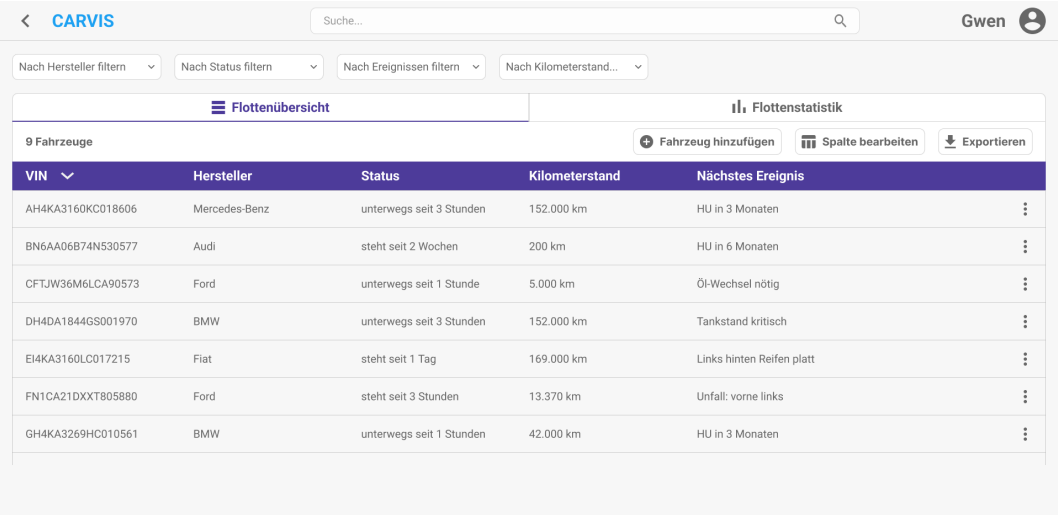



**Figure 6.10:** Sales employee's view: fleet statistics page

This view is similar to the decision maker's view seen in figure 6.2, however it also includes the option to edit the vehicle table. The sales employee clicks "Spalten Bearbeiten". This opens a popup as seen in figure 6.11.

In this view, the sales employee can add or remove columns and change their order. For example, they can choose the vehicle model and add it to the shown elements. Then they click "Speichern" and the table includes the new column with the data for each vehicle.

### *Use Case 11: Create Widget*

This scenario begins in the view seen in figure 6.6. The sales employee clicks a project they want to edit. This opens the page seen in figure 6.10. The sales

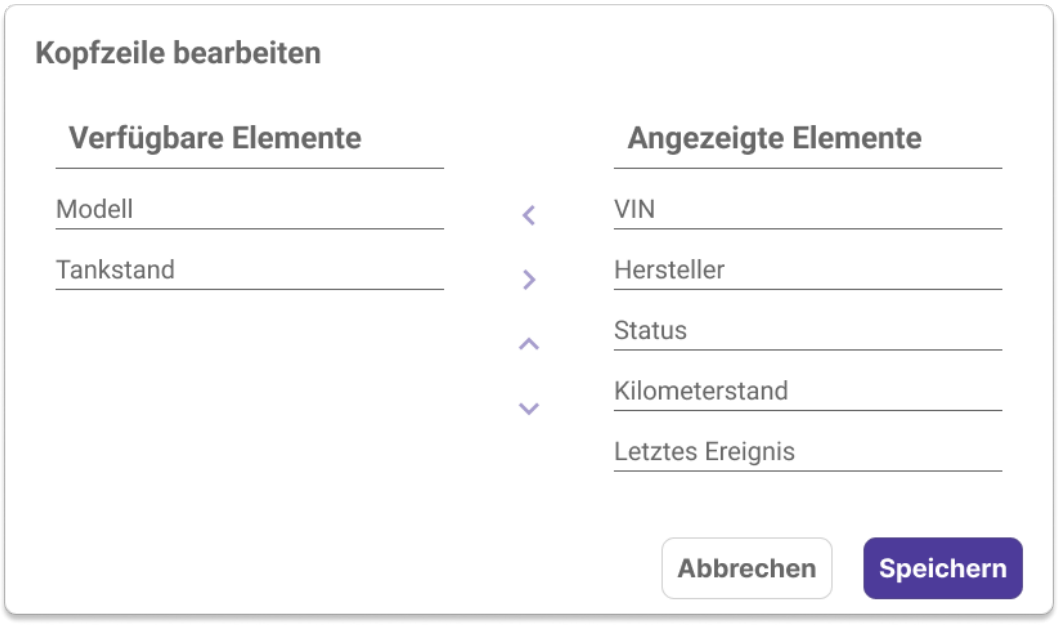



**Figure 6.11:** Sales employee's view: edit vehicle table

employee clicks on a vehicle to open the vehicle information seen in figure 6.12 or the "Flottenstatistik" tab, depending on which widgets they want to add.

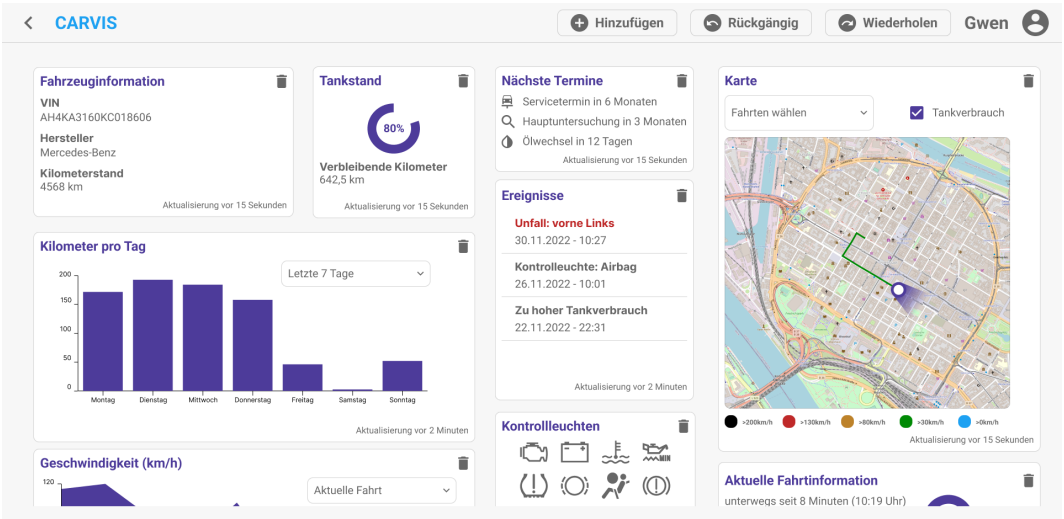



**Figure 6.12:** Sales employee's view: vehicle page

his view is similar to the decision maker's view seen in figure 6.3, however it also includes the option to add or delete widgets, as well as to undo and redo actions.

The sales employee clicks "Hinzufügen" which opens a list of widgets to choose from. This can be seen in figure 6.13.

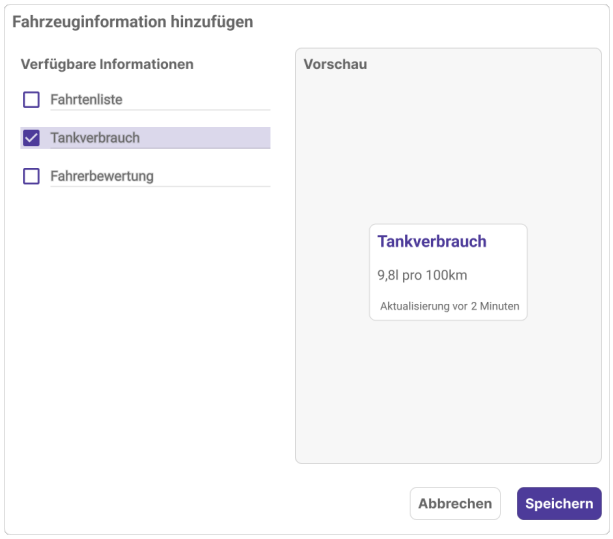



**Figure 6.13:** Sales employee's view: add vehicle data item

The sales employee chooses a widget and can see a preview of it. They then click "Speichern" and the widget is added to the vehicle page.

This process is identical for the fleet statistics page and thus not considered a separate use case. Clicking "Flottenstatistik" from the vehicle page in figure 6.10 takes them to the fleet statistics page seen in figure 6.14.

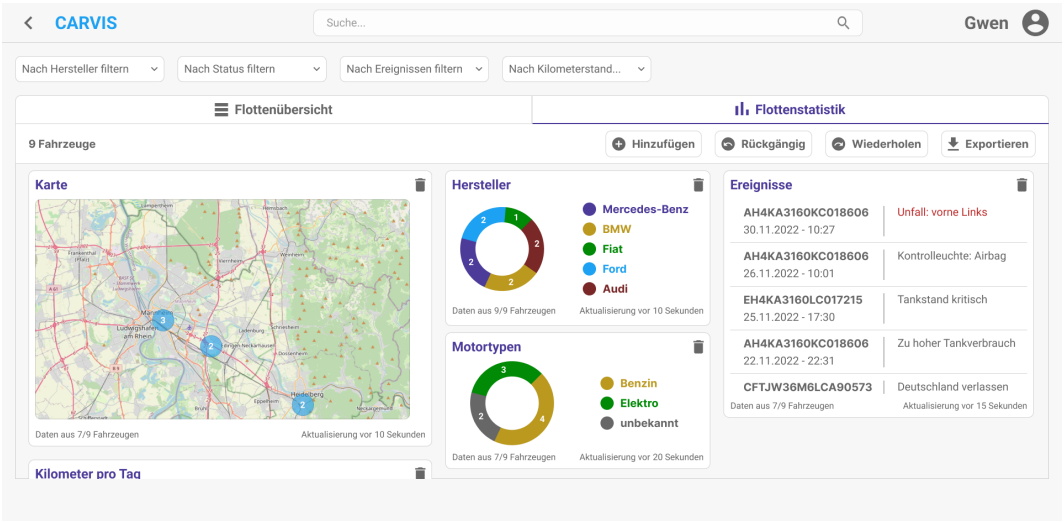



**Figure 6.14:** Sales employee's view: fleet statistics page

Like in figure 6.12, this view has the option to add new widgets. The sale employee clicks "Hinzufügen" which opens a list of available widgets like in figure 6.15.

This view is similar to the vehicle widget list from figure 6.13. Only the widgets which can be added are different as they are for fleet data, not individual vehicle

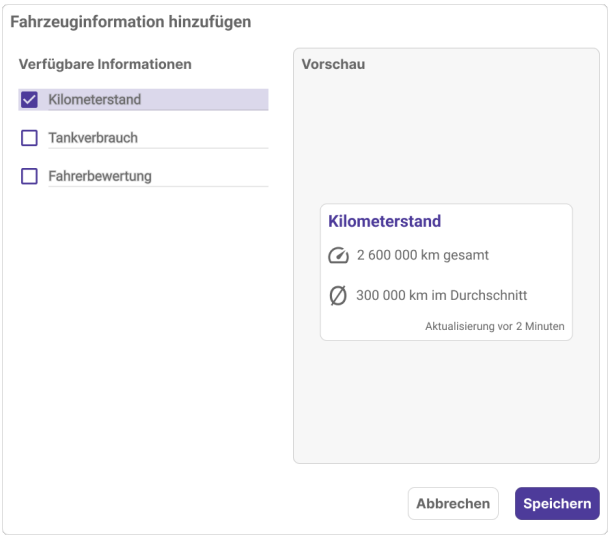



**Figure 6.15:** Sales employee's view: add fleet data item

data. Once the sales employee has chosen a widget and has clicked "Speichern", the widget is added to the fleet statistics page.

#### *Use Case 12: Delete Widget*

This scenario begins in the view seen in figure 6.6. The sales employee chooses the project in which they want to delete a widget. This leads to the page seen in figure 6.10. As in the previous use case, widgets can be deleted both in the fleet statistics page and the vehicle page. In figure 6.12 and figure 6.14, each widgets have a trashcan icon in the top right corner. Once the sales employee clicks it and confirms the decision, the widget is removed from the corresponding page.

#### *Use Case 13: Move Widget*

This scenario begins in the view seen in figure 6.6. The sales employee chooses the project in which they want to move a widget. This leads to the page seen in figure 6.10. As in the previous use case, widgets can be moved both in the fleet statistics page and the vehicle page. Figure 6.12 and 6.14 show widgets. If the sales employee clicks and holds on a widget, they can move the widget with their mouse along an invisible grid. When releasing the mouse, the widget clicks into place on the grid.

# Chapter 7

# Functional Requirements

User stories were created to collect the requirements of Carvis. They consist of a stakeholder of the core target group and their wishes and goals. The following tables include the requirements grouped by their stakeholder. Every user story has an id and a reference to associated use cases. They also have descriptions to present any details that are relevant. The user stories are prioritised according to the MoSCoW method into must, should and could have. There are no will not have stories. Must stories are required to be implemented for a succesful project, should have stories are important and could have stories are nice to have if there is time for them.

**Table 7.1:** User stories of the decision maker and sales employee

| US ID | UC | Description | Criteria |
|---|---|---|---|
| US_01 | UC_01 | As a decision maker and sales employee, I want to see a list of all of my vehicles to see which vehicles are in my fleet. | Must |
| US_02 | UC_01 | As a decision maker and sales employee, I want to see the number of vehicles connected to my Caruso dataplace account to see how many vehicles I have. | Should |
| US_03 | UC_01 | As a decision maker and sales employee, I want to search for a vehicle to quickly find it in the list.<br>*The search criteria correlate to the information which is shown in the vehicle table.* | Should |
| US_04 | UC_01 | As a decision maker and sales employee, I want to filter vehicles in the vehicle table to only see the vehicles which fit my current criteria.<br>*The filter criteria correlate to the information which is shown in the vehicle table.* | Should |
| US_05 | UC_01 | As a decision maker and sales employee, I want to sort vehicles in the vehicle table to group them according to different criteria.<br>*Sorting should be able in ascending and descending order for all columns of the vehicle table.* | Should |

| | | | |
|---|---|---|---|
| US_06 | UC_01, UC_02, UC_03 | As a decision maker and sales employee, I want to export and download a list of my vehicles, vehicle specific data and data for my whole fleet as a PDF to show my coworkers. | Can |
| US_07 | UC_02 | As a decision maker and sales employee, I want to view statistics and current information of a vehicle to gain a better understanding of Caruso data.<br>*The shown data items are set by the sales employee in form of widgets. A list of all possible widgets can be found in table 7. This reduces user story redundancy, as they don't have to be repeated for the decision maker.* | Must |
| US_08 | UC_02 | As a decision maker and sales employee, I want to see if a vehicle supports a vehicle-specific widget to know which data items are available for that vehicle. | Must |
| US_09 | UC_02, UC_03 | As a decision maker and sales employee, I want to know when the data shown by widgets was last updated to be convinced of their recency. | Must |
| US_10 | UC_03 | As a decision maker and sales employee, I want to view statistics and current information of my whole fleet to gain an overview of my fleet and its status.<br>*The shown data items are set by the sales employee in form of widgets. A list of all possible widgets can be found in table 7. This reduces user story redundancy, as they don't have to be repeated for the decision maker.* | Must |
| US_11 | UC_03 | As a decision maker and sales employee, I want to how many of my vehicles provide data to a fleet-specific widget to know which proportion of my fleet supports it. | Must |
| US_12 | UC_03 | As a decision maker and sales employee, I want to filter the contents of fleet-specific widgets to only see the data of vehicles which currently interest me.<br>*The filter criteria correspond to the columns of the vehicle table.* | Should |

**Table 7.2:** User stories of the sales employee

| US ID | UC | Description | Criteria |
|---|---|---|---|
| US_13 | UC_04 | As a sales employee, I want to see all projects to know which ones exist. | Must |
| US_14 | UC_04 | As a sales employee, I want to search for projects by name to find a specific project. | Should |
| US_15 | UC_04 | As a sales employee, I want to see the amount of projects to know how many projects exist | Should |
| US_16 | UC_04 | As a sales employee, I want to see who last changed the project and when to know when it was last updated. | Must |
| US_17 | UC_04 | As a sales employee, I want to see who last viewed the project and when to know if it is still being used. | Must |
| US_18 | UC_05 | As a sales employee, I want to create a project to prepare a new presentation for a decision maker. | Must |
| US_19 | UC_06 | As a sales employee, I want to edit a project to change project information when needed. | Must |
| US_20 | UC_05, UC_06 | As a sales employee, I want to connect a Caruso dataplace account to a project to connect the account's cars to Carvis. | Must |

| | | | |
|---|---|---|---|
| US_21 | UC_05, UC_06 | As a sales employee, I want to add multiple Caruso dataplace accounts to a project to allow multiple employees to view it. | Should |
| US_22 | UC_05, UC_06 | As a sales employee, I want to add a company logo to the project to incorporate the customer's CI. *The logo should be visible while using Carvis.* | Should |
| US_23 | UC_05, UC_06 | As a sales employee, I want to choose a main and accent colour for a project to incorporate the customer's CI. | Should |
| US_24 | UC_05, UC_08 | As a sales employee, I want to see a list of all template to know which are available for creating a new project. | Must |
| US_25 | UC_05, UC_08 | As a sales employee, I want to see a preview of the templates to see which template is appropriate for a new project. | Should |
| US_26 | UC_05, UC_08 | As a sales employee, I want to search a template by its name to quickly find it in the list. | Should |
| US_27 | UC_07 | As a sales employee, I want to delete a project to remove it when it is no longer needed. | Must |
| US_28 | UC_08 | As a sales employee, I want to reset a project to start the configuration anew. | Should |
| US_29 | UC_09 | As a sales employee, I want to save a project as a template to be able to use it for future projects. | Must |
| US_30 | UC_10 | As a sales employee, I want to add new information to the vehicle table to show the decision maker relevant information on the home page. *The information corresponds to columns in the table. VIN, manufacturer, status, mileage, next event, model and fuel gauge.* | Must |
| US_31 | UC_10 | As a sales employee, I want to remove information from the vehicle table to show the decision maker only relevant information on the home page. | Must |
| US_32 | UC_10 | As a sales employee, I want to die change the order of information in the vehicle table to prioritise the information for the decision maker. | Should |
| US_33 | UC_11 | As a sales employee, I want to see a preview for a widget that I want to add to know how it will look before I add it. | Should |
| US_34 | UC_12 | As a sales employee, I want to delete a widget to remove information that is not interesting for the decision maker. | Must |
| US_35 | UC_13 | As a sales employee, I want to move a widget to prioritise their order for the decision maker. | Should |
| US_36 | UC_11, UC_12, UC_13 | As a sales employee, I want to undo my last action to correct mistakes I have made. | Should |
| US_37 | UC_11, UC_12, UC_13 | As a sales employee, I want to redo my last action to correct an accidentally undone action. | Should |

**Table 7.3:** User stories of the sales employee for vehicle-specific widgets

| US ID | UC | Description | Criteria |
|---|---|---|---|
| US_38 | UC_11 | As a sales employee, I want to add a widget for the decision maker which includes the VIN, manufacturer and mileage of a vehicle so that they know which vehicle is currently being viewed. | Must |

| | | | |
|---|---|---|---|
| US_39 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows the current fuel gauge and remaining drivable distance in kilometres of a vehicle to know if the vehicle needs to be refuelled. | Must |
| US_40 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows upcoming events of a vehicle to know if it will be out of commission soon.<br>*Events are service appointments, general inspections or oil changes.* | Must |
| US_41 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows the current position and speed of a vehicle on a map to see where it is and if it is driving. | Must |
| US_42 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows past rides and stops of a vehicle on a map to know how the vehicle was used in the past. | Must |
| US_43 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows a statistic of driven kilometres per week day to know when it is being used. | Must |
| US_44 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows a chronological list of vehicle events to know when something has happened to the vehicle.<br>*Vehicle events refers to accidents or indicator lamps. Accidents should be highlighted to alert the decision maker of possible damage to the vehicle.* | Must |
| US_45 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows a history of driven speeds to know how safely the vehicle is being driven. | Must |
| US_46 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows the current indicator lamps of a vehicle to know if something is wrong and needs attention. | Must |
| US_47 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows information about the current ride to know where the vehicle is and what it is doing.<br>*Current information about rides includes the start time and which street it has last stopped in.* | Must |
| US_48 | UC_11 | As a configurator, I want to add a widget for the decision maker which shows the current fuel consumption per 100 kilometres to know how high it is. | Must |

**Table 7.4:** User stories of sales employee for fleet-specific widgets

| US ID | UC | Description | Criteria |
|---|---|---|---|
| US_49 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows the distribution of vehicles from different manufacturers to know how many of the vehicles are from which one. | Must |

| | | | |
|---|---|---|---|
| US_50 | UC_11 | As a sales employee, I want to add a widget for the decision maker which shows a chronological list of all vehicle events to know which vehicle recently had an event.<br>*Vehicle events refers to accidents or indicator lamps. Accidents should be highlighted to alert the decision maker of possible damage to the vehicle.* | Must |
| US_51 | UC_11 | As a configurator, I want add a widget which shows the distribution of engine types to know how many vehicles have which type.<br>*Engine types are fuel, electric or hybrid.* | Must |
| US_52 | UC_11 | As a configurator, I want to add a widget for the decision maker which shows a statistic of driven kilometres per week day of all vehicles to know when they are being used. | Must |
| US_53 | UC_11 | As a configurator, I want to add a widget for the decision maker which shows a map of all vehicle positions to know where they are. | Must |
| US_54 | UC_11 | As a configurator, I want to add a widget for the decision maker which shows the total mileage of all vehicles as well as the average mileage to know how high it is. | Must |

# Chapter 8

# Look and Feel Requirements

The following chapters will discuss the visual and tactile aspects of Carvis to ensure that it meets the desired standards for aesthetics and usability.

## 8.1 Appearance Requirements

Carvis should have a simple, easily understandable interface for non-technical users to not overwhelm them. It should feel “live”, using data items that are as recent as possible. The connection between to the real world data and vehicles should be apparent. In addition, the usefulness of the data items should be brought attention to. The user should recognise their benefit and be inspired as to how to use them.

## 8.2 Style Requirements

Carvis should be visually appealing by complying with the CIs of the customers. It should also be built up very intuitively and easy to use, but still bring added value to the user.

# Chapter 9

# Usability and Humanity Requirements

This chapter describes the requirements for how easy Carvis should be to use and how well it should meet the needs and expectations of its users.

## 9.1 Ease of Use Requirements

For a configurator, a data appetiser should be able to be created for the decision maker in under one hour.

Ease of use is a prerequisite for the customers. All information should be quickly at a glance. Information should be limited to the most necessary for the home page and be quickly available at a glance. It is not assumed that customers already have some experience with the digital world. Basic terms from the automotive industry such as VIN, on the other hand, should be known to all customers.

## 9.2 Personalisation and Internationalisation Requirements

As stated in chapter 8, Carvis should comply with the CI of the customers. The logo and colours of Carvis should be adaptable to those of the customers to make them feel more at home.

For the configurator, English is set as the default language. Since configurations are only created by Caruso where English is being spoken. I18n is therefore not necessary.

## 9.3 Learning Requirements

The decision maker will receive a short presentation on the application from the sales employee, but will also be able to use Carvis alone. Since the customers are to be convinced, a long learning phase should be refrained from. The customer's view should be very understandable and easy to use.

The configurator is a Caruso employee. Since they will repeatedly use Carvis, a longer learning curve is to be expected.

# Chapter 10

# Performance Requirements

For Carvis, extensibility and scalability are key aspects. As it is intended to service a wide range of customers with different interests, the ability to add new templates and widgets quickly is crucial. As Carvis is only used for presentations and possibly by customers for short periods of time, it does not have to accomodate much user traffic.

Limitations in the availability of the data item are completely on the side of the Caruso API and OEMs. Only a steady connection to the Caruso API must be insured. Decision makers are unlikely to spend much time on Carvis by themselves, and likely only in short windows. This makes it all the more important that when they decide to use it that it is running and available.

# Chapter 11

# Security Requirements

This chapter covers the access and privacy requirements for the product. Section 11.1 specifies how cars and decision makers are connected as well as what cars the configurators can see. Section 11.2 goes over the consent management process and how it is handled for this project.

## 11.1 Access Requirements

Decision makers should have access to their cars that are connected via the Caruso dataplace and should also be able to delegate access to other employees within their company. To facilitate this, the Caruso dataplace has a company organization unit that includes both cars and employees. This unit allows decision makers to manage access to their connected cars and assign appropriate permissions to other employees within their organization. This helps to ensure that the necessary individuals have access to the data and functionality they need, while also maintaining control over who is able to access sensitive information and perform certain actions.

It is important to keep in mind that configurators do not have access to the cars registered to a decision maker. They can only access the cars that they are specifically assigned to. This should be considered when designing the configurator's view, as it may be necessary to include some example cars that can be used for testing purposes. One option for this is to use the VirtualOEM from Caruso, which provides a set of sample cars that can be used for testing and development. This will help to ensure that configurators are able to effectively test and debug their configurations without needing access to actual cars.

## 11.2 Privacy Requirements

One important aspect of the privacy requirements in an application concerning connected cars is consent management. Consent management refers to the processes and systems in place for obtaining and documenting an individual's consent for the collection, use, and sharing of their personal data. In the case of Carvis, consent management is handled by Caruso and is therefore not subject of this project.

# Chapter 12

# Off-the-Shelf Solutions

To implement the map in Carvis, there are a variety of ready-made solutions which can be included. These include, but are not limited to, the following options:

- Leaflet
- Google Maps
- OpenStreetMap
- MapBox

For all of these solutions, it is important to analyze their cost, their benefit, and if they can be used for the purposes required by the Carvis map:

- Showing a live location of one or multiple vehicles
- Opening a popup window when clicking a location
- Showing one or multiple routes with colours and colour gradients
- Basic panning and zooming

# Chapter 13

# Risks

All projects involve the risk of something going wrong. While risk is an inherent part of any project, it is only a problem if it is ignored and becomes a major issue. Risk management involves identifying the risks that are most likely to affect the project, developing contingency plans in case they do become problems, and monitoring the project to give early warnings of potential risks. In this section of the specification, a list of the most likely and most serious risks for the project will be provided, along with the probability of them becoming a problem and any contingency plans in place. By effectively managing these risks, the project team can minimize their impact and ensure the success of the project.

One potential risk for this project is the possibility of there being the wrong widgets, due to the focus on one use case and the widgets not being created in consultation with the relevant decision makers. This risk is medium as it has the potential to significantly impact the overall success of the project. If the wrong widgets are developed, it could lead to delays and additional costs. To mitigate this issue the Sales Employee has been consulted to ensure that the widgets are relevant to the use cases. As a contingency the Decision Makers have to be consulted to ensure that the widgets are relevant to the use cases.

A potential risk for this project is that the feasibility of the widgets was not checked in practice. This risk is medium as it could have some impact on the project, but is not necessarily a showstopper. To reduce the impact of this issue, all widgets were designed with the capabilities of the Caruso dataplace in mind, specifically their data catalogue. In case of any issues, the widgets can be adjusted to fit the capabilities of the Caruso dataplace or be discared.

There is a low risk that the configuration may not be easy to understand. To mitigate this issue, the configuration has been designed in cooperation with the configurator. This ensures that the configuration is clear and easy to follow, reducing the probability of it becoming a problem. If the configuration does happen to be confusing, a contingency plan has been put in place to provide additional support and assistance to those who may be struggling to understand it. This includes providing additional resources and guidance to help individuals navigate the configuration more effectively or even providing additional training to help them understand the configuration.

Caruso may not invest their own development time in this project. While this could potentially be a problem, there is no hard requirement for a specific set of functionality, so the risk of this becoming a real issue is relatively low. However, it is important to note that this risk could only become a problem after the timeline of this project has been completed. As such, a contingency plan is not currently within the scope of this project. If Caruso does not invest their own development time in the project, it may be necessary to reassess the situation and consider potential alternative solutions or approaches.

# Chapter 14

# Outlook

This additional chapter briefly addresses the future of the application, which is not currently part of the scope but can still be kept in mind as information.

According to Caruso's CEO, the future of the application can be divided into three phases: The bronze, silver and gold phase.

After the first development phase is completed and the application proves to be useful, in the bronze phase the project will be taken up again by internal development and set up again on a larger scale.

In the silver phase, the application should also be able to be used productively for customers and exceed the scope of data appetiser.

In the gold phase, the intention is to sell the application as a productive system to customers.

# Glossary

**Caruso API**

The Caruso interface through which vehicle data is received from the OEMs and vehicles can be registered.

**Caruso dataplace**

A digital marketplace where Caruso sells subscriptions to data items.

**CI**

Corporate identity. The manner in which a company presents itself and its products to the public, for example logos, colours or brands.

**data appetiser**

A presentation showcasing Caruso data items.

**data item**

A single standardised point of data sold in the Caruso dataplace.

**design sprint**

A process of gathering requirements which is used iteratively in five phases to create prototypes.

**MoSCoW method**

A prioritisation method for requirements. Stands for Must have, Should have Could have and Won't have.

**non-technical**

A person who uses or otherwise interacts with Caruso data items without deeper knowledge or understanding of the technology behind them.

**OEM**

Original equipment manufacturer. The car manufacturers who sell the raw vehicle data to Caruso.

**persona**

A fictional person representative of a stakeholder in the project.

**stakeholder**

A person, group, company or other entity who is impacted by the success of the project. Can be seperated into the core target group, direct stakeholders and indirect stakeholders.

**telemetry data**

Data that is automatically gathered and transmitted during the use of a vehicle such as position, fuel gauge or indicator lamps.

**use case**

A standalone action the user wants to take with the help of the application to achieve a specific goal.

**user story**

A requirement in the form “as a

$$role$$

I want to

$$action$$

to achieve

$$goal$$

”

**VIN**

Vehicle identification number. A unique identifier for a vehicle. Used to register vehicles in the Caruso dataplace. Used by both technical and non-technical people.

**widget**

A small, standalone piece of the user interface built for a single purpose.

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