Improving System Adoption of the OV-chipkaart

Linking organisational requirements to a user-centered travel experience

Master's thesis, June 2013
OV-chipkaart Graduation Lab

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TUDelft
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IMPROVING SYSTEM ADOPTION OF THE OV-CHIPKAART

Master of Science Graduation Report - Strategic Product Design - Delft University of Technology

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PROJECT

Improving System Adoption of the OV-chipkaart
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EXECUTIVE SUMMARY

Background
Soon after the OV-chipkaart, the electronic ticketing system of The Netherlands, was introduced it became clear that the system suffers from several usability problems. Therefore the Graduation Lab was set up, an initiative of the Delft University of Technology. The Lab is supported by the national and regional government bodies: Ministry of Infrastructure and Environment, IPO, and SkVV; the transport operators NS and RET as well as the travellers' association ROVER. The overall goal of the investigations within the Graduation Lab is 'to improve the public transport e-ticketing system for travellers in The Netherlands'.

During the development and introduction of the OV-chipkaart a lot of attention was paid to the technological possibilities and restrictions, as well as to the different interests of the parties involved. A third component, which is essential for the successful introduction of innovations – the users' needs – was taken into account only insufficiently. This is one of the main reasons for the appointment of the Graduation Lab and its support by the organizations mentioned above.

As one research field out of three of the OV-chipkaart Graduation Lab from the TU Delft this report focuses on the improvement of the system adoption. Previous analysis has shown that a main problem area manifests itself in the purchasing process of the OV-chipkaart and its subscriptions. The challenge lies in identifying the barriers that truly affect the system adoption of users and to transform these barriers into a solution space.

The research has been conducted mainly qualitatively in order to reveal the user concerns.

Analysis
The analysis was divided into two main parts, first the system, the technology and the usability has been investigated in detail, followed by an in depth analysis of the system adoption.

The need for an e-ticketing system arose in the late 90ies on the part of the transport operators since they wanted to be able to divide the income adequately among themselves. Besides this the possibility to get insights into the travellers' behaviour and to increase the security at stations and in the vehicles were important drivers too.

When it came to assign responsibilities to maintain the system, parliament decided to liberalise and decentralise the public transport market in order to make it more efficient and effective, and thereby financially healthy and self-sustaining. The decentralisation and liberalisation led to an increased competition between public transport operators and thus made public transport cheaper and more efficient. However, a major downside of this competition is the lack of cooperation between operators (Meijdam commission, 2011).

The lack of cooperation causes multiple usability problems, within several stages of the customer journey. The three main problem areas that have been identified establish themselves during (1) the orientation and guidance in the pre-travel phase, (2) the check-in and the consequences in case of errors, and (3) the completion of a journey and the consequences for the evaluation. The problems occurred since users not only had to get used to a kilometre based tariff system (instead of zone based), but also to an electronic based ticketing system (instead of a paper based).

The first analysis is based on existing reports, interviews with experts and observations and interviews with users of the OV-chipkaart.
After the general analysis and the identification of the three main problem areas they have been investigated in more depth. This report gives

Operators and governments are trying to collaborate with each other as much as possible without greater success which leads to further decentralization. The stakeholders considered the 'Authority' as most favourable from a user's point of view. However the 'Authority' does hold disadvantages for the parties and technical challenges. The evaluation of these scenarios with users as well as with experts and the insight that the reduction of the current barriers is crucial for an improvement of the system adoption finally led to the development of the final scenario: 'Balanced Powers'.

This scenario is mainly based on the Authority, since users and stakeholders have evaluated it most favourable. However, 'Balanced Powers' introduces some changes to make it easier to implement.

The reorganisation of business processes and the technological platform implies a simplification of the system adoption for users. One front office improves the understanding of the system and regulates the information. The integrated payment system ensures financial predictability for users and the junction of the operators back offices renders a supportive selection tool possible. The implementation of the suggested scenario will contribute to a significant decrease of all four identified barriers.

Recommendations

In order to improve the system adoption and the system interaction for users of the OV-chipkaart it is recommended to implement the proposed changes to the OV-chipkaart service and the processes and organisations that facilitate it. However, before doing so the findings from this investigation should be evaluated with a wider scale of users and experts. This will hopefully underpin the results and but may also change some of the conclusions drawn. Since this investigation mainly focusses on the users' needs, it is recommended to evaluate the findings concerning technological and organizational changes in more detail.

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CHAPTER 01: INTRODUCTION

1 INTRODUCTION

The OV-chipkaart is an electronic ticket, currently used in The Netherlands for all regional and national transportation. During its introduction (2003-2011) it became clear that the OV-chipkaart suffers from a number of usability issues. This is the reason for setting up the OV-chipkaart Graduation Lab, an initiative of TU Delft in collaboration with transportation operators (RET, NS), the travellers' association (ROVER), and national and regional government bodies (Ministry of Infrastructure and Environment, IPO, SkVV).

> **Overall goal:** Improve the public transport e-ticketing system for travellers in the Netherlands.
>
> **Vision:** The OV-chipkaart system should be so easy and convenient that the Dutch will brag about it abroad.

The project is divided into two main phases. The analysis phase, in which three students worked together to analyse the OV-chipkaart system (for the initial assignment see Appendix 1), and the development phase, in which the three most relevant topics as deducted from the analysis were investigated individually. Both, the initial analysis and the investigation as described in this report have been conducted qualitatively. Further information on qualitative research can be found in Appendix 2.

The three topics as derived from the initial analysis are: 'How to make the invisible information of the OV-chipkaart visible', 'How to improve the system adoption', and 'How to facilitate the process of checking-in and –out'.

This report focuses on the improvement of the system adoption. As the first analysis has shown, one of the main usage problems is the first contact users have with the OV-chipkaart. The purchasing process and the general concept of the OV-chipkaart can be hard to understand for users. Therefore this report concentrates on the identification of those barriers in order to contribute to an improved purchasing process and a satisfying pre-travel experience.

This first chapter aims at introducing the project, providing a brief summary of the initial analysis phase (Joppien, Niermeijer, Niks & van Kuijk 2013), from which the final assignment has been derived. The first chapter is subdivided into five parts.

After a brief introduction on the overall project is given, the system and the technical platform are described (1.1) in order to understand the development and implementation of the OV-chipkaart. Paragraph 1.1.3 furthermore concentrates on the usage of the system and summarizes usability problems. Since many of these problems are connected to Technology Based Self-Services, paragraph 1.2 provides a brief literature review on this topic. The summarized initial analysis is followed by the design brief formulation (1.3) and a description of the process followed in this report.

Relevance
Public transport fulfils an important role in the Netherlands. The Dutch Government values the effect public transport has on area accessibility, impact on liveability, participation of citizens in society, and the support for economic activity (CPB & KiM, 2009). Electronic ticketing influences many aspects of public transport usage and has an effect on the decision making process of prospective customers. It is therefore important to make e-ticketing as easy and pleasant to use as possible.

1.1 About the OV-chipkaart

The initial analysis was based on existing reports and qualitative research and focussed on identifying usability problems, in order to further improve the system. Technological and business considerations are taken into account. The three factors are of great influence on product, service and product-service development. Figure 1 illustrates the current division of the emphasis of these three aspects. As it can be seen, the technological considerations are the main focus point, followed by business and then human considerations. Therefore a shift towards a more balanced division is proposed.
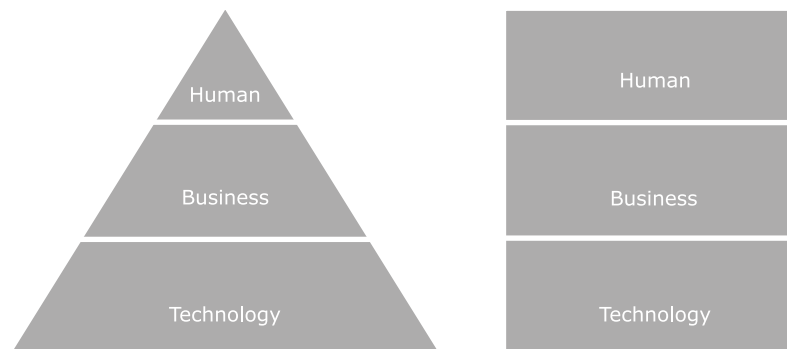
Figure 1. Achieving a new balance from current (left) to future (right)

As Figure 2 (on the right) illustrates, the three circles should overlap with each other in order to form one sweet spot where business considerations, user needs and wants, and technological requirements are equally taken into account. Human-centred design, as described by IDEO (2009), starts with investigating what is desirable for the users,

and thereafter investigating what is technically feasible and viable for the organization involved. The following paragraphs briefly summarize the findings concerning the system of the OV-chipkaart and the usability, as discovered during the first analysis phase.

1.1.1 The system

In the 1970s, many public bus operators were making losses because of the increasing competition with cars and the national government decided to subsidise these operators (Minister of Transport, 1979; KpVV, 2010) in return for price setting authority (Minister of Transport, 1979). Eventually, this led to the national tariff system in the 1980's, which was based on a national zoning scheme and a national ticket called the 'Strippenkaart' (Minister of Transport, 1979). The national tariff and ticket were express wishes of Parliament, in order to make it easier for people to travel throughout the country without having to purchase unique tickets for separate operators (Minister of Transport, 1979).

Revenue from the Strippenkaart was divided by the government over the individual operators based on a sales and usage survey. Nearly all operators were convinced that they were receiving less money than they should, because of flaws in the surveys or other operators trying to influence the survey results.

Therefore public transport operators wished to replace the national tariff system with something that gave them direct control over fare payment and insight into traveller behaviour. After seeing the successful introduction of contactless electronic tickets in Hong Kong, the NS decided in 1999 it was time to look into Radio Frequency Identification (RFID) technology (Zwan, 2011). A smart card system could not only be used as a payment system, but also solve some long-standing issues, such as insecurity at stations and trains, and fare evasion, by closing the stations with gates.

In 2001, the NS (national rail), GVB (Amsterdam), RET (Rotterdam), HTM (The Hague), and Connexxion (regional bus) formed the Trans Link Systems (TLS) joint-venture in order to introduce a national electronic ticketing system. The national government set up 13 functional requirements, determining the minimum scope of the system (CVOC, 2004). In 2003, the East West Consortium, consisting of Accenture, Vialis and Thales, won the tender to develop this new electronic ticketing system for TLS. The name of this new, national electronic ticketing system is 'OV-chipkaart'. A function comparison of paper tickets and the OV-chipkaart can be found in Appendix 3.
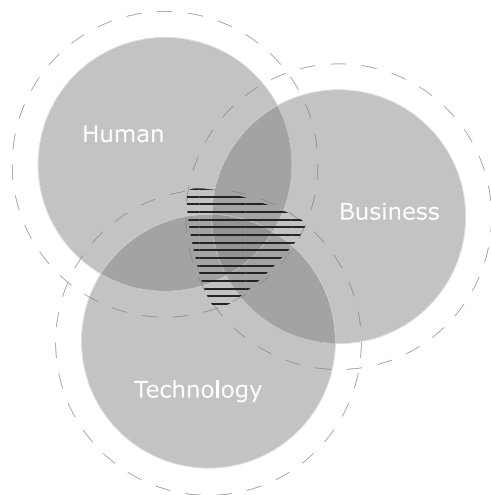
Figure 2. Overlap forms 'sweet spot' of product innovation

Decentralisation
During the 1990's, operator losses kept growing and the government had to increase the subsidies (KpVV, 2010). Parliament decided to liberalise and decentralise the public transport market in order to make it more efficient and effective, and ultimately financially healthy and self-sustaining.

Now, instead of the Ministry of Infrastructure in The Hague having the last word on which regional transport lines are necessary, the regional governments take on responsibility of ensuring reliable public transportation. The Public Transport Act of 2000 ('Wet personenvervoer 2000' or Wp2000) requires regional public transport authorities to tender transport concessions, with exception of the national rail network and the concessions of Amsterdam, Rotterdam and The Hague. Operators can acquire a concession by offering the lowest price, high quality or a combination of these two.

Each concession is tendered again every 4 to 15 years, depending on regulatory requirements or regional government plans (European Commission, 2007; KpVV, 2011). The duration tends to become longer for bus concessions, due to big investments of the transport operators.

In case an operator loses a concession, their operating personnel will be taken-over by the company which won the contract. Most operating equipment is owned by the respective company and is generally not taken-over but sold at the second hand market, mainly abroad (Heide, 2009).

The decentralisation and liberalisation resulted in increased competition between public transport operators. The OV-chipkaart makes it possible to have different fares, based on time, usage, location and operator. The consensus is that public transport is cheaper and more efficient now than it would have been without the governance overhaul. A major downside of this competition is the lack of cooperation between operators (Meijdam commission, 2011).

Companies, particularly, try to sell their season tickets to customers and have almost no incentive to make sure that travellers experience a smooth transition when they transfer from one to another operator. While the companies are heavily tied to their region, travellers have little regard for these artificial boundaries and continue to travel from A to B and if

necessary with multiple operators (Meijdam Commission, 2011). The travellers hit most by the direct consequences of the decentralisation are the ones who cross borders and end up, for example, with two mismatching season tickets.

Trans Link Systems
Trans Link Systems (TLS) manages most of the inter-operator financial, operational, and organisational aspects related to the OV-chipkaart system. They act as central back office (tracks all transactions), clearing House (redistributes revenue), and system developer (determines technical standards); simultaneously serving their clients (the operators) and deciding on what the operators can and cannot do. Thereby TLS is having a large influence on the business strategy of its customers. Furthermore, all public transport operators are currently obliged by regional transport authorities to use the OV-chipkaart system, without all operators (shareholders vs. non-shareholders) having decisive influence on the costs, effectiveness, and innovation that TLS is delivering (Meijdam Commission, 2011).

Since the Central Back Office (CBO) and Clearing House (CH) have access to the travel transactions of all operators, some of the non-shareholding-operators suspect that the shareholding-operators have access to their business data via TLS (Meijdam commission, 2011).

To solve these asserted problems, the Meijdam commission (2011) has suggested separating the different functions of TLS. Their proposal is that TLS can keep the CBO and CH responsibilities for now, but the System Development responsibility will be turned over to a new organisation called the 'Permanente Structuur' (Permanent Structure, PS). The current shareholders of TLS will be bought out of the remaining operational entity and the PS will negotiate a service level agreement with this new, independent service provider (Kwartiermaker, 2012).

1.1.2 Platform technology
Payment and identification are handled by the user registering a contactless chip card when boarding and disembarking a vehicle (bus, tram), or when entering and leaving a station (metro, light rail, train, ferry). The system uses radio-frequency identification (RFID) chips to facilitate communication between the user's card and the validation devices of the public transport operator.

The OV-chipkaart system consists of several data processing parts called levels (TLS, 2003). These levels have different functional tasks corresponding with the physical location of the respective computer systems. Figure 3 gives an overview of these levels.

> **Level 0**
> The zero level comprises the payment and identification of cards issued by the public transport operators. Currently, three types of cards are in use: disposable, anonymous, and personal.
> All cards contain RFID chips to store information about credit balance, season tickets, and recent check-in and check-out actions.
>
> **Level 1**
> The first level includes the station access gates, station or vehicle validators, mobile validators used by conductors (Personal Validation Unit), and point of sale terminals at sales desks. These are the machines the user encounters. Validators and gates need to contain all necessary information about fares, subscription information, network topology, and blocked cards.
>
> **Level 2**
> Information collected by machines on level 1, such as gates, validators, or point of sales terminals, is send to equipment of level 2.
> Stations are provided with Station Processing Servers and

receive data from connected level 1 machines every 15 minutes. Moving vehicles with validators on board have a Validator Concentration Feature, which collects the data and sends it to the Depot Processing Server when the vehicle is parked at the depot or a bus station.

Level 3
Every public transport operator has a Central Processing Server (CPS) at level 3 to collect all information from level 2. This CPS stores all transactions made with the OV-chipkaart at one operator and thus contains information about start and

end points of a trip, and credit balance changes. Transport operators use the data collected at level 3 to verify the financial transactions with TLS and for business intelligence.

Level 4
The top-level part of the system is called the Central Back Office (CBO), currently operated in the Netherlands by Trans Link Systems. This is where all transactions with all cards are stored and analysed in order to fulfil the Clearing House function. The CBO also keeps a list of all active and blocked cards, and manages auto-credit top-up.
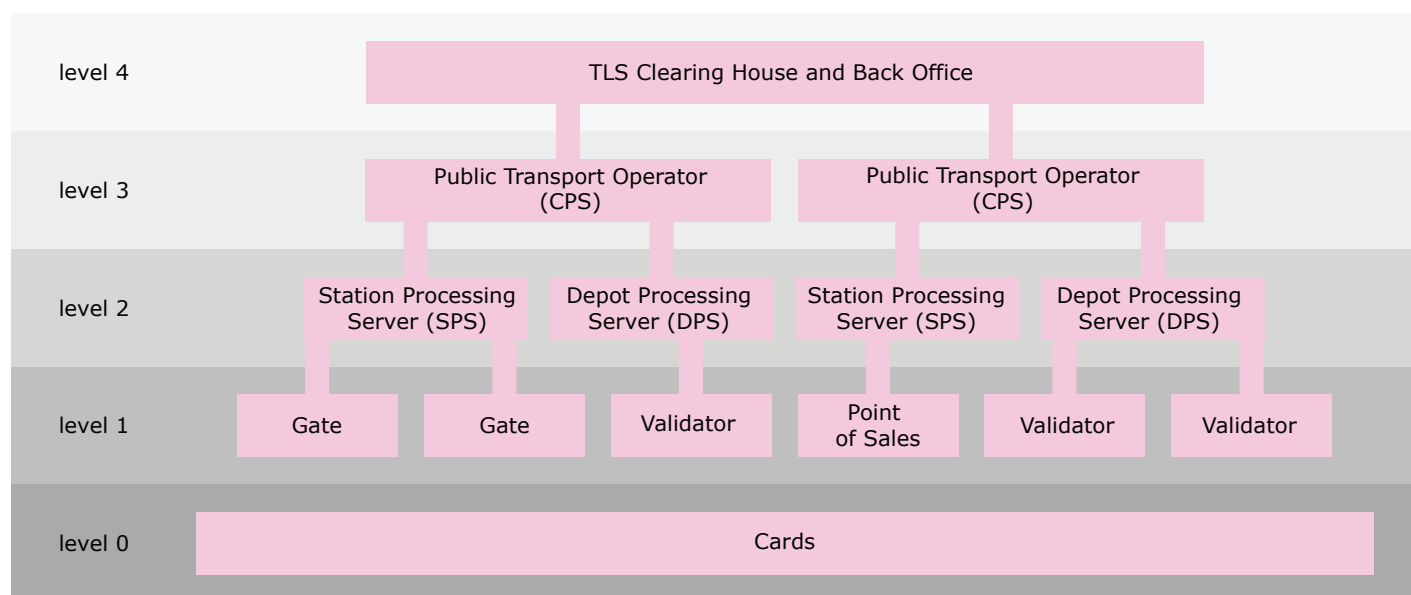
Figure 3. The technical levels of the OV-chipkaart system

1.1.3 Usability of the OV-chipkaart

This section summarizes the findings concerning the user group segmentation, the usage of the system, and the problems participants experienced. For the latter two, a customer journey map (Stickdorn & Schneider, 2010) has been created to describe the different steps users go through in more detail pointing out problem areas (Joppien , Niermeijer, Niks & van Kuijk, 2013).

User group segmentation

The initial analysis has shown that users may encounter problems, and that the routine of problem solving increases and the frequency of encountering problems decreases if travellers use the OV-chipkaart more often. Three properties of travellers were identified that have a large influence on the overall perception of the OV-chipkaart.

These dimensions are 1) frequency of travelling, 2) number of operators used, and 3) the technological understanding (see Figure 4), and have been used to select participants for all studies. They have been considered as relevant, since:

The frequency of travelling has a great influence on the travel experience. The more often users travels the less problems they are likely to encounter.

Travelling with one operator is relatively simple and only a few things can go wrong, travelling with multiple operators requires more knowledge and more alertness of the traveller.

The stages of product activation and loading balance, as well as solving problems, demand a certain level of understanding and experience of the traveller in order to understand and execute the required steps.
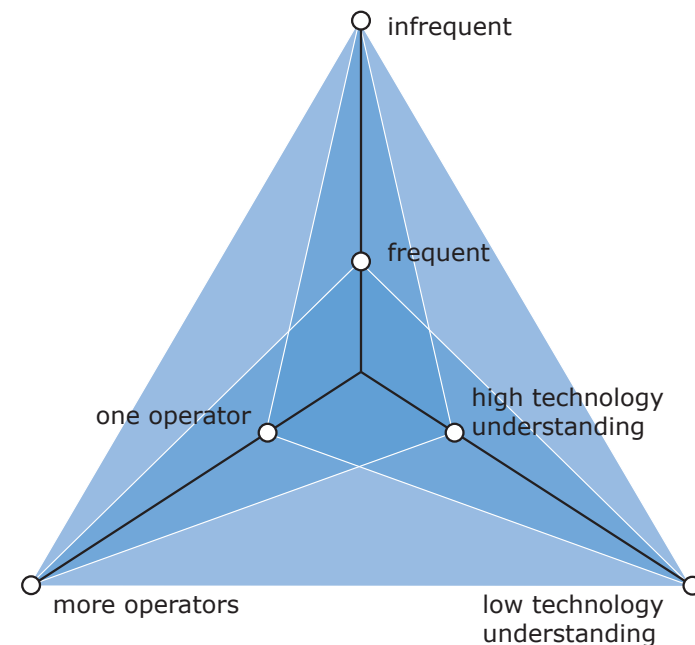
Figure 4. Dimensions for user group segmentation

In the analysis report the three dimensions, which are relevant parameters for selecting participants, developing and testing concepts are explained in more detail.

Usage of the system

Suitable information for successful (re)designs requires a deep first-hand understanding how people use and experience the OV-chipkaart. This can only be achieved by observing traveller behaviour and by getting to know their perception of the system. This paragraph concentrates on the problems our participants experienced based on qualitative research: interviews, observations and a qualitative questionnaire. A customer journey map has been used to structure the different aspects of travelling (Figure 5), and to identify problem areas.

Step	Action
Orientation	Users of the OV-chipkaart get in contact with the system (for the first time).
Purchase	Acquiring a card with or without products.
Activation	Activating the card and collect travel products.
Loading	Add value to a card.
Preparation	Travellers prepare their upcoming journey by checking their route or the time schedule.
Check-in	Check-in action just before or after entering a vehicle or station.
Station	The time travellers stay at a station.
Travelling	The time users are actually in a vehicle, going from A to B.
Interchange	Changing from one vehicle to another, this can include changing operators as well.
Check-out	Check-out action just before or after having left a vehicle or station.
Evaluation	Travellers' Reflection on their journey.

Problems

While analysing users of the OV-chipkaart several problems could be identified (see Appendix 4). It can be concluded that the usability problems occur amongst the different steps of the customer journey, that different types of users experience different problems at different occasions, that their level of experience and technology acceptance is highly important as to the severity and frequency of problems they encounter. Three main problem areas can be defined.

Problem 1: Orientation and guidance in the pre-travel phase
Problem 2: Check-in and the consequences in case of errors
Problem 3: Ending a journey and consequences for the evaluation

The orientation, the travel experience, as well as checking-in and checking-out, create multiple problems and due to a lack of guidance and of sufficiently structured information the stress level of the traveller rises. Beside these two factors, the problems are related to the wrong assessment of the underlying organizational structure (e.g. not knowing that the OV-chipkaart was not developed by one company only), and that travellers' service expectations are not always met (e.g. long waiting time for a new OV-chipkaart).

Quantitative surveys conducted on behalf of transport operators (Stadregio Rotterdam, 2010) and the government (Lubbe & Larsen, 2007; Broek & Radewalt, 2009) indicate that the majority of the travellers believe the OV-chipkaart to be an improvement and that on the whole it works well. However, this report investigates the possibilities on improving only the first problem area.

Phases: Purchase | Pre-travel experience | Travel experience | Post-travel experience

Steps: Orientation | Purchase | Activation | Loading | Preparation | Check-in | Station | Travelling | Interchange | Check-out | Evaluation

Figure 5. Steps of the customer journey

1.2 Literature on Technology Based Self-Services

Technology-Based Self-Services (TBSS) are increasingly used by companies in order to serve individual customer needs better and to increase their own brand value, differentiate from competitors and to save costs. TBSS can be applied in multiple ways, such as automated teller machines, package tracking services, or the OV-chipkaart. According to Meuter et al. (2000) these technologies are a critical component of customer-firm interactions and will be increasingly important for long-term business success. The technology replaces the interaction with a company's employee, which makes this new interaction a crucial part of the resulting customer satisfaction.

Self-service technologies replace the personal interaction by enabling the customer to carry out a certain service without the direct involvement of an employee of the company (see Figure 6).
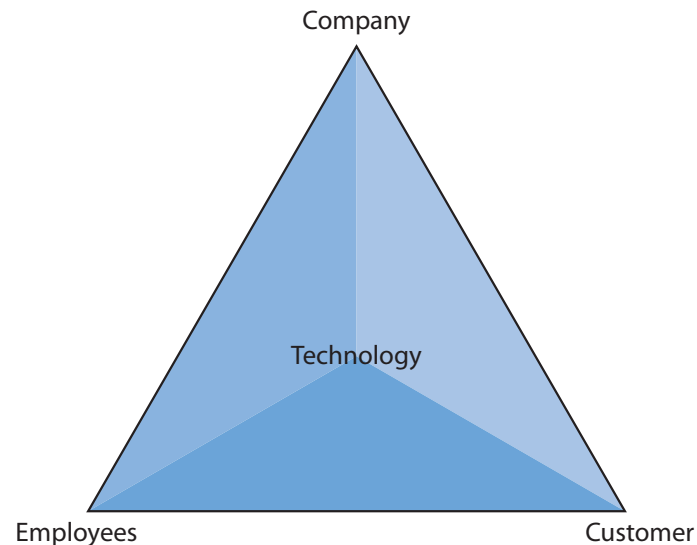
Figure 6. Service Marketing Pyramid

If well-designed, SSTs deliver advantages to the company and its customers as well. Reinders et al. (2007) summarized the advantages for the company and the customer as researched in multiple studies (Curran et al., 2003; Dabholkar, 1996; Meuter et al., 2000). According to them the main advantages for the company are: the speed of delivering a certain service, preciseness and level of customization, cost savings, competitive advantage, constant quality, and more flexibility in time and space where the service is available. The biggest advantages for the customer are: ease of use, time saving, availability, feeling of independency, more control, and cost savings.

Sometimes customers are forced to use Technology-Based Self-Services, if there is no other option to fall back on other available services. In the case of the OV-chipkaart, this is the case at smaller train stations or bus stations where no service personnel are present or at times when the service desks are closed. Reinders et al. (2008) states that a limited choice of service delivery may result in negative effects and goes on in saying that 'imposing an innovation on consumers results in resistance towards the innovation'. Furthermore literature points out, that previous experiences with TBSS have a positive effect on the attitude customers have towards new technologies and their usage.

In order to use a SST successfully, it is crucial for companies to understand which factors cause dis/satisfaction. The research of Meuter et al. (2000) identifies three factors that trigger satisfaction and four factors, which trigger dissatisfaction. The factors of customer satisfaction are availability, the ease of use, the saving of time and money. On the other hand, the most important factor for dissatisfaction is technology failure. Therefore a successful problem recovery is satisfying to customers (Meuter et al., 2000 referring to Tax et al., 1998).

In case customers do not have an alternative to the Self-Service Technology (SST) and are forced into TBSS their attitude towards the service provider is negative and their evaluation is likely to be affected

as well (Reinders et al. 2008). However, according to Chang (2006) their feeling of having no freedom of choice somehow recuperates when they are provided with a recovery option in case of service failure. The study of Reinders et al. (2008) further points out that the evaluation becomes more positive, when users of the TBSS are provided with a 'fall-back' option in case of service failure in terms of an employee. Finally, it can be stated that users with more experience of TBSS are generally more positive towards the TBSS. However, they are not towards the service provider.

SSTs are increasingly important to companies and offer a lot of potential. However, the user has to be taken into account when developing such a system. In the case of the OV-chipkaart, one can conclude, that the service also has to offer advantages for the user, such as cost saving, more control and a feeling of independency. Apart from that, a forced situation should be avoided and service personnel should be available more often as an 'escape-solution' for users of the system.

Concluding, the TBSS theory predicts that people will enjoy using SST if it offers ease-of-use and saves time and money. SST will help companies to reach different users, offer a better product and at lower costs. Forcing users to adopt SST might cause dissatisfaction and a negative attitude.

1.3 Design Brief formulation

After creating an understanding of the technical and organizational considerations of the OV-chipkaart system and the current usability of it a design brief (see Appendix 5) is formulated. In order to do so, the gap in the previous analysis is defined, based on which the assignment, including the goal and the research questions is formulated.

Gap in previous analysis
As mentioned earlier, the initial analysis is followed by three individual investigations in order to improve the usability of the OV-chipkaart during the whole journey (see Figure 7).

One of the usage issues that surfaced during the analysis of the OV-chipkaart was the first contact that travellers have with the OV-chipkaart, the image they create of the OV-chipkaart due to their first experiences and the expectations they have prior to acquiring a (new) card. The analysis of the OV-chipkaart system led to the conclusion that the purchasing process and the first contact with the system were difficult to understand for some of the interviewed and observed participants.

Orientation › Purchase › Activation › Loading › Preparation › Check-in › Station › Travelling › Interchange › Check-out › Evaluation

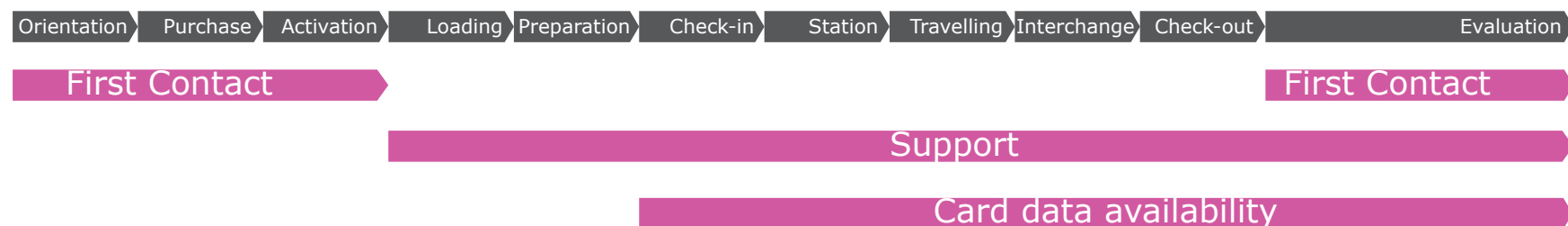First Contact   First Contact   Support   Card data availability

Figure 7. Problem areas within the customer journey

However, the barriers that make the system entrance more difficult for users of the OV-chipkaart have not been investigated in depth. In order to contribute to an improved situation this report will focus on the initial purchase of the OV-chipkaart.

1.3.1 Assignment

Improving the OV-chipkaart product-service system adoption, by facilitating a satisfying pre-travel experience, in order to increase the overall customer satisfaction of the system.

Goal
The main goal of this investigation is to identify and develop possibilities to improve the current system adoption. In order to reach this goal, this report explores, how to offer users a seamless, unified travel experience (with a focus on the pre-travel-experience), how to enable users to quickly and easily identify the proper information sources, and how to simplify the error recovery process for users. Besides exploring how the current system could be improved, it will be briefly looked onto the value proposition of the OV-chipkaart system and if an adoption of extension would make the system more attractive to its (future) users.

After having analysed the system dimensions that influence the adoption of it, the most promising and relevant limitations of the current system adoption will be translated into possibilities to improve it. Three scenarios will be developed based on these insights, which will be evaluated on business, technology and human aspects. This argumentation in addition to a user testing will lead to the final scenario. This will then be finalized, stakeholder benefits will be formulated and a roadmap for 3, 5 and 10 years from now on will be created.

Research questions
- How can the product service system be improved to facilitate user satisfaction?
- What are the limitations of the current system adoption?
- How can the entrance of the system be simplified?
- How could the usage of the system become more attractive to (future) users?
- What are the dimensions that influence the adoption?
- How can these dimensions be adapted in order to improve the overall system adoption?

1.3.2 Process
Within this creative problem solving process first multiple ideas are generated, by reframing the problem. This part is called the diverging process and is followed by a process of converging (Tassoul, 2009). Here the gathered ideas are translated into insights, and the most valuable ones are selected. Based on these selected insights, a new problem is formulated, which serves as the starting point for the following stage of diverging and converging.

The process followed in this project is, as visualized in Figure 8, subdivided into five stages of diverging and converging:

1 Introduction
In chapter one the initial assignment is the starting point for this project. First a summary of the analysis on the technical system, the business considerations and the usability of the OV-chipkaart is given. Based on this a gap of the first analysis could be formulated. This led to the formulation of a new design brief, which is the starting point for the investigation documented in this report.

2 Analysis of the barriers

As stated in the design brief, the second chapter concentrates on analysing the barriers that decrease the system adoption for users of public transportation. In order to investigate these barriers three studies have been done. The results of those studies led to the formulation of user requirements. Those form the starting point for the redesign of the system adoption.

3 Idea generation

Next to understanding the barriers, it is relevant to understand which incentives would improve the system adoption. Therefore the third chapter focuses on the incentives, which make the entrance more appealing to users. In order to do so, an explorative creative session has been held, to determine factors that possibly have a positive effect on system adoption.

4 Development of Scenarios

Based on the identified user requirements of chapter two, three

scenarios have been developed in order to simplify the system adoption of the OV-chipkaart. These three scenarios explore the possibilities for improving the system adoption, ranging from a very centralized to a very decentralized approach. Hereafter, these scenarios have been compared with each other and were evaluated by both users and experts in order to select the most favourable scenarios to continue with.

5 Final Scenario

The selected scenario is further explored and developed to come up with an improved system adoption process for users. An implementation roadmap and a stakeholder benefit analysis conclude this chapter.

6 Reflection & Recommendation

The report concludes with a reflection on the analysis, the identified user requirements and the proposed incentives, and adds recommendations for further steps.
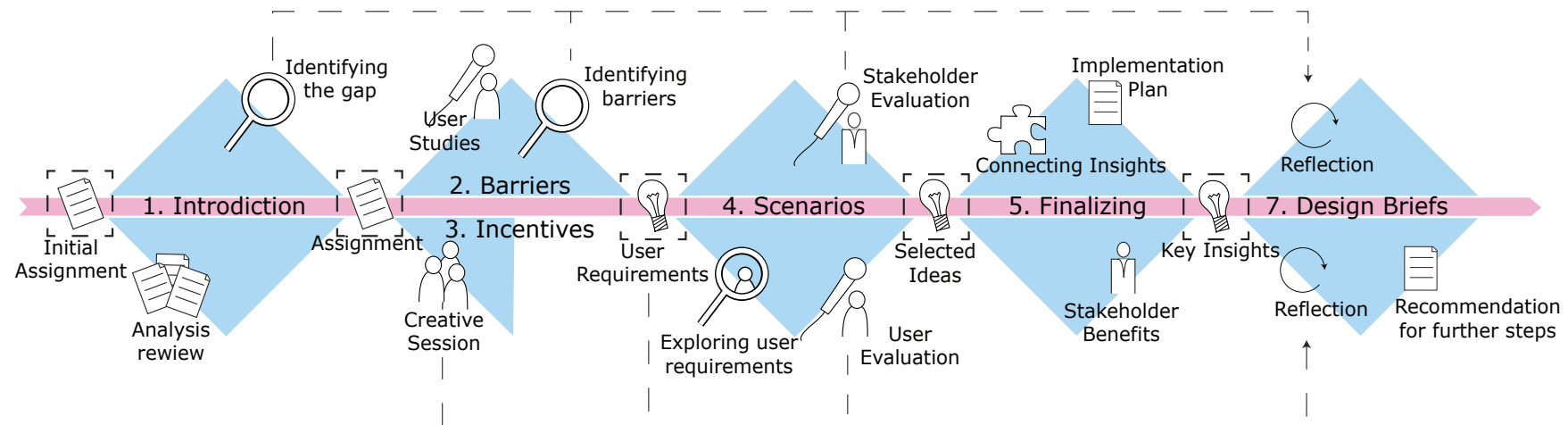
Figure 8. The user-centered innovation process as followed for this assignment

Deliverables
- A report that explains the project, the analysis, the findings, the proposed improvement, further recommendations
- A public, oral presentation of the project
- A1 poster giving an overview of the outcome of the projectA movie explaining the proposed improvement

1.4 Conclusion

This first chapter introduced the project, provided a brief summary of the initial analysis phase, and introduced the assignment and the process that has been followed during the project. One of the gaps of the previous research has been, that the purchasing process has yet not been investigated in depth. In order to identify the requirements of users to simplify the system adoption of the OV-chipkaart, the following chapter focuses on analysing the current barriers.

CHAPTER 02: THE BARRIERS
**IDENTIFYING USER REQUIREMENTS
FOR SYSTEM ADOPTION**

2 IDENTIFYING USER REQUIREMENTS

The ease of system adoption is a crucial part for the user evaluation of the OV-chipkaart. Whether users adopt a new technology based system or not, depends on multiple factors, such as their technology experience and understanding, their general ability to accept and apply changes, the perceived added value this system offers and the easiness to access the system. Whereas the individual person determines the first two factors, the second two factors can be influenced by the system itself.

Therefore this chapter focuses on analysing the factors that influence the system adoption of the OV-chipkaart, focussing on the barriers and specific user requirements. These will be taken into account when redesigning the current adoption process.

The chapter is subdivided into six parts. First a brief introduction on the goal of this investigation is given and the aligned research questions are introduced. Hereafter the current purchasing process of the personal and anonymous OV-chipkaart is described in 2.1. The insights as derived from the current purchasing process are the starting point for three studies on the purchasing process, which are introduced in 2.2. In section 2.3 the expectations, experiences, knowledge and understanding of the OV-chipkaart and its purchasing process are summarized. These findings are then translated into user requirements, which are elaborated in 2.4. This chapter ends with a conclusion, which forms the starting point for the following chapter.

Goal
This chapter aims at investigating the barriers that currently complicate the purchasing process of the OV-chipkaart and its subscriptions. This chapter also aims at generating a better understanding of where and why users encounter problems. Therefore the first study focuses on comparing the expectations of users with their experiences. Furthermore it is relevant to understand what made users decide to buy the OV-chipkaart or why on the other hand some potential users of the OV-chipkaart currently still do not have one. Finally, the insights gathered from the studies serve as an input in order to formulate user requirements.

Research questions
- What are the expectations of users when purchasing an OV-chipkaart and when purchasing a travel product?
- What are their experiences when searching for and selecting a suitable travel product?
- Which gaps can be identified between the experiences and the expectations of users?
- Are users aware of the differences of personal and anonymous OV-chipkaarts?
- What do users base their purchasing decision for an anonymous or a personal OV-chipkaart upon?
- What are the reasons for not having an OV-chipkaart, yet?
- How easy/ difficult is the current purchasing process of an OV-chipkaart without a subscription?
- Which user requirements can be identified that contribute to a simplified purchasing process?

2.1 Current purchasing process

In the analysis phase the purchasing process has been one of the main focus points. Therefore it will be investigated in more depth here. Figure 9 visualizes the steps within the purchasing process of an anonymous and a personal OV-chipkaart that are explained below.

The purchasing process of a personal OV-chipkaart consists of 10 steps, whereas purchasing an anonymous card requires three steps only. Both purchasing processes are elaborated in more detail in order to illustrate the current purchasing process and its differences.

Step	Action
Orientation	Orientation on the two types of cards and making a decision for one of them
Search	Searching for information about types of tickets, subscriptions, reductions etc. at multiple transport operators
Comparison	Comparing all this information and calculating the most beneficial option

|	
Decision	Making a decision based on this information and peer experiences
Environment	Selecting an environment where to purchase
Purchase	Purchasing (paying) the card and/or the subscription (online or offline)
Waiting	Waiting for the card to be sent home (approximately 1 week)
Arrival	The card arrives by mail at the home of the enquirer
Activation	The card has to be activated (the subscriptions etc. have to be loaded onto the card) at a ticket machine of the transport operator one wants to travel with.
Top-up	In order to be able to travel with the card, money needs to be put on the card. This can be done online, at the ticket machine or at some shops
Usage	Now the OV-chipkaart is ready to use.
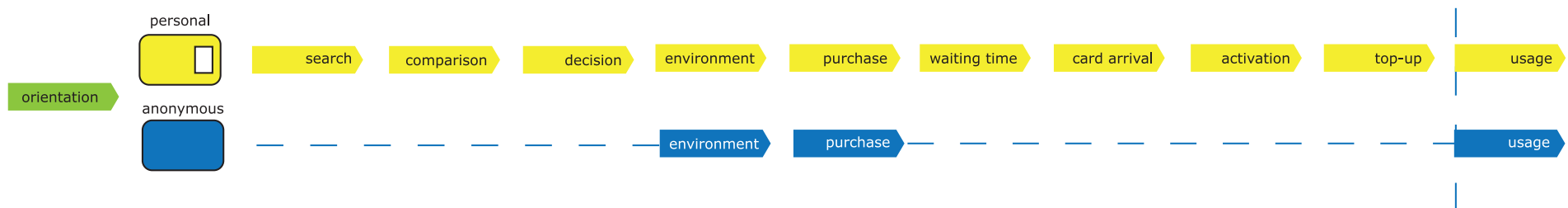
Figure 9. Steps of the purchasing process of a personal and anonymous OV-chipkaart

2.1.1 Possible problems when purchasing a personal OV-chipkaart

Most of the ten steps of purchasing a personal OV-chipkaart, currently contain problems and difficulties for users of the OV-chipkaart (see Figure 10). The purchasing process is quite demanding and holds multiple possibilities for making a mistake without being aware of it and its consequences. The following steps explain the difficulties users may have as identified in the initial analysis report (Joppien, Niermeijer, Niks & van Kuijk, 2013).

Orientation

Before entering the purchasing process of an OV-chipkaart, future users first have to decide on the type of card they like to use (personal or anonymous). The main advantages of the personal OV-chipkaart are the possibility to add subscriptions to the card and the age-based reductions.

Search

In this second step the user is looking for information on subscriptions and reduction. Since every transport operator has his own 'products' the search can become (depending on the user's situation and travel pattern) very difficult. Searching online simplifies the search in that it becomes more convenient. However, participants also have difficulties with finding the right information on each site, since the structure of the websites as well as the terminology varies. Multiple operators have to be consulted (offline and/or online) before one can finish this step and enter the next one.

Comparison

After having gathered all information and after having developed an overview about the possibilities that might fit the own situation, the 'products' and the possibility of their combination have to be compared with each other. Having too much or too little information can affect the comparison.

Decision

When the decision has to be made between two operators or two products of one operator, the decision is fairly easy. However, when a combination of different products (for example for the national train, and for the regional transport in the living area) has to be worked out, it can get very complex. Many combinations are possible, which requires a thorough calculation of the costs and the benefits. After having made the decision a feeling of 'having made an uninformed decision' sometimes remains.

Purchase channel selection

After having made a decision on the product/s the (future) user of the OV-chipkaart selects a purchase environment. This can either be online (on ov-chipkaart.nl) or offline at the service desk of the transport operator. When deciding on the latter option, the user might be confronted with the situation that the chosen product is not available in an offline environment and can be purchased online only. For users who decided to purchase offline, in order to ask some final questions this might be a little annoying but does not affect the process significantly. However, for people who decided to purchase offline because they do not have internet access (a family member might have looked up the 'right product' online) or do not participate in online banking the unavailability of the chosen product in an offline purchasing environment has a mayor impact on the overall process. These people are forced to either ask someone else to purchase and maintain their 'product' or they have to start searching again. Both possibilities will probably lead to an interrupted process and a first negative impression of the system.

Purchase

Purchasing the OV-chipkaart can either be done via Ideal (a digital, online payment system of The Netherlands) or with a Maestro card at the service desk. Again for people who do not have an internet bank account, this step requires more effort. The consequence would either be to arrange online banking, to go to the service desk (which might be difficult when living in a rural area) or to let someone else pay for the card. None of these options is very convenient for users.

Waiting Time

After purchase, the user has to wait for the card to arrive at home. Many participants indicated that they do not understand the necessity of this step and that they would like to travel immediately with the card.

Card Arrival

After approximately one week the card will reach the user at home. Enclosed in the envelope he will find a letter describing what he has to do to activate the card. Some of the participants tend to throw the letter away without reading it, assuming that it will only state something such as 'Congratulations with your card, it's now ready to use'.

Activation

Activating the product on the card is absolutely essential in order to be able to travel. If the user fails to do so his card may either be rejected at the check-in pole or he may be charged more when checking-out as expected. Both scenarios do not contribute to a positive perception of the OV-chipkaart.

Top-up

Topping-up the card is the final step the user has to do before the OV-chipkaart is ready to use. The card can be either topped-up online, at a machine in a retail environment or at the ticket machine of a transport operator. Online top-up can only be done with online banking. Topping-up at a retailer or at the ticket machine requires a maestro-card, since credit cards are not accepted. This makes topping-up slightly more difficult for long and short-term visitors. However, the distribution of maestro cards is widely spread in Europe with about 260 million maestro-cards are in circulation (www.cardcomplete.com).

Usage

After having successfully passed all these ten steps, the OV-chipkaart can be used for travelling on all transportation modes all over country.
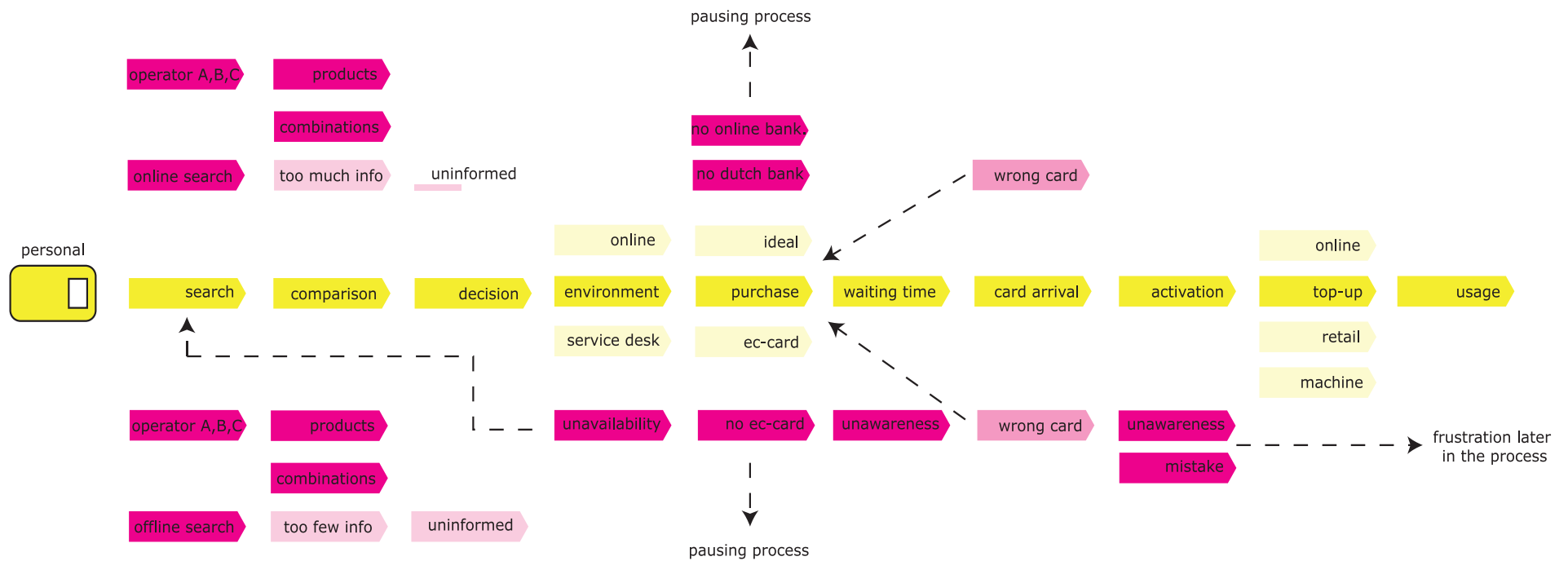
Figure 10. Possible problems within the purchasing process of
a personal OV-chipkaart

2.1.2 Possible problems when purchasing an anonymous OV-chipkaart

The purchasing process of an anonymous OV-chipkaart is much easier and involves fewer steps compared to the purchasing process of the personal OV-chipkaart (see Figure 11). Since only one anonymous card exists and no products can be loaded onto it, the searching, comparing and decision phase are redundant. The anonymous OV-chipkaart can only be purchased in an offline environment; either from a ticket machine or in a convenience store. Payment is possible either cash or with a maestro card. However, purchasing an anonymous OV-chipkaart costs € 7,50, which seems to be a problem for some of the interviewed users. The personal OV-chipkaart costs the same, however when purchasing a subscription in addition this money is not charged.

Currently the anonymous OV-chipkaart targets the infrequent travellers or people who share it with other users. Some people also own an anonymous OV-chipkaart as a 'back-up' card in case an additional is needed or the own OV-chipkaart cannot be found/is lost. However, after having purchased the card, no waiting time, no activation and no top-up is required, the card is ready to use immediately.

Conclusion
Summarizing it can be said that the purchasing process of a personal OV-chipkaart is more demanding than the purchasing process of an anonymous card. Therefore the focus of this research will be on investigating the purchasing process of a personal card and the products that can be loaded onto this card.

anonymous

environment · purchase · · · · · · · · · · · · usage

€7,50

Figure 11. Possible problems within the purchasing process of an anonymous OV-chipkaart

2.2 Studies

The analysis of the current purchasing process points out that most of the problems users may experience, occur when purchasing a personal OV-chipkaart with subscription. To further investigate the problems one quantitative and two qualitative studies have been executed. The studies aim at answering the previously formulated research questions and to possibly identify user requirements.

The first study: 'Personal vs. anonymous OV-chipkaart' quantitatively investigates what users base their decision upon when choosing between a personal and an anonymous OV-chipkaart. In order to improve the system adoption it is relevant to investigate if users are aware of the basic differences of these two types of OV-chipkaart, and if they choose consciously for one of the types of cards.

The second study: 'Expectations vs. Experiences' aims at understanding the problems users currently may encounter, in order to redesign the system adoption accordingly. 'Expectations vs. Experiences' consists of two parts: first the expectations of users when purchasing a personal OV-chipkaart (with subscription) are investigated, then their experiences when doing so are analysed.

Finally the third study: 'Not having an OV-chipkaart yet?!' focuses on why some users do not have an OV-chipkaart yet and whether they are capable to purchase one in an online environment. This helps to generate a better understanding of the current barriers. The results of the studies can be found in Appendix 6, 7 and 8. The findings are discussed below.

2.2.1 Quantitative study: Personal vs. anonymous OV-chipkaart

Before purchasing an OV-chipkaart, users first have to make the decision whether they want a personal OV-chipkaart (which offers in combination with a travel product reductions) or whether they want to have an anonymous OV-chipkaart (which does not offer reductions but can be used by more then one person). It is relevant to investigate if users are aware of the basic differences of these two types of OV-chipkaart, and if they choose consciously for one of the types of cards. In order to explore this a quantitative questionnaire has been developed and distributed to fifty participants.

Research questions
- What do users base their purchasing decision for an anonymous or a personal OV-chipkaart upon?
- Are users aware of the differences of personal and anonymous OV-chipkaarts?

Procedure
A quantitative online questionnaire has been developed, in which the participants were asked to answer the questions: Do you have an OV-chipkaart? What kind of OV-chipkaart do you have? Why have you chosen this particular one? And what do you think are the main differences between a personal and an anonymous OV-chipkaart? Based on the answers given it can be concluded why users select the particular type of card. A summary of the results can be found in Appendix 6.

Participants
The online questionnaire was spread in the personal network. In total 50 participants contributed to this research. The participants all had an OV-chipkaart, either personal or anonymous.

Results

The participants mentioned multiple differences between the personal and the anonymous OV-chipkaart. And even though some of the indicated reasons show, that some participants do not understand the general concept of the OV-chipkaart, most of the participants knew that the personal OV-chipkaart enables for discount. This also shows to be the main reason for participants to own a personal OV-chipkaart. Owning an anonymous OV-chipkaart is mainly based on the consideration that it is useful to have a chipkaart for visiting family or friends.

Limitations

This study knows two limitations. The first is that the questionnaire has been spread via the researcher's personal network. This means that most of the participants are living in the western part of The Netherlands, and that they are more likely to be young and well educated, which may have skewed the results.

As a second limitation is due to the fact that quantitative studies generally do not offer the possibility to get to know more about the underlying assumptions and believes of the participants. Gaining a better understanding what the different ideas about a personal and an anonymous OV-chipkaart are based on, could serve as a starting point for a revised channel management and communication strategies in order to improve the purchasing process.

2.2.2 Qualitative study: Expectations vs. Experiences

How users evaluate service quality depends on the gap between their expectations and their experiences (Andersson et al., 1994). This gap either causes satisfaction or dissatisfaction. Therefore it is relevant to understand problems users currently may encounter. This understanding will help to redesign the system adoption accordingly. In order to do so, first an expectation map has been developed by sixteen participants. Hereafter eight participants were confronted with real-life scenarios in order to let them experience the purchasing process. The evaluation and comparison of the outcome of both parts of the study served as an input to the final conclusions.

> **Research questions**
> - What are the expectations of users when purchasing a personal OV-chipkaart and when purchasing a travel product?
> - What are their experiences when orientating and selecting a suitable travel product?
> - Which gaps can be identified between the experiences and the expectations of users?

Procedure

In the first part, the participants were asked to write down their expectations as to the system, the actions they believe they have to take and the expected outcome related to each step within the customer journey. First they were asked which goal they want to achieve within each step. Hereafter they had to fill in which steps they thought they had to take in order to achieve their goal. They had to indicate the expected difficulty within each step, the importance of completing each step in a successful way for the rest of the journey, and the time they expect to spend on each step. A template of the expectation map can be found in Appendix 7. The expectation map provides an insight into the problem

areas within the purchasing process from a user-based perspective (Stickdorn & Schneider, 2010).

In the second part the experiences are analyzed. In order to do so the participants are confronted with a 'real-life' scenario of a product-purchasing situation. The scenario describes a situation the participant has to place himself into: the living situation and the travel pattern of the person. Next to this written description, the participant is provided with a map of The Netherlands on which the relevant places are marked. The map also provides the participant with information on the transport operator of each place. This is done, since it can be assumed that in a real life scenario the person who is about to purchase an OV-chipkaart also knows which company operates in his region. The participant is asked to select the most suitable travel 'product' for his/her scenario. The scenarios can be found in Appendix 7. While the participant is doing so, he/she is filmed from the front (for facial expressions), the back (for an overview of the scene), and the computer screen is filmed (to document which sites are visited and in what way).

Analysing the movies and the experience maps of the participants serves as an input in order to generate insights into the experience. The conclusions are then compared with the insights gathered from the expectation maps. Finally these insights lead to the identification of gaps between experience and expectation, and also of the barriers of entering the system.

Participants
The three dimensions as described in 1.1.3 have been used to select the participants. The 16 participants, which contributed to the expectation part (see Appendix 7), were asked to estimate whether they would score high, medium or low within each of these criteria:
- For 'frequency of travelling' travelling more than 4 times a week is high, travelling once or twice a week is medium, and travelling less is low.

- For 'number of different operators used on an average journey' 3 or more is high, 2 is medium, and 1 is low.
- For the parameter technological understanding, high is defined as being able to program websites, medium indicates that the person uses the internet frequently and is able to download an upload files, whereas low technical understanding refers to people who use the computer mainly for checking mails and looking up information via Google.

The participants were selected based on the given information, which ensured a good spreading amongst these three criteria. About half of the participants were Dutch whereas the other half was not Dutch but (temporally) living in The Netherlands. Also recruiting non-Dutch and temporary residents also participants were included with less or no experience with the OV-chipkaart system.

The participants, who contributed to the experience part, were selected accordingly. But this time the task is performed by Dutch (speaking) people only, since a lot of information is available in Dutch only. In total 8 participants contributed to this part of the research, and two different participants did every scenario. The participant overview can be found in Appendix 7.

Results
Concerning the expectations of users it can be said that the expected degree of difficulty is quite low. The participants estimated that the first three steps of searching, comparing and deciding would not take longer than 30 to 40 minutes.

Besides this, participants expect the search and comparison steps to have supportive elements, which reduce the amount of products one can choose from. Participants mentioned comparison tools, personal advice, clarified choices, and assistance to calculate the cheapest product. According to the participants' expectations, each product/

card can be purchased in an online and in an offline environment.

Generally spoken, participants do not expect a waiting time (even though most of them understand the necessity of it), and therefore no arrival of the card at their homes.

Participants indicated that should a waiting time be necessary it would only be acceptable if it does not take longer than one week and if in the meantime the purchased product could be used already (e.g. by collecting a temporary card at the service desk of the transport operator). The participants also do not expect the step of activation, they do not understand the necessity, say that it is extra effort for them, which they do not want to take. Also the first top-up is not expected by most of the participants and according to them should be integrated in the purchasing process already. Travelling is expected to be easy and quick. Overall, it can be stated that participants expect less steps than those included in the current purchasing process and expect to pass the remaining steps in an easy and quick way.

Concerning the experiences, it can be summarized, that most participants start their orientation at the site of 9292.nl, in order to get to know the prices (which serve as a basis for a later calculation) and to evaluate, which transport operator(s) run the service. Many participants also assumed that there would be one central site, which provides them with all information on reductions, subscriptions and cards. They also often assume that there will be one product, which fits all their needs of travelling with multiple national and regional operators. To some of the participants the site of ov-chipkaart.nl seemed to be the site, which combines all the information on different operators and their products. However, it is not. When it comes to selecting a suitable subscription, seven out of eight participants started with looking up the right NS subscription. According to their explanation they do so due to the familiarity of the site and because the NS covers the longest part of their route, therefore it is most important to the participants to

make a good decision in this subscription. It can be assumed that users who mainly use a regional transport operator would start their search at this site instead. On the NS site most of the participants compared three different subscriptions with each other by making a calculation or an estimation of costs before they decide on the most favourable product. The main problem participants had during this process lay in understanding of the product names. After having decided on the product, participants repeated the process on the site of the regional transport operator. Here the main problems were finding an overview of the products and since many products require a 'centrum zone', the identification of such. The first problem can partly be explained by the unfamiliarity of the participants with the site. After having made a decision concerning the product, most of the participants returned to 9292.nl in order to check the single ticket prices and thus be sure they have made the right decision on the subscription(s).

Limitations
This first study focussed on understanding the problems people encounter when purchasing a personal OV-chipkaart with a subscriptions. The most important limitation of this analysis was that the scenarios where fictitious and forced upon the participants. When purchasing an OV-chipkaart in reality users probably already know more about the context due to local advertisement, experiences and peer-to-peer information. Therefore in our case the situation was probably more demanding for the participants than it would be in real life and could be compared with a situation people encounter after having moved from one concession region to another. Those users do have to start from scratch, as the participants had to. A second limitation arose from the fact, that this study focussed on the purchase of a personal OV-chipkaart only and did not take the decision-making step of choosing a personal or an anonymous card into account. Therefore the second study will focus on this aspect.

2.2.3 Qualitative study: Not having an OV-chipkaart yet?

Currently some users of public transportation still do not have an OV-chipkaart. In order to understand why these people do not have an OV-chipkaart and what keeps them from purchasing an OV-chipkaart, two people have been interviewed. This helps to generate a better understanding of the current barriers. Besides this, both participants were also asked to purchase a personal OV-chipkaart (without subscription) in order to analyse the purchasing process of this as well.

Research questions
- What are the reasons for not having an OV-chipkaart yet?
- How easy/ difficult is the current purchasing process of an OV-chipkaart without a subscription?

Procedure

In order to understand why some people do not have an OV-chipkaart yet and in order to observe whether the online purchasing process of a personal OV-chipkaart is easy to understand or not, two participants who do not have an OV-chipkaart are interviewed and afterwards observed while purchasing an OV-chipkaart online. The results of this study are summarized in Appendix 8.

Participants

Both participants are male, and around 40 years old. The first participant is an employee of the TU Delft, whereas the second participant is a physical therapist. Both participants travel at rare intervals and therefore do not have an OV-chipkaart yet.

Results

Purchasing an OV-chipkaart does not require a lot of knowledge, no experience and the process is easy to follow. The most confusing

part within this purchasing process for the two participants is, that the anonymous OV-chipkaart can only be purchased offline and is immediately ready to use, whereas the personal OV-chipkaart can be acquired online and offline, but has to be produced and send to the user's home, before the card can be used for travelling. Both participants indicated that it would be an improvement if they could purchase the anonymous OV-chipkaart in an online environment as well.

As mentioned, the actual purchasing process is neither difficult nor does it cause many problems; the third study researches the process of purchasing a subscription for the personal OV-chipkaart. Here many problems are already known and are further investigated by user-testing.

Limitations

This study knows one main limitations. The results are based on two participants only (due to a difficulties in the recruiting procedure), who are concordant with one another in three points: both participants travel only little, both have an intermediate technology understanding and travel (if they do so) with multiple operators. Therefore the provided results are quite similar and it is recommended to do more research in this field in order to come to more thorough findings.

2.3 Results

The analysis phase revealed that there are several factors, which hamper the (first) entrance into the system and make it challenging for users. By now focussing on the purchasing process solely (instead of analysing the whole customer journey) problems can be identified more precisely. Based on these findings the identified gaps are classified in four barriers; information, support, understanding and money.

Information

- *The first and second studies indicate that the purchasing processes of an anonymous OV-chipkaart and a personal OV-chipkaart without subscription are easy.*
- *When searching for suitable travel products or general information, participants of the first and third study tended to search on the ovchipkaart.nl website where they could not find all the information they needed. This caused frustration.*
- *The first study reveals that inconsistency of (product) names and structure on one page and across several pages lead to a complex searching process, which is time consuming and long-winded.*
- *The lack of a central point of information as to cards, subscriptions, and reductions, where users can get an overview on the available products caused problems during the first study.*

Support

- *Participants of the first study expected a supportive tool to guide them to the right type of OV-chipkaart and subscription.*
- *Participants pointed out that they did not feel supported enough in the selecting process and that the process could be improved with for example a comparison tool or likewise, in order to give users more confidence about their choice and to save them time and effort.*
- *Study one indicates that when purchasing a personal card users have to pass a couple of steps, which all contain a certain risk of failure, since insufficient support is provided by employees or TBSS systems.*

Understanding

- *Users do not understand why they have to activate a travel product, which may cause incorrect behaviour and errors as the first study points out.*
- *The second study shows that the difference between a personal and an anonymous OV-chipkaart is not clear to all participants.*
- *According to the results of the third study users find it confusing that the anonymous OV-chipkaart can only be purchased offline and is immediately ready to use, whereas the personal OV-chipkaart can be acquired online and offline, but has to be produced and send to the user's home, before the card can be used for travelling.*

Money

- *Participants of the first study did not expect - and did not want - to wait for the card and indicated that once they have paid for their product i.e. a subscription, they wanted to be able to make use of the advantages right away.*
- *Getting a discount is the main reason for purchasing a personal OV-chipkaart as the second study points out.*
- *High initial costs for the anonymous card form a barrier to purchase it as indicated in the first and third study.*

These barriers mainly manifest themselves in the first three steps of the purchasing process: orientation, search and comparison. However they do have consequences on the following steps of the customer journey as well. Appendix 9 summarizes the current situation and provides opportunities for improvement for all steps of the purchasing process as derived from the analysis on how to simplify the entrance into the OV-chipkaart system. Based on these findings user requirements were formulated and elaborated in the following paragraph.

2.3.1 User requirements

The analysis of the barriers to enter the system has evolved a couple of improvements, which would simplify the entrance to the system and make it more attractive to users. They are described in the following sections.

Increase Information through 'Communication Material'

The development of information material would brief users on the OV-chipkaart and its advantages in general. This general information preferably should be placed within the travelling domain, e.g. train stations, bus stops and within the vehicles. Thus the general awareness and understanding of the OV-chipkaart, especially amongst the laggards but also within other user segments would increase. Furthermore the barrier for potential new users would be reduced. They then get 'automatically' informed about the OV-chipkaart and its advantages, when waiting for the vehicle to arrive. They would not have to take an action themselves anymore, but will get all the relevant information on how the system works, which type of card would be more suitable for them, which advantages it brings to them, and where to go in order to purchase their first card.
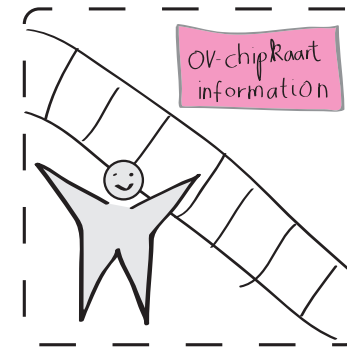
Figure 12. Communicational material about the OV-chipkaart

Increase Support through a 'Selection and Comparison Tool'

The development of a smart selection and comparison tool, which helps users to choose the right product, has been identified as a user requirement during the analysis phase. In order to realize this, the integration of products is the main requirement. Of course, each transport operator could develop his own tool to support user choices, however it would be less effective compared to an overall selection and comparison tool. Relevant questions users have to be asked when making use of the supportive tool are:

- From where to where do you travel mainly?
- How often do you travel within a week on this route?
- At what time do you normally travel?
- To which other destinations do you travel?
- How often do you travel on other routes?

Based on these questions the supportive tool then will be able to advise different options to users.

Increase Understanding through 'No initial top-up, No activation'
During the research users indicated that they would highly appreciate if the initial top–up and the product activation were not necessary anymore. In general users do not understand why this cannot be done in the back office with immediate effect. Instead, they are forced to do another time-consuming and difficult step, which in their eyes should be part of the service of the transport operators.
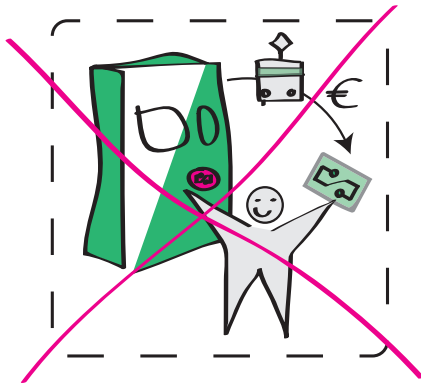
Figure 13: No initial top-up and activation needed

Increase Understanding through 'Single check-in / check-out'
When it comes to single check-in / check-out, and enabling immediate travelling at all transport operators at the same conditions, the biggest challenge is the integration of activities and efforts of transport operators.

Increase Understanding through 'Sending anonymous OV-chipkaarts home'
Besides making personal OV-chipkaarts faster available, the service of sending anonymous cards home should be introduced as well. As the analysis showed, users of the anonymous card typically are infrequent travellers. Therefore they do not care waiting for the card to be sent home, but appreciate the service since it adds extra convenience.

Infrequent travellers do not go to the station often, and therefore would have to go there especially for purchasing a card. As the analysis has shown, infrequent travellers and users of the anonymous chipkaart typically purchase it at the station, when going on a trip. Since they do not receive any reduction on the travelling price, and since they are not used to travelling prices, they will already experience travelling by public transport as expensive. Adding an extra €7,50 in such a situation, increases the perception of expensive travelling even more and might lead to travellers not going on the trip at all, since they cannot afford it, especially when travelling with a family.

Separating the purchase of the OV-chipkaart from purchasing the train ticket would ease the situation and improve the perception of public transportation amongst infrequent travellers.
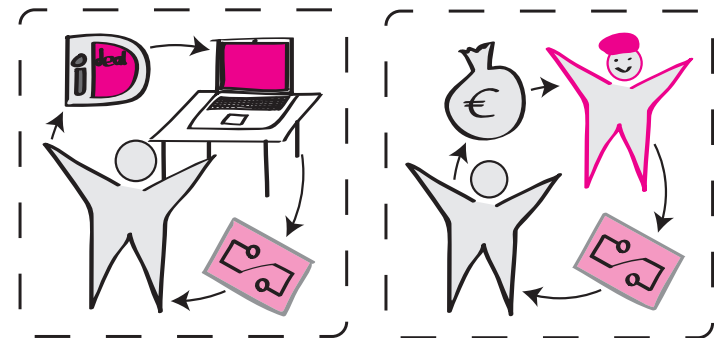
Figure 14: Receiving anonymous OV-chipkaart home

Reduce Costs through 'Preliminary and Temporary OV-chipkaart'
As derived from the analysis, users want to travel with the personal OV-chipkaart immediately. In order to enable this wish, a preliminary personal OV-chipkaart could be printed at a service desk at the train station, which holds the same information as the final card will, and

would be valid for a maximum period of time, e.g. two weeks only or until the final card has been received by the user. The transport operators will have the technically fully working cards available at their service desks and therefore only need to print the picture and load the right product onto the card. However, since the quality of an instantly printed card cannot be guaranteed, those cards will only be preliminary.

This step will simplify the purchasing process for the users a lot and at the same time offers an additional chance for the transport operators to interact with their customers, to provide good service and thereby distinguish themselves from the competitors.
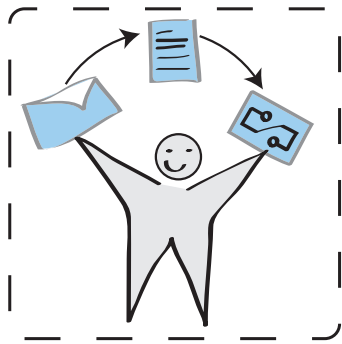
Figure 15: Preliminary OV-chipkaart after purchase

Reduce Costs through 'Automatic fill-in of missed check-outs'
Finally, automatic fill-in of a missed check-out would improve the perception of the OV-chipkaart system in general. However, without integrating the transport operator's actions, this is not possible to implement.

2.4 Conclusion

This chapter aimed at investigating the barriers that complicate the system adoption of the OV-chipkaart.

In order to do so first the current purchasing process of both the personal and the anonymous OV-chipkaart are investigated. Based on this analysis is could be concluded that the most problems manifest themselves in the purchasing process of the personal OV-chipkaart.

Therefore it has been decided to focus on such in the three conducted studies. First the expectations were compared with the experiences of users when purchasing a subscription, then the decision making process when deciding on a personal or on an anonymous OV-chipkaart were analysed and finally it has been investigated why some users still do not have a personal OV-chipkaart.

Based on these studies four barriers (information, support, understanding and money) could be identified, which are related to the information load, the provided support, the knowledge users have of the system and the costs. For each of these barriers at least one user requirement has been formulated, which will be taken into account in the scenario development phase in chapter four.

Besides analysing the barriers of the system, the second area of interest as formulated in the design brief is to identify and investigate the incentives, which could help to simplify the system adoption as well. The next chapter documents this study.

CHAPTER 03: IDEA GENERATION
ENABLING EASIER SYSTEM ENTRY AND CONCEIVING NEW FUNCTIONS

3 IDEA GENERATION

The previous chapter identified the factors related to; understanding, support, information and money as the main barriers for system adoption. Now it is investigated how the overall system can be made more attractive and appealing to current and future users. Therefore it is investigated how the travel experience itself and the extended journey can be improved. Furthermore it is investigated whether the OV-chipkaart can add value to users by offering special applications outside the domain of travelling.

A creative session has been held in order to reveal current user experiences and to understand what people like or dislike about the OV-chipkaart and whether there are certain incentives, which would contribute to a more positive evaluation of the OV-chipkaart. This chapter focuses on the documentation of such and is divided into four main parts.

First the search fields upon which the creative session is based are specified in 3.1. Hereafter the set-up of the creative session is elaborated explicitly in 3.2. The results of the creative session are summarized in 3.3. Finally the conclusions drawn from this creative session are discussed in 3.4.

3.1 Search fields

In order to structure the creative session and to develop relevant research questions three main search fields of interest have been chosen; travelling, the journey before and after travelling, and everything beyond the journey. These three areas are explained in more detail below.

Travelling
Since the main purpose of the OV-chipkaart is to enable travelling and to facilitate quick and easy changes between operators throughout the country, the search field 'travelling' is the core of the investigation. This search field focuses on making the trip as comfortable, easy and personal as possible.

> Vision The traveller should feel like being on a red carpet.

Journey
Besides travelling (which is defined as the time span between entering and leaving the vehicle) the journey is more than just getting from A to B. It involves several considerations, planning and communication. The search field 'journey extension' therefore includes the whole act of travelling, starting from making plans, deciding on time, day and route, getting to the station, travelling, enjoying the final destination, going back, and remembering a nice day.

> Vision The traveller should feel like being in front of a luxurious buffet, composing his own plate.

Added Value
The third search field 'added value' even goes beyond the journey experience and focuses on exploring possibilities that are not directly connected to public transportation. Within this search field the idea will be pursued how to create special, memorisable and engaging experiences in order to make the OV-chipkaart attractive even to people who normally do not make use of public transportation. The aim of this search field therefore is to explore how the applications of the OV-chipkaart can be extended and how to increase the number of OV-chipkaart users. This will generate revenues and improve the overall perception of the OV-chipkaart amongst public transport users.

> Vision The user should feel like being on an expedition, discovering pleasant and surprising things.

3.2 Setup: Creative Session

A creative session has been hold in order to gain a deeper understanding of possible incentives while travelling, during the whole journey and even outside the domain of travelling.

Research question
The main research question of the creative session aims at to answer is: "How to enhance the engagement people have with the OV-chipkaart". In order find a solution six supportive questions were developed, which focus on two questions for each search field. Within the creative session these questions were discussed separately in order to cover the search fields best and to be able to generate broad ideas.

For the search field travelling the questions are:
- How to make the travelling experience more personal?
- How to improve the travelling experience and make it memorisable?

For the search field journey extension the questions are:
- How to create communities within an extended journey experience?
- How to enhance the connection between the OV-chipkaart and its users within an extended journey experience?

And finally, for the search field added value these questions are:
- How to create a special connection between the OV-chipkaart and its users?
- How to create adding value memories with the OV-chipkaart?

Procedure
As mentioned above the main question the creative session aims at while exploring the search fields is: 'How to enhance the engagement people have with the OV-chipkaart'. For this purpose parts of different

methods have been combined with each other. The creative session starts with an icebreaker game, to be followed by the two main parts, a mind map and dynamic brain writing and finishes with a wrap-up. The employment of the mind map within the creative session brings the participants to think about the topic in a collaborative and playful way, whereas dynamic brain writing is used to generate 'out-of-the-box' ideas. The complete set-up for this creative session and the methods used can be found in Appendix 10a.

Participants
This creative session aims at exploring the context as deeply as possible, being as creative as possible and generating diverse ideas. Therefore it was decided to select industrial design master students to participate in this session. These students are familiar to the way of thinking, familiar to being part of a creative session, know how to break down problems and have sufficient expertise. In total six students participated in this creative session representing the three master directions (Integrated Product Design, Design for Interation, and Strategic Product Design) in order to ensure diversity.

Limitations
Even though the participants were chosen with good cause it can be mentioned as a limitation, that students as a definite group probably encounter the same kind of problems and are looking for incentives, which might be less relevant for people with different occupations and of different age. Furthermore it has to be stated that the results of a creative session cannot be used as verified results but serve as a source of inspiration for further investigations.

3.3 Results

In order to interpret the solutions developed during the creative session, each step of the creative session has been analysed separately at first. Clustering these results with each other leads to the identification of five incentives on three levels. When developing an improved system these incentives should be taken into account according to their level. These five incentives are explained in more detail below. Appendix 10b summarizes all the results of the creative session.

Basics of travelling: Technical improvement
The basics of travelling are detailed information via multiple channels, the convenience and plainness of elaborating a personal route and a good routing system. In order to achieve these improvements technical adaptations of the system have to be done (see Appendix 10c for more examples of technical opportunities for improvement).

Money: Business improvement
The participants also indicated that actions related to money are quite important for them too. The possibility of loading credit, of collecting bonus points, of getting compensations, of saving money and of being (financially) rewarded after certain actions are important to them. These incentives are identified as a business factor, since it leads to saving money from the users point of view (see Appendix 10c for more examples of business improvements).

Personal well-being: Improve the users perception
The incentive personal well-being combines the topics, which are related to personal attention: the possibility to personalize the card, a wide range of choices, good facilities and increased convenience. These topics indicate the high value the participants of the creative session assign to better personal care within the domain of travelling.

Social interaction: Improve the users perception
The social factor also seems to be very important to the participants. To them travelling means interaction, getting to know new people and the possibility to connect the personal route to the route of a friend. Also outside the domain of travelling the social factor seems to be very important to the participants. They like to share experiences and by that connect to other people. Both, the personal well-being and the social factor can be identified as human considerations, since they add comfort and social connections to the individual journey.

The wow-factor: Creating a brand and developing business opportunities
It is the 'wow-factor' which increases the tie between the users and the OV-chipkaart. The wow-factor can occur while travelling, within the extended journey or beyond the travel domain. Participants indicated personal gifts or memories, getting the feeling of being special, the information about particular and/or extraordinary activities and extended functionalities and applications of the card as wow-factors. This incentive represents the brand factor (see Appendix 10c). By providing personal service and creating special memories, the user feels like being part of a bigger group, the tie between the user and the OV-chipkaart gets reinforced.

Results for each search field
- With regard to travelling the participants indicated money, (personal) information, and good facilities as most important.
- Within the extended journey, participants are looking for personal information and social connection.
- Beyond the travel domain the participants would appreciate extended functionalities and special memories of their shared experiences.

Summary of the results per travel phase
- Participants want the preparation phase to be personal.
- Participants want (to share) activities during travelling.
- Participants want to share experiences in the post travel phase.

3.4 Conclusion

The creative session aimed at generating inspirations on the three search fields and to reveal whether they hold relevant incentives, which should be increased in order to make the OV-chipkaart more attractive. The findings of this session are summarized below. Figure 16 visualizes the conclusions and relates them to the customer journey map.

Five incentives on three levels could be identified

- Level 1: Make travelling cheaper and improve the basics of travelling, such as facilities and information.
- Level 2: Increase the personal well-being and enable social interaction.
- Level 3: The wow-factor; add value to the card by extending its applications.

Each incentive is relevant within the travel phase, the extended journey and when adding extra applications. Improving the first two incentives (basics of travelling and money) demands changes on the technical and organizational level. Improving the second two incentives (personal well-being and social interaction) demands changes on how the interaction between card and user is designed. Improving the last incentive (the wow-factor) demands technical, organizational and interaction related changes. In order rebalance the importance of these three factors, the relevance of the levels is according to their numbering. Therefore the basics of travelling and the level of information should be improved first.

These findings support the barriers related to the understanding, support, information and money as identified in chapter two. Therefore it can be concluded that the first step to improve the system adoption of the OV-chipkaart is to reduce the barriers. The reduction of those barriers might also form an incentive for users to use the OV-chipkaart as well. Once the barriers are reduced it could be further explored how to increase the incentives. However this is not the scope of this report.

Figure 16. Visualisation of the conclusion

CHAPTER 04: THREE SCENARIOS

**ORGANIZATIONAL STRUCTURES AND THEIR
CONSEQUENCES FOR USERS**

4 THREE SCENARIOS

To improve the purchasing process three possible scenarios focussing on the organizational structure are investigated. These scenarios aim to lower the understanding, support, information and monetary based barriers and to fulfil the user requirements as defined in chapter two. The scenarios are all based on the vision as stated below and may hold advantages and disadvantages for the parties involved compared to the current situation. The main goal of this investigation is to improve the situation for the users of the OV-chipkaart. Therefore users will be the starting point in order to come to a decision on the future scenario, however technical limitations and organizational concerns will be equally taken into account.

This chapter focuses on the development of three scenarios of organizational structures, which all aim at improving the current purchasing process for users and is subdivided into six parts.

First the visions, which form the basis of the three scenarios are briefly explained, then a short introduction to the design of services is given and the structure of the three scenarios is explained. Hereafter the three scenarios are introduced in paragraph 4.2, 4.3, and 4.4. The developed scenarios are compared with each other in 4.5 and their advantages and limitations are discussed. This chapter ends with a conclusion on the scenarios and forms the starting point for the fifth chapter.

4.1 About the scenarios

As the analysis of the barriers has shown, the scattered information on travel products of different transport operators, and the subsequent confusion and insecurity of users, is one of the main problems. The high number of parties involved in the OV-chipkaart system, a lack of agreement between the parties involved, indistinctness about responsibilities and the diversity of product offerings lead to a complex structure of the system, which makes interaction with it difficult for users.

The organization of the system can be assigned as a main cause for
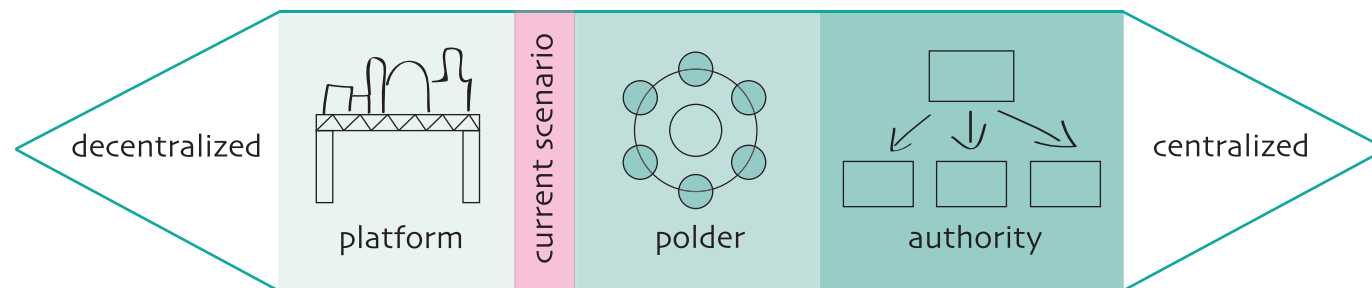

Figure 17. Three scenarios from a decentralized to a centralized organizational structure

the complex purchasing process. Beside this, the heterogeneous density of population in The Netherlands makes the situation even more challenging. In order to suggest alternative solutions for the restructuring of the system, a vision of the future purchasing process has been developed, which is as follows:

The payment system for Dutch public transport is easy to understand, enter and use in both an online and offline environment and by a large diversity of users.

When it comes to deciding on how the payment system of the OV-chipkaart system should be organized in order to simplify the purchasing process, the main question is whether the system should be more centralized or more decentralized. To answer this question, three scenarios reaching from a decentralized to a highly centralized organizational structure are developed (see Figure 17): 'the platform', 'the polder' and 'the authority'.

4.1.1 Introduction on design of services

How consumers experience services is based on its actual quality. The perceived quality will be determined by the gap between the expected and the experienced performance of the service (Anderson et al., 1994). This gap can either lead to experiences above expectations, which is then followed by satisfaction or below expectations which in turn results in dissatisfaction or even anger.

Zeithaml (1998) defines the perceived service quality as "the consumer's judgment about a product's overall excellence or superiority". The perceived service quality will also influence the consumer's behaviour (Andreassen and Lindestad, 1998). Several researches (Anderson and Sullivan, 1991; Liljander and Strandvik, 1996; Tronvoll, 2011; Mittal et al., 1998) suggest that a negative service experience will have a greater impact on consumer's behaviours than a positive experience ever has. Besides, consumers remember negative experiences for a longer

period of time then positive ones (Mittal et al., 1998). They are therefore more likely to complain about a bad service than sharing their positive experiences with a good one (Tronvoll, 2011). However, consumers, who experienced service satisfaction, are more likely to develop a strong relationship to the service provider (Liljander and Strandvik 1995). The evaluation of the quality of a service can be described as a cognitive response, whereas the resulting satisfaction is an emotional response of consumers to their experience (Liljander and Strandvik, 1996).

When it comes to service recovery consumer's evaluation primarily depends on the process of the service recovery (Spreng et al., 1995). The way the consumer problem is handled by the service provider and especially how well the consumer-personnel contact is designed within this process, has a great impact on the overall evaluation of the service quality on part of the consumers (Martin,1993; Spreng et al., 1995). Providing front office employees with more responsibilities in order to solve consumer problems immediately can be one option to increase the consumer's satisfaction.

The literature survey has shown that not only the development of a high quality service, but also the development of a seamless recovery process are crucial to consumers' perception of the service and the provider.

While developing the three scenarios these considerations are equally taken into account as the identified user requirements to overcome the barriers of misunderstanding, lacking support, insufficient information and high costs.

4.1.2 Structure of the scenarios

The description of the three scenarios follows the same structure. First their basic concepts are briefly discussed. Then their impact on the activities 'getting familiar with the OV-chipkaart', 'searching the right travel product' are analysed, and finally the implications on

'while travelling' or 'when things go wrong' are discussed. This fourth factor has been taken into account since it has been identified as one of the main causes for customer complaints (see Appendix 11) and is influenced by the organizational structure as well.

The effects can be associated with certain characteristics of the systems and are described focussing on the three areas: 'communication towards users', 'products available to users' and 'service provided to users'.

Hereafter the appropriate Business Models (Osterwalder & Pigneur, 2010) are introduced and it is briefly described how they have to be implemented. In all scenarios the key partners (the government, the public transport operators and the regional concession holders), and the key resources (the public transportation network and the facilities) are the same. 'Customer segments' focuses on the three dimensions, which were introduced earlier: 1) frequency of travelling, 2) number of operators used while travelling and 3) the technological understanding. It is then discussed which of these categories is relevant within each of the three proposed business models and to what degree.

Each scenario ends with an evaluation of both users and stakeholders. For the user evaluation the front offices of the three scenarios have been discussed, by focussing on the aspects: orientation, search, purchase, travelling and error resolving. Appendix 12 describes the detailed results of the user testing. Also the stakeholders were asked to respond to the scenarios, whether they believe in them or not, how they judge the consequences and they were invited to provide further remarks and thoughts. The stakeholders' comments have been verified by them in order to avoid a misinterpretation of the data. According to Miles and Huberman (1994) it is not sufficient to collect data in order to draw conclusions, since the own interpretation may be influenced by the results that one would like to have or is expecting to get. Appendix 13 elaborates the results from the stakeholder evaluation in more detail.

All three scenarios involve advantages and disadvantages for the parties concerned, however, this approach aims at proposing a user centred and implementable final concept, which combines as many requirements of both users and stakeholders as possible.

4.1.3 List of requirements

As derived from the analysis of the barriers

- *Increase information through 'Communication Material'*

- *Increase support through a 'Selection and Comparison Tool'*

- *Increase understanding through 'No initial top-up, No activation'*

- *Increase understanding through 'Single check-in / check-out'*

- *Increase understanding through 'Sending anonymous OV-chipkaarts home'*

- *Reduce costs through 'Preliminary and Temporary OV-chipkaart'*

- *Reduce costs through 'Automatic fill-in of missed check-outs'*

As derived from the literature review

- *Close the gap between expectations and experiences*

- *Provide excellent service recovery*

- *Provide a 'fall-back' option when users encounter technology-based problems*

4.2 Scenario 1: The Platform

Value Proposition: Serving individual user needs best by offering a wide range of options to users and supporting the customization of products.

Basic idea

The basic idea of scenario one is to develop a platform (see Figure 18), which functions as the technical back office of the OV-chipkaart system. This means that the offerings of the transport operators would be very much focussing on the specific user needs, and the offerings of transport operators would differ more than they currently do.

However, users travelling within a specific region would benefit from products, which are specially adapted to their needs. The transport operators gain more freedom when it comes to deciding on what kind of products they offer, how they target their customers, which channels they use in order to reach them etc. In this scenario, each transport operator would be free to develop his own environment within the given technical restrictions. Appendix 14 visualizes the proposed scenario.

Transport operators own ecosystem

Users
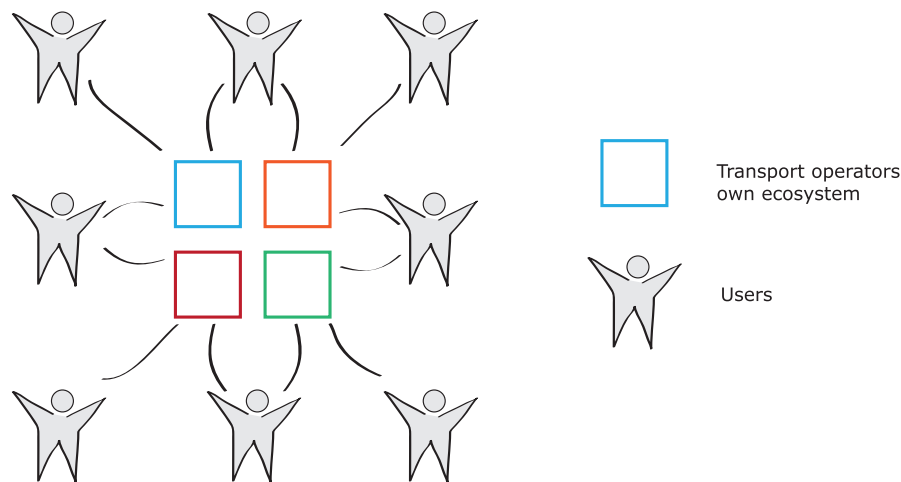
Figure 18. Organization structure of scenario one

Detailed explanation

In order to implement this first scenario, the back offices of the transport operators would not have to be changed a lot, therefore this is the scenario, which is the easiest to achieve. The transport operators still would collect their own data, develop their own products, use their own channels to sell to and communicate with users. Also the transport operators would be able to adapt their product offerings to the needs of their customers even better.

Whereas some tasks, which are currently carried out by TLS, such as providing a transaction overview to the users, could then be integrated into the individual transport operator's activities others like establishing and maintaining a technical environment should be fulfilled by TLS. In the past TLS expressed quite clearly that they would not like to take over more responsibility when it comes to controlling other parties or the user interaction.

However, this scenario suggests that TLS would be the one to create the platform for the transport operators to offer the OV-chipkaart to their customers. TLS would develop some rules or guidelines for the transport operators to follow in order to ensure the technical functioning of the system, but will have less responsibility and less contact to users than they currently have. The ov-chipkaart.nl website would shut down, transaction overviews will be provided by the transport operators, and cards will be issued by them as well.

This front office could be compared to the front offices of mobile network providers. They all sell products to enable users to make use of the mobile network. However, each provider has his own conditions, prices and offers. With contracts, customer service and customized combinations they try to establish a lasting relationship with their customers.

4.2.1 Effects on OV-chipkaart usage

Here the effects the first scenario has on the users of the OV-chipkaart while getting familiar with the card, searching for the right subscription, travelling with the card or when faced with an error are outlined.

Getting familiar

In this scenario, the platform will only create the technical environment for the transport operators. Still each transport operator is able to interpret the guidelines set by TLS according to his own needs. Therefore the offerings of the transport operators will be very diverse.

On the one hand offering multiple products ensures that every user will find a suitable product/card in the end. Beyond that, for users travelling in one concession only/mainly it is an advantage that the product offerings are adjusted to the local needs. However, the orientation of users towards the OV-chipkaart will not be streamlined, since consistency amongst the operators is lacking. This might make the orientation process for users more demanding.

Searching for a subscription

When searching the most suitable product, users have to consult the websites or service desks of all transport operators that might be of interest for their personal travel route (see Figure 19). The search may be rather time-consuming and therefore might create a barrier for users to start the process. Since users are confronted with diverse information, presented in different ways the comparison of the operators becomes more difficult. However, the more specialized the transport operators get the better they can satisfy the individual user needs by offering more customizable products. Transport operators will become more competitive, which might result in cheap product offerings.
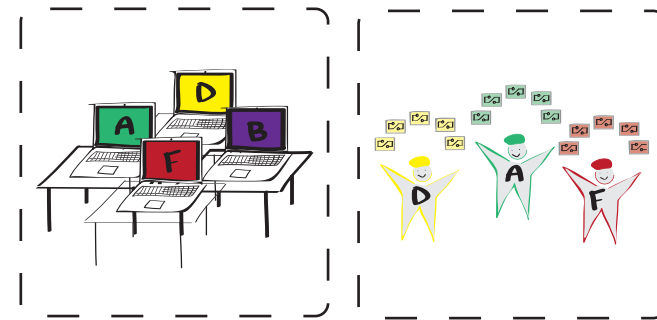
Figure 19. Users duty to consult different operators, receiving inconsistent information

Travelling

The more individualized transport operators are, the more their (service) offerings during the course of the journey will differ from each other. Transport operators will probably try to improve the relationship they have with their customers, e.g. by offering a free trip after a certain amount of travelled kilometres.

This diversification holds both advantages and disadvantages for transport operators and users. Especially the smaller transport operators, with less financial possibilities will suffer from this, since their competitiveness will be threatened. Users mainly travelling with one travel operator may profit from such offerings, however travellers using multiple transport operators will probably face more expensive journeys, since the travel products are less integrated. Single check-in/check-out is not possible within this scenario, since that requires an integration of the transport operators' back offices. Also when transferring from one operator to another, users will probably have to pay the basic tariff at each operator again.

Error recovery process

The development of a platform and more individually structured transport operators has consequences on the error resolving process, which will get more individualized as well, and users will experience different types of error resolving processes. Whereas one transport operator will probably deliver an excellent process another might not. Also the communication between transport operators decreases in this scenario, which may cause difficult and long error resolving processes once users deliver their complaint to the wrong party. On the other hand, transport operators get the possibility to build up a strong customer relationship by means establishing an efficient service. In this scenario it is important to users to deliver their card to the right party (see Figure 20).
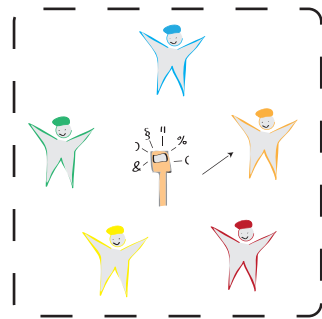
Figure 20. Importance to address the right party

4.2.2 Characteristics of the system

The characteristics of the system are also influenced and are dealt with below considering the following three aspects: communication with users, products available for users and the service provided for users.

Communication with users

The communication with users will differ from one transport operator to another. The competition between transport operators increases and users have to decide which message to believe or where to receive the most favourable service.

Products available for users

Within the platform scenario, each transport operator targets his particular customers and will probably adjust his products to the specific needs of his (local) target group, thus differing from other operators' products. Offering special reductions to constant customers for example could be one possibility, the implementation of a bonus point system might be another one within this scenario to evoke the loyalty of the customers even more. Whereas the overall situation might improve for customers mainly using one transport operator, it might worsen for people travelling with multiple transport operators. Furthermore the product fit across transport operators will be worse compared to the current situation.

Service provided for users

The level of service provided to customers by the transport operators will vary in this scenario, due to increased competition. On the one hand this is positive, since the service delivered will probably improve overall. Transport operators that differ from other operators may become users' 'preferred' operator, when purchasing their OV-chipkaart for example. On the other hand, it leads to a fragmented sector in which the satisfaction of users might decrease. Users who are mainly travelling with a transport operator with a less extended service portfolio will feel disadvantaged.

4.2.3 Business Model: Platform

The key activity is to build up a strong customer relationship and to let users travel through the Netherlands with their preferred transport operator and the particular OV-chipkaart offered accordingly (see Figure 21). Therefore in this scenario the value proposition is:

Serving individual user needs best by offering a wide range of options to users and supporting customization of products.

This scenario places emphasis on the customization of products, offering a good price to users and focussing on innovation. This value proposition supports individual customer relationships to "his" transport operator. Also the transport operators could differ from each other and compete with one another by offering different services to their customers. In such a scenario, users may choose the transport operator they want to travel with (e.g. if two transport operators are both offereing a connection between two stops). In order to reach their users the transport operators would have to make use of individual online and offline communication channels. Therefore here travellers who have a lower technological understanding and those that make use of multiple transport operators are likely to encounter more problems, since they are less aware of how to interact with the system, e.g. where to check in and -out, or at which operator to purchase an OV-chipkaart and travel product.

The costs connected to this business model would not differ a lot from the current situation. However, the development of stronger customer relationships will lead to extra costs for the transport operators. The earnings of each transport operator will immediately reach him and calculations in order to divide income will be redundant.

4.2.4 User Evaluation: Platform
The participants who contributed to this evaluation rated the consequences for users within this scenario as mainly negative. They rated it as confusing. During the orientation phase it is most important for users to find the relevant information. They also prefer to get less but plain information at first glance, instead of searching for all the information of the different transport operators by themselves. The evaluation of this scenario also showed that users are not longing for a relationship with a transport operator. They do not care who is running the service and what the service looks like as long as they get from point A to point B easily and at the best possible price.

4.2.5 Stakeholder Evaluation: Platform
The stakeholders evaluated this first scenario in many different ways. Some of the transport operators stated that they want to serve their customers needs best and that it is important to them to build a strong customer relationship. They hope that customers who chose them deliberately will in turn stand up for them when it comes to winning a concession. Other operators believe that a strong customer relationship can only be achieved by making travelling easy and comfortable for the user. They believe that the easier travelling is, the more people will travel. The governments also support this opinion. Since this scenario does not simplify travelling for users, the platform model is not favourable from a user-centred point of view. Generally speaking the interviewed project partners agree that this scenario makes the situation worse for the traveller and therefore is neither helpful in building up a strong customer relationship nor does it provide a good service.
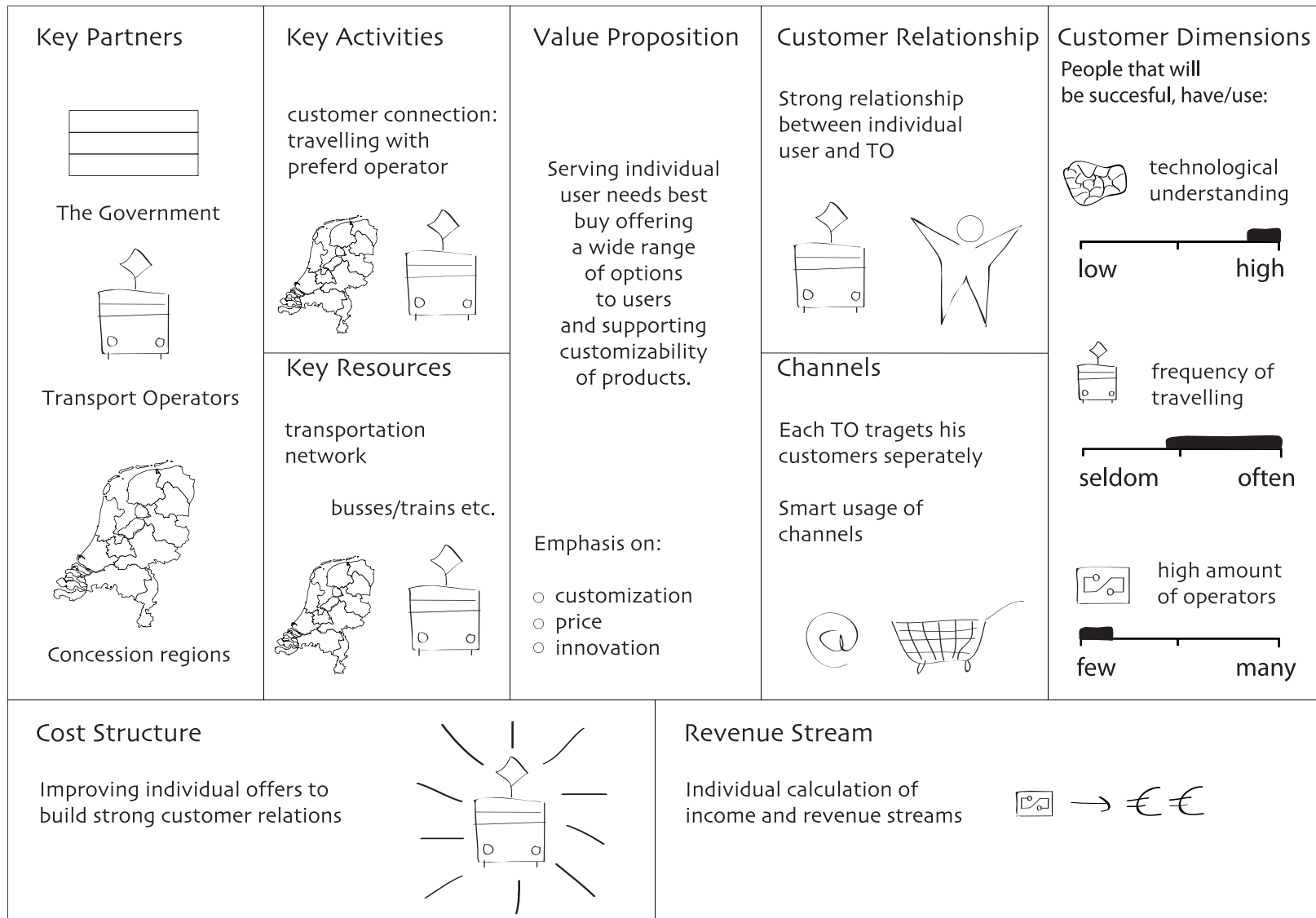
Figure 21: Business Model of the platform
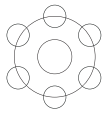
4.3 Scenario 2: The Polder

Value Proposition: Reducing variety and simplifying choices of users by introducing a facilitator, who ensures that all decisions of the service providers are aligned with each other.

Basic idea

The basic idea of scenario two is to develop one integrated polder along with all transport operators (see Figure 22). Introducing one central polder, that sets the rules for the transport operators involved, that guarantees that the decisions of each party will be aligned with the decisions of the others. That logically connects the individually offered products of the transport operators to the products of other transport operators. Besides this, the information is structured in a coherent way across all of them. In order to introduce a new product for example, the transport operators first have to consult the new polder and align their ideas with those of the others involved.

These changes may lead to less innovation, but will improve the purchasing process for users by structuring everything in a logical way. The integrated polder therefore can be conceived as a coordinator, who is empowered to refuse individual requests for the sake of the total picture. Appendix 15 visualizes the proposed scenario.

Detailed explanation

In order to realize such a polder, the parties, which are currently involved in the system of the OV-chipkaart have to form a group, to which representatives of each party are delegated. Together they will improve the current situation and maintain it in the long run.

Figure 22. Organizational structure of scenario two
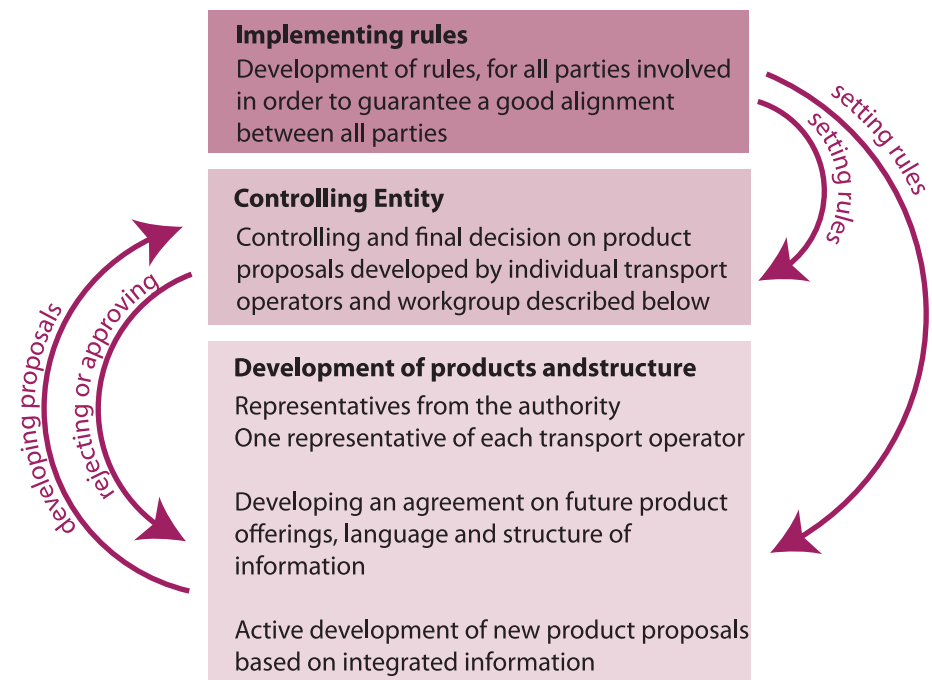
Figure 23. The structure of the polder

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The development of the integrated polder model is, judged from the current situation, a demanding task to achieve and implement. The different transport operators with their diverse interests have to come to an agreement and common understanding on what the future of public transportation should look like. The structure of the polder, and the division of the responsibilities is visualized in Figure 24.

4.3.1 Effects on OV-chipkaart usage

Here the effects the second scenario has on the users of the OV-chipkaart while getting familiar with the card, searching for the right subscription, travelling with the card or when facing an error are outlined.

Getting familiar
In this scenario the commonly developed polder will develop guidelines for the language used by the transport operators and for the structuring of the information. By achieving more consistency among the operators and across the different channels, the orientation phase would be simplified for users. The system of the OV-chipkaart and the available options would then be explained to users in a consistent language which applies to all online and offline touch points, including ticket machines and validators, and therefore simplifies the understanding. Also the development of a consistent structure across multiple websites contributes to the simplicity. By introducing a coherent structure and language, the situation will improve a lot for the user, offers and choices are clarified, insecurity is reduced and thereby the barrier for entering the system is lowered for new users.

Searching for a subscription
The development of an integrated polder will not only improve the structure and the language used across the different transport operators (see Figure 24), which makes the search much easier, but also involves that the available number of products will be reduced and better aligned to one another.
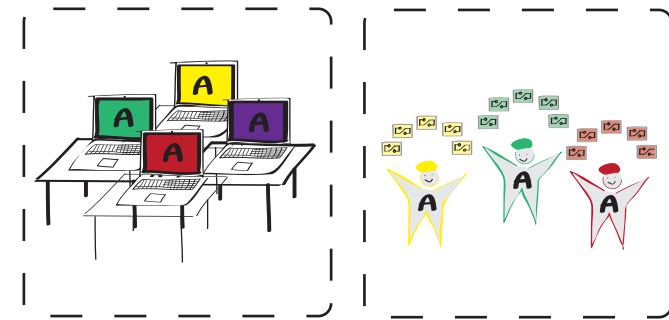
Figure 24. Different operators provide consistent information

Travelling
This scenario affects the collaboration and connection of the transport operators and makes them act unified instead of multiple service providers towards users. In this scenario users still have to take care of their own actions, such as making sure that they have sufficient balance to travel, and that they are checking in and out at the right transport operator. However, the development of an integrated polder would decrease the efforts on the user's side by supporting single check-in/check-out and by automatically filling in missed check-outs. Since the travelling information of users is shared with all transport operators, a better understanding of the individual user's travel pattern can be developed. Due to this connected and integrated information, more service can be offered to users.

Error recovery process
The development of an integrated polder holds great potential to improve the current situation. The polder would act as a gatekeeper, assembling all the errors of the transport operators and redirect them to the relevant party. This approach would ensure that errors would immediately be identified correctly and solved by the company concerned. This speeds up the process of error resolving and increases the trust in and perception of the transport operators. Besides this, users will immediately receive a temporary OV-chipkaart at the service desk of the transport operator

they have delivered the card to. Since all faulty cards will be directly send to the polder, it does not matter anymore at which transport operator users deliver their card (see Figure 25).
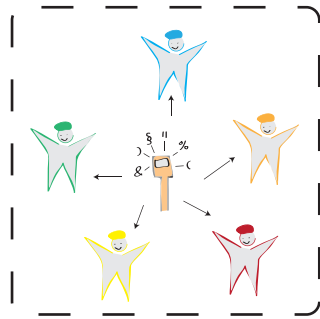
Figure 25. Multiple addresses to solve the problem

4.3.2 Characteristics of the system

The characteristics of the system are also influenced and dealt with below considering the following three aspects: communication towards users, products available for users and the service provided for users.

Communication towards users
Once a structure has been found (common language, agreement on products, etc.) the transport operators have to implement this, in order to build a joint front office. This involves that they rebuild their website; develop new communicational material, which explains the concept of the OV-chipkaart.

On sufficient places across The Netherlands (e.g. at all main train stations and in smaller places at a mobile service point) service desks have to be equipped with a printer, which can immediately print the user's picture on the OV-chipkaart and with a device to load the chosen product on the card. This also means that each service point has to be equipped with semi-finished OV-chipkaarts (technically working,

but not yet assigned to a person and/or product). As elaborated in the user requirements, such a card will be preliminary and replaced by a permanent card send to the user's home.

Products available for users
In this scenario, the product offerings will probably be reduced but will be better aligned across the different transport operators. In order to develop consistency, reducing the product variety and increasing communication between the transport operators is a key factor. First an overview of the differences and similarities on product offerings, language, service, structure and facilities of the transport operators involved has to be generated.

The currently available products have to be analysed on whether they are necessary and whether some subscription could be combined. This should not only be done internally at each transport operator, but also across operators in order to make the offer easier to understand and overlook for the users. Once this step is achieved, the polder will unite the offers and maintain the rules and guidelines set for the implementation of new product offerings. Since each transport operator is connected closer to his customers and therefore knows their needs better than any of the others, he will be in charge of developing new products. However, before such a product can be implemented it has to be approved by all other members of the polder. They will evaluate the necessity of the new product, whether it can replace an existing product and whether it is align with the products of other transport operators.

By doing so, the polder can ensure a continuously high standard of developments within the domain of public transport. The speed of innovation and of new products to the market might decrease, but such an approach will probably pay-off in the long term, since adaptations of products after implementation are unnecessary. The collaboration will lead to a good overview of the whole market, and can therefore identify errors more easily and redirect them to the responsible party.

Service provided for users
Even though the polder promotes alignment between the transport operators, it has no effect on the service each transport operator offers in order to build a customer relationship and to stay active and involved in the decisions within the domain of public transportation services. Transport operators could for example rethink via which channels they reach their different target groups best. One example is to send anonymous OV-chipkaarts to the user's home as well. As the analysis has shown, and as it is described in the user requirements, users of the anonymous OV-chipkaart would appreciate this as an increased convenience.

4.3.3 Business Model: Polder
In this scenario the key activity is to enable public transport throughout The Netherlands across all transport operators with one card. Therefore in this scenario the value proposition is:

> *Simplifying the users choices by aligning the decisions of all parties involved via a coordinating facilitator as elected by the parties.*

The value proposition places an emphasis on transport operators' performance, risk reduction and accessibility for users (see Figure 26). This value proposition leads to less individual relationships between the transport operators and its customers than proposed in scenario one. The transport operators still differ from each other and compete with one another by offering different services to their customers and they would still make use of individual online and offline communication channels to reach their customers. In this scenario the technical understanding of users and the amount of operators they are travelling with is less important, since the front office is simplified due to the cooperation of the transport operators. This makes it easier to understand the working of the system and to interact with it.

The costs connected to this business model would not differ a lot from the current situation. Extra costs for establishing a better communication across transport operators may arise. However, these extra costs can pay off in the long term, due to shorter and more efficient communication ways. The revenues have to be divided in the back office in order to guarantee that each transport operator will receive his individual sales profit.

4.3.4 User Evaluation: Polder
The participants have evaluated the second scenario in a more favourable way. The evaluation has shown that participants would appreciate a better collaboration between the transport operators if that results into more clarity for the users. To the participants it is most important that they get homogeneous information and receive a consistent and reliable service. Users do not want to worry about which might be the right organisation for their purposes. It can be noticed that some of the participants prefer a combined solution of scenario two and three in case of searching for and purchasing a travel product. Here some participants preferred to have one online website with all the information and diverging service desks of the individual transport operators in the offline environment, whereas others preferred it the other way around. Even though the participants have rated this scenario quite positive, they do not appreciate multiple addresses to solve an error for them. In this situation the participants prefer the third scenario.

4.3.5 Stakeholder Evaluation: Polder
Most of the interviewed stakeholders have stated that this scenario has the greatest potential for a successful implementation. In order to achieve this scenario, the technical equipment needs to be aligned and more strict certifications have to be implemented, which function as a filter in order to either allow or reject changes to the system. A standardisation of check-in/ check-out systems and messages, prices and payment would simplify the situation for users, but is expensive to realize. To this end the stakeholders develop products, which are valid at other

operators as well. They believe they do not have to look the same but have to come to a common agreement. The transport operators state that they are already trying to work together as closely as possible. But, according to them, this is not always possible due to different regulations of provincial governments. The regional governments instead do have a different perception on it. They state that the difficulty of collaborating is based on the different interests of the different types of operators.

According to some of the transport operators, the commercial and travellers interests should be more important than the political interests. According to them, a main problem of this scenario is that the transport operators are focussed on long-term achievements whereas the governments of the provinces are more focussed on short-term achievements.
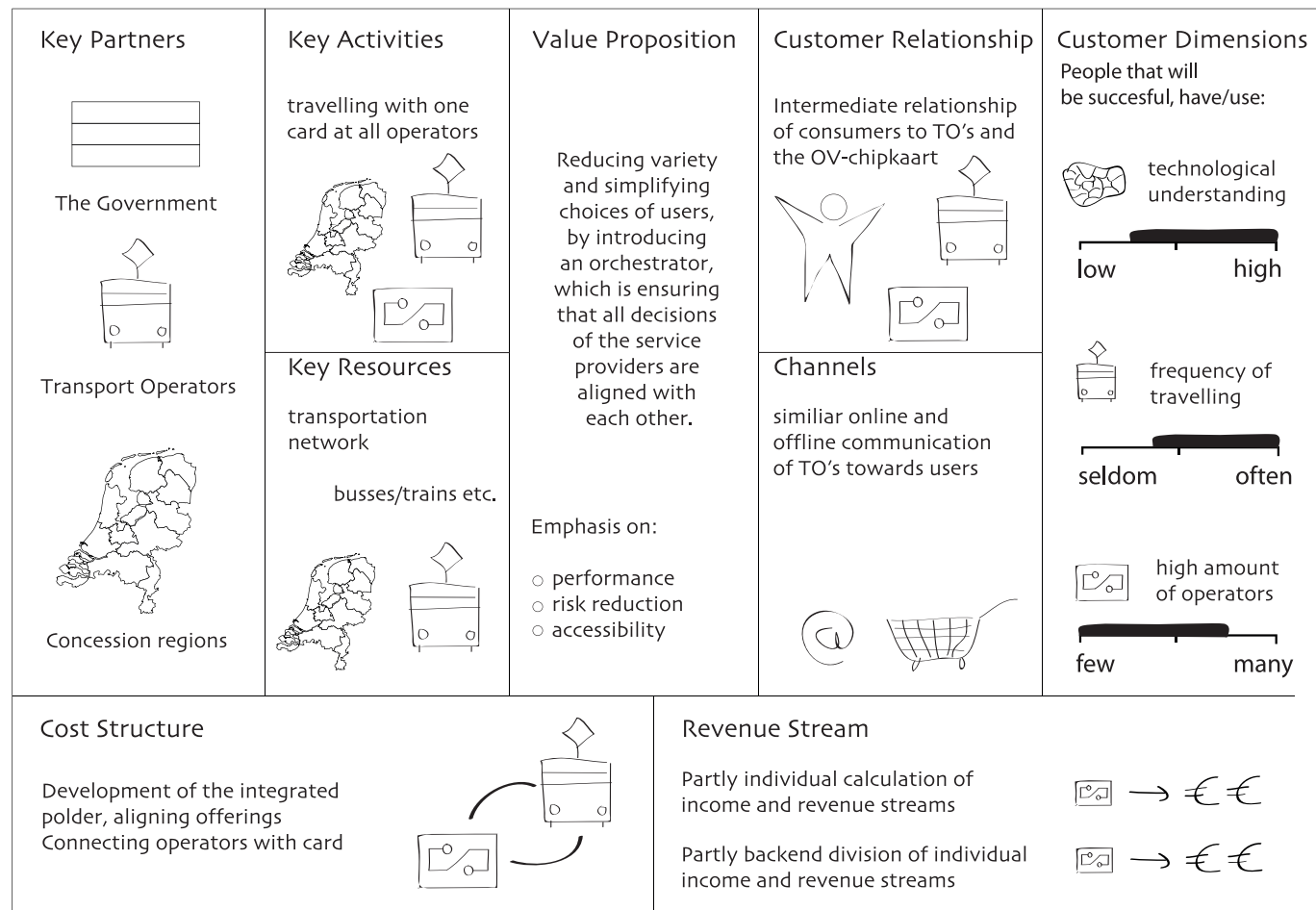
Figure 26. Business Model of the polder
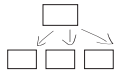
4.4 Scenario 3: The Authority

Value Proposition: Development of a seamless travel experience, by reducing the visible diversity to the user and offering all services by one party.

Basic Idea

The basic idea of the third scenario is to create one brand, which enables users to travel throughout The Netherlands (see Figure 27). Instead of paying NS or Connexxion, the user then will pay with/to the OV-chipkaart. This means that it does not matter any longer with which transport operator a user travels, he can check-in and –out wherever he wants. The financial transactions are taken care of in the back office of the system. Users will make fewer mistakes and if they do so, the system will take care of the solution. International examples, such as London show that such an approach increases the usability for users. However, such an approach has never been applied for a whole country and therefore needs to be investigated in more depth.

Transport operators completly integrated ecosystem

Users
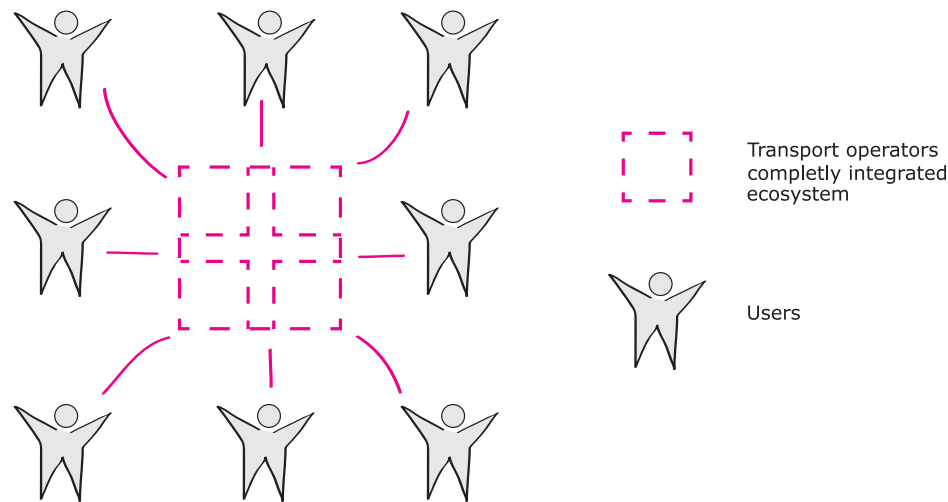
Figure 27. Organizational Structure Scenario Three

A comparable model to the one suggested here is the business model of 'Currence' the uniform payment system of The Netherlands for bank transaction (see Appendix 17). Appendix 16 visualizes the proposed scenario and compares it to the current situation.

Detailed explanation

In order to develop a seamless brand an orchestrator (see Appendix 18) has to take the main responsibility to develop and maintain the brand. The transport operators then would be supporting this brand. In the current situation this task would most likely be performed by TLS or 9292, using the name OV-chipkaart. This would mean an extension of the ov-chipkaart.nl website and the development of additional OV-chipkaart service points. However in the past, TLS did not seem to be interested in more involvement but likes the role of being a card issuer and central processor. The task could also be executed by 9292, which already enjoys the confidence of Dutch citizens. This image could be favourable for the implementation of the 'OV-chipkaart' brand.

In this scenario, the role of the transport operator has moved from the front office to the back office, which means that the transport operators will have a supportive function above all. They will become suppliers for the authority and are no longer direct service providers for the users. The development of one authority and one brand identity related to payment actions, to be implemented throughout The Netherlands, is required. No matter which of the earlier mentioned companies will take the responsibility for maintaining this brand, the existing facilities (such as the service desks) of the operators should be harmonized in order to send one consistent message. The unified standard should be, that each transport operator actively communicates that he supports the OV-chipkaart (see Figure 28). By this the front office will be more recognizable to users. Ticket machines probably have to be replaced, in order to harmonize the (technical) capabilities and visual appearances of the current ones.

Figure 28. Communicating two brands

4.4.1 Effects on OV-chipkaart usage

Here the effects the first scenario has on the users of the OV-chipkaart while getting familiar with the card, searching for the right subscription, travelling with the card or when faced with an error are outlined.

Getting familiar

With the implementation of one authority, the orientation phase will be seamless. With the extension of the OV-chipkaart brand users will only have one source of information when orientating for an OV-chipkaart. Just one website, for example the website of ov-chipkaart.nl, will inform users of the different types of cards and the different available products. For users the development of such a seamless brand means a further simplification of gathering relevant information by for example encountering communication material at stations and elsewhere. The entrance into the system will be simplified by establishing one authority.

Searching for a subscription

The development of a seamless brand does mean a lot of simplifications for users when orientating, searching, comparing and purchasing an OV-chipkaart. It will be easier for users to find the right information, since there is only one source (see Figure 29). Also all information on all products is available on one site/at one service desk, which enables users to immediately create an overview of the relevant offerings. Here it is important that the user will be guided through the website with a supportive tool, in order to give him just the information that is the relevant for him and to not confuse him with special offers.

In an offline environment, users would consult the OV-chipkaart service desks, which will be located at all main stations and in smaller places in mobile busses. Here the employee of the OV-chipkaart knows the advantages and disadvantages of each product and therefore can advise the user, which product to purchase. The service employee also makes use of a supportive selection and comparison tool. By entering information on the personal travel pattern of the user, this tool is able to come up with suggestions and a comparison of them.
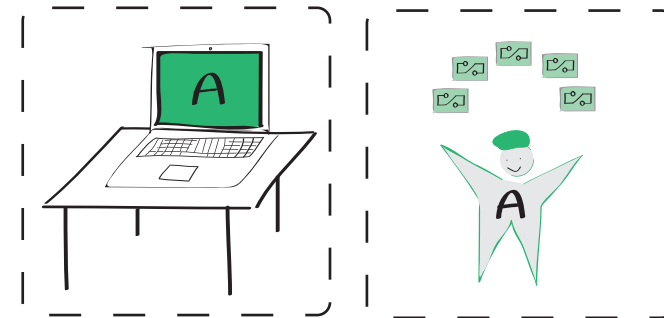
Figure 29. One source of information

Travelling

Travelling will be simplified and becomes a seamless experience. This scenario is based on the assumption that the transport operators will work together when it comes to the financial part and the calculation of travelling costs. As soon as the user is enabled to pay for his journey at each transport operator's validator, insecurity and stress will be reduced for him and he will experience a simplified travelling. In this scenario he for example does not have to select the right validator any longer when checking-in or -out. The goal is to make users feel in charge again, since they actually do understand what is happening and who is responsible.

Error recovery process

The main advantage of scenario three for users is that it does not matter anymore whether they turn to the right party or not when faced with a problem, because they address the authority directly: the OV-chipkaart brand. Here users have only one option where to leave their complaint, which increases their certainty of addressing the right party (see Figure 30). Users will always have to deliver their currently incorrect working OV-chipkaart at the service desk of the OV-chipkaart, where they will immediately receive a preliminary OV-chipkaart, which allows them to travel at the same conditions. In order to get their OV-chipkaart back, they have to return the preliminary card to the service desk. The credit of the card will always stay with the user; at the service desk it will be loaded on the card of current use.
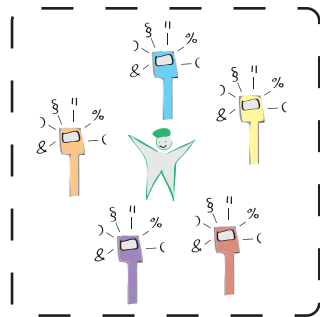
Figure 30. One address to solve each problem

4.4.2 Characteristics of the system

The characteristics of the system are also influenced and will be outlined below considering the following three aspects: communication towards users, products available for users and service provided for users.

Communication towards users

The information send to the users will come from one authority only. This makes the communication much clearer to users and reduces individual effort and costs for the transport operators. Consistent information material has to be developed and implemented, the existing touch points of the transport operators have to be rebranded in order to communicate uniformity towards users.

In order to avoid that users get the impression of the OV-chipkaart brand being a 'monopoly, which does not permit different points of view of e.g. the individual transport operators, a combined branding of transport operators and OV-chipkaart is preferred on all touch points related to payment.

Products available for users

The products, which are available for users will be integrated in this scenario. This means, that they can be purchased at one front office and that users are able to use their product at each transport operator. Single check-in/check-out will be possible within this scenario, since the product offerings do not vary across the operators, in fact the user does not get in contact with the operators, but with the authority instead. When purchasing a product, users then can make use of a selection tool, which helps them to customize their travel product, based on their individual needs and travel behaviour. Figure 31 visualizes what the supportive tool could look like. In order to achieve this, the currently available products have to be reviewed first and reduced and aligned afterwards.
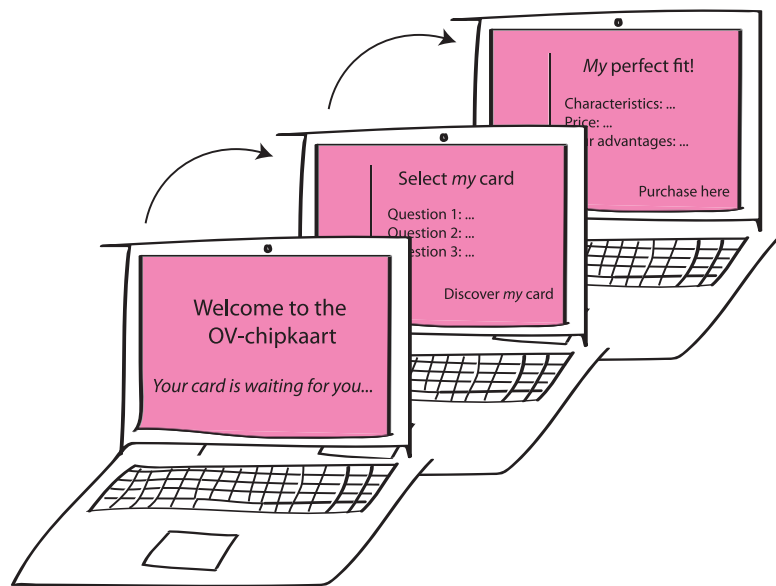
Figure 31. The supportive tool

Besides these tasks, the authority also has to ensure that semi-finished OV-chipkaarts will be available at each service desk and that printers are located at each service desk as well.

Service provided to users
In order to efficiently recover errors the authority, which has an overall knowledge of the product offerings stays in charge of the error identification and develops a solution in cooperation with the transport operators knowledge and experience. The authority will also be responsible for providing consistent and useful information at e.g. the CICO validators in order to support self-service error recovery.

4.4.3 The Business Model: Authority
As mentioned earlier the key partners and key resources are the same as in the previous two scenarios. However the key activity slightly differs. In this scenario it enables travelling by public transportation throughout The Netherlands with one card (see Figure 32), due to an integrated payment system. The aspect of the transport operators can be left aside, since this scenario aims at creating one integrated payment system for all transport operators. Therefore it becomes irrelevant to users with whom they are actually travelling. The value proposition therefore is:

> *Enabling a seamless travel experience by combining multiple offers to one brand/party.*

This value proposition influences the customer relationship extremely. Instead of individual relationships between users and transport operators, users will be closer connected to the brand. In this future scenario, the transport operators will be interpreted (by users) as the medium needed to enable travelling. The brand will communicate to the users via online and offline channels as well.

The two customer dimensions 'degree of technological understanding' and 'number of operators used' are not of importance any more. Since the products are integrated and users have to interact with just one front office, solely the second dimension (frequency of travelling) may further simplify the interaction. Overall this scenario is easy to use likewise for well-experienced and inexperienced users.

Extra cost for the development, communication and implementation of the brand are expected. In order to divide the income, a smart back office has to calculate which revenues belong to which transport operator in order to divide the income.

Key Partners	Key Activities	Value Proposition	Customer Relationship	Customer Dimensions
The Government	Enabeling travelling through NL with one card	Development of a seamless travel experience, by reducing the visible diversity to the user and offering all services by one party.	Develop relationship between users and the OV-chipkaart	People that will be succesful, have/use: technological understanding low — high
Transport Operators	**Key Resources** transportation network busses/trains etc.	Emphasis on: ○ convenience ○ reliability ○ usability	**Channels** Online and offline communication of the OV-chipkaart authority towards users	frequency of travelling seldom — often high amount of operators few — many
Concession regions				

Cost Structure

Development of the authority and communication of it

Revenue Stream

Backend division of individual income and revenue streams

Figure 32. Business Model of the authority

4.4.4 User evaluation: Authority

The participants have rated the third scenario the most favourable. According to the participants the OV-chipkaart system enables them to adapt their journey flexibly if something unforeseen happens. This basic idea can be implemented even better if the transport operators are integrated and if the users just have to turn to one central party instead of multiple parties. Users appreciate the OV-chipkaart as the one card to travel throughout The Netherlands. According to the participants this is already achieved when everything works as it should, however as soon as any complications appear, the user is left on his own.

An improvement of the error resolving process seems to be very important to users, and as this evaluation has evolved, users believe that this scenario has the potential to bring the needed change. Besides this, participants appreciated the idea of one central authority, since the orientation, search and purchasing process would be much easier. One central authority increases their understanding of the OV-chipkaart system and their trust in it, since it is easier to overlook. However, when purchasing a product, users would like to be able to purchase products that really fit their needs. The participants asked for a comparison tool, which selects certain modules for the user and explains the dis/advantages of each module.

4.4.5 Stakeholder evaluation: Authority

The stakeholders have evaluated this scenario with mixed feelings. On the one hand, they are aware that such a system would be most favourable for the travellers, but on the other hand they evaluate the realization of it as being very complex and fear a loss of autonomy. Currently the development points to further decentralisation and in order to achieve this scenario a law would have to be introduced which 'forces' the transport operators to work together. According to the governments, the transport operators would have to make use of the same technical equipment, agree on one supplier, align their products and even more important their tariffs in order to make the third scenario work. Furthermore, they state that the biggest threshold of this scenario would probably be to develop cooperation between the operators, which are currently competing against each other.

According to the transport operators this scenario is most favourable for the travellers, but since the technical equipment of the transport operators differs a lot from one another the realization seems almost impossible.

4.5 Comparison of the three scenarios

Taking the identified requirements into account and transforming them into separate ideas three different scenarios were developed. Each scenario aimed at fulfilling the vision as stated in the introduction:

The Dutch public transport is equally easy to use, enter and understand in an online and offline environment by the diversity of users.

However, since the scenarios mainly differ in their organizational approach (from decentralized to centralized) the translation of the requirements into ideas have different effects on the usage and the characteristics of the system.

In Appendix 19 the effects and characteristics of the system are described along the three factors of human, technological and business considerations. As stated in chapter one, these three factors have to be taken equally into account in order to come up with a sustainable product or service. However, when the OV-chipkaart system was developed the technical and business considerations were taken into account first of all. The user perspective has somehow previously received less attention.

In order to develop a good balance between these three considerations, the human factor is given a weighting factor of three, and the business factor of two. This means that the user related effects and characteristics of the system (as described in Appendix 19) are considered to be three times more important than the technology related effects and characteristics. Likewise, the business related effects and characteristics of the system are considered to be twice as important as the technology related effects and characteristics. This is done to restore the balance.

Whether the described ideas (of each scenario for each user requirement) involve a positive or negative effect for the user, or whether it is easy or difficult to achieve from a technical or business point of view, is indicated in points. One point (positive, easy), half a point (neutral, intermediate), or minus one point (negative, difficult) can be assigned to each idea.

Counting up these points is the basis for selecting the most favourable scenario (from a user perspective) and the most implementable scenario (from a business and technical point of view). The following three tables show the ratings of each scenario.

4.5.1 Evaluation of the platforms scenario

Within the first scenario - the platform - orientation, search, comparison, purchase, getting relevant information, travelling and the recovery of errors is more difficult for the user compared to the two other scenarios. Multiple front offices will provide inconsistent information; the convenience for users is low. However, the organizational and technological development of the back office is easy, for each individual transport operator. The individuality and the product diversity will increase in this scenario. Also the division of income will be easy and there are no high extra costs expected. While the integration of products across transport operators will be low, the innovation power of the separate transport operators will be high, offering customizable products to the user.

	Human	Organizational	Technology	
Information	-1	1	1	
Support Tool	-1	1	1	
Anonymous home	0,5	1	1	
Preliminary card	-1	1	1	
Expect. vs. Exper.	-1	0,5	1	
Recovery process	-1	0,5	1	
Fall back option	-1	0,5	1	
Single CICO	-1	-1	-1	
Top-up/activation	0,5	1	0,5	
Auto fill-in	-1	-1	0,5	
Summary	= -7 x 3 = -21	= 4,5 x 2 = 9	= 7	= -21+9+7 = -5

Figure 33. Evaluation of the platform

4.5.2 Evaluation of the polder scenario

In the second scenario - the polder - the orientation, search, comparison, purchase, getting relevant information, travelling and the recovery of errors will be easier than in the current situation. Multiple front offices will provide consistent information; therefore also the convenience is medium to high for users. The organizational and technological development of the back office needs some adaptations of the current situation. The individuality of the transport operators and the product diversity will decrease. But the product integration will increase. The division of income and the extra costs that emerge at the implementation of this scenario are intermediate. The innovation power of the transport operators and the customization of the products might decrease, but the communication towards the user will be improved.

	Human	Organizational	Technology	
Information	0,5	0,5	1	
Support Tool	1	-1	1	
Anonymous home	0,5	0,5	1	
Preliminary card	0,5	0,5	0,5	
Expect. vs. Exper.	0,5	0,5	1	
Recovery process	1	0,5	1	
Fall back option	0,5	0,5	1	
Single CICO	1	0,5	-1	
Top-up/activation	1	0,5	1	
Auto fill-in	1	0,5	0,5	
Summary	= 7,5 x 3 = 22,5	= 3,5 x 2 = 7	= 7	= 22,5+7+7=36,5

Figure 34. Evaluation of the polder

4.5.3 Evaluation of the Authority scenario

In the third scenario - the authority - the orientation, search, comparison, purchase, getting relevant information, travelling and the recovery of errors will be easier compared to the two other scenarios and the current situation. There will be only one front office, which increases the convenience for users a lot. However the development of the back office will be a demanding task. The individuality of the transport operators and the product diversity will decrease. Also the division of income will get more difficult, and a lot of extra costs are expected to establish this scenario. The innovation power will probably decrease and customizable products are limited in this scenario.

	Human	Organizational	Technology	
Information	1	0,5	1	
Support Tool	1	-1	0,5	
Anonymous home	1	1	1	
Preliminary card	1	1	1	
Expect. vs. Exper.	0,5	0,5	1	
Recovery process	1	0,5	1	
Fall back option	1	1	1	
Single CICO	1	0,5	-1	
Top-up/activation	1	1	1	
Auto fill-in	1	1	0,5	
Summary	= 9,5 x 3 = 28,5	= 6 x 2 = 12	= 7	= 28,5+12+7=47,5

Figure 35. Evaluation of the authority

4.6 Conclusion

This chapter aimed at the development of three equivalent scenarios (platform, polder and authority) for possible future organizational structures of the OV-chipkaart system. In order to do so first an introduction on the underlying vision of the three scenarios was given.

The three proposed scenarios have been evaluated with both users and stakeholders. It can be concluded that users have a strong preference for the third scenario. And after having evaluated the three scenarios with the stakeholders three main conclusions, which all stakeholders agree on may be drawn:

1. The integration of one authority would be the best
2. There should be fewer products
3. Currently the user is the loser of the system

And even though there is no agreement among the stakeholders on what should be done in order to change the current situation concerning these three aspects, it is remarkable that all of them specify the same three main issues. Also when it comes to financing these changes the stakeholders do not differ a lot in their opinions. On the one hand the transport operators are not willing to make yet another investment, and on the other hand the governments insist that the transport operators have to serve their customers and that it is their duty to make the required investment.

It therefore can be concluded that all parties involved want to achieve the same, however taking different approaches. As the different parties cannot come to an agreement, each party tries to improve the system from the own point of view. Thus these actions result in a diverging system even though the parties strive to converge. The current situation therefore can be labelled a 'prisoners dilemma'.

Taking a look at international examples and quoting an interviewee from a project partner it can be stated that: "In all systems across the world we can recognize that the more accessible the system is the more people travel. All international systems have been implemented without governmental subsidies, but based on a commercial business case."

Based on this evaluation and a comparison of the three scenarios the most favourable and implementable ideas are selected, which will be combined in chapter five and lead to the final recommendations for the future organizational structure.

CHAPTER 05: BALANCING POWERS

SIMPLIFIED SYSTEM ADOPTION BY AN INTEGRATED PAYMENT SYSTEM AND ORGANIZATIONAL RESTRUCTURING

5 BALANCING POWERS

The reduction of barriers for system adoption is crucial for the improvement of the interaction with and perception of the OV-chipkaart. This chapter focuses on the description of the final scenario 'balancing powers', which is based on the analysis of the system barriers, and the comparison of the three developed scenarios. The title of the final scenario refers to a balance between cooperation and competition, both required to achieve a sustainable system. It is the balance between cooperation and competition of the operators, which has to be found (Meijdam, 2001).

The final scenario is mainly based on the 'authority model' as users and stakeholders have evaluated it most favourable in many respects. However compared to the authority model the final scenario is slightly changed in order to make it easier to implement.

First the scenario is discussed from the user perspective, highlighting which user benefits the Balancing Powers scenario holds (5.1). Next the scenario is discussed from the business perspective (5.2), zooming in on the service blueprint and business model that should enable the improved user experience. And then the same is done for the required technological solutions (5.3). Also a suggestion for an implementation plan is provided (5.4) and the chapter ends with an overall conclusion on this developed scenario. (5.5).

5.1 User perspective
The primary goal of developing a new organisational scenario is to be able to provide travellers with an improved user experience for paying in public transport in The Netherlands. If the suggestions for changes to the back office are implemented this can contribute to a large extent to achieving the ultimate goal of this investigation:

'The Dutch bragging abroad about how easy and convenient their OV-chipkaart system is'.

Below the primary user benefits of the 'Balancing Powers' organisational scenario are discussed: one digital front office, easy travel product selection, aligned physical front offices, support for error recovery, single check-in/check-out, removal of product activation and initial top-up, automatic fill-in of missed check-outs (see also Figure 37, page 73).

5.1.1 One digital front office
This scenario suggests one digital front office for the users of the OV-chipkaart to interact with. Users would have one point to turn to when searching for general information, information on travel products, on payment, service or error recovery.

General information about the OV-chipkaart, provided by a single party was identified as crucial for the acceptance of the OV-chipkaart. The ability of travelling with one card throughout the country at the same conditions should be the main message of the OV-chipkaart. This scenario suggests to first of all explain the OV-chipkaart system and its advantages via a central website. Therefore the ov-chipkaart.nl website should be extended. it should inform users about the OV-chipkaart in general: What is the OV-chipkaart? How does it work? Where to turn to when facing a problem? This information should also be communicated in the physical travel domain (see Figure 37). Through the website also information on schedules, prices and connections should be provided.

In the proposed future scenario all products can be purchased at the ov-chipkaart.nl website. Also the transaction overview can be downloaded on the website. According to the insights gained from user interviews it is suggested that filters are integrated, by which users can select for example their bus expenses only. The users' desire to receive an

overview on their mobile or in a special program on the computer, since that is perceived as more personal, could be fulfilled easily and it is recommended to do so. But as it is not be the most urgent change it can be done at a later date.

5.1.2 Easy travel product selection
The new product offering is simplified compared to the current situation. Users will be able select a travel product, which suits their personal needs best. It is recommended to enable users to select on a monthly base which kind of reduction they want to have in what kind of vehicle, at what times of the day, and day of the week (see figure 35). These modules can be selected and deselected in an online environment by the users themselves or in an offline environment by the service employees. Depending on their selection, the price for their monthly ticket varies.
Users would also have the possibility to purchase a travel product at

constant conditions for a whole year, which leads to further savings. Offering modules to users instead of pre-developed products makes the system more convenient to users, since it is customizable and besides makes it easier to integrate the product offerings of different transport operators. The OV-chipkaart would then be very flexible and can easily be adapted to the users' changing needs. Once the user has chosen suitable modules they would be automatically loaded on his card at the next check-in.

5.1.3 Daily capping
In comparable systems abroad a daily capping (see figure 36) feature is implemented: if travellers never pay more than a specified budget. This seems a promising user-centered way of offering travellers the reassurrance that they will not pay too much.

Figure 35. Example on how to select modules

Figure 36. Daily capping at €5 (as an example)
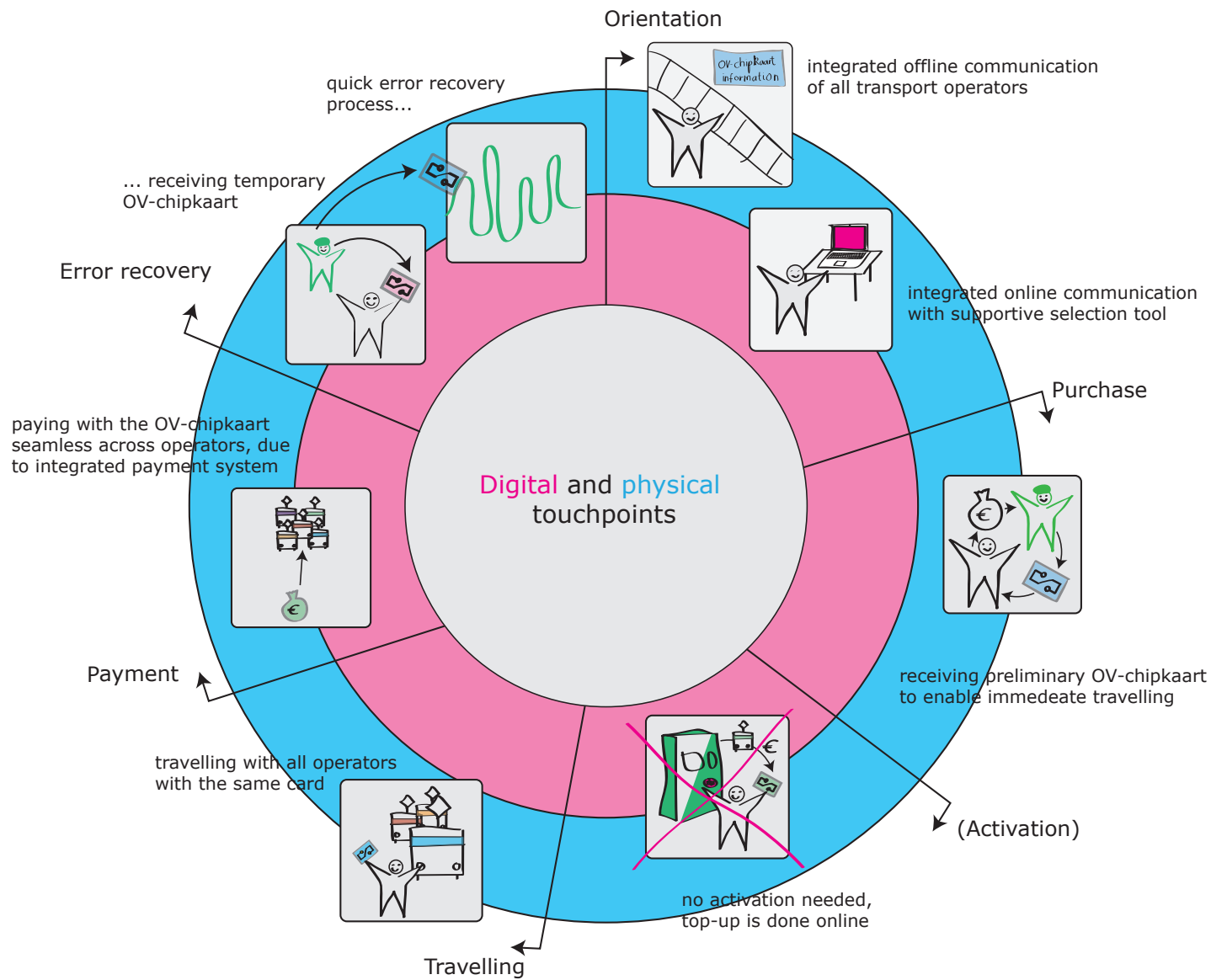
Figure 37: Most important digital and physical touch points

5.1.4 Aligned physical front offices

Next to the online environment, also the offline environment would become more unified. The service desks of the transport operators could remain, however explicitly communicating that they are powered by the OV-chipkaart. Additionally, OV-chipkaart service desks could be placed at all major train stations to provide transport operator neutral information to users and to increase the brand awareness. In order to reach potential users of the OV-chipkaart it is recommended to spread the information also outside the domain of travelling (e.g. at city centres) because not all potential users get in touch with the domain of public transport easily. Therefore it is important to target these 'laggards' at the right place.

In this scenario the OV-chipkaart organisation is the only entity users have to turn to with question or when facing a problem. Of course, users will still travel with different transport operators but when it comes to purchasing the OV-chipkaart, purchasing travel products or paying for a trip users interact with the 'OV-chipkaart'. By whom payment is handled and who manages the scheme should not be a worry to users.

5.1.5 Improved error recovery

Even though users may feel certain about the party they are delivering their complaint to, it often turns out to be the wrong one, due to which the error resolving process takes longer, which can result in expensive travelling. Establishing an 'OV-chipkaart organisation', which communicates to the user to take care of his complaint (reassigning the right party behind the scenes) would improve the current process a lot. Besides this, preliminary and temporary OV-chipkaarts could be issued to users while their actual card gets repaired or replaced. In the future scenario, users will be sure about their own actions, comprehend the error and the process of fault repair and last but not least they will be able to travel at the same conditions meanwhile.

5.1.6 Single check-in / check-out

It is recommended that users check-in when starting their journey and check-out when they finished it. Besides this, users will no longer be bound to check-in and -out at the 'right' operator.

5.1.7 Remove product activation and initial top-up

The research on the barriers that make the system adoption more complex has revealed that users perceive the subsequent product activation as a barrier. Furthermore they would appreciate the convenience of receiving an OV-chipkaart, which already comprises a balance for travelling.

5.1.8 Automatic fill-in of missed check-outs

The analysis showed that users long for best price guarantee. A smart back office will come up to their. Since the data of all transport operators are known at TLS, this back office can identify travel patterns of users. Based on these data missed check-outs could easily and automatically be filled in by the back office. This would improve the customer satisfaction since they will encounter fewer problems.

5.2 The Business Perspective

To be able to provide the desired improved user experience of paying in public transport, the organisations behind the OV-chipkaart will need to implement a number changes to the way they run their businesses. Below it is discussed how the desired new user benefits are linked to the back office, through the Servive Blueprint, and the business model of the OV-chipkaart is discussed.

5.2.1 Service Blueprint

A service blueprint (Schneider & Stickdorn, 2011) has been developed in order to visualize the user actions, the user's interaction with the system and the behind the scenes processes (see Figure 38). A Service
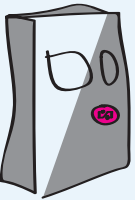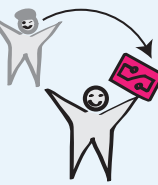
	Orientation	Search & selection		Purchase & travelling		Error recovery		Evaluation
Physical Evidence	Communication material			Ready to travel with personal OV-chipkaart	Ready to travel with anonymous OV-chipkaart	Preliminary OV-chipkaart	Fixed OV-chipkaart	Personal transaction overview on mobile or pc
User Action	Informing onself about the OV-chipkaart ⏎ Q&A with employees	Informing on one website or at one service desk or combination of both ⏎ Making use of selection tool	Selecting and deselecting modules within the selection tool (at service desk with help of the employee)	Online information & online purchase or Offline information & offline purchase or Online information & offline purchase	Online purchase or Offline purchase	Delivering the own OV-chipkaart to the central authority	Receiving and opening letter	Checking in and out
Line of interaction								
Front - Office	Employees are distributing communication material and are actively informing about OVC system	Service employee informs the user about possible options and combinations	Service employee is helping user with the de/selection of modules	Service employee is supporting the information and purchasing process ⏎ Activation of the travel product by service employee	Interaction with ticket machine	Taking in the card ⏎ Providing a preliminary card to the user directly		
Line of visibility								
Back - Office	Developig and printing information on different media	Developing one integrated website ⏎ Development of visual apperance of service desks to ensure recognizability and implementing it	Developing a selection tool ⏎ Implementing the modules	Activation of travel product ⏎ Training of service employees to give consistent information	Ticket machine maintenance ⏎ Sending anonymous OV-chipkaart to users home	Delivering preliminary OV-chipkaart to the service desks ⏎ Sending 'broken' OV-chipkaart to right workgroup to resolve	Sending fixed card to the user with a letter of excuse and explanaition of problem ⏎ De-activating preliminary card after one week	Connecting user actions at CICO to users mobile/pc and inform with 'instant messages' about CICO actions
Line of internal interaction								
Supporting Action	Communication Workgroup: Development of one language and one structure on how to inform and communicate to users		Enabeling customization of products by developing modules users can choose from	Product Workgroup: Generating an overview of the products and development of a reduced offer		Service Workgroup: Identification of cause of error ⏎ Development of preliminary OV-chipkaart	Sending fixed card back to central authority ⏎ Enabeling messages on validators to inform user about de-activation of the preliminary card	Collecting the travelling data

Figure 38. Service Blueprint of a future OV-chipkaart system (back office)

Blueprint illustrates the future interactions of the users with the front office and of the front office with the back office and is a schematic visualisation of the relevant steps of the purchasing process and error recovery. The top row visualizes the physical evidence users receive as proof of their actions. The highlighted block represents the front-end area that is visible to the user. Finally the two bottom rows provide more details of the steps that have to be taken in the back office in order to make the front-end happen. Taken as a whole this service blueprint provides a roadmap for the service delivery.

Simplified travel products portfolio
As mentioned, because currently users experience the travel products offering as too complex, alignment of the product offering is required.

First of all a distinction is to be made between national and regional products. The national travel products should be aligned and reduced to a minimum of required products. Each transport operator would offer the same travel products.

In order to align the regional products and to save development costs it is suggested to develop regional products based on modules. The modules could for example be based on types of reduction (20%, 40%, 100%), five types of vehicles (bus, tram, metro, train, boat), two periods of the day (peak hours, off-peak hours), day of the week (working day, weekend), and type of traveller (age-based reduction or not). Combining these modules with each other, the regional governments would have the ability to serve their individual customer needs, but the system would not get too complex. The modules would be applicable in each region and form a unique travel product based on different combinations.

Daily capping
To enable daily capping at buses, trams and metros an integrated regional tariff system should be introduced,

Supportive comparison tool
The supportive tool has to be developed once the decision on national travel products is made. Based on the travel behaviour it would recommend the best travel product to the traveller.

Concerning regional travel products, the supportive tool would suggest several modules, provide the dis/advantages of each module and leaves the final choice and combination of products by the user (see Figure 39). Thus it would be easy for travellers select a product that really fits their individual needs. Users who do not want to take the effort, can just pick one of the combinations suggested on the website.

In an offline environment, the service employee would inform the customer about the different options. In the suggested future scenario, each product can be purchased in an online and in an offline environment.

5.2.2 Business model
The business model (see Figure 39) describes the different actors and their roles within the recommended future scenario. Besides this it explains who the customers are and how they can be reached. The value proposition of this business model is to 'develop a seamless travel experience by integrating the payment system and reducing the visible diversity to users and by simplifying the system adoption'.

The users of the system would develop a customer relationship with their OV-chipkaart, since it enables them to travel and pay seamlessly in The Netherlands. The customers will be mainly reached via offline information, whereas the purchasing process will mainly be settled in an online environment. Integrating the different offerings of all transport operators, developing one front office users will interact with and create a uniform payment experience would make the system accessible for people scoring the lowest on all three dimensions (having a low technology understanding, travelling infrequently, and making use of a variety of operators).

Key Partners	Key Activities	Value Proposition	Customer Relationship	Customer Dimensions
The Government Transport Operators Concession regions	Development of one online front office Development of a uniform payment system **Key Resources** transportation network busses/trains etc.	Development of a seamless travel experience, an interated payment system and reducing the visible diversity to users and by simplifying the system adoption Emphasis on: ○ convenience ○ performance ○ usability	Develop relationship between users and the OV-chipkaart **Channels** Mainly offline information and communication Mainly online purchasing	People that will be succesful, have/use: technological understanding low — high frequency of travelling seldom — often high amount of operators few — many

Cost Structure

Development of the payment system
Develpment of communication
Costs for technical equipment

Revenue Stream

Division of individual income and revenue streams by credit institute

Figure 39: Business Model

In this business model the operators generate revenue by providing a travel service to travellers, either through subscriptions, single-journey tickets or through a check-in and -out with the OV-chipkaart. In turn, the OV-chipkaart is a service that is offered to the transport operators. Of each transaction that travellers make through an OV-chipkaart a stipulated percentage is reserved for maintenance, innovation and implementation of the OV-chipkaart payment services.

5.3 The technology perspective

In addition to a change to the way business is performed, in order to improve the user experience, also a number of technological improvements have to be implemented.

5.3.1 Single check-in / check-out
To enable travellers to only check in and out at the very beginning and end of their journey, the back office has to calculate the route and the transport operators involved, in order to calculate the price for the journey and to divide the income. Therefore single check-in/check-out could only be realized if the back office accelerates the calculation of journeys and the connected income of the transport operators. With the development of one back-office it is possible to recognize instantly, (due to time and route) with which transport operator the user has been for travelling.

5.3.2 Product activation and initial top-up
In order to enable instant product activation and delete the need for initial top-up it is suggested that the back office always loads the purchased travel product on the user's card immediately. Also each user could decide individually whether he wishes money to be loaded onto the card during the purchasing process.

5.3.3 Automatic fill-in of missed check-outs
The analysis showed that users long for best price guarantee. A smart back office will come up to their. Since the data of all transport operators are known at TLS, this back office can identify travel patterns of users. Based on these data missed check-outs could easily and automatically be filled in by the back office. This would improve the customer satisfaction since they will encounter fewer problems.

5.4 Implementation Plan

For implementation of the reorganized OV-chipkaart system an 8 step plan is suggested with a total time frame of ten years. Figure 42 visualizes the steps, which are briefly explained below. It is suggested that the first three steps would be achieved within a time frame of three years, step four and five would be implemented within five years and step six to eight within a time span of ten years. Within this time frame, the laggards are supposed to join the system as well, due to its simplification. In addition, most of the Dutch would have replaced their first OV-chipkaart by a second one. It is important that these two steps proceed seamlessly so that the system perception improves.

Step 1: Development of the organizational structure
Before starting to implement the back and front office, the underlying organizational structure as described previously has to be developed. In order to do so, the parties involved have to come to an agreement by means of which the role of each party would be determined. It is important to mention, that the proposed final scenario does hold advantages and disadvantages for all parties involved but makes the interaction with the system for users easier and therefore improves the overall perception of the OV-chipkaart and the public transportation system in The Netherlands. In order to achieve this important long-term goal, all parties are expected to accept some short-term disadvantages.

Back-office development

Front-office development

Implementation

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

3 years   5 years   10 years

1 Development of organizational structure

2 Development of one back-office

3 Reviewing and aligning products

4 Development of supportive tool

5 Communication of new OV-chipkaart

6 Implementation of products

7 Rollout of digital and physical identity

8 Exploitation of new system, adding applications

Figure 40: Implementation Roadmap

Step 2: Development of one back office
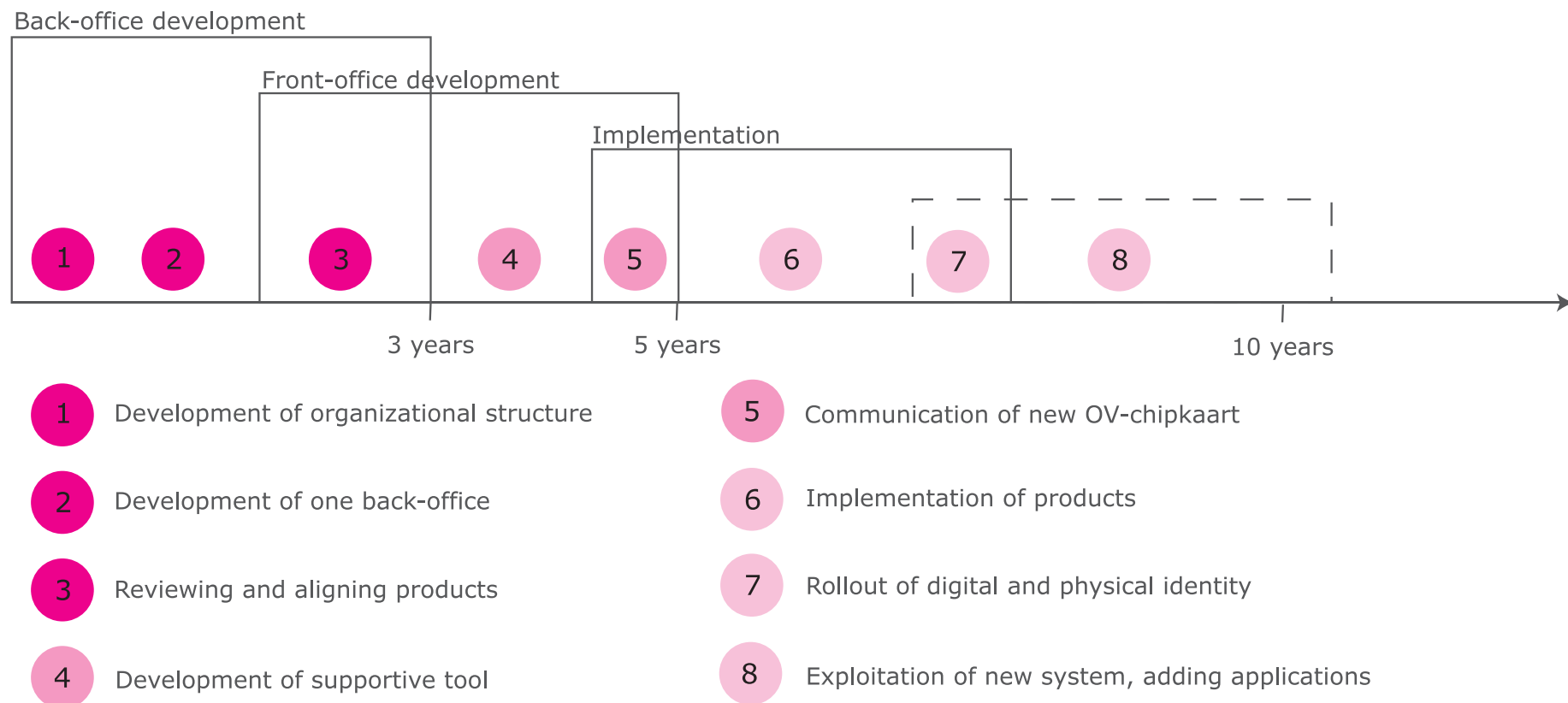Once an agreement on the organizational structure has been reached, the parties have to develop one back-office technically. In order to do so, the businesses have to get together as well. This step is probably the most challenging and some loops between step one and two may occur. The transport operators have to share their data with TLS so that they can develop a joint back office. Furthermore, the future touch points have to be discussed and prepared in order to roll them out in step seven.

Step 3: Reviewing and aligning products
In a third step the national products of the transport operators are reviewed and aligned. It is suggested to split the regional products up into modules to uniform this offer as well. In this step it has to be defined which modules are the relevant ones and which price would be connected to each of the modules. Besides this, it has to be determined, at which price daily capping would be introduced and at what time of the day the income of daily capping and the single step-in-rate would be allocated.

Step 4: Development of supportive selection tool
The products, modules and conditions defined in step three now have to be realized technically. In order to do so, a selection tool for online self-service and a selection tool for employees to support users in choosing the right modules have to be developed. In addition a selection tool has to be implemented into the back office. Besides this, the touch points, such as validators have to be equipped with the relevant information by means of the National Action List.

Step 5: Communication of the new OV-chipkaart
Once the back office has been developed completely, the communication of the new OV-chipkaart system can be initiated. Information such as 'one front office', 'travelling with a best price guarantee', 'daily capping', 'automatic fill-in of missed check outs', 'preliminary and temporary OV-chipkaart', 'one card for travelling in The Netherlands', 'flexible travel

products' and others have to be communicated to users. This would push the image of the OV-chipkaart and beyond that lead to high expectations. This is why it is crucial, that the technical background of the system gets developed first, before communicating it to users.

Step 6: Implementation of products
The developed products have to be loaded into the validators so that the system can deliver the promised features. The current travel products of the users would not function anymore, once the new system is implemented. Therefore the users have to be informed about the new modules that are replacing their current travel product in the future. However, users do not have to worry about an extra step in order to do so. The validators will automatically split up their travel product(s), which makes them applicable instantly.

Step 7: Rollout of digital and physical identity
In a seventh step the rollout of the digital and physical identity of the new authority is realized. The website has to be created and installed, the physical touch points have to get aligned, but also the employees have to be educated in order to communicate one message, and the service process has to be unified. In short, all touch points have to be orchestrated.

Step 8: Exploiting of new opportunities
Once the new system is fully implemented, new payment possibilities can be added to the system in order to further increase the attractiveness of the OV-chipkaart. Examples of current business opportunities are the 'OV-fiets' or the payment with the OV-chipkaart at stations.

5.5 Conclusion

This chapter sketched a future customer journey for travelling with the OV-chipkaart and described and visualized the various touch points. The recommended customer journey requires demanding but realistic

changes in the way the organisations involved run their business and the of the technological platform that enables the OV-chipkaart. The implementation plan that is provided makes clear which steps to take first. In Appendix 20 the storyboard of the movie, which illustrates the final scenario can be found.

This chapter, based on the whole report, illustrated that there are multiple possibilities to improve the system from the user's perspective. These changes require great efforts and investments and a rethinking of the own role of all parties involved. However, the simplification for users to enter the system should be put first, since the users have to be enabled and motivated to use public transportation and do so more and more. Their usage generates income and should therefore be a strong stimulus for the parties involved to work together and establish a good public transportation system in The Netherlands.

In the following chapter the analysis is reviewed, a conclusion on the outcome is drawn and the limitations of the analysis are elaborated. Finally the next steps to take and other recommendations are discussed.

CHAPTER 06: CONCLUSION
DISCUSSION AND RECOMMENDATIONS

6 Conclusion

After having elaborated the final design 'Balancing Powers', this last chapter offers an overall conclusion on the final design and reflects on the user requirements. The findings will be compared to what is stated in literature and the limitations of the project will be discussed. This chapter ends with recommendations on the next steps to take and further gains and insights beyond the main scope of the project.

6.1 Conclusion

Up to now few studies were conducted that investigated the usability of the OV-chipkaart system, which made this investigation necessary. Also the purchasing process has never been studied in depth from a user's perspective. Since the first contact with a new system is of great influence on the overall evaluation, the improvement of the system adoption and the identification of the current barriers are considered to be highly relevant.

From to several studies documented in this report it can be concluded that there is a great difference between the expectations users have concerning the purchasing process of a personal OV-chipkaart and/or a suitable subscription and their actual experiences when purchasing. The experiences are well below expectations, which causes a negative evaluation (of the process and) of the OV-chipkaart and its system in general. It is therefore crucial that this initial contact is designed to be seamless. Within the purchasing process four main barriers can be identified which cause the gap between expectations and experiences. These barriers manifest themselves in the information load provided by different operators, the lack of support to guide users towards a good decision, the general knowledge, understanding and assumptions users have towards the functions of the system, and finally in the costs for the card and travelling.

These barriers have been translated into user requirements and led to the development of three equivalent scenarios (platform, polder and authority) for possible future organizational structures of the OV-chipkaart system. Those three scenarios range from a decentralized to a centralized approach in order to explore the possibilities of the system in different contexts. Since users as well as stakeholders agreed on the statement that one authority would be best from a users' perspective and that less travel products would simplify the purchasing process, these two statements formed the basis for the development of the final scenario 'balanced powers'.

The final scenario, which focuses on a balance of the parties involved, enables cooperation and competition at the same time. Cooperation is important to achieve a reduced variety and to simplify the processes for users. The final scenario suggests realizing the cooperation by establishing a central authority that sets certain rules for the players. On the other hand competition is also important in order to establish a system that is constantly improving and in doing so is not depended on one party only. The central authority doesn't take full responsibility but rather gets advice by the other parties involved. Besides this, the payment system is out sourced to a neutral party. These changes of the tasks of the different parties involved eventually lead to an improved system adoption for users due to greater cooperation within a competitive environment.

6.1.1 Reflection on the reduction of identified barriers

Reflecting on the identified barriers of understanding, information, support and monetary related problems it can be said that the scenario 'balanced powers' achieves an improvement of all of these barriers. Due to the centralization of the system, the information will be structured better, which increases the understanding and a supportive tool will lead

the user through the selection process (taking all offers into account). Furthermore an integrated payment system and unified travel products will cause less usability problems and foreclose unexpected costs. The alignment of the back offices results in a reduction of user handlings and can also step in, when the user makes a mistake, for example forgets to check-out. And finally, the increased communication between operators enables a quicker error recovery process, which again reduces costs and inconvenience for travellers.

6.2 Discussion

When the Ov-chipkaart first was developed the two most important things to achieve were: (1) to reach a decentralized system in order to enable innovation and (2) to improve the security on stations by a closed system. The second point is still not completely achieved, since it soon became clear that it is too expensive to develop a closed system. In order to achieve it The Netherlands had to invest in gates at each station, which was a totally different situation to that in London and Hong Kong where the gates were already available due to the previous magnet stripe ticketing system. However the electronic ticketing system reduced fare dodging.

Consequently the achievement of the first point, the decentralization of the system got into the focus even more. A decentralized system seemed favourable, since the competition between the parties is enforced, which can lead to more innovation, creativity and lower prices. An important step to achieve this liberalized system was the 'Public Transportation Act of 2000' in which the responsibility for a reliable public transport and the development of travel products is handed over to the regional governments.

It is surprising to realise, that, when the system of the OV-chipkaart was first theoretically developed, the cooperation (next to the competition) of the parties involved played an important role, too. But somehow this idea got lost during the practical implementation. In the beginning the role of TLS was designed quite differently from what it turned out to be. As it could be revealed from multiple interviews and from the literature, TLS was expected to have a gate-keeping role, thereby enabling cooperation between the operators.

In 2011 the Meijdam commission stated that the competition between operators also has a major downside, which is the lack of cooperation. It is the balance between cooperation and competition of the operators, which has to be found. As this study focuses on the user and his requirements, naturally the cooperation is evaluated to be more important than the competition.

One of the main focus points is to improve the usability of the system especially since it became a technology-based self-service system. This approach is new to the Dutch travellers and therefore needs experience, education and fall-back options in order to reach a positive evaluation of the system (Reinders et al.). Probably too many changes were done at the same time, which led to an insufficient implantation of the system and a more negative evaluation than it deserved.

6.2.1 Limitations of the study
As a limitation of the study it can be mentioned that the findings as documented in this report are mainly based on qualitative research with sometimes a limited numbers of participants. The findings should be verified by running more elaborate qualitative studies, investigating the fit of the proposed changes with peoples needs, desires and capabilities.

6.3 Recommendations

Even though it is recommended to implement the complete final proposal, there are some parts, which could be implemented by the operators themselves, contributing to a better system adoption. These parts are the development of a preliminary and temporary card, the

abolishment of the necessity to activate products, the channels via which personal and anonymous cards are sold and the development and proper communication of transport operator's individual selection tools.

The development of a preliminary and a temporary OV-chipkaart is important in order to let users benefit from their product from the first day on (preliminary) and in case it is not working properly (temporary). Users will perceive this as a service offered by their transport operators and reward the action with a positive evaluation.

The abolishment of the necessity to activate the travel product will probably not be perceived as an extra service, but it will certainly help to overcome the feeling users have now, that this necessity was only introduced by the operators to make more money due to the users mistakes. Within the back office of each operator such a pre-activation is easy to achieve.

The channels via which the different types of OV-chipkaarts are sold are not conform to the expectations and needs of different types of users and should therefore be thought about again so as to eventually reach more potential users.

And finally the development of a supportive selection tool is recommended to each transport operator who did not introduce it so far. This would make the process much easier to users and also increase their evaluation of the operator, which is important in order to become a consumers preferred operator. This may become relevant for example when it comes to winning new concessions. Those operators who already have a supportive selection tool, should make an effort to communicate it better, since in the perception of nearly all participants, none of the operators offers a supportive selection tool so far.

Besides these changes, which would be initiated by the operators, it

is recommended that the role of the OV-chipkaart website either gets extended (all products available on that site) as suggested in the final scenario 'balanced powers' or minimized to maintain the own OV-chipkaart only (no product purchase). It is strongly recommended to decide in favour of the first option since users currently expect the site to fulfil the role of a 'neutral advisor' and a 'platform' where all information is united. Not fulfilling the expectations of users will always lead to a negative overall evaluation of the service.

6.3.1 Gains and insights
During the creative session it was given thought to the incentives, which would make the system more attractive to users. Since the insights collected during the session cannot be regarded as strong findings it is recommended to collect further input and ideas on possible incentives. As the incentives were a bit out of the scope of the project they were not elaborated in more depth. According to the creative session five main incentives on three levels were identified. On the first level the improvement of information and the price of the OV-chipkaart are partly achieved by decreasing the identified barriers. The incentives on the other two levels, i.e. making the travel experience more personal, enable social interaction and extend the function of the OV-chipkaart are certainly domains worth to elaborate in more detail. These incentives can on the one hand create business opportunities for the companies and on the other hand increase the value of the OV-chipkaart to users.

During the interviews with the stakeholders it became obvious that each party has certain assumptions about what the other parties are thinking and what their position is. Even though many of these assumptions were right, some also were not. Therefore it is recommended that the communication between all parties should be improved. It is not only important that the transport operators communicate with each other, but also that the communication across different roles will be intensified.

Besides this, the decision making process currently seems to be slowed

down by political interests and considerations (both on a governmental and a corporate level). Obviously political interests do not enhance neither the speed nor the quality of decisions. It may be worthwhile to investigate how the future development of the OV-chipkaart can be less subjected to political maneuvres of all parties involved..

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APPENDIX

Appendix 1 Initial Assignment

The TU Delft OV-chipkaart graduation lab focuses on developing integral future solutions for user-centred electronic ticketing (e-ticketing) used by public transport in the Netherlands.

During nine months, three Master of Science students from the faculty of Industrial Design Engineering identified which usability problems travellers encounter and developed solutions to solve these problems.

In the first three months the students analysed the Dutch context, studied users and international examples and combined their insights in order to formulate three individual design briefs. The solutions generated within the graduation lab are looking three, five and ten years ahead and take into account the existing infrastructure, positions of the different stakeholders and the benefits for the traveller.

Important stakeholder groups are: public transport operators, governments, and consumer organisations. This project is supported by the Permanente Structuur, the provinces (IPO), metropolitan areas (SkVV), Rotterdam public transport operator (RET), Dutch railways (NS) and travellers' association Rover.

Problem statement
We observe that some travellers have problems with understanding how to use the OV-chipkaart, with anticipating the consequences of their actions and at times lack the knowledge of the requirements for obtaining an affordable valid ticket. This can increase insecurity for some travellers and cause stress, discouraging public transport usage by some people.

Vision & Mission
We envision an OV-chipkaart system that is easy to understand, helps the traveller with their journey, and sets the worldwide standard for ease-of-use public transport ticketing.

The mission of our project is to improve the OV-chipkaart e-ticketing system to such a degree that Dutch people when travelling abroad will share proud positive stories about it.
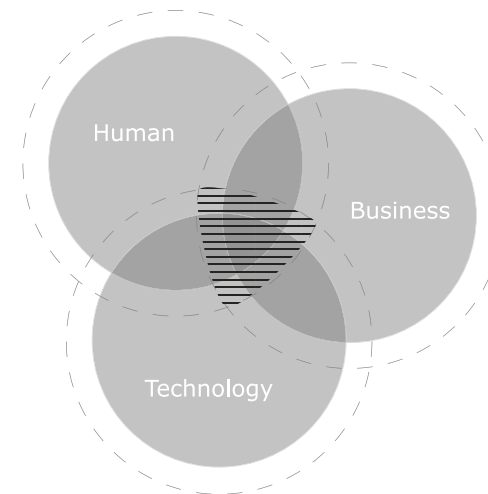
Figure 1. Overlap forms 'sweet spot' for product innovation

Aim

The aim of this first analysis is to determine the (unused) OV-chipkaart possibilities, and problems.

The main focus is the perspective of travellers and the identification of elements that could be improved for them. In order to come to a good overall user-centred product or service, it is important to take into account the business and technology side as well. The human, business and technology factors are of great influence on product, service and product-service development. As Figure 1 illustrates, the three circles overlap with each other and form one sweet spot where business considerations, user needs and wants, and technological requirements are equally taken into account.

Human-centred design, as described by IDEO (2009), starts with investigating what is desirable for the users, and thereafter investigating what is technically feasible and viable for the organization involved.

Research questions

The questions cover the three areas mentioned before: user, business and technology.

Questions related to the users of the OV-chipkaart; the travellers:
- What are relevant properties of travellers?
- What is the traveller group segmentation?
- How do travellers experience the OV-chipkaart, what causes this?
- What touchpoints do travellers encounter?

The organizational and business side:
- Who are the stakeholders and what are their interests?
- What were, and are, the roles of the stakeholders during development, implementation and management of the system?

Technology:
- How does the OV-chipkaart system work?
- How does the OV-chipkaart work compared to other e-ticketing systems?
- How does the technology influence usage?
- What are the technical opportunities and restrictions?

Appendix 2: Qualitative research

The conducted analysis is based on qualitative research. Instead of collecting a lot of data and to create statistics, this research aims at collecting rich insights and understanding the thoughts, expectations, attitudes and processes of people. These insights are obtained by talking to people, observing them in their natural behaviour, conducting semi-structured interviews, and by interpreting textual material (Malterud, 2001). Qualitative research aims at partial understanding of a certain phenomenon and developing more questions while conducting the research (Kvale, 1983). Following this approach, the researcher gains deeper understanding of the latent knowledge and understands what people know, feel and dream (Sleeswijk Visser, 2005). Whereas quantitative research aims at obtaining as many descriptions as possible in order to gain data, qualitative research aims at collecting rich data about the studied interaction (Kvale, 1983).

Possible problems with qualitative research may include interview bias, leading questions, wrong analysis of the data and skewed interpretation meaning. However, qualitative research goes beyond a surface understanding of people and their interactions with products and services (Kvale, 1983).

Literature asserts that a deep understanding of the people who will ultimately use the product (or service) is required in order to design a product that serves their needs, satisfies their expectations and provides them with a pleasant experience (Jeffries and Miller, 1998 as cited in Kanis, 1999 & Sleeswijk Visser, 2009). Furthermore, literature suggests that quantitative data provide useful information such as performance, time and total number of errors (John, 1998 as cited in Kanis, 1999) but is not supporting designers in creating usability-focused design (Kanis, 1999). Since this project aims at improving the usability of the OV-chipkaart, this analysis is conducted qualitatively.

Appendix 3: Comparison of paper tickets with the OV-chipkaart

Category	Paper tickets	OV-chipkaart
Usage flexibility	Unable to change destination after ticket purchase/validation	Flexibility to change destination after check-in
Travel advice	Operator personnel is able to offer advice based on the destination on the ticket	Operator personnel is not able to offer advice based on the destination on the ticket
Payment method	Paper ticket only, ability to buy tickets in advance	Need to purchase card and deposit money; add value for travelling, ability to add value for multiple journeys; more expensive single journey bus and tram tickets available
Payment method	Always necessary to bring sufficient money if you need to buy a ticket	Ability to link a card to a bank account for direct deposit
Expense overview	Have to keep track of travel patterns and expenses yourself	OV-chipkaart provides overview of travel patterns and expenses if you have an online account
Expense visibility	Travel expenses are visible on the ticket and the tickets are physical	Travel expenses are visible at points of system interaction and available online after processing time
Business data	Incomplete business data available for revenue division, service optimisation and government subsidy distribution	Detailed business data available for revenue division, service optimisation and government subsidy distribution
Gates	Harder to open station gates with one key throughout the Netherlands	Easier to open station gates with one key throughout the Netherlands
Distribution	More Strippenkaart distribution points with a person to help you (Trouw, 2005)	Fewer OV-chipkaart distribution points, mainly self-service (OV-chipkaart.nl, 2013)
Fares	Harder to change fares and only on a coarse level	Easier to change fares and on a detailed level
Fare structure	Pay per zone for busses, trams and metros	Almost always pay per kilometre for all modalities

Orientation

Lack of information overview
Information regarding the acquisition of an OV-chipkaart, travel products, usage and customer service is distributed by different organisations. Some of the participants find it hard to determine which organisation is the one they should turn to in order to get information about the OV-chipkaart or to solve their problem. As a result users spend a lot of time in finding the right information or they give up because (they expect) it takes too much time.

OV-chipkaart components
The OV-chipkaart itself is a 'card' onto which one can put 'travel products' that may or may not be used with a 'transport operator' in a 'concession'. To understand the differences between the components and the items in these component categories can be difficult for people. Most travellers want to get from place A to place B and have little patience for artificial concession boundaries, business reasons for season ticket limitations or technical obstacles preventing one from moving freely. The idea of adding 'travel products' to a 'card' and the fact that these products have an effect on the fare seem to confuse people. Travel products and cards used to be the same and inseparable. Apart from the invisibility of the travel products the fact that some transport operators distribute cards that look as if they only (are able to) contain one product, makes the distinction hard to explain and understand. People try to simplify their ideas about the OV-chipkaart system and will come up with wrong explanations for why things happen; based on the few interactions they think they understood.

Internet reliance
For a particular group of people the difficulties expected to access the web and the lack of ability to navigate complex websites is limiting their usage of the OV-chipkaart and thus public transport. Most transport operators have reduced the amount of service desks, limited the matters to be handled at these desks and introduced charges for people using service desks. Depending on other people to navigate public transport ticketing makes some people feel dumb and incapable, reducing their willingness to use public transport at all.

Purchasing

Inconsistent man-machine interaction
Man-machine interaction of OV-chipkaart hardware is different per machine and operator: screen layout, information, terminology and available options seem to differ highly without any apparent reason to the user. Ticket vending machines offer a range of tickets and sometimes just a few. At some machines users can purchase an anonymous OV-chipkaart, at others you cannot. Some machines will allow users to load travel products you bought online, while others do not.

Payment methods
Available payment methods differ per machine, per location, per operator. The most common available method is PIN and second is coins. These are, for example, often unsuitable for tourists, who are more likely to possess a credit card or not-supported debit card.

Spread out purchase process
The process of buying, for example, a personal OV-chipkaart requires the user to find information about where to buy it, to visit the OV-chipkaart website, fill out the purchase form, upload a digital portrait picture, wait for delivery, charge the balance, and activate the national train travel product. These are many steps at different moments in time and at different locations before one can use the card.

Activation

Product activation

Users now have to buy their 'travel product' at one location and 'activate' it at another place. This new and unfamiliar concept of split purchase and activation makes it difficult to understand what actions have to be taken at which places.

Cards are not activated for national trains by default

Any OV-chipkaart is ready for use in a bus, tram, metro or regional rail, but only cards purchased at the NS are directly ready for travelling with the national trains. Many users are unaware that they will have to activate their OV-chipkaart and will conclude that "it just does not work for the train".

Product pickup points

If you order a travel product online, you will need to 'load' it on your OV-chipkaart to activate it. Operators have installed product pickup devices all over the country, but many people still do not encounter a pickup device in their regular routine (surroundings?). Furthermore, one has to remember the necessary steps if one encounters such a device. Most of these pickup devices have a suboptimal design and are difficult to operate because of the display and interface quality.

Credit charging

The deposit for trips with the national trains is 20 euro for anonymous cards, an amount of money many people consider too large to idly put on a card. Most people accept that it is needed, but do not necessarily understand why or appreciate.

Unknown required trip deposit

At check-in, the validator takes a deposit the amount of which currently depends on the modality and the operator. In the future, the extent of the trip deposit might change from service line to line.

This means that the minimal amount of money that is needed to travel is unpredictable for the user, resulting in validators not accepting cards while travellers expected to be able to check-in.

Check-in

Validator

Validators from different transport operators provide varying feedback when travellers check-in or -out, sometimes confusing users about what the fare is and what the trip deposit is. Many validators also have screens hard to read, due to low contrast, bad typography, or the height and angle of the display. Some validators are less readable than others, causing boarding queues and users are not sure whether the machine is working.

Card status

An OV-chipkaart does not show whether it is checked-in, whether it is using a travel product or how much money is loaded. This invisibility makes people uncertain and reduces trust.

Train transfer

Transferring from one train operator to another train operator requires the traveller to checkout and check-in again. While this is less of a problem on trams and busses because those use onboard validators, it is confusing people at stations. Forgetting to check-out and -in during a transfer, but only at the endpoint of a trip, will in the worst case result in two deposit deductions.

Error solving

Room for error solving is very limited when validators deny an OV-chipkaart. Usually the traveller wants to take the next vehicle but may not when solving the error takes too much time. Charging a card might not be possible if there is no machine around and a blocked card will require the purchase of a new one.

Check-out
Forgetting
Users have to remember a lot of things while travelling and checking-out is just one of the things to be kept in mind. Especially if the point of check-out is unenforced and away from the vehicle, the traveller has already moved-on in his thinking process beyond the end of the trip.
The financial risk of not checking-out forces people to undertake actions to fix these Situations; something people consider to be cumbersome and difficult.

Time limits
Checking-out is only possible within a certain time frame, after which the system assumes you have forgotten. In some cases this assumption is wrong and hinders the traveller, who now needs to arrange a refund.

Flat fare
Some fields of public transport work with a flat fare, such as ferries and night busses, but the OV-chipkaart does not accommodate this yet. Travellers are required to check-in and -out, resulting in the confusing situation of two validators side by side, which you have to use both to complete your payment before you board a ferry.

Customer service
Who to address
The many organisations involved with the OV-chipkaart have different responsibilities and capabilities. For travellers it is difficult to determine which organisation to contact for customer service. For example, requesting a refund needs to be done at the right operator, while hardware problems with a card are always handled by TLS no matter by which operator the card was issued.

Checking expenditure
Keeping track of travel costs is less accessible now than it was in the past. Having an online overview of trips—if you know that this is possible and have activated it—saves time, but is not necessarily easier for people to understand.

Slow card replacement
A broken card takes days, if not weeks to be replaced and usually requires sending it in by mail. In the meantime, travellers often have to cover their cost and hope for a refund afterwards. This decreases the trust in the system.

Distance based
Most of the customer service is only available by phone and this distance based customer service sometimes makes the participants feel trapped if the problem is hard to explain. The lack of personal service makes people feel left behind.

Operator specific rules
Different operators have different rules and routines for refunds and other customer service issues. Transferring knowledge a user gained during one interaction to another one is often impossible.

Balance refund (for tourists)
Reclaiming the credit balance from an OV-chipkaart that isn't used anymore is possible at service desks for amounts under 30 euro. Users will need to have a Dutch passport or identification document, making this option unusable for tourists who would benefit in fact the most from this offer.

Pricing
Initial cost of the OV-chipkaart is higher, especially compared to the paper tickets, which had no initial cost. A family with four children to buy six cards for 7,50 euro each and charge them with
20 euro each before they can go on a train trip. This sets the family back € 165, a considerable investment.

Appendix 5: Design Brief

General information

Title of Graduation Project: Improving system adoption of the OV-chipkaart
Chair of Supervisory Team: Dr. ir. J.I. van Kuijk
Department / Section: Industrial Design / Applied Ergonomics and Design
Mentor of Supervisory Team: Ir. E. Roscam Abbing MSc
Department / Section: Product Innovation Management / Management and Organisation
Company name: Faculty of Industrial Design Engineering
City & Country: Delft, The Netherlands
Company Mentor: Dr. ir. J.I. van Kuijk
Start date: 01-01-2013
End date: 31-05-2013

Content
Introduction: The OV-chipkaart is an electronic ticket, currently used in The Netherlands for all regional and national transportation. During its introduction it became clear that the OV-chipkaart suffers from a number of usability issues. This is the reason for the OV-chipkaart Graduation Lab, an initiative of TU Delft in collaboration with transportation operators (RET, NS), the travellers' association (ROVER), and national and regional government bodies (Ministry of Infrastructure and Environment, IPO, SkVV). The overall goal of this project is to improve the public transport e-ticketing system for travellers in the Netherlands. A design vision with horizons at 3, 5 and 10 years will be created.
The outcome of this project will most likely be a design for a product-service system. The OV-chipkaart is a very innovative product, which holds great potential for users and the companies and distinguishes The Netherlands from other countries by being the first country to implement a nationwide electronic travel card system.

Analysis: One of the usage issues that surfaced during an analysis usage of the OV-chipkaart was the first contact that travellers have with the OV-chipkaart, the image they create of the OV-chipkaart due to their first experiences and the expectations they have prior to acquiring a (new) card.
It is assumed that an improvement of this first usage phase will have a positive impact on the overall perception of the OV-chipkaart. Either simplifying the entrance in the system and/or providing additional benefits of using the system could achieve this.
Providing travellers with more relevant information and a better customer support in the pre-travelling phase seems a promising way to improve users' feeling of empowerment. Simplifying and enabling the purchasing process and communicating the positive characteristics of the OV-chipkaart, would reduce the barrier for people to buy a card, enable them to select travel products (i.e., subscriptions, tickets) they benefit from and increase their confidence in the system and their own actions.
Besides this, the OV-chipkaart is currently perceived by many users as compulsory in order to be able to use public transportation. Users do not want to have the OV-chipkaart but need the OV-chipkaart, which may provide the feeling of being forced into a system. Increasing the incentives, which trigger users to enter the system, will be a positive contribution to the perception of the system.

Problem definition: The main user issues related to the interaction with the OV-chipkaart are insecurity, uncertainty, stress, and a feeling of powerlessness towards the system. These feelings mainly occur due to (perceived) financial disadvantages, a lack of information and poor customer service. These problems are present in all phases of travel, from pre-travelling (e.g. orientation, purchase), to travelling (e.g. check-in, interchange), and post-

travelling (evaluation). These problems seem to decrease traveller trust in the system.

Assignment:

Improving the OV-chipkaart product-service system adoption, by facilitating a satisfying pre-travel experience, in order to increase customer satisfaction and trust of the system.

In this assignment it will be explored how to offer users a seamless, unified travel experience (with a focus on pre-travel), which enables users to quickly and easily identify the proper information sources, and whom to turn to when encountering a problem. Besides exploring how the current system could be improved, it will be explored as well how the value proposition of the OV-chipkaart system can be extended in order to make the system more attractive to its (future) users.

After having analysed the system dimensions that influence the adoption of it, the most promising and relevant limitations of the current system adoption will be translated into possibilities to improve it. About three scenarios will be developed based on these insights, which will be evaluated on business, technology and human aspects. This argumentation in addition to a user testing will lead to the final scenario. This will then be finalized, stakeholder benefits will be formulated and a roadmap for 3, 5 and 10 years from now on will be created.

Research questions:

→ How can the product service system be improved to facilitate user satisfaction?
→ What are the limitations of the current system adoption?
→ How can the entrance of the system be simplified?
→ How can the usages of the system become more attractive to (future) users?
→ What are the dimensions that influence the adoption?
→ How can these dimensions be adapted in order to improve the overall system adoption?

Planning:

The project will be finished within an approximate timeframe of 20 weeks starting from the 1st of January 2013, which sets the end of May as intended point of completion. The graduation project will start with a two-folded analysis on how to decrease the difficulties to enter the system and on how to increase the attractiveness of the system. The most important dimensions will be redesigned in order to increase system adoption and will be supported by an analysis of the stakeholder benefits.

Deliverables:

→ A service-blueprint for the OV-chipkaart that improves and increases system adoption
→ A report that explains the research findings and which describes the process of how those findings are translated into a repositioning strategy
→ A public, oral presentation of the project
→ A1 poster giving an overview of the outcome of the project

<u>Approval</u>
Date of approval:

Signature of Chair:

Appendix 6: Quantitative study - Personal vs. anonymous OV-chipkaart

Some users of public transport have an anonymous chipkaart and most of the users have a personal one. But, are they aware of the differences? Have they made a conscious purchasing decision, and if yes what was it based on? In order to find answers to these questions a qualitative online survey has been conducted to find answers to the two research questions:

- What do users base their purchasing decision for an anonymous or a personal OV-chipkaart upon?
- Are users aware of the differences of personal and anonymous OV-chipkaarts?

Procedure
The participants who filled in the questionnaire had to answer the questions: Do you have an OV-chipkaart? What kind of OV-chipkaart do you have? Why have you chosen this particular one? And what do you think are the main differences between a personal and an anonymous OV-chipkaart? Based on the answers given it can be concluded why users select the particular type of card.

Participants
The online questionnaire was spread in the personal network. In total 50 participants contributed to this research. The participants all had an OV-chipkaart, either personal or anonymous.

Results
45 of these 50 participants already owned an OV-chipkaart. 40 only own a personal OV-chipkaart, 5 only own an anonymous OV-chipkaart and 4 participants own both types of the OV-chipkaart.

The reasons for having a personal OV-chipkaart are: getting discount (20 participants), having a student OV-chipkaart (12 participants), being able to automatically top-up the card (5 participants), and to be able to declare the travel expenses (3 participants). Figure 2 visualizes the results.
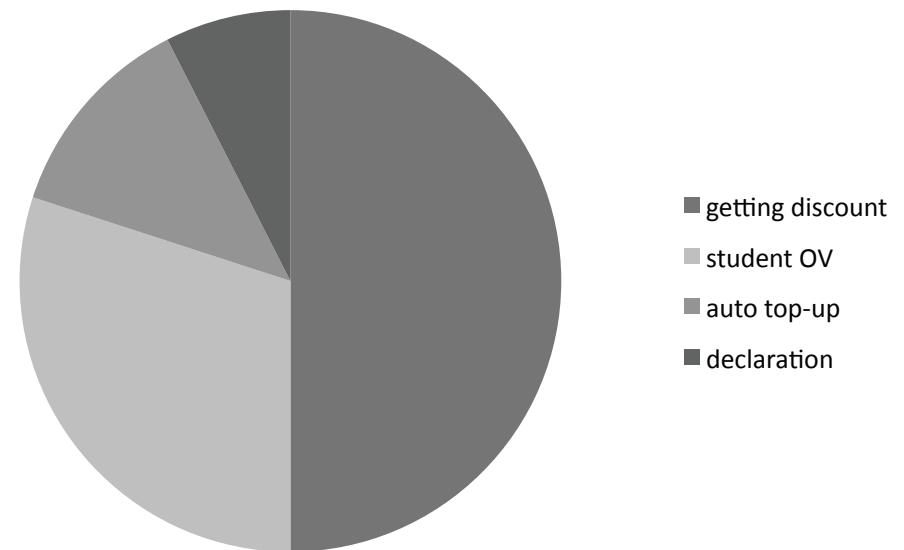
Figure 2. Reasons for owning a personal OV-chipkaart

One of the 5 participants that indicated to have an anonymous OV-chipkaart bought it as a replacement for the personal one in case this one gets lost, one person had an anonymous card before having/receiving the personal one, one person wanted to travel anonymously and two indicated they kept an anonymous OV-chipkaart for potential visitors. Figure 3 visualizes the results.
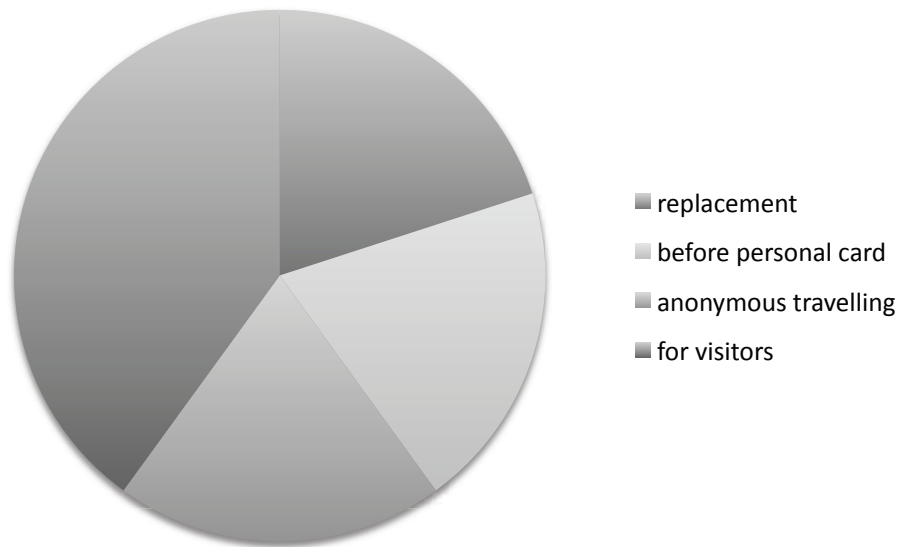
Figure 3. Reasons for owning an anonymous OV-chipkaart

- replacement
- before personal card
- anonymous travelling
- for visitors

Most of the participants (14) mentioned that the difference between the anonymous and the personal OV-chipkaart is that the personal one enables the user to keep track of the own travel behaviour and provides an insight into the costs. 13 participants mentioned that the possibility to load products on the personal OV-chipkaart and the consequential discount on traveling makes the biggest difference. Seven people said that the difference lies in the ability to automatically top-up the personal card, and six people said that the difference is that the anonymous card has no picture on it. Four participants said that the anonymous card is easier and quicker to purchase and that everybody can use it. Two participants said that the anonymous card enables anonymous travelling, that the personal OV-chipkaart looks nicer and that it provides the user some extra advantages such as the OV-fiets. All of them said that the personal OV-chipkaart is less likely to get stolen, that it allows

unlimited travelling, and that it offers discount to family and friends as well. One person said that the difference between the personal and the anonymous OV-chipkaart was the graphic design only. Figure 4 visualizes the results.

- declaration and track of journeys
- products and discount
- auto top-up
- A-card has no picture
- easier and quicker to purchase
- anybody can use A-card
- anonymous travelling
- P-card looks nicer
- extra advantages with P-card
- P-card less likely to be stolen
- P-card offers unlimited travelling
- dicount for family and friends with P-card
- grafic design
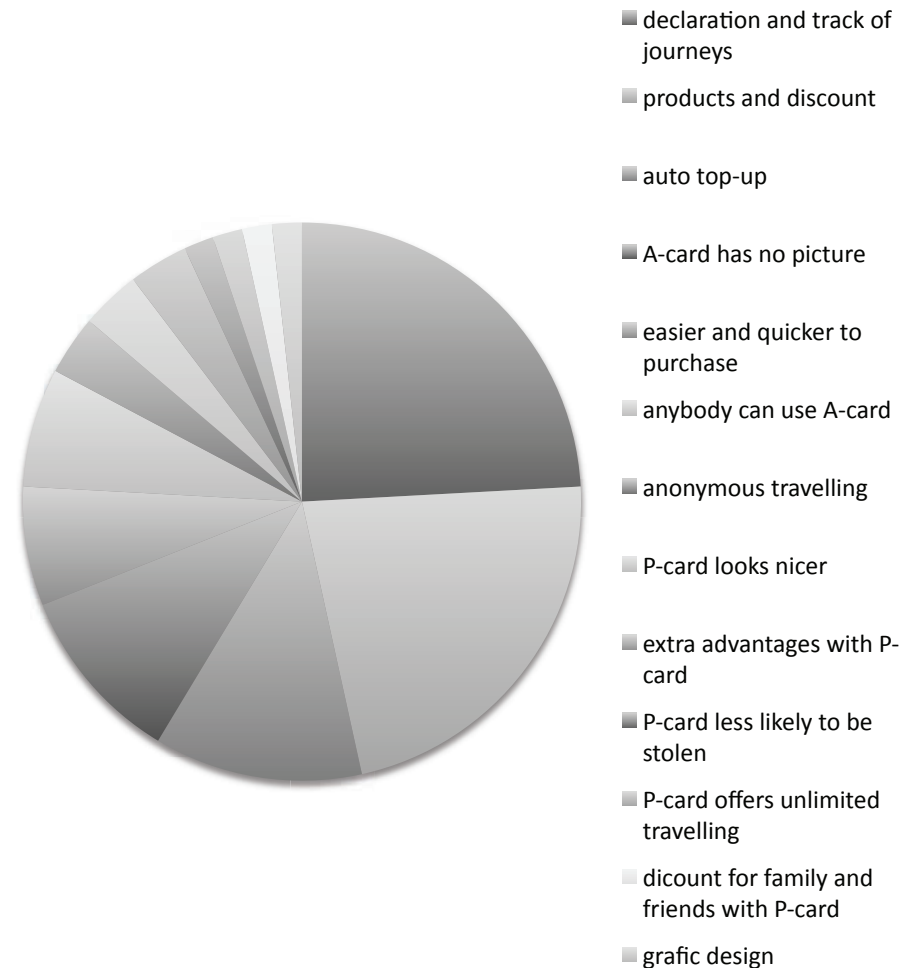
Figure 4. Main differences between an anonymous and a personal card

Appendix 7: Qualitative study - Expectations vs. Experiences

The main research question of this study is:

- Which gaps can be identified between the experiences and the expectations of users?

The understanding and identification of those gaps is considered as important in order to focus on the real problems users encounter, when redesigning the purchasing process.

This Appendix is subdivided into two main parts. The first part investigates the expectations users have when purchasing a travel product for of with an OV-chipkaart. The second part focuses on the experiences users have when actually doing so.

Part 1: Expectation Map

First the expectations users have when purchasing a travel product are investigated, therefore the research question is:

- What are the expectations of users when purchasing a personal OV-chipkaart and when purchasing a travel product?

Expectation Map: Participants

In total 16 participants contributed to the research, eight Dutch and eight non-Dutch people. The list below shows, how they have evaluated themselves on the three dimensions, technology understanding, number of operators they are using and the frequency of travelling. Based on these answers these participants have been selected.

	Technology Understanding	Number of operators	Frequency
Participant 1	Low	Low	Medium
Participant 2	Medium	Low	Low
Participant 3	Medium	Medium	Medium
Participant 4	High	Medium	High
Participant 5	High	Medium	Medium
Participant 6	Low	Low	Low
Participant 7	High	Medium	Low
Participant 8	Low	Low	Low
Participant 9	High	Low	Low
Participant 10	High	Low	High
Participant 11	Medium	Low	Low
Participant 12	High	Low	High
Participant 13	High	Medium	Medium
Participant 14	Medium	High	High
Participant 15	Medium	High	Medium
Participant 16	Low	High	Medium

Expectation Map: Method

The participants were provided with an expectation map (see Figure 5). They were asked to write down their expectations as to the system, the actions they believe they have to take and the expected outcome related to each step within the customer journey.

| search | comparison | decision | online environment service desk | purchase | waiting time | card arrival | activation | online top-up retail | usage |

What is your goal you want to achieve in this phase?

Steps you take to achieve this goal in an online and offline environment

Expected degree of difficultie to achieve your goal
☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
low   high

How could this phase be simplified? (e.g. supporting online/offline tools)

Importance to succesfully finish this phase
☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆ ☆☆☆☆☆
low   high

How much time are you willing to spend on this phase?

What if this phase would not be a part of this purchase process any longer? (Improvements/Drawbacks)

Figure 5. Empty expectation map

Expectation Map: Results

The following ten paragraphs provide a summary of the expectations participants have of each step within the purchasing process. Since some questions have not been answered by every participant, the total number of answers may differ across the questions. The overall expectation map, which combines all insights in one map can be found at the end of this description.

Search

When searching for an OV-chipkaart and/or a product 10 participants indicate that their goal is to get an overview about the offer (see Figure 6), whereas 5 participants said that it is their first goal to understand the concept of the OV-chipkaart, what it has to offer and how it can be used. Another 5 participants want to find the cheapest option and a ticket that fits their needs best. Nine participants expect to start searching online on Google, ns.nl or ov-chipkaart.nl, however 4 people out of sixteen also indicated that they would go to a service desk first or rely on word-of-mouth recommendation. The searching phase is expected to be doable but effort is required. All participants would appreciate information, as from service personnel, advertisement at the station or an overview of temporary offers. Five people clearly indicated that they would like to have one central point of information. Eight participants are only willing to spend less than fifteen minutes on the search; another six participants are prepared to search up to 30 minutes.

Comparison

In the comparison phase eight people stated that they want to find the cheapest option only (see Figure 7). Five participants indicated that they want to select the product that fits their needs best. Two people stated that they would also compare the OV-chipkaart with international examples to get an idea of the overall usability of the card. Most of the participants expect their criteria to be: price, reductions, advantages and temporary offers. Ten participants expect the difficulty of the comparison phase to be average or slightly above average. Therefore, people again mentioned that they would expect a comparison tool (6 participants), a central website or platform which is able to do the comparison for them (3 participants), or they simply expect clear choices in general (3 participants). Eleven participants expect not to spend more than 15 minutes on this step.
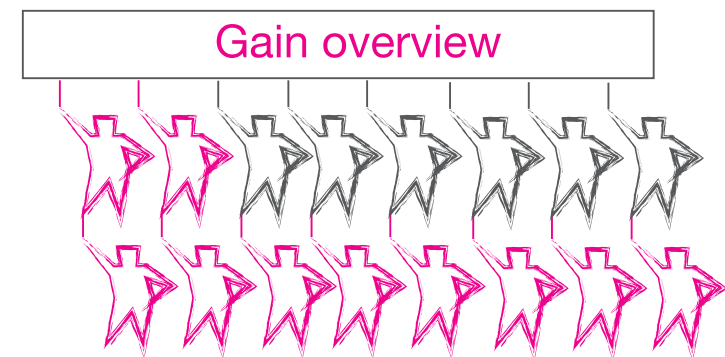
Figure 6. Main goal of the search

Figure 7. Finding the cheapest option is most important when comparing

Decision

Within the decision step the main goal seems to be to get the best offer (see Figure 8). Ten participants have mentioned this. Six other participants indicated that their main goal in this phase is to be sure about the own decision. The means to achieve these goals vary from trusting word of mouth, selecting the best fitting product based on own comparison, asking at the service desk or to simply choosing the cheapest option. The expected degree of difficulty varies highly. Again, participants would expect a comparison tool, clear information and personal advice, when it comes to deciding. Seven people indicated that they are only willing to spend less than five minutes on this step.
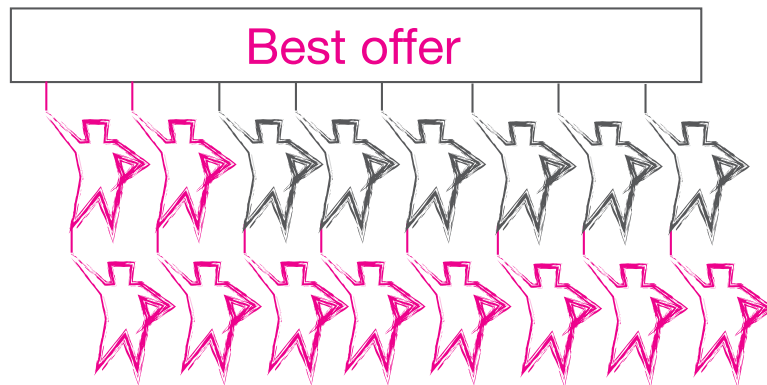
Figure 8. Being sure about the own choice is important to most of the participants

Environment

When it comes to choosing an environment, seven participants indicate that they simply go for the easiest location to purchase a card (see Figure 9). Since most of the participants expect to search online, for them buying online is the easiest place. However, some participants expect that when having a doubt on a certain product, they would go to the service desk first. It is expected that both cards (the personal and the anonymous card) can be purchased in an online and offline environment. Ten participants have rated the expected degree of difficulty to select and go to the purchasing environment as quite low and expect to spend less than five minutes on this step. Four people expect that purchasing the card at the station would mean that they are immediately able to use the card. For them this expectation is the main reason to purchase offline. One person also expects a digital chipkaart instead of physical one.
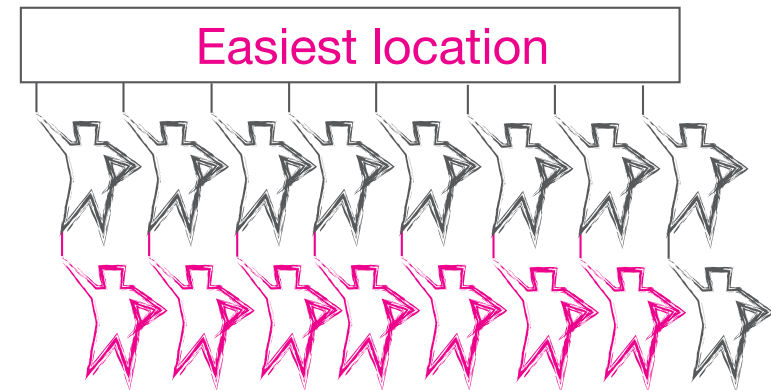
Figure 9. Location is chosen on convenience

Purchase

When purchasing the card, five people said that within this phase it is their goal to receive the card and four people said that their goal is to use it immediately (see Figure 10). Most of the participants would purchase the card by the means of online banking (11 participants), expect this to be very easy (12 participants), and that it will take them less than 5 minutes (13 participants). Nine participants said that the importance to successfully finish this phase is very high.

Receive card, use instantly
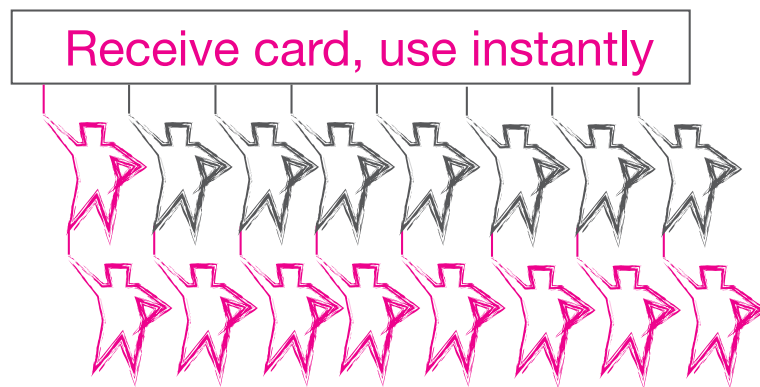
Figure 10. Receiving the card and using it instantly are the main expectations when purchasing

No waiting time (all participants)

Figure 11. None of the participants expects waiting time

Waiting Time
None of the participants has a goal when waiting for the card, they indicate that they do not expect and do not want to wait before being able to actually use the card (see Figure 11). Therefore the waiting time should be as short as possible or other options should be offered in order to use the card earlier. Thirteen participants said that they do not want any waiting time at all. Six people would expect to receive the card immediately and to make use of it instantly. The other ten participants consider a waiting time between 1 and 7 days as acceptable, however 5 participants said that there should be a possibility to make use of the purchased reduction immediately, by providing a temporally card which can be collected for example at the station.

Card Arrival
Four people mentioned that they expect that once the card arrives at their home that they can use it immediately (see Figure 12). This step is expected to be very easy by almost all participants, since it does not require any action from the user's side. The participants therefore rate the importance that the card arrives as relatively high.
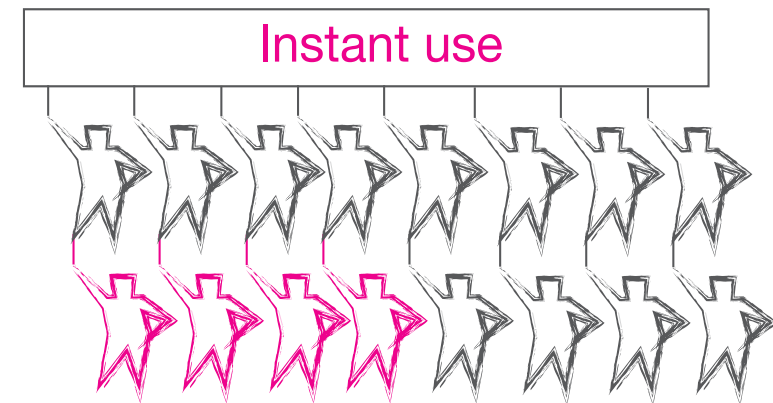
Instant use

Figure 12. Four participants would expect instant usage to be possible

Activation

Nine participants do not expect any activation step at all (see Figure 13), seven participants expect an activation but assume that it is very easy to do. In order to activate the card nine participants indicated that they would go to a ticket-selling machine, whereas three participants said that they have no idea where and how to do it. Half of the participants (8) expect this step to be very easy. Eleven participants expect to spend less than 5 minutes on this step and that it should not take more time.

Already activated card
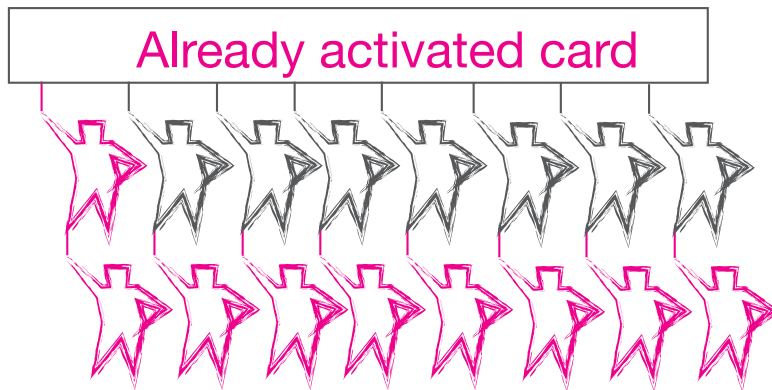
Figure 13. Most participants do not expect to activate the card

Top-up

The participants involved in this research either indicated that they expect to top-up their card (8 participants) with the goal to have money on their card or to be able to travel (6 participants). Eight participants expect that this can be done at a ticket machine at the station, that it will be easy/or quite easy to do (11 participants) and done within 5 minutes (15 participants). Six people expect that this step can already be done when purchasing the card (see Figure 14), three people expect themselves to decide for automatic top up.
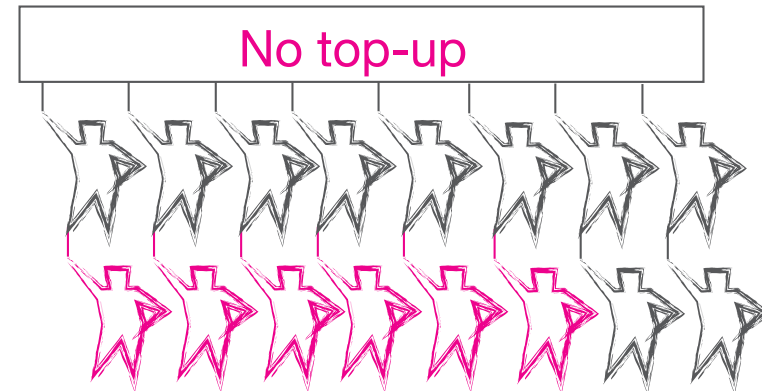
No top-up

Figure 14. Six participants do not expect that it is necessary to top-up their card

Usage

For the participants of this investigation the goal of using the card is to travel cheap and easy (see Figure 15). In order to do so, nine participants said that they expect that a check-in is required. Eight participants rated this final step as very easy. Four people expect that it is possible to check-in/-out inside and outside of each vehicle.
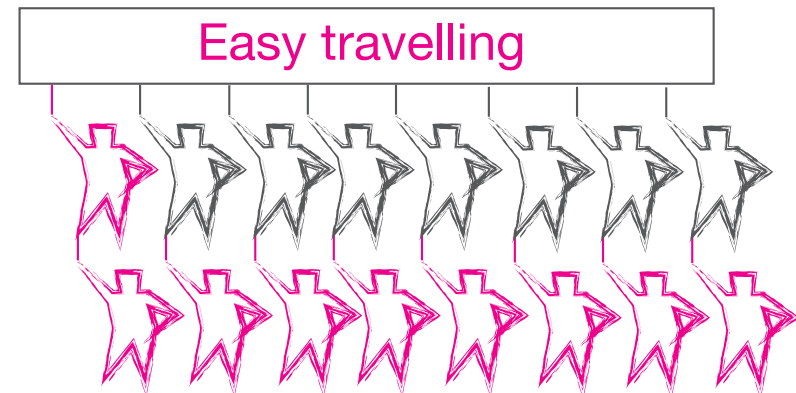
Easy travelling

Figure 15. Easy travelling is expected

Expectation Map: Overview of the given answers
This expectation map (Figure 16) provides an overview of the problem
areas within the purchasing process from a user-based perspective.

Figure 16. Expectation Map summary

Expectation Map: Conclusion

Concluding it can be said that the expected degree of difficulty is quite low. The participants estimated that the first three steps of searching, comparing and deciding would not take longer than 30 to 40 minutes.

Besides this, participants expect the search and comparison steps to have supportive elements, which reduce the amount of products one can choose from. Participants mentioned comparison tools, personal advice, clarified choices, and assistance to calculate the cheapest product. According to the participants' expectations, each product/card can be purchased in an online and in an offline environment.

Generally spoken, participants do not expect a waiting time (even though most of them understand the necessity of it), and therefore no arrival of the card at their homes.

Participants indicated that should a waiting time be necessary it would only be acceptable if it does not take longer than one week and if in the meantime the purchased product could be used already (e.g. by collecting a temporary card at the service desk of the transport operator).

The participants also do not expect the step of activation, they do not understand the necessity, say that it is extra effort for them, which they do not want to take. Also the first top-up is not expected by most of the participants and according to them should be integrated in the purchasing process already.

Travelling is expected to be easy and quick. Overall, it can be stated that participants expect less steps than those included in the current purchasing process and expect to pass the remaining steps in an easy and quick way.

Part 2: Experiences

Second, the experiences users have when purchasing a travel product are investigated, therefore the research question is:

- What are the experiences of users when orientating and selecting a suitable travel product?

Experiences: Participants

In total 8 participants contributed to the research, all Dutch. The list below shows, how they have evaluated themselves on the three dimensions, technology understanding, number of operators they are using and the frequency of travelling. Based on these answers these participants have been selected.

	Technology Understanding	Number of operators	Frequency
Participant 1	High	Medium	High
Participant 2	Low	High	Medium
Participant 3	Medium	Medium	Low
Participant 4	High	Medium	Medium
Participant 5	Low	Medium	High
Participant 6	High	Low	Low
Participant 7	High	Low	Low
Participant 8	Medium	Medium	High

In the second part the experiences are analyzed. In order to do so the participants are confronted with a 'real-life' scenario of a product-purchasing situation. The scenario describes a situation the participant has to place himself into: the living situation and the travel pattern of the person. The participant is asked to select the most suitable travel 'product' for his/her scenario. The scenarios can be found in Figure 17-21.

Scenario

Imaging you are living in Hasslet. In Hasslet you mainly use the bike, since it is a smaal village. Currently you go twice a week to Enschede and three times a week you go to Groningen both for your work as a freelancer. However, since you are a freelancer your working relationships never last longer then two month and you don't know yet where the next job will be.

Find the cheapest subscription / the most advantageous subscriptions for yourself. Describe the steps you have taken and argue why this is the most suitable option for you. Also indicate what you found easy going and where you were having troubles.

Thank you for participating!

Figure 17. Scenario 1

Plataanlaan 173
Groningen

Karimatastraat 2
Enschede

De Marke 3
Hasselt

Transport operators and their concessions

January 2013

Arriva (Deutsche Bahn)
Connexxion (Transdev/BNG)
Hermes (Connexxion)
Qbuzz (deels NS)
Syntus (Keolis)
Taxicentrale Renesse
Veolia
EBS (Egged Group)
GVU (Connexxion)
GVB
HTM
HTMbuzz (HTM/Qbuzz)
RET

**Kennisplatform
Verkeer en Vervoer**

Chosen 'product' for the national train + costs:

Chosen 'product' for the regional train + costs:

Chosen 'product' for the bus/metro/tram + costs:

Scenario

Imagine you are living in Brielle and you are working in The Hague. You go to The Hague every day and you usually travel within the peak hours. Besides this you travel to some other cities in the Netherlands, however you do not travel very often. Probably about 5-10 times a week. You have just turned 65.

Find the cheapest subscription / the most advantageous subscriptions for yourself. Describe the steps you have taken and argue why this is the most suitable option for you. Also indicate what you found easy going and where you were having troubles.

Thank you for participating!

Transport operators and their concessions

January 2013

- Arriva (Deutsche Bahn)
- Connexxion (Transdev/BNG)
- Hermes (Connexxion)
- Qbuzz (deels NS)
- Syntus (Keolis)
- Taxicentrale Renesse
- Veolia
- EBS (Egged Group)
- CVU (Connexxion)
- GVB
- HTM
- HTMbuzz (HTM/Qbuzz)
- RET

**Kennisplatform
Verkeer en Vervoer**

Conradkade 69
Den Haag

Turfkade 48
Brielle

Chosen 'product' for the national train + costs:

Chosen 'product' for the regional train + costs:

Chosen 'product' for the bus/metro/tram + costs:
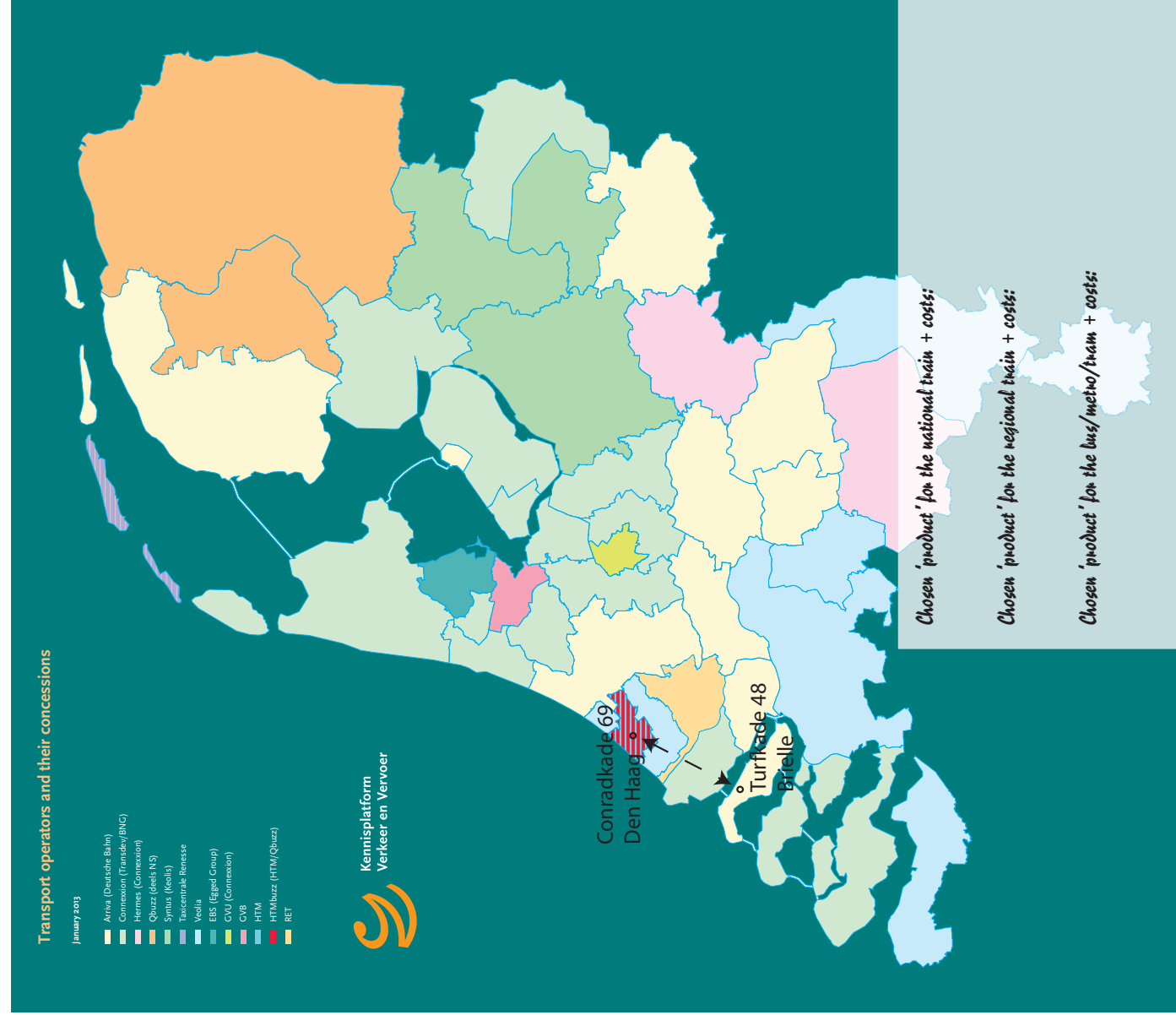
Figure 18. Scenario 2

Scenario

Imagine you live in Roermond and you work in Eindhoven. Since you have flexible working times you can travel outside the peak hours. Only on monday you have to be at your work at 9:00 in order to be able to attend the week opening. Also on friday evening you have to travel in the peak hours, because on fridays you have to stay longer to attend the week closing session. When you are at home you often use the bus, for travelling inside and outside of Roermond.

Find the cheapest subscription / the most advantageous subscriptions for yourself. Describe the steps you have taken and argue why this is the most suitable option for you. Also indicate what you found easy going and where you were having troubles.

Thank you for participating!

Figure 19. Scenario 3

Chosen 'product' for the national train + costs:

Chosen 'product' for the regional train + costs:

Chosen 'product' for the bus/metro/tram + costs:

Transport operators and their concessions

January 2013

Arriva (Deutsche Bahn)
Connexxion (Transdev/BNG)
Hermes (Connexxion)
Qbuzz (deels NS)
Syntus (Keolis)
Taxicentrale Renesse
Veolia
EBS (Egged Group)
GVU (Connexxion)
GVB
HTM
HTMbuzz (HTM/Qbuzz)
RET

**Kennisplatform
Verkeer en Vervoer**

Adelaarshorst 20
Roermond

Busonilaan 2
Eindhoven

Scenario

Imagine you live in Winterswijk. Four days a week you go to Apeldoorn to your work. You have to start working at 8:00 o'clock in the morning and you leave Apeldoorn at 18:00. Since you don't owe a car you go by public transport. Each saturday you go with the whole family (mother, father, two children and one dog) to Vreden in order to visit the market and to do some shopping there. On your free day, the market is also open in Vreden so often visit to the market on that day as well. But then you go on your own.

Find the cheapest subscription / the most advantageous subscriptions for yourself. Describe the steps you have taken and argue why this is the most suitable option for you. Also indicate what you found easy going and where you were having troubles.

Thank you for participating!

Transport operators and their concessions

January 2013

Arriva (Deutsche Bahn)
Connexxion (Transdev/BNG)
Hermes (Connexxion)
Qbuzz (deels NS)
Syntus (Keolis)
Taxicentrale Renesse
Veolia
EBS (Egged Group)
GVU (Connexxion)
GVB
HTM
HTMbuzz (HTM/Qbuzz)
RET

Kennisplatform
Verkeer en Vervoer

Vreden

Nikkelweg 30
Apeldoorn

Piersonstraat 2
Winterswijk

Chosen 'product' for the national train + costs:

Chosen 'product' for the regional train + costs:

Chosen 'product' for the bus/metro/tram + costs:
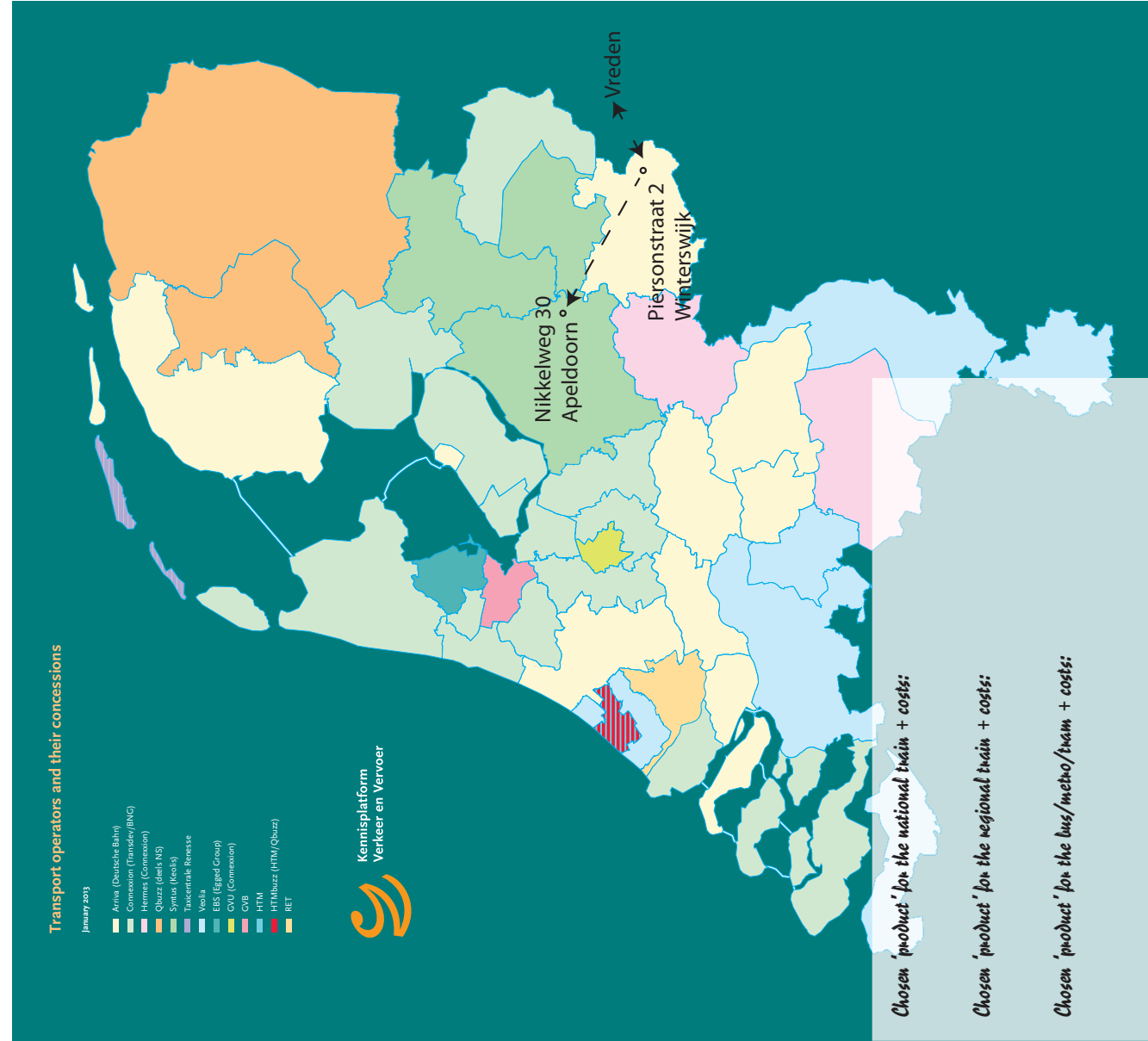
Figure 20. Scenario 4

Scenario

Imagine you are living in Utrecht. You work in Amsterdam. Five times a week you travel to Amsterdam and back. Eventhough you have flexible working periods you try to be in Amsterdam between 8:00 and 10:00. Normally you leave Amsterdam at 19:00. Every tuesday you stay in Amsterdam until 22:00 to attend a sports class. On friydays you often stay in Amsterdam for a night out as well.
Every sunday you are visiting your parents in s'Hertogenbosch.

Find the cheapest subscription / the most advantageous subscriptions for yourself. Describe the steps you have taken and argue why this is the most suitable option for you. Also indicate what you found easy going and where you were having troubles.
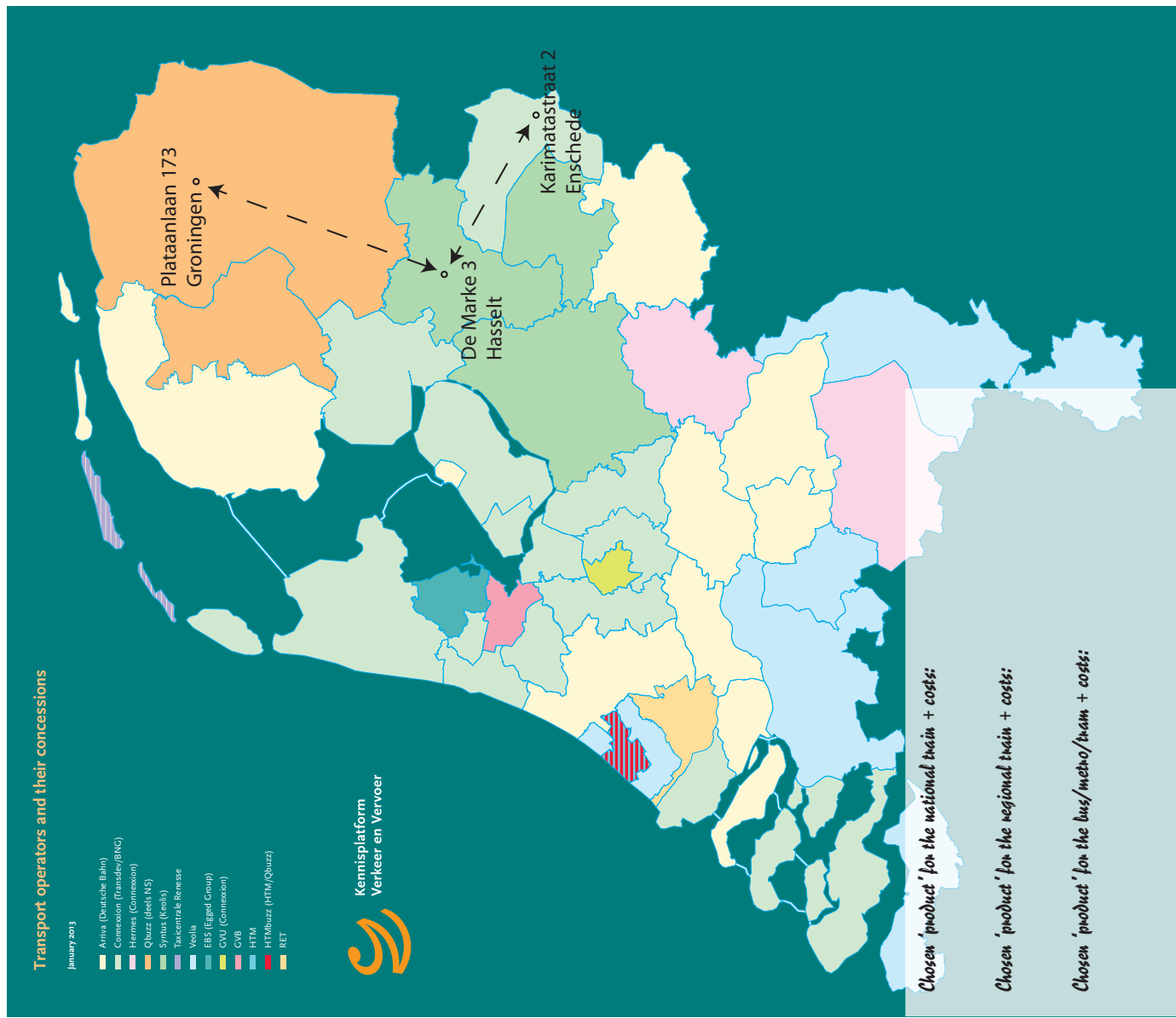
Thank you for participating!

Transport operators and their concessions

January 2013

Arriva (Deutsche Bahn)
Connexxion (Transdev/BNG)
Hermes (Connexxion)
Qbuzz (deels NS)
Syntus (Keolis)
Taxicentrale Renesse
Veolia
EBS (Egged Group)
GVU (Connexion)
GVB
HTM
HTMbuzz (HTM/Qbuzz)
RET

Kennisplatform Verkeer en Vervoer

Chosen 'product' for the national train + costs:

Chosen 'product' for the regional train + costs:

Chosen 'product' for the bus/metro/tram + costs:

Tuinstraat 238 Amsterdam
Beneluxlaan 70 Utrecht
Jan Heinsstraat 21 s'Hertogenbosch
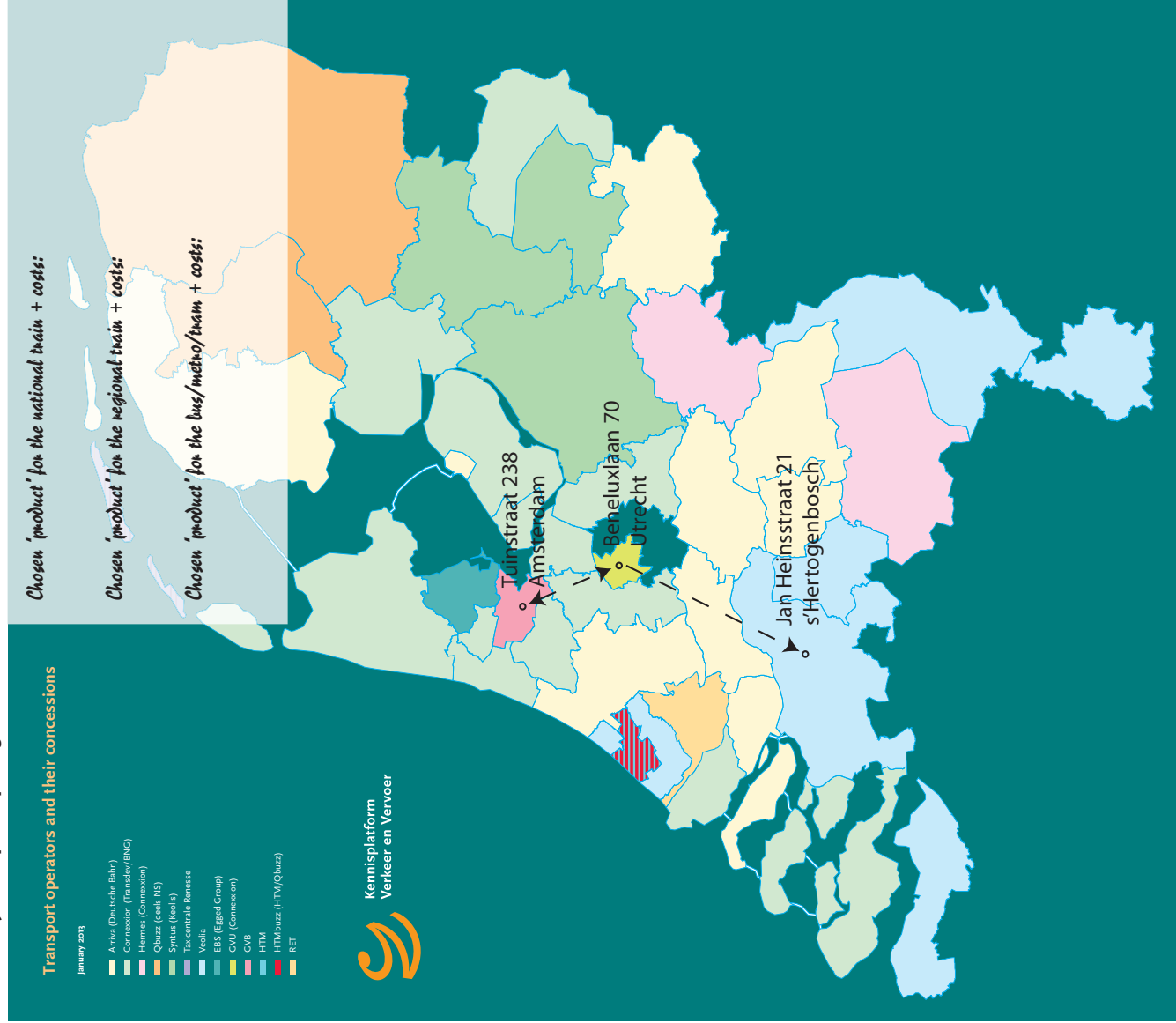
Figure 21. Scenario 5

Experiences: Results

The searching process in order to purchase a subscription for the OV-chipkaart is experienced to be difficult, complex and annoying. Before actually searching for a subscription the participants entered an orientation phase followed by a searching phase, a comparison and decision phase and finally an evaluation phase. All phases are explained briefly below. Figure 29 visualizes the steps participants were taking.

Orientation

From the eight monitored participants five started their orientation with the website of 9292.nl (see Figure 22). They indicated that this site seems to be a good starting point, since they get information on transport operators and costs.

Figure 22. Common sites to start the orientation phase with

Two participants started with searching 'OV-chipkaart abonnement' on Google (see Figure 22), since they had no better idea how to start the process. Both were then directed to the site of OV-chipkaart. Here they both spent some time (10 and 15 minutes) looking for a suitable 'product'. Both participants made the assumption that when travelling in the Netherlands with the OV-chipkaart as a 'carrier' the available subscriptions will be sold on that site. One of the participants even logged in on his OV-chipkaart account, in the belief to be able to add products to the card there. Whereas one participant found a link to 9292.nl, which he followed, (see Figure 23), the other participant did not know what to do and returned to Google. Via Google he finally ended up at 9292.nl as well.

After having received the information on the transport operators, participants decided on a transport operator to start with. Participants indicated that they start with searching for a NS subscription, since it is the longest and most expensive part of the journey and because they feel more familiar with this site. From the six cases in which the NS was part of the proposed journey, five participants decided to start with searching for a NS subscription. One person looked up NS subscriptions even though Arriva ran the train; he drew the conclusion that going by train involves the NS.

Link to 9292.nl, hidden in the descriptive text
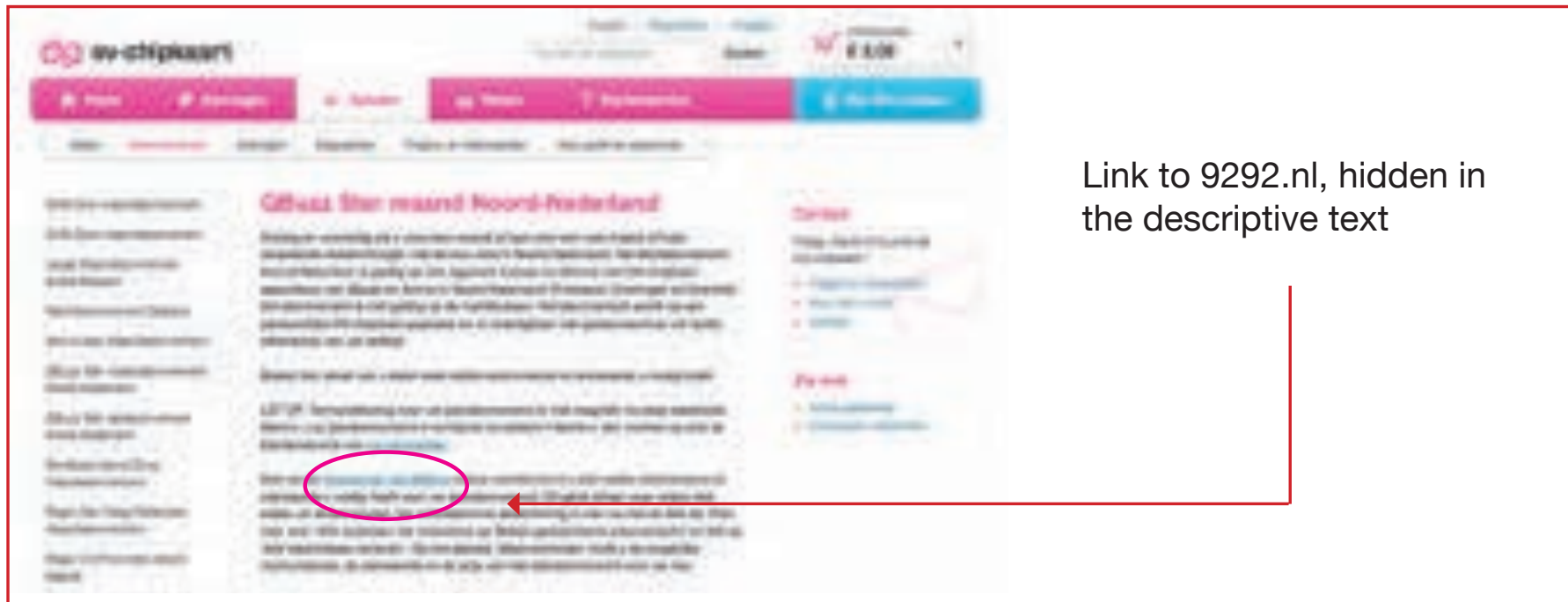
Figure 23. Hidden link to 9292.nl on ov-chipkaart.nl

Search

On the NS site only one participant out of seven was aware of the product-selection-tool. The other participants started clicking through the list of possible subscriptions. They had problems with interpreting the product name and did not think that the product name really fits the actual product. For example, 'Altijd Voordeel' offers 20% reduction during the whole day and 40% reduction in the off-peak hours. However, in the central positioned information box the 20% reduction are not mentioned, which leads to the perception that 'Altijd Voordeel' means reduction only from on 09:00 pm onwards (see Figure 24).

Besides this, all participants had difficulties in finding/calculating the price of a 'Maand-/Jaartrajectabonnement'. Whereas the description site of the other subscriptions informs about the price immediately, it is not offered here (see Figure 25). In fact the enquirer has to calculate the price himself. Two participants could not find the price, instead clicked on 'Vraag nu aan', filled in all their personal data and still did not know the price.

Four participants found the Hyperlink to the 'NS Reisplanner', where the price can be calculated, but it took them some time to figure out where to find the information they were looking for, since it is not visible immediately (see Figure 26).

The attention of the participants is drawn here, therefore missing the information of always travelling with 20% reduction.

Figure 24. 'Altijd Voordeel Abonnement'

Two participants were more attracted by the button and therefore did not see that they could calculate the price first.

Figure 25. Not finding the right information

Figure 26. 'Reisplanner' maybe confusing

When searching for a subscription on a site of a regional transport operator the participants were asked to fill in their 'centrumzone' at a certain moment in the process. Whereas on the site of RET, GVB, and Veolia a map with the zones is provided (almost) immediately, this is not the case on the sites of Connexion, Syntus, and OV-chipkaart (see Figure 27). The participants spent about 15 minutes on searching on the site or on Google in order to determine their 'centrumzone'. One person succeeded in finding a card on Google, two persons finally called the service hotline or the transport operator (without results), one person called the service hotline of 9292 (with success), and two other participants stopped searching and indicated that they would go to the service desk.

Within this searching phase half of the participants reached a first point of frustration and decided to go back to ov-chipkaart. nl in order to search for one product that solves all their problems or to find a product-selecting tool on the Google.

Comparison

Six participants compared 2-5 possible subscriptions with each other by calculating in detail the costs and the savings compared to single tickets. Based on this calculation the subscription was chosen. One participant made rough estimations on costs and savings without actually calculating in detail. One person could not find any suitable products and stopped the whole process. This person said he would rely on

personal advice as provided at the service desks of the transport operators.

Figure 27. These sites; Connexxion (left), Syntus (above), OV-chipkaart (below), provide the user with a list of numbers that refer to the different zones, but no visualisation of it.

Decision

After having made the calculations, the participants did not have problems with deciding on a product. However they sometimes changed their mind during the process since they found something even more suitable. The suggestions for improvement vary from providing personal advice, better information, a comparison tool or offer modules which each customer can combine individually instead of offering pre-made product packages (see Figure 28).

Evaluation
After having made a decision five of the eight participants returned to the site of the regional or national transport operator or to 9292.nl in order to confirm their decision. Typically they quickly looked through the options again and then decided that they have made the right decision.

Rekenvoorbeeld:
Retour Amersfoort - Rotterdam
Centraal (2e klas)

Normaal gesproken: € 25,60
Met Dal Voordeel: € 15,40
Conclusie: na 5 retourtjes terugverdiend!

Any help in deciding on a product is appreciated.

Figure 28. Calculation assistance provided by NS (some products only)

Experiences: Conclusion

It can be summarized, that most participants start their orientation at the site of 9292.nl, in order to get to know the prices (which serve as a basis for a later calculation) and to evaluate, which transport operator(s) run the service. Many participants also assumed that there would be one central site, which provides them with all information on reductions, subscriptions and cards. They also often assume that there will be one product, which fits all their needs of travelling with multiple national and regional operators. To some of the participants the site of ovchipkaart.nl seemed to be the site, which combines all the information on different operators and their products. However, it is not. When it comes to selecting a suitable subscription, seven out of eight participants started with looking up the right NS subscription.

According to their explanation they do so due to the familiarity of the site and because the NS covers the longest part of their route, therefore it is most important to the participants to make a good decision in this subscription. It can be assumed that users who mainly use a regional transport operator would start their search at this site instead.

On the NS site most of the participants compared three different subscriptions with each other by making a calculation or an estimation of costs before they decide on the most favourable product. The main problem participants had during this process lay in understanding of the product names. After having decided on the product, participants repeated the process on the site of the regional transport operator. Here the main problems were finding an overview of the products and since many products require a 'centrum zone', the identification of such. The first problem can partly be explained by the unfamiliarity of the participants with the site. After having made a decision concerning the product, most of the participants returned to 9292.nl in order to check the single ticket prices and thus be sure they have made the right decision on the subscription(s). The process of the search is visualized in Figure 29.
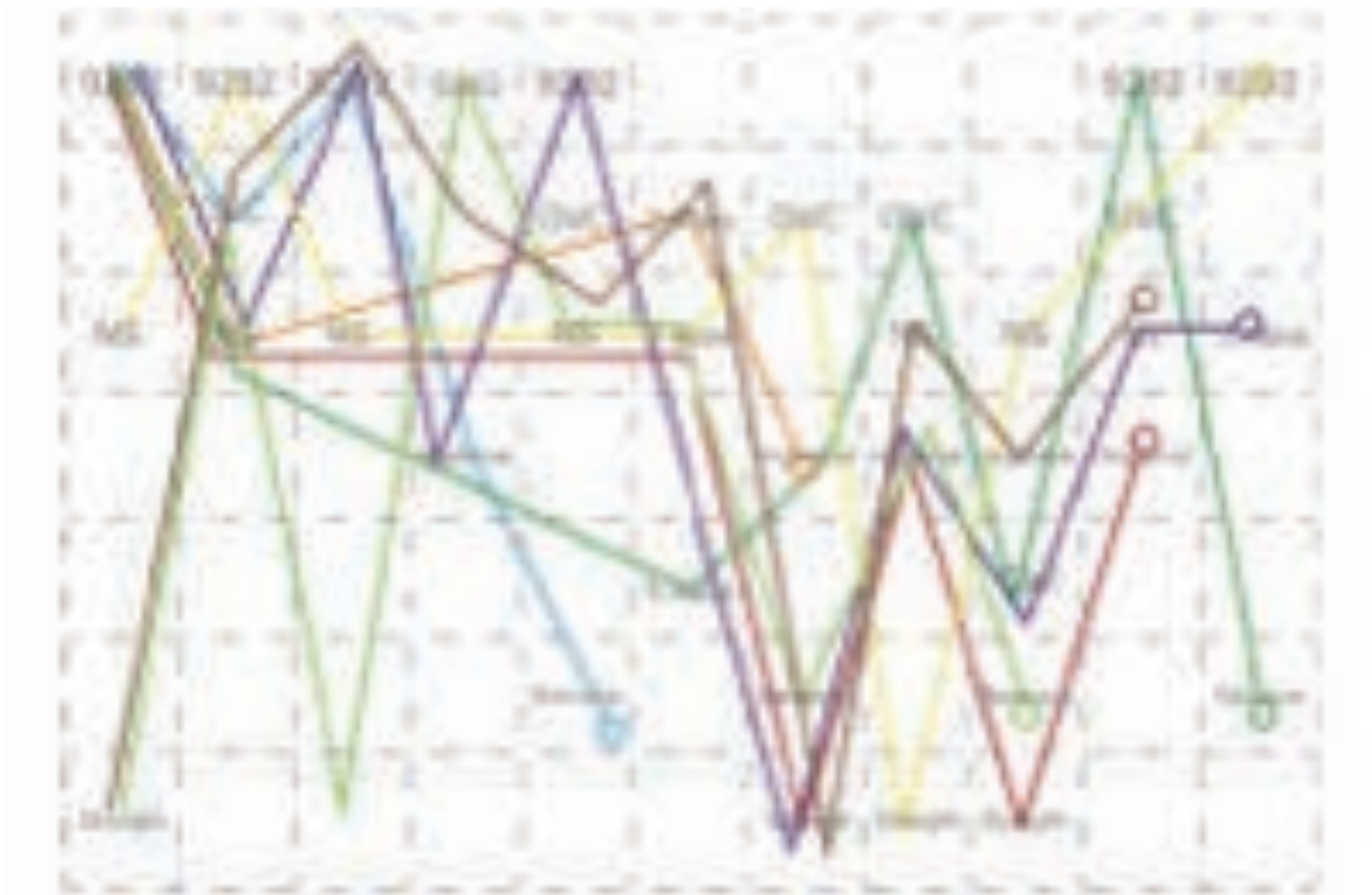
Figure 29. Visualization of the phases, participants went through (x axis: time; y axis: options)

Improving System Adoption of the OV-chipkaart

Appendix 8: Qualitative Study: No OV-chipkaart yet?!

Some users of public transportation still do not have an OV-chipkaart. These are the people, which might be attracted to the system due to a simplified purchasing process. In order to understand whether this really is the reason for not having an OV-chopkaart the following two research questions have been formulated:

- What are the reasons for not having an OV-chipkaart yet?
- How easy/ difficult is the current purchasing process of an OV-chipkaart without a subscription?

Procedure
In order to understand why some people do not have an OV-chipkaart yet and in order to observe whether the online purchasing process of a personal OV-chipkaart is easy to understand or not, two participants who do not have an OV-chipkaart are interviewed and afterwards observed while purchasing an OV-chipkaart online.

Participants
Both participants are male, and around 40 years old. Both participants travel at rare intervals and therefore do not have an OV-chipkaart yet.

Results from the interviews
Why don't you have a personal OV-chipkaart yet?
Participant 1: I don't need one. I cycle to work and I have three children who are 1,4, and 7 years old and when I travel with them I go by car and not with public transportation. If I go by train I purchase a single ticket. I don't see the added value of an OV-chipkaart.

Participant 2: I hardly ever travel with public transportation. I live in Delft and I work in Delft. If I go somewhere else I either take the bike or the car. If I go by train I purchase a single ticket. I really don't need an OV-chipkaart. I don't want to have my picture on the card, and I want to be able to share my card with someone else. I don't see the advantage of a personal OV-chipkaart.

Would you say that you are a late adopter when it comes to new technology?
Participant 1: Maybe, I was also late when they introduced the chipknip. But it is not because I don't understand the technology or actively reject it, it is more because I often have the idea that this new technology is not invented to help me as an individual but helps the companies earn more money. In the case of the OV-chipkaart for example, they only want to collect data and track my travel behaviour. That is not helping me, but the companies.

Participant 2: No I don't think so. I simply don't have an OV-chipkaart because I don't need one. In general I like to experience new things, but not if they don't hold any advantage for me.

Results from the Observation
The observations are briefly described for each step of the purchasing process.

Search
Both started the process with entering 'OV-chipkaart aanvragen' into Google. This led them to the OV-chipkaart site. Here they chose the option 'aanvragen' (apply).

Comparison
In the window 'aanvragen' the characteristics of a personal and anonymous card are described. The first participant decided to purchase an anonymous card, since he does not need a subscription. Unfortunately, purchasing an anonymous OV-chipkaart is not possible in an online environment. Since he does not want to purchase a personal OV-chipkaart for himself, he ordered one for me.

The second participant indicated that he would prefer to buy an anonymous card as well, since he does not want his identity to be connected to the card, and to him it is an advantage that he can possibly share his anonymous OV-chipkaart with someone else who is not travelling a lot as well. But since he knew that the core of this research was to investigate the purchasing process of a personal OV-chipkaart, he decided to purchase a personal OV-chipkaart anyways.

Decision
After having made the involuntary decision of purchasing a personal OV-chipkaart, the first participant followed the steps. To him, the whole process was easy to run through. The second participant evaluated the process as being easy and logic as well. However, he experienced some problems when uploading his picture, since it flipped to the left or right side instead of being in an upright position. After a couple of times of uploading the picture it finally worked.

Environment
Since the searching process had taken place in an online environment already, both participants kept staying in that environment in order to follow the steps of purchasing. In a real life situation, the first participant probably would have gone to the closest supermarket in order to purchase an anonymous OV-chipkaart.

Purchase
The purchasing process itself was very easy and they both received a confirmation text and a mail immediately, which made sure that the purchase was successful. After having purchased the card, the first participant already installed an OV-chipkaart account, which he perceived as easy. The second participant decided to install the account, after the card had arrived at his home. He expected that after installing the online account he would be able to travel immediately.

Conclusion
Purchasing an OV-chipkaart does not require a lot of knowledge, no experience and the process is easy to follow. The most confusing part within this purchasing process is, that the anonymous OV-chipkaart can only be purchased offline and is immediately ready to use, whereas the personal OV-chipkaart can be acquired online and offline, but has to be produced and send to the user's home, before the card can be used for travelling. Both participants indicated that it would be an improvement if they could purchase the anonymous OV-chipkaart in an online environment as well.

As mentioned, the actual purchasing process is neither difficult nor does it cause many problems; the third study researches the process of purchasing a subscription for the personal OV-chipkaart. Here many problems are already known and are further investigated by user-testing.

Appendix 9: Overview of barriers

How it is now…	How it could be…
1) Many different products 2) Inconsistent language and structure across operators in the online environment 3) Time consuming and sometimes frustrating search	1) Central point of information 2) Better structured and consistent information 3) Seamless searching, quick and easy
1) Insecurity about required amount of information 2) Selection is mainly based on price 3) Making own calculations	1) Comparison Tool 2) Clarified choices 3) Personal advice 4) Central platform for information 5) Calculation assitance
1) Making a decision on combined products is difficult 2) Insecurity whether all information has been taken into account	1) Feeling secure about own decision 2) Selecting and combining modules 3) Clear information 4) Decision-making tool 5) Personal advice
1) Selection of the environment depends on the selected product/card 2) Restricted payment possibilities influence the choice of the purchasing environment 3) Unawareness about point 1 and 2	1) Every product/card can be purchased in each environment (convenience) 2) Payment possibilities do not influence the purchasing environment
1) Restricted payment possibilities 2) Purchasing does not mean receiving 3) One time top-up not possible	1) No restricted payment possibilities 2) Purchasing should at least offer the possibility of receiving 3) Include one time top-up in this step
1) Waiting	1) No more/less waiting 2) Offer temporary card/product to user
1) Wrong card could be send 2) Only the personal card is send home	1) Quick(er) delivery 2) Also offer the service to send the anony-mous card home, if wanted 3) Send an activated and loaded card
1) Unawareness of the necessity of this step	1) Activation should be unnecessary 2) Better explanation on the how and where
1) Top-up slows down the first usage	1) Include it in purchasing process 2) Increase payment possibilities 3) Make auto top-up possible for anonymous card 4) € 7,50 should be the first travel balance 5) Top-up reminder (for the smartphone) 6) Free choice of amount of money to top-up

Appendix 10: Creative Session

A creative session has been hold in order to gain a deeper understanding of possible incentives while travelling, during the whole journey and outside the domain of travelling.

Research question
The main research question of the creative session aims to answer is:

> "How to enhance the engagement people have with the OV-chipkaart".

Number	Education	Direction	Gender	Age	Nationality
1	Master student	Strategic Product Design	Male	30	Non-Dutch
2	Master student	Strategic Product Design	Female	25	Non-Dutch
3	Master student	Strategic Product Design	Female	27	Non-Dutch
4	Master student	Strategic Product Design	Female	29	Dutch
5	Master student	Integrated Product Design	Female	24	Dutch
6	Master student	Design for Interaction	Male	28	Dutch

Procedure
10:00   Participants arrive

10:10   Welcome and Introduction
Welcome everybody and thank you for being here, participating in this brainstorm session. As some of you might know, I'm currently doing my graduation project. The project is about the OV-chipkaart and focuses on the first contact people have with it. The perception of the OV-chipkaart and the convenience of the purchasing process are therefore relevant considerations within my research. Today I would like to start a brainstorm with you on what comes up to your mind when

you think of the OV-chipkaart and how the card and it's surrounding system can become more appealing to current and future customers. In order to do so, we will start with generating a mind map together, and afterwards we will do dynamic brain writing, answering six How to's…?. Finally I will ask you to assign points to the most promising ideas in your view.

10:15   Icebreaker
But now, to get into the creative mode we will start with an icebreaker game.

10:20   Mind Map
Okay, I would like to start with a mind map on the topic 'going on a trip'. As you can see on this flip over sheet, this mind map has unlike common mind maps six pre defined routes in which I would like to direct your thinking. However if you want to add something, which does not fit into these groups, feel free to write it down. You may write down anything that comes up to your mind, and that you somehow connect to 'going on a trip'. Have fun.

10:45   How to?
Now that we have dived into the topic a bit, it is time to get more concrete. I have prepared six flip over's with 'How to' questions on it. These questions are derived from my analysis until now. I would like to ask you to each stay next to one of the flip over papers. Once we have started you have three minutes to generate ideas to answer this question. Please try to write down at least five different ideas and write down each one on a separate post-it, and stick them onto the paper. Every three minutes you will rotate to the next flip over and you start again with writing down ideas. Then you can generate own ideas or follow up the existing ideas, which are stuck onto the paper already. Okay, lets start.

11:00
Everybody has passed the first four posters so far. For the final two rounds I will now provide each of you with a different character. You will get an item that represents the character, and a card on which I have written down some associations going with this character. Of course you can interpret the character in your own way as well. If you do so, please write down the characteristics on the card.

11:15   Assigning points
Now that we have finished the idea generating part, I would like you to have a quick look again at the ideas on the post-it's and to assign points to them. For each flip over you have three points you can assign to the best ideas.

11:25   Closure
Thank you very much for your participation!

Appendix 10a: Methods of the Creative Session
The following sections describe the methods applied and the adaptation of the standard methods, which were required to achieve the results aimed at.

Icebreaker
In order to get into the creative mode it is a common method to start with a short 'icebreaker', a short game of about five minutes, which enables participants get to know each other, puts them in a creative mood and gives them the opportunity to say something before (to talk to one another?) the actual session begins (Tassoul, 2009).

As an icebreaker within this session served a game in which the participants are asked to write down three statements about their lives of which two are true and one is false. After passing these statements to the person sitting on the right, this person reads them out loud and the other members of the group then have to guess which statements are true and which is the false one. This game does require a certain amount of creativity of each participant to come up with a false statement, but is quite easy to do at the same time. The participants get to know each other better, which makes them feel like being part of a group and sharing some funny stories makes them feel at ease.

Part 1: Mind Map
The creative session starts with a mind map of 'going on a trip'. Buzan first used the term mind map in 1993. Normally a mind map is used in order to write down all associations people have with a certain topic or term. Each association then serves as a new starting point for yet another association. By applying this method it is possible to evoke associations people have with certain terms/topics even though they would not have mentioned them in the first place. Subsequently these associations may be used in order to decide which aspects of the product/service to enhance or to reduce. Normally mind maps do not have any boundaries or pre given terms, but develop during the process. They can be seen as an overview of ideas and associations that are connected to each other (Tassoul, 2009). Mind maps also help to 'get rid' of the first associations in order to start with the creation of something new afterwards.

In the creative session the mind map is used to let the participants start thinking about the topic in a collaborative and playful way. Especially in the beginning participants of creative sessions tend to have difficulties with generating ideas by themselves and therefore it is often decided to start thinking about the topic together. Unlike common mind maps, the mind map used here provided four categories in which the participants had to think. These categories were based on the gaps, which arose from chapter 2 (understanding, information, money, and support).

The aim of this mind map is not only to get a better overview of how the participants feel about the current situation, but also to understand

what kind of improvements they could think of. Therefore the group is divided into two groups. The first group starts mind mapping, while the second group is observing only. After ten minutes of mind mapping the first group will stop and the second group is provided with 'the glasses of the future'. Looking through these glasses the second group broadens the mind map by reacting on the current associations, making them more extreme, futuristic and improving the situation.

Part 2: Dynamic Brain Writing
In the second part of the creative session the method of 'Dynamic Brain Writing' (developed by Manu De Bruyn; see Figure 30) is applied in an adapted way. The basic idea of this method is to generate as many ideas as possible in a very short time, by generating own ideas and by building on the ideas of others. At the beginning each participant is provided with one question written down on a paper. Within three minutes he writes down five ideas on separate post-its and sticks them onto the paper. After three minutes it is passed to the next participant. He now develops own ideas or follows up the existing ideas. This procedure is repeated until each participant has written down some ideas on post-its and has stuck them to the corresponding paper. This technique is known as the 635 procedure (6 papers, 3 minutes, 5 ideas), which has been further developed by Horst Geschka (Geschka, 1993).

In this creative session the method helps to explore the six H2's (How to's ?). Since the participants are familiar with the topic of travelling it might be difficult for them to generate real 'out-of-the-box' ideas. To enhance their creativity even more it was decided to combine the method of dynamic brain writing with the so-called 'superman-method', which provides each participant with a certain character, based on which he tries to solve the problem from a different point of view: 'How would Superman solve this problem?' Within the 'standard' procedure of dynamic brain writing, images and collages are used. Since the aim of this creative session was to place oneself into the context it was chosen to work with characters instead.
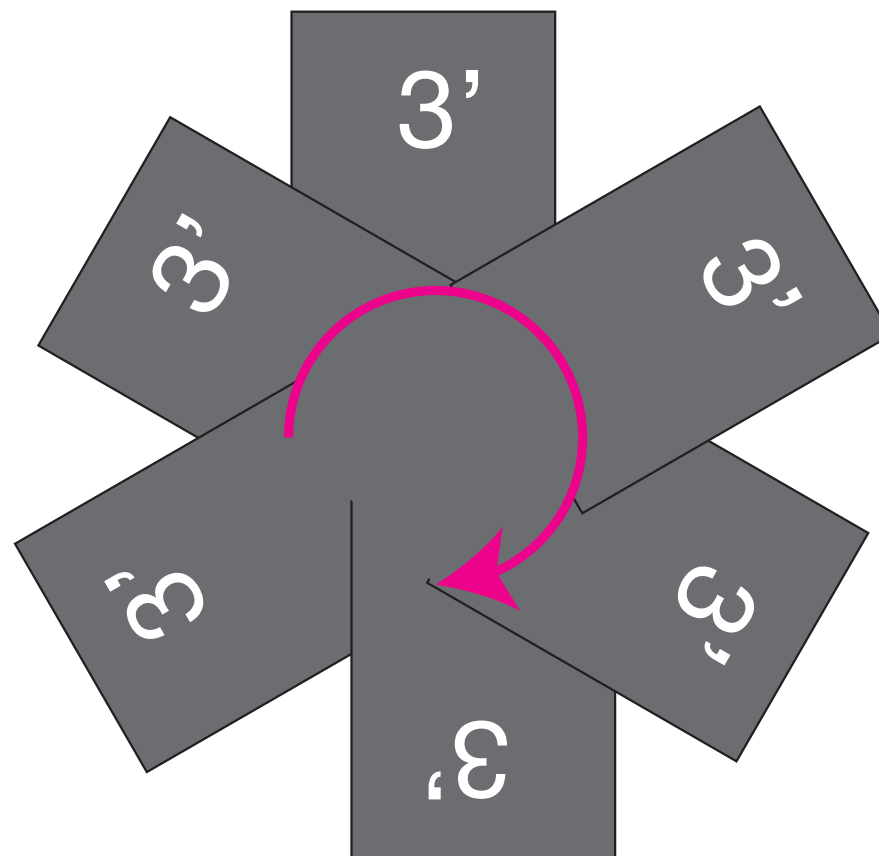
Figure 30. Dynamic Brain Writing

In this creative session the chosen characters are:

- A Princess: has servants, likes comfort, demands special treatment, enjoys challenging conversations and delicious food
- The Easter Bunny: brings gifts, is hiding things, creates surprises, brings family and friends together
- An Alien: has special powers, creates a special memory, always knows things first, is curious
- Mickey Mouse: is very practical, thinks problem-solution oriented, is smart, honest and reliable
- A Hula Dancer: enjoys the ease of being, strives for harmony and peace, wants to connect people by means of dancing, is evoking happiness
- A good Dragon: protects people, stands up for his rights and the rights of others, spits fire in case of danger, has low control of his temper

Figure 31. Example of the character cards

After four of six rounds of dynamic brain writing each participant is provided with a character card (see Figure 31) and has to put himself into the new role. The participant will then write down ideas from a his character perspective. After a couple of rounds the creativity usually decreases a bit, which is the reason why it is chosen to integrate the characters to enhance the creativity again.

Wrap-up
After six rounds the participants are asked to rate the ideas put down on the papers. Each participant is allowed to assign three points to each paper, giving the most points to the best idea. These evaluations will later be taken into account when generating concepts.

Appendix 10b: Results of the Creative Session
The following paragraphs summarize the findings for each step of the creative session.

Part 1: Mind map
In order to get the participants into the same mind-set, the creative session starts with a mind map. Based on the remarks the participants gave, it can be said that the degree of provided information closely is connected to the perceived degree of support. It is obvious that the participants are mainly asking for on time information and reasons for e.g. delays, which according to them should be provided through multiple channels, such as mobile applications, physical information and staff. Also they suggest that providing information on where one is and tips for visiting the surrounding area should be given.

Based on the answers given on the mind map it is evident, that the participants assigned the three key words 'personal', 'experience', and 'activity' to the three travel phases 'pre', 'while', and 'after'. They interpreted the key word 'personal' mainly focussing on the pre-travel phase. Here the personal reasons for a trip are investigated, decisions

on the route and on which friends to take are made. The key word 'activities' is mainly connected to activities during the trip, such as reading, listening to music, or preparing for the final destination. The key word 'experiences' focuses on the post-travel phase. Here participants came up with terms such as discovering a new place, having social interaction and emotions.

This separation was not intended and is therefore interesting to recognize. It may be concluded, that when going on a trip the participants want to have a personal preparation phase, do activities while travelling and share experiences and have social interaction after having reached the destination.

Part 2: Dynamic Brain Writing

The results from the dynamic brain writing session are divided into the three search fields: travelling, journey extension and added value, and elaborated below.

Search field: Travelling

In order to generate ideas and to further explore the search field 'travelling' the two "How to"- questions were prepared; "How to make the travelling experience more personal?" and "How to improve the travelling experience and make it worth to memorize?". In order to enhance the travel experience multiple ideas have been generated, which can be found at the end of this Appendix. To the participants the most important topics to make the travel experience more personal are: offering a special service, creating the feeling of being at home, making the journey more customizable and enhancing social interaction. To improve the experience and make it more memorable the relevant topics are: providing information, offering choices, increase the convenience, arrange compensation if required, enhance the interaction and make sure the facilities are good. It seems that in the travelling domain information, good facilities, and money are very important to the participants.

Search field: Journey Extension

The search field journey extension has been investigated by the means of the two "How to's…?"; "How to create social communities within an extended journey experience?" and "How to enhance the connection between the OV-chipkaart and its users within an extended journey experience?"

To enhance the connection between users and the OV-chipkaart the participants generated ideas on: the simplification concerning the preparation of a personal route, how to give personal travel suggestions, personalize the card, make the card interaction easier when it comes to balance check and top-up, and how to reward the user for his (travelling) actions.

The main topics that seemed to be relevant to the participants in order to create social communities are: getting to know new people, connecting to friends, motivation to travel, making travelling more fun, and to evoke a special feeling in the individual traveller.

Within the extended journey experience it seems that (personal) information, and social connection are important to the participants.

Search field: Added Value

The last search field 'added value' was further explored during the creative session with the "How to's…?" "How to create a special connection between the OV-chipkaart and its users?" and "How to create adding value memories with the OV-chipkaart?"

To create a memory that adds value the participants indicated the categories: gifts, reminders, shared experiences, personal attention, and connecting people as most important.

The main topics that seemed to be relevant to the participants in order to create a special connection are: extended functionalities of the card,

more bonus options, and a card that correlates with the personal interests.

Within the search field of added value (or how to add value) it seems that the topics extended functionalities and personal memories are the most important to the participants.

An overview of the relevant topics across all search fields can be seen in Figure 32. A second round of clustering, now clustering the relevant topics only, finally led to the five main incentives: to make travelling cheaper, to improve the basics of travelling, to increase the personal well-being, to enable social interaction, and to add value to the card by extending its applications.

Appendix 10c: Insights

Besides the development of these five incentives, the creative session also provided valuable insights and ideas on how to improve the balance between business, technology, and human considerations. For each of these factors the user perspective is central. "What are my business related considerations?"; "How can I benefit from technology?", and "What adds up to my personal well-being?". Figure 33, 34, and 35 summarize the ideas on these three areas.

cards help to get to know
who the cute guy in the train is

Game:
'Spaar ze allemaal'
visit places by public
transport

when arriving, inform about
what to do in this city/
at this place

information on what to see
close to the station and
how to get there

entertainment at station

special treatment provided by
stores at station on regulary
tours e.g. get YOUR coffee
every morning

contact with friends

Instagram on interesting
stuff from journey

give physical information

clear information on how
to get there and back

fun travel website

know in what mood
I am and the service
adapts to it

tell your friends
which train you take,
maybe they join

ask other people
about your destination

flash mobs

travel together
find a buddy online

special powers:
make everybody
talk to each other

Game: who travelled
most km's

inform about delays
and alternative routes

information about
layout of the station

do yoga while
rush hour,
bonding

luxury

butler helps with bags

monthly infografic
summarizing your previous actions

match
frequent travel
behaviour with others

working portal
do your business
while travelling

bar/café to meet

meet & great

card as a
navigaton system

perfume

personal servant
who takes care of
your journey

guided tour

make people
laugh

movie

long lasting family memories

extend
functionalities

improve and broaden
your network while travelling

guidance to
check-in points

one joke
each day

food

a personal seat

use the card to open
doors/lockers

check who is travelling on your traject
and match your trip

share experiences
after travel

photo service at
place of destination

use the card as identification when dating
a matched traveller

share destination and travel together

bonus card for life changing experience

make community befor the trip

help out fellow travellers

use the card to pay for other things as well

see where friends are
travelling and go together

dating portal

information

wayfinding

energizer

gift

special feeling

memory/reminder

tanking coupons to make public
transport attractive to car
drivers as well

make a profile on personal interests
and connect it to the trip

share reason of travelling

share interests

motivator

extended functionalities

help people when in problems,
lend/share the credit

interaction

give more information on
what to do at each stop

touristic area with
special offers

connector

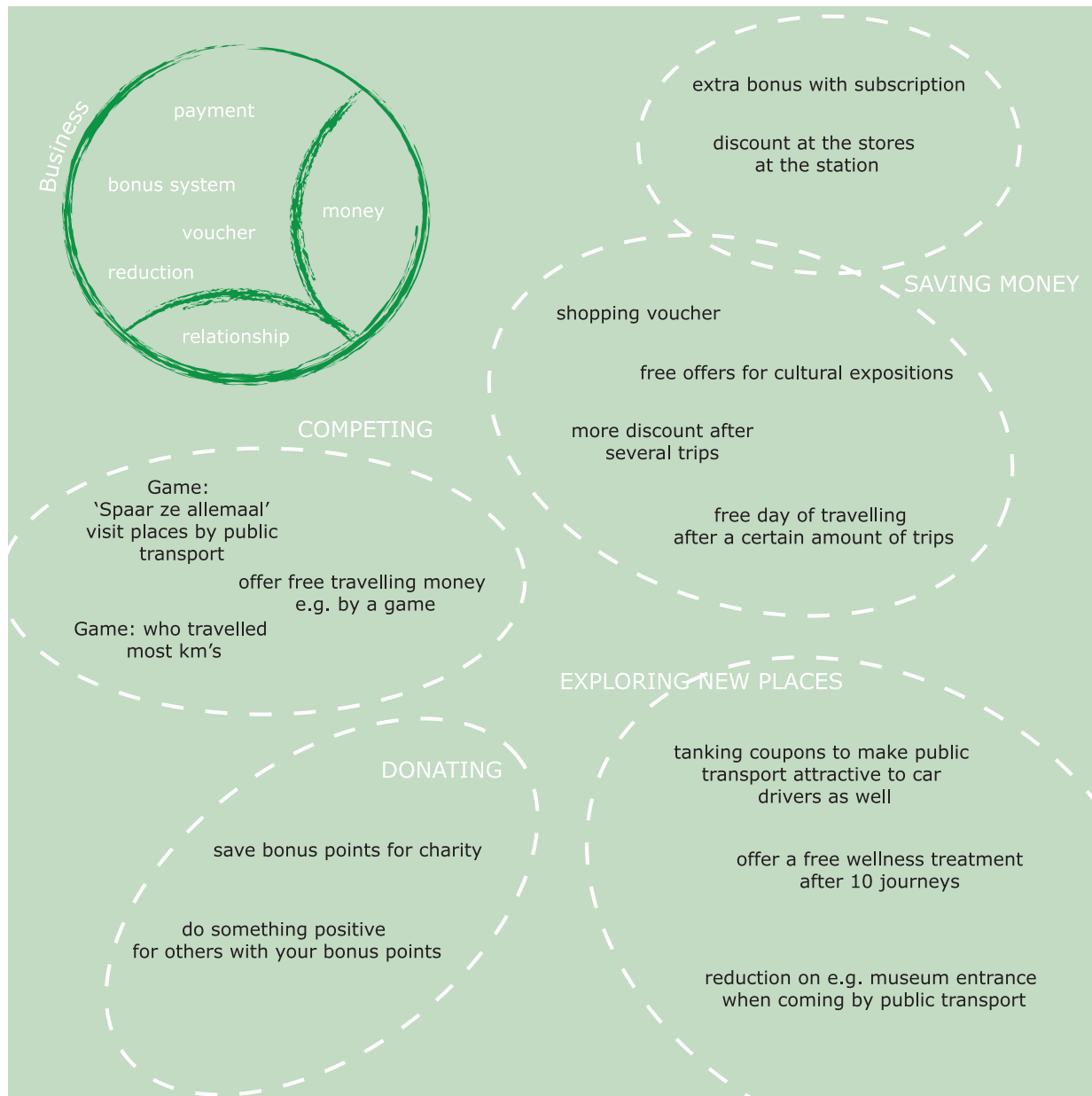connect friends destination

new people

basics of
travelling

what do you want? efficency? enjoyment? relaxation?

special mentioning of personal
interests activities

bringing people together

social
factor

The OV-chipkaart

making it nice

more activities

save profile of actions and give
personal informations and suggestions

sharing experience

personal
wellbeing

money

compensation

thank people for their patience & understanding

share experiences

special attention

bonus

provide a free coffee

train/bus waits for me

facilities

rewarding

free acts in the train

special treatment e.g provide
an umbrella when it is raining

@ home

credit

more discount after
several trips

surprises and gifts

staff knows you and
e.g contratulates you to your birthday

food & drinks

customizable

personalize

special service

choices

convenience

offer free travelling money
e.g. by a game

staff knows your travel pattern
and gives personal advice

music

movies

extra bonus with subscription

clean toilet

art

personal reminder
to add value

offer a free wellness treatment
after 10 journeys

nice smell

music

check credit on
the card more easily

discount at the stores
at the station

cleanliness

have an area to rest

pillow?
blanket?
musik?

allround
usage of
the card

see credit of the card
on a display on the card

free day of travelling
after a certain amount of trips

free offers for cultural expositions

silence

reminder to
leave the train
when falling
asleep

reduction on e.g. museum entrance
when coming by public transport

enough personal space

fully furnished bathroom

'Just-what-I-need'
solutions

how much
travelling
in a month

check-out
possible at
e.g. the AH

different
theme every
month

always be able to
upgrade value on card

save bonus points for charity

bonus, bonus, more bonus...

personal attributes in
the travel domain

card tells
you how often
you have used
public
transportation

range of
choices on
where to sit,
what to eat,
who to talk to...

no need to get
the card out
of the wallet
when checking in

be able to check in differently
e.g. at the computer

do something positive
for others with your bonus points

shopping voucher

breakfast in the vehicle

offer a complete package
for train + bus + bike

print ticket for you
or carry it on your phone

personal
suggestions to
visit places

movies & games

make payment possible everywhere

Figure 32. Overview of the relevant topics

Business

payment

bonus system

voucher

money

reduction

relationship

extra bonus with subscription

discount at the stores
at the station

SAVING MONEY

shopping voucher

free offers for cultural expositions

more discount after
several trips

free day of travelling
after a certain amount of trips

COMPETING

Game:
'Spaar ze allemaal'
visit places by public
transport

offer free travelling money
e.g. by a game

Game: who travelled
most km's

EXPLORING NEW PLACES

DONATING

tanking coupons to make public
transport attractive to car
drivers as well

save bonus points for charity

offer a free wellness treatment
after 10 journeys

do something positive
for others with your bonus points

reduction on e.g. museum entrance
when coming by public transport

Figure 33. Overview of ideas related to technology

IN CONTROL

personal reminder
to add value

check credit on
the card more easily

see credit of the card
on a display on the card

always be able to
upgrade value on card

help people when in problems,
lend/share the credit

make payment possible everywhere

Technology

key functionality

money

identification

proof

enabler

functions

OPENING

use the card to open
doors/lockers

NAVIGATING

CHECKING-IN AND -OUT

check-out
possible at
e.g. the AH

card as a
navigaton system

print ticket for you
or carry it on your phone

guidance to
check-in points

EXTENDING

be able to check in differently
e.g. at the computer

no need to get
the card out
of the wallet
when checking in

Instagram on interesting
stuff from journey

extend
functionalities

use the card as identification when dating
a matched traveller

Figure 34. Overview of ideas related to business

COMFORT

have an area to rest

a personal seat

personal attributes in
the travel domain

enough personal space

use the card to pay for other things as well

reminder to
leave the train
when falling
asleep

card is
your 'friend'
reminds to
leave

'Just-what-I-need'
solutions

tell your friends
which train you take,
maybe they join

working portal
do your business
while travelling

dating portal

improve and broaden
your network while travelling

travel together
find a buddy online

share destination
and travel together

CONNECTING

EVALUATION

monthly infografic
summarizing your previous actions

personal
suggestions to
visit places

INFORMATION

how much
travelling
in a month

share experiences
after travel

make a profile on personal interests
and connect it to the trip

clear information on how
to get there and back

information on what to see
close to the station and
how to get there

inform about delays
and alternative routes

when arriving, inform about
what to do in this city/
at this place

give more information on
what to do at each stop

functions

information about
layout of the station

touristic area with
special offers

personal

connection

customizable

give physical information

communities

save profile of actions and give
personal informations and suggestions

Human

Figure 35. Overview of ideas related to the human

Appendix 11: Purchase related complaints (collected by the OV-Loket)

In order to generate a broader understanding of the problems users encounter when purchasing an OV-chipkaart and/or a travel product, 50 complaints of the OV-Loket, which are classified into 'purchase related problems' has been analyzed. The total amount of complaints within this category that was provided by the OV-Loket comprised about 250 complaints. The 50 complaints have been chosen randomly. As it can be seen in the pie chart in Figure 36 most of the complaints are related to the error recovery process (21 complaints), to the agreement across the transport operators (10 complaints) and the cancelling and renewing of travel products (9 complaints). It can be stated that these complaints are connected to each other and that the organizational structure behind causes these three main problem areas.

Illustrative quotes

Error recovery: "Pas defect, opgestuurd, verzoek kwijtgeraakt, pasblokkade, pasfoto zoek, opgestuurd, productieproblemen niet gemeld, gevolg 5 weken verder en geen pas" (complaint 54549)

Agreement of TO's: "Een abonnement geregeld via de site van Connexion, en gekocht bij verkooppunt Primera in Dieren. Bij controle in de bus blijkt Syntus dit abonnement, bijgeschreven op de OV-kaart, niet te accepteren. Mijn zoon dient een zichtkaart te hebben. BRENG accepteert overigens de kaart wel." (complaint 54647)

Cancelling/renewing products: "Ik heb recent mijn altijd vrij abonnement opgezegd. Nu kreeg ik ineens post dat ik weer een nieuw abonnement heb. Dat is dus niet de bedoeling." (complaint 55301)
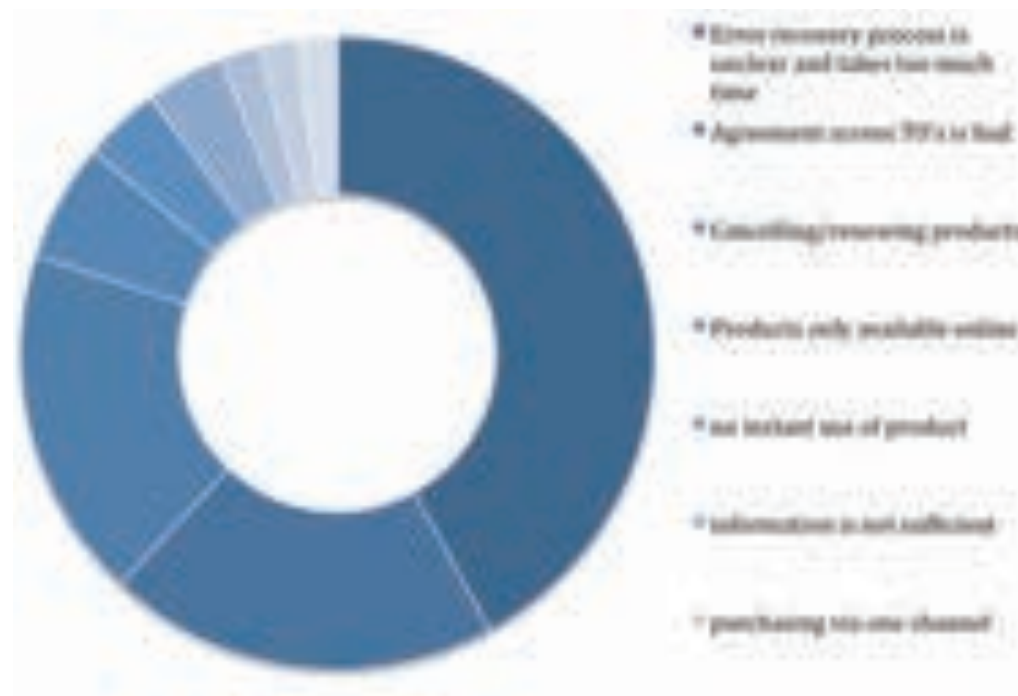
Figure 36. Overview of some of the purchase related complaints

Appendix 12: User Evaluation

In order to compare the three scenarios they are evaluated with users and stakeholders. This Appendix describes the results of the user testing. Here the front offices of the three scenarios have been discussed, by focussing on the aspects: orientation, search, purchase, travelling and error resolving.

Method

In order to evaluate the three developed front offices with the participants a service walkthrough (Stickdorn & Schneider, 2011) has been developed. In total 10 people participated in this evaluation and were evaluating the scenarios in pairs. The current steps of the purchasing process and the error resolving were visualized and displayed on the table in between the two participants. The five aspects of the three scenarios, which had to be discussed, have been visualized as well. The visualizations of the three concepts have been mixed with each other. In front of each participant half of these visualisations were displayed in the order in which they needed to be discussed (see Figure 37). The participants then discussed the three options with each other in order to come to a decision which of the provided options would be the best for them. By doing so, the participants had to come up with arguments why a certain scenario is more favourable than another. By following this approach it could be ensured that the participants interpreted the options in the right way and their underlying reasons of choosing for one scenario could be understood in more depth. Additionally the participants received some plain cards in order to add ideas they developed during the evaluation.

After this service walkthrough has been completed, the participants were asked to rank nine characteristics of the future OV-chipkaart system from very important to least important. These characteristics also correspond to the three scenarios as well and were used to further understand what users are actually looking for.

Figure 37. Set-up of the user evaluation

Participants

Session 1: Linda & Chen

Session 2: Geert & Thijs

Session 3: Bregje & Basil

Session 4: Floor & Dorine

Session 5: Josje & Job

Results

This section summarizes the results of the user evaluation for each scenario.

Scenario 1

Orientation (Each TO is informing about the OV-chipkaart system in his own way)

Geert: "This one is not an option, you might need different information for the boat and the metro, but how the system works in general is the same. So the information should be consistent. If they use different terms for the same kind of things this seems really confusing to me."

Floor: "Having the information on different posters is really confusing, because it means you have to 'collect' all the posters first before you know the information. That would not be an improvement to the current situation."

Job: "I don't like this option because you cannot compare the information with each other, and you have to go on multiple places to get all the information. I think it is really important that all the posters have the same formation in order to simplify comparison."

Search (Each TO is having his own website, service desk, travel products…)

Chen: "For me it really isn't an option to go to different service desks of different transport operators, to get all the information I need to come to a decision."

Geert: Different sources of information that provide different information implies one mistake after the other. This really is no option."

Travel (Less integrated products, strong customer relationship to the TO)

Thijs: "I don't want to select 'my region' I'm travelling in. I don't even want to think about regions and concessions, I just want to travel from A to B with whatever operator or vehicle available for the best possible price."

Geert: "Maybe I would like to get more reduction the more I travel (kwantum korting). Also I might not even need a subsription, but I would pay at the end of each month for what I have travelled with eventually some extra reductions for the kilometres I have travelled."

Scenario 2

Orientation (TO's inform about OVC system independently, but in a consistent way)

Chen: "Providing transport operator specific information is too much, you cannot grasp all the information, especially in the orientation phase it is important that the information is dense and consistent."
Thijs: "Multiple posters could be useful when you are interested in specific information of a specific transport operator. Maybe it is an idea to split the poster in two parts. The right part of the poster would provide general and consistent information about the OV-chipkaart, the left side would inform about transport operator specific tariffs and products."

Search (TO's sell products independently through own website/service desk, but in a consistent way)

Linda: "I think at this moment of time I would like to have more specific and more detailed information, so therefore I would prefer transport operator specific sites, but maybe there could be a general website, which directs you into the specific websites of the transport operators."
Geert: "All the different websites are already existing, so why would you erase them. They can still be used as an entry site from which users will be redirected to one central site on which the information is integrated."
Josje: "The most important thing is that they all give the same kind of information, so that it doesn't matter any longer to which operator I'll go. Since all the service desks and all the service desk employees of the different transport operators are already there, I would prefer this scenario for the offline situation. However, I'm not sure whether I would trust a service employee of the NS for example, giving me information about the RET. So maybe scenario three is better after all."

Purchase (Each product can be purchased at each transport operator)

Bregje: "I would prefer to purchase at a transport operator, it feels somehow better to me to purchase at the transport operator I want to travel with. However for convenience reasons I see it as an added value if can purchase my subscription at any transport operator."
Job: "I like the idea that once I have made my decision to purchase a certain product, I can do that wherever I want to."

Travel (Products are integrated, messages consistent, operators differ on services they provide)

Dorine + Floor: "I prefer this concept because I believe that in the third concept the competition between the transport operators will decrease, which might have negative consequences for me as a user, especially in terms of service and quality of the trip."

Error (Error complaint can be delivered to each TO)

Chen: "This concept is also okay, but especially in case of errors I would prefer one party that takes care of my problem and knows everything to help me. So it is somehow confusing if you could contact multiple parties to solve your error."
Josje: "This scenario is really confusing, it is not logic that you have a problem at the RET but you can also go to the NS in order to resolve it."
Job: "I want to be able to be hopping mad with a certain party. It would be weird if each transport operator could fix my problem, how can I be mad with one transport operator if the error is actually caused by another transport operator."

Scenario 3

Orientation (One authority provides one kind of information about OVC system)

Linda: "The user is not interested in knowing which product is from which company, he just wants to get clear information about how the system works. It doesn't matter to the user which type of vehicle or

transport operator he is using to get from A to B."

Chen: "Especially at the beginning when you don't know the OV-chipkaart system yet, you want few but clear information."

Geert: "One poster is recognizable, has the same visual appearance, same information, that is easy to understand. It doesn't matter where you are, you will always encounter the same poster."

Dorine: "I just want one poster on which I can find all the relevant information."

Bregje: "I prefer one type of poster with general information, but it would be nice to have additional posters with transport operator specific information on it. It is important that the structure across these posters is the same in order to simplify the understanding."

Search (One webshop/ type of service desk has all the information of all TO's)

Chen: "I like the concept with one service desk only. Having a place where all the information is integrated and having someone who knows everything and can give me a good advice for my situation would be really helpful and convenient."

Linda: "I do think, that one service desk is good, but I don't think that it is possible to put all the information on one website, you would not find the information you need."

Geert: One service desk, with a person that knows all the answers to all the problems is really ideal, however maybe not so realistic."

Thijs: "One website with all the information on it seems like the ideal situation to me."

Dorine: "I just want to have one type of service desk: all have the same colour, the same information, the same service. To me this is really the best way."

Job: "I would prefer one website, which has a tool which helps me to select the most suitable product for me. However, I don't want the products to be predetermined, but rather want to be able to select certain packages in order to develop 'my' travel product. Besides I want to know the advantages and disadvantages of the packages and I want to be able to select or deselect packages, which the tool has selected for me. I want to stay in charge when it comes to developing 'my travel product'."

Purchase (Products can be purchased at one webshop/service desk)

Linda + Chen: "It is the most convenient and the easiest to communicate one central desk to people, especially to foreigners. In case you don't know whether you need to take a bus or a metro, it would be very convenient if you can just purchase your ticket at one location and also get all the relevant information there."

Thijs "I want to buy a product that offers me reduction everywhere, but only if it is not more expensive then. I don't want to pay for reduction somewhere in Groningen that I'll probably never use."

Floor: "I just want to purchase at one integrated point where I can get good advice and purchase every travel product I need. Also I would prefer to have a reduced amount of choices."

Dorine: "I prefer more choices, which I can select from in order to adapt my travel product to my personal needs and to make sure I get the best possible price. I don't care if that process takes some time."

Josje: "I think the only added value of this concept compared to concept two is, that you have one contact person, instead of multiple. That makes it easier to understand and more consistent."

Travel (integrated products, travelling with OVC instead of with certain TO, equal service)

Linda: "I like to use my OV-chipkaart equally for all transport operators. This is the added value to me: that you are so flexible to change the type of vehicle you take. I don't see than anybody would prefer a certain transport operator to travel with."

Error (One authority can fix all problems)

Linda: "I really prefer this concept, for the user it is the ideal situation if you have one party you can turn to and they are going to fix your problems. If you have a problem you don't want to figure out who is

responsible for it."

Geert + Thijs: "For the user scenario two and three are the same since the problem always get solved, however this option is more clear to the user, since there is only one party available."

Dorine + Floor: "I prefer to have one central authority I can turn to which is going to solve my problem for me. It is really not my responsibility to figure out which party to address if there is something wrong with their product."

Bregje: "I prefer one central party that is able to understand, interpret and solve my problems. If they assign the problem to someone else behind the scenes I don't care as long as I know that one central authority will be responsible for the error."

The ideal future OV-chipkaart system

As mentioned earlier, the participants were also asked to rank nine characteristics of the future OV-chipkaart system. Three of these characteristics can be assigned to one of the scenarios at a time. The characteristics of the first scenario were: customization of travel products, innovative transport operators, and the best possible price. The characteristics of the second scenario were: equal performance of transport operators, a reduced risk to encounter an error and an accessible OV-chipkaart system. The characteristics of the third scenario were: a convenient purchasing process, integrated travel products and a reliable service and quality.

Concluding on the ratings of the ten participants of this study the ideal future OV-chipkaart system provides: reliable service and quality with integrated transport operators and travel products, and reduces the risk to encounter errors.

Conclusion

It can be concluded that the participants preferred the third scenario. Positive aspects of this scenario are that users have one party only, with which they have to interact and where they can arrange everything related to the OV-chipkaart. This improves the general understanding of the system and simplifies especially the first entrance into the system and the error recovery. However, some of the participants also indicated that the second scenario could be an option as well, especially when it comes to the relationship between the user and the transport operator. Even though participants said, they do not care who provides the service it seems that they are somehow attached to the transport operators' advice and service. According to the participants the most preferred front office would be scenario three, however in order to reach this point a combination of scenario two and three should be implemented first.

Appendix 13: Stakeholder Evaluation

Four interviews with different types of authorities
First Interview
The first interviewee points out that the initiative to improve the situation for the traveller should come from the government's side. In this case the transport operator can be bound by a concession agreement but still is free to work user-centred. The government pledges the operators to do so as well. Every improvement requires a lot of investment from the transport operator and as these costs are not included in the concession contract and only little revenue is to be expected, it is unattractive from a commercial point of view and therefore it will not happen. The government basically determines, which topics are socially relevant and important. Interim changes are expensive and difficult to negotiate with the transport operators. Therefore at the moment of a new tender as many aspects as possible have to be taken into account.

The interviewee further points out that the financial risk should be more at the transport operators' side. Currently the financial risk is very much on the users side. For example, if the system is not working, if the user cannot find the validator or in case it is unclear what to do when changing vehicles, it is always the user who has to proof that it was not his mistake. But actually the traveller should always have the benefit of the doubt. Therefore the 'drivers' that stimulate the transport operators and the users to take actions have to be rebalanced.

From the interviewee's point of view it is essential to enable the user to travel as easy as possible, with a low risk of errors. He points out that banks are good at the handling of payment transactions, and that therefore the OV-chipkaart should probably be integrated in the debit card and not the other way arround.

Finally the interviewee states that post-payment is an excellent solution for a limited group of travellers, such as business travellers, but that it is not a solution for everybody. The financial risk is too high.

Second interview
In order to enable one authority as proposed in scenario three either the idea of decentralisation or the idea of competition has to be removed. Removing one of these basic ideas under which the OV-chipkaart system has been implemented would lead to one party serving The Netherlands and remove the choices for customers.

The interviewed person is not convinced that such a situation could be achieved, since the development points towards further decentralisation of the transport operators. However, the interviewee is aware that centralisation could be favourable for the users of the system.

In an offline environment such an approach is not needed, since the amount of service points is shrinking and focussing more on providing information instead of selling products anyway.

In order to realize a more centralized scenario, a law could be introduced which 'forces' the transport operators to e.g. develop a website together. The provinces then could control the transport operators of their region and introduce a reward/punishment rule as well. According to the interviewed, one of the most relevant questions would be again; who is going to pay for this.

For the provinces a more centralized situation would be favourable since problems with users crossing concession boarders would be reduced or even eliminated. According to the interviewed, requirements should be developed such as: the different types of equipment have to be able to communicate with each other. The conditions of the system have to be thought of right now.

"Reducing the amount of travel products offered, makes it easier for the traveller. The provinces are busy achieving this."

Third interview
According to the interviewee, scenario one would make the situation for users worse compared to now. Therefore the interviewee would not support this scenario, however the interviewee is aware of the fact that transport operators want to build and maintain their brand, by offering for example 'only-subscriptions'. The interviewee somehow gets the impression that even though transport operators want to maintain their identity their resistance on this aspect is changing at the moment.

The third scenario however is too extreme from the interviewees' point of view to be supported by the transport operators. In order to make the third scenario work, the transport operators would have to make use of the same technical equipment, agree on one supplier, align their products and even more important their tariffs. According to the interviewee this might be possible without the NS, but not together with the NS, since their tariff system is completely different to the tariff system of the other (regional) transport operators. And finally the biggest threshold to realize scenario three is to develop the collaboration between the operators, which are currently competing with each other.
Therefore the interviewee thinks that scenario two has the greatest potential, since the barriers are a little lower compared to scenario three. Still the technical equipment needs to be aligned and more strict certifications have to be implemented, which function as filter in order to only allow or reject changes to the system.

The interviewee does believe in the option of developing one central back office, which calculates the price for the traveller in retrospective. The function of the OV-chipkaart then of course would change. Instead of paying directly at the validator users would pay by the end of each month. According to the interviewee, this would be a very good option since the user experience would be as suggested in the third scenario, whereas the organizational structure of the back office would be more like set out in scenario two. Also the transport operators could still handle their different tariff systems. However, they have to share their data with

each other. This role could be fulfilled by TLS, as a neutral party. The market competition would decrease in this scenario, but it offers a good compromise for both the users and the transport operators.

Fourth interview
According to the interviewee it is not desirable to have different kinds of travel products in different regions. It would be better if these different products work at the same conditions, in order to save development costs, to increase the integration of travel products and thus to be able to offer different products for different needs.

The interviewee has a personal preference for the operators being responsible for the revenues, to be controlled to a certain degree by the governments. He elaborates that the risk for the governments is lower and that the service towards the traveller increases, when the operator is responsible for the revenue. Furthermore he thinks that once the responsibility is with the governments, the operators will become lazy, which is not favourable for the traveller. Besides this he thinks that in such a situation the focus is too much on the money, which might reduce the overall quality of public transport.

The interviewee thinks that it would slow down each decision process within the domain of public transportation if the authority would be established by the central government. According to him, the local/regional governments work faster and more efficient, due to a smaller administrative district. It would be good if all local governments collaborate more closely. According to him it is already happening, but only with neighbouring governments.

Finally he points out, that an independent party should do the division of money. He says that it is really weird that competitors are dependent from each other in order to receive their money.

Four interview with different types of transport operators

First interview
One of the goals of this transport operator is to make travelling as easy as possible for their customers. Therefore this transport operator is aware of the fact that the platform model is not the most suitable scenario from the user's point of view. The interviewee believes that The Netherlands can learn a lot from other international transportation systems.

According to this transport operator, the idea that all consumers can travel postpaid is very customer friendly; but has one important credit risk for the operator: 'can the user pay his or her bill at the end of the month?' Since this transport operator and other public transport companies currently have no technical options (like e.g. banks or telco's) to check the solvency of its private customers, this transport operator is not very willing to support this option for all individual users. Also they believe that from a social point of view it is unjustifiable to block the card of customers in case they are not paying. In the end they want their customers to continue travelling. Since this concept holds financial and administrative disadvantages this transport operator is not pushing it.

Automatic top-up on the other hand is favoured in the organisation. According to this transport operator currently about 15-20% of their customers use it, and they are trying to extend this. According to this transport operator this is also an opportunity for the users to learn to trust their transport operator, since it is a very transparent process and the customer can see that this transport operator is taking the right amount of money each time he is travelling, and filling it automatically in order to enable him to keep on travelling.

For this transport operator it is important to serve their customers best, since they want to build up a strong relationship with them. This transport operator wants their customers to choose consciously for

them. They think that a good customer relationship will help them to win concessions once they will have to fight about it as well.

They don't think that it is necessary that everything looks the same across operators. But still they believe that it would work in the customer's favour if the transport operators work closer together than they currently do. A standardisation of check-in/ check-out systems and messages, prices and payment would simplify the situation for users. Therefore they also develop products, which are valid at other operators as well.

They expect that once the system is developed TLS will take a stronger position and develop more consistency. They also expect TLS to be the central back office for all transport operators in order to simplify processes. In the current situation all transport operators have to develop their own products and services, which makes it more expensive. More standardisation would be good for the customers. However that would lead to a complete different management of the sector and this transport operator will not be the one to initiate this change. Since they are a very dominant party at the moment, they could only lose on initiating more standardisation. According to this transport operator the system would function much more efficiently if they would (travel in) run all concessions.

"Our aim is it to make sure that our customers understand the system, once they understand they will travel and we earn money."

Second interview
This interviewee states, that currently the responsibility of revenue is at the transport operator. In his eyes this is the favourable situation, since each transport operator can offer the propositions that fit his customers. Also the transport operators stay innovative if they are responsible for the revenue. To him the authority model is not favourable, since in this case one single authority would be responsible for the revenues instead of a multitude of transport operators. Probably the system gets easier

to use for customers with one authority, but not necessarily better. Customer dissatisfaction can also occur with one party in charge.

Furthermore the interviewee points out, that different types of travellers need different types of propositions. A bigger variety may be confusing in the beginning, but is to be favoured over just a few products that do not fit the needs of the customer in the end. He says that some joint travel products may be acceptable, but that the transport operators still have to have the possibility to develop their individual propositions. According to the interviewee, this is necessary since the schedules (frequency of which the operators are running a certain line) cannot be aligned. In order to align the travel products, first the frequency of transport services have to be aligned, in order to align the travel products.

This could be realised, if a transport operator replaces a governmental institution to become the authority. The lack of alignment of transport schedules can be financed by the transport operators' income from more efficient routes. Furthermore, even if there was only one operator he could simplify the product offering and meet his customers' needs all the same. In such a situation less propositions could be developed, but more substitutions would be required compared to the current situation.

"Currently we are in a storming phase, that's why there are so many travel products available. But in the end the best propositions will survive and we will automatically get less product diversity"

Third interview
The outcome of the study is presented to this transport operator as an opening point for discussion. The four solutions were presented to him via mail. The interviwee is not convinced the presented solutions will resolve the difficult situation of the Public Transport (PT) Chip Card and support system as a whole. An inventory of all PT Chip Card related problems is not the right starting point for proposed changes. A different angle of approaches is needed. This will probably changes the ideas

presented. According to the interviewee; the less complex the PT Chip Card system is, the better it is to be accepted by the general public.

The main hurdle and reason why the PT Chip Card is not embraced by the general public, are due to the fact that the plastic card, as a carrier of PT propositions (Tickets),has to be purchased upfront. The mind-set of the customer is; "I do not get anything for my money, except a plastic card, which has to be loaded afterwards with complex products and propositions that cost my even more money." At least in the perception of the general public, the card should be given for "free", so only the "tickets" should be charged. This can be solved when the price of the plastic card is incorporated in a new integral price for PT propositions. PT authorities should realise, a new set of rules is to be accepted to set the pricing strategy right, now we have changed from a paper world based on averaged prices, to a kilometre pricing strategy.

The interviewee also states the government should give more autonomy to the transport operators. Transport operators should develop a product and price mix, with lesser boundaries set by the government. Still nowadays local governments can still intervene in pricing strategies of PT operators. This model should be reviewed and less political issues should be of influence to the pricing strategy of a PT operator. Currently the transport operators work as much together as possible, but due to different local regulations within the different contracts, this is only possible to a certain extent.

According to the interviewee, customers are not purchasing a single 'product' but a 'proposition' to pay for their journey. Customers with a transport need want to travel from point A to B. Which products are required in order to enable the customer to make the journey, should not be the concern or the customer, but be organized by the PT operators. Due to regulations and boundaries set in contracts, different business perspectives of the regional operators and technical issues, the number of integral accepted PT products is available for customers.

Nowadays PT products are loaded onto the PT chip card and this process has to be managed, both by user and operator. The complexity of things makes it hard to understand, choose the right set of products and be managed by the operators via technical specs in vehicles and back office. Organizing all the technical issues in a back office, either handled by the PT operators or in a centralised back office, will have a positive effect on.

Therefore this transport operator supports the idea that each integral accepted type of 'PT Chip Card proposition' should be for sale at each transport operator. When encountering a problem with the card, the customer should turn to the operator at first. Customers do not see the difference in a Card problem or a Product problem. They only experience the situation: "It dos now work as I expect it to work." Although the PT Chip Card is a property of TLS, Customers turn to the operator, which can deliver the complaint to TLS. This means there will be a single point of contact.

According to this transport operator, for now small changes of the PT Chip Card system, will not bring the change that is expected/needed. The whole system should be developed again or at least be redesigned to a "2.0" level. Also the interviewee points out that the individual transport operators are busy with working together in order to improve the situation. But until the expectations of the government and the users are too high, they will never be satisfied. The instant success of the nowadays expectations, need to be managed upfront.

"We cannot provide a solution to every problem, always and immediately, but only money is the boundary."

"The more uniform the system is, the better it will be accepted, but it should not be expected that the transport operators will make the investments again, without resources from either local or central governments."

Fourth interview
According to this transport operator the authority model would be the best for the traveller, however in fact the development points towards the platform model. The technical equipment of the transport operators is very different across the operators, which makes it almost impossible to realize the authority model. The investments made for the equipment are just too high.

Personally, the interviewee expected TLS to take a more legislative role, providing rules on how to name products, what kind of products to develop, which equipment to use or what kind of messages to provide to users. However, TLS did not take this role, which lead to the current situation.

According to the interviewee the transport operators (especially regional and local) strive to polder as much as possible, however within the realm of the technical system. Besides this, the provinces and city regions have different political interests, which make the reduction and alignment of product choice more difficult. According to this transport operator, the commercial and travellers interests should be more important than the political interests. A main problem is that the transport operators are focussed on long-term achievements whereas the governments of the provinces are more focussed on short-term achievements.

It should be investigated what kind of products are currently on the market, in order to plot them into a scheme. Here the products could be divided into the main groups: regional products, reduction products, day tickets, one-way/return tickets, and service tickets. Investigating these groups with their parameters would make it possible to reduce the current offer of products. Also it would serve as a checklist when it comes to developing new products.

According to the interviewee the "best-price principle" is an interesting alternative to the current amount of products. Travelling on balance and

everything travelled above a certain amount of money would go at the expenses of the operator. The interviewee is aware that such a concept needs to be carefully calculated at first, but the interviewee believes that such a concept would simplify things a lot and that it could be easily communicated to customers as well. However, the decision necessary should come from the government.

Currently each party is just doing what they are used to do. The transport operators are trying not to lose any money, the provinces are trying not to lose political power.

"Whereas we all want to polder, we are developing our own platforms meanwhile."

Interview with a consumers organisation

The interviewee is representing the user interests. His main interest is to make the OV-chipkaart as usable as possible. However, he is aware of the reasons that led to the decisions made in the past. According to him the OV-chipkaart should be easy to use. Simplicity is reached with the authority model. In this scenario one organisation would communicate with the user, one identity would be developed, the service processes would be easier and quicker, and a more uncomplicated range of travel products would be available. All these points will contribute to simplicity for users.

However, according to him the transport operators are attached to their own identity, they want to develop their own products and want to have their own responsibilities. Besides, the third scenario makes the distribution of income more difficult and transport operators would receive their money later compared to the current situation. He assumes that the transport operators therefore would prefer scenario one, since the second scenario makes the distribution of income more complex as well. The integration of the individual customer services into one central customer service would increase the usability for users. However, the

transport operators would probably not trust each other in informing travellers neutrally (side remark: this concern has been mentioned during the user evaluation as well).

According to the interviewee this leads to the conclusion that more uniform and integrated products should be developed, which can be equally sold by all transport operators. Still the branding and identity of the transport operators could be maintained. They would develop one central back office together, while maintaining their individual identities. According to him, transport operators get more aware of the fact that something has to be changed.

However, it gets easier for users if there is one branding only (such as in London). In order to reach this, the authorities have to develop a common vision and take the responsibility as well as the extra effort to implement this vision. Personally, he prefers one consistent brand.

Visualisation of the current purchasing process
- in addition to Appendix 14-16

Improving System Adoption of the OV-chipkaart
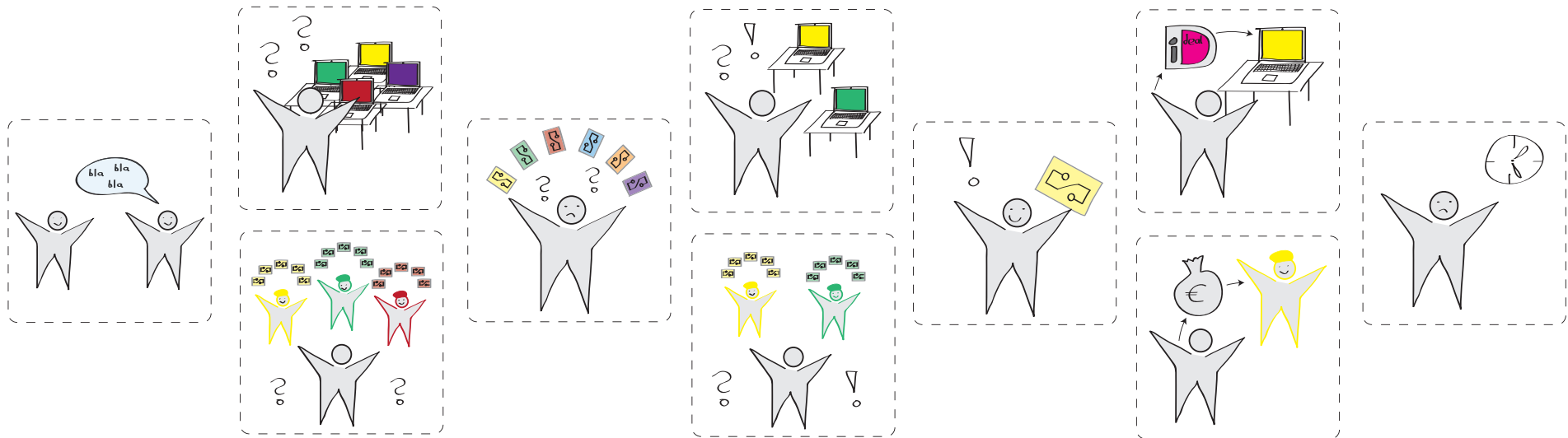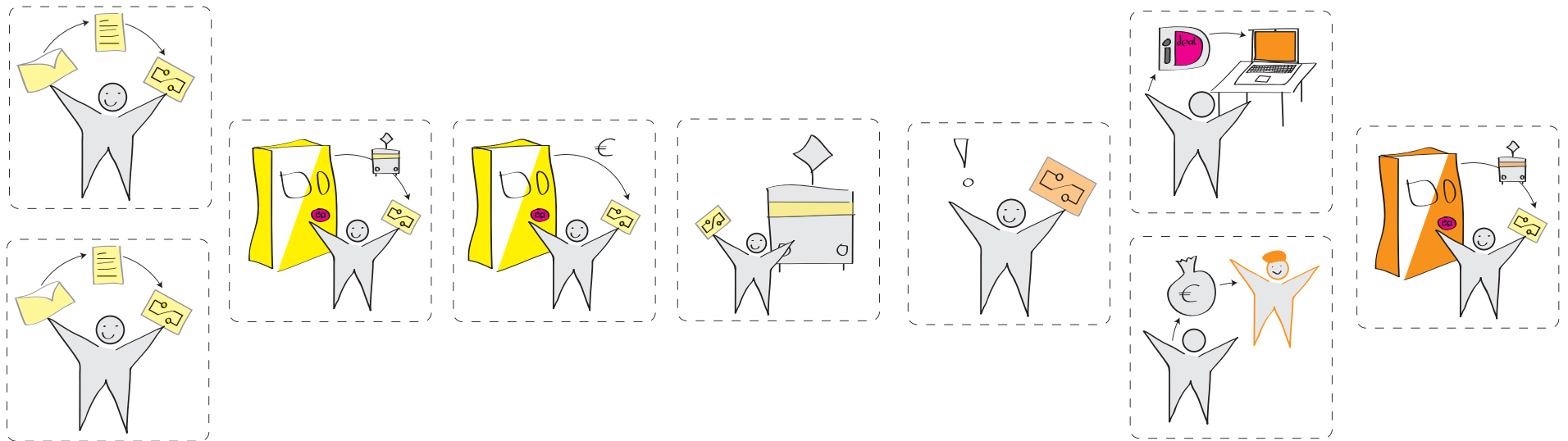
Visualisation of the current error recovery process
- in addition to Appendix 14-16
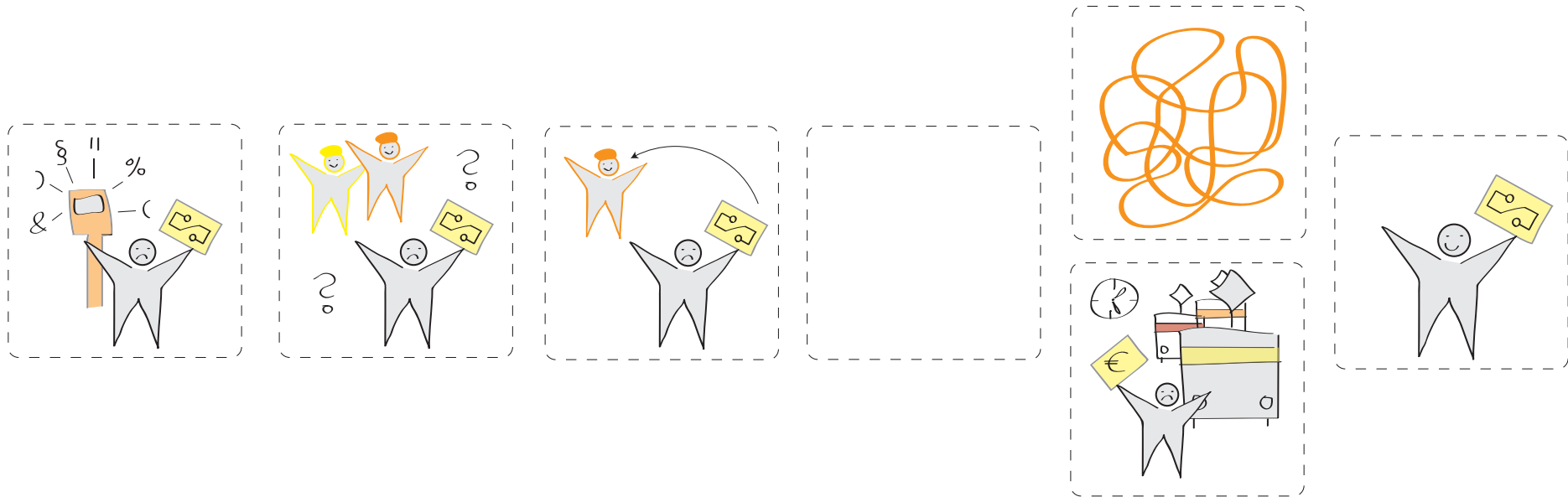
Appendix 14: Visualisation of Scenario 1 - Platform

different types of commu-
nication material with
different infomation

different websites with
different information

different service desks with
different information

Paying at a specific transport
operator
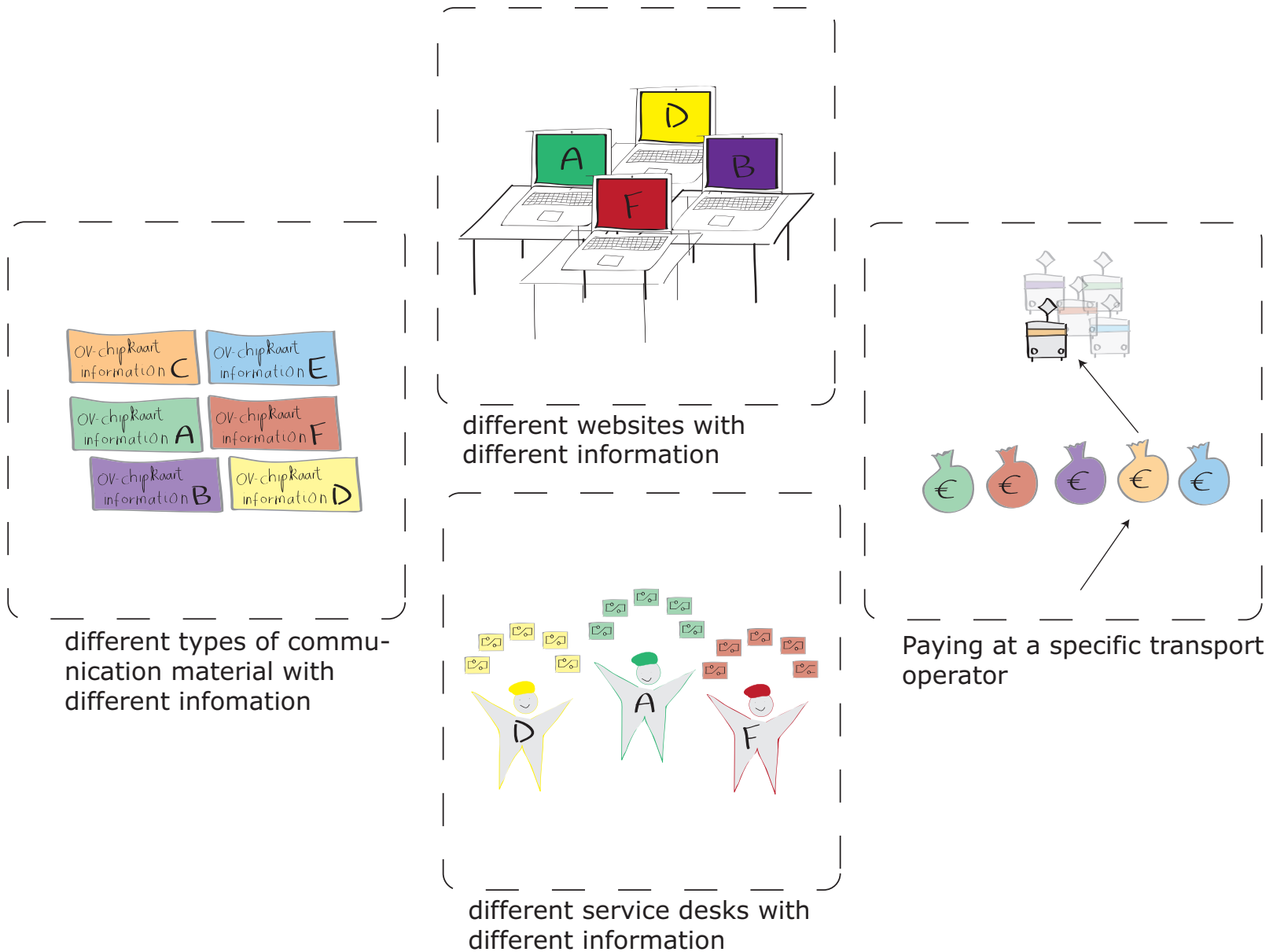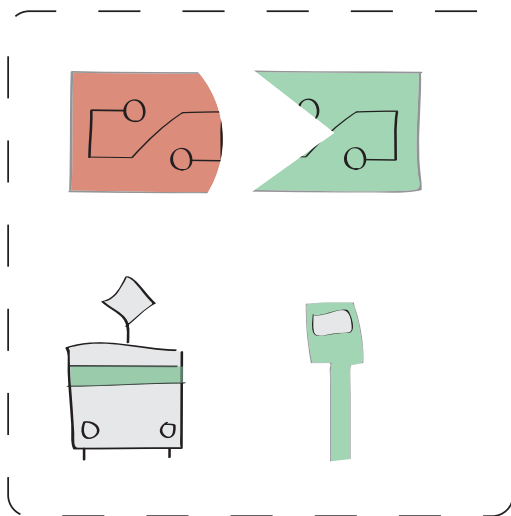
travelling with preferred transport operator cheap, others probably more expensive,
products are not integrated, choosing for one operator, strong relationship to the transport operator, checking in/out at right party very important
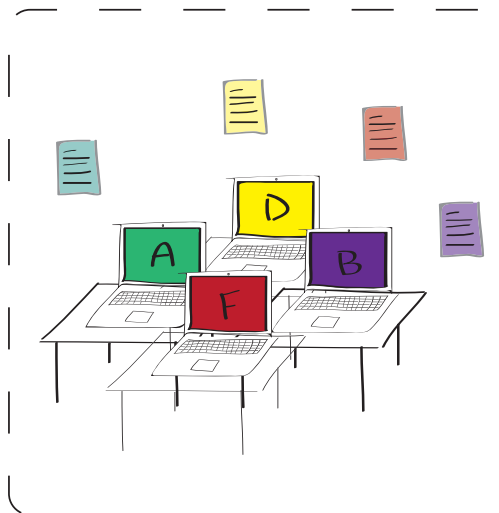
Transaction overview etc. on each transport operators website seperately
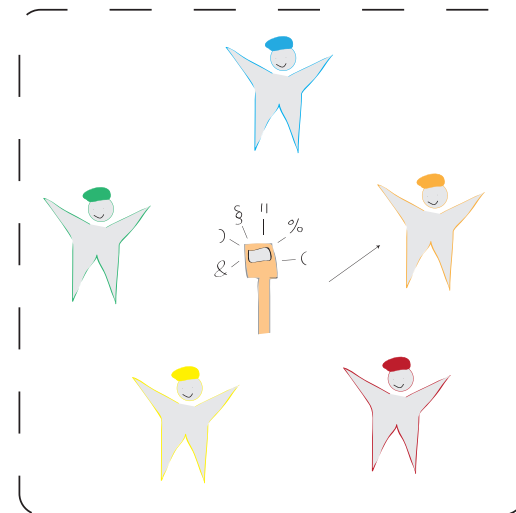
Important to adress right party to solve problems

different types of communi-
cation material with
consistent informaion

different websites with
integrated and consistent
information

different service desks with
integrated and consistent
information

Paying at any transport
operator

travelling with each transport operator,
integrated products,
relationship to operators and card,
checking in/out everywhere possible
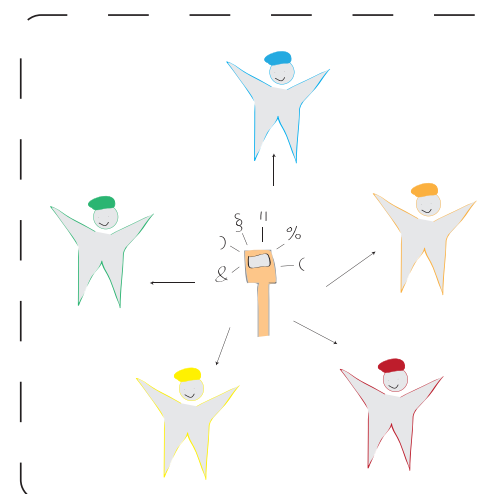
Multiple adresses to solve problems,

one website with integrated information

one poster

one service desk with integrated information

Paying at the central authority

travelling with the OV chipkaart,
relationship to card,
integrated products,
checking in/out everywhere
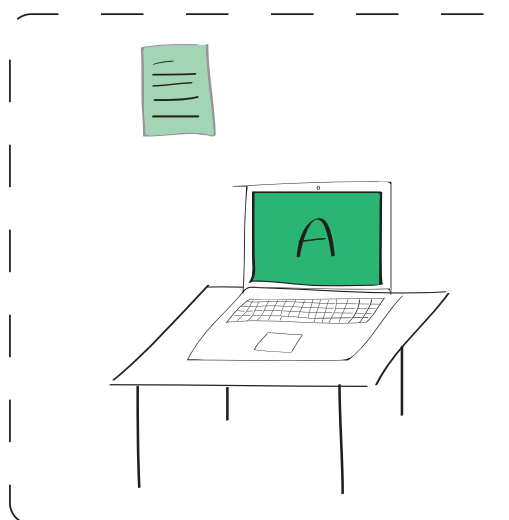
Transaction overview etc. on
one central site available
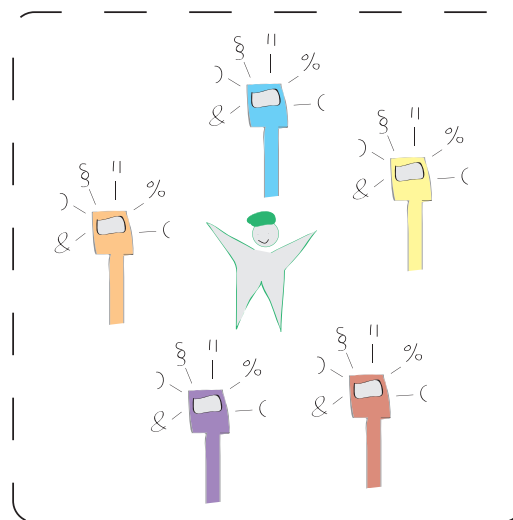
One adress to solve problem

Appendix 17: Currence - payment system

The third scenario is mainly based on the idea, that the payment will be integrated across all transport operators. Having one central authority, which would stay in charge of this and would align the transport operators actions would simplify the interaction for the user. As an example of such an integrated payment system, the company 'Currence' can be mentioned. Currence facilitates the uniform payment system in The Netherlands. Currence has developed the playing field for the payment possibilities, such as Chipknip, Incasso or iDEAL in which the banks and their suppliers can operate. Each party has to agree on the same conditions, which makes the payment system efficient, secure and fast. However, the system promotes market competitiveness and transparency, which benefits from innovation on product and service level, and allows new players to enter the system. It is important to state that Currance is an independent organization, owning the payment products.

By setting unified rules for all parties that are part of the payment system (or that are applying to become part of it), Currence can guarantee that each party meets the same requirements. Besides this, Currence is in charge of the controlling that these rules are followed, and to discipline those parties, which are not acting accordingly. This enables a competitive and transparent market.

Appendix 18: Network product-service systems

According to Hagel et al. (2002) collaboration is the improvement of the coordination of companies and their activities in order to increase the economic value. To achieve this, the roles of each party have to be well defined, and agreements on rules, renewals and rewards have to be made. By improving the coordination of activities through supply chain management, customer relationship management, and product innovation and commercialization the performance of the involved companies will grow over time and creates economic value and customer value.

In such networks, one party has to have the role of the orchestrators, which is responsible for streamlining the process, keeping an eye on the service provider and coordination the activities. The other involved party have the role of service providers.

Service providers are highly specialized and have thorough domain knowledge. Their distinctive capabilities and their understanding of the key drivers within their domain, makes the service providers an essential part of the overall performance of the network.

The orchestrator is obligated to manage the activities of the service providers, however he does not provide full information transparency of these actions, in order to foreclose conflicts, reduce costs, and to reinforce its own position. Due to its stand-alone position within the network, the orchestrator is continuously assessing and evaluating the performance of the service providers. This leads to a more innovative and dynamic structure of the entities.

If the actions are well aligned with each other such a network has the opportunity to generate a more specific customer solution, which leads to higher satisfaction and growing returns of the network.

Appendix 19: Comparison of the three scenarios

Improve information via 'Communication Material'
Current user problem: Users have difficulties to understand the OV-chipkaart system and in gaining an overview over the different options offered by the transport operators.

• Platform: Users get a good overview of each transport operator's offerings but are longing for an integrated overview (-1). This cannot be realized within this scenario and therefore a simplification for users is not within reach. However, from an organizational point of view it is possible that each organization does so separately (1), which is also easy to achieve from a technical point of view (1).

• Polder: In this scenario the communication material is streamlined and all transport operators provide the same kind of information, which simplifies the orientation for users (0,5). From a business point of view the streamlining of communication material requires big investments (0,5), however it is technically seen easy to achieve (1).

• Authority: Since this scenario proposes that only one authority provides information to users, they would easily understand the OV-chipkaart system and gain an overview about the product options (1). Again, from a business point of view the streamlining of communication material requires big investments (0,5), however it is technically seen easy to achieve (1).

Increase support via a 'Selection and Comparison Tool'
Current user problem: The search across multiple transport operators is time intensive for users and gets even more complicated to them by how the information is given, the language used to describe products and the degree of support provided to users differ considerably from one another.

• Platform: Even though each transport operator could develop a supportive tool, most of the users are not travelling with one operator only and therefore still have to consult multiple sites, which would not improve the situation from a user's perspective (-1). From a business point of view a selection and comparison tool is technically easy to achieve (1) and offers business potentials, e.g. selling more and better (1).

• Polder: Within the polder model it could be thought of an integrated selection and comparison tool, which is available at each transport operator's website in order to guide users towards the right product choice (1). From a business perspective a joint selection and comparison tool is not favourable, since users could easily identify disadvantages of certain products (-1). Technically spoken it is easy to achieve (1).

• Authority: The authority can easily develop such an integrated selection and comparison tool (1). Again, from a business perspective a joint selection and comparison tool is not favourable, since users could identify disadvantages of certain products at once (-1). Technically spoken it is easy to achieve (1).

Increase understanding via 'Sending anonymous OV-chipkaarts home'
Current user problem: The distribution channels of the anonymous and the personal OV-chipkaart are not aligned with the different needs of users.

• Platform: The platform model enables this requirement, however it cannot be guaranteed that each transport operator will offer this service, which makes the situation confusing to users (0,5). From a business perspective, offering this service is beneficial (1), and also quite easy to implement technically (1).

- Polder: In the polder model, all transport operators would offer this service, however the cards could have a different branding, which again makes the situation a bit confusing (0,5). From a business point of view, it doesn't matter whether all operators do or do not offer this service (0,5). Technically it is easy to achieve (1).

- Authority: In the authority model, all operators would offer this service in the same way, which increases the recognisability for users (1). It is also beneficial for the business since it could improve the overall perception of the OV-chipkaart for all operators (1). Finally, as mentioned before, it is easy to achieve technically spoken (1).

Reduce costs via 'Preliminary and Temporary OV-chipkaart'

Current user problem: Currently users do not get a preliminary card after purchase or a temporary card when their card is broken. In both cases they cannot make use of the subscription they have paid for, which causes a negative respond.

- Platform: Here this requirement can only be achieved when users have products of one operator exclusively. Therefore in the most cases this requirement cannot be achieved (-1). From a business perspective, offering this service is beneficial (1), and also quite easy to implement technically (1).

- Polder: The polder model technically supports the preliminary OV-chipkaart. The temporary card is however more difficult to achieve, since a defect card can be returned to any transport operator (0,5). From the business perspective it has to be decided whether the temporary card will have a consistent branding or whether users will receive a temporary card from the party they have returned their card to (0,5). For users, it would be a partly improvement (0,5).

- Authority: In the authority model, the branding will be uniform. Due to this it is easy for users to understand and would thus be an improvement. From a business point of view it will improve the overall perception of the OV-chipkaart for all operators (1). The technical realization of a preliminary and a temporary card are no problem (1).

Close the gap between expectations and experiences

Current organizational problem: As concluded in chapter two the expectations users have of the OV-chipkaart differ from their experiences, which leads to a negative evaluation. Examples for expectations that are not met are: good information, support when purchasing, saving money and a general understanding of the OV-chipkaart. These problems are related to the underlying organizational structure of the parties involved.

- Platform: In a more decentralized structure these problem areas will not improve for users (-1), since they ask for an integration of information in order to streamline all processes. Technically spoken the perceived gaps could be closed by each of the transport operators separately (1), however it would improve the business only partly (0,5).

- Polder: A slightly more centralized approach compared to the current situation will improve things for users (0,5). From a business point of view will be hard to come to an agreement, however not impossible (0,5). Once an agreement is found the technical development of the improvements is realizable (1).

- Authority: A very centralized approach also improves all these factors, however holds the risk of consistent but insufficient quality for users (0,5), since there is less control from other parties, as it is in the second scenario (0,5). The technical realization should not be a problem (1).

Provide excellent service recovery
Current organizational problem: Currently each transport operator provides his own service recovery processes, which are not connected to one another. Therefore some recovery processes are long-winded and include high the costs for the users.

• Platform: The current problem will not be solved in this scenario, probably even worsen for users (-1). Each transport operator can provide excellent service recovery. However, as long as they are not aligned with one another there will be only little improvement (0,5). Technically spoken it is quite easy to achieve (1).

• Polder: Within the polder model, the organizations are connected to each other, which enables a quicker and better recovery process (1). Nevertheless a good agreement across all operators is required, which might be difficult to develop (0,5). Once an agreement is found, the technical development is easy (1).

• Authority: Within the authority model one party takes care of this process and therefore can support users best and facilitate a quick error recovery process (1). However, if only one party decides on the error recovery process it holds certain risks that the process does not fit to the (local) users' needs and therefore may become a threat to the business (0,5). But one authority makes the implementation of the service recovery process easy (1).

Provide a 'fall-back' option when users encounter technology-based problems
Current organizational problem: Currently users often have no fall back option when encountering a technology-based problem. They have to solve the problem themselves without support of the system.

• Platform: In the platform model the fall back option would differ from operator to operator, which does not improve the situation for users

(-1). For each individual operator the development of a 'fall-back' option is technically easy to achieve (1), and could improve their business as well (0,5).

• Polder: In the polder model the fall back options would be very much alike, however executed by different transport operators (0,5). The execution would probably improve the individual businesses (0,5) and is easy to achieve technically (1).

• Authority: Here the fall back option would follow strict guidelines, would be the same at every place and therefore recognizable for users and probably easier to approach (1). The development of a good 'fall-back' option would improve the overall perception of the OV-chipkaart (1), and is - as mentioned before - easy to develop (1).

Increase understanding via 'Single check-in / check-out'
Current technological problem: Due to the fact that the technical equipment of the transport operators is not communicating with the others and is not familiar with the product offerings of other operators a check-in and –out at each individual transport operator is compulsory.

• Platform: The current technological problem cannot be resolved in the first scenario, since the transport operator's work individually and therefore would not share their data (-1), which is a requirement in order to enable single check-in/-out (-1). It does not improve the user's situation (-1).

• Polder: In the polder model the back offices of the operators are connected which enables single-check-in/-out from a business point of view (0,5). Also for the users this would be a great improvement (1). However, the technical development asks or a quicker back office as well in order to realize this requirement (-1).

- Authority: Here too the back offices of the operators are connected which enables single-check-in/-out from a business point of view (0,5). Also for the users this would be a great improvement (1). In order to realize this requirement, the technical development asks or a quicker back office as well (-1).

Increase understanding via 'No initial top-up, No activation'

Current technological problem: Currently users have to activate their travel product and load money on the card in order to be able to travel with it. This is confusing to users and could be solved technically.

- Platform: In this model it could be realized for one operator (1), however, purchasing a second product would be impossible anymore from a technical point of view (0,5). Therefore the platform model only offers a slight improvement to users compared to the current situation (0,5),

- Polder: Since the back offices are connected, this requirement can be realized (1). This also improves the situation for users (1). On the other hand it is not a very favourable option from the business perspective, since the activation of products is a proof of purchase as well (0,5).

- Authority: One integrated back office of all transport operators makes this possible (1). For users this is an improvement (1). And with all businesses working together, this is also an improvement from the business point of view (1).

Reduce costs through 'Automatic fill-in of missed check-outs'

Current technological problem: About 2% of all journeys are not completed, which means that users forget to check-out. By automatically

filling in the missed check-out for users the negative experience users have would be eliminated and a currently negative aspect could be turned into a service.

- Platform: Auto fill-in of missed check-outs is not possible within this scenario, since the travel data of one operator is not shared with the others (-1). So here there is no improvement for the user to be expected (-1). Technically it is possible for each operator, but not for all together (0,5).

- Polder: The polder model could support auto fill-in of missed check-outs. However, sharing travel data is not the main aim of this scenario from a business perspective, but rather the integration of product offerings (0,5). But from a user perspective it would improve the situation (1). Technically it is possible to do, but requires a faster back office to calculate the right price (0,5).

- Authority: With one authority and a joint back office of the transport operators, especially related to an integrated payment system this requirement can be achieved and improve the user experience (1). Technically it is possible to do, but requires a faster back office to calculate the right price (0,5). From the business perspective, it also would improve the overall perception of the OV-chipkaart and probably stimulate travelling (1).

Appendix 20: Storyboard of the movie

1   This is Bob. Bob has a new job. To get there,
Bob has to take the train every day. He learned that the
OV-chipkaart can be used for all public transportation
in The Netherlands. Therefore he decides to purchase
a personal OV-chipkaart as well.

2   At home, Bob immediately starts searching for information
about the OV-chipkaart and possible subscriptions.

3   But the process is not quite what he expected. The
information provided by the different transport operators
when orientating for the right card and subscription is too
much and too unstructured to him.

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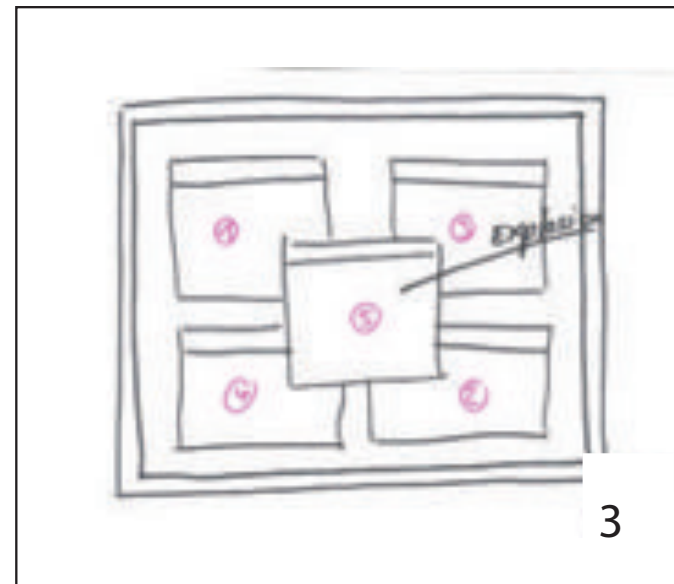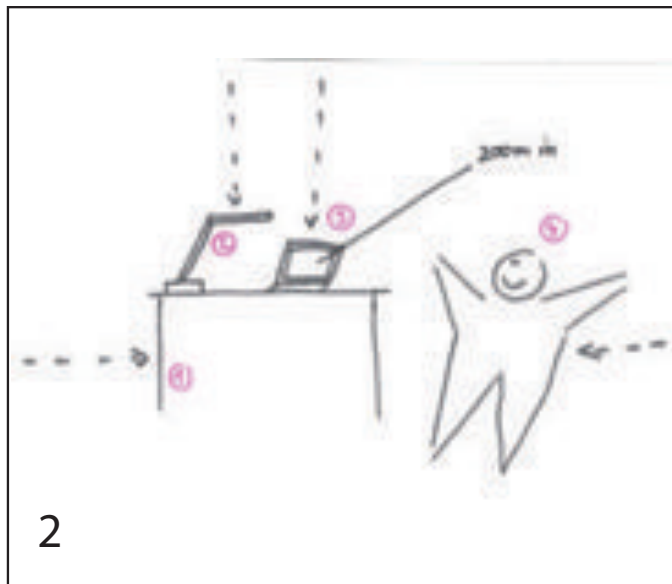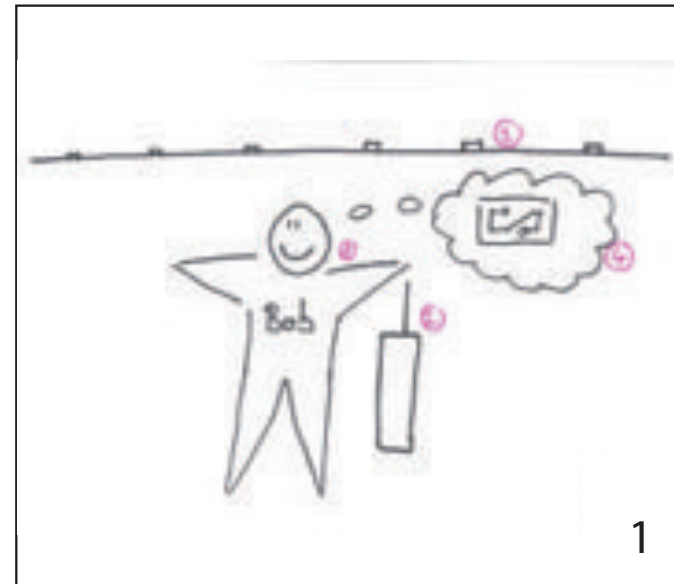
4, 5, 6 Different types of travel products; such as 'operator related reductions', 'age related reductions', 'location based reductions', 'time based reductions', and many more make the selection process difficult.


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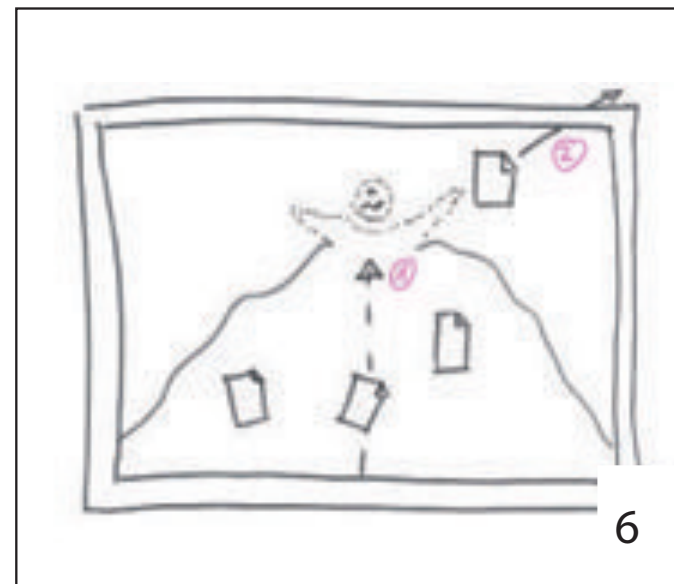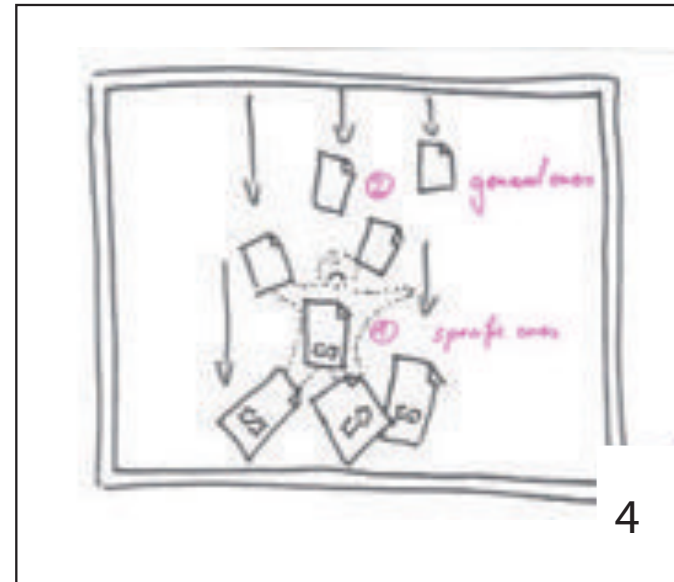
7   Why it is necessary to activate the travel product and
        load money onto the card is beyond his understanding.
        But, at least now he is ready to travel with reduction.

8,9   But travelling becomes expensive again, when making
        a mistake or when the card is broken.
   Bliep, bliep, bliep Error bliep
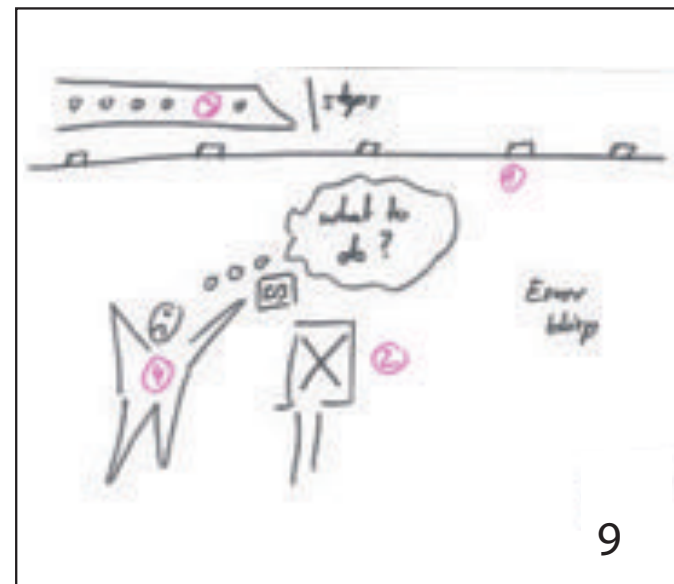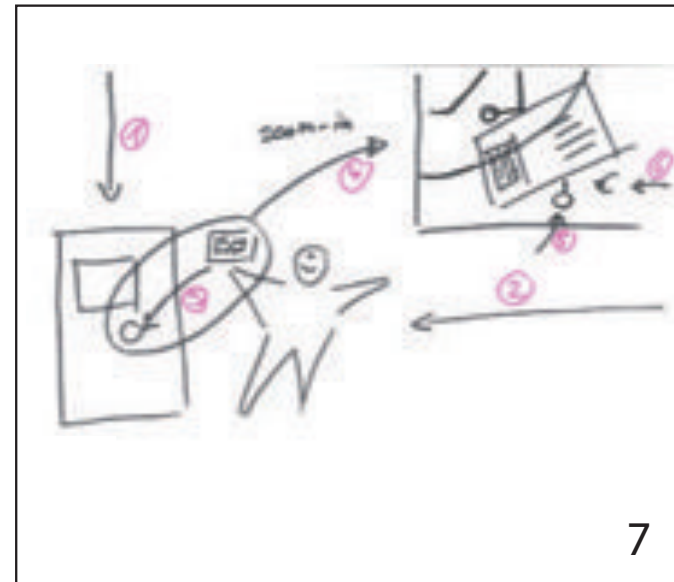
10   But what causes the problems Bob is experiencing?
– Well, first The Netherlands knows multiple transport
operators who are promoting their own services through
their own websites. This is the reason for high and
unstructured information load.

11   Different operators are running in different areas. These
areas have different local needs and political interests.
This is the reason for the diversity in travel products.

12   And because these travel products are hardly integrated
or unified, Bob needs to activate his card (a), check-in
and –out at every operator (b), and sometimes has to
pay an extra step-in rate (c).
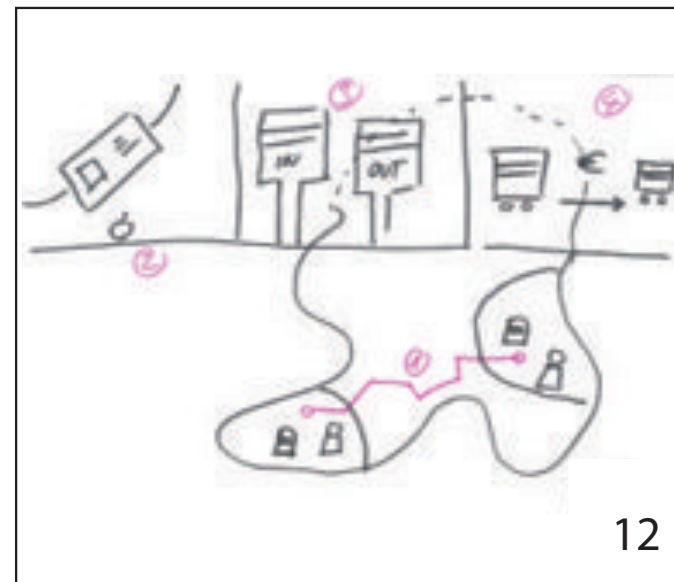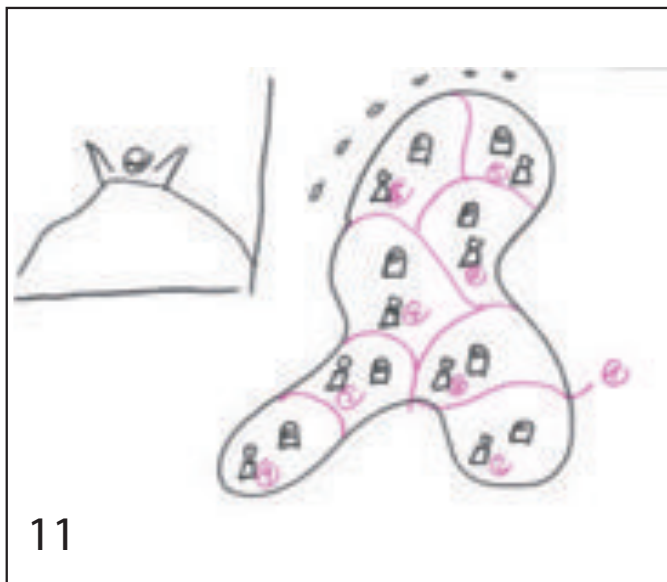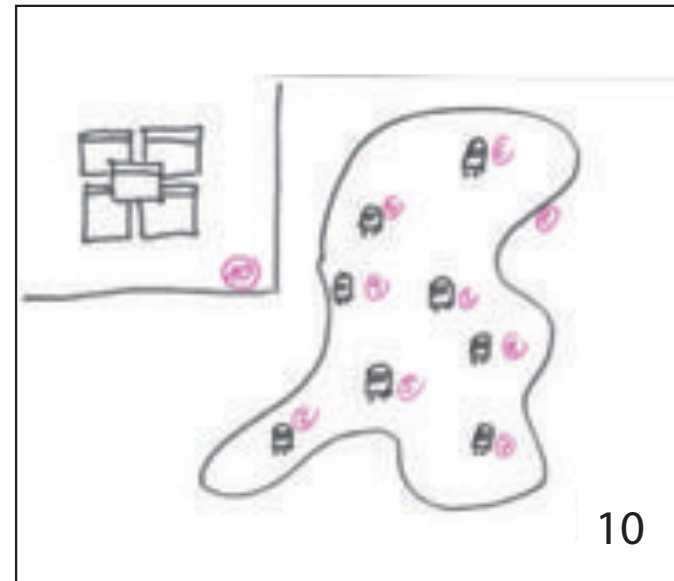
13 And finally the decentralization causes a demanding and long error recovery process since one party does not know what the other is doing. This is the reason why Bob has to purchase meanwhile more expensive paper tickets.

14 So what can we do to solve these problems and to improve the system adoption for Bob? – First a central authority is needed, which sets the rules for the technical development of the system, the products offered and the communication towards Bob. The Ministry for Infrastructure and Environment is suggested to take over this role.

15 By centralizing the system, less but more unified travel products can be developed. The information load, Bob has to handle decreases.

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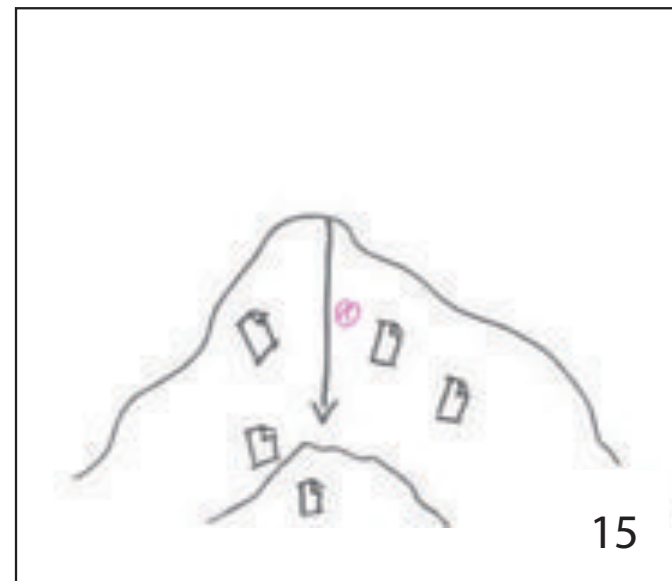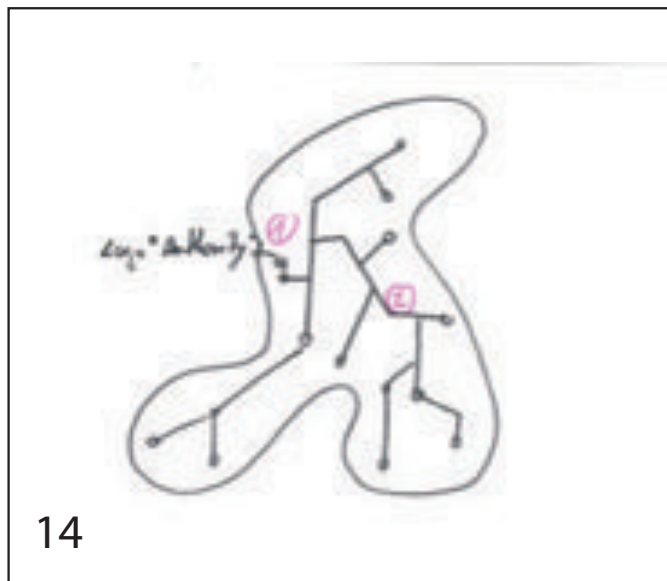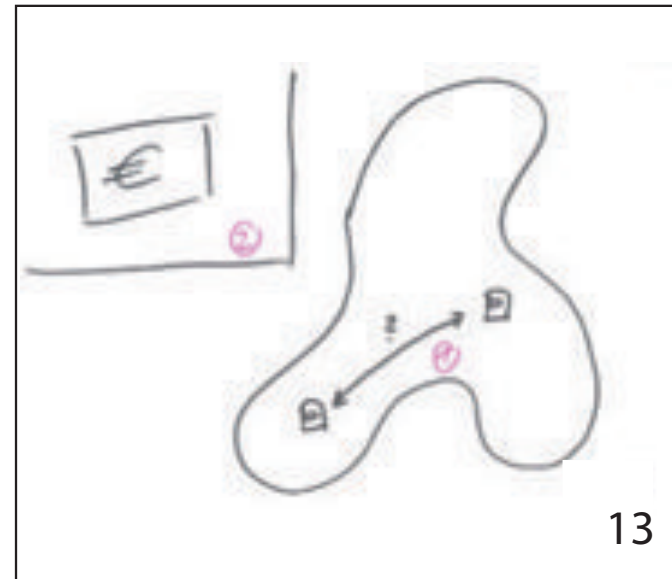
16   Consistent information and a supportive selection tool
would simplify the purchasing process. An additional
selection tool that informs on Bob on his own travel
behaviour could also suggest the most suitable product
to him.

17   The Alignment of the technical back offices of the transport
operators could eliminate some handlings. For Bob this
means, that he doesn't have to activate his product
anymore and that the card can be purchased with
pre-loaded balance.

18   The improvement of communication across the transport
operators makes the error recovery process more efficient,
and Bob will be enabled to travel with a constant reduction.

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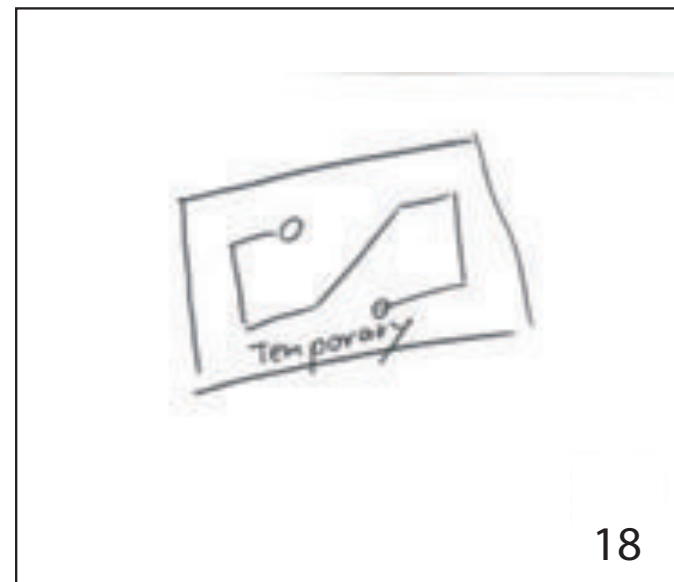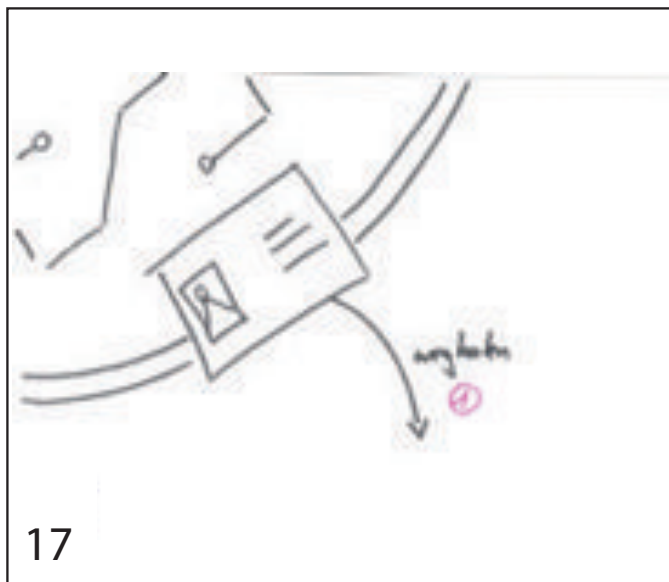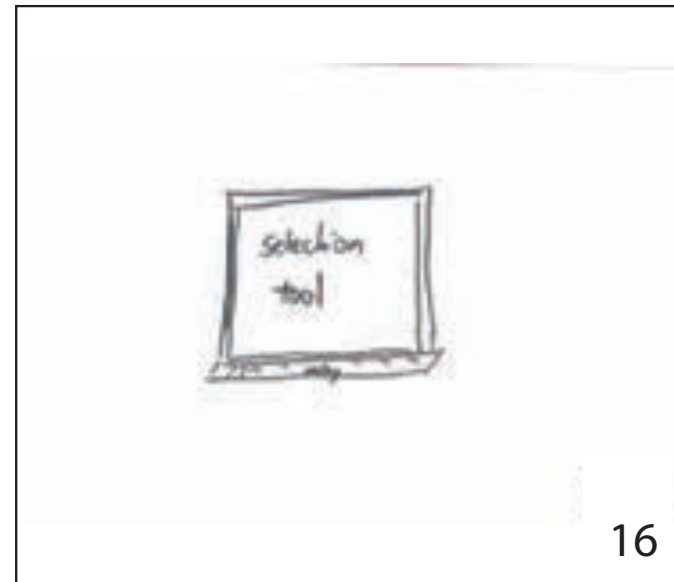
19   And finally if Bob forgets to check-out, because he has a date
      with a beautiful girl, the system will understand and
      check-out for him instead.

20   Now wherever Bob is travelling he can focus on things
      that really matter to him.

19

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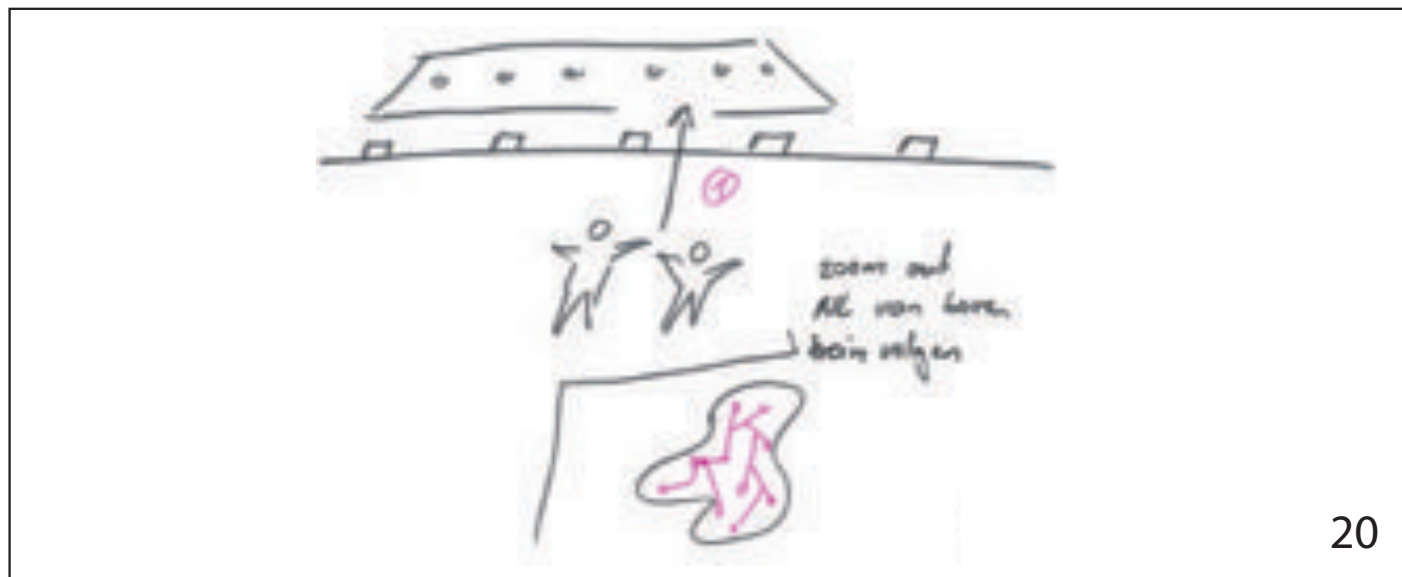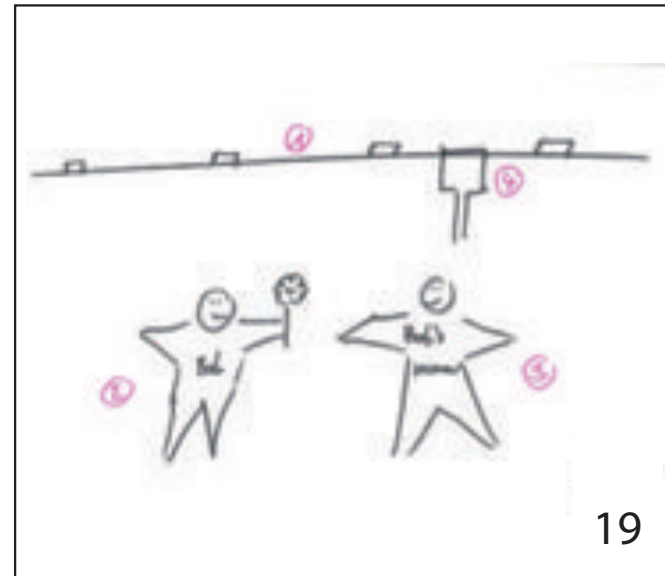
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