# A roadmap towards a passenger-oriented public transport tariff system

Graduation report, July 2020

Seamless Personal Mobility Lab

Eva Taylor Parkins

Faculty of
Industrial Design Engineering

TU Delft

# A roadmap towards a passenger-oriented public transport tariff system

Graduation report, July 2020

Seamless Personal Mobility Lab

Eva Taylor Parkins

Delft University of Technology
This report is part of the Seamless Personal Mobility Lab

July 2020

**Author**
Eva Taylor Parkins

**Project coordination**
Dr.ir. S.Hiemstra-van Mastrigt

**Academic supervisors**
Dr.ir. S.Hiemstra-van Mastrigt
S.Hiemstra-vanMastrigt@tudelft.nl

Dr.ir. S.C.Mooij
S.C.Mooij@tudelft.nl

**Project execution**
Eva Taylor Parkins
evataylorparkins@gmail.com

**Project partners**
9292 | Reisinformatiegroep
GVB
Ministry of Infrastructure and Water Management
OV-Campus (CROW-KpVV and samenwerkingsverband DOVA)
RET
Rover
TransLink Systems

*This project received project funding for Public-Private Partnerships for Research and Development (PPP allowance) from the Dutch Ministry of Economic Affairs and Climate Policy via CLICKNL.*

# Preface

Dear reader,

During the past year, I have been working on this project, starting with the research elective, and since January continuing on this graduation project. Diving into such a complex context has been interesting, and though at times. But most of all, it has been a great learning experience.

However, I could not have completed this project without the support and feedback of the people around me.

Suzanne, thank you for giving me the opportunity to engage in such a challenging project, and for providing me with all kinds of support. It was a pleasure to graduate within the Seamless Personal Mobility Lab.

Sylvia, thank you for your outside perspective on the project. Your advice and critical questions really helped to elevate the project.

Claudia, thank you for being my bonus supervisor, and for all the reading you did. It was great to have you around to discuss my project with.

I want to thank my friends and family for your belief in me, and support during the project. In particular, Neema, for proofreading everything, and supporting me during the long deadline days. Martha, for helping out with the visuals, and even teaching me some photoshop tips & tricks. Joy, for being my office buddy, even when our desks were not in the same room anymore.

With this project, my time at Industrial Design Engineering has come to an end and I will finish my master Strategic Product Design. I am curious to see what will come next!

Enjoy reading!

# Executive summary

The current public Dutch transport tariff system is complex and difficult to understand for the passenger. It is assumed that passengers feel like they are not getting the “best price”, but do not have the means to validate this. Furthermore, there is a large offer of tickets and subscriptions available which can lead to insecurity for the passenger.

The Dutch public transport is provided by several carriers and organized in a decentralized manner. The OV-chipcard is the main payment method within the system. The current tariff system of the Dutch public transport works with a starting rate and a kilometre rate. The starting rate is determined nationally, while the kilometre rate differs per region and/or carrier.

The landscape of Dutch public transport is changing. Firstly, within the coming years, the OV-chipcard will be replaced with a new system where the price calculations will happen in a back office instead of at the card readers (NOVB, 2018). The new system is called account-based ticketing (ABT). Currently, the Dutch public transport makes use of card-based ticketing (CBT). The introduction of this new system is a great moment to revise the tariff system. In addition, multiple new forms of (shared) mobility are appearing which, together with the current public transport, create a Mobility as a Service (MaaS) landscape.

## Assignment

For this graduation project the following assignment was formulated:

*Creating a roadmap to implement the ideal passenger-oriented tariff system for public (and shared) transport in the Netherlands.*

The goal of this project is to develop a user-centred solution to improve the experience of the traveller concerning the tariff system of the Dutch public transport, and other forms of shared transport. The solution will consist of changes in the tariff system and will consist of short- and long-term developments. The future vision (ideal passenger-oriented tariff system) and steps towards this vision will be combined into a roadmap.

## Seamless Personal Mobility Lab

This graduation project is executed within the Expertisecentre for User-Centred Mobility Services, one of the projects of the Seamless Personal Mobility Lab, which is one of the Delft Design Labs of the faculty of Industrial Design Engineering. In this research and design lab, students and researchers of Industrial Design Engineering at TU Delft work together with transport operators, mobility companies, government and technology developers to gain a better understanding of the wants, needs and behaviour of passengers.

The following parties are connected to the Expertisecentre for User-Centred Mobility Services:

- 9292 | Reisinformatiegroep
- GVB
- Ministry of Infrastructure and Water Management
- OV-Campus (CROW-KpVV and samenwerkingsverband DOVA)
- RET
- Rover
- TransLink Systems

This graduation project is preceded by a research project, which was executed within the lab. Within this research project, an international benchmark was conducted to map the pros and cons of different public transport tariff systems. During this benchmark, the different systems were compared on, among others, price awareness, transparency, ticketing and pricing. The benchmark, consisting of questionnaires, interviews and service safaris, was conducted in Antwerp, South Tyrol (Bolzano), London, and Helsinki (Taylor Parkins, 2020).

## Process

This graduation project was executed in four phases: inspiration, ideation, conceptualization and implementation.

### Inspiration

During the first phase, the context analysis and international benchmarking conducted within the research project (Taylor Parkins, 2020) were combined with user research.

Within the context analysis the operational set-up, OV-chipcard and the tariff system of the Dutch public transport

system are discussed. Furthermore, important developments in the context of public transport are discussed, such as account-based ticketing, MaaS, and single check-in check-out.

The international benchmark was conducted to generate a deeper understanding of different international public transport tariff systems. Antwerp, South Tyrol, London and Helsinki were selected as benchmark locations.

In addition to the context analysis and international benchmark, user research with Dutch passengers was conducted. A creative session was conducted with the use of friendships booklets and statements.

From the context analysis, international benchmarking and user research, user values and user needs were derived. Furthermore, need-based personas were composed to make sure the needs of all passengers are taken into account.

### Ideation

The ideation phase was started with defining the future vision, this vision is the following:

*In the future, all passengers should be **confident** about and **in control** of their spendings on public transport. Therefore there should be a **unified** and **transparent** tariff system that is **adopted by all** carriers. Additionally, carriers and other mobility providers should **cooperate** to offer the passenger **personalized** and **all-inclusive** travel products for the best price.*

With this future vision in mind, two creative sessions were organized, one with members of the Seamless Personal Mobility Lab, and another with IDE students. The outcome of the sessions was used as input for the final design: the strategic and visual roadmaps.

### Conceptualization

During the conceptualization phase of this project two roadmaps were designed, a visual roadmap and a strategic roadmap. The visual roadmap is used to quickly show the vision and steps towards this vision to the stakeholders, and open up the conversation. The strategic roadmap contains more detail and shows the links between the elements.

Within the strategic roadmap four horizons can be found, working towards the future vision. The 26 roadmap elements are divided into six categories: major events, personalization, cooperation, transparency, simplification and trends.

**Horizon 0 | 2020 | Current status**
To set the stage for the roadmap, horizon zero is added. This horizon represents the current status of the public transport (tariff system) and is an addition to the findings of the context analysis.

Recently, a lot has changed within society, and public transport, due to COVID-19. Within this horizon, the implications of COVID-19 will be discussed as well as the current service society we live in. Furthermore, digital ticketing and the seven Dutch MaaS pilots are discussed.

**Horizon 1 | 2021 | Clarifying the system**
Within the first horizon, the focus is on clarifying the system. It is important that the tariff system and built up is explained to the passengers, and insight is offered into the personal travel history of the passengers.

Additionally, during this horizon, the carriers need to start cooperating by minimizing the offering of travel products, but instead offering regional travel products, and harmonizing the tariffs. A public transportation authority can make sure all these steps are executed with mutual agreement.

**Horizon 2 | 2023 | Make it teamwork**
During the second horizon, the cooperation between the carriers is improving even more, as well as the personalization for the passenger.

ABT is implemented, which opens up possibilities for other improvements like single check-in, check-out and the utilization of automatic discounts in the back-office. Additionally, resulting from the MaaS pilots, the first Dutch MaaS concepts will be available to the passenger.

**Horizon 3 | 2025 | Adding new players**
In the third horizon of this roadmap, the system is ready for the addition of new players, in the form of international MaaS service providers and international services. Public transport will act as the backbone for a complete mobility concept, and the passenger will be able to use all these services using the

same system for planning, booking, tickets and payment.

### Implementation

During the implementation phase, the roadmaps are validated with stakeholders and experts and an implementation cardset is created. This implementation cardset can be used in addition to the strategic (and visual) roadmap, individually or together with colleagues and/or stakeholders. When the implementation cardset and strategic roadmap are used together a complete understanding of the roadmap can be formed, and since each roadmap element has its own card it is easy to lay them together and start a conversation.

Furthermore, the results of this project are discussed and recommendations are given for the implementation of the roadmaps and suggestions for further projects within the Seamless Personal Mobility Lab.

## Conclusion

The goal of this project was to develop a user-centred solution to improve the experience of the traveller concerning the tariff system of the Dutch public transport, and other forms of shared transport. The aim was to design a solution consisting of short- and long-term developments and to combine the future vision and steps towards this vision in a roadmap.

### User-centredness

During the whole project the user, in this case the passenger on public transport, was kept in mind.

This user-centred approach is important to make sure the tariff system is adopted to the user needs and values, instead of requirements from carriers or authorities. When the system is better adjusted to the passengers, it is expected that public transport will be used more, and with this result in advantages for the carriers and authorities as well.

### Implementation

Next to user-centredness, implementation was an important factor during this project. Within the context of public transport a lot is changing, carriers and authorities are working on a new payment system, and with this rethinking the product offering. This makes that the timing of this project is ideal, there is still room for input and adjustments, and the stakeholders can use the outcome of this project as input for their own projects.

To foster this implementation the concept was validated with stakeholders and experts, and the implementation cardset was designed. The deliverables (roadmaps and cardset) were made tangible on purpose, this way they can be showcased to the stakeholders.

*To conclude, during this project a strategic roadmap, visual roadmap and implementation cardset were designed and created. Within the roadmaps short- and long term developments are defined to lead towards the ideal passenger oriented public transport tariff system where passengers are confident about and in control of their spendings on public transport. The roadmaps, combined with the implementation cardset, offer a user-centred solution and are a great source of inspiration for the current developments within public transport.*

The project deliverables

# List of abbreviations

| | |
|---|---|
| ABT | Account Based Ticketing |
| AFC | Automated Fare Collection |
| BTM | Bus, Tram, Metro |
| CBT | Card Based Ticketing |
| DOVA | Decentrale OV-autoriteiten |
| EBS | Egged Bus Systems |
| GVB | Gemeentelijk Vervoerbedrijf |
| HTM | HTM Personenvervoer NV |
| IenW | Ministerie van Infrastructuur Waterstaat |
| KBA | Kosten-baten analyse (Cost-benefit analysis) |
| KpVV | Kennisplatform Verkeer en Vervoer |
| LCO | Landelijk Consumenten Overleg |
| LOCOV | Landelijk Overleg Consumentenbelangen Openbaar Vervoer (National Consultation on Consumer interests in Public Transport) |
| LTI | Landelijke Tariefindex (National Index Rate) |
| LTK | Landelijk Tarievenkader (National Tariff Framework) |
| MaaS | Mobility as a Service |
| MAD | Media Acceptance Device |
| MRDH | Metropoolregio Rotterdam Den Haag |
| NDOV | Nationale Data Openbaar Vervoer |
| NMBS | Nationale Maatschappij der Belgische Spoorwegen |
| NOVB | Nationaal Openbaar Vervoer Beraad |
| NS | Nederlandse Spoorwegen |
| RET | Rotterdamse Elektrische Tram |
| ROCOV | Reizigers Overleg Consumentenbelangen Openbaar Vervoer (Regional Consultation on Consumer interests in Public Transport) |
| SiCiCo | Single check-in check-out |
| TLS | Trans Link Systems |

# List of definitions

**Boarding rate**
When using the OV-chipcard there is a boarding rate that will be deducted from the card when checking in. When checking out the travelled kilometres will be charged and the remainder of the boarding rate will be refunded onto the card. The boarding rate differs per modality, on the most bus-, metro and tram lines the boarding rate is €4,00 while for NS trains it is €20,00 (Translink, 2019a).

**cEMV**
Contactless EMV. EMV is a technical payment standard that ensures chip-based payment cards and terminals are compatible (can communicate with each other) around the globe. EMV stands for Europay, Mastercard and Visa, the three companies that developed the specifications for the standard (Gooch, 2018).

**Concession**
The right to perform public transport to the exclusion of others in a certain area during a certain period of time (Overheid.nl, 2019).

**Concessionaire**
Licensed public transport operator to whom a concession has been granted (Overheid.nl, 2019).

**Electronic ticket**
Proof that gives access to and provides for payment for the use of public transport through electronic registration of the journey or part thereof (Overheid.nl, 2019).

**Fare**
The money paid for a journey on public transport (Lexico, 2019a).

**Grijsrijden**
Grijsrijden is the act of checking-in, but intentionally not checking-out because the costs of the journey are higher than the boarding rate.

**Mobility as a Service (MaaS)**
A new transport concept that integrates existing and new mobility services into one single digital platform, providing customized door-to-door transport and offering personalized trip planning and payment options. Instead of owning individual modes of transportation, or to complement them, customers would purchase mobility service packages tailored to their individual needs, or simply pay per trip (Durand et al., 2018).

**Mobility services providers**
Mobility service providers facilitate mobility solutions, for the business market in particular, by combining different transport services (both in public transport and beyond) and accompanying services (such as taking care of administration) into one product (Autoriteit Consument Markt, 2018).

**Multiple check-in check-out**
Due to system requirements, it is necessary to check-in and out with every carrier. This results in multiple check-ins and check-outs during a single trip.

**NS rate**
The rate applied by NS differs from the regional rate. NS calculates with a fixed rate of approximately € 1 plus a degressive rate per tariff unit, with a minimum of 8 tariff units. This leads to a minimum rate of € 2.40 per trip (Rover, 2019).

**OV-chipcard**
The OV-chipcard is the payment method for public transport in the Netherlands. You charge the card with a balance in euros or you put a travel product on it, such as a one-way ticket, a monthly home-work travel subscription or a travel card. The OV chipcard is a plastic card the size of a bank card. There are different cards in circulation. There are, for example, public transport chip cards from NS, GVB or RET. There are personal and anonymous OV-chipcards. An OV chipcard is always recognizable by the pink logo. The chip in the OV chipcard is not visible (Translink, 2019e).

**Passenger**
A traveller on a public or private conveyance other than the driver, pilot, or crew (Lexico, 2019b).

**Post-paid travel**
Also known as “travelling on account”. The traveller pays afterwards, by means of an invoice or direct debit. Price calculations are carried out afterwards, in the back office (Gelevert et al., 2016).

### Prepaid travel
Also known as “travelling on balance” or e-ticket. The traveller pays for a journey that has not yet begun. Travelling with a subscription is also seen as a prepaid method of payment (Gelevert et al., 2016).

### Public Transport
Passenger transport open to every one according to a timetable with a car, bus, train, metro, tram or a vehicle propelled through a guidance system (Overheid.nl, 2019).

### Regional rate
Also known as the kilometre rate, this rate is not nationally determined. This means that travelling can currently cost slightly less in one region than in another (Translink, 2019b). The price per kilometre varies between €0,14 and €0,21 (DOVA, 2019a). This regional tariff structure applies to the regional train services and in all buses, trams and metros (Rover, 2019).

### Single check-in check-out
The ideal situation for checking-in and out, where you only check-in at the start of a journey and check out at the final destination.

### Specify while travelling
With “specify while travelling” the fare is determined by checking in and out. This applies to travel on balance (prepaid) and travel on account (post-paid) (Rover, 2019).

### Starting rate
When paying for the public transport the fare is built up of a starting rate and a kilometre rate. The starting rate is set nationwide, for 2019 this rate is €0,96. When travelling by multiple modalities (bus, tram, metro) or lines, you only pay the starting rate once when you change within 35 minutes. However, when changing to the train you have to pay the starting rate again since the starting rate is calculated within the price of the ticket/ride (Translink, 2019a, 2019d).

### Strippenkaart
The strippenkaart is a ticket for city- and regional transport (BTM) and is the precursor of the OV-chipcard. The strippenkaart is provided with a number of “strips”, the traveller had to stamp off the amount of “strips” needed for a trip on public transport (OV in Nederland, 2019a).

### Tariff unit
Tariff units are used by NS to determine the fares. A tariff unit is not equal to a kilometre but approaches this. The number of tariff units has been determined by NS per route. The number of tariff units on a route can be adjusted by NS, this has been done in the past with the aim of making travelling over longer distances via that route cheaper (Rover, 2019).

### Transaction-based travel
Transaction-based payment means that the traveller will immediately pay for the journey when checking-in or out, via his bank card, credit card or connected EMV carrier (Gelevert et al., 2016).

### Traveller
A person who is travelling or who often travels (Lexico, 2019c).

### Travel Product
A travel product is essentially an (electronic) “right” that enables the traveller to travel on public transport at a certain time and place at a certain price (Autoriteit Consument Markt, 2018).

### Travel Token
A travel token is a means of identification used for checking-in and out on public transport. Examples of travel tokens are the OV-chipcard, smartphone, barcode, and debit card.

### WP2000 (Wet personenvervoer 2000)
Law of 6 July 2000, containing new rules regarding public transport, private bus transport and taxi transport (Overheid.nl, 2019).

WP2000 and the Passenger Transport Decree 2000 form the legal framework. In essence, these laws and regulations state that there are a national tariff and card system and, at the same time, that regional transport authorities can set their own requirements for the card and tariff system of the concession carriers (Veeneman et al., 2011).

The introduction of the WP2000 has ensured decentralization and market forces for regional public transport (Ministerie van Infrastructuur en Waterstaat, 2019a).

# Table of contents

# Introduction

# 1

## Project context

The current public Dutch transport tariff system is complex and difficult to understand for the passenger. It is assumed that passengers feel like they are not getting the “best price”, but do not have the means to validate this. Furthermore, there is a large offer of tickets and subscriptions available which can lead to insecurity for the passenger.

The Dutch public transport is provided by several public transport operators and organized in a decentralized manner. The OV-chipcard is the main payment method within the system. The current tariff system of the Dutch public transport works with a starting rate and a kilometre rate. The starting rate is determined nationally, while the kilometre rate differs per region and/or carrier.

The landscape of Dutch public transport is changing. Firstly, within the coming years, the OV-chipcard will be replaced with a new system where the price calculations will happen in a back office instead of at the card readers (NOVB, 2018). The new system is called Account-Based Ticketing (ABT). Currently, the Dutch public transport makes use of Card-Based Ticketing (CBT). The introduction of this new system creates a great moment to revise the tariff system.

In addition, multiple new forms of (shared) mobility are appearing which, together with the current public transport, create a Mobility as a Service (MaaS) landscape. The first levels of MaaS integration are the integration of information (level 1) and the integration of booking and payment (level 2) (Sochor et al., 2018). This implies that to make the integration of public transport and MaaS possible these are areas should be looked at, thus making the revision of the public transport tariff system a logical point to start.

## Scope

The focus of this project is the Dutch public transport system as it is organized at the moment. The public transport system in the Netherlands is the only one worldwide that is organized nationally, and thus this project will focus on the system on a national level. The tariff system spoken about is that of the public transport in general, the specific products/ subscriptions of single providers will not be looked at.

In addition to the current public transport modalities, other forms of shared transport will also be taken into account. With the developments towards Mobility as a Service, these forms of transportation will most likely be added to the current public transport system. This implies that the tariff system of public transport should be capable of adapting to these additions.

## Assignment

The assignment is formulated as follows:

*Creating a roadmap to implement the ideal passenger-oriented tariff system for public (and shared) transport in the Netherlands.*

The goal of this project is to develop a user-centred solution to improve the experience of the traveller concerning the tariff system of the Dutch public transport, and other forms of shared transport. The solution will consist of changes in the tariff system and will consist of short- and long-term developments. The future vision (ideal passenger-oriented tariff system) and steps towards this vision will be combined into a roadmap.

## Seamless Personal Mobility Lab

This graduation project is executed within the Expertisecentre for User-Centred Mobility Services, one of the projects of the Seamless Personal Mobility Lab, which is one of the Delft Design Labs of the faculty of Industrial Design Engineering. In this research and design lab, students and researchers of Industrial Design Engineering at TU Delft work together with transport operators, mobility companies, government and technology developers to gain a better understanding of the wants, needs and behaviour of passengers.

Within the lab multiple graduation and research projects are executed. Figure 1 shows the members of the lab.

The following parties are connected to the Expertisecentre for User-Centred Mobility Services:

- 9292 | Reisinformatiegroep
- GVB
- Ministry of Infrastructure and Water Management
- OV-Campus (CROW-KpVV and samenwerkingsverband DOVA)
- RET
- Rover
- TransLink Systems

*This project received project funding for Public-Private Partnerships for Research and Development (PPP allowance) from the Dutch Ministry of Economic Affairs and Climate Policy via CLICKNL.*

More information on the lab, partners and other projects can be found via https://delftdesignlabs.org/seamless-personal-mobility/

This graduation project is preceded by a research project, which was executed within the lab. Within this research project, an international benchmark was conducted to map the pros and cons of different public transport tariff systems. During this benchmark, the different systems were compared on, among others, price awareness, transparency, ticketing pricing. The benchmark was conducted in Antwerp, South Tyrol (Bolzano), London, and Helsinki (Taylor Parkins, 2020).

Figure 1: Members of the Seamless Personal Mobility Lab

# Project approach

# 2

## Process

This project exists of four phases, inspiration, ideation, conceptualization and implementation. Figure 3 shows the four phases and table 1 shows an overview of the main steps taken during the process

### Inspiration

During the first phase, the context analysis and international benchmarking conducted within the research project (Taylor Parkins, 2020) were combined with user research. From these parts, user needs and values were distilled, and additionally, need-based personas were created.

### Ideation

During the second phase, the future vision was defined and creative sessions were held to generate ideas for the conceptualization phase.

### Conceptualization

During the third phase the strategic and visual roadmaps were designed, these are the main deliverables of this project.

### Implementation

During the fourth and final phase, the concepts were validated with stakeholders and experts. Additionally, an implementation cardset was created and recommendations were made.

## Report structure

The report is structured following the four phases mentioned before. At the start of each chapter an introduction of the phase can be found.

Throughout the report yellow boxes (figure 2) can be found, these boxes are used to indicate insights and summaries. The insights can contain user needs or user values, these needs and values will be listed at the end of the inspiration chapter.


Figure 2: Insights and summaries throughout the report

The terms “passenger” and “traveller” are used interchangeably throughout the report, and are referring to the same thing: someone travelling by public transport.

## Project deliverables

The deliverables of this graduation project are, apart from this report:

- a visual roadmap (page 80);
- a strategic roadmap (page 82);
- an implementation cardset (page 115).

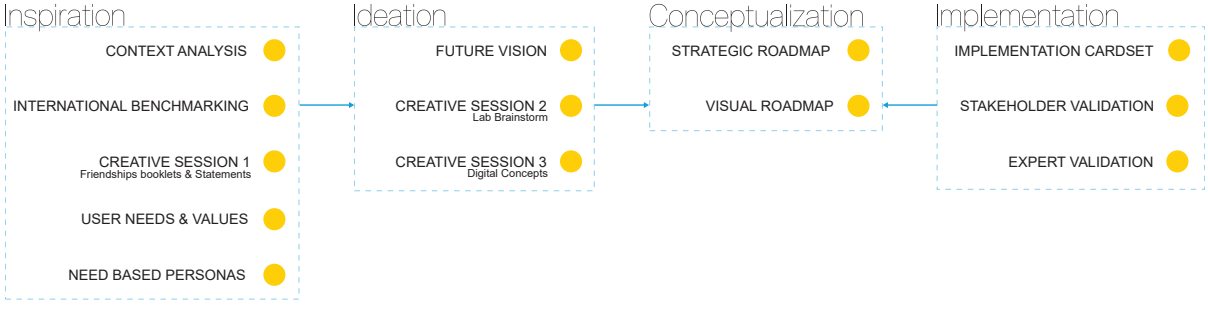



Figure 3: The four phase used during this project

Table 1: The activities and outcomes of this project.

| Description | Participants | Format | Outcome |
|---|---|---|---|
| Context analysis | | Desk/literature research | User needs and values. |
| International benchmarking | **Antwerp** (38 questionnaires, 4 interviews), **South Tyrol** (5 questionnaires, 14 interviews), **London** (45 questionnaires, 8 interviews), **Helsinki** (35 questionnaires, 8 interviews), **the Netherlands** (28 questionnaires) | Interviews, questionnaires and service safari. | Pros and cons of international tariff systems, user needs and values. |
| Session 1: Friendships booklet and statements | **15 participants** | Interactive pdf with friendships booklet and 12 statements | Need based personas, and user needs values. |
| Session 2: Lab brainstorm | **4 Participants**<br>Members of the Seamless Personal Mobility Lab | Digital brainstorm using Zoom and Miro.<br><br>Mind mapping, how to's and placing ideas on the three horizons of the roadmap. | (Technology) trends roadmap elements and time pacing of ideas. |
| Session 3: Digital concepts | **5 Participants**<br>BSc, DFI, 3 IDE Graduates | Digital brainstorm using Zoom and Miro.<br><br>How to's and concept designs. | Input for the strategic roadmap, digital concepts. |
| Stakeholder validation | **Lab partners** (DOVA, CROW, Rover, 9292, Translink, Ministry of Infrastructure and Water Management) | Presentation and Google Form during knowledge sharing session with the Seamless Personal Mobility lab | Initial reactions and possible bottlenecks. |
| Expert validation | **2 experts** (TU Delft and DOVA) | Discussion using the strategic and visual roadmaps. | Comparison to current project, possible bottlenecks. |

# Inspiration

# 3

The inspiration chapter consists of the context analysis, international benchmarking and user research.

Within the context analysis (3.1, page 28) the operational set-up, tariff system of the Dutch public transport system and the OV-chipcard are discussed. Furthermore, important developments in the context of public transport are discussed, such as account-based ticketing, Mobility as a Service, and single check-in check-out.

The international benchmark (3.2, page 40) was conducted to generate a deeper understanding of different international public transport tariff systems. Antwerp, South Tyrol, London and Helsinki were used as benchmark locations.

In addition to the context analysis and international benchmark user research (3.3, page 54) with Dutch passengers was conducted. A creative session was conducted with the use of friendships booklets and statements.

From the context analysis, international benchmarking and user research user needs (page 61) and user values (page 62) were derived. Furthermore, need-based personas (page 63) were created to make sure the needs of all passengers are taken into account.

# 3.1

## Context Analysis

Within the Netherlands, we have a national public transport system, which is quite different from the rest of the world where the systems are built around a city or region. The Dutch public transport is provided by multiple carriers such as RET, GVB, and NS.

This chapter discusses the operational set-up, the tariff system of the Dutch public transport the and OV-chipcard. Furthermore, important developments in the context of public transport are discussed, such as account-based ticketing, MaaS, and single check-in check-out.

To conclude this chapter the connections between the different topics are discussed and the collected user needs and values are are summarized.

# Operational set-up Dutch public transport

Within the Netherlands the public transport is organized in a decentralized manner, this means that there is a factor of freedom when it comes to fares (Nationaal Openbaar Vervoer Beraad, n.d.). Provincial and local authorities are responsible for granting concessions in their region (Government of the Netherlands, 2011). Appendix B shows an overview of the concessions on January 1st, 2020.

## Stakeholders

The field of public transport has several types of stakeholders, who jointly shape policies and the execution of public transport. These stakeholders can be summarized broadly in the categories of passengers, government and carriers (Gelevert et al., 2016).

### Passengers

Within the field of public transport, passengers are represented by consumer organizations such as Rover. The consumer organizations place their wishes with the decentralized authorities (the granting authority). These wishes are formulated towards the carriers, who at their turn translate them to Translink Systems (TLS) (Meijdam et al., 2011).

**User value**: Consumer organizations translate the wishes of the consumer to the transport authorities.

Consultation at a national, cross-concession level is clearly more difficult because of the numerous parties involved. In the national consumer consultation (LCO), consultation takes place between the national consumer organizations, the Ministry of Infrastructure and Water management and the carriers.

### Government

The decentralized authorities have a regional consultation on consumer interests in public transport (ROCOV) per concession area where the relevant government consults with the regional carrier and regional departments of consumer organizations on public transport. (Meijdam et al., 2011). Within the national consultation on consumer interests in public transport (LOCOV) the consumer organisations, NS and the ministry of Infrastructure and Water management consult on national issues.

Furthermore, the National Public Transport Council (NOVB) exists, in which all carriers and concession providers, as well as consumer organizations in the Netherlands, work together. The NOVB focuses on national and cross-concession issues concerning the OV-chipcard and (the development of) other forms of public transport payment (NS Connexxion, 2018).

### Carriers

Dutch public transport is provided by several different public transport operators. These carriers offer a range of trains, trams, buses, metros, transport over water and additional services such as bicycles. Table 2 shows an overview of the carriers within the Netherlands and the modalities they offer.

Next to the carriers, mobility service providers are popping up in the landscape of public transportation. These mobility service providers facilitate mobility solutions, for the business market in particular, by combining different transport services (both in public transport and beyond) and accompanying services (such as taking care of administration) into one product (Autoriteit Consument & Markt, 2018).

Table 2: Dutch public transporation operators and modalities offered

| Dutch public transportation carriers | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Public transport company | | Arriva | Connexxion | GVB | Hermes | HTM | NS | RET | Qbuzz | Keolis Nederland | Aquabus | EBS | Westerschelde Ferry BV |
| Transportation modality | Train | ● | ● | | | | ● | | | ● | | | |
| | Tram | | | ● | | ● | | ● | | | | | |
| | Metro | | | ● | | | | ● | | | | | |
| | Bus | ● | ● | ● | ● | ● | | ● | ● | ● | | ● | |
| | Other | | | ● | | ● | ● | ● | | ● | ● | | ● |

# Tariff system

The tariff system of the Dutch public transport works with multiple building blocks, namely: the starting rate, national rate / degressive rate, and boarding rate. Furthermore, numerous travel products are available.

## Starting rate

When paying for public transport the fare is built up of a starting rate and a kilometre rate. The starting rate is set nationwide, for 2019 this rate is €0,96. When travelling by multiple modalities (bus, tram, metro) or lines, you only pay the starting rate once when you change within 35 minutes. When changing to the train you have to pay the starting rate again, since the starting rate is calculated within the price of the ticket/ride (Translink, 2019a, 2019d).

**User value**: The starting rate is set nationally.

## The regional rate

There is no nationally determined kilometre rate yet. This means that travelling on balance can currently cost slightly less in one concession than in another (Translink, 2019b). The price difference per concession (carrier) can cause confusion with the passengers, especially on points where two carriers operate in the same region. The price per kilometre varies between €0,14 and €0,21 (DOVA, 2019a). This regional tariff structure applies to the regional train services and in all buses, trams and metros (Rover, 2019).

**User need**: Transparency on the price difference per concession.

## The NS rate

The rate applied by NS differs from the regional rate, which can cause confusion with the passengers as well. NS calculates with a fixed rate of approximately € 1 plus a degressive rate per tariff unit, with a minimum of 8 tariff units. This leads to a minimum fare of € 2.40 (Rover, 2019).

**User need**: One way of price calculation for the whole public transport system.

A tariff unit is not equal to a kilometre but approaches this. The number of tariff units has been determined by NS per route. The number of tariff units on a route can be adjusted by NS, this has been done in the past with the aim of making travelling over longer distances via that route cheaper (Rover, 2019).

## Boarding rate

When using the OV-chipcard there is a boarding rate that will be deducted from the card when checking in, with checking out the travelled kilometres will be charged and the remainder of the boarding rate will be refunded to the card. The boarding rate differs per modality, on the most bus-, tram and metro (BTM) lines the boarding rate is €4,00 while for NS trains it is €20,00 (Translink, 2019a).

The boarding rate does not affect the accessibility of the system. At check-in, the boarding rate is deducted from the card balance. For BTM it is not necessary that the amount of the boarding rate is on the balance of the OV-chipcard. Having a positive balance at the time of check-in is sufficient to be able to travel with the OV-chipcard (Meijdam et al., 2011). However, when travelling by train the card balance needs to be at least as high as the boarding rate.

**User value**: For BTM transport only a positive balance is necessary.

**User need**: Being able to travel by train with only a positive balance.


Figure 4: Building blocks of the Dutch tariff system

### How the fare is determined

The above mentioned national rates for BTM are set annually according to agreements made. Decentralized public transport authorities have statutory tariff authority, meaning that they may set their own rates in their concessions, independently of other public transport authorities. To make sure the passengers experience as little inconvenience as possible when crossing (concession) boundaries, the decentralized public transport authorities try to make national agreements.

To make these national agreements the National Tariff Framework (Landelijk Tarievenkader, LTK) has been created. The LTK consists of agreements on, among other things, national tariffs and products for city and regional transport, and the distribution of proceeds. Almost all national rates are indexed in the National Rate Index (Landelijke tariefindex, LTI). The LTI method is also part of the LTK.

The main national tariff is the starting tariff discussed before, in addition, rates for national products are set annually. This usually concerns subscriptions that allow unlimited travel and discount products. In addition to the national products, there is a multitude of local products (subscriptions, individual card products) and, of course, the kilometre rates for travel on balance that are agreed between the grantor and concessionaire and discussed with consumer organizations. According to WP2000 (Overheid.nl, 2019), consumer organizations have the right to advise on a change in rates and conditions (DOVA, 2019b).

## Travel products

A travel product is essentially an (electronic) “right” that enables the passenger to travel on public transport at a certain time and place at a certain price (Autoriteit Consument  Markt, 2018). Examples are a 40% discount subscription, a bike ticket and traject subscription. However, due to the numerous travel products available choosing the right one can be tough for travellers.

**User value**: Travel products offer a larger array of options and are theoretically personalizable for each traveller.

**User need**: Advice when choosing from the multitude of travel products.

A passenger can have several travel products on his OV-chipcard, for example, a national and a regional travel product. A product change can then take place on an interoperable journey. For example, the first part with the national travel product, the second part with the regional. The travel product is automatically selected at check-in, according to a prioritization list (Rijnhout  van der Niet, 2018).

## Issues current tariff system

Within the current tariff system of public transport in the Netherlands, there are some issues to be found.

Firstly, consumers pay millions too much each year for travelling by public transport because the tariff systems of the different carriers are not aligned (Ammelrooy, 2020b). This makes it hard for the average passenger to find the cheapest travel option (Ammelrooy, 2020a).

**User need**: Alignment between carriers.

Secondly, the various rates cannot be explained to the traveller (Ammelrooy, 2020b). Small differences in rates make sense given the regional rate freedom. However, it cannot be explained to travellers that for a train journey from Venlo to Blerick with Arriva they will pay € 1.36 but when they take the NS train four minutes later they pay € 2.40 for the same journey (Rover, 2019).

**User need**: Transparency on travel rates/ticket prices.

**User need**: Paying the same price for the same journey, independently of the carrier.

Lastly, the financial risk of wrongdoing in the system now lies partly with the passenger (e.g., when forgetting to check out), while this risk with the strippenkaart and the paper train ticket laid with the carrier (Meijdam et al., 2011).

**User need**: Placing the financial risk back with the carriers.

# OV-chipcard

The OV-chipcard is used in the Dutch public transport for over 10 years now. This chapter briefly discusses the history of the OV-chipcard, how the system is organized, possible payment methods within public transport (with or without the OV chipcard) and the purchase of the OV-chipcard.

## History

During the 1970s the Dutch government started subsidizing public transportation carriers. The main reason for this subsidy being the high competition the public transportation carriers experienced with cars. Later on, in the 1980s a national tariff system called “strippenkaart” was introduced. This “strippenkaart” could be used to pay for bus, tram, metro and some train routes. The introduction of the “strippenkaart” made travelling in the Netherlands a lot easier since you did not have to purchase tickets for different carriers anymore. From 2009 onwards the “strippenkaart” was gradually replaced by the OV-chipcard, the abolition of the “strippenkaart” was completed October 2011 (OV in Nederland, 2019a).

In 2001 Connexxion, GVB, HTM, RET and NS founded Trans Link Systems (TLS), the company that is responsible for the OV-chipcard (OV in Nederland, 2019b). Since January 2016 all public transport carriers (Arriva, Connexxion, EBS, GVB, HTM, Keolis, NS, Qbuzz and RET) are a member of the “Coöperatie Openbaar Vervoerbedrijven” and together they own TLS (Coöperatie Openbaar Vervoerbedrijven, n.d.; Translink, 2019c).

The OV-chipcard is the first integrated national electronic ticket system in the world. Other countries have similar systems, but these systems only work within one city. Examples of these systems are the Octopus card (Hong Kong), Oyster card (London) and Opal card (Singapore).

**User value**: The OV-chipcard is a integrated national system.

Having the OV-chipcard as a nationwide system implicates that it is a complex system. The system needs several public transportation operators, and the national, regional and local governments to cooperate.

## The OV-chipcard system

The OV-chipcard works on a distributed offline system, where the credit is kept on the card itself. Card readers can be connected online with the systems of carriers, but the operation of the system is not directly dependent on this connection (Gelevert et al., 2016) which can lead to delays in the processing of transactions.

## Payment methods

Within public transport payment methods can be divided into three categories: prepaid, post-paid and transaction-based. Where prepaid and post-paid are already possible in the current OV-chipcard system, transaction-based payment will be implemented in the future. The three categories are explained below.

### Prepaid travel

We know this form of payment as “travelling on balance” or as an e-ticket: the traveller pays for a journey that has not yet begun. Travelling with a subscription is also seen as a prepaid method of payment (Gelevert et al., 2016).

### Post-paid travel

This form of payment is seen as “travelling on account”. The traveller pays afterwards, after receiving an invoice or with a one-time transfer. Post-paid travel is already available for business travellers (Business Card) and recently via NS Flex (NS, n.d.). With Post-paid travel, the price calculation can be carried out afterwards, in the back office (Gelevert et al., 2016). The creditworthiness of the traveller is of great importance here.

### Transaction-based travel

Transaction-based payment means that the traveller will immediately pay for the journey when checking-in or out, via his bank card, credit card or connected EMV carrier (Gelevert et al., 2016).

**User value**: Multiple forms of payment available, suitable for different passenger needs.

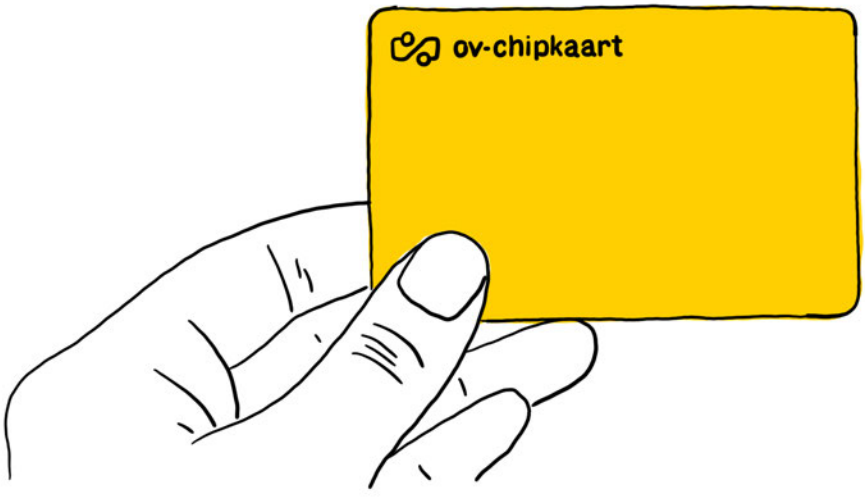
## Purchase of the OV-chipcard

The first step in using the Dutch Public Transport with the OV-chipcard system is acquiring an OV-chipcard. This card can be personal or anonymous. The OV-chipcard has a validity of five years, after the five years the card needs to be replaced (Translink, 2019d).

The suggested retail price of an OV-chipcard is established at €7,50. The retail price of the OV-chipcard is high compared to international alternatives, these internationall cards often have a longer validity as well.

Part of this price (€2,50) is constructed out of material costs, production costs and distribution costs. While the other €5,00 is for the management and maintenance costs of the services offered around the OV-chipcard. This means that there is a discrepancy between the usages of the OV-chipcard and the costs. With the service costs included in the retail price, incidental users pay for the service costs of frequent travellers. The way the service costs are currently charged is unfair and creates a high threshold for incidental users.

With the implementation of account-based ticketing (see next page) additional travel tokens will be introduced, this means that a new way of charging the service costs has to be thought of.



# Account-based ticketing

The current OV chipcard may disappear in 2023. According to State Secretary Van Veldhoven, the technology is due for replacement. In a letter to public transport carriers and other governments, she writes that the ease of use of the card is appreciated by travellers, but that a more contemporary system is preferable (van Veldhoven - Van der Meer, 2019). Van Veldhoven wants to go to a system where the travel balance is no longer kept on an OV-chipcard, but where the travellers choose their own payment method, for example, a bank card or mobile phone (van Limpt, 2019).

**User value**: With the new system travellers can choose their preferred payment method.

The new system is called account-based ticketing (ABT), while currently, the Dutch public transport makes use of card-based ticketing (CBT). The following paragraph will explain the two systems and discuss developments in this area.

## Card-based Ticketing

A CBT system consists of smart cards (e.g. OV-chipcard), terminals that access the cards, servers that forward the data to its destination and ID management systems.

The data necessary to calculate and validate fare payments are stored within the memory of the card. This requires complex reader software that can perform a variety of security functions, validations, and calculations within a small time window (Mangla, 2019).

## Account-based ticketing

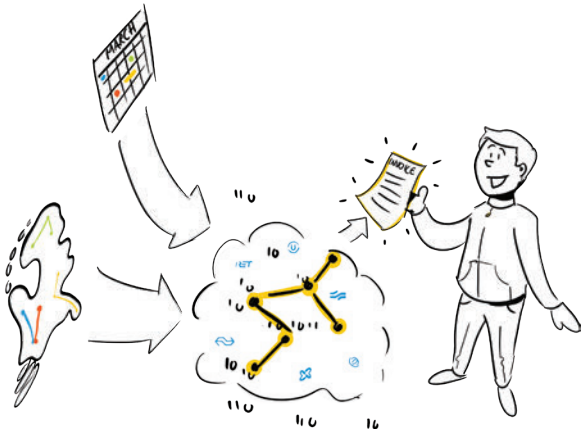
In an ABT system, the data stored on the card (or other means of identification) is static and is used only as a means to identify the card within an automated fare collection (AFC) system. Travel products (e.g. time-based passes, discount products, stored value) are managed in virtual accounts that are housed within the agency's central computer system and accessed and verified each time the card is presented to a reader in a station. Calculation of the fare due is assigned to the central system (Mangla, 2019).

With this system, it becomes possible to use other means of identification, such as bank cards or smartphones since the Media Acceptance Devices (MAD) / validators do not write any data on the transport card or token that are used in the system but merely read the ID to identify the traveller (Lipre, 2016).

With the use of ABT, the location and amount of taps calculate the fare, which is charged to the traveller post journey. This means travellers no longer need to buy a ticket and can benefit from the best fare policies (Masabi Ltd, 2019).

**User value**: With ABT the fare is calculated post journey, potentially resulting in the best fare policies for the traveller.

Next to changes to the OV-chipcard system, the new system creates opportunities for other changes. Carriers and concession providers are currently considering possible adjustments to tariff structures and travel products. This is done because the new technology for public transport payments can offer new possibilities for the tariff structure (Rover, 2019).



# Mobility as a Service

The transport sector is evolving towards the Mobility as a Service (MaaS) landscape (Matyas & Kamargianni, 2019). “MaaS is a very recent mobility concept. It can be thought of as a concept (a new idea for conceiving mobility), a phenomenon (occurring with the emergence of new behaviours and technologies) or as a new transport solution (which merges the different available transport modes and mobility services).” (Jittrapirom et al., 2017, p. 14).

Different definitions for MaaS exist, the one used in this report is as follows by Durand et al (2018, p. 6) :

*“MaaS is defined as a new transport concept that integrates existing and new mobility services into one single digital platform, providing customized door-to-door transport and offering personalized trip planning and payment options. Instead of owning individual modes of transportation, or to complement them, customers would purchase mobility service packages tailored to their individual needs, or simply pay per trip.”*

## Public transport as the backbone of MaaS

It is indicated that public transport should be the backbone of MaaS (Matyas & Kamargianni, 2019; Ramboll, 2019). On the other hand, a common concern about MaaS is that access to car-based options (e.g. car rental, car sharing, taxis) may encourage a car-dependent user base.

**User value**: With public transport as the backbone of MaaS transportation options for the travellers increase.

Yearly, 25 trillion kilometres are travelled with public transport in the Netherlands (Ministerie van Infrastructuur en Waterstaat, 2018). With these kinds of numbers, we cannot ignore the significance of the role that public transport will play in the future MaaS landscape.

It needs to be considered that the integration of MaaS starts with the integration of information (level 1) and the integration of booking and payment (level 2) (Sochor et al., 2018). This implies that to make the integration of public transport and MaaS possible integration of information, booking and payment are the first areas that need to be looked at.

Currently, carriers can offer access to their travel product in various ways. This can be done by allowing mobility service providers to resell the existing range of travel products (with or without a discount) to customers, or by creating the option to purchase transport kilometres with which mobility providers can develop their own products (such as subscriptions).

In practice, there is no (effective) access to the public transport services of carriers, because the carriers have the ability and incentive to restrict access. As a result, mobility service providers have a competitive disadvantage, since the business model of mobility service providers depends on being able to bundle different transport services. This competitive disadvantage has an inhibiting effect on the development of the mobility market and can be detrimental to the development of a wider market of MaaS services (Autoriteit Consument & Markt, 2018).

# Single check-in check-out

One of the changes in the world of public transport is the transition from multiple check-in, check-out to single check-in, check-out (SiCiCo).

This chapter explains the systems of multiple and single check-in, check-out as well as possible variations, implementation conditions, pros, and cons of SiCiCo.

In 2011 an analysis on this transition was executed, with the verdict that SiCiCo could be implemented, but due to the steps that have to be taken, it would take two to three years. (Meijdam et al., 2011)

However, in 2020, 9 years later, SiCiCo is still not implemented. Recently (December 5, 2018) the NOVB has decided not to roll out national SiCiCo in the current OV-chipcard system. The main reason for this is that the costs do not outweigh the benefits, due to the introduction of ABT in 2023 and the phasing out of the current OV-chipcard technology. Moreover, the implementation requires adjustments in terms of market organization (Nationaal Openbaar Vervoer Beraad, 2018).

## Multiple Check-in Check-out

The implementation of the OV-chipcard system forces the traveller when switching to a train from another carrier, first to check out at one train carrier and then to check-in at the other train carrier. We call this process multiple check-in, check-out. With this, the journeys are handled per carrier, so that the carrier has a high degree of freedom in his own domain to offer transportation propositions (Meijdam et al., 2011).

It has to be noted that multiple check-in check-out is not so much a problem when switching to a different modality (e.g., entering/leaving the station or vehicle), but for switching between different operators for the same modality (train).

The process of multiple check-in, check-out has some disadvantages for the traveller. For many travellers, the phenomenon is a source of stress and frustration (Puylaert, 2020). Additionally multiple check-in, check-out can have financial consequences (e.g., paying the boarding rate twice due to checking out at the wrong carrier) for the traveller.

**User need**: Hassle-free travelling.

## Variations SiCiCo

With SiCiCo the traveller only needs to check-in at the start of his journey, and check-out at his final destination, independently of the carriers he travels with.

With the introduction of SiCiCo, a choice can be made to develop SiCiCo within the current OV-chipcard system or to use SiCiCo with new forms of public transport payment (Rijnhout et al., 2018).

Rijnhout et al (2018) propose the following options:

- No SiCiCo, except for the regions where it is already in practice;
- SiCiCo in the current OV-chipcard system;
- SiCiCo for travellers who travel on account within the current OV-chipcard system;
- SiCiCo in a future token system;
- SiCiCo for those travelling with an app and location determination
- SiCiCo for travellers who purchase individual tickets before their journey.

## Implementation conditions SiCiCo

To implement SiCiCo in the Dutch public transport there are some conditions that the system has to meet.

With regard to the technical design of public transport, hardware and software, the following requirements are set:

- A clear check-in principle is important for all stakeholders (Gelevert et al., 2016);
- A real-time connection with all validators is necessary (Gelevert et al., 2016);
- Every validator of every carrier must have all the tariff information of the different carriers (Meijdam et al., 2011).

In addition, changes will have to be made to concession contracts (Rijnhout & van der Niet, 2018). These changes revolve around agreements for tariff harmonization and revenue distribution, only with agreements on these topics SiCiCo can become a reality (Ministerie van Infrastructuur en Waterstaat, 2019a).

Furthermore, carriers must make binding agreements to inform each other and the traveller about the fares, the

system of mutual settlements, the handling of complaints, leniency arrangements and the blacklisting of cards (Meijdam et al., 2011).

## Pros SiCiCo

SiCiCo makes public transport more understandable, easier to use and accessible to more travellers. This will contribute to an increase in the use of public transport and a higher number of satisfied travellers (van Leijenhorst, 2018). Travelling by train also becomes easier and more accessible with validators who are no longer dependent on carriers, this is especially true for the blind and visually impaired (Rijnhout et al., 2018). SiCiCo also makes the entry of new carriers affordable and prevents unnecessary capital destruction in the event of a change of concession (Meijdam et al., 2011).

In addition, SiCiCo will ensure time savings for the traveller and saved costs as a result of fewer errors when checking in and out (Ministerie van Infrastructuur en Waterstaat, 2019a). Additionally fewer incorrect transactions mean fewer complaints and refunds, which means that the costs of customer service can be reduced (Rijnhout et al., 2018).

In conclusion, it can be said that SiCiCo makes the use of public transport easier for the traveller, and attractive public transport is ultimately of value to the carriers themselves (Rijnhout et al., 2018).

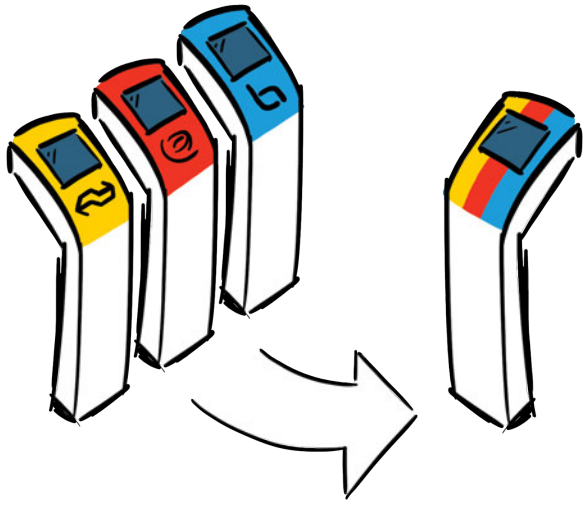
## Cons SiCiCo

SiCiCo adds complexity, regardless of whether it has to be realized in the validators or in back-office systems. The benefits are largely independent of the form in which SiCiCo is offered. In addition, every validator or gate at every train station in the Netherlands must be able to determine the fare for a journey from any other station, taking into account all products and rates that apply somewhere on the route, after which the proceeds must be distributed among the relevant carriers. Furthermore, it will not always be clear which route and which transporter was used for travelling, this has consequences for journey prices and revenues (Rijnhout et al., 2018).

With the introduction of SiCiCo, multiple concessions become connected. There is an obligation to come to an agreement with each other, and choices made in a certain concession have financial and technical consequences for all other concessions (Rijnhout & van der Niet, 2018). SiCiCo would mean that the same fares would have to be applied for parallel travel options with different carriers, and this goes against the current decentralized system (Nationaal Openbaar Vervoer Beraad, 2018).

The introduction of SiCiCo also encounters the market model chosen in the past, and with this the associated tariff freedom of local authorities (Nationaal Openbaar Vervoer Beraad, 2018).

Furthermore, SiCiCo will ensure a shift of disadvantages from the passenger domain to the domain of carriers and concession providers (van Leijenhorst, 2018). For example, there is an additional risk of “grijsrijden”, because the journey between check-in and check-out can be longer, and the price of this journey will more often be higher than the boarding rate (Rijnhout et al., 2018).



# Coherence of the tariff system, SiCiCo and ABT

Previously the tariff system of the Dutch public transport, single check-in check-out and account-based ticketing are discussed separately, but these factors certainly have an influence on one another. In the following paragraphs, the links and influences between the factors are discussed, as well as implementations for the future Dutch public transport system.

## Account-based ticketing and the tariff system

When the current OV-chipcard system changes from card-based ticketing to account-based ticketing an opportunity for other changes arises. Carriers and concession providers are already considering possible adjustments to tariff structures and travel products since the new technology offers new possibilities. In the system of account-based ticketing, more calculations will be done in the back office instead of at the validators, and payment will more often happen in a post-paid method. With the calculations done in the back-office, it will be possible to, for example, combine fare calculations of multiple carriers or apply a discount after a certain amount of time, journeys or distance travelled.

## The tariff system and single check-in check-out

To begin with, new techniques or developments do not on themselves make SiCiCo possible. The interdependence of concessions, processes and the OV-chipcard system, in general, is too large to realize SiCiCo with an adjustment in only one of these areas.

One of the main implementation conditions for SiCiCo is that the tariffs of carriers are harmonized, which also creates a great opportunity for further adjustments to the tariff system. When there are mutual agreements on the harmonization of fares and the distribution of proceeds the tariff system will become less complex, and with this SiCiCo will be easier and more affordable to implement. This does imply that the market model of public transport needs to undergo a radical change.

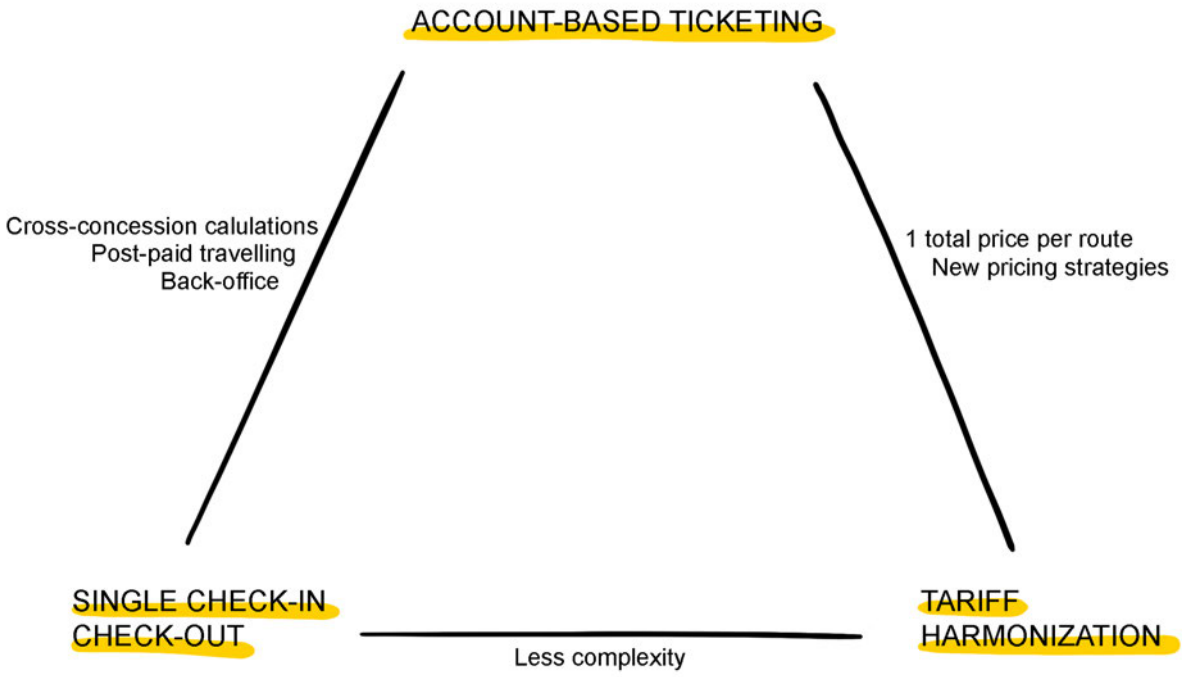
Moreover, as been said by Rover (2019), an optimal network derives its strength not from mutual competition between public transport services but from the cooperation between providers of public transport services.

## Single check-in check-out and account-based ticketing

To be able to make the complex calculations necessary for SiCiCo the calculations need to take place in a back office. The system of account-based ticketing that is about to be implemented will already be working with a back-office, which makes the implementation of SiCiCo easier.

Post-paid travelling is connected with account-based ticketing since the calculations are done in the back office and the traveller will pay via an invoice or direct debit. With the calculations done in the back office there is the possibility to calculate the fares of cross-concession travel, and therefore those of SiCiCo journeys. It thus is expected of carriers and authorities that the problem of multiple check-in, check-out no longer occurs with the new payment methods.

The combination of a harmonized, passenger-oriented, tariff system and account-based ticketing makes it possible to implement SiCiCo as well.


ACCOUNT-BASED TICKETING
Cross-concession calulations
Post-paid travelling
Back-office
1 total price per route
New pricing strategies
SINGLE CHECK-IN
CHECK-OUT
TARIFF
HARMONIZATION
Less complexity

# 3.2

## International benchmarking

For a complete analysis of the possible pricing strategies for public transport, four cities/regions (Antwerp, South Tyrol, London and Helsinki) were selected for the international benchmarking.

During the benchmarking three methods were used: interviews, auto-ethnographic research. and questionnaires. The goal of the benchmark research was to generate insights on the experience and behaviour of travellers in and a deeper understanding of the different public transport tariff systems.

In the following paragraphs, the tariff systems of the four benchmark locations will be discussed briefly, as well as the pros and cons of each system.

The details of this international benchmark can be found in the Analysis report (Taylor Parkins, 2020).

# International tariff systems

The tariff systems used in cities, regions and countries worldwide can roughly be divided into four categories, namely: point-to-point pricing, zone pricing, price capping and fixed price.

## Point-to-point pricing

With the point-to-point pricing strategy, the price for a ticket depends on the distance travelled, resulting in a different price for each possible trip. This pricing strategy is often combined with a starting rate, or decreasing tariff structure. Examples of cities/regions where this system is used are Sydney, Tokyo, and South Tyrol.

## Zone pricing

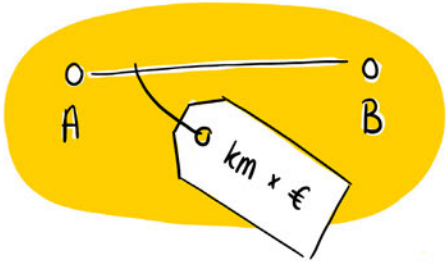
Zone pricing is often applied within city borders. With this system the city is divided into zones, most of the times these are formed around the city centre. Tickets can be bought for one or multiple zones and are valid for a certain time period. With multiple modalities and stops within one zone, there is less price fluctuation with this system compared to point-to-point pricing. Public transport systems that use zone pricing can be found in, among other places, Copenhagen, Berlin, and Helsinki.

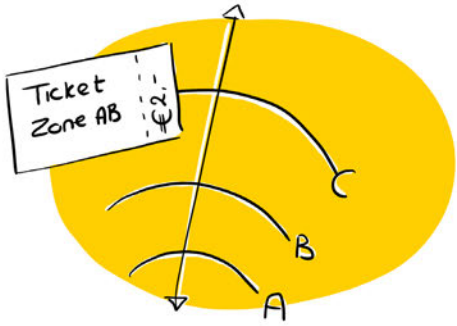
## Price capping

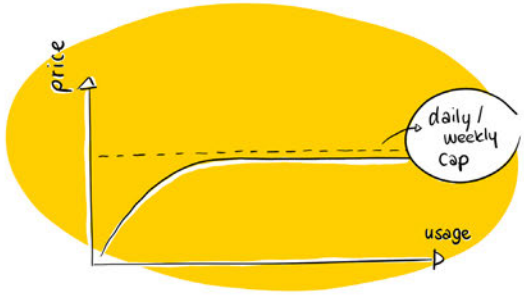
Within some public transport tariff systems price capping is applied, this can be either on a daily, weekly or yearly basis. Next to the time period, price capping is often also connected to the region that is travelled in. With the system of price capping, the traveller has a maximum price for travelling within this time frame and region, offering security. Examples of price capping can be found in London, Sydney, and South Tyrol.

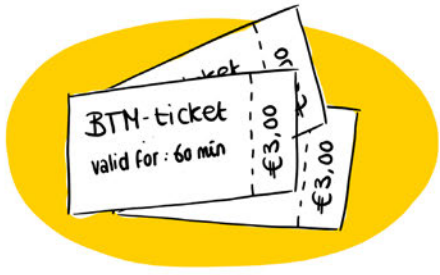
## Fixed-price

When a fixed price is applied in the tariff system it is possible to buy one ticket to use on all forms of public transport within a city/region. This ticket often has a certain validity period, for example, 60 minutes. These tickets are mainly used for BTM transport. Public transport systems that use this fixed price strategy can be found in New York, Lisbon, Prague and Antwerp.




12 Sportpaleis
7077

# Antwerp

Questionnaires N=38
Interviews N=4

The public transport in Antwerp can be divided into two categories: public transport to get to the city, and public transport to move through the city. To move through the city of Antwerp buses and trams are available, operated by De Lijn. Within this part of the public transport system the fixed price structure is used.

To pay for the buses and trams within Antwerp there are three ticket options:

- Paper tickets bought at the bus/tram drivers, a ticket machine or ticket office (Lijnwinkel);
- Mobile tickets (M-tickets) bought through the application of De Lijn;
- SMS-tickets

The tickets are available for different time intervals, with the basic ticket being valid for 60 minutes. There are also (multiple)day tickets and it is possible to buy 10 tickets at once for a discounted price. The price per ticket differs between the different options, in table 3 an overview can be found (De Lijn - Vlaamse Vervoermaatschappij, 2019). In addition to these tickets, subscription options for unlimited travel on buses and trams are available.

Table 3: overview of ticketprices De Lijn

| | Paper ticket | M-ticket | SMS-ticket |
|---|---|---|---|
| Ticket (60 min) | €3,00 | €1,80 | €2,25 |
| Daypass | €7,00 | €6,00 | €7,15 |
| 10-tickets | €16,00 | €15,00 | Not available |

## Benchmarking insights

To use public transport in Antwerp, and specifically to buy single tickets, you have to be somewhat familiar with the system. The ticket prices are not shown at the bus stop or within the bus, so most people search for this information online (website or application). Next to the prices not being shown, the bus driver assumes that you know the price of a ticket moreover the app does not indicate which ticket is best to buy.

**User need**: Transparency on travel rates/ticket prices.

Most frequent travellers invest in a subscription, the main reason to do so is that they think it is profitable. If this really is the case is not always calculated. Single tickets are seen as expensive, especially when bought at the bus driver. The prices for single tickets vary enormously, a ticket bought via the application is almost half the price of one bought with the bus driver.

**User need**: Insight in travel products and the personal fit.

**User need**: Paying the same price independently of the way/place the ticket is bought.

When looking at the questionnaire results it is noticeable that the price awareness is quite high, it is expected that this is because of the fixed price for bus and tram. Next to that, it has to be noted that the questionnaire respondents all use public transport on a regular basis.

**User value**: High price awareness due to fixed prices.

The most important pros and cons derived from the benchmarking in Antwerp are:

### Pros

- Travel/price information can be found on websites/ applications
- M-tickets can be bought everywhere and at every time as long as the traveller has a smartphone
- Subscriptions can be price-effective for regular travellers

### Cons

- Single tickets are seen as expensive in comparison to the subscriptions
- Travellers are only aware of the tickets/products they use themselves, not the tariff system as a whole
- To buy/use the M-tickets you have to have a smartphone and be somewhat digitally savvy
- Ticket prices differ a lot depending on the place they are bought

# South Tyrol

Questionnaires N=5
Interviews N=14

The public transport in South Tyrol region is operated by the South Tyrolean transport association. It mostly consists of busses and regional trains. To pay for public transport in South Tyrol there are a couple of payment options. It is possible to buy single tickets for a trip, use a prepaid value card or buy a (multiple) day ticket (called a Mobilcard) (IDM Südtirol, 2019). More information on these options can be found in the analysis report.

Next to the payment options mentioned above, it is also possible to use a Südtirol Pass. The Südtirol Pass is an electronic ticket similar to the OV-chipcard. The card can be topped up with credit but it is also possible to pay via a postpaid option. The Südtirol Pass is personal, meaning it can only be used by one dedicated user (STA - Südtiroler Transportstrukturen AG, 2019a).

When travelling with the Südtirol Pass you start with paying a tariff of 12 cents per tariff kilometre. This tariff decreases when the user travels more. In table 4 an overview of the price paid when travelling with a Südtirol Pass is shown, as you can see here, after travelling 20.000 km (€640,-) within a year public transport becomes free. For students and the elderly, there are also subscription options to put on the card (STA - Südtiroler Transportstrukturen AG, 2019b).

Table 4: Price per tariff kilometre when using a Südtirol Pass

| Kilometers traveled | Price per tariff kilometre |
|---|---|
| 1 - 1.000 | 12 cent |
| 1.001 - 2.000 | 8 cent |
| 2.001 - 10.000 | 3 cent |
| 10.001 - 20.000 | 2 cent |
| from 20.000 | 0 cent |

## Benchmarking insights

The public transport tariff system in South Tyrol stands out because of its clear kilometre pricing and the decreasing tariff. During the interviews, it stood out that the regular travellers use the Südtirol Pass and is aware of the kilometre pricing and decreasing tariff, but can't explain the details of the system. However, they seem to like the fact that they are paying less when using public transport more, and the system was even explained as having a maximum price to pay for public transport per year. Downsides of the Südtirol Pass are the fact that almost no-one reaches the highest category and the fact that you have to carry a plastic card with you.

**User value**: Using public transport on a regular basis is motivated with a financial benefit.

**User need**: Transparency on the details of the (tariff) system.

Next to the Südtirol Pass single tickets, value cards and Mobilcards are available. These options are suited for the people that use public transport more sporadically. These travellers do not mind paying a bit more when using public transport and often do not know how the system of the Südtirol Pass works because they simply do not use it.

Information on the costs of public transport and the system, in general, is available via multiple applications as well as on the stations. The information is shown in a consistent matter, making it easy to understand.

**User value**: Information is shown in a consistent matter.

The most important pros and cons derived from the benchmarking in South Tyrol are:

**Pros**

- Prices of the Südtirol Pass decrease when the card is used more often
- When using the Südtirol Pass the traveller knows that there is a maximum price for public transport per year
- The system looks the same at all stations/locations
- The applications available to plan trips with public transport in the region show the different steps of the tariff system

**Cons**

- The categories of the Südtirol Pass are not clear to all travellers
- The last category of the Südtirol Pass (above 20.000 km) is almost never reached
- Rides on the cable car are not calculated based on the length of the cable car line itself
- When travellers do not use public transport often, using a car is still cheaper


Friern Barnet 43
BDE2617
Metroline
LJ19 CUC
43 Friern Barnet
HT 196
CITY NORTH
Live London your
LAUNCHING 16TH NOVEMBER
Waterloo 521
SEe37
LJ66 CHK
B
521
N343

# London

Questionnaires N=45
Interviews N=8

The day-to-day operation of the public transport network in London is managed by the integrated transport authority Transport for London (TfL). TfL is responsible for the buses, Underground, Docklands Light Railway (DLR), Overground, TfL Rail, Trams and London's main roads (Transport for London, n.d.-d).

To pay for public transport in London there are multiple options (Transport for London, n.d.-a): the Oyster card, contactless, single and return tickets, bus & tram pass and travelcards.

### Oyster card and paying contactless

The Oyster card is a smart card that can be used to travel on public transport, it works via the pay-as-you-go principle. Travelcards, bus & tram passes, and discounts can be added on the Oyster card. The Oyster card has to be touched in at the start and touched out at the end of the journey (Transport for London, n.d.-c).

Contactless cards or mobile devices can also be used to pay-as-you-go. Similar to the Oyster card, you have to touch in and out with the contactless card or mobile device (Transport for London, n.d.-b).

### Price capping

When using an Oyster card or paying contactless a price cap is applied, meaning that there is a maximum you need to pay per day. If you are paying contactless a weekly cap also exists, the weekly cap has the same price as a 7-day travelcard. The height of the cap depends on the amounts of zones you travel through, for example, the daily cap for zone 1-3 is £8.20 (± €8,90), and for zone 1-5 it is £12.00 (± € 13,10) (Travellers Toolkits Ltd, 2019). An overview of the caps and zones can be found in the Analysis report (Taylor Parkins, 2020).

## Benchmarking insights

Within the London public transport system numerous options to pay and/or buy tickets exist. The Oystercard or a contactless credit or debit card can be used to pay-as-you-go. While cards like the Freedom pass and Key to the city exist as well and can have travel products on them.

The costs of public transport differ per traveller. Elderly can travel for free using a Freedom pass while other travellers pay over 300 pounds a month when travelling regularly. For the Oystercard daily capping is available, and when paying with a contactless credit or debit card there is also a weekly capping available. This weekly capping is a reason for some passengers to use this payment method.

**User need**: More price equality between travellers.

**User value**: With price capping there is a maximum price per day/week.

The Oystercard can be managed via an application in which the passenger can buy new travel products. This application can be used to track the travel history and offer insight into the capping. However, the application does not always function, which makes it hard for the passengers to trust the system.

**User value**: Insight into travel history and price capping is offered via an application.

The most important pros and cons derived from the benchmarking in London are:

### Pros

- Capping makes sure passengers do not pay more than a daily or weekly maximum
- Paying for public transport with a credit card is easy and fast, no need to worry about having a balance on your card
- The Oystercard can be managed via an application

### Cons

- Capping is related to zones, and thus not effective if you travel outside these zones
- The Oystercard application does not always work properly, making that you can not solely trust on this application
- The tariff system of the London public transport is hard to understand for passengers due to the variety of subsystems (capping, zones, etc.)


DIGELIUS MUSIC
MIDWAY
120

# Helsinki

Questionnaires N=35
Interviews N=8

Public transport in the Helsinki region is operated by Helsinki Region Transport (HSL). The Helsinki Region is divided into zones (A, B, C & D) and tickets for public transport can be bought for a different combination of these zones.

To pay for public transportation in Helsinki there are a few different options, namely: single tickets, day-tickets, season tickets and zone extension tickets.

### Single tickets

Single tickets can be bought via the HSL application, the Whim (MaaS service) application, at a ticket machine or with the bus driver (this is not possible in other modes of transportation). It is also possible to pay for a single trip with credit on an HSL card (HSL, n.d.-c). In the Analysis report, an overview of the prices of a single trip within the different zones can be found. It is notable that the ticket price is higher when the ticket is bought with the bus driver.

Table 5: Single ticket prices (in €) depending on zones and type

| | AB | ABC | ABCD | BC | BCD | CD | D |
|---|---|---|---|---|---|---|---|
| HSL app | 2.80 | 4.60 | 6.40 | 2.80 | 5.40 | 4.20 | 2.80 |
| HSL card | 2.80 | 4.60 | 6.40 | 2.80 | 5.40 | 4.20 | 2.80 |
| Ticket machine | 2.80 | 4.60 | 6.40 | 2.80 | 5.40 | 4.20 | 2.80 |
| Bus driver | 4.00 | 6.50 | 9.00 | 4.00 | 7.50 | 6.00 | 4.00 |
| Validity (min) | 80 | 90 | 110 | 80 | 100 | 90 | 80 |

### Day-tickets

Day-tickets are available for the same combination of zones as the single ticket. With a day ticket, it is possible to travel unlimited within this zone (HSL, n.d.-a). The tickets are available starting from one day (€8.00 in zone AB), to a 7 day period (€32.00 in zone AB).

### Zone-extension tickets

A new option within the Helsinki system are the zone-extension tickets. If you have a season ticket, you can inexpensively expand your travel area by buying a zone extension ticket. For example, if you have an AB season ticket, with the zone-extension ticket you can make it an AB+C ticket and travel in zone C as well.

## Benchmarking insights

Public transport in Helsinki works with a zone system, the arrangement of these zones changed recently. The zones are formed around the city centre and combined with the highways around Helsinki they make the city easily accessible.

**User value**: Public transport and other infrastructure complement each other.

To travel with public transport in Helsinki you can buy paper tickets at ticket machines, or with the bus driver. It is also possible to use an HSL card (either pay-as-you-go or with a subscription) or to buy tickets and subscriptions via the HSL application. In this last case, only a smartphone is needed, which can also cause problems, for example when running out of battery.

With the Helsinki zone system, travellers do not have to think about the costs of public transport as long as they stay in the zone(s) of their ticket or subscription. When travelling outside of these zones a zone extension ticket can be bought.

**User value**: The zones simplify the system, making it easy to understand for the traveller.

The most important pros and cons derived from the benchmarking in Helsinki are:

### Pros

- Zone extension tickets are available when travelling past the borders of the ticket/subscription already bought
- Ticket/subscription prices are clearly shown digitally as well as near stations
- Using subscriptions provides unlimited travel and is easier to use.
- Travellers do not need to think about their public transport costs as long as they stay within the zone(s) of their ticket/subscription

### Cons

- When using public transport for only a few stops the traveller still needs to buy a ticket for the whole zone
- Tickets are activated immediately when bought
- When relying on an application for public transport tickets/subscriptions problems like empty batteries and crashing applications arise

# Conclusion international benchmarking

The results of the international benchmarking in Antwerp, South Tyrol, London and Helsinki, will be discussed and compared to the Dutch system. The tariff system of the different public transport systems will be looked at, as well as the ticketing and payment options that are available.

## Tariff System

When looking at the tariff systems of the researched public transport system two main themes stand out, namely: price awareness and transparency.

### Price Awareness

A common theme across all benchmark locations is the fact that passengers like to be aware of their public transport costs, and the tariff systems are constructed in a way that offers this information.

When looking at the results from the benchmarking (see Analysis report) it is noticeable that the price awareness in Antwerp and Helsinki is high on all modalities. In London, there is a high price awareness for bus and metro, but the price awareness for train and tram is low. For the Dutch public transport system, the price awareness is on the low side.

**Relation price awareness and use frequency**

Table 6 shows the modality ("other" modalities are excluded) with the highest and lowest use frequency per location, with their respective price awareness. It stands out that in almost all cases a high use frequency equals a high price awareness, and low use frequency equals an average to low price awareness. There are two deviations, namely the train in Helsinki and the Netherlands.

Table 6: Relation price awareness and use frequency

| Location | Use frequency | Modality | Price awareness |
|---|---|---|---|
| Antwerp | High | Train | High |
| | Low | Metro | Average |
| South Tyrol | High | Bus | High |
| | Low | Tram | Low |
| London | High | Metro | High |
| | Low | Tram | Low |
| Helsinki | High | Bus | High |
| | Low | Train | High |
| the Netherlands | High | Train | Average |
| | Low | Tram | Low |

The train in Helsinki has a relatively low use frequency, while the price awareness is still high. On the other hand, the train in the Netherlands has a relatively high use frequency, but there is only an average price awareness.

**Relation price awareness and tariff system**

South Tyrol and London the capping gives the passenger a maximum price for the use of public transport. The London system does it on a weekly or even daily basis, while the South Tyrol system works with a yearly maximum. In both of these systems the passenger only pays this maximum possible price when reaching a certain usage, and thus never pays more than necessary.

Both the public transport tariff systems of Antwerp and Helsinki work with fixed prices. The Antwerp system has a fixed price for all BTM transportation throughout the city, while the Helsinki system is split up in zones. Zones or not, the passengers can buy a single ticket and travel unlimited for a certain time period within Antwerp or a Helsinki zone. With these kinds of systems, the passenger does not need to calculate the price of each trip, since all trips within a zone can be done with the same ticket, and thus for the same price.

Adding to this, subscriptions, in general, create a sense of security and freedom. When using a subscription that gives them rights to unlimited public transport (within a certain area) the passenger does not have to think about the costs of public transport. Often these subscriptions are bought for one month at a time and paid in advance, which can also help the passenger with their personal budget since there are no more surprises when it comes to public transport costs.

**Factors of price awareness**

To conclude, the following factors are found to have an influence on price awareness:

- Use frequency
- Variation in pricing, e.g. fixed prices or a kilometre tariff
- Price capping
- Travel products, such as traject subscriptions

### Transparency

Looking at the information provision there is a difference between the information provision in South Tyrol and Helsinki, compared to the information provision in Antwerp and London. In South Tyrol and Helsinki, the information was clear and available on all stations, in the other cities information was lacking. The systems in South Tyrol and Helsinki are very transparent regarding the information offered.

In South Tyrol, the ticket machines offered clear information on the different types of tickets available and also showed the kilometre tariff the traveller pays when using a südtirolpass or value card. Furthermore, screens at the different stations showed information on the departure times of public transport and looked the same throughout the system.

The information provision in Helsinki was on point, the same visual style was used in all media. It is expected that with the changing zone system the information provided was also revised. At the stations and bus stops, and within the application, price information could be found. Next to that there was information within the vehicles on how to use the tickets and HSL card.

On the contrary, the systems in Antwerp and London are hard to understand and cause confusion with the passengers.

During the Service Safari in Antwerp, it was noticed that the bus driver expects the traveller to know the price of a ticket, without this information being stated somewhere on the bus or near the bus stop. The only clear information source was the internet/application, which is not available for all passengers.

The information provision in London is similar to Antwerp, with the added downside that the suggested prices form applications such as citymapper differ from the prices of the ticket machines. Furthermore, these ticket machines only show the price of the products/tickets at the last step of the process, making the comparison of tickets virtually impossible.

## Ticketing and payment

Looking at the ticketing and payment aspect of the public transport tariff systems the OV-chipcard equivalents, digital ticketing, other payment methods and divergence in pricing will be discussed.

### OV-chipcard Equivalent

Next to paper tickets, all the benchmark locations have their own OV-chipcard equivalent. Belgium, and thus Antwerp, has the MOBIB card, South Tyrol has its südtirolpass, London uses the Oystercard and within Helsinki, there is the HSL card.

Until now the MOBIB card could only be used to put travel products or subscriptions on, but recently there were some developments making it possible to have single tickets on this card.

The südtirolpass, Oystercard and HSL card can all be used on a pay-as-you-go basis, meaning that they can contain a certain balance and be used to check-in and -out of public transport. These passes can also contain travel products and subscriptions.

The passes are a great way to pay for public transport and use travel products and subscriptions. It was indicated that these passes have a downside as well because they are physical passes that can get lost, be forgotten or break.

### Digital Ticketing

Out of the benchmarking locations Antwerp, London and Helsinki had options for digital ticketing. In Antwerp, the application of the public transport operator De Lijn offers the possibility to buy single tickets as well as the “10-rittenkaart”. Unfortunately, this can only be done by residents of Belgium, since you need a Belgian bank account to pay within the application. Whim (MaaS service available in Helsinki) offered a solution, but here it was only possible to buy a single ticket.

With the Oyster application, it is possible to buy travel products and subscriptions to put on the Oystercard, and also to top up the card. These tickets are not completely digital since the traveller still needs to use the Oystercard to use the products/subscriptions.

Lastly, in Helsinki the public transport operator HSL offers all tickets and subscriptions via their application. Next to that, it is also possible to use Whim in Helsinki.

The possibility to buy digital tickets without the use of an additional card (Antwerp and Helsinki) is an advantage for digital-savvy travellers.

### Other Payment Methods

Next to the paper tickets, OV-chipcard equivalents and digital ticketing discussed before the London public transport system also accepts contactless credit or debit cards as a payment method (cEMV). With the contactless cards, it is possible to check-in and out of public transport, the costs of the journey will be automatically deducted from the bank account. As said by interviewees this system is easy to use, you have one less card to keep in your wallet and the weekly cap that comes with this payment method is beneficial to the traveller. This payment method is not (yet) available in Antwerp, South Tyrol, Helsinki and The Netherlands.

### Divergence in Pricing

Within all benchmark locations, it was noticed that there are different prices for the same journey or ticket. Examples are:

- The 60-minute BTM ticket in Antwerp, priced at €3,00 when bought with the bus driver, but only €1,80 when bought via the application of De Lijn or Whim
- An Adult AB-ticket in Helsinki, priced at €4,00 when bought with the bus driver, but only €2,80 when bought at a ticket machine or via the HSL application.
- A single ticket for the bus in South Tyrol, €1,50 when buying only this ticket, €1,20 when paying with a value card and even cheaper if you are paying with a südtirolpass in a higher category.

It is expected that this difference in price should motivate the travellers to use an electronic card to pay for public transport or buy the tickets in advance. In most cases, the cheaper option is easier to use. A downside is that with this pricing the sporadic travellers almost always pay more for their journey, which can be a hurdle to use public transport more often.

## Recommendations for the Dutch public transport system

Summarized, the research conducted gives the following insights for the Dutch public transport system:

- When there is less variation in the pricing of public transport, passengers are more aware of the costs;
- With tools like price capping, which set a maximum price, price awareness is increased;
- Travel products can offer passengers control over their public transport expenses;
- The information provision around the tariff system and travel products should be organized in such a way that it is easy to find and accessible to all;
- Digital ticketing can be an addition to the OV-chipcard, as is already done by HSL in Helsinki;
- Account-based ticketing offers new payment methods, putting the passenger in control by offering a choice;
- Divergence in pricing can help control the way passengers use and pay for, public transport, but it can confuse passengers.

# 3.3

## User Research

In addition to the context research and international benchmarking user research was conducted. With a (digital) creative session using friendships booklets and statements user needs and values were identified.

# Session 1: Friendships booklet and statements

The creative session was first designed to be face-to-face, consisting of the friendships booklet, statements and a brainstorm session. But due to the COVID-19 circumstances, it was changed into a digital session. The original setup can be found in Appendix C. The first two parts (friendships booklet and statements) of the original session were converted into interactive pdfs and distributed to the participants.

## Goal

The goal of this session was to identify the user needs and values of passengers, as well as elements of their ideal public transport tariff system.

## Friendships booklet

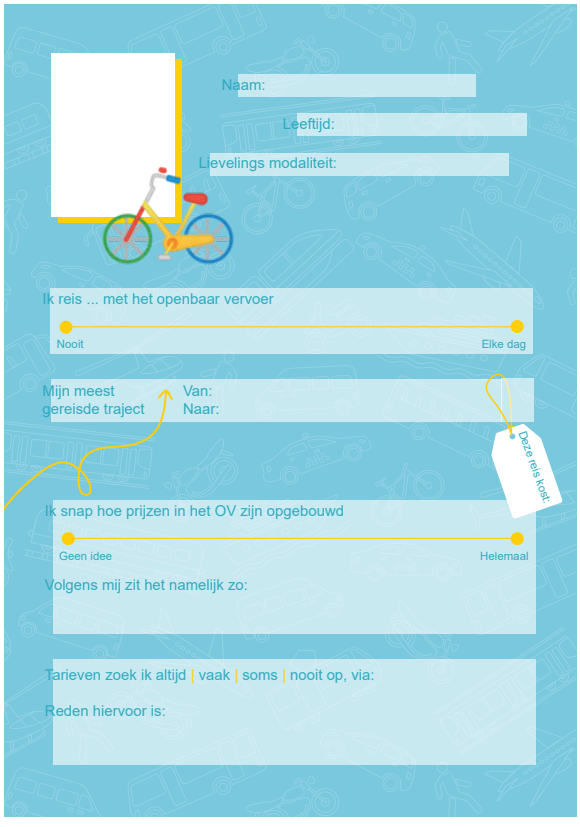
With these friendships booklets, in Dutch, the OVriendenboekje, (see figure 5, and Appendix D) traveller personas were created and user needs were identified.

The friendships booklets consisted of a series of questions on the travel behaviour of the participant, knowledge about the system, and the pros and cons of the Dutch public transport system.

## Statements

Next to the friendships booklet, 12 statements were given to the participants, divided into two categories: the current system and the future system.

Table 7 shows an overview of the statements. All statements, except for statement 3 for the future system, had six answer options, a neutral was not available, forcing the participants to choose a side. The complete statement form can be found in Appendix E.



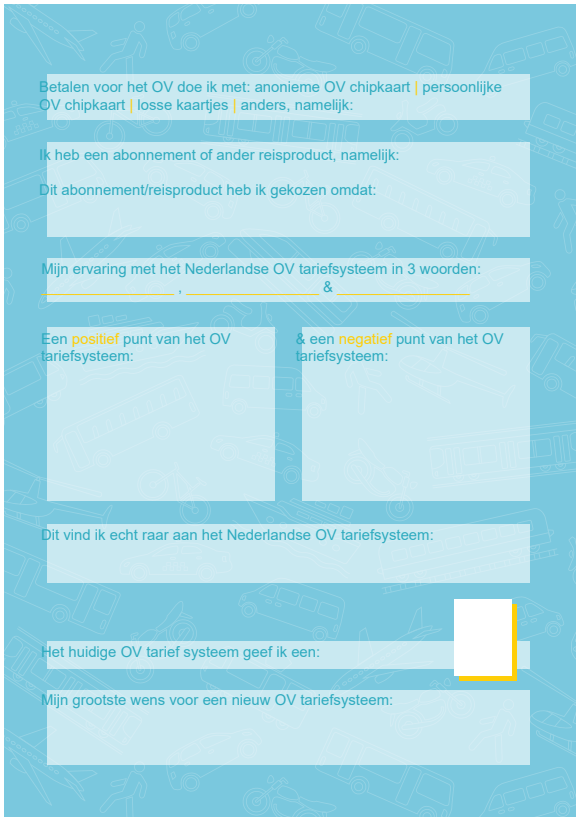




Figure 5: The friendships booklet, or OVriendenboekje

Table 7: Statements used during the digital creative session

| | | |
|---|---|---|
| **The current system** | | |
| 1. When it comes to travel products.. | | |
| I have no clue which travel product to choose. | | I know exactly which travel product fits my situation. |
| 2. The information provision about fares in Dutch public transport is.. | | |
| Incomplete, hard to find and unclear. | | Complete , easy to find and clear. |
| 3. I choose my route and/or used modality based on.. | | |
| Price of the trip. | | Duration of the trip. |
| 4. I feel like I pay .. to travel by public transport. | | |
| Too little. | | Too much. |
| 5. I feel .. about my travel expenses in public transport. | | |
| Uncertain. | | Confident. |
| 6. I think the OV-chipcard is a pleasant way of paying for public transport: | | |
| No, I would prefer to pay in a different way. | | Yes, very pleasant. |
| **The future system** | | |
| 1. I am most confident in this way of checking in- and out.. | | |
| Checking in- and out with every means of transport used. | | Not checking in or out at all, my route is determined using GPS. |
| 2. The price of a bus ride.. | | |
| Must be fixed, regardless of the distance travelled. | | Must by calculated based on the distance travelled. |
| 3. This seems to me to be the easiest way to pay in public transport.. | | |
| Transaction based, each ride is paid separately. | Prepaid, travel on balance. | Post-paid, travel on account. |
| 4. Discount during off-peak hours.. | | |
| Should only be available as a subscription, you pay extra to use it. | | Should be applied by default for every traveller. |
| 5. During my trip by public transport I want to.. | | |
| Remain anonymous. | | Use as many personalized options as possible. |
| 6. The tariff system should financially accommodate the frequent traveller.. | | |
| Disagree. | | Agree. |

Figure 6: Clustered insights

## Results

The friendships booklets and propositions were filled in by 15 participants, generating numerous insights. To make sense of these insights they were put on post-it's and clustered to generate themes. The clusters can be seen in figure 6, the themes and sub-themes in the scheme in figure 7. Next, the seven themes will be discussed.

### Price awareness

When it comes to price awareness participants only know the total price of a trip with public transport if they even know the price at all. They have no clue what the prices are based on, which can make them feel insecure. The prices are looked up to decide if the trip is worth it, and to see if there are different options.

> "I'm just looking at the price and whether I think it's worth travelling for this price." - Female, 24

Participants would like to see the built-up of the fares they are paying, as well as information on their spendings with different public transport carriers. With this information, they can be more in control, and make deliberate decisions on their travel behaviour.

**User Need**: An explanation on the built-up of the total costs of a trip.

**User Need**: An overview of the costs with different public transport providers

> "I only know the total price because it is indicated in the apps." - Female, 26

> "I don't have an OV application (if it exists) in which I can see very clearly how much money I spend in total with different carriers, which sometimes gives me an uncertain feeling." - Female, 27

### Payment methods and digital ticketing

Each payment method has advantages and disadvantages and the preference differs per person. Having insight into the costs is mentioned as an important factor when choosing a payment method.

**User Need**: Insights into the costs of a trip, and the total costs per time frame.

> "Post-paid: The danger is that you do not have insight into your costs and that the bill can surprise you very much" - Female, 27

> "By doing it via transaction-based, you get more insight into how much you actually pay for a ride" - Female, 26

### Transparency

When it comes to transparency the total costs of a trip are easy to find, but it is unclear how these costs are built up. This finding corresponds with the findings under price awareness.

> "There is often a price stated, but it could be explained much more easily" - Male, 27

Furthermore price information is especially important on new or unknown routes.

**User need**: Price information on new routes.

> "I am especially curious about the costs if I am travelling on a new route or if it is a one-off" - Female, 27

### Travel products

Travel products are used by the participants, but it is not always clear if they are using the right travel product. There is a lot of uncertainty, especially when it comes to BTM products, and it is hard to check if a travel product is beneficial.

> "I have now chosen something on the recommendation of someone else because I had been without a travel product for 2 years" - Male, 26

It is mentioned that a personal travel product would be appreciated, it could be based on recent travel behaviour.

> "Maybe it is a good idea to get a proposal for a personal subscription, based on my travel behaviour in recent months" - Male, 30

**User need**: Insight in travel products and the personal fit.

### OV-chipcard

The OV-chipcard is experienced in a positive way by the participants. Although there are a few minor downsides, such as losing or forgetting the card. The participants really like the possibility to automatically charge the OV-chipcard, or already use the NS Flex subscription where they are paying afterwards.

> "Especially with my NS flex subscription, I just check-in and out and charge the card myself when necessary. This saves me a lot of time and hassle. Super handy." - Female, 26

Checking in- and out gives the travellers a sense of control, they can trust their own actions. However, this does not mean that the travellers want to check-in and out throughout the journey, only at the start and the end of the trip.

> "If I check-in and out myself, I know for sure that I did it. I'm in control." - Female, 26

**User Need**: Be in control, not all actions should be automated.

### Divergence in pricing

Within the Dutch system, there is some divergence in prices, which mostly cannot be explained by the participants. It is hard to compare the prices and travel products of different carriers. Furthermore, it was mentioned by the participants that public transport seems rather expensive compared to using a car or public transport in other countries. Participants also mention that it is strange that travel products are not valid for all carriers.

> "I find public transport in the Netherlands ridiculously expensive, especially if you compare it to other countries / the car. " Female, 25

> "It is strange that the discount applies to NS services, but not, for example, to the tram" Female, 25

**User Need**: The possibility to compare the prices of different public transport operators/modalities.

**User Need**: Travel products valid for all public transport (carriers).

### Use factors

When looking at the use factors of public transport in the Netherlands a few things are mentioned by the participants. First of all the use of public transport should be encouraged, for example by offering financial benefits. Secondly, it looks rather strange that a faster option, such as the intercity direct charges extra, while this should be the logical route to take. And lastly, it is seen as a hassle to compare different modalities, and thus the easiest, fastest or best-known options is chosen.

> "I find it a hassle to compare the different modalities, so I choose the fastest option" - Female, 26

**User Need**: The possibility to compare different modalities.

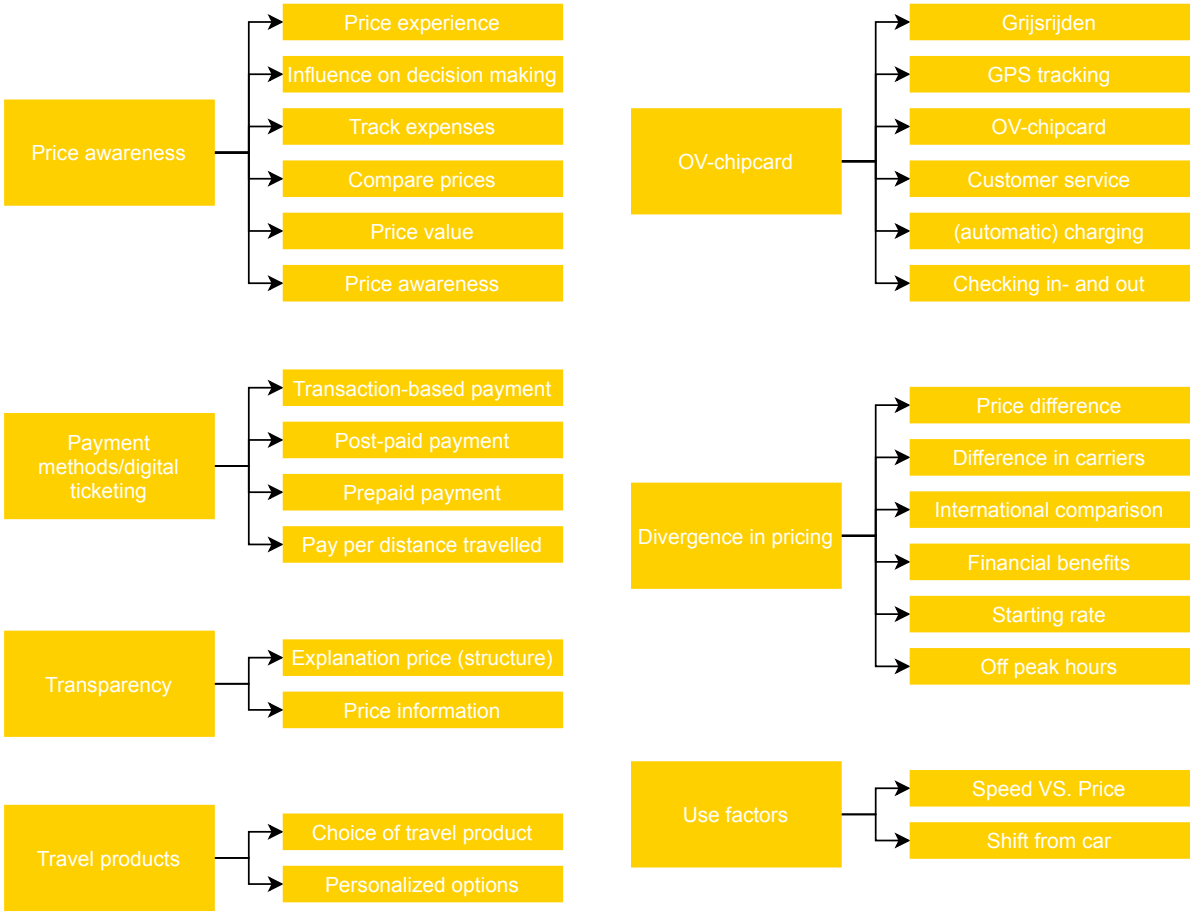



Figure 7: Overview of themes and sub-themes found during the analysis of the session results

The insights found during this session were used to complete the overview of user needs and values and create the need-based personas. The themes found were also used as a basis for the following creative sessions and during the conceptualization phase.

# 3.4

## Results inspiration phase

The inspiration phase consisted of context analysis, international benchmarking and user research. Within these parts, user needs and values were identified. In addition to the user needs and values need-based personas were composed.

The user needs, values and personas will form the start of the next phase, ideation.

# User needs

During the context analysis, benchmarking research and user research (creative session 1) user needs were found. These needs need to be addressed to get to the ideal passenger-oriented public transport tariff system, and thus need to be taken into account while designing the roadmap leading to this ideal system.

The user needs are categorised into five groups: price awareness, transparency, OV-chipcard, divergence in pricing, and other. Table 8 shows the user needs and indicates in which part of the research the needs are found.

Table 8: Overview of the user needs

| | | Context Analysis | Benchmarking Research | User Research |
|---|---|---|---|---|
| | **Price awareness** | | | |
| **1.1** | Insight in travel products and the personal fit | | ● | ● |
| **1.2** | Insights into the costs of a trip, and the total costs per time frame | | | ● |
| **1.3** | An explanation on the built-up of the total costs of a trip | | | ● |
| **1.4** | The possibility to compare the prices of different public transport operators/modalities | | | ● |
| **1.5** | An overview of the costs with different public transport providers | | | ● |
| | **Transparency** | | | |
| **2.1** | Transparency on the price difference per concession | ● | | |
| **2.2** | Advice when choosing from the multitude of travel products | ● | | |
| **2.3** | Transparency on travel rates / ticket prices | ● | ● | |
| **2.4** | Transparency on the details of the (tariff) system | | ● | |
| **2.5** | Price information on new routes | | | ● |
| | **OV-Chipcard** | | | |
| **3.1** | Being able to travel by train with only a positive balance | ● | | |
| | **Divergence in pricing** | | | |
| **4.1** | More price equality between travellers | | ● | |
| **4.2** | One way of price calculation for the whole public transport system | ● | | |
| **4.3** | Alignment between carriers | ● | | |
| **4.4** | Paying the same price for the same route, independently of the carrier | ● | | |
| **4.5** | Paying the same price independently of the way/place the ticket is bought | | ● | |
| | **Other** | | | |
| **5.1** | Placing the financial risk back at the carriers | ● | | |
| **5.2** | Hassle free travelling | ● | | |
| **5.3** | Be in control, not all actions should be automated | | | ● |
| **5.4** | Travel products valid for all public transport (carriers) | | | ● |

# User values

Next to user needs, user values were found during the research. The values found in the context analysis are positive points of the Dutch public transport system that need to stay in place to keep the system at the level it currently is. These values are the following:

- Consumer organizations translate the wishes of the consumer to the transport authorities.
- The starting rate is set nationally.
- For BTM transport only a positive balance on the OV-chipcard is necessary.
- Travel products offer a larger array of options and are theoretically personalizable for each traveller.
- The OV-chipcard is an integrated national system.
- Multiple forms of payment are available, suitable for different passenger needs.
- With the new ABT system, travellers can choose their preferred payment method.
- With ABT the fare can be calculated post journey, potentially resulting in the best fare policies for the traveller.
- With public transport as the backbone of MaaS transportation options for the passenger increase.

Furthermore, during the benchmarking research values of international public transport systems were found. These values can be used as inspiration for the ideal passenger-oriented public transport system that is being designed.

The values found during the benchmarking research are the following:

**Antwerp**
- High price awareness due to fixed prices.

**South Tyrol**
- Using public transport on a regular basis is motivated with a financial benefit.
- Information is shown in a consistent manner throughout the system.

**London**
- With price capping, there is a maximum price per day/ week.
- Insight into travel history and price capping is offered via an application.

**Helsinki**
- Public transport and other infrastructure complement each other.
- The zones simplify the system, making it easy to understand for the traveller.

# Need-based personas

There are different public transport users, they do not use public transport in the same way and have different needs. To create an overview of the different public transport users, six need-based personas were created, based on the method of Koos Service Design (Koos Service Design, n.d.). With these personas, demographics are not taken into account, instead, they are described based on their shared needs. This makes it easier to design for the new situation and prevents unconscious prejudices.

The need-based personas were based on insights taken from the interviews and questionnaires during the international benchmarking and creative session 1 (friendships booklet and statements) with Dutch passengers, combined with the user needs and values found throughout the project. The personas were used during the ideation and conceptualization phase to keep a passenger-oriented perspective and to make sure the different personas were taken into account when designing the roadmap.

On the next page, the six need-based personas are discussed, namely: the analogue traveller, the information hoarder, the tourist, the carefree traveller, the money watcher and the commuter.

### Overlap

As can be seen in the need-based personas, not every need is unique to one of the personas, there is some overlap. Furthermore, as a traveller, you will not identify with the same persona each time.

For example, maybe you are a student, and still have the student subscription during the weekdays, but at the weekends you need to pay yourself out of your small budget. In this case, you are a commuter during the weekdays and a money watcher during the weekends.

### The international traveller

The international traveller uses the Dutch public transport system intensively for a short period of time while on a holiday or business trip. He/she has to quickly learn how the system works. Furthermore, this traveller does not own an OV-chipcard, yet. The International traveller will choose speed and comfort over price since costs don't matter that much while on a trip. He/she prefers buying a travel product that will cover all travelling needs to prevent any hassle.

> "I am only here for a few days, I just want to get to all the hotspots quickly"

### The carefree traveller

The carefree traveller uses public transport regularly but has no need for extra information. He/she travels with public transport because he/she needs to go somewhere, and does not care about the costs or route. The carefree traveller wants to travel with the least friction possible and does not want to pay for each trip separately.

> "Public transport is my main form of transportation, I just use it whenever I need to go somewhere"

### The information hoarder

The information hoarder uses public transport regularly and wants to know every detail of the system. He/she always plans his/her trip upfront to find out al the details. Multiple sources are used to gather information on prices, departure times and routes. He/she is most insecure about trips on new routes. The information hoarder finds it important to know what he/she is paying for each trip individually.

> "I want to be in control, so I like to know as much as possible about my trip with public transport"

### The analogue traveller

The analogue traveller uses public transport sporadically. This kind of traveller is not digital savvy, and does not want to, or is not able to use a smartphone and applications. The analogue traveller prefers the "old way" of buying paper tickets.

> "Back in the days it worked just fine, now all the technology is making it hard to understand"

### The commuter

The commuter uses public transport practically every day to get from home to work and vice versa, he/she travels mostly on a fixed route. The commuter uses a travel product that offers unlimited travelling for a fixed price, often the costs for this travel product are reimbursed by the employer. For the commuter convenience is key, he/she will always pick the fastest route. The commuter has no interest in the costs of single tickets since he/she never uses these tickets.

> "I use a travel product for unlimited travelling, so I don't need to know the price of a single trip"

### The money watcher

The money watcher only uses public transport when necessary, since he/she has a small budget and needs to determine the value of a trip with public transport. The money watcher always compares the price of different public transport modalities and other transportation options and will choose price over speed and comfort. The money watcher wants to pay transaction-based, and cannot afford to use a prepaid or post-paid payment method.

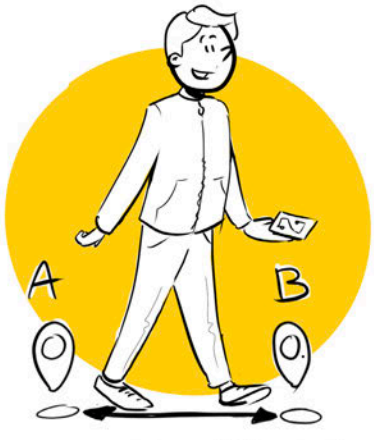
> "With my small budget I need to determine if a trip with public transport is worth the money"


THE INTERNATIONAL TRAVELLER

THE CAREFREE TRAVELLER

THE INFORMATION HOARDER

THE ANALOGUE TRAVELLER




THE COMMUTER

THE MONEY WATCHER

# Ideation

# 4

The ideation phase starts with defining the future vision (page 68), the future vision is an elaboration on the assignment formed at the start of the project.

With this future vision in mind two creative sessions were organized, one with members of the Seamless Personal Mobility Lab (page 71), and another with IDE students (page 73). The outcome of the sessions was used as input for the final design, the roadmap.

# Future vision

The future vision is an elaboration on the assignment formed at the start of the project. With input from the inspiration phase the following future vision was defined:

*In the future, all passengers should be confident about and in control of their spendings on public transport. Therefore there should be a unified and transparent tariff system that is adopted by all carriers. Additionally, carriers and other mobility providers should cooperate to offer the passenger personalized and all-inclusive travel products for the best price.*

The following parts of this future vision stand out: confident, in control, unified, transparent, personalized and all-inclusive. These elements are explained below.

**Confident**
In the ideal public transport tariff system, the passenger is confident about his/her spendings on public transport. The passenger knows how much he/she is spending and understands why this is the price.

**In control**
In addition to being confident, the passenger needs to be in control in the ideal public transport tariff system. With knowledge of the available travel products and personal fit, the passenger can choose the best option for him/herself.

**Unified**
The ideal public transport tariff system is unified and feels like one system. Behind the scenes, all parties (carriers, authorities, mobility service providers) should cooperate to create this unified system.

**Transparent**
When the tariff system is transparent, it is easier to explain it to the passengers, and with this make them feel confident and in control.

**Personalized**
For the passengers to be confident and in control personalization is key. With personalization, the experience of each passenger can be slightly different, and adjusted to their needs and wishes.

**All-inclusive**
In the ideal public transport tariff system, the passenger can travel with all modalities, and even MaaS services, within one system.

In the future, all passengers should be CONFIDENT about and IN CONTROL of their spendings on public transport. Therefore there should be a UNIFIED and TRANSPARENT tariff system that is ADOPTED BY ALL carriers. Additionally carriers and other mobility providers should cooperate to offer the passenger PERSONALIZED and ALL-INCLUSIVE travel products for the best price.


2021
Horizon 1
Clarifying the system
How to make a flexible long lasting system that is open for rapid societal, social & economic changes changes
Mbv de service balie
flexibiliteit, etc)
te plannen
aanpassen
best price (gevoel): nooit teveel betalen
Per maand bij stellen
gezamenlijke website met objectieve informatie
prijsopbouw laten zien bij prijzen
Start with a vision
sustainability, liveability
capping (daily/weekly/ monthly/yearly)
updates adhv real-time informatie
notificatie na elke gemaakte reis
Zelf regie hebben, altijd keuze opties
Realtime arrival/travel time, from door to door
Zoals de bonus kaart
bijhouden wekelijkse/ maandelijkse kosten
tijdens plannen van de reis indicatie van totale kosten
spending alert: "je zit nu op 80%"
2023
Horizon 2
Make it teamwork
Personalized options
Cooperation PT operators
integration
Who's responsible?
Een OV burgemeester
Een OV ministerie voor financiele zaken
Miro voor OV bedrijven
Ontwerp bureaus inhuren voor het maken van gezamelijke plannen
OV/transport autoriteit
abonnementen vergelijker (a la gas-licht)
Teamwork in specific workshops with specific goals
Voorkeur reservering, ruimte of groeps/sociaal
beslis ondersteunend systeem
Interactive planning: When circumstances change, route changes immediately
Multiple options based on different needs
zelf samenstellen (building blocks/modulair)
Opties voor gezin/huishouden
standard API's
ground rules & contracts
Zoals telefoon abonnementen ooit waren
Self learning system predicts rythm
alle aanbieders kunnen tickets aanbieden tegen zelfde kosten (bijv 40% korting)
each player needs to know his/her role
Teams formed based on specific goals values
2025
Horizon 3
Adding new players
MaaS
Public transport and shared mobility become one
platform
Een klanten panel
Open source
Who's responsible?
Iedereen mag ideeen indienen
Mogelijkheid om input te geven over de dienst
persoonlijk advies
open for

# Session 2: Lab brainstorm

To generate ideas for the roadmap and find relevant trends a digital brainstorm was organized. The participants of this brainstorm were fellow Seamless Personal Mobility Lab-members. The lab-members were chosen because of their insight knowledge on the topic of public transport and mobility.

The session was conducted in three phases with the use of videoconferencing tool Zoom and Miro, a digital brainstorming tool. Figure 8 shows an impression of the session.

## Phase one

During this first phase, two mind maps are created. The first one focussing on general trends in the area of public transportation and mobility, and a second one focusing on technology trends. Mind mapping is a method used for creating an overview and showing relations between aspects/elements (van Boeijen et al., 2020).

## Phase two

During the second phase of the brainstorm, how to's were used. How to's are problem statements written in the form of questions used to stimulate the team to come up with ideas (van Boeijen et al., 2020). The how to's were based on the user needs found during the inspiration phase.

The following how to's were used:
How to..

- ..personalize a travel product?
- ..offer insight into travel costs?
- ..stay in control while travelling?
- ..compare prices? (Carriers, modalities, private transportation)

## Phase three

During the third and final phase, the trends and ideas that were found/created in the first two phases were placed on the three horizons of the roadmap. This was done to generated insight into the time pacing of the ideas and trends.

This session was used as input for the trends and roadmap elements. Interesting findings from this session are:

- Trends like the service society, (deep) personalization and green cities;
- Input on the form and personalization options of travel products;
- Time pacing of ideas over the three horizons.

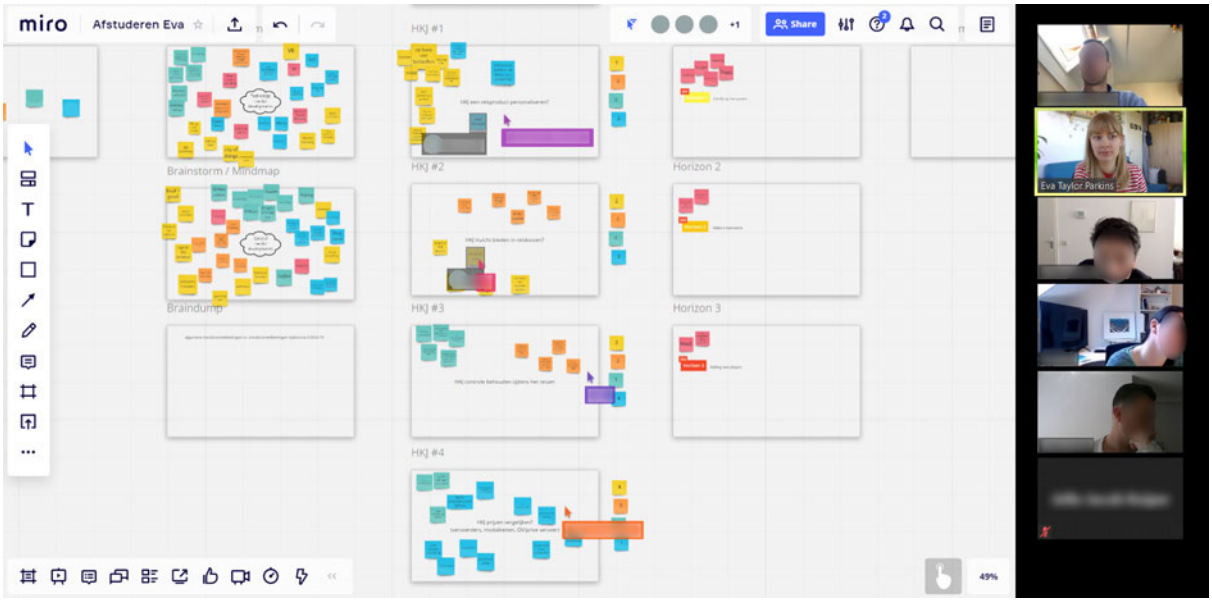
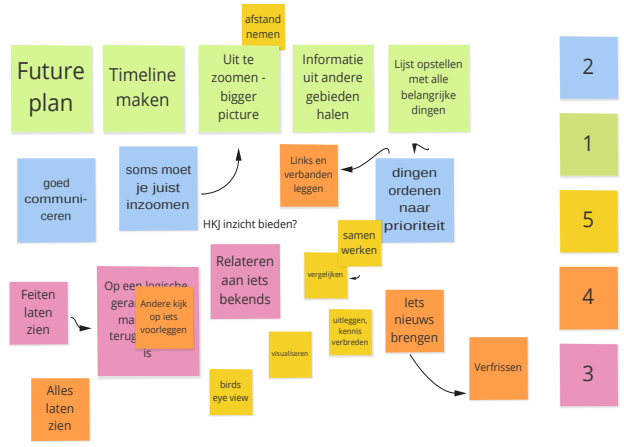
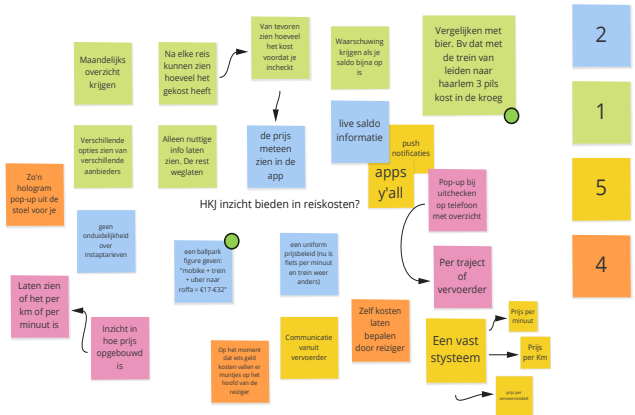


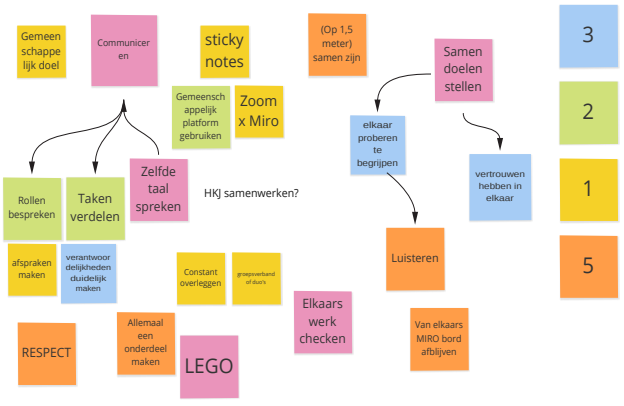

Figure 8: An impression of the digital workspace during the lab brainstorm.

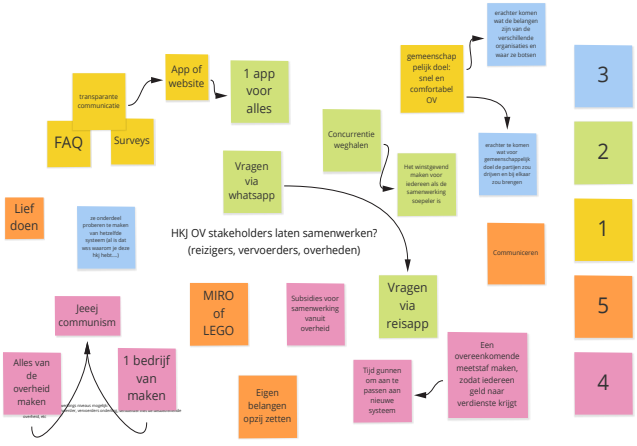

HKJ personaliseren?
een basis met een aangepast omhulsel
Feedback geven
Welkomstscherm met naam
Je eigendom zijn
ambiguïteit - zodat je je eigen betekenis er aan geeft
Keuzemogelijkheden geven, dan voelt het persoonlijker, meer voor jou.
Je gehoord of begrepen voelen
Keuzes maken
Favorieten
Voorkeuren opslaan, herinneren voor volgende keer, dan voel je je begrepen
4
3
2


HKJ een reisproduct personaliseren?
Het een naam kunnen geven?
Roze kunnen maken
Koppelen aan Google account oid
Zelf routes maken (ook als de treinrails er nog niet ligt)
needs vertalen in het product
voor elke persona een passend reisproduct
4
3

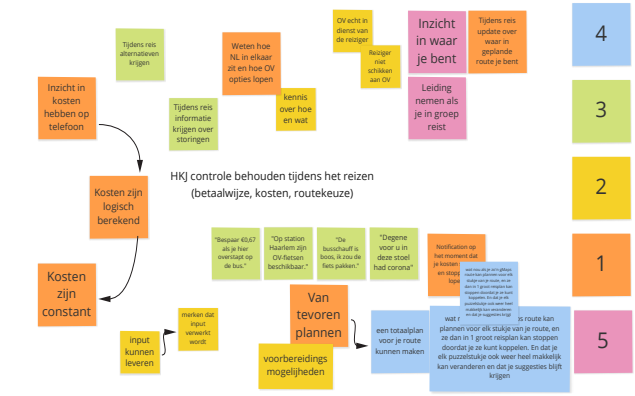

Future plan
Timeline maken
Uit te zoomen - bigger picture
afstand nemen
Informatie uit andere gebieden halen
Lijst opstellen met alle belangrijke dingen
goed communi-ceren
soms moet je juist inzoomen
HKJ inzicht bieden?
Links en verbanden leggen
dingen ordenen naar prioriteit
samen werken
vergelijken
Relateren aan iets bekends
Feiten laten zien
Andere kijk op iets voorleggen
uitleggen, kennis verbreden
visualiseren
Iets nieuws brengen
Verfrissen
birds eye view
Alles laten zien
2
1
5
4
3


HKJ inzicht bieden in reiskosten?
Maandelijks overzicht krijgen
Na elke reis kunnen zien hoeveel het gekost heeft
Van tevoren zien hoeveel het kost voordat je incheckt
Waarschuwing krijgen als je saldo bijna op is
Vergelijken met bier. Bv dat met de trein van leiden naar haarlem 3 pils kost in de kroeg
Verschillende opties zien van verschillende aanbieders
Alleen nuttige info laten zien. De rest weglaten
de prijs meteen zien in de app
live saldo informatie
push notificaties
apps y'all
Zo'n hologram pop-up uit de stoel voor je
Pop-up bij uitchecken op telefoon met overzicht
geen onduidelijkheid over instaptarieven
een ballpark figure geven: "mobike + trein + uber naar rotfa = €17.432"
een uniform prijsbeleid (nu is fiets per minuut en trein weer anders)
Per traject of vervoerder
Laten zien of het per km of per minuut is
Inzicht in hoe prijs opgebouwd is
Op het moment dat iets geld kosten vallen er munjes op het hoofd van de reiziger
Communicatie vanuit vervoerder
Zelf kosten laten bepalen door reiziger
Een vast systeem
Prijs per minuut
Prijs per Km
2
1
5
4

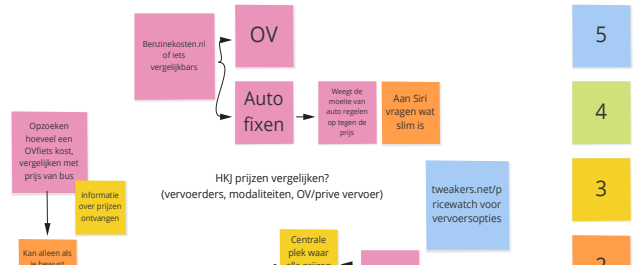

HKJ samenwerken?
Gemeen schappe lijk doel
Communicer en
sticky notes
(Op 1,5 meter) samen zijn
Samen doelen stellen
Gemeensch appelijk platform gebruiken
Zoom x Miro
elkaar proberen te begrijpen
vertrouwen hebben in elkaar
Rollen bespreken
Taken verdelen
Zelfde taal spreken
afspraken maken
verantwoor delijkheden duidelijk maken
Constant overleggen
groepsverband of duo's
Luisteren
RESPECT
Allemaal een onderdeel maken
LEGO
Elkaars werk checken
Van elkaars MIRO bord afblijven
3
2
1
5


HKJ OV stakeholders laten samenwerken? (reizigers, vervoerders, overheden)
transparante communicatie
App of website
1 app voor alles
FAQ
Surveys
gemeenschappelijk doel: snel en comfortabel OV
erachter komen wat de belangen zijn van de verschillende organisaties en waar ze botsen
Concurrentie weghalen
Het winstgevend maken voor iedereen als de samenwerking soepeler is
erachter te komen wat voor gemeenschappelijk doel de partijen zou drijven en bij elkaar zou brengen
Vragen via whatsapp
Lief doen
Communiceren
Jeeej communism
MIRO of LEGO
Subsidies voor samenwerking vanuit overheid
Vragen via reisapp
Alles van de overheid maken
1 bedrijf van maken
Eigen belangen opzij zetten
Tijd gunnen om aan te passen aan nieuwe systeem
Een overeenkomende meetstaf maken, zodat iedereen geld naar verdienste krijgt
3
2
1
5
4


HKJ controle hebben?
Check check dubbel check
Zelf de regels bepalen
Bazig doen
Controller van PlayStation
Geen teamplayers hebben
Overzicht houden, inzichten hebben in alles
Letterlijk iets vasthouden
Een tunnel hebben waar iets precies doorheen moet
je moet een standaard hebben om aan te kunnen meten / je moet weten wat je controleert
conducteur
Vertrouwen op de keuzes die je maakt
Plannen/ Planning maken
een control freak zijn
grip hebben op de situatie
Zeggenschap hebben
Gevolgd worden, geloofd worden
Eisen stellen
Toekomst plannen
bestuurder van een auto (gas, stuur, rem)
leiding nemen
voldoende kennis/ervaring
expertise
Snel kunnen beslissen, voordat iemand anders dat doet
Het doel voor ogen houden
Als enige toegang hebben
4
3
2


HKJ controle behouden tijdens het reizen (betaalwijze, kosten, routekeuze)
Tijdens reis alternatieven krijgen
Weten hoe NL in elkaar zit en hoe OV opties lopen
OV echt in dienst van de reiziger
Reiziger niet schikken aan OV
Inzicht in waar je bent
Tijdens reis update over waar in geplande route je bent
Inzicht in kosten hebben op telefoon
kennis over hoe en wat
Tijdens reis informatie krijgen over storingen
Leiding nemen als je in groep reist
Kosten zijn logisch berekend
"Bespaar €0,67 als je hier overstapt op de bus."
"Op station Haarlem zijn OV-fietsen beschikbaar."
"De busschauff is boos, ik zou de fiets pakken."
"Degene voor u in deze stoel had corona"
Notification op het moment dat je kosten en stops
Kosten zijn constant
Van tevoren plannen
een totaalplan voor je route kunnen maken
input kunnen leveren
marken dat input verwerkt wordt
voorbereidings mogelijheden
4
3
2
1
5


HKJ vergelijken?
Naast elkaar zetten
Lijstjes maken en vergelijken
Over elkaar leggen
TriVaGo
Consumentenbond
hierarchie maken in criteria
Pro's en cons
PvE/PvW
Criteria bepalen
Waarde bepalen bij opties, daarna die waardes vergelijken, bijvoorbeeld lengte, data etc
keeping up with the joneses
overleggen/ bespreken
prijsvergelijker.nl
feiten op een rij zetten
5
4
3


HKJ prijzen vergelijken? (vervoerders, modaliteiten, OV/prive vervoer)
Benzinekosten.nl of iets vergelijkbars
OV
Auto fixen
Weegt de moeite van auto regelen op tegen de prijs
Aan Siri vragen wat slim is
Opzoeken hoeveel een OVfiets kost, vergelijken met prijs van bus
informatie over prijzen ontvangen
tweakers.net/pricewatch voor vervoersopties
Centrale plek waar
5
4
3

# Session 3: Digital concepts

Where creative session 2 was conducted with fellow members of the Seamless Personal Mobility Lab this third creative session is conducted with the help of IDE students and graduates. With this session, a creative perspective from outside the public transportation and mobility sector was found.

Similar to creative session 2 this session was conducted in three phases with the use of Zoom and Miro. Figure 9 shows an impression of the session.

### Phase one: general how to's

During the first phase of this creative session, five how to's were conducted. These how to's were made very general on purpose and were used as inspiration in phase two. The how to's used were:

How to..

- ..personalize?
- ..offer insight?
- ..cooperate?
- ..stay in control?
- ..compare?

### Phase two: specific how to's

After the first round of general how to's the second round of how to's was conducted, during this round, the how to's were more specified. The how to's in this round were the following:

How to..

- ..personalize a travel product?
- ..offer insight into travel costs?
- ..let public transportation stakeholders cooperate? (travellers, carriers, governments)
- ..stay in control while travelling? (payment method, costs, routes)
- ..compare prices? (carriers, modalities, private transportation)

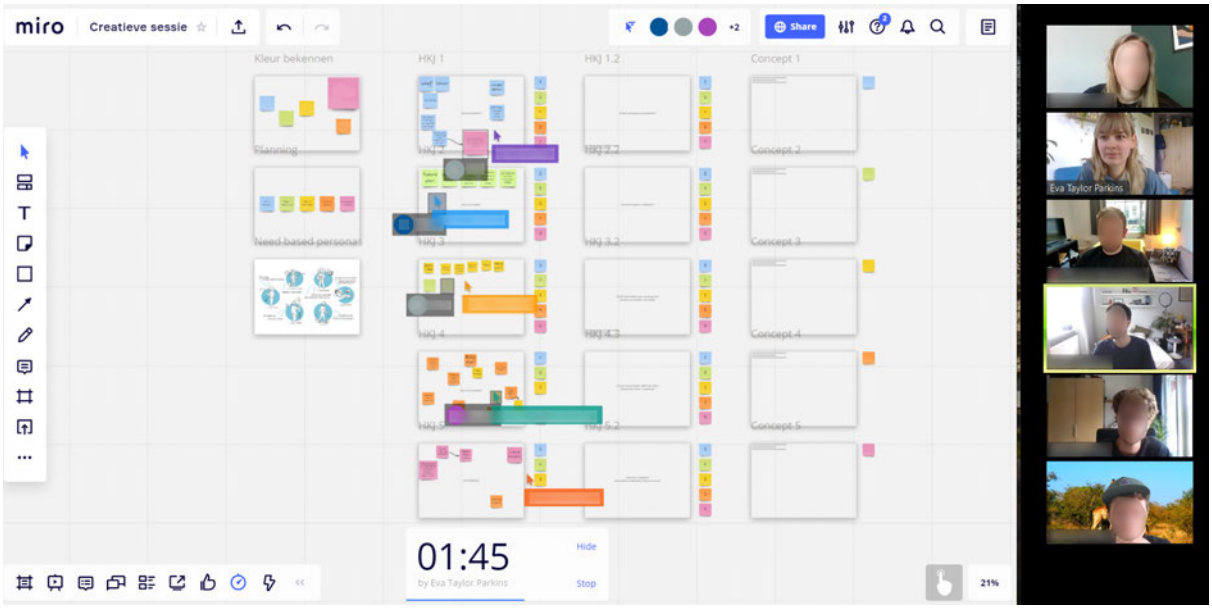
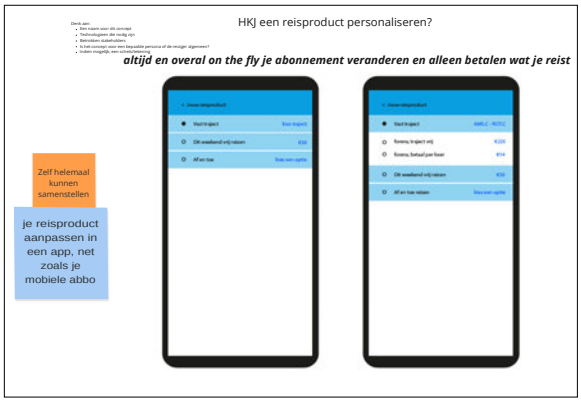
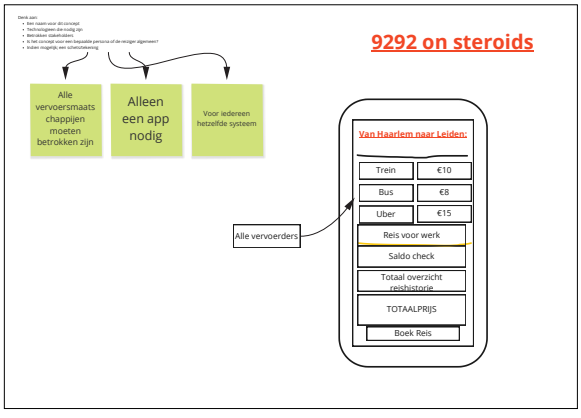
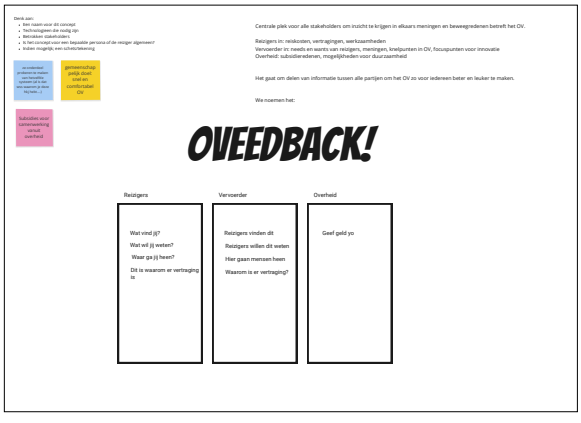
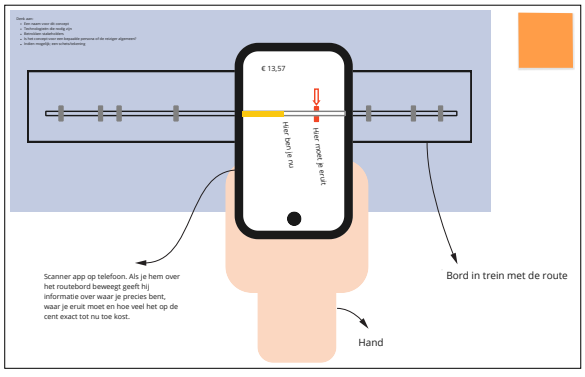



Figure 9: An impression of the digital workspace during the session



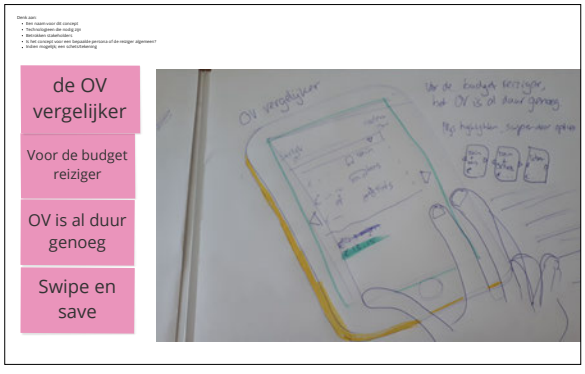




Figure 10: Concepts generated during the creative session

### Phase three: concepts

During the third and final phase of this creative session, each participant made a concept fitted to one of the themes of this brainstorm. The concepts were visualized using pen and paper, Illustrator or even the tools within Miro. The concepts can be seen in figure 10.

Similar to session 2 the results from this session are used as input for the roadmap and roadmap elements. Interesting findings from this session are:

- Input on ways that passengers can have control and insight over their spendings on public transport;
- Ideas on the topics of comparing prices and personalizing products.
- The concepts made during the sessions, which by chance all are digital concepts for applications.

# Conceptualization

# 5

During the conceptualization phase of this project two roadmaps were designed, a visual roadmap (page 80) and a strategic roadmap (page 82).

This chapter explains the roadmap horizons and 26 roadmap elements, as well as the connections between these elements.

The roadmap elements are divided into six categories:

- Major events (5.1, page 84);
- Personalization (5.2, page 88);
- Cooperation (5.3, page 92);
- Transparency (5.4, page 98);
- Simplification (5.5, page 102);
- Trends (5.6, page 104).

# Roadmap horizons

For this project, two types of roadmaps are created: a visual roadmap and a strategic roadmap. The visual roadmap is used to quickly show the vision and steps towards this vision to the stakeholders, and open up the conversation. The strategic roadmap contains more detail and shows the links between the elements. Additionally, the elements (A-Z) of the strategic roadmap are explained in this report to offer more insight into these steps. Both roadmaps and the explanation of the roadmap elements can be found in the following chapter.

### Future Vision

The future vision formulated in the ideation phase of this process is the following:

*In the future, all passengers should be confident about and in control of their spendings on public transport. Therefore there should be a unified and transparent tariff system that is adopted by all carriers. Additionally, carriers and other mobility providers should cooperate to offer the passenger personalized and all-inclusive travel products for the best price.*

Both roadmaps show the path towards this future vision.

### Horizon 0 | 2020 | Current status

To set the stage for the roadmap, horizon zero is added. This horizon represents the current status of the public transport (tariff system) and is an addition to the findings of the context analysis.

Recently, a lot has changed within society, and public transport, due to COVID-19. Within this horizon, the implications of COVID-19 will be discussed as well as the current service society we live in. Furthermore, digital ticketing and the seven Dutch MaaS pilots are discussed.

### Horizon 1 | 2021 | Clarifying the system

Within the first horizon, the focus is on clarifying the system. It is important that the tariff system and built up is explained to the passengers, and insight is offered into the personal travel history of the passengers.

Additionally, during this horizon, the carriers need to start cooperating by minimizing the offering of travel products, but instead offering regional travel products, and harmonizing the tariffs. A public transportation authority can make sure all these steps are executed with mutual agreement.

### Horizon 2 | 2023 | Make it teamwork

During the second horizon, the cooperation between the carriers is improving even more, as well as the personalization for the passenger.

ABT is implemented, which opens up possibilities for other improvements like single check-in, check-out and the utilization of automatic discounts in the back-office. Additionally, resulting from the MaaS pilots, the first Dutch MaaS concepts will be available to the passenger.

### Horizon 3 | 2025 | Adding new players

In the third horizon of this roadmap, the system is ready for the addition of new players, in the form of international MaaS service providers and international services. Public transport will act as the backbone for a complete mobility concept, and the passenger will be able to use all these services using the same system for planning, booking, tickets and payment.

# Roadmap elements

The strategic roadmap consist of 26 elements, indicated with a letter (A-Z). The elements are divided into six categories:

- Major events
- Personalization
- Cooperation
- Transparency
- Simplification
- Trends

Some roadmap elements are interconnected, this is elaborated on within the descriptions and shown within the strategic roadmap this by dotted lines.

All roadmap element are described in this chapter, ordered by category. Underneath each element title, it is indicated in which horizon this element fits.

Additionally, the visual at the end of each description indicates which user needs are solved by this element, as well as which need-based persona(s) this element fits best. Figure 11 shows the icons matching the need-based personas.

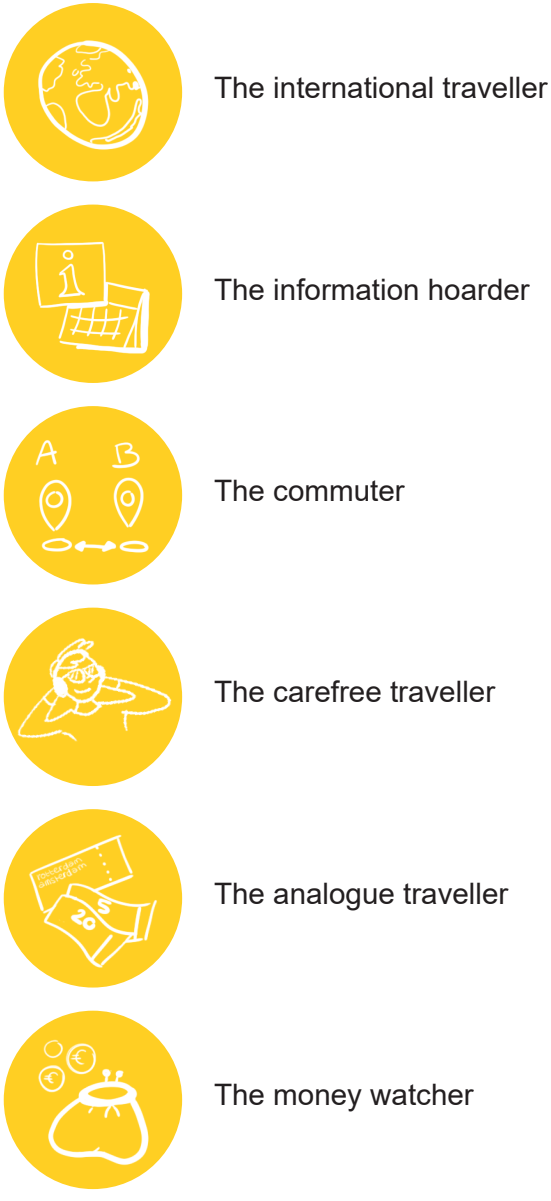
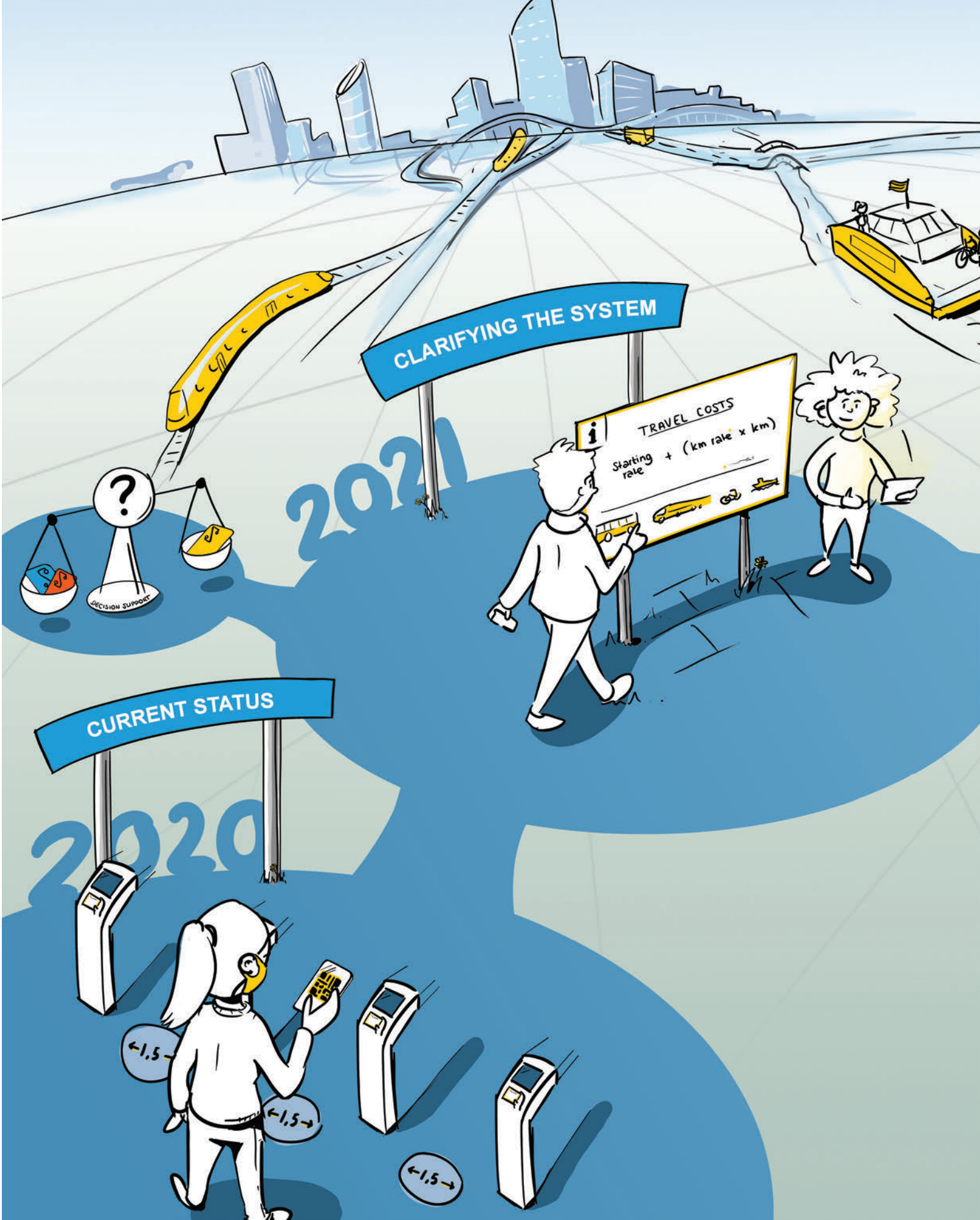
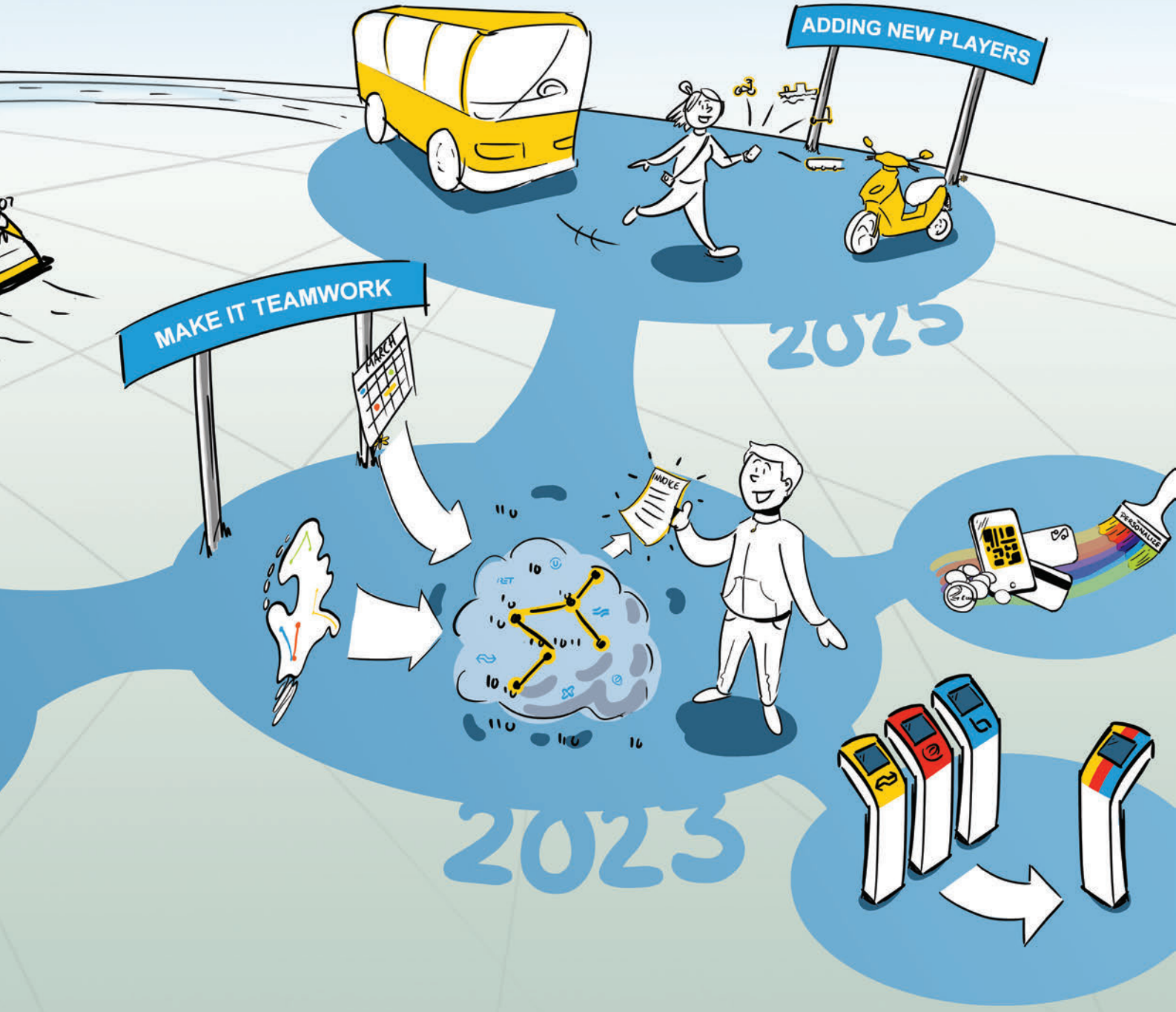


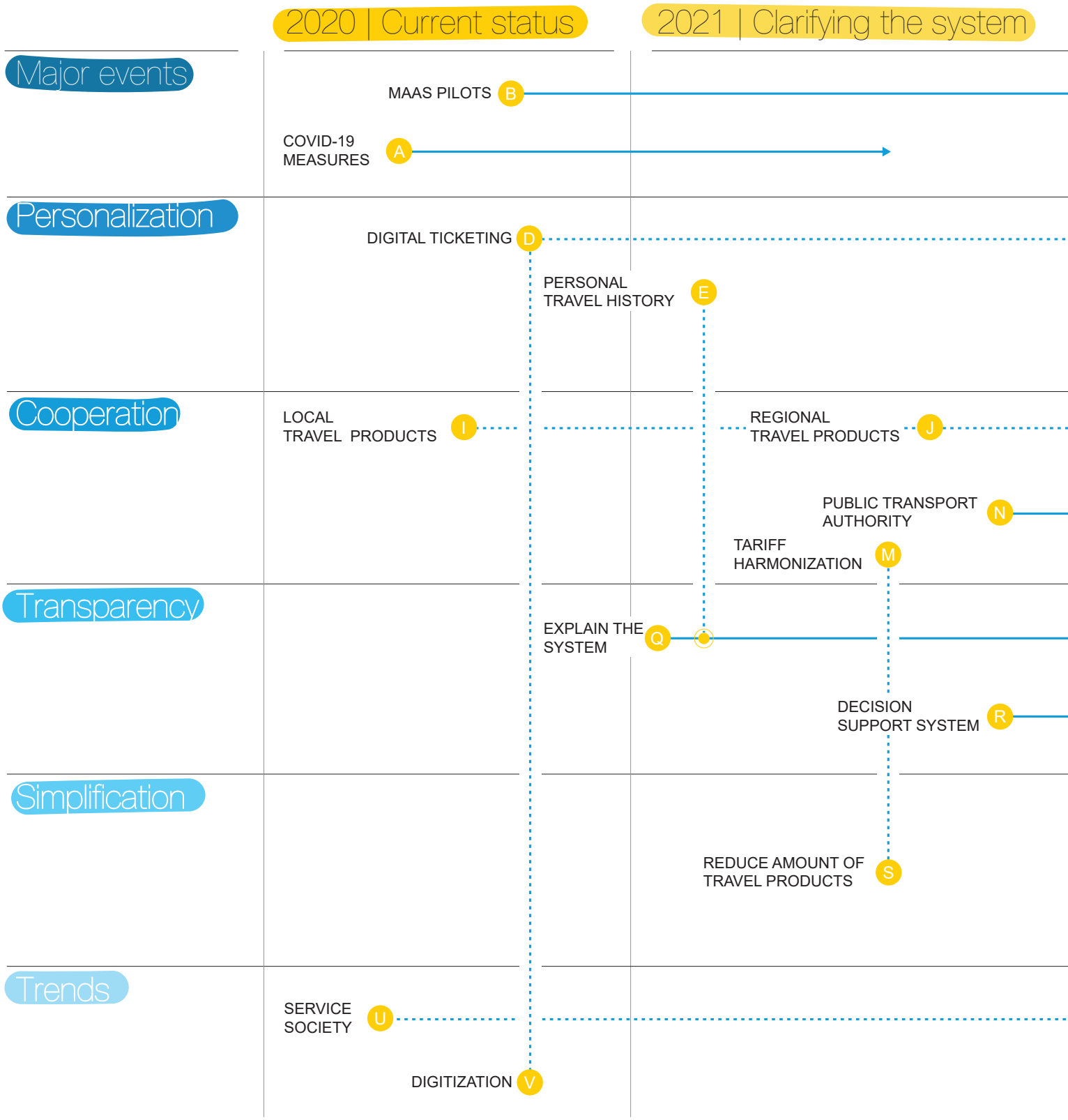

Figure 11: Icons need-based personas

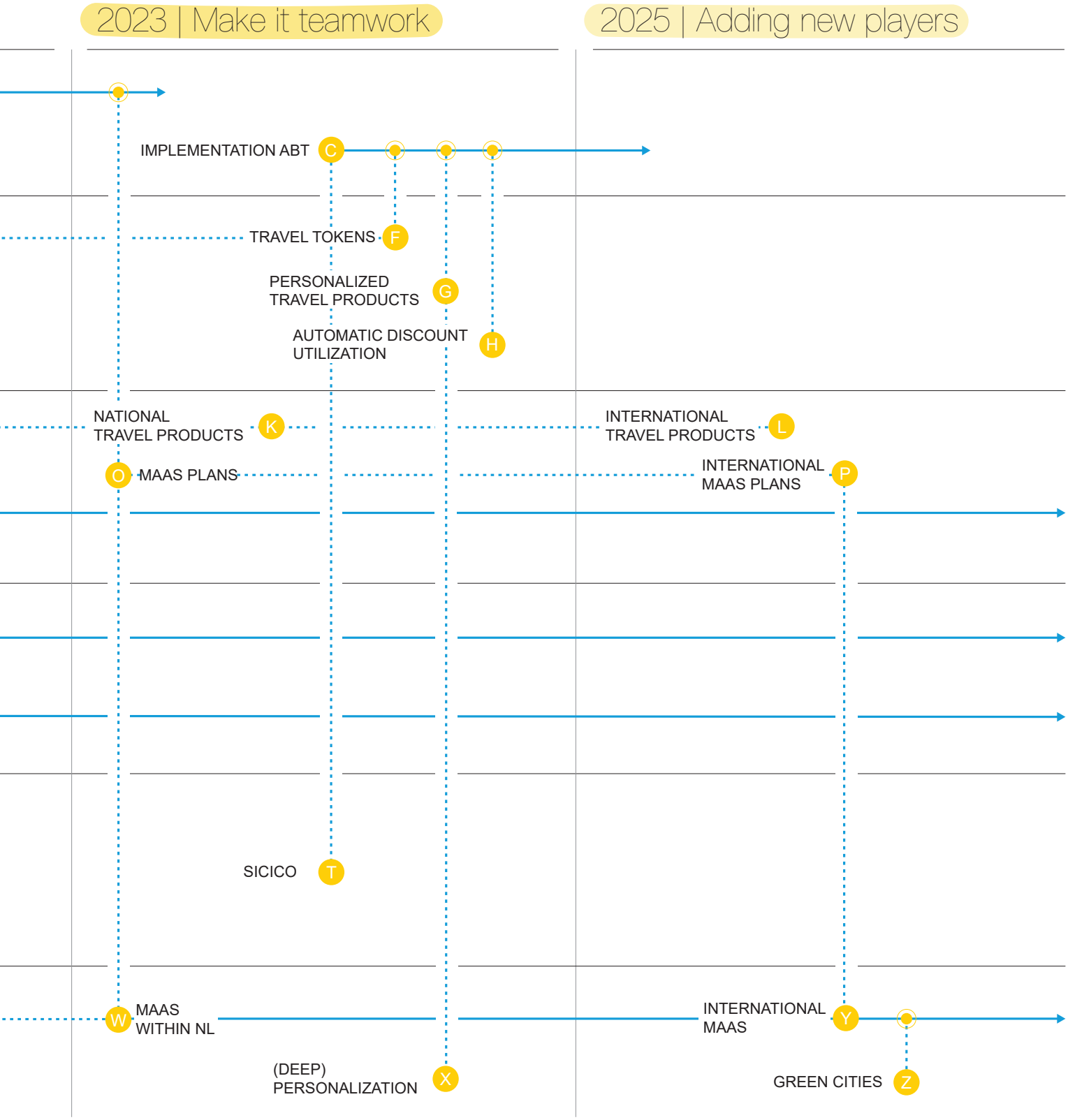

CLARIFYING THE SYSTEM
2021
TRAVEL COSTS
Starting rate + (km rate x km)
DECISION SUPPORT
CURRENT STATUS
2020
←1,5→
←1,5→
←1,5→




## FUTURE VISION

In the future, all passengers should be **confident** about and **in control** of their spendings on public transport. Therefore there should be a **unified** and **transparent** tariff system that is **adopted by all** carriers. Additionally, carriers and other mobility providers should cooperate to offer the passenger **personalized** and **all-inclusive** travel products for the best price.


2020 | Current status
2021 | Clarifying the system
Major events
MAAS PILOTS
B
COVID-19
MEASURES
A
Personalization
DIGITAL TICKETING
D
PERSONAL
TRAVEL HISTORY
E
Cooperation
LOCAL
TRAVEL PRODUCTS
I
REGIONAL
TRAVEL PRODUCTS
J
PUBLIC TRANSPORT
AUTHORITY
N
TARIFF
HARMONIZATION
M
Transparency
EXPLAIN THE
SYSTEM
Q
DECISION
SUPPORT SYSTEM
R
Simplification
REDUCE AMOUNT OF
TRAVEL PRODUCTS
S
Trends
SERVICE
SOCIETY
U
DIGITIZATION
V


2023 | Make it teamwork
2025 | Adding new players
IMPLEMENTATION ABT
C
TRAVEL TOKENS
F
PERSONALIZED
TRAVEL PRODUCTS
G
AUTOMATIC DISCOUNT
UTILIZATION
H
NATIONAL
TRAVEL PRODUCTS
K
INTERNATIONAL
TRAVEL PRODUCTS
L
O
MAAS PLANS
INTERNATIONAL
MAAS PLANS
P
SICICO
T
W
MAAS
WITHIN NL
INTERNATIONAL
MAAS
Y
(DEEP)
PERSONALIZATION
X
GREEN CITIES
Z

# 5.1

## Major events

The coming years there are events that influence the tariff system or the public transport system in general.

COVID-measures have an impact on the public transport system in general. The MaaS Pilots and Implementation of account-based ticketing influence the tariff system as well and are interconnected with other elements on the roadmap.

# A. Covid-19 measures

2020 | Current status

The last few months, the world has been under the spell of COVID-19, which has a huge impact on public transport.

During the intelligent lockdown in the Netherlands, it was advised to only use public transport when absolutely necessary, resulting in less than 20% of the capacity being used.

From June 1st onwards the use of public transport has increased a bit, although there are a lot of measures and restrictions to keep in mind. The trains can be used to around 40% of their normal capacity, for BTM transport this is 30-40%. It is still uncertain when public transport can be used to its full capacity again. It still is advised to only use public transport for necessary trips, keep 1,5-meter distance to other passengers, and walk or cycle if this is an option. Additionally, it is obligated to wear a facemask (Rijksoverheid, 2020).

Moreover, Rover has launched a ‘corona and public transport’ reporting centre. This reporting point is used by the passenger association to monitor whether passenger concerns are justified and find opportunities for improvement. The reporting point can be found at www.meldpunt-corona.nl (Rover, 2020).

Behind the scenes, the public transport stakeholders are still working on improving the system, but due to the COVID-19 measures, these improvements could run into delays or changes.

# B. MaaS pilots

2020 | Current status

The Ministry of Infrastructure and Water Management, together with seven regions, has developed seven nationally scalable MaaS pilots. These pilots start from:

- The Zuidas in Amsterdam
- Utrecht-Leidsche Rijn, Vleuten and De Meern
- Twente
- Groningen-Drenthe
- Rotterdam-The Hague (including Rotterdam The Hague Airport)
- Eindhoven
- Limburg

Each pilot focuses on different policy objectives: from accessibility and social inclusion to sustainability, cross-border transport and traffic congestion.

Three goals were formulated for these pilots. Firstly, offering seven user-friendly applications which make it possible for the passengers to choose from all combinations of transport options, and plan, book and pay. Secondly, gaining MaaS experiences and expanding mobility knowledge. And lastly, taking the first step towards a sustainable service-oriented transport future with MaaS (Ministerie van Infrastructuur en Waterstaat, 2019b).

Due to COVID-19 delays have occurred in the execution of the pilots, it is expected that the pilots will start in the second half of 2020, and run throughout 2021.

The results of these pilots can be used as input for the MaaS plans (O), and MaaS within the Netherlands (W).

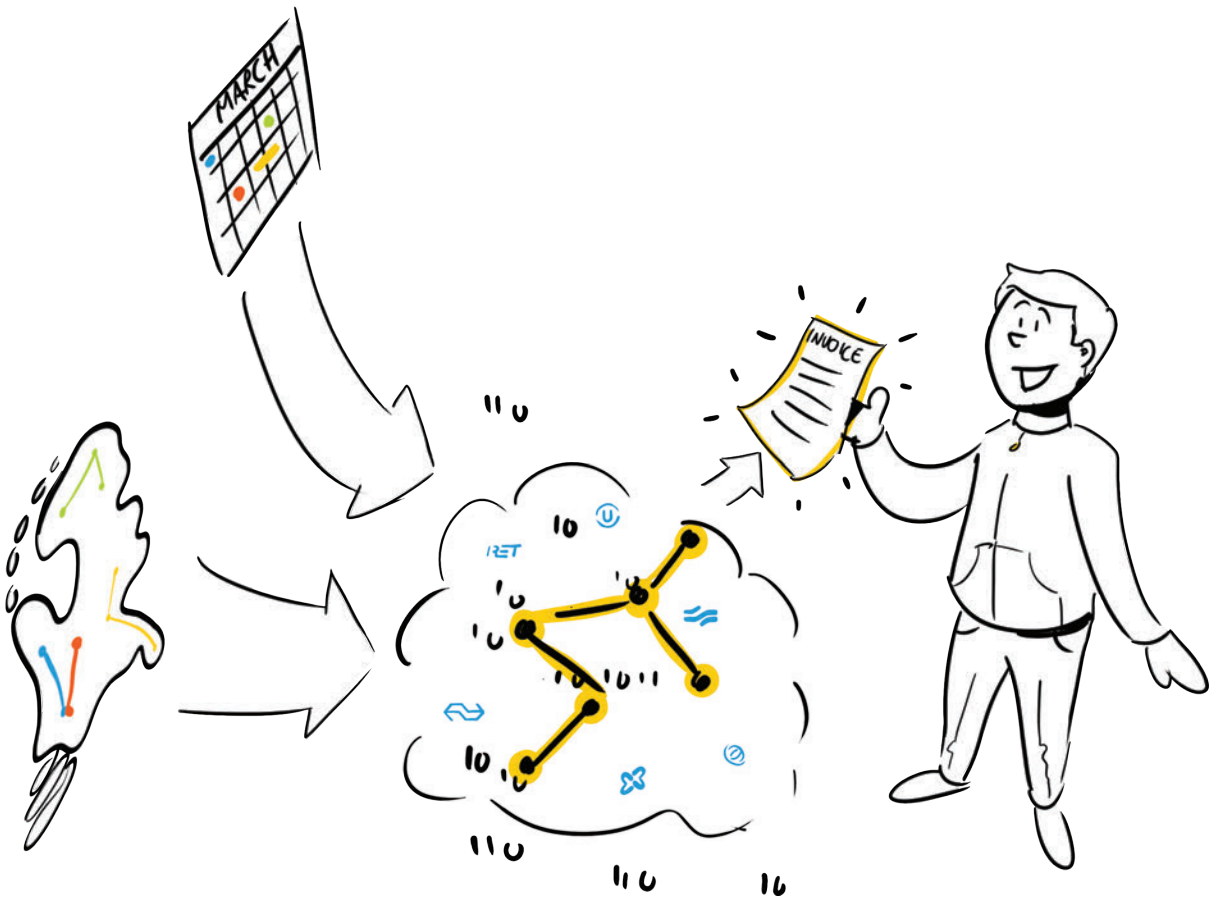

# C. Implementation ABT

2023 | Make it teamwork

As mentioned in the context analysis account-based ticketing will be implemented in the Dutch public transport system in 2023. With this new system calculations will take place in the back-office instead of at the terminals, this creates numerous opportunities for change.

With account-based ticketing, the passenger can choose from multiple travel tokens (F) such as a smartphone, barcode, or debit card. Furthermore, because of the calculations happening in the back-office it is possible to apply new pricing strategies such as automatic discount utilization (H) and offer personalized travel products (G).

The back-office that comes with account-based ticketing is suited for the complex calculations needed for SiCiCo (T), making it possible to implement SiCiCo in the Dutch public transport.


MARCH
INVOICE

# 5.2

## Personalization

Five elements are categorized within personalization, namely digital ticketing, personal travel history, travel tokens, personalized travel products and automatic discount utilizations.

Digital ticketing and travel tokens offer more identification options to the passengers, making it possible to choose an option that fits their personal wishes best.

With a personal travel history insight is offered, and the personalized travel products and automatic discount utilization make sure the passenger gets the best personal fit and price.

# D. Digital ticketing

2020 | Current status

Digital ticketing is a step towards being able to choose from multiple travel tokens (F) when travelling with public transport. With digital ticketing a ticket is bought via a smartphone application, the ticket is then scanned or shown to enter public transport.

An example of digital ticketing is the RET barcode application. With the RET barcode application, a mobile ticket can easily be bought for BTM in the RET transport area. The RET barcode application is ideal if the passenger does not have an OV-chipcard or if there is no vending machine nearby. With the barcode generated, you can check-in and out at the metro, and on the bus and tram the digital ticket is shown to the driver or conductor (RET, n.d.).


# E. Personal travel history

2021 | Clarifying the system

To give the passengers insight into their spendings on public transport it is important that they can see their own travel behaviour. The personal travel history should be offered in an approachable and easy understandable matter.

Currently, a travel history is available trough, among others, www.mijnovchipkaart.nl. However, this system takes numerous steps to get to the travel history and shows each transaction separately making it difficult for the passenger to identify the costs of, for example, a door-to-door journey.

> "I do not have a PT application (if it exists) in which I can see clearly how much money I spend in total with different carriers, which sometimes gives me an uncertain feeling" - Female, 27

With a personal travel history, it becomes easier for passengers to understand how certain costs are built up. The explanations of the tariff structure discussed in part Q can be part of this.

Concluding, a personal travel history should offer the passenger:

- an approachable and easily understandable overview of their spendings on public transport;
- insight into the built-up of travel costs;
- an overview of the costs for a door-to-door journey.

Further down the line, this personal travel history can be used to offer personalized travel products (G) to the passengers, based on their past behaviour.

# F. Travel tokens

2023 | Make it teamwork

With the implementation of account-based ticketing in the Dutch public transport options open up to use other tokens than the OV-chipcard as identification. The main opportunity is the shift from calculations in the terminals to calculations in the back-office. Within the new system bank cards, smartphones, barcodes and other kinds of tokens can be used, in addition to the OV-chipcard, to identify with the system.

With this freedom, passengers can use the travel token of their choice, and with this personalize their journey with public transport.

This opens up possibilities for different types of passengers. The more digital-savvy passengers are likely to use a smartphone as a travel token. On the other side, the analogue travellers can make use of less complex tokens like a printed barcode.


# G. Personalized travel products

2023 | Make it teamwork

With travel data connected to digital accounts and stored in a back-office, it becomes possible to analyse this data and offer personalized travel products to the passengers.

These travel products can be based on the passenger's past behaviour in public transport and can be adjusted when the behaviour of the passenger changes.

These kinds of travel products are especially well suited for passengers that use a post-paid payment method. With such a payment method the spendings are already clustered in payment periods, and the data is saved in a personal account.

A sidenote with these personalized travel products is that the passengers have to have trust in the system, they need to really believe that the system is offering them the best deal.

# H. Automatic discount utilization

2023 | Make it teamwork

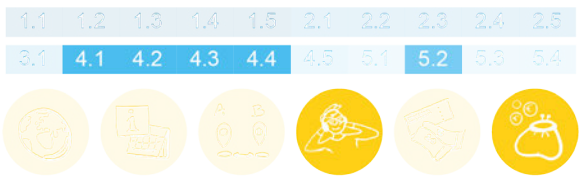
With the implementation of account-based ticketing, most price calculations will happen in the back office. Which means that the calculations take place after the passenger has checked-out.

When the calculations in the back-office are combined with a post-paid payment method, for example with a monthly invoice, automatic discounts can be applied.

The capping that is applied in London is an example of such an automatic discount, whenever a traveller reaches a certain maximum within a day, week or month nothing more is charged.

Off course the discounts can be applied in other matters as well, by offering a certain percentage off when the costs reach a certain amount for example.

This automatic discount utilization is a way to offer passengers the best price, since the discount is applied automatically they don't have to worry about it.



# 5.3

## Cooperation

With eight elements cooperation is the largest category on the roadmap. Carriers will have to cooperate to offer local travel products, which will evolve into regional, national and even international travel products. Furthermore, public transport carriers and mobility service providers will cooperate to offer MaaS plans within the Netherlands and internationally.

Additionally, tariff harmonization and a public transport authority are discussed.

# I. Local travel products

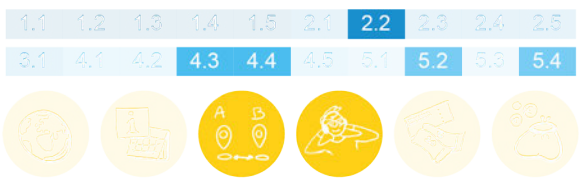
2020 | Current status

Currently, a local travel product exists in Utrecht, the U-OV “Gemak Utrecht Stad” and “Gemak Utrecht Regio” offer the passenger the ease of travelling by train, tram and bus with one travel product (U-OV, n.d.).

With a local travel product like this, the passenger is not forced to travel with a specific modality since all modalities are included in the travel product. This makes that the passenger can focus on other things, like the route with the least transfers, or the fastest route.

A first step in improving the offering of travel product would be to make local products like this possible in other cities and regions.

To make these kinds of travel products reality carriers have to cooperate, this can be enforced by the concession contracts or public transport authority (N).




# J. Regional travel products

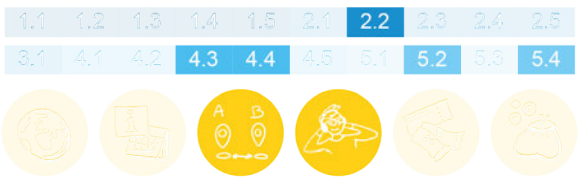
2021 | Clarifying the system

The most logical step after the local travel products described in part I are regional travel products. Meaning the areas the products are valid for are enlarged to a combination of multiple cities or even a province.

In Noord-Brabant travel products for unlimited travel by bus in the province exist, as well as national products for BTM (Bravo, 2018), however, a complete travel product for all modalities is still missing.

These regional travel products will be especially suited for passengers that travel from one city to another, within a region, on a regular basis, and additionally, like to use public transport to visit a friend or run errands close to home. With regional travel products, the passenger will have the freedom to use all kinds of modalities available in the region without having to think about the costs or purchase of multiple travel products. For example, Metropolitan Region Rotterdam The Hague can be a great region to offer such products in.

Making these regional travel products a reality will work in a similar matter as the local travel products, carriers will have to cooperate. Since we are talking about a larger area, the chances are that for a regional travel product more carriers will have to cooperate. This cooperation can again be enforced by the concession contracts or public transport authority.



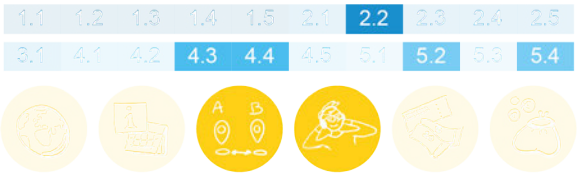
# K. National travel products

2023 | Make it teamwork

After local and regional travel products, national travel products are the last step within the Dutch public transport system. A national travel product is available on the NS Businesscard, this “OV-vrij” travel product offers unlimited travel with all modalities within the Netherland (NS, n.d.). Unfortunately, this travel product is not, yet, available for private travellers.

For a passenger, a national travel product would mean total freedom since it offers the possibility to use every modality available and no town, region or province borders have to be taken into account.

Since this product is available for business travellers, it is feasible to make it available for private travellers. Again, concession contracts or the public transport authority can play an enforcing role in this.




# L. International travel products

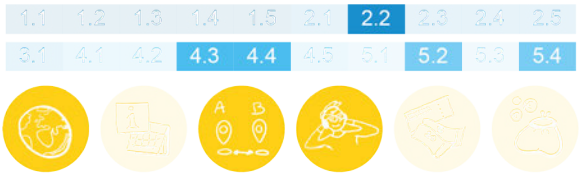
2025 | Adding new players

Using public transport does not immediately mean that you are staying within the Netherlands. Public transport can be used to travel to other countries, instead of flying there or going by car. Additionally, there are enough passengers that live in border areas close to Belgium or Germany that use public transport for work, study or leisure in both countries.

A logical travel product for these passengers would be an international travel product. This can be a product for the whole Dutch system and, for example, the whole Belgian system, but it can also be a travel product for a border area.

With an international travel product, the journey across the border becomes one, instead of two separate parts. This can ensure that financial benefits, such as a distance discount, can be applied correctly (Vierlandenplatform Voor Grensoverschrijdend Personenvervoer per Spoor, 2019).

To create these kinds of international travel products not only the Dutch carriers need to cooperate, but the international carriers come into play as well. Having successful local, regional and national travel products can act as argumentation within these collaborations.



# M. Tariff harmonization

2021 | Clarifying the system

In line with reducing the number of travel products, tariff harmonization makes the tariff system more unified and transparent.

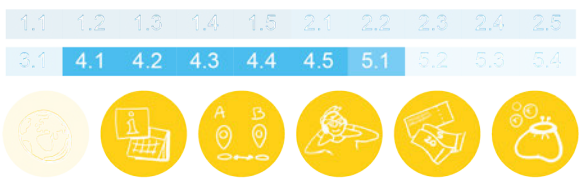
Tariff harmonization is not a single action, it is a process consisting out multiple steps. A couple of these steps will be discussed here.

Firstly, the double starting rate paid by passengers when changing from BTM to a train (or the other way around) has to go. When travelling, and transferring between, BTM this already is the case. With removing the double starting rate the whole trip will become one unified journey. For the carriers and authorities, this means that agreements around the starting rate need to be reviewed since currently this rate is paid to the first carrier in the journey. When a journey consists out of multiple modalities/carriers this will cause discrepancies.

Secondly, the NS tariff and regional tariff need to be attuned to each other. Currently, the NS tariff works with a minimum price of €2,40 while the regional tariff can be as low as the starting rate. This can be done in two ways, adding a minimum price to the regional tariff, or lowering the minimum price of the NS tariff. Which way is used has to be adapted to other changes that will be implemented to the tariff system.

Lastly, passengers need to pay the same price for the same journey, independently of the carriers used. On some train routes, multiple carriers operate, resulting in different prices for the same journey. For the passenger, this causes confusion, since it does not feel logical to them.

It has to be noted that complete tariff integration is difficult to realize in our public transport system since the system is based on decentralization and market forces. However, it is possible, to achieve more cohesion while maintaining regional tariff freedom. To realize this the parties involved in public transport have to be willing to come to joint agreements.



# N. Public transport authority

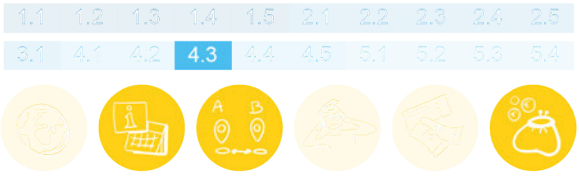
2021 | Clarifying the system

To realize this roadmap a significant amount of cooperation is asked of the public transport parties. To guide this process a national public transport authority can be established.

Such a public transport authority can guide the carriers and regional authorities through the process of making agreements, mediate by conflicts and enforce cooperation.

A national public transport authority can help in, amongst others, these situations:

- realizing local, regional, national and international travel products;
- sorting out the profit distribution in situations with a single starting rate, or multiple carriers on the same route;
- implementing single check-in check-out.




# O. MaaS plans

2023 | Make it teamwork

After the public transport carriers have harmonized their tariff system and offerings it is important to keep adding to the system to get to one uniform MaaS structure. One of the things that can be done is offering MaaS plans, which essentially are travel products for public transport as well as MaaS.

Currently, carriers can offer access to their travel product in various ways. This can be done by allowing mobility service providers to resell the existing range of travel products (with or without a discount) to customers, or by creating the option to purchase transport kilometres with which mobility providers can develop their own products (such as subscriptions).

In practice, there is no (effective) access to the public transport services of carriers, because the carriers have the ability and incentive to restrict access. As a result, mobility service providers have a competitive disadvantage, since the business model of mobility service providers depends on being able to bundle different transport services and adding service fees. This competitive disadvantage has an inhibiting effect on the development of the mobility market and can be detrimental to the development of a wider market of MaaS services (Autoriteit Consument & Markt, 2018).

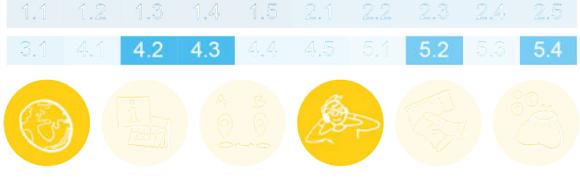
Thus, to makes these MaaS plans a possibility the carriers have to be open to cooperation with other mobility services, removing the competitive disadvantage.

# P. International MaaS plans

2025 | Adding new players

The MaaS plans discussed before (O) will eventually evolve into international MaaS plans, similar to MaaS in general. With these international MaaS plans, Dutch and international public transport and other mobility services will be offered through one platform.

The competitive disadvantage of the mobility service providers also comes into play in an international context, since there are even more competitors. However, cooperation within a national context can offer a great example and hopefully inspire cooperation in an international context. Additionally, at this point, there should be cooperation between international public transport carriers as well.



# 5.4

## Transparency

To be clear to the passengers it is important that the tariff system is transparent. To do this it is important to explain the system, and offer the passengers a tool to compare travel products and find their best fit: a decision support system.

# Q. Explain the system

2021 | Clarifying the system

One of the first steps that need to be taken to give the passenger more insight and confidence in explaining the system.

Currently, it is possible to find out how the Dutch public transport tariff system works, and to see the different parts of the prices but it is cumbersome. As a passenger, you have to search for this information actively and look at various different sources.

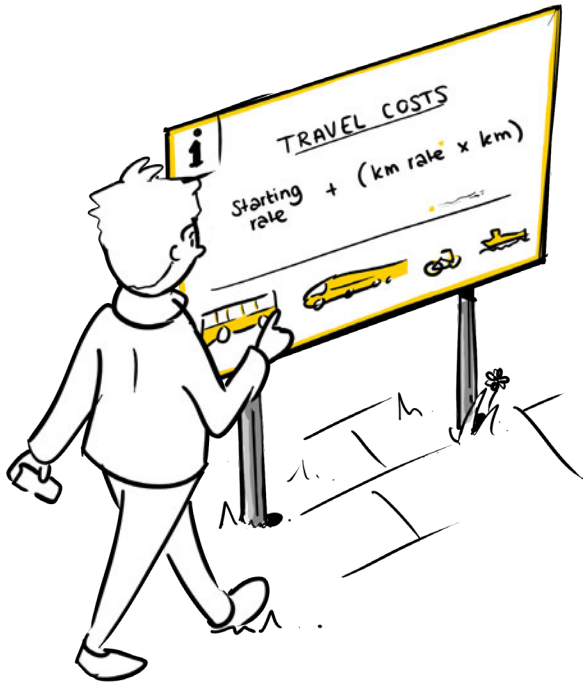
> "The built-up of the costs is not stated on the NS or 9292 website. I think it can be found, but then you have to actively search for it"
> - Female, 26

When you use a public transport planner like 9292 the total costs are already shown, so why not show the price structure as well?

> "I only know the total price because it is indicated in the application"
> - Female, 26

The price structure does not have to be visible on the first screen you see as a passenger since not all passengers are looking for this information. For example, there could be an information icon next to the price, which leads to an explanation.

Additionally, the information needs to be available for non-digital-savvy passengers as well. This can be done by placing the price structure on information boards at the stations or put it on flyers that are available at service desks.




# R. Decision support system

2021 | Clarifying the system

To make sure passengers are confident and in control of their spending on public transport, it is important that a decision support system is available. Such a system will help the passenger choosing between the numerous travel products available.

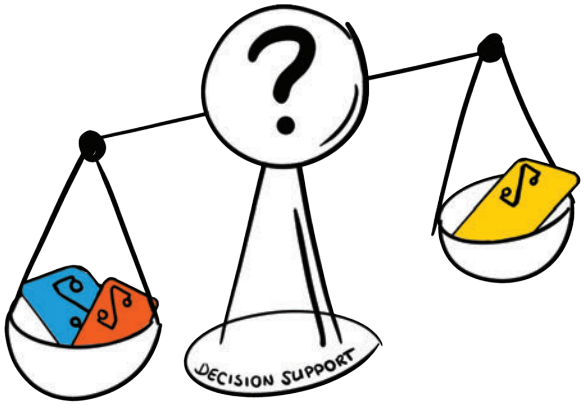
In other branches such decision support systems are already in place. Examples are independer for car insurance, home insurance and energy contracts (Independer.nl, n.d.) and ZorgKiezer for health insurance (ZorgKiezer.nl, n.d.). With these tools, consumers are able to compare multiple products and see which one fits there situation best.

A decision support system for public transport should:

- Offer a complete overview of all travel products available;
- Include the multiple discount propositions;
- And give the passenger control over the selection criteria (such as price, duration, etc);

Additionally, the decision support system could be linked to the personal travel history (E) of the passenger and offer advice based on travel behaviour.

The decision support system should not be offered to the passengers by the carriers or authorities, but by a third party, to prevent conflict of interest and offer the passenger the best, and unbiased, advice.




# 5.5

## Simplification

One of the steps that need to be taken to make the tariff system understandable for the passenger is the simplification of the system. Two main things are important here: reducing the amount of travel products, and implementing single check-in, check-out.

# S. Reduce amount of travel products

2021 | Clarifying the system

Currently, there is a multitude of travel products to choose from, which is confusing to passengers. All carriers offer their own products, often similar to each other, but with slightly different conditions. Web pages like “OV-chipkaart abonnement” try to give an insight in the number of travel products available (OV-chipkaart abonnement overzicht, n.d.), but the overview often is not complete.

Additionally, a lot of these travel products only exist because it is required in the concession contracts, and the carriers just offer these products to win the contract. These products are often only used by a handful of passengers.

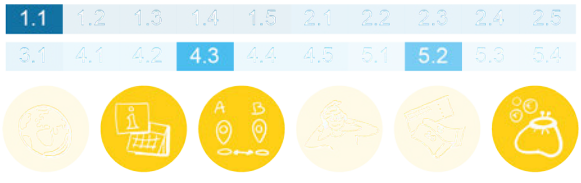
When reducing the amount of travel products available it will become easier for the passenger to find the travel product that suits his/her personal needs, without getting overwhelmed by the offering. Furthermore, it will reduce the complexity for the carriers as well, opening up possibilities when it comes to back-office calculations, harmonization and SiCiCo.

Steps that need to be taken to reduce the amount of travel products are the following:

- Identify all travel products*;
- Identify the use of these travel products*;
- Find out if the product with low usage can be replaced with another product, to prevent unhappy passengers;
- Keep the travel products with a high usage;
- Communicate with other carriers to adjust the offering to each other.

Furthermore, it is important that the wish to minimize the number of travel products available is kept in mind while composing new concession contracts, to prevent new, unnecessary products from forming.

*Translink should be able to provide this overview.




# T. SiCiCo

2023 | Make it teamwork

Single check-in check-out is something that is explored since 2011, different analyses on the implementation have been conducted, but to date, it is not implemented.

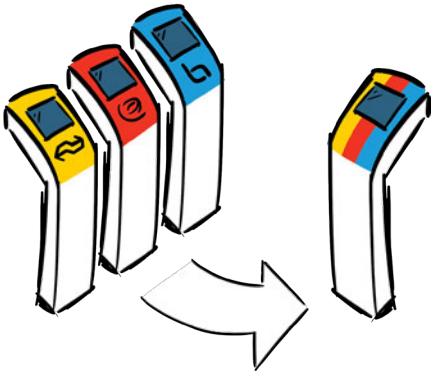
As can be read in the context analysis SiCiCo is closely linked with ABT and the tariff system. With a more harmonized, simpler tariff system and the back-office calculations offered by ABT it becomes easier to implement SiCiCo.

SiCiCo will offer advantages to the passenger as well as the carriers and other public transport stakeholders.

For passengers, it becomes easier to use public transport, with fewer errors. It is not necessary anymore to check-in and out multiple times, and the passenger does not need to pay attention to the terminals that need to be used.

For the carriers, fewer mistakes from the passenger mean fewer costs on the side of customer service. Additionally, fewer terminals are necessary, and these terminals can be independent of the carrier.

All in all, it is a great opportunity for all stakeholders to implement SiCiCo together with ABT.



# 5.6

## Trends

In addition to the major events happening, and steps that need to be taken to get to a passenger-oriented tariff system, there are also trends that have an influence. These trends are service society, digitization, (deep) personalization, Mobility as a Service (within the Netherlands as well as internationally) and green cities.

# U. Service society

2020 | Current status

The world we live in is more and more changing into a service society. Think of something, and there probably is a service for it. Groceries can be delivered by picnic, movies and series can be watched on-demand using services like Netflix and Videoland, and even razor blades can be delivered to your home on a monthly basis without ever worrying about it.

When it comes to transportation there is shift noticeable as well. Students do not own a bike anymore, but instead, have a subscription to swapfiets. For the last-mile of a journey on public transport, an OVfiets or MoBike can be used. And in neighbourhoods Hely hubs are popping up, offering multiple kinds of shared mobility, from cargo bikes to cars.

It is expected that this trend will continue, and consumers will use more services and own fewer products.


# V. Digitization

2020 | Current status

In addition to products transitioning to services, there is digitization happening. Examples of digitization are:

- Physical products that come with their own application;
- turning lights and music on by voice control (internet of things);
- real-life experiences (such as grocery shopping) within an application;
- customer service provided by chatbots (Artificial intelligence).

It is thus logical that digitization will play a roll in the public transport context as well. Currently, this is already happening in the form of digital ticketing (D). With digital ticketing, the paper ticket, OV-chipcard or even printed barcode is replaced by a digital ticket within an application.

# W. MaaS within NL

2023 | Make it teamwork

As mentioned in the context analysis Mobility as a Service (MaaS) is an upcoming trend within the mobility landscape. MaaS is defined as a new transport concept that integrates existing and new mobility services into one single digital platform, providing customized door-to-door transport and offering personalized trip planning and payment options. Instead of owning individual modes of transportation, or to complement them, customers would purchase mobility service packages tailored to their individual needs, or simply pay per trip (Durand et al., 2018).

Furthermore, it is indicated that public transport should be the backbone of MaaS (Matyas & Kamargianni, 2019; Ramboll, 2019).

When MaaS is merged with the existing public transport network the possibility for all-inclusive MaaS plans arises, more on these MaaS plans can be found in part O.

The seven Dutch MaaS pilots (B) are exploring an array of options in this field and will form a great basis for MaaS within the Netherlands.


# X. (deep) Personalization

2023 | Make it teamwork

Personalization is defined as “the action of designing or producing something to meet someone’s individual requirements” (Lexico, 2020). To apply personalization in public transport there has to be an insight into the individual (travel) behaviour of passengers. Where do they travel? Which modalities do they use? How often do they travel by public transport?

With the implementation of ABT (C) a database will be formed in the back-office that contains this individual information. With the use of this data, of course, while safeguarding the privacy of the passenger, in combination with developments like artificial intelligence it becomes possible to personalize services and products in public transport.

When the experience with public transport becomes more personalized, passengers will feel like they get the best options.

# Y. International MaaS

2025 | Adding new players

Similarly to the travel products evolving from national to international products (K, L), MaaS will also evolve into international forms.

It is expected that these MaaS services will be used by passengers living in border areas for work, study or leisure activities. Additionally, they can be used by international travellers exploring the area.

The MaaS pilot (element B) in Limburg is a great example of international MaaS. Limburg is the only province in the Netherlands that borders two other countries, Germany and Belgium. These borders hinder multimodal, cross-border mobility, especially in public transport. This is because ticketing systems on both sides of the border do not connect. Limburg, therefore, wants to simplify cross-border, multimodal travel and thereby also reduce car use (Ministerie van Infrastructuur en Waterstaat, 2019b).

The other border provinces in the Netherlands, such as Zeeland or Gelderland, can also profit from cross-border mobility with international MaaS.

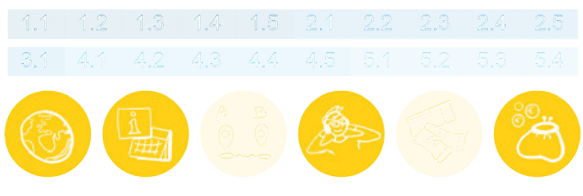

# Z. Green cities

2025 | Adding new players

In the coming years, sustainability will become an even more important topic, resulting in more and more shared mobility and public transport usage and less privately owned transportation cities will become greener. Cars will no longer drive urban planning, and the design of cities and districts will be more user-oriented.

Mobility as a Service will play a big role in this change, offering the passengers a door-to-door mobility concept, and thereby eliminating the need for private owned transportation.

However, this can only happen if MaaS, and public transport, are understandable and reliable enough for the passengers. The passengers should be confident and in control when it comes to their transportation.



# Implementation

# 6

During the implementation phase, the roadmaps are validated with stakeholders and experts (page 110 - 113). In addition to the visual and strategic roadmap an implementation cardset (page 115) is designed .

Furthermore, the results of this project are discussed (page 116) and recommendations (page 118) are given for the implementation of the results of this project and further projects within the Seamless Personal Mobility Lab.

# Stakeholder validation

The stakeholder validation was performed during the quarterly knowledge sharing session of the Seamless Personal Mobility Lab. During this session, all students taht are graduating within the lab had the opportunity to present their findings and process to the partners of the lab.

This time partners from DOVA, CROW, Rover, Translink, 9292 and the ministry of Infrastructure and Water management were present.

During the session, a 10-minute presentation was given, with a focus on the future vision and roadmap horizons. After the presentation, the partners were asked to fill in a Google form to share their first thoughts and concerns considering the roadmap. Additionally, there was some time left for questions and answers. Figure 12 shows an impression of the knowledge sharing session.

## Google form

During the stakeholder validation, the focus was on the initial reaction of the lab partners. After presenting about the future vision and horizons they were presented with a Google form. This form showed an image of each horizon with the most important roadmap elements and asked the following question (per horizon): “What is your first impression about this horizon, and do you see any bottlenecks?”

## Results

The results of this validation were predominantly positive. Although it was hard to tell the whole story in only 10 minutes, the vision came across clearly and the partners were enthusiastic about learning more about the roadmap. Below a selection of comments/questions made in the Google form or during the questions and answers will be discussed.

> “SiCiCo would be nice, but there is resistance from carriers” - DOVA

During the context analysis, it was noticed that SiCiCo had been a bottleneck for quite some time already. Multiple scenarios are analyzed, but it still is not implemented in the system. However, a coherence between SiCiCo, ABT and the tariff system was found. The roadmap shows that SiCiCo and ABT can be implemented parallel. This report and the roadmap show the advantages of implementing SiCiCo, for the passengers as well as the carriers, and can be used to persuade the carriers.

> “I think this will certainly help us in the coming periods!” - Translink

This is a great comment to get. The focus of this project was on implementation, and hearing that the stakeholders can work with the deliverables is amazing!

> “What is the impact of COVID-19 on the tariff system, is the end goal still the same?” - Rover

Although the COVID-19 measures are in the roadmap, they do not affect the envisioned ideal tariff system. However, they could influence the planning of for example the implementation of ABT. Currently, it is not clear to what matter the planning is influenced since it is hard to estimate when public transport will be used to the full capacity again, and what the financial effects of COVID-19 are.

> “How do the horizons relate to your six (beautiful) personas?“ - DOVA

As explained in the previous chapter not every persona will benefit from every roadmap element. Within this report, and on the implementation cardset, it is indicated which personas the element fits best. For example, all personas are affected by the COVID-19 measures, but the MaaS pilots are especially interesting for the international and carefree traveller.

> “ Do you expect complete transparency from all parties and is it necessary to paint a realistic picture? “ - 9292

As can be seen, cooperation plays a major role in the roadmap. However, with the numerous parties involved and conflicting interest, cooperation will not immediately run smoothly. From a passenger perspective, however, it is of the utmost importance that the carriers, authorities and others involved cooperate to offer the passenger the ideal tariff system. The cooperation will evolve (from local to international travel products for example), and with a shared vision, compromises will be found. Here lies a role for the potential public transport authority as well.

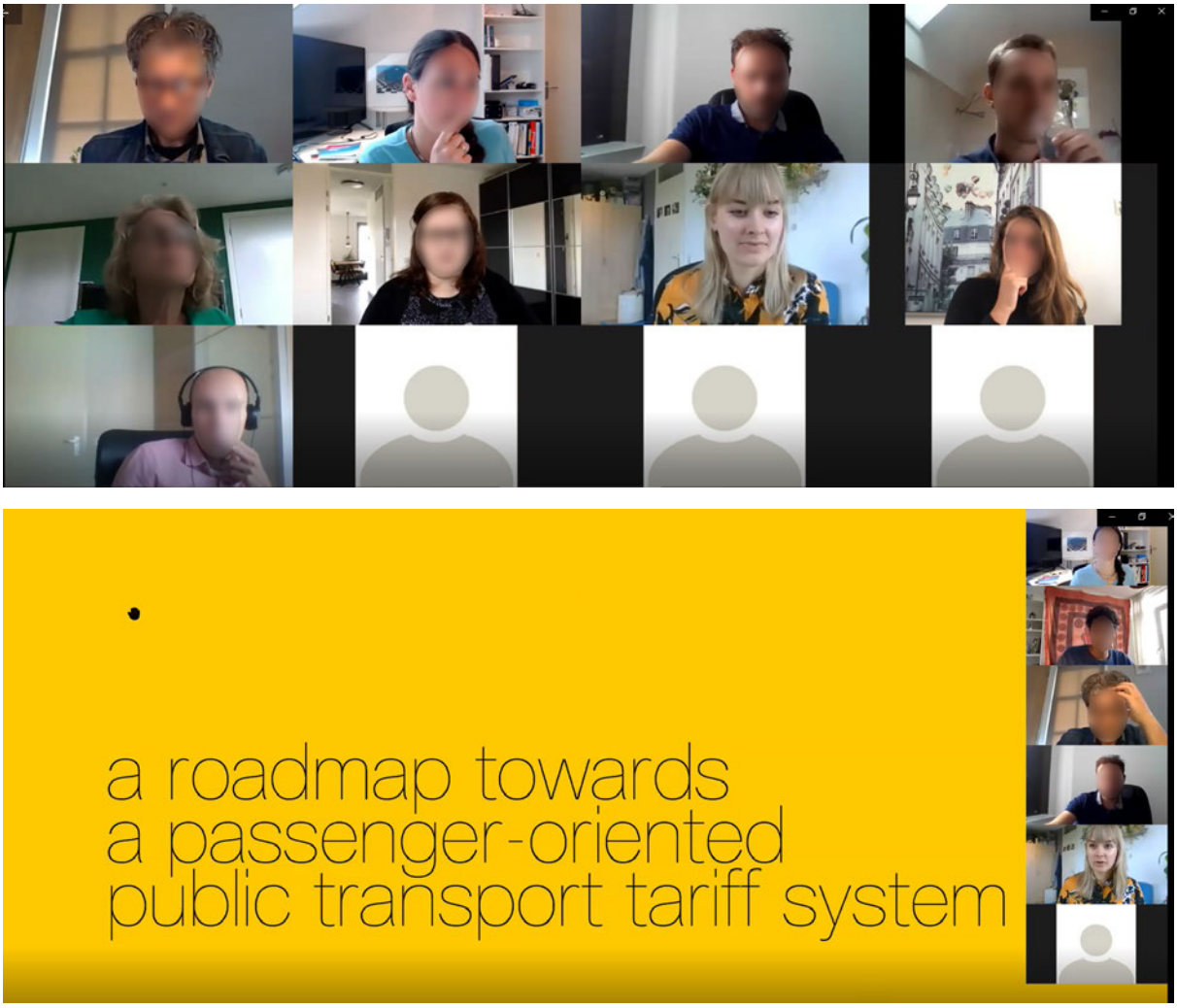



Figure 12: An impression of the knowledge sharing session.

# Expert validation

In addition to the stakeholder validation, the roadmaps were validated with two experts.

## Experts

Expert A is an assistant professor at the faculty of Industrial Design Engineering, TU Delft, with experience in the field of public transport.

Expert B works at DOVA and is involved in the developments around new payment methods and tariff structures.

## Validation set-up

The expert validation was done via video calls. The roadmaps were sent beforehand to give the experts some time to analyse them. During the conversation, the focus was on the first impression of the roadmaps and the possible bottlenecks. In addition, the current activities of the authorities and carriers concerning the tariff system were discussed.

## Results

### Project deliverables

Firstly the project deliverables were talked about, and the initial reaction of the experts was asked. The results were perceived as intended and the reaction was positive and in line with the vision of the experts.

> "I think this is where it should go, but the challenge is mainly in how to get there" - Expert A

> "We mainly focus on the fact that the new product palette must be transparent, clear and the passengers must receive a fair price that can be explained" - Expert B

### The problem, bottlenecks and challenges

Secondly, the problem solved by this project, potential bottlenecks and challenges were discussed with the experts.

One of the things that stood out is the overwhelming product offering of the current system, this is something that the team is currently working on and also can be seen in the roadmap.

> "The passengers are overwhelmed by the offering, there is too much to choose from, there are too many travel products" - Expert B

Furthermore, it was noted that financials can be an enormous bottleneck when it comes to making changes in the system.

> "What is the business model like? Who gets the profit? Who makes the investments?" - Expert A

In addition to questions about investments and revenues, COVID-19 plays a role in the financial picture as well.

> "It is unclear whether the schedule for the introduction of ABT will be met, there may be a delay due to liquidity issues related to COVID-19. There is no formal confirmation of this yet, it is only rumoured"- Expert B

### Current developments

In parallel to this project, a team consisting of authorities and carriers is working on a new product palette for public transport. The findings of this team overlap with the findings of this report.

> "The starting points for the new product range are: simple, fair and flexible" - Expert B

To simplify the product palette five product families were defined by the team.

> "The new product palette will consist of five product families: travelling on balance, graduated scale, purchased travel rights, capping and discount" - Expert B

Currently, the team is working with concepts. These concepts need to be tested and financial and technological scenarios need to be played out.

> "We are currently working on effect analysis of new concepts within the product range" - Expert B

Since the developments are still in a concept phase, this report and deliverables can be used as input.

### Steps for implementation

One of the goals of this project was designing an implementable solution. To get to this implementation there are a couple challenges. The first one convincing the right people. It was mentioned by Expert A that to get the carriers to cooperate, the authorities need to be convinced first.

> "Innovation and optimization in the field of individual transport services or applications often comes from the carriers, but integration, how the system as a whole works and long-term investments, that are things the government has to decide, someone has to take control" - Expert A

Furthermore, it is important to show the stakeholders the different options they have, and the consideration.

> "That is good to explain to the stakeholders, it is either giving a lot of feedback and explaining it or simplifying it very much" - Expert A

To conclude the role of a design project within a complex context such as public transport was discussed, and it was mentioned that even if a small part of this project gets implemented a huge step is made.

> "It is a push in the right direction, and that is a lot if you achieve that. Just because you are so realistic, that you understand well what is going on, there is a greater chance that what you propose will be taken along." - Expert A

## Conclusion

The roadmaps were well received by the experts. Without additional explanation, the key message of the project came across clearly.

The main bottleneck seems to be the finances. Questions arose on the topic of investments and revenues. This is a recurring problem when it comes to innovations in the field of public transport, for example with the (still not successful) implementation of SiCiCo. Due to the numerous stakeholders involved, and with that conflicting interests, it is hard to agree on the innovation and decide on a responsible party.

The vision and roadmap proposed during this project form a great match with the current developments around new payment methods and tariff structures. For example, the terms "transparent, clear and fair" were mentioned, these terms fit this project well.


for these
be an international
be a product
Dutch system and, for
Belgian system,
travel product for a

# Implementation cardset

To foster implementation of the roadmaps, an implementation cardset was designed. The cardset exist out of 33 cards: 1 instruction card, 26 roadmap element cards and 6 need-based persona cards.

Each roadmap element card shows the letter it connects to on the strategic roadmap, an indication of the horizon the element fits in, a short description of the element and shows which need-based persona(s) match this element. Figure 13 indicates the parts of the roadmap element cards.

The need-based persona cards give a description of the personas and their needs for public transport. The cards also include a visual of the personas and the icon that is used to indicate the personas on the roadmap element cards. Figure 14 shows the parts of the need-based persona cards.

## How to use

The implementation cardset can be used in addition to the strategic (and visual) roadmap, individually or together with colleagues and/or stakeholders. The physical form of the cardset makes that it is easy to interact with. When the implementation cardset and strategic roadmap are used together a complete understanding of the roadmap can be formed, and since each roadmap element has its own card it is easy to lay them together and start a conversation.

The roadmap element cards can also be combined with the matching need-based persona cards. An example of a combination of cards can be seen in figure 15.

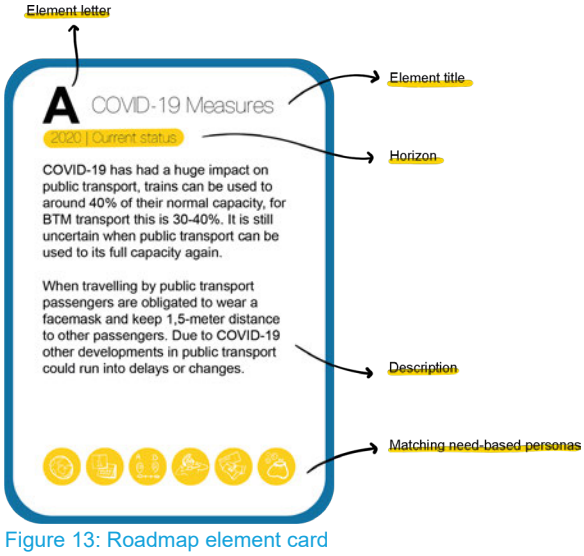



Figure 13: Roadmap element card

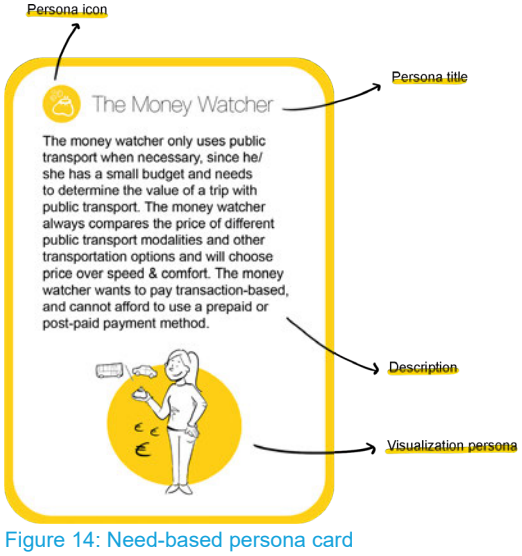



Figure 14: Need-based persona card

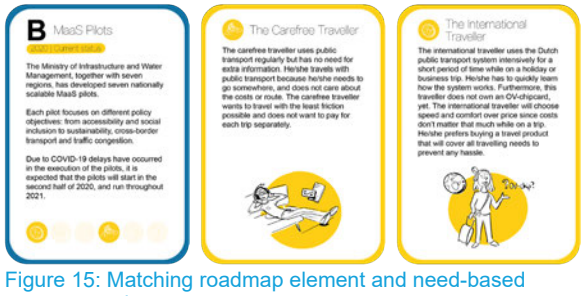



Figure 15: Matching roadmap element and need-based persona cards

# Conclusion and discussion

In this chapter, the results and the limitations of the project will be discussed. The design brief will be looked at in order to see if the formulated goal has been reached.

## Discussion

The focus of this project was on user-centredness (designing for the passenger) and implementation. Here these two factors will be discussed.

### User-centredness

During the whole project the user, in this case the (potential) public transport passenger, was kept in mind. During the inspiration, interviews and questionnaires were conducted with Dutch and international passengers to uncover their needs and values. From these insights, the need-based personas were created.

Within the ideation phase, the need-based personas were used to design from a user-centred perspective.

Finally, during the conceptualization phase, the roadmap elements were designed in a way that fits the user needs and serves the different need-based personas.

This user-centred approach is important to make sure the tariff system is adopted to the user needs and values, instead of requirements from carriers or authorities. When the system is better adjusted to the passengers, it is expected that public transport will be used more, and with this result in advantages for the carriers and authorities as well.

### Implementation

Next to user-centredness implementation was an important factor during this project. Within the context of public transport a lot is changing, carriers and authorities are working on a new payment system, and with this rethinking the product offering.

This makes that the timing of this project is ideal, there is still room for input and adjustments, and the stakeholders can use the outcome of this project as input for their own projects.

To foster this implementation the concept was validated with stakeholders and experts, and the implementation cardset was designed. The deliverables (roadmaps and cardset) were made tangible on purpose, this way they can be showcased to the stakeholders.

## Limitations

This project is executed from a user-perspective, this means that not all stakeholder requirements are taken into account. The concepts demands the stakeholders to cooperate, and conflicting interests are likely to come into play. But ultimately a system better adjusted to the passenger will work to the advantage of the stakeholders as well.

Additionally, this project was executed with a design perspective, creating a vision and general steps towards this vision. Details like finances and technology requirements were not taken into account. To implement the concept these details need to be worked out.

Furthermore, stakeholder and expert validation were conducted, but to a limited extend. It would be interesting to sit down with different stakeholders/experts and discuss the possibilities and bottlenecks of the design.

However, even though this project has some limitations, it can inspire the stakeholders to make the Dutch public transport tariff system more passenger-oriented. And even if only a part of the concept gets implemented, a huge accomplishment is achieved.

## Conclusion

The goal of this project was to develop a user-centred solution to improve the experience of the traveller concerning the tariff system of the Dutch public transport, and other forms of shared transport. The aim was to design a solution consisting of short- and long-term developments and to combine the future vision and steps towards this vision in a roadmap.

In order to reach this goal the project was executed in four phases: inspiration, ideation, conceptualization and implementation.

### Inspiration

During the first phase, inspiration, the context analysis and international benchmarking executed during the research elective were complemented with user research. These

three parts were used to gather user needs and values. These needs and values are combined into an overview, and additionally, need-based personas were composed.

### Ideation

The second phase was started with forming the future vision, this vision is the following:

In the future, all passengers should be confident about and in control of their spendings on public transport. Therefore there should be a unified and transparent tariff system that is adopted by all carriers. Additionally, carriers and other mobility providers should cooperate to offer the passenger personalized and all-inclusive travel products for the best price.

With the user needs and values, need-based personas and future vision two creative sessions were held to generate ideas and input for the roadmap.

### Conceptualization

During the third phase, conceptualization, the strategic roadmap was designed. This roadmap consists out of 26 roadmap elements and works towards the future vision. In addition to the strategic roadmap a visual roadmap was created, this visual roadmap gives a quick and easy to understand overview of the road ahead.

### Implementation

The fourth and final phase of this project is the implementation phase. Since the subject of this project is so relevant, implementation played an important role. To ensure implementation validation with stakeholders and experts was executed. Furthermore, an implementation cardset was created to support the strategic roadmap.

*To conclude, during this project a strategic roadmap, visual roadmap and implementation cardset were designed and created. Within the roadmaps short- and long term developments are defined to lead towards the ideal passenger oriented public transport tariff system where passengers are confident about and in control of their spendings on public transport. The roadmaps, combined with the implementation cardset, offer a user-centred solution and are a great source of inspiration for the current developments within public transport.*

# Recommendations

## Further development

During this project, a future vision for a passenger-oriented public transport tariff system is created, as well as the steps towards this vision in the form of a roadmap. However, before the results of this project can be implemented some additional steps need to be taken.

### Staying passenger-oriented

This project was executed from a user-centred perspective. The context analysis, international benchmarking and user research were used to distil user needs and values, which were then used to design with.

The user needs and values derived from the research during this project are focussed on the tariff system and offering of travel products. However, user needs and values on other topics related to public transport can be found, such as the development of account-based ticketing. It is advised to the public transportation stakeholders to keep a passenger-oriented approach in future projects/developments to make sure all user needs are accounted for, and user values remain intact.

### Detailing the roadmap elements

The deliverables of this project are the strategic roadmap, visual roadmap and implementation cardset. The strategic roadmap consists out of 26 roadmap elements, a description of these elements can be found in this report and on the cardset. However, these elements are not completely detailed and there is still room for interpretation.

Before implementing these elements, they have to be further detailed. In addition to the user needs and values, the wished and requirements of the public transportation stakeholders need to be taken into account.

### Technical requirements and finances

As mentioned before this project was executed from a design perspective, creating a vision and general steps towards this vision. To implement elements from the concept the details like finances and technology requirements need to be worked out. It is important that clear agreements are made regarding investments and revenues. Due to the numerous stakeholders involved these agreements can be hard to make. As mentioned in the roadmap a public transport authority can resolve these issues by enforcing cooperation en mediating between stakeholders.

## Development teams new payment methods and tariff structure

Within DOVA development teams are working on the new payment methods and tariff structure that will be implemented in 2023. These teams can use this project (and deliverables) as a great source of inspiration. The project offers a user-centred approach to the problem and shows the teams a new perspective.

## Future (graduation) projects

This project was executed within the Seamless Personal Mobility Lab, within this lab there is room for new (graduation) projects to be executed. Since the roadmap explains numerous elements on a general level, there is an opportunity to dive into one (or more) of these elements and detail them.

Examples of elements suitable for such a project are digital ticketing (D), personal travel history (E), MaaS plans (O) and decision support system (R). Where digital ticketing and the personal travel history can be developed by the carriers, it is advised to have the decision support system developed by a third party.

At the moment two graduation possibilities related to the above-mentioned elements are already defined within the lab, namely: travelling on public transport with QR / barcode, and designing a decision support system.

# Reflection

# 7

In this reflection, I will look back on the personal objectives as stated in my graduation proposal (Appendix A) and reflect on the parts that stood out to me the most. In addition, I will reflect on graduating during a pandemic.

## Stakeholder management

The context I graduated in has a great number of stakeholders, and as expected it was a challenge to keep all these stakeholders involved. Luckily, there were two knowledge sharing sessions during my graduation during which I could present my findings to the parties connected to the Expertisecentre, which are the stakeholders as well. During these sessions, the partners provided me with feedback and questions which I used as input for the project. Furthermore, I spoke to some of the partners individually.

Dealing with this amount of stakeholders was completely new for me, but it was interesting to be able to dive into the context like this. Especially with my project being so close to the current developments it really feels like I have contributed something.

## Practise skills

During my Masters, I have been in a couple of creative sessions as a participant, and have seen how they can generate numerous ideas or even a new perspective on a project. Therefore, I intended to organise a creative session of my own.

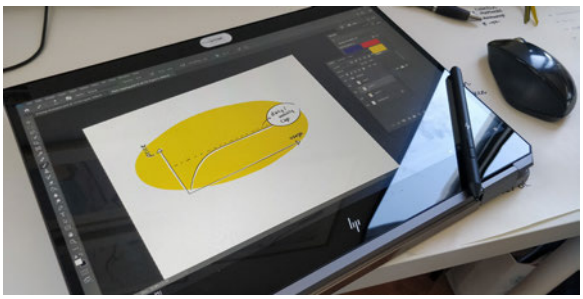
With the help of friends with experience on the topic, I designed a complete session and even had twelve participants to help me out. Unfortunately, the session was planned in the first week of the intelligent lockdown, and could not be executed.

I managed to turn parts of the session into a digital session, and still got great results, but it is a pity that I did not have the change to organize a “real” creative session during my graduation project.

I learned other skills as well, for example using photoshop. I asked Martha to help me out with the visual roadmap and need-based persona illustrations. While working together on the roadmap (figure 15) I started understanding the program better myself, and I am proud to say that the roadmap became a collaborative piece, instead of a drawing someone else made for me. In future projects, I will for sure use my new photoshop skills to my advantage.

## Focus on implementation

In my graduation proposal, I stated that I did not want to design a pink glittery cloud. During this project, I had a focus on implementation. To foster the implementation of my project I have validated the roadmaps with the stakeholders and created an implementation cardset to go with these roadmaps. I am aware that my graduation project can not be placed into the real world one on one, but I am certain that there are parts of my design that can be implemented.



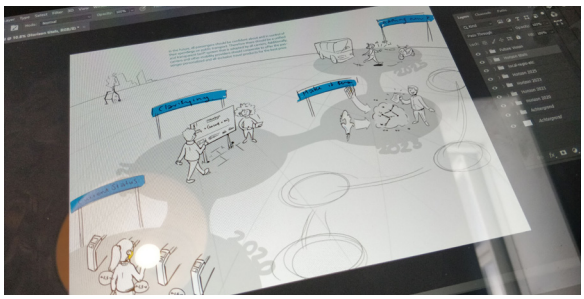


Figure 16: Working on my photoshop skills

## Graduating during COVID-19

I have started my graduation project in January, working at the faculty, but unfortunately, I had to continue working from home due to the intelligent lockdown.

### Working from home

Working from home took some time to get adjusted to. I live in a student house where we do not have a common room, so working from home form me meant working from my bedroom. At first, I did not even have a desk to work at.

Working from home also meant that I had to build a new routine, divide my day into “work hours” and “free hours”. When all activities need to happen in the same surroundings, it can be tough to keep this separated. Buying a desk to work on, and with this creating a little study corner in my room helped a lot. With this designated study area it became easier to separate study and leisure activities.

I had to get used to a new concept of productivity. When studying at the faculty from, let’s say, 9:00 till 17:00, I could feel like I had a great productive study day. While in the meantime, I had multiple coffee breaks, had lunch with friends and talked to the other students in the graduation office. On days like these, I achieved a lot, but I did not work the full eight hours. While, when working from home, I felt like I had to be productive the whole time. Since there were no unconscious breaks (like a cup of coffee with a friend), I had to learn to create these breaks myself and to be less harsh on myself when I was not constantly productive.

Lastly, working from home also meant less social contact, and with that less peer-to-peer feedback. In a normal situation, working at the faculty, it is easy to show something to a fellow student, and get some feedback on it. When working at home, the already individual graduation project becomes even more individual. Luckily my roommate has studied Strategic Product Design as well, and she was able to provide me with the necessary peer-to-peer feedback.

### Digital cooperation

Since face-to-face cooperation was not possible anymore, I had to find new, digital ways to cooperate. Coach meetings were held via Skype, weekly Lab meetings via Zoom, and brainstorming was done with the use of Miro.

Although working via all these digital tools is not ideal, especially if you are used to the face-to-face way, there are some advantages as well. For example with the digital brainstorms, since the participants could stay at home and join digitally it was much easier to find participants and a timeslot that suited all. I also noticed that since everyone was staying at home (and probably bored), and thus had enough time and were not in a rush, reactions to for example the friendships booklet and statements were very elaborate.

I also studied together with other graduate students, digitally. For this, we used Zoom and just left the meeting open while working on our own project. When there was a question or just a random comment, it was easy to unmute and talk for a few minutes, simulating working together at the faculty.

## Conclusion

To conclude I can say I learned a lot. I got to work within a complex multi-stakeholder environment, I have learned practical skills such as photoshop and using digital brainstorming tools, but I also got to know myself and my process better by being forced to work at home. I am sure that I can, and will, use this knowledge and new tools to tackle future challenges.

# References

## A

Ammelrooy, P. van. (2020a, February 13). De ondoorgrondelijke wegen van het openbaar vervoer: Prijsverschillen. de Volkskrant. https://www.volkskrant.nl/gs-be836348 [Last accessed: 13-02-2020]

Ammelrooy, P. van. (2020b, February 13). Tarievenchaos in openbaar vervoer kost reiziger miljoenen. de Volkskrant. https://www.volkskrant.nl/gs-b61f5ddf [Last accessed: 13-02-2020]

Autoriteit Consument & Markt. (2018). Advies Regulering van de OV-betaalmarkt.

## B

Bravo. (2018, December 12). OV-chipkaartproducten. Bravo. https://www.bravo.info/vervoerbewijzen/ov-chipkaartproducten [Last accessed: 24-06-2020]

## C

Coöperatie Openbaar Vervoerbedrijven. (n.d.). Coöperatie. https://cooperatieovbedrijven.nl/cooperatie/ [Last accessed: 16-10-2019]

## D

De Lijn - Vlaamse Vervoermaatschappij. (2019). Tickets. https://www.delijn.be/nl/vervoerbewijzen/tickets [Last accessed: 01-11-2019]

DOVA. (2019a, January 31). Overzicht km tarieven 2013—2019. https://www.dova.nu/document/overzicht-km-tarieven-2013-2019 [Last accessed: 08-12-2019]

DOVA. (2019b, July). Nieuwsbrief #4. https://us13.campaign-archive.com/?e=u=4a52d3d8730e6c3a8433a3e8bid=6c645504f9 [Last accessed: 16-10-2019]

Durand, A., Harms, L., Hoogendoorn-Lanser, S., Zijlstra, T. (2018). Mobility-as-a-Service and changes in travel preferences and travel behaviour: A literature review.

## G

Gelevert, H., Wiersema, H., Ensing, H., Huitema, G. (2016). Uitkomsten van een quickscan naar technische ontwikkelingen in relatie tot enkelvoudig in- en uitchecken op het spoor. TNO.

Gooch, J. (2018, August 21). An introduction to 'contactless' (cEMV) ticketing in public transport. https://blog.masabi.com/blog/an-introduction-to-contactless-cemv-ticketing-in-public-transport [Last accessed: 19-12-2019]

Government of the Netherlands. (2011, December 14). Organisation of public transport. https://www.government.nl/topics/mobility-public-transport-and-road-safety/public-transport/organisation-of-public-transport [Last accessed: 16-10-2019]

## H

HSL. (n.d.-a). Day tickets. https://www.hsl.fi/en/tickets/day-tickets [Last accessed: 15-11-2019]

HSL. (n.d.-b). Single tickets. https://www.hsl.fi/en/tickets/single-tickets [Last accessed: 15-11-2019]

## I

IDM Südtirol. (2019). Mobiliteit in Zuid-Tirol. https://www.suedtirol.info/nl/informatie/heenreis/mobiliteit-in-zuid-tirol [Last accessed: 11-10-2019]

Independer.nl. (n.d.). Bespaar direct op je vaste lasten. https://www.independer.nl/?refer=adwordsalgemeen-ts56g clid=Cj0KCQjwwr32BRD4ARIsAAJNf_35ntaBeRtprDlldVu NZ0opXNaU8f24u-a2BCrLaBtIGjoCrWLxh30aAk9ZEALw_ wcBgclsrc=aw.ds [Last accessed: 28-05-2020]

## J

Jittrapirom, P., Caiati, V., Feneri, A.-M., Ebrahimigharehbaghi, S., González, M. J. A., Narayan, J. (2017). Mobility as a Service: A Critical Review of Definitions, Assessments of Schemes, and Key Challenges. Urban Planning, 2(2), 13. https://doi.org/10.17645/up.v2i2.931

## K

Koos Service Design. (n.d.). Need-Based Persona's | Inzicht in klanten. https://www.koosservicedesign.com/nl/tool/service-design-need-based-personas/ [Last accessed: 07-04-2019]

## L

Lexico. (2019a). Fare. Lexico Dictionaries | English. https://www.lexico.com/en/definition/fare [Last accessed: 19-12-2019]

Lexico. (2019b). Passenger. Lexico Dictionaries | English. https://www.lexico.com/en/definition/passenger [Last accessed: 19-12-2019]

Lexico. (2019c). Traveller. Lexico Dictionaries | English. https://www.lexico.com/definition/traveller [Last accessed: 19-12-2019]

Lexico. (2020). Personalization | Definition of Personalization by Oxford Dictionary on Lexico.com also meaning of Personalization. Lexico Dictionaries | English. https://www.lexico.com/en/definition/personalization [Last accessed: 25-06-2020]

Lipre, E. (2016, November 17). What is account based ticketing (ABT) in public transport? Medium. https://medium.com/@erkilipre/what-is-account-based-ticketing-abt-in-public-transport-57fc72fecdc1 [Last accessed: 02-12-2019]

## M

Mangla, A. (2019, October 15). Smart Card Based Ticketing System: Everything you need to know about. Urban Transport News. https://urbantransportnews.com/smart-card-based-ticketing-system-everything-you-need-to-know-about/ [Last accessed: 20-12-2019]

Masabi Ltd. (2019). Account Based Ticketing | Ticketless Ticketing for Public Transport. Masabi. https://www.masabi.com/account-based-ticketing/ [Last accessed: 02-12-2019]

Matyas, M., Kamargianni, M. (2019). The potential of mobility as a service bundles as a mobility management tool. Transportation, 46(5), 1951–1968. https://doi.org/10.1007/s11116-018-9913-4

Meijdam, H., Biesheuvel, P. J., Hulman, S., Janse de Jonge, E., Kaper, T., Rat, H., Vervest, P. (2011). Het spoor naar slagkracht. NDR, Den Haag.

Ministerie van Infrastructuur en Waterstaat. (2018). Kerncijfers Mobiliteit 2018.

Ministerie van Infrastructuur en Waterstaat. (2019a). Vervolgaanpak overstapproblematiek OV-chipkaart.

Ministerie van Infrastructuur en Waterstaat. (2019b). MaaS-pilots Optimaliseren van het mobiliteitssysteem.

## N

Nationaal Openbaar Vervoer Beraad. (n.d.). Over het NOVB. Nationaal OV Beraad. https://www.nationaalovberaad.nl/Over+het+NOVB/Over+het+NOVB+-+Algemeen/default.aspx [Last accessed: 16-10-2019]

Nationaal Openbaar Vervoer Beraad. (2018). Brief voorzitters NOVB over besluit enkelvoudig in- en uitchecken.

NS. (n.d.). OV Vrij | Zakelijke abonnementen | NS. https://www.ns.nl/producten/abonnementen/p/zakelijk-ov-vrij-abonnement [Last accessed: 28-05-2020]

NS, Connexxion. (2018). Eindevaluatie Pilot Valleilijn.

## O

OV in Nederland. (2019a, August 10). Strippenkaart. https://wiki.ovinnederland.nl/wiki/Strippenkaart [Last accessed: 19-12-2019]

OV in Nederland. (2019b, August 10). Trans Link Systems. https://wiki.ovinnederland.nl/wiki/Trans_Link_Systems [Last accessed: 08-12-2019]

OV-chipkaart abonnement overzicht: Vergelijk kosten en makkelijk kopen. (n.d.). OV-chipkaart abonnement. https://www.ovchipkaartabonnement.nl/ [Last accessed: 28-05-2020]

Overheid.nl. (2019, June 16). Wet personenvervoer 2000 [Wet]. https://wetten.overheid.nl/BWBR0011470/2019-06-16 [Last accessed: 17-10-2019]

## P

Puylaert, G. (2020, January 21). Helft reizigers vindt omchecken lastig. OV-Magazine. https://www.ovmagazine.nl/2020/01/helft-treinreizigers-vindt-omchecken-lastig-1625/ [Last accessed: 13-08-2020]

## R

Ramboll. (2019). Whimpact—Insights from the world's first Mobility-as-a-Service (MaaS) system.

RET. (n.d.). Reizen met barcode. https://www.ret.nl/home/reisproducten/mobiele-tickets.html [Last accessed: 25-06-2020]

Rijksoverheid. (2020). Protocol verantwoord blijven reizen in het openbaar vervoer.

Rijnhout, R., van der Niet, S. (2018). Enkelvoudig in- en uitchecken op het spoor in relatie tot de tariefbevoegdheid. Hypercube Business Innovation.

Rijnhout, R., van der Niet, S., Niermeijer, G. (2018). Rapport Update KBA enkelvoudig in- en uitchecken. Hypercube Business Innovation.

Rover. (2019). Naar meer Tariefsamenhang—Visie van Rover op tariefintegratie binnen het openbaar vervoer.

Rover. (2020, June 2). Rover lanceert corona-meldpunt openbaar vervoer. Rover. https://www.rover.nl/nieuws/50-corona/1703-rover-lanceert-corona-meldpunt-openbaar-vervoer [Last accessed: 22-06-2020]

## S

Sochor, J., Arby, H., Karlsson, I. C. M., Sarasini, S. (2018). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals. Research in Transportation Business Management, 27, 3–14. https://doi.org/10.1016/j.rtbm.2018.12.003

STA - Südtiroler Transportstrukturen AG. (2019a). Südtirol Pass, ein Pass für alle. https://www.sii.bz.it/de/tickets/suedtirol-pass-ein-pass-fuer-alle [Last accessed: 11-10-2019]

STA - Südtiroler Transportstrukturen AG. (2019b). Unsere Tarife. https://www.sii.bz.it/de/unsere-tarife [Last accessed: 11-10-2019]

## T

Taylor Parkins, E. (2020). Passenger-oriented public transport tariff system | Analysis report. Delft University of Technology, Delft, the Netherlands.

Translink. (2019a). Instap- en basistarief. https://www.ov-chipkaart.nl/zo-werkt-reizen/tarieven/instap-en-basistarief.htm [Last accessed: 07-12-2019]

Translink. (2019b). Kilometertarief. https://www.ov-chipkaart.nl/zo-werkt-reizen/tarieven/kilometertarief.htm [Last accessed: 07-12-2019]

Translink. (2019c). Over ons. https://www.translink.nl/about [Last accessed: 07-12-2019]

Translink. (2019d). Tarieven. https://www.ov-chipkaart.nl/zo-werkt-reizen/tarieven.htm [Last accessed: 07-12-2019]

Translink. (2019e). Wat is de OV-chipkaart? https://www.ov-chipkaart.nl/ov-chip-kopen/wat-is-de-ov-chipkaart.htm [Last accessed: 19-12-2020]

Transport for London. (n.d.-a). Buying tickets and Oyster. https://tfl.gov.uk/fares/how-to-pay-and-where-to-buy-tickets-and-oyster/buying-tickets-and-oyster?intcmp=54759 [Last accessed: 11-11-2019]

Transport for London. (n.d.-b). Contactless and mobile pay as you go. https://tfl.gov.uk/fares/how-to-pay-and-where-to-buy-tickets-and-oyster/pay-as-you-go/contactless-and-mobile-pay-as-you-go?intcmp=55539 [Last accessed: 11-11-2019]

Transport for London. (n.d.-c). Oyster pay as you go. https://tfl.gov.uk/fares/how-to-pay-and-where-to-buy-tickets-and-oyster/pay-as-you-go/oyster-pay-as-you-go [Last accessed: 11-11-2019]

Transport for London. (n.d.-d). What we do. https://tfl.gov.uk/corporate/about-tfl/what-we-do?intcmp=2582 [Last accessed: 11-11-2019]

Travellers Toolkits Ltd. (2019). Contactless Cards  Apple Pay On London's Public Transport. https://www.londontoolkit.com/briefing/contactless_cards.html [Last accessed: 11-11-2019]

## U

U-OV. (n.d.). U-Ov Gemak Utrecht Stad. https://www.u-ov.info/abonnementen-kaartjes/product-details/UFJPRFVDVF9UWVBFOjEz/gemaksabonnement-stad [Last accessed: 28-05-2020]

## V

van Boeijen, A. G. C., Daalhuizen, J. J.,  Zijlstra, J. J. M. (2020). Delft Design Guide (Revised edition): Design strategies and methods. BIS Publishers B V.

van Leijenhorst, J. (2018). Advies enkelvoudig in- en uitchecken in de treinketen (sicico).

van Limpt, T. (2019, July 3). Ov-chipkaart verdwijnt mogelijk in 2023. https://nos.nl/l/2291781 [Last accessed: 07-12-2019]

van Veldhoven - Van der Meer, S. (2019, July 2). Openbaar vervoer [Kamerbrief]. https://www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2019Z14150did=2019D29082 [Last accessed: 29-06-2020]

Veeneman, W., ten Heuvelhof, E., de Bruijn, H.,  Saanen, N. (2011). Naar een betere governance voor de  OV-Chipkaart—Advies aan de commissie Permanente Structuur en Dubbel Opstaptarief in de Treinrailketen. 47.

Vierlandenplatform voor grensoverschrijdend personenvervoer per spoor Eindverslag en aanbeveligingen. (2019). https://zoek.officielebekendmakingen.nl/blg-893802

## Z

ZorgKiezer.nl. (n.d.). Keuzehulp zorgverzekering. ZorgKiezer.nl. https://www.zorgkiezer.nl/zorgverzekering/info/keuzehulp-zorgverzekering [Last accessed: 28-05-2020]

# Appendix

# Table of contents

# A. Graduation brief

## IDE Master Graduation

### Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

**USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT**
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

**STUDENT DATA & MASTER PROGRAMME**
Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy".
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1 !

family name: Taylor Parkins
initials: E. given name: Eva
student number: [redacted]
street & no.:
zipcode & city:
country:
phone:
email:

Your master programme (only select the options that apply to you):
IDE master(s): ( ) IPD ( ) DfI (★) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

**SUPERVISORY TEAM ****
Fill in the required data for the supervisory team members. Please check the instructions on the right !

** chair: Suzanne Hiemstra-van Mastrigt dept. / section: SDE / M&M
** mentor: Sylvia Mooij dept. / section: DOS / MCR
2nd mentor:
organisation:
city: country:
comments (optional)

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v..

Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

**Procedural Checks** - IDE Master Graduation

**APPROVAL PROJECT BRIEF**
To be filled in by the chair of the supervisory team.

chair Suzanne Hiemstra-van Mastrigt date - - signature

**CHECK STUDY PROGRESS**
To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair.
The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: _____ EC

Of which, taking the conditional requirements into account, can be part of the exam programme _____ EC

List of electives obtained before the third semester without approval of the BoE

YES all 1st year master courses passed

NO missing 1st year master courses are:

name date - - signature

**FORMAL APPROVAL GRADUATION PROJECT**
To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **.
Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

comments

name date - - signature



Initials & Name E. Taylor Parkins Student number 4205855

Title of Project Passenger-oriented Public Transport Tariff System

**Personal Project Brief** - IDE Master Graduation

TU Delft

Passenger-oriented Public Transport Tariff System — project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 20 - 01 - 2020 — 22 - 06 - 2020 end date

## INTRODUCTION **

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

The current public Dutch transport tariff system is complex and hard to understand for the traveller. It is assumed that travellers feel like they are not getting the "best price", but do not have the means to validate this. Furthermore, there is a large offer of tickets and subscriptions available which can lead to insecurity for the traveller.

The Dutch public transport is provided by several public transport operators and organized in a decentralized manner. The OV-chipcard is the main payment method within the system. The current tariff system of the Dutch public transport works with a starting rate and a kilometer rate. The starting rate is determined nationally, while the kilometer rate differs per region and/or operator.

There are some changes to happen within the landscape of Dutch public transport. Within the coming years, the OV-chipcard will be replaced with a new system with which the price calculations will happen in a back office instead of at the card readers (NOVB, 2018). The new system spoken about is called Account-Based Ticketing (ABT). Currently, the Dutch public transport makes use of Card-Based Ticketing (CBT). The introduction of this new system also creates a great moment to revise the tariff system.

In addition, multiple new forms of (shared) mobility are appearing which, together with the current public transport, create a Mobility as a Service (MaaS) landscape. The first levels of MaaS integration are the integration of information (level 1) and the integration of booking & payment (level 2) (Sochor et al., 2018). This implies that to make the integration of public transport and MaaS a possibility these are interesting areas to look at, thus making the revision of the public transport tariff system a logical point to start.

This graduation project is one of the projects executed within the Seamless Mobility Lab of the faculty of Industrial Design Engineering. Within the lab eight partners actively participate, an overview of these partners can be found in figure 1. During this project the partners will be involved in the process, since they are the stakeholders of the project. This also means that stakeholder management will be a large part of this project.

Furthermore, this graduation project is preceded by a research project. Within this research project, an international benchmark is conducted to map the pros and cons of different public transport tariff systems. During this benchmark the different systems are compared on, among others, price awareness, transparency, ticketing & pricing. The benchmark is conducted in Antwerp, South Tyrol (Bolzano), London, and Helsinki (Taylor Parkins, 2019).

NOVB. (2018). De reiziger centraal—Manifest van de consumentenorganisaties in het NOVB over de ontwikkeling van OV-betalen.
Sochor, J., Arby, H., Karlsson, I. C. M., & Sarasini, S. (2018). A topological approach to Mobility as a Service: A proposed tool for understanding requirements and effects, and for aiding the integration of societal goals. Research in Transportation Business & Management, 27, 3–14. https://doi.org/10.1016/j.rtbm.2018.12.003
Taylor Parkins, E. (2019). Passenger-oriented Public Transport Tariff System - Analysis report.

space available for images / figures on next page

introduction (continued): space for images


image / figure 1: Partners of the Seamless Mobility Lab

image / figure 2:

## PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

During this project, the focus is on the Dutch public transport system as it is organized at the moment. The public transport system in the Netherlands is the only one worldwide that is organized nationally, and thus this project will also focus on the system on a national level. The tariff system spoken about is that of the public transport in general, the specific products/subscriptions of single providers will not be looked at.

In addition to the current public transport modalities other forms of shared transport will also be taken into account. With the developments towards Mobility as a Service these forms of transportation will most likely be added to the current public transport system. This also implies that the tariff system of the public transport should be capable of adapting to these additions.

## ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... . In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

Creating a roadmap to implement the ideal passenger-oriented tariff system for public (and shared) transport in the Netherlands.

The goal of this project is to develop a user-centred solution to improve the experience of the traveller concerning the tariff system of the Dutch public transport, and other forms of shared transport. The solution will consist of changes in the tariff system and/or a decision support system and will consist of short- and long-term developments. The future vision (ideal passenger-oriented tariff system) and steps towards this vision will be combined into a roadmap.

Vision
A tariff system for the Dutch public (and shared) transport that is easy to understand and gives the traveller insight into and confidence about their travel costs, travel products and subscriptions.

Mission
Improve the experience of travellers when looking for price information and/or deciding on a travel product/subscription by developing a user-centred solution that gives travellers insight into and confidence about their travel costs.



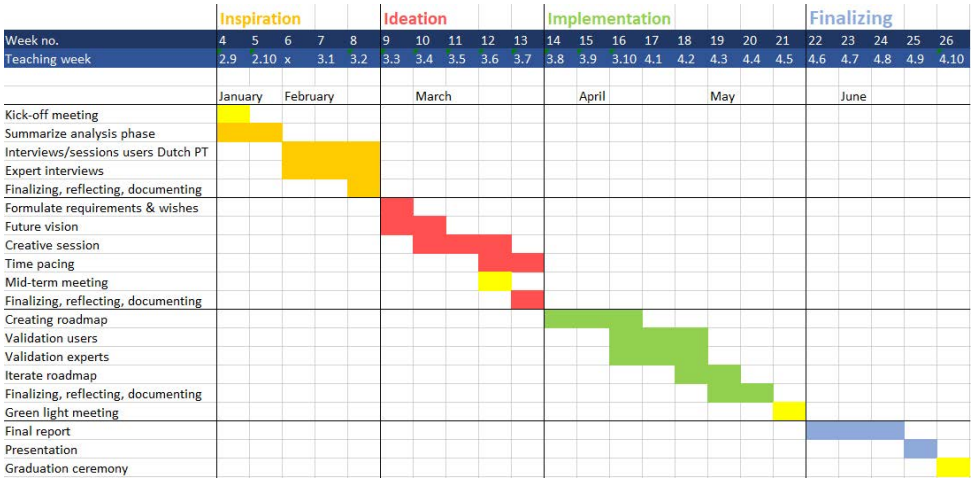
Initials & Name E. Taylor Parkins Student number 4205855

Title of Project Passenger-oriented Public Transport Tariff System

## PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 20 - 1 - 2020 22 - 6 - 2020 end date




This project will consist of three phases, based on the Human-centered design approach of IDEO (IDEO, 2015). After completing these three phases the green light meeting will take place and the remaining weeks will be used to finalize the graduation project, deliverables, and presentation. In addition to the three phases described by IDEO, I will use some of the roadmapping techniques (Simonse, 2017).

1. Inspiration
During this first phase, I will get to understand the target audience. This will be done by further analyzing the insights found during the research elective, and conducting additional interviews with users and experts

2. Ideation
With the insights from the research elective and the inspiration phase, I will start ideation in this second phase. Requirements and wishes will be formulated, and a future vision will be formed. With the use of time pacing the different elements can be put on a roadmap.

3. Implementation
The focus of the final phase is on implementation and feasibility. The complete roadmap will be put together, showing all elements on a timeline. The concept will be validated with users and experts to maximize impact.

IDEO (Ed.). (2015). The field guide to human-centered design: Design kit (1st. ed). IDEO.
Simonse, L. W. L. (2017). Design roadmapping (J. Whelton, Ed.). Bis Publishers.

## MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, ... . Stick to no more than five ambitions.

As a strategic product designer, I have always had the opinion that the human factor should not be forgotten. During this project, the human/passenger is the central point, since the project aims to find a passenger-oriented public transport tariff system. In addition this project as a focus on stakeholder management and implementation, two other factors that I find very important.

During this project, there are three focus points for me.

Firstly, this project is high in stakeholders, making stakeholder management very important. It is gonna be a challenge to keep all these stakeholders involved and happy, but in the meantime, they are a huge source of information, which I certainly plan to use!

Furthermore, I want to try out some new techniques (such as creative sessions) and practice with the ones I already know (for example: roadmapping). During my masters I've been in a couple of creative sessions as a participant, and have seen how they can really offer lots of ideas or even a new perspective on a project, however, I've never organized one myself, yet. I've learned the roadmapping techniques during the roadmapping course, and used some of them during the Design Strategy Project. I think roadmapping fits well with the objective of this project, and thus want to dive into the techniques again.

Lastly, I don't want to design a pink glittery cloud. I'm aware that a graduation project can't be placed into the real world 1:1, but I would like my project to have some parts that can be taken into practice. Since this project will be executed in close relationships with the stakeholders, this should be possible. To help make this goal a reality, the implementation phase of the project has the emphasis.

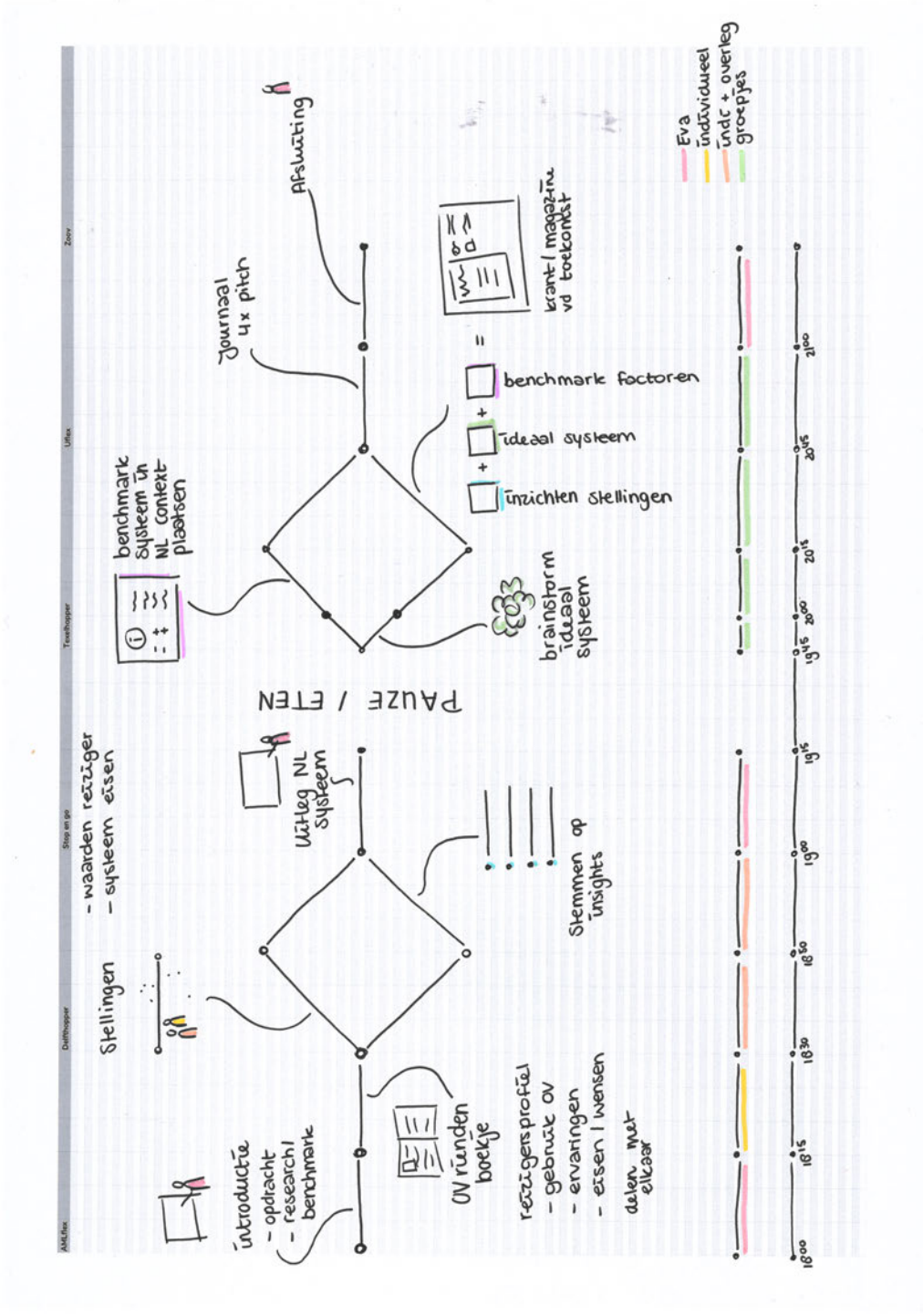
## FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

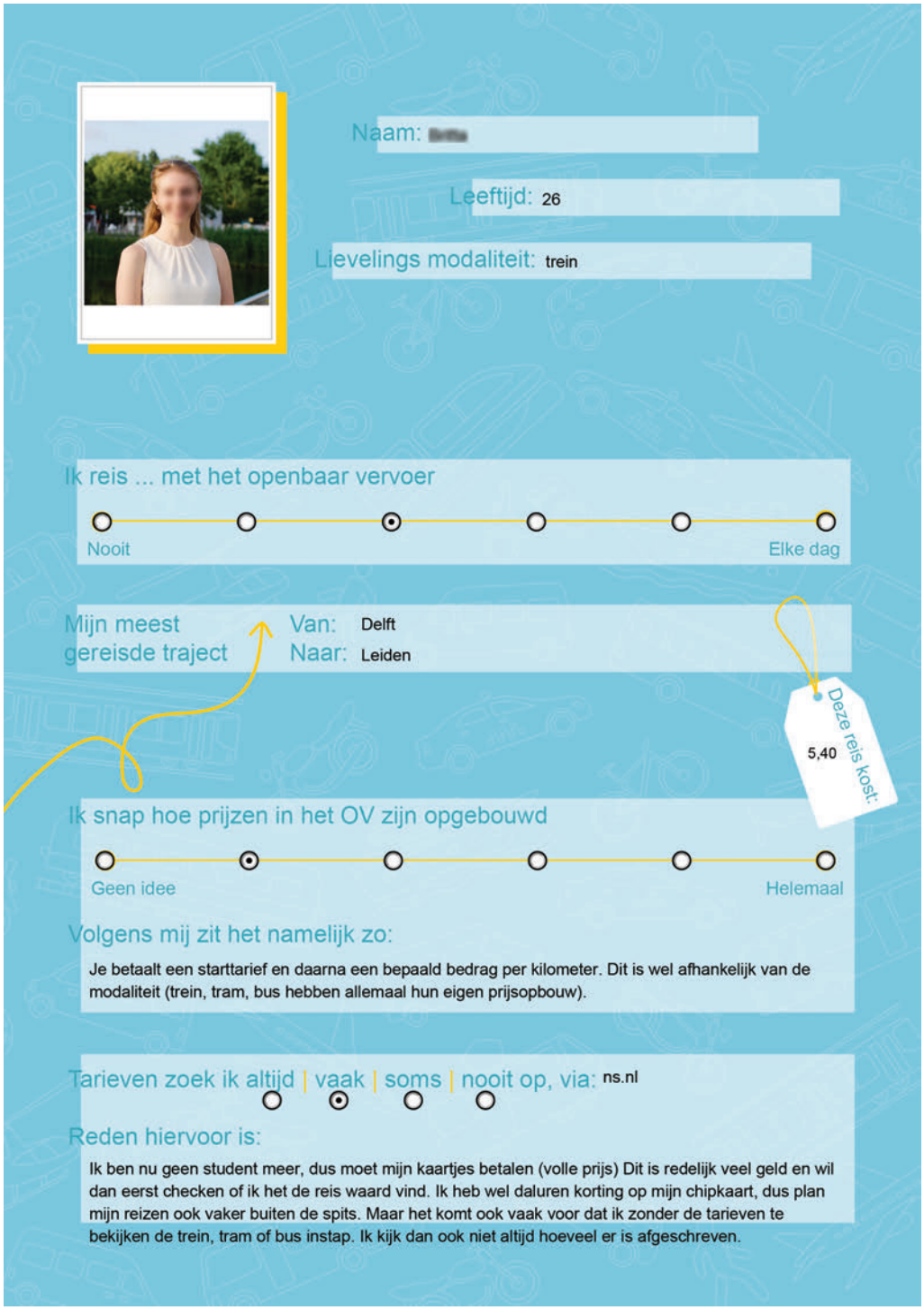
This graduation project is part of the Seamless Mobility Lab of the faculty of Industrial Design Engineering.

# B. Overview concessions 2020

# C. Original set-up session 1



# D. Friendships booklet



Betalen voor het OV doe ik met: anonieme OV chipkaart | persoonlijke OV chipkaart | losse kaartjes | anders, namelijk:

Ik heb een abonnement of ander reisproduct, namelijk:

Daluren korting (kado van NS voor afgestudeerden)

Dit abonnement/reisproduct heb ik gekozen omdat:

Ik nu de volle prijs moet betalen. Dit is een groot contrast met toen ik nog wel student was. Daarnaast heb ik nog geen baan die evt. reiskosten vergoeden.

Mijn ervaring met het Nederlandse OV tariefsysteem in 3 woorden:

Prijzig , Onopvallend & Onduidelijkheid in opbouw

Een positief punt van het OV tariefsysteem:

Als je wilt weten hoeveel iets kost, kan je het altijd vinden.

& een negatief punt van het OV tariefsysteem:

Het is prijzig en onopvallend als je 'snel' wilt reizen. Je checkt snel in en uit zonder te kijken hoeveel je eigenlijk hebt betaald voor die specifieke rit.

Dit vind ik echt raar aan het Nederlandse OV tariefsysteem:

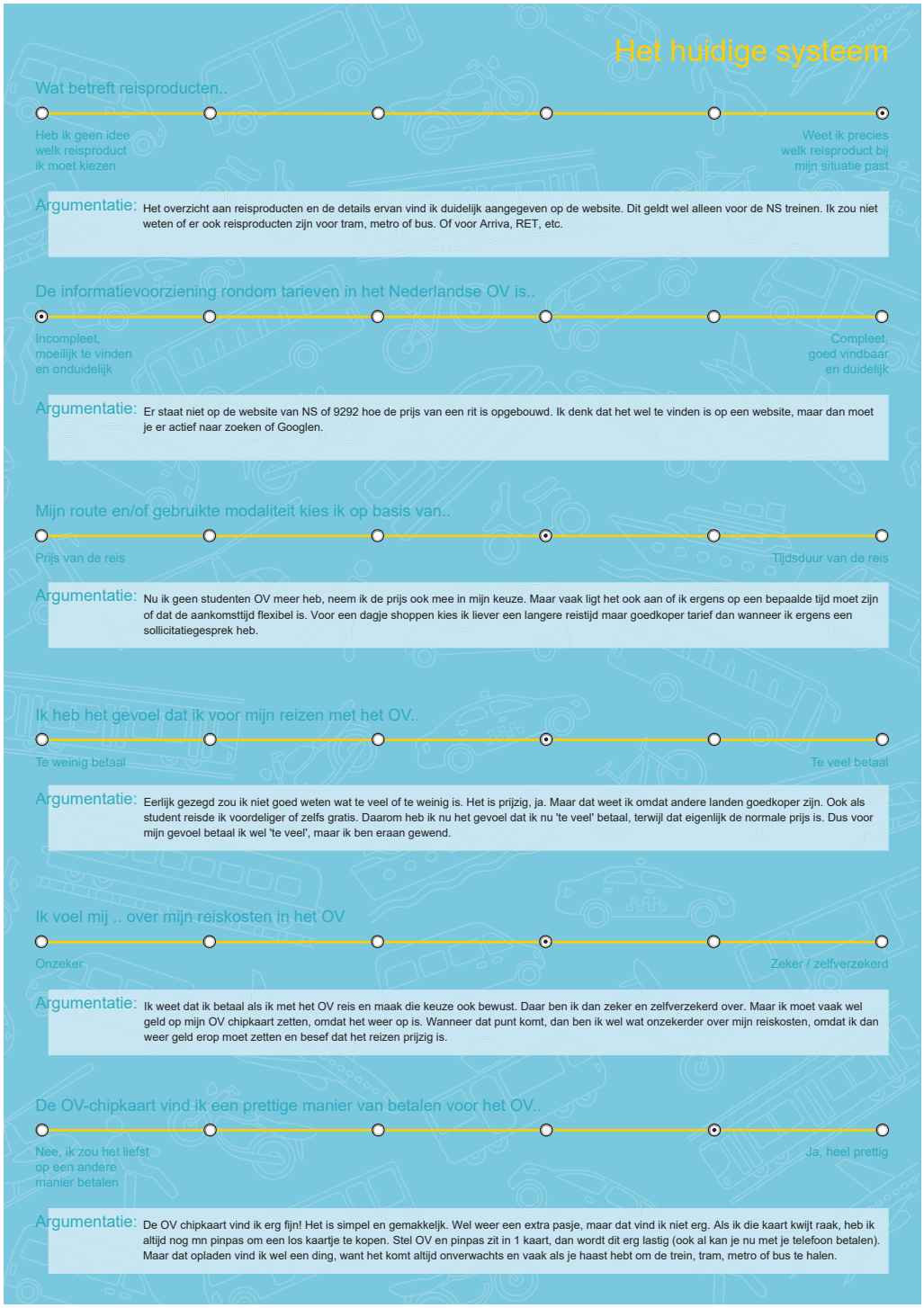
Je checkt snel in en uit (dat is goed), maar hoeveel je betaald is onduidelijk. Je moet snel lezen, terwijl je al bent uitgestapt of door de poortjes bent gelopen.

Het huidige OV tarief systeem geef ik een: 6

Mijn grootste wens voor een nieuw OV tariefsysteem:

Gratis reizen ;-). Een manier waarbij je bewuster wordt van de prijs van je rit tijdens het reizen. Nu check je dus snel in en uit en heb je eigenlijk niet echt door wat je betaalt.

# E. Statements



# Het systeem van de toekomst

## Ik heb het meeste vertrouwen in deze manier van in- en uitchecken..

In- en uitchecken bij elke vervoersmiddel dat wordt gebruikt

Helemaal niet in- of uitchecken, mijn route wordt bepaald met behulp van GPS

**Argumentatie:** Sowieso zelf in- en uitchecken. Dit geeft mij de controle over waar ik in- en uitstap en ook echt betaal voor dat stukje. GPS vind ik niet betrouwbaar op dit moment en dan moet ik de controle uit handen geven voor iets waarvoor ik betaal. Dit vind ik geen fijn idee. Genoeg ervaringen gehad dat de GPS van mijn telefoon niet correct is of niet kan 'verbinden' en denkt dat ik op een totaal andere plek ben. Daarbij kan ook je telefoon uitvallen.

## De prijs van een ritje met de bus..

Moet vast staan, onafhankelijk van de gereisde afstand

Moet berekend worden op basis van de gereisde afstand

**Argumentatie:** Een ritje met de bus (of andere modaliteit) moet vast staan, onafhankelijk van de gereisde afstand. Hierdoor betaal je elke keer hetzelfde bedrag voor hetzelfde ritje dat je maakt. Zo weet je waar je aan toe bent, zeker als je dat ritje elke dag maakt. Wel vind ik dat alle modaliteiten dezelfde tariefopbouw moet hebben.

## Dit lijkt mij de prettigste manier van betalen in het openbaar vervoer..

**Transaction-based**
Elk ritje wordt afzonderlijk betaald

**Prepaid**
Reizen op saldo

**Post-paid**
Reizen op rekening

**Argumentatie:** Door het via transaction-based te doen, krijg je meer inzicht in hoeveel je daadwerkelijk betaalt voor een ritje. Daarnaast is het wel heel onhandig om voor elk ritje geld op je OV chipkaart te zetten. Dus om eerst saldo erop te zetten of dat het op een andere manier gedaan wordt, is wel zo handig. Misschien dan toch pinpas en OV in 1..?

## Korting in de daluren..

Moet alleen beschikbaar zijn als abonnement, je betaald extra om hier gebruik van te maken

Zou standaard toegepast moeten worden voor elke reiziger

**Argumentatie:** Zeker om te stimuleren dat reizigers buiten de spits reizen! Dit voorkomt dus ook dat het tijdens de spitsuren achtelijk druk is in het OV. Uitgezonderd van de reizigers die een business card hebben.. Deze zullen alsnog in de spits reizen. Net zoals studenten.

## Tijdens mijn reis met het openbaar vervoer wil ik..

Anoniem blijven

Van zo veel mogelijk gepersonaliseerde opties gebruik maken

**Argumentatie:** Ik deel niet graag mijn prive gegevens. Maar als ik een bepaald ritje elke dag maak (voor werk, school, ...) dan zou een gepersonaliseerde optie top zijn. Je krijgt bijvoorbeeld korting op dat specifieke ritje. Nu heb je traject-vrij bijvoorbeeld, maar dit kan ook automatisch gedaan worden. Dat je bijvoorbeeld korting krijgt op een traject dat je vaak reist, maar wel in de daluren. Zoiets.

## Het tariefsysteem zou de frequente reiziger financieel gezien tegemoet moeten komen..

Oneens

Eens

**Argumentatie:** Mee eens. Maar wel met regels. Dus niet dat je in de spits met korting kan reizen, want dan wordt het alleen maar aantrekkelijk om vaker in de spits te reizen. Je zou wel financiele tegemoetkoming kunnen krijgen tijdens daluren bijvoorbeeld. Of op specifieke dagen waarom je altijd reist.

# Colophon

**Student**
Eva Taylor Parkins did her Bachelor of Science in Industrial Design Engineering at the Delft University of Technology. This report is her graduation project for the Strategic Product Design master degree.

**Academic Supervisors**
Suzanne Hiemstra-van Mastrigt studied Industral Design Engineering (BSc and MSc) at Delft University of Technology, with a specialisation in automotive design. She has performed her PhD research project at TU Delft, faculty of Industrial Design Engineering, on the topic of ‘Comfortable passenger seats’. Curently she is the director of the Seamless Personal Mobility Lab.

Sylvia Mooij received her Master’s degree in Industrial Design Engineering at Delft University of Technology. She has perferomed her PhD research project at TU Delft, faculty of Industrial Design Engineering, on the topic of ‘Product Communication and Information’ . Currently she is the coordinator of the bachelor program of IDE.

**Project**
*This project received project funding for Public-Private Partnerships for Research and Development (PPP allowance) from the Dutch Ministry of Economic Affairs and Climate Policy via CLICKNL.*

https://delftdesignlabs.org/seamless-personal-mobility/

Faculty of Industrial Design Engineering
Landbergstraat 15
2628 CE Delft
The Netherlands


TU Delft

Faculty of Industrial Design Engineering
Landbergstraat 15
2628 CE Delft

www.io.tudelft.nl